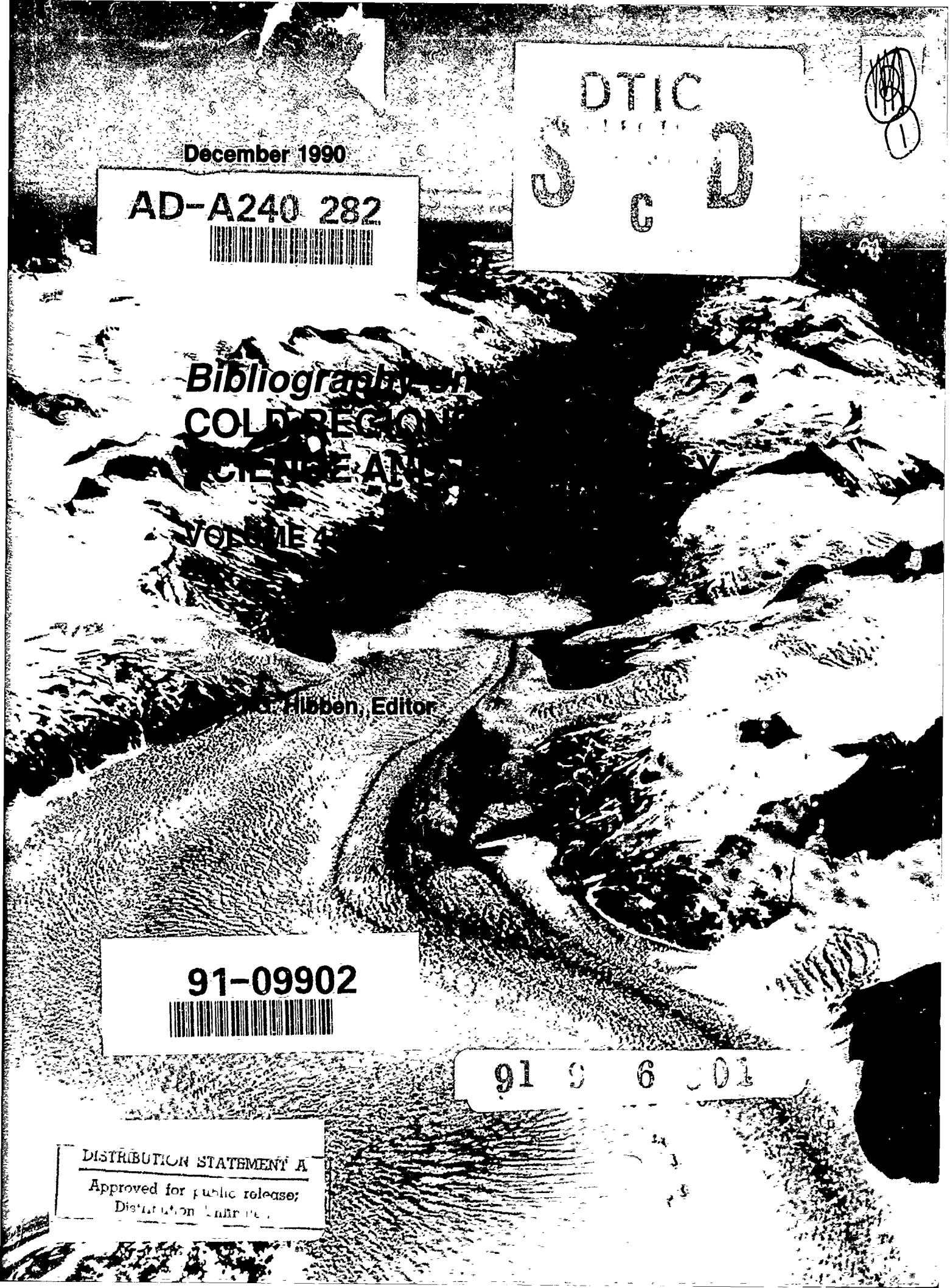


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# Bibliography on COLD REGIONS SCIENCE AND TECHNOLOGY

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Hibben, Editor

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Volume 44, 1990

## INTRODUCTION

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The present volume contains material accessioned between October 1989 and September 1990. It contains full citations of 4551 items, in many cases with abstracts. Indexing for the volume is issued as Volume 44, Part 2.

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44-1
Improving snow roads and airstrips in Antarctica.
Lee, S.M., et al, *U.S. Army Cold Regions Research and Engineering Laboratory*, July 1989, SR 89-22, 18p., ADA-211 588, 7 refs.
Haas, W.M., Brown, R.L., Wuori, A.F
Snow roads, Runways, Antarctica—McMurdo Station, Antarctica—Amundsen-Scott Station.
During the 1986-1987 austral summer, snow road and runway test lanes were constructed at McMurdo Station and at South Pole Station. These lanes were monitored during Dec. 1986, Jan. 1987, and again in Jan. 1988. Test sections were constructed of 1) tractor-compacted snow topped with a 15-cm thick layer of rotary blower processed snow, 2) rotary processed and compacted snow in 15-cm layers to a depth of 60 cm, 3) rotary processed and compacted snow in 15-cm layers incorporating a wood sawdust additive mixed at 5% by volume, and 4) rotary-processed snow with 10% sawdust by volume. These test sections were observed and monitored by obtaining temperature and density profiles, Rammsonde hardness profiles, California Bearing Ratio and Clegg surface strength values, and testing for ability to withstand traffic. It was concluded that wood sawdust added to processed snow in amounts of 5% to 10% by volume significantly increases the strength of the resulting snow road or runway. This increase was greater at McMurdo than at the South Pole, appearing to be a function of snow temperature. Adequate strengths of the snow/sawdust mixtures were achieved for limited use by wheeled C130 aircraft, but additional processing with heat, water or added compaction appears necessary to produce a 25-cm-thick surface layer adequate for more frequent use and to accommodate wheeled C141 aircraft. At McMurdo, it was found that the sawdust was not effective in maintaining the integrity of the surface for traffic during the thawing season without additional maintenance, whereas at the South Pole, thawing was not a problem since temperatures remained well below the melting point. It was concluded that the McMurdo snow roads were not constructed adequately early in the season to prevent failure and, therefore, required an unduly high maintenance effort during the warm season. It is recommended that the future roads be constructed by depth processing with a rotary miller or blower. It is also recommended that geotextile fabrics or membranes be used to divert water into culverts, and that the use of heat (or water) injection or confined dynamic compaction be investigated for creating a hard snow surface layer for use by C141 wheeled aircraft (Auth.)

44-2
Regional aquifer systems of the United States: the Northeast glacial aquifers.
Randall, A.D., ed, AWRA monograph series, No.11, Bethesda, MD, American Water Resources Association, 1988, 156p, Refs. passim.
Johnson, A.I., ed, AWRA Symposium on Monitoring, Modeling, and Mediating Water Quality, Syracuse, New York, May 17-20, 1987.
Ground water, Glacial hydrology, Glaciation.

44-3
Scandinavian, Siberian, and Arctic Ocean glaciation: effect of Holocene atmospheric CO2 variations.
Lindstrom, D.R., et al, *Science*, Aug. 11, 1989, 245(4918), p.628-631, 26 refs.
MacAyeal, D.R.
Ice sheets, Carbon dioxide, Climatic changes, Atmospheric composition, Models.
A computer model of coupled ice sheet-ice shelf behavior was used to evaluate whether observed changes in atmospheric CO2 concentration could have caused the advance and retreat of Pleistocene ice sheets in the Eurasian Arctic. For CO2 concentrations below a threshold of approximately 250 parts per million, an extensive marine-based ice sheet covering Scandinavia, the Barents, Kara, and East Siberian seas, and part of the Arctic Ocean developed in the model simulations. In the simulations, climatic warming associated with the Holocene rise of atmospheric CO2 was sufficient to collapse this widespread glaciation and restore present-day ice conditions. Temperature reduction data from the Vostok ice core were used as a comparison guide for those of the model. Model input temperatures and ice accumulation figures were varied according to CO2 concentrations also derived from the Vostok core. (Auth. mod.)

44-4
Surface-blowing anti-icing technique for aircraft surfaces.
Tabrizi, A.H., et al, *Journal of aircraft*, Apr. 1989, 26(4), p.354-359, 17 refs.
Johnson, W.S.
Countermeasures, Ice removal, Aircraft icing, Ice accretion, Icing rate, Test equipment, Glaze.

44-5
Investigation of surface water behavior during glaze ice accretion.
Hansman, R.J., Jr., et al, *Journal of aircraft*, Feb. 1989, 26(2), p.140-147, 12 refs.
Turnock, S.R.
Icing, Glaze, Ice accretion, Surface properties, Aircraft icing, Drops (liquids), Wind tunnels.

44-6
Winter cover of a high-mountain Mediterranean lake (Estany Redó, Pyrenees).
Catalan, J., *Water resources research*, Mar. 1989, 25(3), p.519-527, 51 refs.
Lake ice, Metamorphism (snow), Ice cover, Ice formation, Flooding, Snow composition, Mountains, Limnology, Spain—Redó Lake.

44-7
Thin ice growth.
Ashton, G.D., *Water resources research*, Mar. 1989, 25(3), MP 2657, p.564-566, 6 refs.
Ice growth, Ice cover thickness, Stefan problem, Degree days, Ice air interface, Freezing rate, Ice forecasting, Thermal conductivity.

44-8
Radar backscattering from artificially grown sea ice.
Bredow, J., et al, *IEEE journal of oceanic engineering*, July 1989, 14(3), MP 2667, p.259-264, 18 refs.
Gogineni, S.P., Gow, A.J., Blanchard, P.F., Moore, R.K.
Sea ice, Artificial ice, Backscattering, Radar echoes, Surface roughness, Measurement, Reflectivity, Microwaves.

44-9
Reinforcing and stabilizing buildings on sagging loess soils. [Usilenie i vosstanovlenie zdanii na lessovykh prosadochnykh gruntakh],
Gil'man, IA.D., , Moscow, Strolizdat, 1989, 159p, In Russian. 65 refs.
Gil'man, E.D.
Loess, Buildings, Foundations, Deformation, Safety, Construction.

44-10
Past three million years. Evolution of climatic variability in the North Atlantic region.
Shackleton, N.J., ed, London, Royal Society, 1988, 278p., Refs. passim. For selected papers see 44-11 through 44-14. First published in Royal Soc. of London Philosophical transactions, Sec. B, 318(1191) p.409-688.
West, R.G., ed, Bowen, D.Q., ed.
Climatic changes, Paleoclimatology.

44-11
Northern Hemisphere climate regimes during the past 3 Ma: possible tectonic connections.
Ruddiman, W.F., et al, Past three million years. Evolution of climatic variability in the North Atlantic region. Edited by N.J. Shackleton, R.G. West, and D.Q. Bowen, London, Royal Society, 1988, p.1-20, Refs. p.17-19.
Raymo, M.E.
Glaciation, Climatic changes, Tectonics.

44-12
Record of the cold stages.
West, R.G., Past three million years. Evolution of climatic variability in the North Atlantic region. Edited by N.J. Shackleton, R.G. West, and D.Q. Bowen, London, Royal Society, 1988, p.95-112, Refs. p.109-110.
Climatic changes, Paleoclimatology.

44-13
Glacial history of Iceland during the past three million years.
Einarsson, T., et al, Past three million years. Evolution of climatic variability in the North Atlantic region. Edited by N.J. Shackleton, R.G. West, and D.Q. Bowen, London, Royal Society, 1988, p.227-234, 30 refs.
Albertsson, K.J.
Glaciation, Paleoclimatology, Climatic changes, Pleistocene, Iceland.

44-14
Climatic evolution of the eastern Canadian Arctic and Baffin Bay during the past three million years.
Andrews, J.T., Past three million years. Evolution of climatic variability in the North Atlantic region. Edited by N.J. Shackleton, R.G. West, and D.Q. Bowen, London, Royal Society, 1988, p.235-250, Refs. p.248-250.
Glaciation, Geochronology, Paleoclimatology, Sediments.

44-15
Advanced energy transmission fluids for district heating and cooling.
Kasza, K.E., et al, Annual Conference of the International District Heating and Cooling Association, 78th, Baltimore, MD, June 21-25, 1987. Proceedings, Washington, D.C., 1987, p.202-211, 4 refs.
Choi, S.U.
Cooling systems, Slush, Ice makers, Heat transfer.

44-16
Performance of an ice/water slurry based district cooling system.
Knodel, B.D., Annual Conference of the International District Heating and Cooling Association, 78th, Baltimore, MD, June 21-25, 1987. Proceedings, Washington, D.C., 1987, p.274-277.
Cooling systems, Performance, Ice water interface.

44-17
Crystal ice slurries for district cooling systems.
Sukhwal, R.N., et al, Annual Conference of the International District Heating and Cooling Association, 78th, Baltimore, MD, June 21-25, 1987. Proceedings, Washington, D.C., 1987, p.444-448, 2 refs.
Goldstein, V.
Cooling systems, Ice crystals, Ice makers, Ice crystal size.

44-18
Potential of slush ice district cooling.
Metz, P.D., et al, Annual Conference of the International District Heating and Cooling Association, 78th, Baltimore, MD, June 21-25, 1987. Proceedings, Washington, D.C., 1987, p.449-459, 9 refs.
Margen, P.
Cooling systems, Slush, Ice makers.

44-19
Direct freeze ice slurry system testing.
Knodel, B.D., Annual Conference of the International District Heating and Cooling Association, 79th, Chautauqua, NY, June 26-30, 1988. Proceedings, Washington, D.C., 1988, p.86-93, 13 refs.
Ice water interface, Cooling systems, Tests, Ice makers.

44-20
AMERIEZ 1986: a summary of activities on board the R/V *Melville* and USCGC *Glacier*.
Sullivan, C.W., et al, *Antarctic journal of the United States*, 1987, 22(5), p.167-169, 3 refs.
Ainley, D.G.
Oceanography, Pack ice, Sea ice, Ice edge, Cryobiology, Scotia Sea, Antarctica—Weddell Sea.
The Antarctic Marine Ecosystem Research at the Ice-Edge Zone (AMERIEZ) project is a multidisciplinary investigation of pelagic ecosystem structure and processes which result from the presence and dynamics of the marginal ice zone in the Scotia and Weddell Seas. R/V *Melville* operated in the open waters east of the ice edge and was complemented by *Glacier* which operated in the pack ice west of the ice edge. During two 24-36 hour stations, day-night comparisons and extensive off-ship activities, such as scuba surveys, ice sampling, and the study of seal activity patterns and diving behavior, were made. When the ship was underway the following data were gathered: meteorological information, ice characteristics, sea-surface temperature and salinity, surface irradiance, *in vivo* chlorophyll fluorescence, and seabird and mammal densities. On *Melville*, the same suite of activities was carried out except for scuba surveys and studies of ice fauna and seal diving behavior. The activities and observations made during the cruises are summarized.

44-21
AMERIEZ 1986: under-ice fauna from the Weddell Sea—responses to low temperature and osmotic stress.
Aarset, A.V., *Antarctic journal of the United States*, 1987, 22(5), p.170-171, 10 refs.
Cryobiology, Sea ice, Pack ice, Ice melting, Ecology, Low temperature tests, Salinity, Antarctica—Weddell Sea.
The objective of this research is to determine how the seasonal growth and recession of annual pack ice influences the distribution of the amphipods *Eusirus antarcticus* and stage 1 juvenile krill *Euphausia superba*. Observations of *E. antarcticus* and *E. superba* collected in the Weddell Sea in Feb. and Mar. 1986 reveal that the amphipod does not tolerate freezing into solid sea ice, by contrast, the krill were able to survive temperatures down to almost -4 deg C in solid ice. The amphipods, however, were able to stay away from an advancing ice front. When individuals of *E. antarcticus* and *E. superba* were cooled in air, they froze and died at temperatures of -11.4 deg C and -9.1 deg C, respectively. Antarctic under-ice fauna seem to have a better supercooling capacity than arctic species. Low temperature seems to promote salt tolerance of both krill and amphipods. Exposure of the two species to low salinity media at an almost constant temperature of 0-1 deg C demonstrated that the animals were osmoconformers over their tolerated salinity range.

44-22
AMERIEZ 1986: oceanic factors affecting the occurrence of seabirds in the Scotia and Weddell seas.
Ainley, D.G., et al, *Antarctic journal of the United States*, 1987, 22(5), p.172-173, 5 refs.
Fraser, W.R., Ribic, C.A.
Cryobiology, Sea ice, Pack ice, Ecology, Ice edge, Scotia Sea, Antarctica—Weddell Sea.
The distribution, composition, and ecological relationships of seabird communities across the ice pack edge have been investigated in order to understand why the observed species assemblages persist. A significant increase in seabird density and bi-

omass occurred near the ice edge. This pattern was similar to that observed in 1983. The total number and kinds of species present in the study area were the same in 1983 and 1986. Little difference was found in the diets between pack-ice and open-water habitats. The dominant seabird prey were krill and myctophid fishes. The diet of emperor penguins, captured in the pack ice and their stomachs pumped, was found to consist mainly of squid.

44-23
**AMERIEZ 1986: phytoplankton at the Weddell Sea ice edge.**
Fryxell, G.A., et al, *Antarctic journal of the United States,* 1987, 22(5), p.173-175, 5 refs.
Kang, S.H., Reap, M.E.
Ice edge, Cryobiology, Sea ice, Algae, Antarctica—Weddell Sea.

As part of the AMERIEZ (Antarctic Marine Ecosystem Research at the Ice-Edge Zone) programs of 1985 and 1986, microalgae from ice-covered, ice-melt, and open-ocean stations in the northern Weddell Sea were compared to test the hypothesis that a pulse of phytoplankton growth takes place that supports the enhanced biological activity observed near the ice edge. By far the highest cell numbers were found in open water during the austral spring, with 68.7 billion cells/sq m north of the ice edge, as compared to a low of 15.3 billion cells/sq m under the ice. A high degree of similarity was found between ice and water-column assemblages, although the open-water bloom can be seeded from other sources as well.

44-24
**AMERIEZ 1986: microzooplankton abundance and distribution in the ice-edge zone.**
Garrison, D.L., et al, *Antarctic journal of the United States,* 1987, 22(5), p.175-176, 5 refs.
Buck, K.R.
Plankton, Cryobiology, Sea ice, Ice edge, Antarctica—Weddell Sea.

Microzooplankton samples were collected in the Weddell Sea during the austral fall of 1986 as part of the Antarctic Marine Ecosystem Study at the Ice-Edge Zone (AMERIEZ) study. The biomass, distribution, and composition of microzooplankton are reported along a transect across the ice-edge zone from ice-covered stations (USCGC *Glacier* stations 12-14) into open water (R/V *Melville* stations 17-24). Microzooplankton biomass in the upper 100 m was low at ice-covered stations but increased in open water away from the ice edge. Heterotrophic flagellates and ciliates were the most important component of the microzooplankton biomass. Radiolarians and foraminiferans were present in low numbers and their biomass was insignificant in comparison to flagellates and ciliates in surface waters. Below 100 m, however, the abundance of ciliates and flagellates declined markedly and phaeodarian radiolarians may have been the dominant microzooplankton.

44-25
**AMERIEZ 1986: acoustic assessment of krill *(Euphausia superba,* Dana).**
Macaulay, M.C., et al, *Antarctic journal of the United States,* 1987, 22(5), p.176-178, 4 refs.
Daly, K.L., Frost, B.W.
Plankton, Sea ice, Cryobiology, Ice edge, Pack ice, Antarctica—Weddell Sea.

As a component of the Antarctic Marine Ecosystem Research at the Ice-Edge Zone (AMERIEZ) Program, the abundance and distribution of micronekton and nekton at the ice edge was investigated by acoustic and net sampling methods in the western Weddell Sea during late austral summer 1986. Two species of euphausiids, *Euphausia superba* and *Thysanoessa macrura,* were collected in the net tows under the pack ice, *E. superba* was found at 12 out of 23 stations. Approximately 28% of the population were juveniles and 72% were immature adults. *T. macrura* occurred at all of the stations. Juveniles comprised 49% of the population and adults were 51%. Salps were also collected but densities were lower during this cruise. Very few patches of krill were observed acoustically during this cruise compared to the previous spring (1983) ice-edge observations. All of the acoustic biomass occurred in the upper 50 m of the water column.

44-26
**AMERIEZ 1986: physical oceanographic conditions in the northwestern Weddell Sea marginal ice zone.**
Muench, R.D., et al, *Antarctic journal of the United States,* 1987, 22(5), p.179-181, 2 refs.
Husby, D.M.
Ice edge, Sea ice, Water temperature, Salinity, Antarctica—Weddell Sea.

As part of the Antarctic Marine Ecosystem Research in the Ice-Edge Zone (AMERIEZ) program, observations were made in the northwestern Weddell Sea during Mar. 1986 to characterize temperature, salinity, and density structures associated with the marginal ice edge zone. Upper layer physical oceanographic conditions in the northwestern Weddell Sea marginal ice zone during Mar. 1986 were the result primarily of local processes and were nearly steady-state. The dominant feature was a 20-30 m thick upper mixed layer underlain by a strong halocline (and pycnocline). Low-salinity lenses of meltwater were associated with the ice edge, and salinity increased away from the edge both beneath and seaward of the ice. Temperature was at the freezing point beneath the ice and increased seaward from the ice edge, with most of the seaward increase occurring across a temperature front just seaward of the ice edge.

44-27
**AMERIEZ 1986: nutrient and phytoplankton biomass distributions in the ice-edge zone of the northwestern Weddell Sea.**
Nelson, D.M., et al, *Antarctic journal of the United States,* 1987, 22(5), p.182-183, 3 refs.
Smith, W.O., Jr., Gordon, L.I.
Plankton, Cryobiology, Ice edge, Sea ice, Antarctica—Weddell Sea.

During observations in the marginal ice zone of the Weddell Sea in Mar. 1986 the nutrients exhibited some correlation with the hydrography, but there were many significant differences which reflected integrated biological effects (primarily removal by phytoplankton). A region of lower nitrate concentration in the upper 50-100 m, centered approx 150 km seaward of the ice edge, coincided with a maximum in chlorophyll *a*. This same spatial pattern, and the correlation between elevated phytoplankton biomass and diminished nutrient concentrations, is evident in the distributions of phosphate, silicic acid, biogenic silica, and particulate carbon and nitrogen. All of these nutrient depletions and biomass enhancements penetrated below the pycnocline by 50 m or more. All phytoplankton biomass parameters were about twice as high on the first transect as on the second, suggesting either a temporal decrease in phytoplankton biomass during Mar. or mesoscale spatial variations. On clear days ice-edge phytoplankton blooms can be observed in satellite ocean-color images.

44-28
**AMERIEZ 1986: photoadaptation of phytoplankton and light limitation of primary production in the ice-edge zone of the Weddell Sea.**
SooHoo, J.B., et al, *Antarctic journal of the United States,* 1987, 22(5), p.185-187, 8 refs.
Lizotte, M.P., Robinson, D.H., Sullivan, C.W.
Plankton, Cryobiology, Ice edge, Sea ice, Optical phenomena, Antarctica—Weddell Sea.

The specific objective of these AMERIEZ studies was to examine the photoadaptive characteristics of phytoplankton and ice algae in the northwestern Weddell Sea in relationship to the optical characteristics of ice and seawater in the marginal ice zone. Of particular interest was the role of ice cover in reducing photosynthetically available irradiance and its influence on the photoadaptive state of microalgae. Incident irradiance in the northwestern Weddell Sea was low during the month of Mar. 1986, and a variety of physiological parameters indicates that phytoplankton were low-light adapted and had very low assimilation numbers. It was demonstrated that phytoplankton photosynthesis in the open water of the ice-edge zone was light limited in approximately one-half to seven-eights of the euphotic zone and that phytoplankton photosynthesis beneath the ice was always light limited. Data collected enable development of a simple but physiologically realistic model of primary production in the marginal sea-ice zone.

44-29
**AMERIEZ 1986: microbial growth and metabolism in sea ice and the water column of the marginal ice zone.**
Sullivan, C.W., et al, *Antarctic journal of the United States,* 1987, 22(5), p.188-190, 7 refs.
Cota, G.F., Kottmeier, S.T.
Cryobiology, Sea ice, Ice edge, Bacteria, Antarctica—Weddell Sea.

The distribution of bacterial cells and biomass and rates of bacterial biomass production and macromolecular synthesis were examined along east-west transects of the marginal ice zone in the western Weddell Sea. The results demonstrated clear spatial gradients in all parameters examined. An objective was also to determine the relationship between heterotrophic microbial features and prominent physical and biological features such as the sea ice, ice edge, pycnocline, and algal abundance/primary production in sea ice and open waters of the marginal ice-zone ecosystem. Bacterial biomass and activity were detected in all samples of sea ice, at all depths of selected sea-ice cores, and in the water column down to 150 m throughout the marginal sea-ice zone. Peak bacterial activity was greatest in surface water down to the depth of the pycnocline/halocline (20-40 m) with a marked decline below that. Whereas bacterial biomass generally increased twofold in surface waters from deep ice to the open ocean, bacterial biomass production rates were 10 to 20 times higher in the area 100-200 km seaward of the ice edge as compared to rates in the water column beneath the pack ice. The data are illustrated.

44-30
**Comparison of neutral lipid content among sea-ice microalgal communities in McMurdo Sound, Antarctica.**
Priscu, J.C., et al, *Antarctic journal of the United States,* 1987, 22(5), p.191-193, 7 refs.
Priscu, L.R., Sullivan, C.W., Palmisano, A.C.
Algae, Cryobiology, Sea ice, Antarctica—McMurdo Sound.

Data are presented on variability in neutral lipid content among individual species and natural assemblages of a number of surface melt-pool and bottom-ice microalgal communities in McMurdo Sound during the 1986 austral summer. A technique utilizing the dye nile red was used in the analysis. The highest lipid levels occurred in diatom communities dominated by *Nitzchia stellata* and other *Nitzschia* species. *Navicula glaciei,* collected from a surface pool near Dunlop I. also contained a relatively large amount of cytoplasmic neutral lipid. The lowest neutral lipid levels were measured in surface communities dominated by microalgae other than diatoms, i.e., dinoflagellates. That *Nitzchia* spp. and *Navicula glaciei* consistently displayed higher specific lipid levels with respect to other diatom and nondiatom dominated communities may be a species-specific trait or it may indicate senescence of this organism at the time of sampling.

44-31
**Effect of temperature on inorganic nitrogen and carbon metabolism in sea-ice microalgae.**
Priscu, J.C., et al, *Antarctic journal of the United States,* 1987, 22(5), p.196-198, 15 refs.
Priscu, L.R., Palmisano, A.C., Sullivan, C.W.
Algae, Cryobiology, Sea ice, Antarctica—McMurdo Sound.

Results are presented of experiments designed to examine the influence of temperature on nitrate and ammonium uptake and the activity of the enzyme nitrate reductase from natural assemblages of sea-ice microalgae. Inorganic nitrogen compounds were examined because they have been shown to regulate the growth of arctic sea-ice microalgae and phytoplankton in many of the world's oceans. Sea-ice cores were collected during the 1985-1986 and 1986-1987 austral summers in McMurdo Sound in the area between the tip of the Erebus Ice Tongue and Tent I. The dominant species present for all experiments were *Nitzschia stellata* and *Amphiprora* spp. Nitrate, ammonium, and carbon dioxide uptake had temperature maxima ranging from about 0.5 C to 3.8 C. The carbon dioxide maximum corroborates previous work on the photosynthesis-temperature relationship. Nitrogen results clearly show that the metabolic pathways required for inorganic nitrogen uptake and reduction also characterize the community as being psychrophilic. The results of nitrogen studies presented here provide further evidence that low environmental temperatures have imposed selection pressures on sea-ice microalgae resulting in physiological characteristics closely fitting habitat conditions.

44-32
**Isolation and identification of photosynthetic pigments in sea-ice communities in McMurdo Sound.**
Palmisano, A.C., et al, *Antarctic journal of the United States,* 1987, 22(5), p.198-199, 4 refs.
Algae, Cryobiology, Sea ice, Antarctica—McMurdo Sound.

During studies of sea-ice diatoms in McMurdo Sound, light absorption by the total pigment complement was characterized using visible spectrometry, and individual photosynthetic pigments were isolated and quantified using high-performance liquid chromatography to assess their relative contributions to light absorbance. An acetone extract of total pigments in a *Nitzschia stellata* dominated sea-ice diatom community in Wohlschlag Bay is shown. Acetone extracts of the diatoms contained chlorophyll *c*, fucoxanthin, and chlorophyll *a*, with trace amounts of diatoxanthin and diadinoxanthin. The molar proportions of the two accessory pigments—chlorophyll *c* and fucoxanthin—varied with respect to chlorophyll *a* by twofold in samples with the highest proportion of accessory pigments in Granite Harbor congelation ice dominated by *Amphiprora* communities and the lowest proportion in Erebus Ice Tongue congelation ice samples containing several species of pennate and some centric diatoms. These variations may be due to photoadaptive strategies, species composition, or both.

44-33
**Antifreeze glycoproteins: physical, chemical, and functional properties.**
Feeney, R.E., et al, *Antarctic journal of the United States,* 1987, 22(5), p.215-217, 9 refs.
Osuga, D.T., Yeh, Y.
Frost resistance, Antifreezes, Cryobiology, Ice crystal growth.

Work under way or completed during the last 2 years has been on the growth of ice crystals and on the ice crystal morphology in the presence of antifreeze glycoproteins in polar fish blood. In one study conducted in the laboratory, linear growth in plastic tubes was used to measure the linear crystallization velocities as a function of temperature and concentrations of antifreeze glycoprotein. Free growth studies were performed in the laboratory of, and with the cooperation of, John Hallett at the University of Nevada at Reno. The main study to date has been using a cold wire inserted from the top of a cuvette into an undercooled solution of antifreeze glycoproteins. The subsequent crystal growth was recorded by a video cassette recorder through a video camera and a Questar telescope. In the second technique an ice crystal of known orientation selected from the surface of a freezing dish of water was carefully inserted through the surface of the undercooled solution using a micromanipulator. Although faster growth was observed using the cold wire technique, relative rates for ice growth in the antifreeze glycoprotein solutions were similar. The free growth experiments appeared to be superior to the linear growth experiments in terms of attaining better accuracy.

44-34
**Report of the International Ice Patrol in the North Atlantic: season of 1987.**
U.S. Coast Guard. *U.S. Coast Guard. Bulletin,* 1987. No 73, 132p., CG-188-42, 4 refs.
Icebergs, Ice detection, Sea ice distribution, Ice conditions.

44-35
Assessing and forecasting the stability of landslide slopes. [Otsenka i prognoz ustoichivosti opolznevykh sklonov],
Tikhvinskiĭ, I.O., Moscow, Nauka, 1988, 143p., In Russian. Refs. p.138-143.
Landslides, Slope stability, Forecasting, Slope processes, Snowmelt.

44-36
Moraines—source of glaciological information. [Moreny—istochnik gliatsiologicheskoĭ informatsii],
Kotliakov, V.M., ed, Moscow, Nauka, 1989, 236p., In Russian with English summary and table of contents. Refs. p.223-232
Moraines, Glaciology, Lithology, Glacier formation, Sedimentation, Nivation, Lichens, Climatic changes.

44-37
Large-scale mapping as a means for detailed study of the structure of vegetational cover (in the example of the arctic tundra of Wrangel Island). [Krupnomasshtabnoe kartografirovanie kak metod detal'nogo izuchenia struktury rastitel'nogo pokrova (na primere arkticheskoĭ tundry o-va Vrangelia)],
Kholod, S.S., Geobotanicheskoe kartografirovanie (Geobotanical mapping). Edited by T.I. Isachenko and S.A. Gribova, Leningrad, Nauka, 1989, p.61-71, In Russian. 21 refs.
Mapping, Tundra, Vegetation patterns, Geobotanical interpretation.

44-38
Effects of curing temperature and early freezing on the pull-out behavior of steel fibres.
Banthia, N., et al, *Cement and concrete research*, May 1989, 19(3), p.400-410, 11 refs.
Trottier, J.F.
Concrete freezing, Ice formation, Supercooling, Concrete strength, Construction materials, Winter concreting.

44-39
Fuel holdup and component diffusivity in a cooled cylindrical tank.
Leo, A., et al, *Journal of aircraft*, May 1989, 26(5), p.465-469, 4 refs.
Fuels, Fluid flow, Liquid cooling, Cooling rate, Tanks (containers), Solid phases, Thermal diffusion.

44-40
Electroimpulse deicing: electrodynamic solution by discrete elements.
Bernhart, W.D., et al, *Journal of aircraft*, June 1989, 26(6), p.547-553, 5 refs.
Schrag, R.L.
Ice removal, Computer applications, Aircraft icing, Analysis (mathematics), Electronic equipment.

44-41
Two-dimensional simulation of electrothermal deicing of aircraft components.
Wright, W.B., et al, *Journal of aircraft*, June 1989, 26(6), p.554-562, 15 refs.
Keith, T.G., Jr., De Witt, K.J.
Aircraft icing, Ice removal, Ice cover thickness, Ice melting, Design criteria, Electric heating, Thermal conductivity, Simulation.

44-42
Hydrogen sulfide on Io: evidence from telescopic and laboratory infrared spectra.
Nash, D.B., et al, *Science*, Apr. 28, 1989, 244(4903), p.454-457, 32 refs.
Howell, R.R.
Extraterrestrial ice, Frost, Radiation absorption, Simulation, Reflectivity, Infrared spectroscopy.

44-43
Structure of poly(vinyl alcohol) hydrogel prepared by repeated freezing and melting.
Nagura, M., et al, *Polymer*, Apr 1989, 30(4), p.762-765, 14 refs.
Hamano, T., Ishikawa, H.
Unfrozen water content, Freeze thaw cycles, Artificial melting, Ice elasticity, Admixtures, Polymers.

44-44
Icebreakers—their historical and technical development.
Segererantz, H., *Interdisciplinary science reviews*, Mar. 1989, 14(1), p.77-85, 9 refs.
Icebreakers, Design criteria, Ships, Marine transportation, History.

44-45
Land-surface temperature measurement from space: physical principles and inverse modeling.
Wan, Z.M., et al, *IEEE transactions on geoscience and remote sensing*, May 1989, 27(3), p.268-278, 52 refs.
Dozier, J.
Snow surface temperature, Spaceborne photography, Thermal radiation, Radiometry, Remote sensing, Measurement.

44-46
Geological and geotechnical conditions of the Beaufort Sea coastal zone, arctic Canada.
Kurfurst, P.J., et al, *Geologie en mijnbouw*, Feb 1989, 68(1), p.121-129, 18 refs
Dallimore, S.R.
Subsea permafrost, Permafrost thickness, Ground ice, Ice erosion, Frozen ground settling, Shores, Beaufort Sea.

44-47
Spatial facies of a group of pingo remnants on the southeast Frisian till plateau (the Netherlands).
Van der Meulen, S., *Geologie en mijnbouw*, Feb 1988, 67(1), p.61-74, 32 refs.
Pingos, Taliks, Permafrost structure, Geologic processes.

44-48
Groundwater flow effects in processes of soil freezing.
Sluzalec, A., *Numerical heat transfer Part A. applications*, Apr. 1989, 15(3), p.399-409, 17 refs.
Soil freezing, Artificial freezing, Ground water, Phase transformations, Pipes (tubes), Thermal analysis.

44-49
Rates of organic carbon accumulation in young mineral soils near Burroughs Glacier, Glacier Bay, Alaska.
James, L.A., *Physical geography*, Jan.-Mar. 1988, 9(1), p.50-70, 44 refs.
Soil formation, Soil dating, Outwash, Glacier melting, Glacial deposits, Organic soils, Glacial geology, Soil analysis, Sampling, United States—Alaska—Burroughs Glacier.

44-50
Remote sensing of snow in visible and near-infrared wavelengths.
Dozier, J., Theory and applications of optical remote sensing. Edited by G. Asrar, New York, Wiley, 1989, p.527-547, 40 refs.
Remote sensing, Snow optics, Ice optics, Reflectivity, LANDSAT, Mathematical models.

44-51
Operating reclamation machinery in cold conditions. Handbook. [Ekspluatatsiia meliorativnykh mashin v zimnikh usloviiakh. Spravochnik],
Surikov, V.V., Moscow, Agropromizdat, 1989, 239p., In Russian.
Machinery, Cold weather operation, Frozen ground strength, Frozen ground physics, Frozen ground mechanics.

44-52
Microflora of tundra soils. Ecological-geographical characteristics and productivity. [Mikroflora tundrovykh pochv Ekologo-geograficheskie osobennosti i produktivnost'],
Parinkina, O.M., Leningrad, Nauka, 1989, 159p., In Russian. Refs. p.144-158.
Tundra, Bacteria, Fungi, Biomass, Soil microbiology, Plants (botany), USSR—Taymyr Peninsula.

44-53
Soil formation in the subarctic Kola Peninsula. [Pochvoobrazovanie v Kol'skoĭ Subarktike],
Nikonov, V.V., et al, Leningrad, Nauka, 1989, 168p., In Russian. Refs. p.165-168.
Pereverzev, V.N.
Soil formation, Soil classification, Tundra, Forest tundra, USSR—Kola Peninsula.

44-54
Frost resistance of concrete in arctic offshore structures. [Betonin pakkasenkestävyys arktisissa merirakenteissa],
Leivo, M., *Technical Research Centre of Finland. Research reports*, May 1989, No.621, 140p., In Finnish with English summary. 58 refs.
Concrete freezing, Frost resistance, Concrete structures, Offshore structures.

44-55
Rational explanation of cross-profile morphology for glacial valleys and of glacial valley development.
Hirano, M., et al, *Earth surface processes and landforms*, Dec. 1988, 13(8), p.707-716, 25 refs.
Aniya, M.
Glacial erosion, Valleys, Glacial geology, Glaciation, Glacier flow, Mathematical models, Geomorphology.
The fact that the cross-profile of the glacial valley could be well approximated by parabolas ($Y = aX^b$, $b = 2.0$) is explained by the variation principle, assuming that the glacier erosion works towards minimizing the friction between ice and bedrock. The variation principle proves that the ideal or fully-developed morphology of the glacial valley should be a catenary, the curve which a chain hanging from two fixed points forms. Maclaurin's series expansion of the catenary equation shows that a parabola is a very good approximation of the catenary, hence, the good approximation of the cross-profile by parabolas. Different catenaries are generated by changing the form ratio (depth/rim width) and are then approximated by $Y = aX^b$ by the method of least squares. The $b$ values obtained become only fractionally larger than 2.0 with increasing form ratios of up to 1.0, indicating that $b$ values and the form ratio were obtained from several glaciers. For one type the $b$ value becomes larger with increasing form ratios, and for the other the opposite. The first type is called the Rocky Mountain model after its source of data and represents overdeepening of the glacial valley development. The second type is called the Patagonia-Antarctica model, representing a widening, instead of a deepening, process of development. These differences are attributed to the nature of the glaciers which produced these valleys, i.e. alpine glaciers and continental ice sheets. (Auth.)

44-56
Autumn Conference of the Japanese Oceanographic Society, Sendai, Japan, Oct. 2-6, 1985. Summaries of the lectures. [Koen yoshishu],
Nihon Kaiyo Gakkai shuki taikai, Sendai, Japan, Oct. 2-6, 1985, [Sendai, 1985], 327p., In Japanese. For selected summaries see 44-57 through 44-62, or B-40322 through B-40324, B-40326, B-40327, F-40320, J-40319, J-40321, J-40325, and J-40328.
Japanese Oceanographic Society.
Sea ice, Marine biology, Oceanography, Biomass.
This is a collection of about 360 summaries of Japanese-language lectures on oceanography, sea water chemistry, and marine biology, of which 10 are pertinent to the Antarctic, presented at the 1985 Autumn Conference of the Japanese Oceanographic Society.

44-57
Ocean structure along 30W in the southern ocean. [Nantaiyo 30 W soi ni okeru kaiyo kozo no tokucho],
Naganobu, M., Nihon Kaiyo Gakkai shuki taikai, Sendai, Japan, Oct. 2-6, 1985. Koen yoshishu (Autumn Conference of the Japanese Oceanographic Society, Sendai, Japan, Oct. 2-6, 1985. Summaries of the lectures), [Sendai, 1985], p.38-39, In Japanese.
Water temperature, Marine biology
Water temperature, the Antarctic Convergence, geostrophic flow and antarctic krill *(Euphausia superba)* distribution were studied along longitude 30W and latitude 38S to the antarctic circle in the southern ocean. The highest velocity of geostrophic flow was 14.4 cm/sec eastward at the surface between latitudes 47 and 51S. A map showing krill distribution, a chart showing geostrophic flow, and a chart showing potential temperature are included.

44-58
Convective mixing and formation of sea ice in the Weddell-Enderby basin of the southern ocean: in the years when the Weddell polynya appeared. [Nantaiyo Uedderu-Endabi kaibon ni okeru tairyu kongo to kaisui seisei: Uedderu hyoko ga shutsugen shita toshi o chushin ni],
Motoi, T., et al, Nihon Kaiyo Gakkai shuki taikai, Sendai, Japan, Oct. 2-6, 1985. Koen yoshishu (Autumn Conference of the Japanese Oceanographic Society, Sendai, Japan, Oct. 2-6, 1985. Summaries of the lectures), [Sendai, 1985], p.40-41, In Japanese. 3 refs.
Ono, N., Wakatsuchi, M.
Sea water freezing, Polynyas, Sea ice, Antarctica—Weddell Sea.
A large polynya with an area of 2-300,000 sq km appeared in the Weddell Sea in 1974-1975. Results from a mathematical model and observations indicate that the polynya was formed when convective mixing in summer brought higher salinity, higher water temperatures, and higher oxygen content from layers as deep as 2400 m to the surface, preventing freezing of the sea water. Five figures are included: (1) shows the mathematical model; (2) shows ice growth at selected stations; (3) shows locations of the stations; (4) shows water temperature, salinity and oxygen content; and (5) shows the temperature, salinity and depth at which the water froze.

44-59
Seasonal variation of marine environmental conditions under fast ice in Ongul Strait, Antarctica. [Nankyoku Onguru kaikyo teichakuhyo shita, kaiyo kankyo joken no kisetsu henka],
Fukuchi, M., et al, Nihon Kaiyo Gakkai shuki taikai, Sendai, Japan, Oct. 2-6, 1985. Koen yoshishu (Autumn Conference of the Japanese Oceanographic Society, Sendai, Japan, Oct. 2-6, 1985. Summaries of the lectures), [Sendai, 1985], p.42-43, In Japanese.
Naganobu, M., Tanimura, A., Hoshiai, T.
Sea water freezing, Fast ice, Water temperature, Salinity, Antarctica—Showa Station.
Seasonal variations of temperature and salinity of sea water were studied at depths of 10-675 m under fast ice in Ongul Strait

at Showa Station. The temperatures ranged from -1.19 to -1.89 C and the salinity from 33.525 to 34.425. At that level of salinity, the freezing point remained lower than the water temperature. A chart showing water temperature, salinity and freezing point is included.

44-60
Drift ice in the Soya Strait. [Soya Kaikyo no ryuhyo ni tsuite],
Akagawa, M., Nihon Kaiyo Gakkai shuki taikai, Sendai, Japan, Oct. 2-6, 1985. Koen yoshishu (Autumn Conference of the Japanese Oceanographic Society, Sendai, Japan, Oct 2-6, 1985. Summaries of the lectures), [Sendai, 1985], p.77-78, In Japanese.
Pack ice, Sea ice distribution, Japan—Soya Strait.

44-61
Seasonal change in heterotrophic bacteria under fast ice at Showa Station, Antarctica. [Nankyoku Showa kichi shuhen no teichakuhyo shita ni okeru juzoku eiyo saikin no kisetsu hendo],
Satoh, H., et al, Nihon Kaiyo Gakkai shuki taikai, Sendai, Japan, Oct 2-6, 1985 Koen yoshishu (Autumn Conference of the Japanese Oceanographic Society, Sendai, Japan, Oct. 2-6, 1985 Summaries of the lectures), [Sendai, 1985], p.200, In Japanese.
Fukami, K., Watanabe, K.
Bacteria, Marine biology, Fast ice, Microbiology, Antarctica—Showa Station
Heterotrophic bacteria were studied under fast ice at Showa Station om May 1983 through Jan 1984 The number of colony forming units rose rapidly from less than 1000 /l in May through Sep. to a high of 240,000/l in Dec. and then started to fall again in Jan. A map showing the study stations and a chart showing the number of colony forming units are included.

44-62
Rate of photosynthesis in phytoplankton under fast ice at Showa Station, Antarctica. [Nankyoku Showa kichi shuhen no teichakuhyo shita ni okeru shokubutsu purankuton no kogosei sokudo],
Satoh, H., et al, Nihon Kaiyo Gakkai shuki taikai, Sendai, Japan, Oct. 2-6, 1985. Koen yoshishu (Autumn Conference of the Japanese Oceanographic Society, Sendai, Japan, Oct 2-6, 1985 Summaries of the lectures), [Sendai, 1985], p.201, In Japanese.
Watanabe, K.
Plankton, Photosynthesis, Marine biology, Fast ice, Antarctica—Showa Station.
The rate of photosynthesis in phytoplankton under fast ice was studied at Showa Station from Jan. 1983 through Jan. 1984. The chlorophyll a content dropped rapidly from a high of 7 mg/cu m at the end of Jan., remained at less than 0.1 mg/cu m from June through Oct., and then began to rise rapidly again at the end of Dec. The rate of photosynthesis dropped gradually from Feb. to its low of 0.1 mg of carbon/mg of chlorophyll a per hour in July and then rose gradually to its high of 4.77 mg of carbon/mg of chlorophyll a per hour in Jan. A chart showing pigment ratio, chlorophyll content, photosynthesis rate and irradiance for each month, and a chart showing photosynthesis rate and light intensity for Oct. and Jan. are included.

44-63
Biotic and chemical characteristics of some soils from Wilkes Land, Antarctica.
Heatwole, H., et al, *Antarctic science*, Sep. 1989, 1(3), p.225-234, 43 refs.
Soil chemistry, Soil microbiology, Fungi, Mosses, Antarctica—Windmill Islands, Antarctica—Bailey Peninsula, Antarctica—Clark Peninsula.
Numbers of micro-organisms in soils from Wilkes Land varied widely. Bacteria, yeasts and filamentous fungi occurred in all samples analyzed and the numbers of bacteria were positively correlated with the numbers of yeasts, and with pH. Moss protonema and seven species of algae and cyanobacteria were also present and measurable amounts of chlorophylls a, b and c were extracted from some samples. Only a few sites, those with moist sandy or gravelly soils free of extensive moss or lichen cover, contained the single mite species recorded. (Auth.)

44-64
Isotopic, chemical and crystallographic characteristics of first-year sea ice from Breid Bay (Princess Ragnhild Coast—Antarctica).
Tison, J.L., et al, *Antarctic science*, Sep. 1989, 1(3), p.261-268, 16 refs.
Haren, J.
Sea ice, Frazil ice, Ice crystal structure, Ice composition, Antarctica—Breid Bay.
A detailed profile of the ice fabric, the deuterium content and the sodium concentration of a 1.64 m long, first year sea-ice core from Breid Bay is described. The core consists mainly of frazil ice (78%), a common feature observed in recent extended studies of the first-year sea-ice cover in the Weddell Sea area. The typical substructure of ice plates/brine lamellae occurs only at the bottom of the core. Otherwise fine-grained congelation ice is sandwiched between layers of frazil. It lacks the intracrystalline substructure but shows a strong textural elongation and c-axis clustering in the horizontal plane. The evolution processes of the first-year sea-ice cover in Breid Bay are analyzed. The dynamical component, demonstrated to play a major role in the eastern Weddell Sea, seems to be of minor importance in this area, where thermodynamics satisfactorily explains the isotopic, chemical and textural characteristics of the core. It is proposed that the top most part of the core consists of frazil ice produced by wind- and wave-induced turbulence. Once a consolidated ice cover is provided, the growth proceeds at a slower rate, through congelation ice formation and frazil ice production, initiated by thermohaline convection processes in the water column. The lower alternate layers of fine grained congelation ice and frazil ice could result from cyclic thermal and salinity regimes at the ice-water interface, connected with the major meteorological events of the year. (Auth.)

44-65
Antarctic drainage flow: implications for hemispheric flow on the Southern Hemisphere.
James, I.N., *Antarctic science*, Sep. 1989, 1(3), p.279-290, 19 refs.
Wind (meteorology), Ice sheets, Antarctica.
An Ekman analysis of the surface drainage winds over a sloping ice surface is reported. Ekman pumping by the boundary layer leads to the formation of an upper tropospheric cyclonic vortex above the summit of the ice sheet. The strength and distribution of upper level vorticity is determined by the shape of the underlying ice sheet. The calculation is verified by comparison with the results from a multi-level primitive equation model of flow above an axisymmetric ice sheet. Both models predict that the surface drainage flow will die out on a timescale of a few days, while the upper vortex is predicted to be considerably stronger than observed. Various mechanisms which could lead to the depletion of upper level vorticity, and hence to the retention of a substantial drainage flow, are discussed. It is concluded that disruption of the polar vortex by decaying mid-latitude cyclones, and the consequent export of cyclonic vorticity to lower latitudes, is the most probable mechanism. (Auth.)

44-66
Atmospheric icing climatologies of two New England mountains.
Ryerson, C.C., *Journal of applied meteorology*, Nov 1988, 27(11), MP 2669, p 1261-1281, 23 refs
Icing, Ice accretion, Ice detection, Icing rate, Precipitation (meteorology), Synoptic meteorology.
The atmospheric icing climatologies of two New England mountaintops with different elevations are compared Mount Mansfield in northern Vermont and Mount Washington in New Hampshire. Atmospheric icing, as measured with Rosemount ice detectors, is twice as frequent on Mount Washington with about 12 to 20 times greater intensities and 25 to 50 times more accretion as on Mount Mansfield. Most of Mount Mansfield icing events are of low intensity, with periods between icing events averaging 35 to 45 hours on both peaks. Return intervals of ice events by length, intensity and accretion amount are tabulated Approximately one-half of all severe icing on the two peaks occurs during and immediately after cold front passages Icing is most intense when lows are about 450 km to the east and high pressure centers are more than about 450 km distant Prolonged accretion periods occur when coastal and inland storms merge or follow closely

44-67
Modeling the transport of chromium (VI) in soil columns.
Selim, H.M., et al, *Soil Science Society of America. Journal*, July-Aug. 1989, 53(4), MP 2670, p.996-1004, 37 refs.
Amacher, M.C., Iskandar, I.K.
Soil physics, Mass transfer, Soil chemistry, Models, Minerals.

44-68
Charge transfer in the interaction of polycrystalline ice spheres with ice crystals in a cloud of supercooled drops. [Peredacha zariada pri vzaimodeĭstvii polikristallicheskikh ledianykh sfer s ledianymi kristallami v oblake pereokhlazhdennykh kapeleĭ],
Klimin, N.N., et al, Atmosfernoe elektrichestvo. Trudy III Vsesoiuznogo simpoziuma, Tartu, 28-31 oktiabria 1986 g. (Atmospheric electricity. Proceedings of the 3rd All-Union Symposium, Tartu, Oct. 28-31, 1986) Edited by V.D. Stepanenko, Leningrad, Gidrometeoizdat, 1988, p.126-129, In Russian. 6 refs.
D'iakonova, I.N.
Supercooled clouds, Cloud droplets, Ice crystals, Charge transfer.

44-69
Study of ice accretion on a spherical hailstone model in a stream of charged water aerosol. [Issledovanie otlozhenia l'da na sfericheskoi modeli gradiny v potoke zariazhennogo vodnogo aerozolia],
Okudzhava, A.M., et al, Atmosfernoe elektrichestvo. Trudy III Vsesoiuznogo simpoziuma, Tartu, 28-31 oktiabria 1986 g. (Atmospheric electricity. Proceedings of the 3rd All-Union Symposium, Tartu, Oct. 28-31, 1986). Edited by V.D. Stepanenko, Leningrad, Gidrometeoizdat, 1988, p.136-139, In Russian. 6 refs.
Bliadze, T.G., Saliashvili, T.N.
Hailstones, Ice accretion, Electric charge, Drops (liquids), Aerosols, Models.

44-70
Preventive heating of power lines of direct current contact nets. [Profilakticheskiĭ podogrev provodov kontaktnoĭ seti postoiannogo toka],
Golev, V.A., Moscow, Transport, 1988, 77p., In Russian. 9 refs.
Glaze, Countermeasures, Heating, Power line icing, Railroads, Analysis (mathematics).

44-71
Springtails on and in snow. [Nogokhvostiki v tolshche snega i na poverkhnosti],
Brummer-Korvenkontio, M., et al, Biologiia pochv Severnoĭ Evropy (Soil biology of Northern Europe). Edited by D.A. Krivolutskiĭ, Moscow, Nauka, 1988, p.119-121, In Russian. 5 refs.
Brummer-Korvenkontio, L.
Animals, Cryobiology, Snow depth, Snow melting, Snow temperature, Air temperature.

44-72
Dehydration in the lower antarctic stratosphere during late winter and early spring, 1987.
Kelly, K.K., et al, *Journal of geophysical research*, Aug. 30, 1989, 94(D9), p.11,317-11,357, 38 refs.
Clouds (meteorology), Ice crystals, Water vapor.
Measurements of total water were made with instruments mounted on the ER-2 and DC-8 aircraft. Direct evidence was obtained for dehydration of the lower stratosphere over Antarctica, minimum values were about 1.5 parts per million by volume (ppmv), compared with values of 3.0-4.5 ppmv immediately outside the region high potential vorticity gradient in the potential temperature range 420<theta<460 K. On one flight, ice crystals large enough to have appreciable sedimentation velocities were observed. The DC-8 data at 300<theta<320 K frequently showed extensive belts of dry, ozone-rich air between 60 and 75S latitude, with the equatorward "edge" in water well correlated with that observed by the ER-2 some 8-9 km higher Data from near Punta Arenas and from the ferry flights are used to argue that the effects of dehydration over Antarctica were visible at mid-latitudes. (Auth.)

44-73
Physical processes in polar stratospheric ice clouds.
Toon, O.B., et al, *Journal of geophysical research*, Aug. 30, 1989, 94(D9), p.11,359-11,380, Refs. p.11,379-11,380.
Clouds (meteorology), Ice crystal growth.
A one-dimensional model of cloud microphysics has been used to simulate the formation and evolution of polar stratospheric ice clouds. The model results are in general agreement with many of the observed properties of these clouds, including their optical properties, impact on water vapor, and particle size. It is found that the clouds must undergo preferential nucleation upon the preexisting aerosols, just as tropospheric cirrus clouds do. Therefore there is an energy barrier between stratospheric nitric acid particles and ice particles implying that nitric acid does not form a continuous set of solutions between the trihydrate and ice. In wave clouds, with cooling rates of hundreds of degrees per day, most of the existing aerosols nucleate and become ice particles. Such clouds have particles with sizes of the order of a few microns, and optical depths of the order of unity, and are probably not efficient at removing materials from the stratosphere. In clouds that form with cooling rates of a few degrees per day or less, only a small fraction of the aerosols become cloud particles. In such clouds the particle radius is larger than 10 micron, the optical depths are low, and the water vapor is efficiently removed. The rate of decline of cloud altitude is not an indication of the fall speed of individual particles nor of vertical air motion, as had been previously suggested. The altitude of the clouds declines during the winter because the temperatures in the Antarctic increase earlier at the higher altitudes. The ice clouds are not able to remove a significant amount of nitric acid through physical processes such as coagulation with, or nucleation upon, nitric acid aerosols. (Auth. mod.)

44-74
World glacier inventory: status 1988.
Haeberli, W., ed, IAHS-UNEP-UNESCO, 1989, Var. p., 16p. of refs.
Ice sheets, Glacier surveys, Ice volume, Ice surveys, Glaciers.
The status as of 1988, of the World Glacier Inventory based in Zurich, Switzerland, is presented region by region worldwide in about 440 pages, variously numbered, of text, charts and tables, of which pages C51-C61 and a table on page C97 deal with the glaciers and ice sheet of Antarctica. The glaciers of Antarctica, about 91% of the world's glacier ice, cover an area of about 13,586,310 sq km and contain an ice volume of about 30,109,800 cu km.

44-75
Handbook of radar scattering statistics for terrain.
Ulaby, F.T., et al, Norwood, MA, Artech House, 1989, 357p., Refs. passim.
Radar, Backscattering, Wet snow, Statistical analysis.

44-76
Chemical quality of water and the hydrologic cycle.
Averett, R.C., ed, Chelsea, MI, Lewis Publishers, 1987, 382p., For selected papers see 44-77 through 44-79.
McKnight, D.M., ed.
Hydrology, Water chemistry, Snow composition, Ice composition, Watersheds, Snowmelt.

44-77
Rime ice composition at the Elk Mountain Observatory - atmospheric processes, acid and nutrient deposition rates.
Snider, J.R., et al, Chemical quality of water and the hydrologic cycle. Edited by R.C. Averett and D.M. McKnight, Chelsea, MI, Lewis Publishers, 1987, p.23-38, 21 refs.
Vali, G.
Ice composition, Cloud droplets.

44-78
Analytical methodology for the measurement of the chemical composition of snow cores from the Cascade/Sierra Nevada mountain ranges.
Taylor, H.E., Chemical quality of water and the hydrologic cycle. Edited by R.C. Averett and D.M. McKnight, Chelsea, MI, Lewis Publishers, 1987, p.55-69, 15 refs.
Coring, Snow composition, Measurement, Statistical analysis.

44-79
Hydrologic and chemical flux in Loch Vale watershed, Rocky Mountain National Park.
Baron, J., et al, Chemical quality of water and the hydrologic cycle. Edited by R.C. Averett and D.M. McKnight, Chelsea, MI, Lewis Publishers, 1987, p.141-155, 29 refs.
Bricker, O.P.
Snowmelt, Watersheds, Hydrology, Chemical analysis, Water chemistry.

44-80
Younger Dryas-Preboreal moraines and deglaciation in southwestern Värmland, Sweden.
Lundqvist, J., *Boreas*, Sep. 1, 1988, 17(3), p.301-316, 48 refs.
Moraines, Ice mechanics, Paleoclimatology, Glacial erosion, Glacier melting, Soil dating, Geomorphology, Glaciology, Sweden—Värmland.

44-81
Deglaciation pattern indicated by the ice-margin formations in Northern Karelia, eastern Finland.
Eronen, M., et al, *Boreas*, Sep. 1, 1988, 17(3), p.317-327, 64 refs.
Vesajoki, H.
Paleoclimatology, Glacier melting, Glacier oscillation, Moraines, Glacier flow, Geomorphology, Glaciology, Finland—Karelia.

44-82
Late Weichselian/Devensian ice sheets in the North Sea and adjacent land areas.
Nesje, A., et al, *Boreas*, Sep. 1, 1988, 17(3), p.371-384, 60 refs.
Sejrup, H.P.
Ice sheets, Paleoclimatology, Subglacial observations, Ice models, Ice mechanics, Ice age theory, Glacial geology, Ice physics, North Sea.

44-83
Controls on sedimentation in a late Devensian ice-dammed lake, Achnasheen, Scotland.
Benn, D.I., *Boreas*, Mar. 1, 1989, 18(1), p.31-42, 49 refs.
Glacial lakes, Ice dams, Meltwater, Ice mechanics, Glacier flow, Glacier thickness, Sedimentation, Geomorphology, Landforms, Sediment transport, Scotland—Achnasheen.

44-84
Late Weichselian glaciation and deglaciation of Forlandsundet area, western Spitsbergen, Svalbard.
Forman, S.L., *Boreas*, Mar. 1, 1989, 18(1), p.51-60, 29 refs.
Paleoclimatology, Ice sheets, Glacier oscillation, Moraines, Geomorphology, Geologic processes, Norway—Spitsbergen.

44-85
Check your admixtures after winter storage.
Suprenant, B.A., *Concrete construction*, Mar. 1989, 34(3), p.320-322.
Winter concreting, Concrete admixtures, Freeze thaw cycles, Cold storage, Cold weather construction, Tests.

44-86
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44-96
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44-134
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44-138
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44-139
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44-141
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44-143
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44-144
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44-145
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44-146
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44-149
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44-209
Moisture distribution and frost heave deformation according to the depth of the freezing layer in clay soils at hydrotechnical structures of irrigation systems in the Kuybyshev region. (Raspred[illegible]enie vlazhnosti i deformatsii pucheniia po glubi[illegible] promerzaiushchego sloia v glinistykh gruntakh osnovanii gidrotekhnicheskikh sooruzhenii orositel'nykh [illegible]stem Kuibyshevskoi oblasti).
Andreeva, N.G., et al. Sposoby ustroistva fundamentov i podzemnykh etazhei v usloviiakh slabykh i merzlykh gruntov. Mezhvuzovskii tematicheskii sbornik trudov (Methods of constructing foundations and underground floors in weak soil and frozen ground. Inter-university thematic collection of papers). Edited by B.I. Dalmatov, Leningrad, Inzhenerno-stroitel'nyi institut, 1985, p.120-125, In Russian. 3 refs.
Kronik, IA.A
Active layer, Soil water migration, Hydraulic structures, Frost heave, Deformation, Clay soils, Irrigation, Distribution.

44-210
Science in Antarctica, Vol.8: Oceanography. (Nankyoku no kagaku, 8: Kaiyo).
Kusunoki, K., ed. Tokyo, National Institute of Polar Research, 1989, 137p., In Japanese. Refs. p.127-132.
Oceanography, Sea water, Sea ice, Oceans, Water chemistry, Ocean currents, Antarctica.
This is Vol.8, in 8 chapters on oceanography, of a series on science in Antarctica. Chapter 1 is a 5-page introduction. Chap. 2 is on ocean physics, including temperature, salinity, water masses, and currents. Chap. 3 is on tides. Chap. 4 is on ocean geochemistry, including distribution of nutrient salts; and Chap. 5 is on sea ice, including a comparison of arctic and antarctic sea ice, formation and growth of sea ice, distribution of sea ice in the Antarctic, and a comparison of sea and glacier ice. Although the text is all in Japanese, there are numerous charts, maps, formulas, and a bibliography of 165 references mostly in English.

44-211
Science in Antarctica, Vol.5: Earth sciences. (Nankyoku no kagaku, 5 Chigaku).
Yoshida, Y., ed. Tokyo, National Institute of Polar Research, 1986, 427p., In Japanese. Refs. p.395-421.
Kaminuma, K., ed
Geology, Topography, Tectonics, Geochemistry, Antarctica.
This is Vol.5, in 8 chapters on earth sciences, of a series on science in Antarctica. Chapter 1 is a 3-page introduction. Chap. 2 is on the geology and petrology of Antarctica region by region, including volcanism, plant and animal fossils, and the theory of Goodwanaland. Chap. 3 is on topography, the continental shelf, and the ice sheet. Chap. 4 is on the earth's crust and mantle, including gravity, seismology, uplift, and isostasy. Chap. 5 is on the antarctic plate, including seismic activity, volcanism, and paleomagnetism. Chap. 6 is on gravity at sea. Chap. 7 is on geochemistry, including the chemistry of snow, ice, and fresh water, the chemistry of salt lakes, mineralogy, and environmental monitoring, and Chap. 8 is on topographic maps. Though the text is all in Japanese, there are numerous charts, maps, pictures, formulas, and a bibliography of at least 450 references mostly in English.

44-212
Science in Antarctica, Vol.3: Meteorology. (Nankyoku no kagaku, 3: Kishoj).
Kawaguchi, S., ed. Tokyo, National Institute of Polar Research, 1988, 335p., In Japanese. Refs. p.308-326.
Kanzawa, H., ed.
Meteorology, Climatology, Climate, Atmosphere, Circulation, Atmospheric composition, Antarctica.
No.3 of the 'Antarctic Science Series', this volume summarizes 30 years of Japanese studies of polar science in the form of 9 chapters by 14 authors having the experience of wintering over in the Antarctic. The introductory chapter traces the history of meteorological research. Based mostly on data collected at Mizuho Station, Chap. 2 deals with the radiation characteristics of the ice and snow cover, radiation in the atmosphere, and radiation budget. Chap. 3 with the boundary layer including katabic winds, snowstorms and heat budget. Chap. 4 covers the behavior of antarctic low pressure and atmospheric circulation. Chap. 5 describes the antarctic middle atmosphere that has attracted worldwide attention in regard to the problem of the ozone hole, and seasonal dynamics of wind and temperature based on recent observations at Showa Station. Chap. 6 deals with different phases of water in the antarctic atmosphere, vapor clouds and snow based on observations at Showa and Amundsen-Scott stations. Research on the antarctic troposphere aerosol as it relates to cloud formation and the radiation process, based chiefly on observations at Showa Station, is described in Chap. 7. The global trend toward increased carbon dioxide and other trace chemicals in the atmosphere, chlorofluorocarbon, CH4 and N2O is covered in Chap. 8. These chemicals are held responsible for the greenhouse effect bringing climatic change to the earth. The last chapter describes the averages, seasonal and yearly fluctuations of atmospheric temperature in Antarctica.

44-213
Geothermal energy applications in wastewater treatment.
Vigrass, L.W., et al. *Journal of cold regions engineering*, June 1989, 3(2), p.55-72. 14 refs.
Viraraghavan, T., Curtis, F.A.
Waste treatment, Water treatment, Geothermy, Sludges, Cost analysis, Analysis (mathematics).

44-214
Moisture accumulation in insulated walls in cold regions.
McFadden, T., *Journal of cold regions engineering*, June 1989, 3(2), p.73-83, 12 refs.
Walls, Moisture transfer, Thermal insulation, Insulation, Moisture, Moisture detection.

44-215
Binders for snow roads and runways in Antarctica.
Barber, M.J., et al. *Journal of cold regions engineering*, June 1989, 3(2), p.84-86, 6 refs.
Lee, S.M., Brown, R.L.
Snow roads, Runways, Snow (construction material), Snow strength, Trafficability, Wood, Antarctica—McMurdo Station, Antarctica—Amundsen-Scott Station.
The effects of adding wood as a binder material to snow is discussed in this paper. Wood/snow pavement test sections were constructed in the Antarctic at two sites, McMurdo and Amundsen Scott South Pole stations. Temperature conditions at McMurdo Station were near freezing, while South Pole Station had constant subfreezing temperatures. Test sections were monitored during the austral summer of 1986-87 and again during the 1988 season. Rammsonde penetrometer, density, and temperature profiles were used to examine material behavior. Results indicate how snow pavements depend upon temperature history, initial material properties, and construction-processing techniques. Solar radiation affected the surface sections at McMurdo by causing melt to occur, since temperatures were near freezing. Satisfactory strengths for supporting aircraft, were obtained at depths down 20 cm at both stations. Evidence shows that with an improved surface-processing technique, such as heat processing, ample strength may be obtained to support wheeled aircraft landing in the Antarctic. (Auth.)

44-216
Strength characteristics of frozen Fox gravel.
Skudrzyk, F.J., *Journal of cold regions engineering*, June 1989, 3(2), p.97-106, 9 refs.
Frozen ground strength, Gravel, Soil strength, Soil tests, Frozen ground mechanics, Excavation.

44-217
Frost weathering and ice action in shore platform development with particular reference to Quebec, Canada.
Dionne, J.C., et al. *Zeitschrift für Geomorphologie*, Dec. 1988, Vol.71(Supp.), p.117-130, 67 refs.
Brodeur, D
Frost weathering, Rock mechanics, Fast ice, Frost shattering, Ice erosion, Abrasion, Shores, Periglacial processes, Landscape development, Geologic processes, Canada.

44-218
Subglacial meltwater discharge in the open-marine tidewater glacier environment: observations from Nordaustlandet, Svalbard Archipelago.
Pfirman, S.L., et al. *Marine geology*, 1989, Vol.86, p.265-281, 47 refs.
Solheim, A.
Subglacial drainage, Pleistocene, Glacier melting, Meltwater, Acoustic measurement, Sediment transport, Glacial erosion, Ice water interface, Subglacial observations, Glacial hydrology, Norway—Svalbard.

44-219
Sedimentary facies of glacial-interglacial cycles in the Norwegian Sea during the last 350 ka.
Henrich, R., et al. *Marine geology*, 1989, Vol.86, p.283-319, 68 refs.
Kassens, H., Vogelsang, E., Thiede, J.
Paleoclimatology, Glacial deposits, Isotope analysis, Drill core analysis, Ocean currents, Soil analysis, Stratigraphy, Sediment transport, Glacier oscillation, Laboratory techniques, Bottom sediment, Norwegian Sea.

44-220
Turbulent flux of sensible heat in the vicinity of antarctic coastal polynyas. (Der turbulente Strom fühlbarer Wärme im Einflussbereich antarktischer Küstenpolynyen).
Engelbart, D., *Meteorologische Rundschau*, Mar. 1989, 41(4), p.111-121, In German with English summary. 24 refs.
Sea ice, Air temperature, Polynyas, Heat flux, Wind velocity.
From data in the coastal area of the southeastern Weddell Sea, the turbulent flux of sensible heat is calculated. The result is determined from a solution of the surface layer profile functions with measurements of windspeed in one height and temperature in two heights. A comparison shows, that applying the often used bulk-formula with a constant transfer coefficient in general underestimates the heat flux from polynyas. An investigation of the roughness length of antarctic sea ice, which influences the energy exchange between a surface and the atmosphere, indicates that extremely rough ice floes with pressure ridges of about 1 m in height correspond to a roughness length of nearly 4 cm. The sensible heat flux over the continental ice shelf is near permanently negative (directed to the ground). On the other hand the almost ice-free water of the coastal polynya produces large positive heat fluxes up to 700 W/sq m in Oct. The frequency distribution of heat fluxes over nearly complete ice covered areas resembles that over the ice shelf. Partially ice covered regimes also cause prevailing positive, but not as large heat fluxes as the almost ice-free polynya. (Auth. mod.)

44-221
Plasma thawing of frozen soils.
Zadvornev, G.A., et al. *Soviet journal of applied physics*, Jan.Feb. 1988, 2(1), p.132-135, Translated from Akademiia nauk SSSR, Sibirskoe otdelenie. Izvestiia. Seriia tekhnicheskikh nauk, 15(4), 1987. 6 refs.
[Akunin, V.N., Prokhorov, IU.B.
Artificial thawing, Ground thawing, Heat transfer coefficient, Frozen ground thermodynamics, Drilling.

44-222
Temperature regime of frozen soils on berms in northern Yakutia.
Stepanov, G.M., *Soviet forest sciences*, 1988, No.5, p.76-82, 15 refs. For Russian original see 43-4068.
Forest soils, Forest fires, Taiga, Soil temperature, Frozen ground temperature, Frozen ground thermodynamics.

44-223
Fracturing mechanism and dust yield dynamics in impact breakage of permafrost.
Lanonov, V.R., et al. *Soviet mining science*, Sep.-Oct. 1988(Pub. July 89), 24(5), p.438-441, 17 refs. For Russian original see 43-3852.
Muksumov, N.Kh., Dovidenko, G.P.
Dust, Impact strength, Dust control, Rock excavation, Frozen rock strength, Mathematical models.

44-224
Vehicles for freight-hauling and for science traverses in Antarctica.
Mellor, M., MP 2504, Hanover, NH, U.S. Army Cold Regions Research and Engineering Laboratory, [1988], Var. p.
Tractors, Tracked vehicles, Logistics, Traverses, Snow vehicles, Cargo.
Proposals for freight hauling vehicles in Antarctica, submitted by Caterpillar Inc. to CRREL, are presented. Various models of Caterpillar LGP, Challenger, and High Speed Hauler tractors are described.

44-225
Planing machines for building runways on ice.
Mellor, M., MP 2505, Hanover, NH, U.S. Army Cold Regions Research and Engineering Laboratory, [1989], 8p. + attachments.
Ice runways, Ice cutting, Construction equipment, Antarctica—McMurdo Station.
An ice runway, 300 ft by 10,000 ft, able to accommodate the C-130 military air transport, is proposed for the Ross Ice Shelf near McMurdo Station. Caterpillar Inc. was requested to submit proposals for ice planing machines to build the runway. A modified Caterpillar PR-450 pavement profiler and RR-250 road reclaimer look promising.

44-226
Ice formation downstream of Oahe Dam—1987-1988 winter.
Ashton, G.D., MP 2506, Hanover, NH, U.S. Army Cold Regions Research and Engineering Laboratory, 1988, 37p., 1 ref.
Dams, Ice formation, Flood control, Ice control, Ice conditions, Reservoirs, United States—South Dakota—Oahe Dam.

44-227
Winter water quality in lakes and streams.
Calkins, D.J., et al, MP 2507, Hanover, NH, U.S. Army Cold Regions Research and Engineering Laboratory, [1988], 8p., Presented at Corps of Engineers 7th. Seminar on Water Quality, Charleston, SC, Feb. 23-25, 1988 11 refs.
Ashton, G.D.
Water chemistry, Lake water, Ice cover effect, Ice conditions, Surface waters.

44-228
"Des Femmes Pour un Pôle" 1986 expedition to study the trans-polar drift.
Williams, F.M., *National Research Council, Canada. Institute for Marine Dynamics. Laboratory memorandum*, Mar. 1987, LM-AVR-16, 12p. + appends., Appendices mostly in French. 8 refs.
Pack ice, Drift, Expeditions, Sea ice distribution, Drift stations, Ice floes, Human factors.

44-229
Dynamics of iceberg grounding and scouring (DIGS) experiment and repetitive mapping of the eastern Canadian continental shelf. Vol.1: The field experiment. Vol.2: Maps and charts.
Hodgson, G.J., ed, *Environmental Studies Research Funds. Report*, June 1988, No.094, 316p. + maps, With French summary. 111 refs.
Lever, J.H., ed, Woodworth-Lynas, C.M.T., ed, Lewis, C.F.M., ed.
Icebergs, Grounded ice, Ice scoring, Drift, Bottom sediment, Marine geology

44-230
Antarctica: past and future glaciations. [Antarktida: proshloe i budushchee oledeneniia],
Miagkov, S.M., Moscow, Universitet, 1989, 160p., In Russian. Refs. p.157-159.
Glaciation, Topographic features, Paleoclimatology, Climatic changes, Ice cover, Ice sheets, Polar regions
Discussed in the five chapters of this book are: the principal feature of antarctic geography, the subglacial topography and its effect on ice cover formation, the beginning—estimated at 40-50 m y.a.—and principal stages of antarctic continental glaciation, past and current variations of antarctic glaciation and its effects on global climate, and prospects for future climatic changes. A possible disintegration of West Antarctica's ice sheet, due to human factors, is anticipated to begin in the 21st century.

44-231
Year of Bowen ratios over the frozen Beaufort Sea.
Andreas, E.L., *Journal of geophysical research*, Sep. 15, 1989, 94(C9), MP 2508, p.12,721-12,724, 15 refs.
Ice heat flux, Latent heat, Sea ice, Seasonal variations, Air temperature, Ice air interface, Analysis (mathematics).

44-232
Applied hydrology in the development of northern basins.
Northern Research Basins Symposium/Workshop, 7th, Ilulissat, Greenland, May 25-June 1, 1988, Copenhagen, 1988, 347p., Refs. passim. For selected papers see 43-2128 and 44 233 through 44-260
Runoff, Snowmelt, River ice, Lake ice, Glacial hydrology, Snow depth, Ice breakup, Hydrology, Electric power, Meltwater, Snow water equivalent, Floods, Mathematical models, Climatic changes, Snow hydrology, Measurement, Measuring instruments, Remote sensing, Ice cover thickness

44-233
Subsurface temperature predictions for hydropower developments.
Christensen, M.I., et al, Northern Research Basins Symposium/Workshop, 7th, Ilulissat, Greenland, May 25-June 1, 1988. Applied hydrology in the development of northern basins, Copenhagen, 1988, p.25-34, 17 refs.
Mai, H.
Temperature measurement, Permafrost thermal properties, Thermal conductivity, Models, Water temperature, Electric power.

44-234
Hydrological background to a glacier-influenced hydropower station in Greenland.
Kern-Hansen, C., Northern Research Basins Symposium/Workshop, 7th, Ilulissa , Greenland, May 25-June 1, 1988. Applied hydrology in the development of northern basins, Copenhagen, 1988, p.35-45, 10 refs.
Ablation, Hydrology, Glacial hydrology, Models, Electric power, Air temperature, Runoff.

44-235
Glaciological research for hydropower planning in Ilulissat/Jakobshavn, West Greenland.
Thomsen, H.H., Northern Research Basins Symposium/Workshop, 7th, Ilulissat, Greenland, May 25-June 1, 1988 Applied hydrology in the development of northern basins, Copenhagen, 1988, p.47-56, 16 refs.
Electric power, Glaciology, Glacier mass balance, Remote sensing, Photogrammetric surveys, Oxygen isotopes, Models, Runoff.

44-236
New approaches to studying effects of glacier ablation on runoff in Greenland.
Braithwaite, R.J., Northern Research Basins Symposium/Workshop, 7th, Ilulissat, Greenland, May 25-June 1, 1988. Applied hydrology in the development of northern basins, Copenhagen, 1988, p.71-76, 15 refs.
Glacier ablation, Glacial hydrology, Runoff, Mathematical models.

44-237
Influences of climatic fluctuations and changes in glacierised area on runoff from alpine basins.
Collins, D.N. Northern Research Basins Symposium/Workshop, 7th, Ilulissat, Greenland, May 25-June 1, 1988. Applied hydrology in the development of northern basins, Copenhagen, 1988, p.77-86, 8 refs.
Climatic changes, Runoff, Glacier oscillation.

44-238
Sermilik—a field station in eastern Greenland.
Hasholt, B., Northern Research Basins Symposium/Workshop, 7th, Ilulissat, Greenland, May 25-June 1, 1988. Applied hydrology in the development of northern basins, Copenhagen, 1988, p.87-93, 8 refs.
Glacier surveys, Research projects, Mapping, Hydrology, Glaciology, Climatology.

44-239
Calculation of normal runoff in glacier-covered areas.
Pettersson, L.E., Northern Research Basins Symposium/Workshop, 7th, Ilulissat, Greenland, May 25-June 1, 1988. Applied hydrology in the development of northern basins, Copenhagen, 1988, p 95-103.
Maps, Runoff, Glacial hydrology, Glacial rivers.

44-240
Hydrology of Bayelva, northwest Spitsbergen.
Repp, K., Northern Research Basins Symposium/Workshop, 7th, Ilulissat, Greenland, May 25-June 1, 1988. Applied hydrology in the development of northern basins, Copenhagen, 1988, p.105-114, 4 refs.
Hydrology, Drainage, Runoff, Sediment transport, Meltwater, Active layer.

44-241
Contribution to the modelling of both quality and quantity of seasonal snowcover.
Babiaková, G., et al, Northern Research Basins Symposium/Workshop, 7th, Ilulissat, Greenland, May 25-June 1, 1988. Applied hydrology in the development of northern basins, Copenhagen, 1988, p.117-129, 10 refs.
Palkovic, D., Bodis, D.
Snow cover, Snow hydrology, Models, Snowmelt

44-242
Resident time of meltwater in different zones of small basins.
Bengtsson, L., Northern Research Basins Symposium/Workshop, 7th, Ilulissat, Greenland, May 25-June 1, 1988. Applied hydrology in the development of northern basins, Copenhagen, 1988, p.131-136, 8 refs
Meltwater, Soil water, Runoff, Ground water, Moisture transfer, Simulation.

44-243
Development and performance of a Canadian automatic snow depth sensor.
Goodison, B.E., et al, Northern Research Basins Symposium, Workshop, 7th, Ilulissat, Greenland, May 25 June 1, 1988 Applied hydrology in the development of northern basins, Copenhagen, 1988, p.137-144, 6 refs.
Metcalfe, J.R., Wilson, R.A.
Snow depth, Acoustic measurement, Remote sensing, Snow acoustics, Equipment.

44-244
Snow-radar. an efficient tool for areal snow pack assessments.
Killingtveit, Å., et al, Northern Research Basins Symposium/Workshop, 7th, Ilulissat, Greenland, May 25-June 1, 1988. Applied hydrology in the development of northern basins, Copenhagen, 1988, p.145-157, 2 refs.
Sand, K.
Snow depth, Snow density, Snow water equivalent, Radar, Measurement, Equipment.

44-245
Determination of snow water equivalents by using NOAA-satellite images.
Kuittinen, R., Northern Research Basins Symposium/Workshop, 7th, Ilulissat, Greenland, May 25-June 1, 1988. Applied hydrology in the development of northern basins, Copenhagen, 1988, p.159-168, 5 refs.
Remote sensing, Spaceborne photography, Snow water equivalent, Snow depth, Mathematical models.

44-246
Continuous electrochemical monitoring of snow melt in Utah, U.S.A.
Metcalf, R.C., et al, Northern Research Basins Symposium/Workshop, 7th, Ilulissat, Greenland, May 25-June 1, 1988. Applied hydrology in the development of northern basins, Copenhagen, 1988, p.169-178, 14 refs.
Probes, Snowmelt, Monitors, Tests.

44-247
Monitoring of snow cover and surface runoff in Greenland by use of NOAA-AVHRR satellite data.
Sögaard, H., et al, Northern Research Basins Symposium/Workshop, 7th, Ilulissat, Greenland, May 25-June 1, 1988. Applied hydrology in the development of northern basins, Copenhagen, 1988, p.179-188, 7 refs.
Thomsen, T.
Snow cover distribution, Snow water equivalent, Runoff, Mapping, Spaceborne photography.

44-248
Modelling extreme effective precipitation.
Bergström, S., et al, Northern Research Basins Symposium/Workshop, 7th, Ilulissat, Greenland, May 25-June 1, 1988. Applied hydrology in the development of northern basins, Copenhagen, 1988, p.191-197, 3 refs.
Brandt, M., Gardelin, M., Lindström, G.
Snowmelt, Soil water, Rain, Floods, Models, Simulation.

44-249
Canadian participation in the WMO solid precipitation measurement intercomparison.
Goodison, B.E., et al, Northern Research Basins Symposium/Workshop, 7th, Ilulissat, Greenland, May 25-June 1, 1988. Applied hydrology in the development of northern basins, Copenhagen, 1988, p.199-207, 5 refs.
Metcalf, J.R.
Organizations, International cooperation, Precipitation gages, Snowfall.

44-250
Computer-generated graphics of river ice conditions.
Bilello, M.A., et al, MP 2509, Northern Research Basins Symposium/Workshop, 7th, Ilulissat, Greenland, May 25-June 1, 1988 Applied hydrology in the development of northern basins, Copenhagen, 1988, p.211-219, 3 refs.
Gagnon, J.J., Daly, S.F.
River ice, Ice conditions, Computer programs
Timely information on river ice conditions is essential to the shipping industry on ice-prone inland waterways where navigation throughout the winter is required Included in a river ice management program are daily ice observations on rivers in PA and WV. Hand-drawn displays of these ice conditions were made from the alphanumeric coded records, but they required excessive time to prepare. To expedite the availability of such diagrams, a computer graphics program was developed Initial computer graphics printed in black and white showed the coverage and extent of river ice, and whether the ice was running or stationary. Further modifications, in which color graphics were used, made it possible to also include ice thickness and other reported river ice characteristics such as clear or rotting ice.

44-251
Development of a dynamic ice breakup control method for the Connecticut River near Windsor, Vermont.
Ferrick, M.G., et al, MP 2510, Northern Research Basins Symposium/Workshop, 7th, Ilulissat, Greenland, May 25-June 1, 1988. Applied hydrology in the development of northern basins, Copenhagen, 1988, p.221-233, 9 refs.
Lemieux, G.E., Weyrick, P.B., Demont, W.
Ice breakup, River ice, Ice control, Ice jams, Floods.
The Cornish-Windsor bridge is the longest covered bridge in the United States and has significant historical value. Dynamic ice

breakup of the Connecticut River can threaten the bridge and cause flood damage in Windsor, VT. Ice conditions were monitored throughout the 1985-86 winter, observed a midwinter dynamic ice breakup, conducted controlled release tests during both open water and ice cover conditions, and analyzed more than 60 years of temperature and discharge records. River regulation presents alternatives for ice management that would minimize water levels during breakup. In this paper the basis of a method is developed to produce a controlled ice breakup at lower stage and discharge than occur during major natural events.

44-252
**Predicting river ice breakup using hydrometric station records.**
Forstius, J., Northern Research Basins Symposium/Workshop, 7th, Ilulissat, Greenland, May 25-June 1, 1988. Applied hydrology in the development of northern basins, Copenhagen, 1988, p.235-243, 2 refs.
Ice breakup, Ice forecasting, River ice, Mathematical models, Floods.

44-253
**Ice conditions of the Finnish lakes in the year 2050.**
Kuusisto, E., Northern Research Basins Symposium/Workshop, 7th, Ilulissat, Greenland, May 25-June 1, 1988. Applied hydrology in the development of northern basins, Copenhagen, 1988, p.245-252, 4 refs.
Ice conditions, Climatic changes, Lake ice, Ice cover thickness.

44-254
**Numerical simulation of ice cover formation in rivers—Finnish River Ice Project.**
Maunula, M., et al, Northern Research Basins Symposium/Workshop, 7th, Ilulissat, Greenland, May 25-June 1, 1988. Applied hydrology in the development of northern basins, Copenhagen, 1988, p.253-267, 5 refs.
Huokuna, M.
Ice cover, Ice formation, River ice, Ice models, Mathematical models, Water temperature

44-255
**Uncertainties in streamflow measurement under winter ice conditions. A case study: the Red River at Emerson, Manitoba, Canada.**
Pelletier, P.M., Northern Research Basins Symposium/Workshop, 7th, Ilulissat, Greenland, May 25-June 1, 1988. Applied hydrology in the development of northern basins, Copenhagen, 1988, p.269-292, 24 refs.
Stream flow, Measurement, Measuring instruments, Statistical analysis, Ice conditions, Tests, River basins, Hydrology.

44-256
**Strength and energy balance of decaying river ice.**
Prowse, T.D., et al, Northern Research Basins Symposium/Workshop, 7th, Ilulissat, Greenland, May 25-June 1, 1988. Applied hydrology in the development of northern basins, Copenhagen, 1988, p.293-301, 15 refs.
Demuth, M.N., Onclin, C.R.
River ice, Ice heat flux, Ice cover strength, Borehole instruments.

44-257
**Effects of an ice cover on a backwater or M-1 profile.**
Santeford, H.S., et al, Northern Research Basins Symposium/Workshop, 7th, Ilulissat, Greenland, May 25-June 1, 1988. Applied hydrology in the development of northern basins, Copenhagen, 1988, p.303-312, 3 refs.
Alger, G.R., Prehoda, T.F.
River flow, Ice cover effect, Ice cover thickness, Underwater ice.

44-258
**Expected effects on the hydrography and brackish layer currents caused by hydroelectric discharges to a Norwegian fjord system.**
Gjerp, S.A., et al, Northern Research Basins Symposium/Workshop, 7th, Ilulissat, Greenland, May 25-June 1, 1988. Applied hydrology in the development of northern basins, Copenhagen, 1988, p.315-323, 11 refs.
Steen, J.E.
Hydrography, Ice control, Electric power

44-259
**Environmental impacts of hydroelectric development in Greenland.**
Nygaard, K.H., et al, Northern Research Basins Symposium/Workshop, 7th, Ilulissat, Greenland, May 25-June 1, 1988. Applied hydrology in the development of northern basins, Copenhagen, 1988, p.325-330.
Aastrup, P.
Environmental impact, Electric power, Ice conditions, Water intakes.

44-260
**Effects of interbasin transfer on streamflow regimes, northwestern Ontario, Canada.**
Woo, M.K., et al, Northern Research Basins Symposium/Workshop, 7th, Ilulissat, Greenland, May 25-June 1, 1988. Applied hydrology in the development of northern basins, Copenhagen, 1988, p.331-341, 7 refs.
Waylen, P.R.
River flow, Stream flow, Seasonal variations, Snowmelt, Runoff, Hydrography, Floods.

44-261
**Correlation function study for sea ice.**
Lin, F.C., et al, *Journal of geophysical research*, Nov. 15, 1988, 93(C11), MP 2511, p.14,055-14,063, 50 refs.
Kong, J.A., Shin, R.T., Gow, A.J., Arcone, S.A.
Sea ice, Artificial ice, Dielectric properties, Analysis (mathematics), Correlation, Remote sensing, Reflectivity, Brines.

44-262
**Theory of freezing: the inhomogeneous Ornstein-Zernike equation.**
McCoy, J.D., et al, *International journal of thermophysics*, Jan. 1989, 10(1), p.87-100, 35 refs.
Haymet, A.D.J.
Theories, Freezing, Phase transformations, Analysis (mathematics), Ice physics, Ice crystal growth, Computer applications.

44-263
**Thermal conductivity of a dendritic ice layer.**
Fukusako, S., et al, *International journal of thermophysics*, Jan. 1989, 10(1), p.269-278, 10 refs.
Yamada, M., Tago, M.
Thermal conductivity, Dendritic ice, Electrical measurement, Frozen liquids, Ice electrical properties, Ice (water storage), Thermodynamics, Test equipment, Solutions.

44-264
**Ice-water saturation adjustment.**
Tao, W.K., et al, *Monthly weather review*, Jan 1989, 117(1), p.231-235, 13 refs.
Simpson, J., McCumber, M.
Saturation, Supersaturation, Cloud droplets, Ice sublimation, Cloud physics, Clouds (meteorology), Simulation, Hail.

44-265
**Comments on "Use of enhanced IR/visible satellite imagery to determine heavy snow areas".**
Elkins, H.A., *Monthly weather review*, Jan. 1989, 117(1), p.251-255, Includes reply by S.K. Beckman For article being discussed see 42-2014. 7 + 10 refs.
Beckman, S.K.
Atmospheric disturbances, Snowstorms, Thunderstorms, Atmospheric circulation, Synoptic meteorology, Meteorological factors.

44-266
**Satellite monitoring of snow cover in the Qilian Mountains and analysis of snowmelt runoff in the Hexi Region.**
Zeng, Q.Z., et al, *Chinese geography and environment*, Summer 1988, 1(2), p.52-66, 14 refs. For Chinese original see 40-4643.
Zhang, S.Y., Jin, D.H.
Runoff forecasting, Snowmelt, Snow cover distribution, Snow accumulation, Spaceborne photography, Runoff, Remote sensing, China—Qilian Mountains.

44-267
**Changes in soil and stream hydrochemistry during periods of spring snowmelt at a pristine site in mid-Norway.**
Ferrier, R.C., et al, *Water, air, and soil pollution*, Apr. 1989, 44(3-4), p.321-337, 28 refs.
Anderson, J.S., Miller, J.D., Christophersen, N.
Snowmelt, Snow impurities, Soil chemistry, Surface drainage, Stream flow, Sampling, Hydrogeochemistry, Water pollution, Forest soils, Norway.

44-268
**Arctic data and information: issues and goals.**
U.S. Arctic Research Commission, *U.S. Arctic Research Commission. Findings and recommendations*, June 1989, No.3, 33p., 9 refs.
Research projects, Data processing, Legislation, Polar regions.

44-269
**Winter field testing of U.S. Navy fleet hospital.**
Sletten, R.S., et al, MP 2512, Hanover, NH, U.S. Army Cold Regions Research and Engineering Laboratory, [1988], 10p., Presented at Test Technology Symposium, Johns Hopkins University, Jan. 1988.
Crory, F.E.
Portable shelters, Military facilities, Cold weather tests.
The U.S. Navy has designed and initiated procurement of more than 20 modular, containerized fleet hospitals ranging in size from 250 to 1000 beds. The hospitals are tent-based but include specially outfitted hard shelters for operating rooms, labs, and other hospital functions. Interconnected tent wings comprise the wards, casualty receiving, and some administrative functions. Hospital staff are housed in general purpose tents. Piped water and wastewater systems are provided in the hospital. All wards and outfitted shelters are provided with electrical, heating, and air-conditioning equipment. All hospital components were designed to operate within a temperature range of +125 F to -10 F, but the lower end of this range had not been evaluated under actual winter conditions. At the request of the Navy's Fleet Hospital Program office, representative sections of a fleet hospital were tested at CRREL from Dec. 1986 through May 1987. The hospital was instrumented with approximately 100 thermocouples, and temperatures were recorded every 3 hours throughout the test period. Extensive weather records were collected by an on-site meteorological station. Several subsystem failures were identified and documented, primarily in the heating, electrical, and wastewater facilities. Modifications were made to the plumbing and heating systems in an effort to correct identified failures or to improve the effectiveness of the systems.

44-270
**Experimental methods for decontaminating soils by freezing.**
Ayorinde, O.A., et al, MP 2513, Hanover, NH, U.S. Army Cold Regions Research and Engineering Laboratory, [1988], 12p., Presented at Test Technology Symposium, John Hopkins University, Laurel, MD, Jan. 26-28, 1988. 6 refs.
Perry, L.B., Pidgeon, D., Iskandar, I.K.
Artificial freezing, Waste treatment, Soil freezing, Soil pollution, Waste disposal, Soil water migration.
Laboratory methods were developed to demonstrate and evaluate the feasibility of using artificial soil freezing as a cost-effective technique in general site decontamination. This effort is part of CRREL's artificial freezing research program for hazardous waste management. The study attempted to quantify parameters which influence contaminant transport in soils during freezing. Among the influencing parameters, freezing rate was found to be the most significant. Contaminant movement profiles in soils during freezing were measured. Laboratory column studies showed a significant mobility of volatile organics, such as benzene, chloroform and toluene, when Lebanon silty soil contaminated with these organics was frozen from the bottom up. A range of 25-67% reduction in contaminant concentration was measured in the frozen soil sample when subjected to an average freezing rate of 0.25 cm/day, with the concentration increase found just around the freezing front. However, a corresponding 25-67% increase in concentration ahead of the freezing front was not obtained as expected, due to contaminant losses through volatilization, biodegradation and sorption. A mathematical correlation was established between the contaminant relative change in concentration and their octanol-water partition coefficients. The well-correlated relationship strongly suggests the dependence of the freezing-induced mobility of the specific organic contaminant component on its octanol-water value.

44-271
**Prototype testing facilities for field evaluation of contaminant transport in freezing soils.**
Ayorinde, O.A., et al, MP 2514, Hanover, NH, U.S. Army Cold Regions Research and Engineering Laboratory, [1988], 29p., Presented at the International Conference on Physiochemical and Biological Detoxification of Hazardous Wastes, Atlantic City, NJ, May 3-5, 1988. 10 refs.
Perry, L.B., Tantillo, T., Pidgeon, D., Iskandar, I.K.
Artificial freezing, Waste treatment, Soil freezing, Soil pollution, Waste disposal, Test equipment, Soil tests, Soil water migration.
Recently, artificial freezing has been identified as a potential and plausible technique for treating soil contamination as well as for general site decontamination. As part of the overall CRREL artificial freezing research program for toxic and hazardous waste management and control in cold regions, a large-scale prototype testing facility has been constructed to study and evaluate contaminant movement in soils during freezing. The contaminants proposed to be used for the study include volatile organics, such as chloroform, toluene, and benzene, and non volatile organics, such as TNT and RDX. Variation in contaminant concentration during freezing would be obtained by soil coring and sampling tubes in different locations. Contaminant concentration would be determined using a gas chromatograph/mass spectrometer and high-precision liquid chromatograph.

44-272
Use of innovative freezing technique for *in-situ* treatment of contaminated soils.
Ayorinde, O A., et al, MP 2515, International Conference on New Frontiers for Hazardous Waste Management, 3rd, Pittsburgh, PA, Sep. 10-13, 1989. Proceedings, [1989], p.489-498, 14 refs.
Perry, L.B., Iskandar, I.K.
Artificial freezing, Soil freezing, Waste treatment, Soil pollution, Waste disposal, Soil water migration, Explosives.
In the past few years, CRREL has been investigating the use of artificial freezing as an innovative technique for soil decontamination A preliminary laboratory study was conducted specifically to evaluate and analyze the possibility of mobilizing different types of contaminants by freezing in Lebanon silt. Contaminants investigated were explosive residues most extensively found at the U.S. Army ammunition plants as well as volatile organic compounds (VOCs) such as chloroform and toluene Explosives studied were 2,4,6-trinitrotoluene (TNT), hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX), octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX), 2,6-dinitrotoluene (2,6-DNT), ortho-nitrotoluene (O-NT, and meta-nitrotoluene (M-NT) Preliminary data from the laboratory column studies suggested that there was a certain degree of movement of both explosives and VOCs when soil columns of Lebanon silt saturated with these contaminants were frozen unidirectionally from the bottom up Slopes of the control and frozen soil concentration profiles were statistically analyzed and a comparison between them was made. One freeze cycle at an average freezing rate of 0 5 cm/day was used Insignificant amounts of movement (<10% change) were observed for RDX, HMX and TNT. Relatively greater movements (20-40% change) were observed for 2,6 DNT, O-NT, M-NT, toluene and chloroform For given freezing rate, freeze-thaw cycles, soil and moisture content, it was hypothesized from this and other previous experimental data that the ability to move any contaminant by freezing strongly depends on the type, initial concentration level and the soil/chemical interaction of the contaminant.

44-273
Interpreting satellite imagery.
Cote, P., *Chinook*, Jan. 1989, 10(3), p.58-59.
Spaceborne photography, Photointerpretation, Ice conditions, Ice formation indicators, Remote sensing, Ice forecasting.

44-274
Constitutive theory for snow as a continuous multiphase mixture.
Adams, E E , et al, *International journal of multiphase flow*, July-Aug. 1989, 15(4), p 553-572, 28 refs.
Brown, R.L.
Snow composition, Metamorphism (snow), Analysis (mathematics), Phase transformations, Snow cover stability, Snow crystal growth, Thermodynamics, Theories, Snow cover, Porous materials

44-275
Glaciation interaction with the ocean: paleogeographic aspects. [Vzaimodeĭstvie oledeneniia s okeanom. paleogeograficheskie aspekty],
Grosvald, M G , et al, *Vsesoiuznyĭ institut nauchnoĭ i tekhnicheskoĭ informatsii Itogi nauki i tekhniki. Seriia paleogeografiia*, 1988, Vol.5, 184p., In Russian. 313 refs.
Glazovskiĭ, A.F
Paleoclimatology, Glaciation, Glaciers, Ice water interface, Ice cover, Sea ice, Icebergs, Sea level.
Extensive literature is reviewed, with current data on the following subjects glacier morphology and dynamics, continental glaciations; the role of oceans in the disintegration of ancient ice covers and the formation of glacial climates; glacial oceanic morpho-lithogenesis—erosion, transport and sedimentation processes—and ice water interface Numerous tables with pertinent data are included

44-276
On the satellite retrieval of aerosol optical thickness over polar regions.
Kergomard, C., et al, *Geophysical research letters*, July 1989, 16(7), p 707-710, 17 refs.
Tanré, D.
Ice cover effect, Polar regions, Sea ice, Aerosols, Albedo.
Field measurements of aerosol content and optical properties of polar atmospheres are difficult and therefore very scarce, especially over ice-covered marine areas of the arctic and antarctic regions The purpose of this paper is to investigate the opportunity to retrieve these properties from the blurring effect of the atmosphere on high resolution satellite imagery over sea ice The obtained results are consistent with field measurements and show the reliability of this method in order to monitor temporal changes in the aerosol content of polar atmospheres Uncertainties remain however in absolute measurements due to the unknown size distribution of aerosol particles and vertical structure of aerosol layers (Auth.)

44-277
Effect of ice and meteorological conditions on several representatives of true seals.
Timoshenko, IU.K , *Soviet journal of ecology*, May-June 1986 (Pub. Jan. 87), 17(3), p.177-182, Translated from Ekologiia. 11 refs.
Animals, Ice cover effect, Cold weather survival, Wind direction.

44-278
Winter ecology.
Schmid, W.D., *Soviet journal of ecology*, Nov.-Dec. 1986 (Pub July 87), 17(6), p 335-340, 16 refs.
Supercooling, Animals, Cold weather survival, Ecosystems, Frost resistance

44-279
Relic cryoxeropsytic communities of the western Chukotski peninsula and their soils.
Kozitskaia, L.T., et al, *Soviet journal of ecology*, May-June 1985 (Pub Jan. 86), 16(3), p.148-153, 19 refs. For Russian original see 39-3745.
Razzhivin, V.IU.
Alpine tundra, Steppes, Forest tundra, Cryogenic soils, Ecosystems, Plant ecology.

44-280
Phytomass reserve and structure in patchy tundras of the eastern shore of Lake Taymyr.
Pospelova, E B., et al, *Soviet journal of ecology*, Jan -Feb 1984 (Pub Sep 84), 15(1), p 12-18, 13 refs For Russian original see 38-2827.
Orlov, M.V.
Biomass, Microrelief, Tundra, Patterned ground, Vegetation patterns.

44-281
Phenological inversions in alpine terrain (western Tien Shan).
Lynov, IU.S., *Soviet journal of ecology*, July-Aug. 1984 (Pub. Mar. 85), 15(4), p.185-188, 21 refs. For Russian original see 39-121.
Ecosystems, Snow cover effect, Seasonal variations, Alpine landscapes, Plant ecology, Slope orientation, Soil temperature, Plant physiology.

44-282
Vibrating wire technology for settled dust monitoring.
Dutta, P K , et al, MP 2516, Battlefield Dust Environment Symposium, 3rd Proceedings, edited by R.R Williams and R.E Davis, [1988], p 71-82, 2 refs
Runstadler, P.W.
Dust, Detection, Remote sensing, Measuring instruments.
A new remote operating sensor for accurate and continuous monitoring of dust settlement rate is described. The system was developed for monitoring settled dust in underground coal mines, but it is conceived that it can also be used for monitoring dust deposition in many other situations The design is based upon vibrating wire technology, which makes the device insensitive to lead wire resistance, contact resistance, ground leakage, and humidity, which are common instrument problems in any field environment The portable readout is microprocessor based, and can read up to 10 remote sensors connected through a switch module. Dust loading on the sensors is read directly in mg/sq cm. In use, the 10 sensors can be placed at various locations, and all can be monitored with their cables terminating at a central station where the switch module is located. The maximum permissible distance of the sensors from the readout is about 1 6 km The readout unit weighs 4 kg and is rugged and splash-proof Both the sensor and the readout unit were tested for shock and vibration, and both met military standards The sensors are temperature compensated and can detect changes in dust loading as small as 0 5 mg/sq m The total range of the sensor is 0 to 500 mg/sq cm The paper describes the principle by which the sensors operate, the assembly procedures, and the results of sensor calibration, stability and repeatability tests. The details of the readout unit are also described.

44-283
Hopkinson pressure bar apparatus: a tool for rapid assessment of material properties at high strain rates.
Dutta, P.K., et al, MP 2517, Test Technology Symposium, 1st, Jan 25-28, 1988 Proceedings, Vol 2, [1988], p.885-903, 20 refs.
Farrell, D., Kalafut, J.
Strain measuring instruments, Strain tests, Ice loads, Dynamic loads, Impact tests, Ice deformation.
The split Hopkinson bar is an analysis tool that allows material characteristics to be determined under high strain rate loading conditions (50 to 1000 strains per second). In the techniques described, the material under test is cooled with liquid nitrogen flowing through coils surrounding the test specimen. The technique incorporates computer control over the data collection and analysis so the material properties are determined rapidly. To illustrate the capability of the testing method, a demonstration using ice as a material is included.

44-284
Perfectly round and clear ice pellet drops. [Ideal runde, klare Eisregen-Tropfen],
Lenggenhager, K., *Zeitschrift fur Meteorologie*, 1989, 39(4), p.234-236, In German.
Precipitation (meteorology), Raindrops, Freezing, Ice structure.

44-285
Long waves in channels with an ice cover.
Debol'skaya, E.I., *Water resources*, July 1989, 15(5), p.425-432, Translated from Vodnye resursy 11 refs.
Ice mechanics, Wave propagation, Floating ice, Ice cover effect, Water flow, Channels (waterways), Hydraulics, Analysis (mathematics), Fluid dynamics.

44-286
Thermal runoff to seas of the Arctic Ocean.
Elshin, IU.A., *Water resources*, July 1989, 15(5), p.448-452, Translated from Vodnye resursy. 6 refs.
Runoff, Measurement, Runoff forecasting, Thermal analysis, Heat balance, Rivers, Statistical analysis, Hydrology, Correlation, River basins, Arctic Ocean.

44-287
Pre-Incan agricultural activity recorded in dust layers in two tropical ice caps.
Thompson, L G , et al, *Nature*, Dec 22-29, 1988, 336(6201), p.763-765, 14 refs.
Davis, M.E., Mosley-Thompson, E., Liu, K.P.
Ice cores, Human factors, Drill core analysis, Ice dating, Dust, Agriculture, Correlation, Climatic changes, Peru—Quelccaya ice cap.

44-288
High-density structures and phase transition in an ionic model of H2O ice.
Demontis, P., et al, *Physical review B*, Aug. 1, 1989, 40(4), p.2716-2718, 9 refs.
Klein, M.L., LeSar, R.
High pressure ice, Phase transformations, Ice crystal structure, Ion density (concentration), Ion exchange, Lattice models, Solid phases, Ice models.

44-289
Exothermic model of percolation zone in a glacier.
Cai, B.L., et al, *Chinese science bulletin*, Feb. 1989, 34(4), p.312-314, Translated from Kexue tongbao. 3 refs.
Kuang, P.Q.
Glacier melting, Glacier ablation, Snow melting, Glacier heat balance, Mathematical models, Snow ice interface, Thermal diffusion, Snow temperature, Heat transfer, Glaciology, Snow depth.

44-290
Recent change and trend prediction of glaciers in the Qilian Mountains.
Liu, C.H., et al, *Chinese science bulletin*, Jan. 1989, 34(2), p 145-149, Translated from Kexue tongbao. 7 refs.
Xie, Z.C.
Glacier oscillation, Glacier surveys, Glacier thickness, Glacier surfaces, Glacier mass balance, Climatic factors, Glaciology, China—Qilian Mountains.

44-291
Air-sea feedback mechanism for quasi-geostrophic water movement near a fast shelf-ice edge with a small curvature.
Chu, P C., *Chinese journal of atmospheric sciences*, 1987, 11(1), p.31-42, Translated from Scientia atmospherica sinica. 5 refs.
Wave propagation, Water temperature, Ice edge, Fast ice, Air water interactions, Ice water interface, Temperature gradients, Ocean waves, Analysis (mathematics), Ice shelves, Wind factors, Sea ice.

44-292
Effects of ice scour on the structure of sublittoral marine algal assemblages of St. Lawrence and St. Matthew Islands, Alaska.
Heine, J.N., *Marine ecology progress series*, Mar. 22, 1989, 52(3), p.253-260, 30 refs.
Ice scoring, Littoral zone, Algae, Subglacial observations, Ice mechanics, Marine biology, Life (durability), Bering Sea.

44-293
On the value of long-term satellite passive microwave data sets for sea ice/climate studies.
Parkinson, C.L., *Geojournal*, Jan. 1989, 18(1), p.9-20, 59 refs.
Sea ice distribution, Climatic factors, Spaceborne photography, Microwaves, Mapping, Seasonal variations, Ice formation, Climatology, Polar regions, Remote sensing, Ice forecasting.

44-294
**Spring melt patterns in the Kara/Barents Sea: 1984.**
Crane, R.G., et al, *Geojournal,* Jan. 1989, 18(1), p.25-33, 10 refs.
Anderson, M.R.
Sea ice distribution, Ice air interface, Ice melting, Albedo, Classifications, Spaceborne photography, Ice temperature, Sea water freezing, Polar regions, Remote sensing, Climatology, Surface properties, Barents Sea.

44-295
**Arctic sea ice characteristics and associated atmosphere-ice interactions in summer inferred from SMMR data and drifting buoys. 1979-1984.**
Barry, R.G., et al, *Geojournal,* Jan. 1989, 18(1), p 35-44, 26 refs.
Maslanik, J A
Sea ice, Ice air interface, Ice floes, Pack ice, Drift stations, Spaceborne photography, Correlation, Periodic variations, Radiometry, Remote sensing, Polar regions, Climatology, Synoptic meteorology, Arctic Ocean.

44-296
**Causes of interannual variability in the sea ice cover of the eastern Bering Sea.**
Niebauer, H.J., et al, *Geojournal,* Jan. 1989, 18(1), p.45-59, 30 refs.
Day, R.H.
Wind factors, Sea ice distribution, Ice cover thickness, Air water interactions, Atmospheric circulation, Seasonal variations, Atmospheric pressure, Wind (meteorology), Climatology, Bering Sea.

44-297
**Fram Strait ice flux calculations and associated arctic ice conditions.**
Englebretson, R.E., et al, *Geojournal.* Jan. 1989, 18(1), p.61-67, 16 refs.
Walsh, J.E.
Sea ice, Pack ice, Drift, Ocean currents, Atmospheric circulation, Mass balance, Wind factors, Periodic variations, Wind (meteorology), Meteorological factors, Fram Strait.

44-298
**Examples of ice pack rigidity and mobility characteristics determined from ice motion.**
Lewis, J.K., et al, *Geojournal,* Jan. 1989, 18(1), p.69-77, 16 refs. For another version see 42-1807.
Englebretson, R.E., Denner, W W.
Sea ice, Ice breakup, Pack ice, Ice hardness, Ice mechanics, Sea water freezing, Seasonal variations, Velocity measurement, Ice navigation, Meteorological factors, Beaufort Sea.

44-299
**Modes of synoptic development within the Polar Basin.**
LeDrew, E F. *Geojournal,* Jan 1989, 18(1), p 79-85, 11 refs.
Synoptic meteorology, Atmospheric pressure, Atmospheric circulation, Ice air interface, Air temperature, Fronts (meteorology), Polar regions, Climatology, Classifications, Arctic Ocean.

44-300
**Intermediate-scale sea ice-atmosphere interactions over high southern latitudes in winter.**
Carleton, A M et al, *Geojournal,* Jan 1989, 18(1), p.87-101, 62 refs.
Carpenter, D.A
Polar atmospheres, Atmospheric circulation, Ice growth, Ice air interface, Seasonal variations, Sea ice distribution, Ice cover, Remote sensing, Synoptic meteorology, Clouds (meteorology), Convection, Polar regions.
Associations between polar air cloud vortices (polar lows), as an indicator of intermediate scale atmospheric activity, and the antarctic sea ice, are examined for the Southern Hemisphere winter. Seven consecutive winters, spanning a period of marked interannual variability of the atmospheric circulation and sea ice (1977-83), are analyzed using sets of DMSP (Defense Meteorological Satellite Program) imagery. Relatively high frequencies of polar lows are found in ice-edge and adjacent ocean latitudes. There is some evidence for an equatorward shift in the latitude of maximum monthly polar low occurrence during the June to Sep. period. Polar low incidence over the Southern Hemisphere on interannual time scales shows a close association with positive sea ice anomalies in the longitudes of more frequent cold air outbreaks from higher latitudes. This is particularly apparent for winters of strongly anomalous circulation, such as FGGE (1979) and the major ENSO of 1982-83. However, for individual cases on daily to weekly time scales, the feedback of cold air—sea ice advance—polar low development is not always evident, and implies that additional processes may contribute to polar air cyclogenesis in the marginal ice zone. (Auth.)

44-301
**East antarctic sea ice zone: ice characteristics and drift.**
Allison, I., *Geojournal,* Jan. 1989, 18(1), p.103-115, 37 refs.
Sea ice distribution, Ice air interface, Air water interactions, Drift, Pack ice, Ice cover thickness, Young ice, Wind factors, Radiometry, Remote sensing, Surface energy, Heat balance, Drift stations, Antarctica—Mawson Station.
Results from studies of the surface energy balance and the ocean structure in the presence of fast ice near Mawson on the antarctic coast are used to illustrate the important ways in which sea ice interacts with the ocean and atmosphere. Away from the coast, ship and drifting buoy observations are used to characterize the east antarctic sea ice zone in a study area between 60 and 120E, S of 61S. Divergent drift over most of the region plays a dominant role in expanding the ice extent in autumn and in determining the characteristics of the pack. Much of the sea ice in the region is young thin ice which forms in leads and polynyas, and in late spring in the study area, the ice thickness averaged over the total ocean surface within the ice edge less than 0.4 m. Even in winter the majority of ice floes off East Antarctica are probably less than 1 m thick. (Auth.)

44-302
**Self-similar solution of the problem of heat and moisture transport in thawing of frozen soil.**
IAnitskiĭ, P.A., *Soviet journal of applied physics,* Jan.-Feb. 1988, 2(1), p.136-144, Translated from Akademiia Nauk SSSR, Sibirskoe otdelenie, Izvestiia, Seriia tekhnicheskikh nauk, 15(4), 1987. 5 refs.
Ground thawing, Moisture transfer, Soil water migration, Frozen ground physics, Heat transfer, Unfrozen water content, Water content, Mathematical models.

44-303
**Glaciological reconstruction of the Late Pleistocene glaciation of the Tibetan highlands.** [Gliatsiologicheskaia rekonstruktsiia pozdneplеistotsenovogo oledeneniia Tibetskogo nagor'ia],
Lebedeva, I.M., *Akademiia nauk SSSR. Izvestiia. Seriia geograficheskaia,* Mar.-Apr. 1989, No.2, p.98-107, In Russian. 17 refs.
Pleistocene, Glaciation, Paleoclimatology, Tibet.

44-304
**Origin and geoelectrical resistivity of rock glaciers in semi-arid subtropical mountains (Andes of Mendoza, Argentina).**
Barsch, D., et al, *Zeitschrift für Geomorphologie,* June 1989, 33(2), P.151-163, With French and German summaries. 23 refs.
King, L.
Geoelectricity, Electrical resistivity, Rock glaciers, Argentina—Andes Mountains.

44-305
**Instrumented aircraft observations of the katabatic wind regime near Terra Nova Bay.**
Parish, T.R., et al, *Monthly weather review,* July 1989, 117(7), p.1570-1585, 26 refs.
Bromwich, D.H.
Wind (meteorology), Glacier ice, Aerial surveys, Antarctica —Terra Nova Bay, Antarctica—Reeves Glacier.
Two aircraft missions to sample the boundary layer dynamics associated with the intense katabatic wind regime at Terra Nova Bay were flown on successive days in early Nov. 1987. Light winds averaging 5 m/s were monitored at the 170 m flight level over the interior of the ice sheet. Dramatic acceleration of the airflow and abrupt 5-7 C cooling were encountered on both days near the head of Reeves Glacier just upslope from where the terrain steepens considerably. These results suggest that much of the airflow convergence which sustains the coastal katabatic winds is forced by localized topographic channeling into Reeves Glacier, and that the descending airstream is negatively buoyant. The horizontally propagating katabatic winds were followed for 250 km directly offshore and for 200 km southward parallel to the Victoria Land coast, the airstream momentum gradually decreased along both flight paths. In conjunction with the descent of negatively buoyant air down Reeves Glacier and horizontal flow across Nansen Ice Sheet, thermal infrared satellite images showed a warm katabatic signature along the trajectory. This paradox is explained by vigorous vertical mixing within the katabatic layer which makes the temperature of the emitting snow surface beneath the katabatic jet much warmer than that for adjacent light-wind areas. Thermal images often suggest that katabatic winds propagate for hundreds of kilometers beyond the slope break, this interpretation is strongly supported by the offshore aircraft data. (Auth. mod.)

44-306
**Seismic stratigraphy of the Antarctic Peninsula Pacific margin: a record of Pliocene-Pleistocene ice volume and paleoclimate.**
Larter, R.D., et al, *Geology,* Aug. 1989, 17(8), p.731-734.
Barker, P.F.
Sea level, Ice volume, Paleoclimatology, Glacial deposits, Antarctica Antarctic Peninsula.
Multichannel seismic profiles across the Pacific margin of the Antarctic Peninsula show a series of oblique progradational sequences. These sequences exhibit a variety of unusual characteristics that suggest they were produced by the action of ice sheets grounded out to the shelf edge at times of glacial maximum. Reflection events from deeper stratigraphic levels, followed down the continental slope and onto the rise, overlie ocean crust of known age, showing that at least 8 such glacial sequences have been deposited within the past 6 m.y. Similar groundings have probably occurred on most antarctic margins, but the depositional record is particularly well preserved at this margin because of Pliocene-Pleistocene thermal subsidence. Neogene global sea-level fluctuations have been attributed to changes in volume of continental ice sheets. The depositional sequences on the Pacific margin of the Antarctic Peninsula are thought to record West Antactic ice-sheet fluctuations directly. Further investigation of these sequences would assess the relation between fluctuations in ice volume and the low-latitude record of global sea-level change. (Auth.)

44-307
**Multiphase flows in porous media.**
Morel-Seytoux, H.J., Developments in Hydraulic Engineering, Vol.4. Edited by P. Novak, London, Elsevier Applied Science Publishers, 1987, p.103-174, 58 refs.
DLC TC1,D47
Porous materials, Soil freezing, Water transport, Analysis (mathematics), Capillarity, Fluid flow, Seepage, Mass flow, Hydrology, Crude oil.

44-308
**Intake design for ice conditions.**
Ashton, G.D., MP 2518, Developments in Hydraulic Engineering, Vol.5. Edited by P. Novak, London, Elsevier Applied Science Publishers, 1988, p 107-138, 44 refs.
Ice control, Water intakes, Ice accretion, Frazil ice, Ice formation, Water flow, Stabilization, Countermeasures, Hydraulic structures, River ice, Fluid dynamics, Lake ice.

44-309
**Partition of air-ice-ocean momentum exchange as a function of ice concentration, floe size, and draft.**
Steele, M., et al, *Journal of geophysical research,* Sep. 15, 1989, 94(C9), p.12,739-12,750, 33 refs.
Morison, J.H., Untersteiner, N.
Sea ice, Ice models, Interfaces, Ice floes.

44-310
**Complex job speeds to completion.**
Lawson, M., *Engineering news-record,* Sep. 28, 1989, 223(13), p.28-30.
Electric power, Earthwork, Glacial lakes, Earth dams, United States—Alaska—Bradley Lake.

44-311
**Pangnirtung water reservoir: geotechnical aspects.**
Smith, L.B., et al, *Canadian geotechnical journal,* Aug. 1989, 26(3), p.335-347, With French summary. 2 refs. For another version see 43-1330.
Reservoirs, Earthwork, Permafrost beneath structures, Excavation, Permafrost, Cold weather construction, Blasting.

44-312
**Influence of placement method on the *in situ* density of hydraulic sand fills.**
Sladen, J.A., et al, *Canadian geotechnical journal,* Aug. 1989, 26(3), p.453-466, With French summary 46 refs.
Hewitt, K.J.
Hydraulic fill, Sands, Offshore drilling, Artificial islands, Penetration tests.

44-313
**Two-stream multilayer, spectral radiative transfer model for sea ice.**
Perovich, D.K., *U.S. Army Cold Regions Research and Engineering Laboratory,* July 1989, CR 89-15, 17p., ADA-212 433, 24 refs.
Sea ice, Ice optics, Albedo, Light transmission, Electromagnetic properties, Radiation, Mathematical models.
The reflection, absorption, and transmission of light at visible and near-infrared wavelengths is important for a number of geophysical problems. Light reflection is an important parameter in remote sensing studies, absorption is significant to ice thermodynamics, and transmission strongly influences biological activity in and under the ice. The focus of this report is on the reflection and transmission of light by spatially inhomogeneous and temporally varying sea ice covers. This is investigated using a two-stream, multilayer radiative transfer model in the wavelength region from 400 to 1000 nm. The model is computationally simple and utilizes the available experimental data on the optical properties of sea ice. The ice cover is characterized as a layered medium composed of selections from nine distinct snow and ice types. Three case studies are presented illustrating values of spectral albedo, transmittance, and transmitted photosynthetically active radiation (PAR) for 1) a spatially inhomogeneous ice cover, 2) a uniform ice cover as it undergoes a melt cycle, and 3) a temporally changing spatially variable ice cover. The importance of thickness and surface conditions on the reflected and transmitted radiation fields is demonstrated.

44-314
Environmental protection problems in gas-bearing regions of northern West Siberia. [Problemy okhrany okruzhaiushchei sredy v uslovnakh gazonosnykh raionov severa Zapadnoi Sibiri],
Popov, S.N., et al, *Problemy severa*, 1988, Vol.23, p.187-197, In Russian. 17 refs.
Popova, S V
Environmental protection, Gas production, Permafrost preservation, Frozen ground temperature.

44-315
Gorbachev's Murmansk speech: the Soviet initiative and Western response.
Scrivener, D , Oslo, Norwegian Atlantic Committee, 1989, 75p., 148 refs.
International cooperation, Legislation, Research projects, Military operation, Environmental protection.

44-316
Regime of groundwaters and runoff in forests and swamps of the Yenisei part of western Siberia.
Konstantinov, V.D., *Soviet forest sciences*, 1986, No.2, p.10-16, 22 refs. For Russian original see 41-3209.
River basins, Taiga, Cryogenic soils, Snow surveys, Snow cover distribution, Snow water equivalent, Soil temperature.

44-317
Water conservation and protection functions of forests of Sakhalin.
Klintsov, A.P , *Soviet forest sciences*, 1986, No 3, p.51-55, Translated from Lesovedenie 15 refs
Snow accumulation, Snow melting, Forestry, Runoff, Forest soils, Hydrogeology.

44-318
Improving the prevention of icing of asphalt-concrete pavements. [Sovershenstvovanie gololedobezopasnykh asfal'tobetonnykh pokrytii],
Mikhallov, A.V., et al, *Avtomobil'nye dorogi*, Sep. 1987, No.9, p.9-11, In Russian. 2 refs.
Polosina-Nikitina, N.S., Rasnikov, V.P., Poshekhonova, T.A.
Road icing, Countermeasures, Safety, Concrete pavements, Bituminous concretes.

44-319
Plasma method of thawing frozen ground. [Plazmennyi sposob ottaivaniia gornykh porod],
Zadvornev, G.A., et al, *Akademiia nauk SSSR. Sibirskoe otdelenie Izvestiia Seriia tekhnicheskikh nauk*, Aug. 1987, 15(4), p.112-115, In Russian. 6 refs.
IAkunin, V.N., Prokhorov, IU.B.
Ground thawing, Frozen ground temperature, Artificial thawing, Analysis (mathematics)

44-320
Self-similar solution to the problem of heat-moisture transfer in thawing frozen ground. [Avtomodel'noe reshenie zadachi teplovlagoperenosa pri ottaivanii merzlykh porod],
IAnitskii, P A , *Akademiia nauk SSSR. Sibirskoe otdelenie. Izvestiia. Seriia tekhnicheskikh nauk*, Aug. 1987, 15(4), p.116-122, In Russian. 5 refs.
Ground water, Frozen ground thermodynamics, Heat transfer, Moisture transfer, Mathematical models.

44-321
Establishment of *Salix alaxensis* on a gravel pad in arctic Alaska.
Bishop, S.C., et al, *Journal of applied ecology*, Aug 1989, 26(2), p.575-583, 36 refs
Chapin, F.S., III.
Site surveys, Plant ecology, Revegetation, Trees (plants), Environmental impact, Pipelines, Alaska - Brooks Range

44-322
Icy reception suits roadheader down to the ground.
Weber, B.H., *Tunnels & tunnelling*, Jan. 1989, 20(1), p.19-21.
Tunneling (excavation), Artificial freezing, Countermeasures, Railroad tunnels, Soil freezing, Seepage, Construction

44-323
Significance of ice-covers for planktonic algae.
Müller-Haeckel, A., et al, *Vatten*, June 27, 1989, 45(2), p.174-177, With Swedish summary. 14 refs.
Andersson. N Å
Algae, Climatic factors, Plankton, Light effects, Ice cover effect, Ice cover thickness, Plant ecology, Growth, Sweden.

44-324
Report of the British Antarctic Survey for the period 1 July 1987 to 30 June 1988.
British Antarctic Survey, Cambridge, Natural Environmental Research Council, [1988], 82p., Refs. p.67-74.
Research projects, Glaciology.
General remarks are made concerning staff changes, finance and activities in various divisions at BAS stations, personnel awards are announced; distinguished visitors, and British and international meetings attended are listed Scientific programs are reviewed in considerable detail in space plasma physics, ionospheric physics and geomagnetism, glacier ice and meteorology, geology, oversnow gravity and seismic projects, marine geoscience, biological oceanography and marine physiology, terrestrial and freshwater life sciences, and human physiology and medicine. Included are lists of 1987-1988 publications, and staff at various locations, divisions and ships

44-325
Possibilities for hydraulic transport of high-viscosity oil in the North. [Vozmozhnosti gidrotransporta vysokoviazkikh neftei v usloviiakh Severa],
Kagan, IA.M , et al, *Stroitel'stvo truboprovodov*, June 1989, No.6, p.36-37, In Russian.
Kudriashov, B.M.
Petroleum transportation, Pipelines, Frozen ground temperature, Design.

44-326
Frost resistance of concrete used by enterprises of the Yakut Coal System. [O morozostoikosti betona, ispol'zuemogo kombinatom IAkutuglestroi],
Smertin, O.S., et al, *Shakhtnoe stroitel'stvo*, June 1987, No.6, p.19-20, In Russian.
Concrete freezing, Frost resistance.

44-327
Method for determining the length of freezing in cement screens under permafrost conditions. [Metodika opredeleniia prodolzhitel'nosti promerzaniia tamponazhnoi zavesy v usloviiakh dolgoletnei merzloty],
Kipko, E.IA , et al, *Shakhtnoe stroitel'stvo*, Dec 1987, No.12, p 5-6, In Russian 2 refs
Cements, Concrete freezing, Analysis (mathematics), Heat transfer coefficient.

44-328
Ice-breaking attachment on air cushion. [Ledokol'naia pristavka na vozdushnoi podushke],
Zuev, V., et al, *Rechnoi transport*, Apr 1986, No 4, p.37-38, In Russian.
Ice breaking, Air cushion vehicles, Ice navigation, Icebreakers.

44-329
Port in the Arctic. [Port v zapoliar'e],
Vinogradova, N., *Rechnoi transport*, Apr. 1986, No.4, p.39-41, In Russian.
Ports, Permafrost beneath structures.

44-330
Loads on shafts of river icebreakers. [Nagruzki valov rechnykh ledokolov],
Chernov, S., et al, *Rechnoi transport*, June 1986, No.6, p.31, In Russian
Merkulov, V
Icebreakers, Ice navigation, Ice loads, Propellers

44-331
Instability and self-regulation of glacial areas. [Neustoichivost' i samoorganizatsiia oledenenii],
Mazo, V.L., *Akademiia nauk SSSR. Institut geografii. Materialy gliatsiologicheskikh issledovanii. Khronika obsuzhden.*: 1989, No.65, p.3-25, In Russian with English summary. 73 refs.
Ice sheets, Glacier oscillation, Glacier flow, Ice mechanics, Topographic effects, Glaciology, Glacier surveys, Stability, Climatic changes, Analysis (mathematics).

44-332
Present snow cover distribution and the intensity of glacier mass transfer at its bottom surface. [Sovremennoe polozhenie khionosfery i intensivnost' massoobmena lednikov na ee nizhnei poverkhnosti],
Krenke, A.N., *Akademiia nauk SSSR. Institut geografii. Materialy gliatsiologicheskikh issledovanii. Khronika obsuzhdenna*, 1989, No.65, p 27-34, In Russian with English summary. 17 refs.
Glacier mass balance, Snow cover distribution, Mass transfer, Glacier ablation, Glacier alimentation, Snow line, Altitude, Precipitation (meteorology), Moisture transfer, Humidity, Glaciology.

44-333
"Folk glaciology" in Central Asia. ["Narodnaia gliatsiologiia" Srednei Azii],
Glazyrin, G.E , et al, *Akademiia nauk SSSR Institut geografii. Materialy gliatsiologicheskikh issledovanii. Khronika obsuzhdeniia*, 1989, No.65, p.35-43, In Russian with English summary. 41 refs.
Stanishevskii, A.V., Chertanov, S.P., Ogudin, V.L.
Glaciology, Mountain glaciers, Transportation, Terminology.

44-334
Climatic effect on temperature distribution in the middle of an ice sheet. [Vliianie klimata na raspredelenie temperatury v tsentral'noi oblasti pokrovnogo lednika],
Larina, T.B., et al, *Akademiia nauk SSSR. Institut geografii. Materialy gliatsiologicheskikh issledovanii. Khronika obsuzhdeniia*, 1989, No.65, p.43-49, In Russian with English summary 12 refs
Zagorodnov, V.S.
Glacier ice, Ice temperature, Climatic factors, Ice sheets, Topographic effects, Temperature distribution, Glacier mass balance, Analysis (mathematics).

44-335
Mathematical model and numerical studies of glacier ice consolidation. [Matematicheskaia model' i chislennoe issledovanie protsessa uplotneniia lednikovogo l'da],
Lipenkov, V.IA., et al, *Akademiia nauk SSSR. Institut geografii. Materialy gliatsiologicheskikh issledovanii. Khronika obsuzhdeniia*, 1989, No.65, p.49-58, In Russian with English summary. 16 refs.
Salamatin, A.N., Grigor'eva, IU.A.
Glacier surveys, Ice density, Ice cores, Porosity, Air entrainment, Mathematical models, Firn, Atmospheric pressure

44-336
Formation and decomposition of air hydrates in glacier ice. [Obrazovanie i razlozhenie gidratov vozdukha v lednikovom l'du],
Lipenkov, V.IA., *Akademiia nauk SSSR. Institut geografii. Materialy gliatsiologicheskikh issledovanii. Khronika obsuzhdeniia*, 1989, No.65, p.58-64, In Russian with English summary. 21 refs.
Glacier ice, Ice density, Air entrainment, Hydrates, Ice structure, Clathrates, Analysis (mathematics), Distribution, Antarctica—Vostok Station.
The results of analysis of the primary gas inclusions and products of the decomposition of gas hydrates contained in the ice core from the 2203 m-deep borehole drilled at the Vostok Station, are discussed in the paper. Three stages of the glacier ice densification have been distinguished Relaxation compression of air bubbles at the first stage causes the growth of pressure at the gaseous phase. At the second stage the gas pressure in bubbles persists at the level of pressure of the air hydrates' dissociation. Decrease in the volume of the gaseous phase is mainly due to hydrate formation. Two mechanisms of the air transition into the clathrate form are established: gradual crystallization of hydrates through compression of the primary gas inclusions, and replacement of bubbles reaching the critical volume by crystalline clathrate inclusions of corresponding volume The development of these processes in the glacier causes the formation of a thick transitional layer, within which the amount of gas inclusions decreases with depth up to their complete disappearance in ice. At the final phase of compaction the ice consists of ice and hydrates of the air, the density of which is determined by the temperature and pressure in the sequence of an ice pack. (Auth.)

44-337
Phenomenon of cryogenic concentration of heavy water. [Avlenie kriogennogo kontsentrirovaniia tiazheloi vody],
Adzhiev, M.E., *Akademiia nauk SSSR. Institut geografii. Materialy gliatsiologicheskikh issledovanii. Khronika obsuzhdeniia*, 1989, No.65, p 65-69, In Russian with English summary. 10 refs.
Heavy water, Permafrost beneath lakes, Ice formation, Ice structure, Molecular structure, Phase transformations, Isotopes, Temperature effects.

44-338
Ground ice of Spitsbergen. [Podzemnye l'dy Shpitsbergena],
Vtiurin, B I., *Akademiia nauk SSSR Institut geografii Materialy gliatsiologicheskikh issledovanii Khronika obsuzhdeniia*, 1989, No.65, p.69-75, In Russian with English summary. 6 refs.
Ground ice, Permafrost, Ice structure, Geocryology, Climatic factors, Moraines, Glacier ice, Thermokarst, Frost mounds, Norway—Spitsbergen.

44-339
Chemical interaction in the system "water-ice-rock". [Khimicheskie vzaimodeistvila v sistemakh "voda-led-poroda"],
Ivanov, A.V., *Akademiia nauk SSSR. Institut geografii. Materialy gliatsiologicheskikh issledovanii Khronika obsuzhdenua,* 1989, No.65, p.75-80, In Russian with English summary 23 refs.
Ground ice, Ice composition, Ice sheets, Permafrost weathering, Freeze thaw cycles, Ions, Chemical analysis, Ice water interface, Ice solid interface, Temperature effects, Rocks.

44-340
Paragenesis of naleds and ground ice. [Paragenez naledei i podzemnykh l'dov],
Alekseev, V.R., *Akademiia nauk SSSR. Institut geografii Materialy gliatsiologicheskikh issledovanii Khronika obsuzhdeniia,* 1989, No.65, p.81-86, In Russian with English summary 9 refs
Naleds, Ground ice, Ice formation, Active layer, Ice structure, Ice physics, Temperature distribution, Ice melting, Frozen ground physics.

44-341
Features of mass transfer of flat-summit glaciers of interior Tien Shan. [Osobennosti massoobmena lednikov ploskikh vershin vnutrennego Tian-Shania],
Mikhalenko, V N., *Akademua nauk SSSR. Institut geografii. Materialy gliatsiologicheskikh issledovanii. Khronika obsuzhdeniia,* 1989, No.65, p.85-92, In Russian with English summary 19 refs
Glacier mass balance, Mass transfer, Mountain glaciers, Glacier thickness, Climatic factors, Ice density, Ice temperature, Firn, Snow cover effect, Albedo, USSR—Tien Shan.

44-342
Variability of accumulation and ablation of mountain glaciers. [Izmenchivost' akkumuliatsii i abliatsii gornykh lednikov],
Diurgerov, M.B., et al, *Akademiia nauk SSSR. Institut geografii Materialy gliatsiologicheskikh issledovanii Khronika obsuzhdenua,* 1989, No.65, p.92-102, In Russian with English summary. 30 refs.
Ol'shanskii, G.I., Prokhorova, N.V.
Glacier alimentation, Glacier ablation, Glacier mass balance, Mountain glaciers, Climatic changes, Seasonal variations, Altitude, Analysis (mathematics), Variations.

44-343
Growth of annual rings of Shrenkiana spruce and glacier fluctuation on the northern slope of Terskei Ala-Tau. [Prirost godichnykh kolets eli Shrenka i kolebaniia lednikov na severnom sklone khrebta Terskei Ala-Too],
Solomina, O.N., et al, *Akademua nauk SSSR. Institut geografii. Materialy gliatsiologicheskikh issledovanii. Khronika obsuzhdenua,* 1989, No.65, p.103-110, In Russian with English summary. 7 refs.
Glazovskii, A.F.
Glacier oscillation, Ice dating, Age determination, Trees (plants), Glacier surveys, Glaciation, Forest lines, Climatic factors, Growth.

44-344
Glacio-nival phenomena in the Polar Urals. [Snezhno-ledovye iavleniia na Poliarnom Urale],
Khodakov, V.G., et al, *Akademiia nauk SSSR. Institut geografii. Materialy gliatsiologicheskikh issledovanii. Khronika obsuzhdeniia,* 1989, No.65, p.110-118, In Russian with English summary. 15 refs.
Il'ina, E.A.
Mountain glaciers, Snowdrifts, Snow cover distribution, Avalanche formation, Mudflows, Naleds, Ice formation, Floods, Snowfall, Ice sheets, Glacial rivers.

44-345
Statistical structure of the snow-reserve fields on various surfaces in the polar regions. [Statisticheskaia struktura polei snegozapasov na raznykh tipakh poverkhnosteI v usloviiakh Zapoliar'ia],
Zhidkov, V.A., et al, *Akademiia nauk SSSR. Institut geografii. Materialy gliatsiologicheskikh issledovanii. Khronika obsuzhdenua,* 1989, No.65, p.118-124, In Russian with English summary. 12 refs.
Samoilov, R.S.
Snow accumulation, Snow depth, Snow cover distribution, Mountain glaciers, Statistical analysis, Slope orientation, Topographic features, Polar regions.

44-346
Impact of vehicles on snow, shielding soil and vegetation in the North. [O vozdeistvii transportnykh sredstv na sneg, ekraniruiushchii pochvenno-rastitel'nyi pokrov Severa],
Zhidkov, V A., et al, *Akademua nauk SSSR Institut geografii Materialy gliatsiologicheskikh issledovanii Khronika obsuzhdeniia,* 1989, No.65, p.124-131, In Russian with English summary. 20 refs.
Samoilov, R.S., Khodakov, V.G.
Permafrost preservation, Permafrost beneath roads, Tracked vehicles, Snow cover effect, Vegetation, Environmental impact, Transportation, Snow compaction, Active layer, Snow melting.

44-347
Giant icebergs of West Antarctica—coincidence or the beginning of ice-sheet disintegration. [Gigantskie aisbergi v Zapadnoi Antarktide—sluchainost' ili nachalo raspada oledeneniia?],
Losev, K.S., *Akademiia nauk SSSR. Institut geografii. Materialy gliatsiologicheskikh issledovanii. Khronika obsuzhdeniia,* 1989, No.65, p.132-134, In Russian with English summary 7 refs
Icebergs, Glacier mass balance, Calving, Ice volume, Remote sensing, Ice sheets, Ice breakup
Space images of the peripheral areas of West Antarctica made in 1986-1987, revealed the calving of a great number of giant icebergs on the Filchner, Larsen, Thwaites and Ross Ice Shelves. Their total volume made up about 9150 cu km which exceeds the mean annual volume of iceberg formation nearly by an order of magnitude The formation of numerous icebergs suggests the presence of a certain common condition, which is supposed to be a significant shrinkage of the area of sea ice since the beginning of the 1970's The sea ice is in a state of complex interrelations with the ice sheet and can serve as a damper of triggering pulses coming from the Ocean as well as a triggering mechanism in compressions. However, as far as no traces of decay have been yet revealed on the ice shelves and on the Antarctic Ice Sheet, the detachment of icebergs can be considered as a random process. (Auth.)

44-348
Temperature regime of the Akademiya Nauk Glacier, Severnaya Zemlya. [Temperaturnyi rezhim lednika Akademii Nauk na Severnoi Zemle],
Zagorodnov, V S , et al, *Akademiia nauk SSSR. Institut geografii Materialy gliatsiologicheskikh issledovanii Khronika obsuzhdenua,* 1989, No.65, p.134-138, In Russian with English summary. 5 refs.
Savatiugin, L.M., Morev, V.A.
Glacier ice, Ice thermal properties, Temperature distribution, Boreholes, Thermal drills, Temperature gradients, Glacier melting, Pleistocene, Firn, USSR—Severnaya Zemlya.

44-349
Anomalous vertical distribution of humidity in the near-glacier air layer. [O prirode anomal'nogo vertikal'nogo raspredeleniia kharakteristik vlazhnosti v prilednikovom sloe vozdukha],
Arapov, P.P., et al, *Akademiia nauk SSSR. Institut geografii Materialy gliatsiologicheskikh issledovanii Khronika obsuzhdeniia,* 1989, No.65, p.138-140, In Russian with English summary. 6 refs.
Krigel', A.M., Morachevskii, V.G.
Humidity, Ice air interface, Ice thermal properties, Glacier melting, Temperature distribution, Water vapor, Glacier surfaces, Phase transformations, Dew point, Temperature inversion.

44-350
Statistical evaluation of the density and direction of glacier crevasses. [Statisticheskie otsenki gustoty i napravleniia lednikovoI treshchinovatosti],
Ivanov, A I., *Akademiia nauk SSSR. Institut geografii. Materialy gliatsiologicheskikh issledovanii. Khronika obsuzhdeniia,* 1989, No.65, p.140-143, In Russian with English summary. 5 refs.
Glacier ice, Crevasses, Ice density, Polarization (waves), Analysis (mathematics), Distribution.

44-351
Stratification of glaciers in Kamchatka. [K stratifikatsii lednikov Kamchatki],
Vaikmiae, R A , et al, *Akademiia nauk SSSR Institut geografii. Materialy gliatsiologicheskikh issledovanii. Khronika obsuzhdeniia,* 1989, No.65, p.144-148, In Russian with English summary. 8 refs.
Murav'ev, IA.D., Punning, IA.-M.K.
Glacier ice, Stratigraphy, Ice structure, Ice composition, Volcanic ash, Isotope analysis, Firn, Seasonal variations, Oxygen isotopes.

44-352
Studies of Fridtjof Glacier in Spitsbergen in 1988. [Issledovaniia lednika Frit'of na Shpitsbergene v 1988 godu],
Glazovskii, A.F , et al, *Akademiia nauk SSSR. Institut geografii. Materialy gliatsiologicheskikh issledovanii. Khronika obsuzhdeniia,* 1989, No.65, p 148-153, In Russian with English summary. 8 refs.
Moskalevskii, M.IU.
Glacier mass balance, Glacier thickness, Glacier beds, Glacier surfaces, Radio echo soundings, Ice structure, Topographic features, Mapping, Wave propagation, Glacier ablation, Glacier melting, Norway—Spitsbergen.

44-353
Features of the snow cover distribution on glaciers in winter and spring on the southern slope of Elbrus Mountain. [Osobennosti raspredeleniia zimne-vesennikh snegozapasov na lednikakh iuzhnogo sklona El'brusa],
Bazhev, A.B., et al, *Akademiia nauk SSSR. Institut geografii. Materialy gliatsiologicheskikh issledovanii. Khronika obsuzhdeniia,* 1989, No.65, p.154-160, In Russian with English summary. 6 refs.
Rototaeva, O V , Khmelevskoi, I.F., Shurdumov, IU.B.
Snow accumulation, Snow cover distribution, Glacier surfaces, Snow density Mountain glaciers, Snow ice interface, Seasonal variations, Altitude, Wind factors, USSR—Elbrus Mountain.

44-354
Meteorological factors on the formation of snowmelt runoff on the northern slope of the Caucasus. [Meteorologicheskie faktory formirovaniia talogo snegovogo stoka na severnom sklone Bol'shogo Kavkaza],
Ananicheva, M.D., et al, *Akademiia nauk SSSR. Institut geografii. Materialy gliatsiologicheskikh issledovanii Khronika obsuzhdenua,* 1989, No.65, p.160-164, In Russian with English summary. 5 refs.
Shaidulin, I.Z., Shmakin, A.B.
Snowmelt, Runoff, Meltwater, Air temperature, Radiation balance, Heat balance, Heat loss, Meteorological factors, Mountains, USSR—Caucasus.

44-355
Studies on snow cover stability in the Dukant River basin using acoustic emission. [Issledovaniia ustoichivosti snezhnogo pokrova v basseine reki Dukant metodom akusticheskoI emissii],
Kanaev, L.A., et al, *Akademiia nauk SSSR. Institut geografii. Materialy gliatsiologicheskikh issledovanii. Khronika obsuzhdeniia,* 1989, No.65, p 164-168, In Russian with English summary. 10 refs.
Kuz'menko, V.P.
Snow cover stability, Avalanche formation, Snow acoustics, Snow accumulation, Acoustic measurement, Avalanche forecasting, Precipitation (meteorology), Wind factors, Air temperature, USSR—Tien Shan.

44-356
Excessive pressure in the pores of a snow cover. [Izbytochnoe davlenie v porakh snezhnoi tolshchi],
Samolliuk, V.I., *Akademua nauk SSSR. Institut geografii. Materialy gliatsiologicheskikh issledovanii. Khronika obsuzhdeniia,* 1989, No.65, p.169-172, In Russian with English summary. With comments by K.S. Losev. 5 refs.
Losev, K.S.
Snow cover, Porosity, Snow density, Thermal diffusion, Thermodynamics, Models, Avalanche formation, Analysis (mathematics).

44-357
Annotated list of the Soviet literature on glaciology for 1986. [Annotirovannyi spisok sovetskoI literatury po gliatsiologii za 1986 god],
Kotliakov, V.M., et al, *Akademua nauk SSSR. Institut geografii. Materialy gliatsiologicheskikh issledovanii. Khronika obsuzhdeniia,* 1989, No.65, p.173-208, In Russian with English summary.
Chernova, L.P.
Glaciology, Bibliographies, Snow surveys, Ice surveys.

44-358
Ninth All-Union Glaciological Symposium in Tbilisi. [Deviatyi vsesoiuznyi gliatsiologicheskii simpozium v Tbilisi],
Ushakov, A.I., *Akademiia nauk SSSR. Institut geografii. Materialy gliatsiologicheskikh issledovanii. Khronika obsuzhdeniia,* 1989, No.65, p.209-224, In Russian.
Glaciology, Meetings, Snow surveys, Ice surveys, Glaciers.

44-359
Avalanches and avalanche prevention. [O lavinakh i bor'be s nimi],
Fersman, A.E., *Akademiia nauk SSSR. Institut geografii. Materialy gliatsiologicheskikh issledovanii. Khronika obsuzhdeniia,* 1989, No.65, p.230-234, In Russian.
Avalanche formation, Countermeasures, Avalanche triggering, Mountains, Avalanche engineering, Structures, Switzerland.

44-360
Glaciation and other "perpetual motions" of the tectonic machine, Earth. [Oledenenie i drugie "vechnye" dvigateli tektonicheskoĭ mashiny "Zemlia"],
Semenov, V I., *Akademiia nauk SSSR Institut geografii Materialy gliatsiologicheskikh issledovanii Khronika obsuzhdeniia,* 1989, No.65, p.234-239, In Russian.
Glaciation, Ocean currents, Tectonics, Analysis (mathematics), Mechanical properties.

44-361
Hypothesis of the origin of ice ages based on the drift of continents in relation to the poles of the Earth. [Gipoteza o proiskhozhdenii lednikovykh periodov za schet smeshcheniia materikov otnositel'no poliusov Zemli],
IAroslavtsev, G.Z., *Akademiia nauk SSSR. Institut geografii Materialy gliatsiologicheskikh issledovanii. Khronika obsuzhdeniia,* 1989, No.65, p.239-240, In Russian
Ice age theory, Continental drift, Paleoclimatology

44-362
Balloon borne observations of PSCS, frost point, ozone and nitric acid in the north polar vortex.
Rosen, J.M., et al, *Geophysical research letters,* Aug. 1989, 16(8), p.791-794, 12 refs.
Oltmans, S.J., Evans, W.F.
Balloons, Polar atmospheres, Cloud physics, Backscattering, Atmospheric composition, Temperature measurement, Stratosphere, Ice crystal growth, Condensation.

44-363
Seasonal variations of sea ice motion in the Transpolar Drift Stream.
Serreze, M.C., et al, *Geophysical research letters,* Aug. 1989, 16(8), p.811-814, 21 refs.
McLaren, A.S., Barry, R.G.
Drift stations, Seasonal variations, Wind factors, Sea ice distribution, Pack ice, Atmospheric circulation, Ice surveys, Oceans, Polar regions, Arctic Ocean.

44-364
Albedo patterns of Triton.
Stansberry, J A , *Geophysical research letters,* Aug 1989, 16(8), p 961-964, 9 refs
Extraterrestrial ice Planetary environments, Hoarfrost, Albedo, Ice sublimation, Surface properties.

44-365
Grain metamorphism in polar nitrogen ice on Triton.
Zent, A.P., et al, *Geophysical research letters,* Aug. 1989, 16(8), p.965-968, 21 refs.
McKay, C.P., Pollack, J.B., Cruikshank, D.P.
Extraterrestrial ice, Ice growth, Grain size, Ice models, Planetary environments, Thermal properties.

44-366
Triton: scattering models and surface/atmosphere constraints.
Thompson, W.R., *Geophysical research letters,* Aug. 1989, 16(8), p.969-972, 30 refs.
Scattering, Extraterrestrial ice, Colored ice, Ice spectroscopy, Albedo, Surface properties.

44-367
Detailed measurement of scattering by a spheroidal particle having varying proportions of ice and water.
Hume, A.L., et al, *Institution of Electrical Engineers. Proceedings. Microwaves, antennas and propagation,* Aug 1989. 136 Pt H(4), p 351-357, 14 refs
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Liquid phases, Computer applications, Scattering, Microwaves, Hailstone structure, Artificial hailstones, Artificial melting, Dielectric properties, Measurement, Spheres, Precipitation (meteorology).

44-368
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Aber, J.S., et al, Dordrecht, Netherlands, Kluwer Academic Publishers, 1989, 200p , Series. Glaciology and quaternary geology. Refs. p.183-194.
Croot, D.G., Fenton, M.M.
DLC GB581.A24 1989
Glacial geology, Tectonics, Geomorphology, Glacial erosion, Glacial deposits, Landforms, Ice push.

44-369
Destructive mass movements in high mountains. hazard and management.
Eisbacher, G H., et al, *Canada. Geological Survey. Paper,* 1988, 84-16, 230p , With French summary. Refs. p.53-68.
Clague, J.J.
Avalanches, Landslides, Slope processes, Landslide control, Avalanche engineering, Mountain glaciers, Rock mechanics.

44-370
Holocene proxy-climate data from the Canadian Arctic.
Ovenden, L., *Canada. Geological Survey. Paper,* 1988, 88-22, 11p., With French summary. 63 refs.
Paleoclimatology, Geochronology, Quaternary deposits, Canada.

44-371
Morphodynamics of the Wadden Sea.
Ehlers, J., Rotterdam, Netherlands, A.A. Balkema, 1988, 397p., Refs. p.363-379.
Marine geology, Coastal topographic features, Shore erosion, Marine deposits, Sea water freezing, Geomorphology, Wadden Sea.

44-372
Ground thermal conductivity effect on the thermal regime of a pipeline-duct-ground-atmosphere system. [O vliianii teploprovodnosti grunta na teplovoĭ rezhim sistemy truboprovody-kanal-grunt-atmosfera],
Sobolev, V.G., *Izvestiia vysshikh uchebnykh zavedenii. Stroitel'stvo i arkhitektura,* July 1989, No.7, p.103-106, In Russian. 2 refs.
Thermal conductivity, Thermal regime, Pipelines, Active layer, Frozen ground temperature.

44-373
Thermal regime of moorings in a Yakut river port. [Temperaturnyĭ rezhim prichalov IAkutskogo rechnogo porta],
Sobol', S.V., et al, *Izvestiia vysshikh uchebnykh zavedenii. Stroitel'stvo i arkhitektura,* June 1989, No.6, p.68-71, In Russian. 3 refs.
Kon'kova, N.A.
Thermal regime, Moorings, Ports, Frozen ground, Seasonal freeze thaw.

44-374
Methane flux time series for tundra environments.
Whalen, S.C., et al, *Global biogeochemical cycles,* Dec. 1988, 2(4), p.399-409, 39 refs.
Reeburgh, W.S.
Tundra, Site surveys, Atmospheric composition, Biomass, Ecosystems, Organic soils, Soil temperature, Measurement, Mosses, Time factor, Mass balance.

44-375
On the generation of stream runoff in till soils.
Rodhe, A., *Nordic hydrology,* 1989, 20(1), p.1-8, 15 refs.
Runoff, Stream flow, Meltwater, Moraines, Isotope analysis, Site surveys, Surface drainage, Ground water, Hydrology.

44-376
Simulation of soil frost depth and effect on runoff.
Vehviläinen, B , et al, *Nordic hydrology,* 1989, 20(1), p.9-24, 10 refs.
Motovilov, IU.G.
Simulation, Frost penetration, Runoff, Snow heat flux, Snow cover effect, Soil freezing, Frost action, Soil water migration, Permeability.

44-377
Transition limits for water-droplet crystallization with the NASA Lewis icing nozzle.
Marek, C J., *Journal of aircraft,* Sep. 1989, 26(9), p.887-888, 3 refs.
Aircraft icing, Simulation, Spray freezing, Cloud droplets, Ice crystal growth, High pressure tests, Test equipment, Temperature effects, Phase transformations.

44-378
Isidis basin. site of ancient volatile-rich debris layer.
Grizzaffi, P., et al, *Icarus,* Feb. 1989, 77(2-Pt.I), p.358-381, Refs. p.379-381.
Schultz, P.H.
Mars (planet), Sediment transport, Extraterrestrial ice, Ablation, Topographic features, Ice erosion, Surface properties.

44-379
Statistical characteristics of radar echoes of precipitating snow clouds over the Ishikari Bay, Hokkaido, Japan (Radar echo climatology; Part 1).
Kikuchi, K., et al, *Meteorological Society of Japan. Journal,* Apr. 1989, 67(2), p.221-230, With Japanese summary. 9 refs.
Asuma, Y., Nakahira, O.
Clouds (meteorology), Snowfall, Radar echoes, Japan —Hokkaido.

44-380
Ocean drilling in the Weddell Sea.
Nagao, T., *Polar news,* Aug. 1987, No.45, p.45-51, In Japanese.
Drill core analysis, Bottom sediment, Offshore drilling, Paleoclimatology, Continental drift, Antarctica Weddell Sea.
This is a popular account of Japanese participation in Leg 113 of the ODP (Ocean Drilling Program) in 1987 with the drillship *Joides Resolution,* the West German icebreaker *Polarstern,* and the Danish support ship *Maersk Master,* in the Weddell Sea. Twenty-two core samples were drilled at 9 sites to study paleoceanography, paleoclimatology, and plate tectonics from the late Campanian (70 million years ago) to the present

44-381
Probing the structure and movement of the antarctic ice sheet.
Nishio, F., *Polar news,* Feb. 1988, No.46, p.2-9, In Japanese.
Ice sheets, Glacier flow, Glacier thickness, Subglacial observations, Bottom topography, Antarctica —Queen Maud Land.
The Japanese East Queen Maud Land Glaciological Research Project studied the structure and flow of the ice sheet from 1982 to 1987 The horizontal flow velocity ranged from a high of about 90 m/yr at a site in the Belgica Mountains to a low of 2-9 m/yr in the Yamato meteorite ice field. The flow velocity of Shirase Glacier ranged from 7 m/yr inland at an elevation of 3000 m to 40 m/yr towards the coast. The ice sheet reaches an elevation of 3000 m above sea level with a thickness, measured by ice sounding radar, of mostly 1000-2000 m The elevation of the bedrock varies from below sea level to about 2000 m, breaking through the surface in the Sör Rondane Mountains. Cross-section diagrams of the Shirase Glacier and the Sör Rondane Mountains to Breid Bay, and sketch maps are included The volcanic ash layer and Yamato meteorites are also mentioned.

44-382
Participation in the international Ocean Drilling Program in the southern Indian Ocean and Antarctic.
Sakai, H., *Polar news,* Aug. 1988, No.47, p.21-26, In Japanese.
Drill core analysis, Bottom sediment, Offshore drilling, Paleoclimatology, Geochronology, Kerguelen Islands, Antarctica—Prydz Bay.
This is a popular account of Japanese participation in Leg 119 of the International Ocean Drilling Program (OPD), Dec. 1987-Feb. 1988, with the drillship *Joides Resolution* and the iceberg surveillance ship *Maersk Master,* to drill core samples from the Kerguelen Plateau in the southern Indian Ocean and Prydz Bay in East Antarctica Core analysis of basaltic bedrock in the limestone layer of the Turonian from the Kerguelen Plateau indicates that about 90 million years ago the Kerguelen Plateau was a shallow sea. Prydz Bay yielded continental red bed and lacustrine clay deposits. Glacial deposits indicate that an exceptionally large ice sheet existed in East Antarctica in the Oligocene about 35.3 million years ago.

44-383
To protect the environment of the Far North and build safe pipelines (field studies in Yamal). [Chtoby sokhranit' prirodu Krainego Severa i sozdat' nadezhnye truboprovody (naturnye issledovaniia na IAmale)],
Krasulin, I ..., et al, *Stroitel'stvo truboprovodov,* Aug. 1989, No.8, p.20-23, In Russian.
Gekhman, A.S., Stepanova, S.G.
Environmental protection, Pipelines, Permafrost.

44-384
Means and methods of preventing the freezing of loose materials. [Sredtsva i metody bor'by so smerzaemostiu sypuchikh materialov],
Terekhin, L.N., et al, *Transportnoe stroitel'stvo,* Aug. 1989, No.8, p.28-31, In Russian. 3 refs.
Tsigel'nyĭ, P.M., Artem'eva, S.V., Iolina, E.M.
Freezing, Countermeasures, Fuel transport, Coal.

44-385
Development of the technology of winter concreting with low-cement concretes. [Otrabotka tekhnologii zimnego betonirovaniia s primeneniem malotsementnykh betonov],
Kuz'min, K.K., et al, *Energeticheskoe stroitel'stvo,* July 1989, No.7, p.37-40, In Russian.
Winter concreting, Concretes, Cements.

44-386
Drilling frozen ground with an instrument of extra-hard materials. [Bureniе merzlykh gruntov instrumentom iz sverkhtverdykh materialov],
Krasnik, V.G., et al, *Energeticheskoe stroitel'stvo,* Aug 1989, No.8, p.41-42, In Russian.
Korshunov, V.V., Stepanets, A.N.
Design, Drilling, Drills, Borehole instruments, Frozen ground strength, Analysis (mathematics)

44-387
Loss of water from Phobos.
Fanale, F.P., et al, *Geophysical research letters,* Apr. 1989, 16(4), p.287-290, 16 refs.
Salvail, J.R.
Ice heat flux, Extraterrestrial ice, Water transport, Ice thermal properties, Ground ice, Ice models, Heat balance, Cryogenic soils.

44-388
Determination of regional sources of aerosol black carbon in the Arctic.
Kahl, J.D., et al, *Geophysical research letters,* Apr. 1989, 16(4), p.327-330, 13 refs.
Hansen, A.D.A.
Polar atmospheres, Aerosols, Haze, Measurement, Atmospheric composition, Carbon dioxide, Air pollution, Atmospheric circulation, Climatic factors, Alaska—Point Barrow.

44-389
Non-equilibrium behaviour of isotherm freezing of water in lysozyme.
Zhang, J.Z., *Chinese science bulletin (Kexue tongbao),* Aug. 1989, 34(16), p.1375-1380, 13 refs.
Temperature measurement, Unfrozen water content, Phase transformations, Polymers, Thermodynamics, Freezing.

44-390
Bacteriological studies in antarctic water and ice. [Estudios bacteriológicos en aguas y hielos antárticos],
Castellvi, J., Primer Symposium Español de Estudios Antárticos. (Spanish Symposium on Antarctic Studies, 1st, Palma de Mallorca, June 1985). [Madird,] Instituto Español de Oceanografía, [1988], p.169-175, In Spanish with English summary
Sea ice, Microbiology, Ice composition.
During the oceanographic mission *Antartic-85,* a sea bacteriological program was carried out covering the global heterotrophic activity and, particularly, the activity of some physiologic groups. The sampling method was based on the automatic and continuous analysis of superficial water. The bacteriological analyses were carried out with discontinuous samples taken every 2 hours, from water flow supplying the automatic autosanalyzers. The heterotrophic activity was determined by the measurement of the exoproteolitic activity, according to Somville and Billen's method. Instead of long incubation periods, which are necessary for others methodologies generally used, this method made it possible to obtain results in a few minutes time Results give a quite high concordance between the physical and chemical parameters, showing a very heterogeneous system. A commentary of some singular structures with the analysis of different ice types is given. (Auth. mod.)

44-391
Development of a procedure for predicting propeller-ice interaction forces.
Chernuka, M.W., et al, *Transport Canada. Report,* May 1989, TP 9850E, 263p., D1460-156-3, With French summary. 646 refs.
Jategaonkar, R.P., Norwood, M.E., Warner, J.L.
Propellers, Forecasting, Ice loads, Ice mechanics, Ice strength, Metal ice friction, Models, Bibliographies.

44-392
Temperature and depth of permafrost on the arctic slope of Alaska.
Lachenbruch, A.H., et al, Geology and exploration of the National Petroleum Reserve in Alaska, 1974 to 1982. Edited by G. Gryc, Washington, D.C., 1988, p.645-656, 19 refs. For another version see 42-1101.
Permafrost depth, Permafrost thermal properties, Permafrost thickness, Thermal conductivity, Sediments, United States—Alaska—North Slope.

44-393
Engineering geology studies on the National Petroleum Reserve in Alaska.
Kachadoorian, R., et al, MP 2519, Geology and exploration of the National Petroleum Reserve in Alaska, 1974 to 1982. Edited by G. Gryc, Washington, D.C., 1988, p.899-922, 15 refs.
Crory, F.E.
Roads, Wells, Research projects, Runways, Drilling, Gravel, Seasonal freeze thaw, Sands.
The U.S. Geological Survey (USGS) has been charged with the responsibility of evaluating the petroleum potential of the National Petroleum Reserve in Alaska (NPRA). This work had already been initiated by the U.S Navy, from whom the NPRA was transferred to the Department of the Interior. To help fulfill its responsibility, the USGS in Feb 1977 started an engineering geology program to provide the geotechnical support necessary for the exploration program. The USGS requested the U.S Army Waterways Experiment Station (WES) at Vicksburg, MS, and the U.S. Army Cold Regions Research and Engineering Laboratory (CRREL) at Hanover, NH, to conduct studies to obtain the physical parameters required to evaluate and solve some of the geotechnical and engineering problems. All of the NPRA is underlain by permafrost, and thus virtually all of the engineering and geotechnical problems encountered during the construction of the well sites and subsequent drilling were associated with permafrost. The widespread occurrence of permafrost containing large amounts of near-surface ground ice in the form of wedges, masses, and intergranular ice required that construction activity not disturb the thermal regime of the ground surface, because such disturbance could lead to thawing of permafrost. Once the permafrost was thawed, ground subsidence, sediment flow, and impassable conditions would result. Construction problems were compounded by the necessity that all construction in the NPRA be done during the winter months to meet the environmental requirements. Therefore, the engineering geology program consistently addressed the impact of the environment on the facilities and the effect of the facilities on the environment.

44-394
Why is helicopter icing protection getting a cold reception.
Smith, L.K., *Rotor & wing international,* June 6, 1983, p.30-34, 76.
Aircraft icing, Helicopters, Ice removal, Cost analysis.

44-395
Jökulhlaups from Strandline Lake, Alaska, with special attention to the 1982 event.
Sturm, M., et al, *Alaska. Division of Geological and Geophysical Surveys. Report of investigations,* June 1989, 88-10, MP 2520, 19p., 14 refs.
Benson, C.S.
Floods, Glacial lakes, Ice dams, Flooding, Subglacial drainage, Glacial hydrology, United States—Alaska—Strandline Lake.
Jökulhlaups, or outburst floods, have occurred every 1 to 5 yr from Strandline Lake, one of the largest glacier-dammed lakes in North America. They flood the Beluga River, which was once in an undeveloped region but now is spanned by bridges and powerlines leading to Alaska's largest urban area. In 1982, a study of the mechanisms that produce these jökulhlaups was initiated to improve the ability to predict them and thereby to mitigate their damages. Reliable precursors appear to be development of a distinct calving embayment in the lobe of the Triumvirate Glacier, which dams Strandline Lake, and rapid formation of a number of supraglacier pools. Comparison of maps made from photos taken immediately before and after the jökulhlaup of Sep. 17, 1982 indicate that over 95% of the lake drained, releasing about 700,000,000 cubic m of water. The lake is dammed by a glacier lobe that fractures and subsides during a jökulhlaup, which indicates that the release mechanism is hydrostatic lifting of ice off a subglacial spillway, the exposed areas surrounding the glacier margins suggest that the spillway may be controlled by bedrock Large variations occur in the refilling period of Strandline Lake. Modifications of subglacial drainage into Strandline Lake as a result of jökulhlaups, combined with complex sub- and marginal drainage patterns, appear to exert controls which are not understood but which contribute to the variable filling rates.

44-396
Cold-temperature characterization of polymer concrete.
Bigl, S.R., *US Air Force Engineering and Services Center Final report,* Sep 1986, ESL-TR-86-26, MP 2521, 46p., 4 refs.
Polymers, Concrete pavements, Concretes, Temperature effects, Cold weather performance, Compressive properties, Flexural strength, Concrete aggregates, Concrete curing.
This report discusses laboratory engineering tests that were performed to determine the properties of polymer concrete under cold conditions. The polymer tested was Percol-5, a three part polyurethane resin, catalyst amounts were adjusted so that samples set at approximately 30 seconds. The 11 conditions tested involved variations of three factors: (1) ambient temperature (35, 15, 0, or -20 deg F); (2) cure time prior to testing (30 minutes or 24 hours), and (3) moisture content of the aggregate (dry or wet) Flexural strength was determined at all conditions Tests of compressive strength, chord modulus of elasticity, and Poisson's ratio were performed at each temperature on samples prepared with dry aggregate and cured for 30 minutes. Results of the compressive strength, flexural strength, and modulus of elasticity tests, which all decreased with temperature, remained above the 30-minute minimum requirements at temperatures from 35 to 0 deg F, but dropped off sharply at the -20 deg F condition samples prepared with wet aggregate had much lower flexural strengths than samples prepared with dry aggregate and met the minimum requirements only at the 35 deg F condition Poisson's ratio, which increased with colder temperatures, remained within the specified range at 35 deg F and 0 deg F and exceeded the specifications at colder temperatures.

44-397
Effect of ice nucleation-active xylem-residing bacteria on frost tolerance of alfalfa. [Effet des bactéries endoracinaires glaçogènes sur la résistance de la luzerne au gel],
Gagné, S., et al, *Phytoprotection,* 1989, 70(2), p.63-73, In French with English summary 27 refs
Richard, C., Antoun, H.
Organisms, Bacteria, Frost resistance, Plants (botany), Temperature effects.

44-398
Occurrence of methylphenols in rain and snow.
Vogt, M., *Fresenius' Zeitschrift für analytische* [illegible], p.540-545, 20 refs.
Rain, Snowfall, Pollution, Snow impurities.

44-399
Modification and testing of a segmented model of an icebreaker to evaluate ice resistance mathematical models.
Glen, [illegible], *Transport Canada. Report,* Mar. 1989, [illegible]E, 107p., D1460-194, With French summary, Refs. passim.
Abdelnour, R., Steele, M.
Ice loads, Icebreakers, Flexural strength, Ice cover strength, Ice models, Mathematical models.

44-400
Calculation of flow over iced airfoils.
Cebeci, T., *American Institute of Aeronautics and Astronautics. Journal,* July 1989, 27(7), p.853-861, 24 refs.
Aircraft icing, Ice accretion, Air flow, Turbulent boundary layer, Surface roughness, Analysis (mathematics), Dynamic properties.

44-401
Overview of LIMEX'87 ice observations.
Carsey, F.D., et al, *IEEE transactions on geoscience and remote sensing,* Sep. 1989, 27(5), p.468-482, 73 refs.
Ice conditions, Ice water interface, Pack ice, Sea ice distribution, Aerial surveys, Simulation, Microwaves, Water waves, Ice formation, Physical properties, Oceanographic surveys, Ice cover, Correlation, Ice air interface, Canada—Labrador Sea.

44-402
Estimating aircraft SAR response characteristics and ocean wave spectra in the Labrador Sea Extreme Waves Experiment.
Tilley, D.G., *IEEE transactions on geoscience and remote sensing,* Sep 1989, 27(5), p.483-491, 19 refs.
Ocean waves, Data processing, Wind factors, Radar photography, Surface properties, Scattering, Spectra, Correlation, Dynamic properties.

44-403
Airborne SAR observations of ocean surface waves penetrating floating ice.
Raney, R.K., et al, *IEEE transactions on geoscience and remote sensing,* Sep. 1989, 27(5), p.492-500, 14 refs.
Vachon, P.W., De Abreu, R.A., Bhogal, A.S.
Floating ice, Data processing, Wave propagation, Surface properties, Ocean waves, Radar echoes, Ice water interface, Ice edge, Spectra, Airborne radar, Remote sensing.

44-404
LIMEX '87 ice surface characteristics. implications for C-band SAR backscatter signatures.
Drinkwater, M.R., *IEEE transactions on geoscience and remote sensing,* Sep. 1989, 27(5), p.501-513, 48 refs.
Measurement, Backscattering, Floating ice, Snow cover structure, Surface properties, Ice floes, Radiophotography, Ice melting, Airborne radar, Snow melting, Surface roughness, Correlation, Ice deformation, Physical properties.

44-405
Effect of ice pressure on marginal ice zone dynamics.
Flato, G.M., et al, *IEEE transactions on geoscience and remote sensing,* Sep. 1989, 27(5), MP 2522, p.514-521, 9 refs.
Hibler, W.D., III.
Sea ice, Ice pressure, Ice models, Cavitation, Wind factors, Ice edge, Floating ice, Ice strength, Drift, Ice mechanics, Compressive properties, Mass transfer.

44-406
C-band SAR observations of marginal ice zone rheology in the Labrador Sea.
Drinkwater, M.R., et al, *IEEE transactions on geoscience and remote sensing*, Sep 1989, 27(5), p.522-534, 47 refs.
Squire, V.A.
Rheology, Shear flow, Ice mechanics, Viscous flow, Ice deformation, Ice models, Airborne radar, Floating ice, Ice floes, Remote sensing, Ice water interface, Ice cover thickness, Viscoelasticity, Labrador Sea.

44-407
Review of sea ice and ocean modeling relevant to the Labrador and Newfoundland shelves.
Ikeda, M., *IEEE transactions on geoscience and remote sensing*, Sep. 1989, 27(5), p.535-540, 37 refs.
Ice edge, Ocean bottom, Ice water interface, Ice forecasting, Sea ice distribution, Ice models, Ocean currents, Oceanography, Thermodynamics, Periodic variations, Labrador Sea.

44-408
Beaufort-Chukchi Seas summer and fall ice margin data from Seasat: conditions with similarities to the Labrador Sea.
Carsey, F.D., et al, *IEEE transactions on geoscience and remote sensing*, Sep. 1989, 27(5), p.541-551, 36 refs.
Pihos, G.
Pack ice, Sea ice distribution, Ice edge, Microwaves, Ice formation, Airborne radar, Backscattering, Ice water interface, Correlation, Surface properties, Beaufort Sea.

44-409
Snow cover detected by diurnal warming of sea ice/snow surface off Labrador in NOAA imagery.
Ikeda, M., *IEEE transactions on geoscience and remote sensing*, Sep. 1989, 27(5), p.552-560, 14 refs.
Infrared photography. Thermodynamic properties, Surface temperature, Spaceborne photography, Thermal radiation, Diurnal variations, Sea ice, Snow heat flux, Snow depth, Surface properties, Ice cover thickness, Analysis (mathematics), Temperature gradients, Labrador Sea.

44-410
Use of a new high-speed digital data acquisition system in airborne ice-sounding.
Wright, D.L., et al, *IEEE transactions on geoscience and remote sensing*, Sep 1989, 27(5), p.561-567, 7 refs.
Bradley, J.A., Hodge, S.M.
Data processing, Radar photography, Aerial surveys, Airborne equipment, Computer applications, Ice surveys, Topographic features, Surface properties, Ice sheets, Remote sensing.

44-411
Study of the planetary boundary layer over the polynya downwind of St. Lawrence Island in the Bering Sea using aircraft data.
Walter, B.A., *Boundary-layer meteorology*, Aug. 1989, 48(3), p.255-282, 22 refs.
Polynyas, Air water interactions, Turbulent boundary layer, Heat transfer coefficient, Wind factors, Aerial surveys, Measurement, Topographic effects, Ice formation, Dynamic properties, Bering Sea.

44-412
One-year temperature records in the atmospheric surface layer above sea ice and open water.
Hoeber, H., *Boundary layer meteorology*, Aug. 1989, 48(3), p.293-297, 5 refs.
Drift stations, Seasonal variations, Air water interactions, Diurnal variations, Ocean currents, Wind factors, Surface temperature, Sea ice distribution, Heat balance, Antarctica—Weddell Sea
Temperature observations of three buoys drifting in the Weddell Sea for one year and covering the ice-water-ice cycle from July 1986 to July 1987 are presented. Significant differences between winter and summer are shown to be a consequence of the air-sea heat exchange being drastically modified by the sea ice cover. Over ice prevailing variance is in the synoptic scale (periods 3 to 5 days) with amplitudes of 25 C, whereas over water, the diurnal wave dominates with amplitudes of less than 1 C. (Auth.)

44-413
Pleistocene deglaciation and the global gravity field.
Mitrovica, J.X., et al, *Journal of geophysical research*, Oct. 10, 1989, 94(B10), p.13,651-13,671, 60 refs.
Peltier, W.R.
Paleoclimatology, Ice volume, Isostasy.
The present-day global geoid and free air gravity anomaly signals induced by Pleistocene deglaciation have been computed, along with their secular variations. A revised Green function has been derived for the free air gravity anomaly, and it was found that an Earth model with a lower mantle viscosity moderately larger than the upper mantle value satisfies observations of the anomaly over both Hudson's Bay and Fennoscandia. Using this "preferred" Earth model, the predicted global geoid anomaly map is characterized by peak negative values of -36.7, -9.4, and -21.9 m over Hudson's Bay, northern Europe, and Antarctica, respectively, and by a smooth, small amplitude (2.5 m) upwarping over the major ocean basins. Although the field has an order of magnitude less power than the observed, there is a significant spatial correlation between the two. Analysis suggests that measurement of these higher-order secular variations of the zonal harmonics based upon analysis of long time series of LAGEOS ranging data could provide very useful additional constraints on the radial variation of mantle viscosity. These constraints, along with all others described in this paper, are shown to be relatively insensitive to assumptions concerning the deflection, during the glacial isostatic adjustment process, of the 400- and 670-km density discontinuities within the mantle. (Auth. mod.)

44-414
Terrain evaluation and pipeline construction in the Canadian North.
Crampton, C.B., *Musk-ox*, 1988, No.36, p.19-28, 12 refs.
Terrain identification, Continuous permafrost, Pipelines.

44-415
Thickness distribution of accreted ice grown on rotor blades under laboratory conditions.
Itagaki, K., et al, MP 2523, International Conference on Atmospheric Icing of Structures, 4th, Paris, Sep. 5-7, 1988. Proceedings, 1988, p.152-156, 9 refs.
Lemieux, G.E.
Ice accretion, Aircraft icing, Measurement, Temperature effects.
The shape of ice accreted on the leading edge of aircraft wings and other structures varies extensively depending on the growth regime in which accretion takes place. This shape feeds back to control the rate of additional accretion. In order to provide numerical information for further analysis of ice accretion, the thickness distribution of accreted ice grown on cylindrical rotor blades under the laboratory conditions was measured. Measurements were made every 1 cm in the radial direction and at every 6 deg interval around the axis of the cylindrical blades. Photographs of the accreted ice were used to identify the growth regime, surface roughness, and the extent of iced area that could not be obtained from thickness measurements by mechanical contact. Extensive liquid migration was observed above -11 C in both radial and tangential directions on the rotor. Evidence of liquid water persisted down to -20 C, however.

44-416
What makes thunderbolts zig and zag.
Itagaki, K., MP 2524, International Aerospace and Ground Conference on Lightning and Static Electricity, Oklahoma City, OK, Apr. 19-22, 1988. Proceedings, 1988, p.22-27, 6 refs.
Lightning, Computerized simulation, Statistical analysis.
It is well known that lightning bolts trace a zig-zag course between clouds or from cloud to ground. This course is apparently determined during the development of "leader strokes" through which the bolt advances. This paper proposes a model for the development of such a leader stroke. Assumptions used in this model are: 1. A uniform global electric field exists between cloud and ground or cloud and cloud. 2. Electric cells of various strengths and sizes are randomly distributed in the vicinity of the tip of a leader. 3. An electric charge is supplied to the tip of the leader stroke through the previous stroke to increase the electric field around the tip. 4. When the field strength between the advancing tip and one of the cells becomes strong enough, discharge between the tip and the cell takes place, advancing the leader stroke to the cell. Monte Carlo computer simulation of such a model in two and three dimensions has produced patterns with a striking resemblance to published photographs of lightning bolts. Statistical analysis of the data generated by the simulation produced by changing various parameters indicated that certain information can be gained by analyzing those photographs. For instantce, an increase in general electric field strength results in a less tortuous track with longer steps, while a larger cell size distribution results in more ragged tracks. By comparing the statistical analysis of lightning stroke shapes obtained from photographs with observed field conditions causing the strokes, various parameters such as field strength and cell size could be estimated.

44-417
Saltation flow measurements relating to modeling of snowdrifting.
Kind, R.J., et al, *Journal of wind engineering and industrial aerodynamics*, 1982, Vol.10, p.89-102, 17 refs.
Murray, S.B.
Snowdrifts, Snow fences, Models, Particles, Wind tunnels.

44-418
Dissolved and particulate trace metals in meltwater from the Rhône glacier.
Lum-Shue-Chan, K., *Schweizerische Zeitschrift für Hydrologie*, 1981, 43(2), p.286-295, 16 refs.
Glacier melting, Meltwater, Metals, Sediments, Water chemistry.

44-419
Spectral bidirectional reflectance of snow.
Dozier, J., et al, International Colloquium on Spectral Signatures of Objects in Remote Sensing, 4th, Aussois, France, Jan. 18-22, 1988. Proceedings, 1988, p.87-92, N89-10318, 18 refs.
Davis, R.E., Chang, A.T.C., Brown, K.
Snow optics, Optical properties, Remote sensing.

44-420
Geotextiles and a new way to use them.
Henry, K., MP 2525, Society of Women Engineers. National Convention and Student Conference, Puerto Rico, June 20-26, 1988. Proceedings, [1988], p.214-222, 11 refs.
Soil water migration, Frozen ground mechanics, Frost heave, Filters.
This study utilizes soil specimens prepared with geotextiles subjected to unidirectional standard frost heave tests. Results indicate that geotextiles can reduce frost heave. Characteristics that influence capillary behavior include pore size distribution and structure of the fabric as well as surface properties of the fibers. Furthermore, fabric thickness appears to influence performance as a capillary barrier. Currently, little is known about fiber surface properties and there are no standard tests to evaluate characteristics such as wetting angle. Test observations indicate the importance of quantifying fabric pore size and the wetting angle of fibers in the fabric so that its influence on capillary behavior can be quantified.

44-421
Theory for a two-wavelength measurement of the path-averaged turbulent surface heat flux.
Andreas, E.L., MP 2526, Lower Tropospheric Profiling: Needs and Technologies, Boulder, CO, May 31-June 3, 1988. Proceedings, [1988], p.219-220, 9 refs.
Heat flux, Measurement, Surface roughness, Analysis (mathematics).
Eddy-correlation, inertial-dissipation, flux gradient, or bulk-aerodynamic methods the traditional micrometeorological ways of measuring the turbulent surface fluxes of momentum and sensible and latent heat—all yield point estimates of the fluxes. Even over surfaces that are only slightly inhomogeneous, however, such point estimates can be unrepresentative of average surface conditions. Wyngaard and Clifford (1978) and Coulter and Wesely (1980), among others, have therefore suggested that path-averaging electro-optical systems could be used to obtain surface-averaged fluxes, but until now no one has shown how to obtain both sensible and latent heat fluxes from path-averaging instruments without the necessity of also making some point measurements. A two-wavelength, electro-optical technique is described that can distinguish temperature and humidity effects and thus can yield path-averaged sensible and latent heat fluxes without requiring associated point measurements.

44-422
Hydraulic engineering.
National Conference on Hydraulic Engineering, New Orleans, LA, Aug. 14-18, 1989, New York, American Society of Civil Engineers, 1989, 1212p., Refs. passim.
For selected papers see 44-423 through 44-426.
Ports, M.A., ed.
Hydrology, Banks (waterways), Water reserves, Glacial hydrology, Models, Electric power, Computer programs, Ice erosion.

44-423
Mechanics of river bank erosion and protection. State-of-the-art report 3: Federal Republic of Germany.
Zimmermann, C., National Conference on Hydraulic Engineering, New Orleans, LA, Aug. 14-18, 1989. Proceedings. Edited by M.A. Ports, New York, American Society of Civil Engineers, 1989, p.289-295, 6 refs.
Banks (waterways), Countermeasures, Ice pressure, Ice erosion.

44-424
Hydrologic implications of global warming on water resources in California.
Lettenmaier, D.P., National Conference on Hydraulic Engineering, New Orleans, LA, Aug. 14-18, 1989. Proceedings. Edited by M.A. Ports, New York, American Society of Civil Engineers, 1989, p.643-646
Hydrology, Water reserves, Climatic changes, Climatic factors, Snow accumulation, Ablation, Snowmelt, Models.

44-425
Interfacing geographic information system data with real-time hydrologic forecasting models.
Eagle, T.C., et al, MP 2527, National Conference on Hydraulic Engineering, New Orleans, LA, Aug. 14-18, 1989. Proceedings. Edited by M.A. Ports, New York, American Society of Civil Engineers, 1989, p.857-861.
Merry, C.J., McKim, H.L.
Hydrology, Forecasting, Data processing, Models, River basins, Computer programs.

This paper discusses a plan to incorporate remotely sensed spatial data into a real time hydrologic decision support system. Because of the nature of the hydrologic forecasting system, a file server type of interfacing is required. Recommendations for a real time GIS are discussed.

44-426
Glacial basin flow for a power operation model.
Shen, Y.Y., et al, National Conference on Hydraulic Engineering, New Orleans, LA, Aug. 14-18, 1989. Proceedings. Edited by M.A. Ports, New York, American Society of Civil Engineers, 1989, p.1078-1083, 3 refs.
Hughes, T.J., Bishop, N.A.
Glacial rivers, Glacier mass balance, Glacial hydrology, Models, Electric power.

44-427
Dalton Highway, Yukon River to Prudhoe Bay, Alaska. Bedrock geology of the eastern Koyukuk basin, central Brooks Range, and Eastcentral Arctic Slope.
Mull, C.G., ed, Guidebook No.7, Fairbanks, Division of Geological and Geophysical Surveys, 1989, 2 vols + appends., Guidebook No.7, Refs. p.B1-B18. For selected papers see 44-428 through 44-430.
Adams, K.E., ed.
Glacial geology, Glacier oscillation, Cirque glaciers, United States—Alaska.

44-428
Glacial geology of the Brooks Range.
Hamilton, T.D., Dalton Highway, Yukon River to Prudhoe Bay, Alaska. Bedrock geology of the eastern Koyukuk basin, central Brooks Range, and Eastcentral Arctic Slope Edited by C.G. Mull and K.E. Adams, Fairbanks, Division of Geological and Geophysical Surveys, 1989, p.23-26. Guidebook No.7.
Glacial geology, Glacier oscillation, Cirque glaciers, United States—Alaska—Brooks Range.

44-429
Road log from Yukon crossing (mile 56) to south fork Koyukuk River (mile 156.2).
Patton, W.W., Jr., et al, Dalton Highway, Yukon River to Prudhoe Bay, Alaska. Bedrock geology of the eastern Koyukuk basin, central Brooks Range, and Eastcentral Arctic Slope. Edited by C.G. Mull and K.E. Adams, Fairbanks, Division of Geological and Geophysical Surveys, 1989. p.59-73. Guidebook No.7.
Miller, T.P., Box, S.E.
Glacial geology, Glacier oscillation, Rivers, Glacial lakes.

44-430
Road log from Chandalar Shelf (mile 237.1) to Prudhoe Bay (mile 414).
Mull, C.G., et al, Dalton Highway, Yukon River to Prudhoe Bay, Alaska. Bedrock geology of the eastern Koyukuk basin, central Brooks Range, and Eastcentral Arctic Slope. Edited by C.G. Mul and K.E. Adams, Fairbanks, Division of Geological and Geophysical Surveys, 1989, p.101-131. Guidebook No.7.
Harris, E.E.
Glacial geology, Pingos.

44-431
Quaternary geology and permafrost along the Richardson and Glen highways between Fairbanks and Anchorage, Alaska.
Péwé, T.L., ed, International Geological Congress, 28th Field trip guidebook T102, Washington, D.C., American Geophysical Union, [1989], 54p., Refs. passim.
Reger, R.D., ed.
Quaternary deposits, Permafrost distribution, Glacial geology, Geomorphology, Geological surveys, United States—Alaska.

44-432
Alaskan geological and geophysical transect.
Nokleberg, W.J., ed, International Geological Congress, 28th. Field trip guidebook T104, Washington, D.C., American Geophysical Union, [1989], 131p., Refs. passim
Fisher, M.A., ed.
Geological surveys, Geophysical surveys, Earth crust, Pipelines, United States—Alaska.

44-433
Glaciers and glaciology of Alaska.
Krimmel, R.M., et al, International Geological Congress, 28th. Field trip guidebook T301, Washington, D.C., American Geophysical Union, [1989], 61p., 48 refs.
Meier, M.F.
Glacier surveys, Glaciology, United States—Alaska.

44-434
Erosion of bedrock by subglacial meltwater, Cantley, Quebec.
Sharpe, D.R., et al, *Geological Society of America. Bulletin*, Aug. 1989, 101(8), p.1011-1020, 44 refs.
Shaw, J.
Subglacial drainage, Water erosion, Meltwater, Ice friction, Rock properties, Glacial hydrology, Abrasion, Landforms.

44-435
Use of SPOT HRV data in the Corps of Engineers dredging program.
Merry, C.J., et al, *Photogrammetric engineering and remote sensing*, Sep. 1988, 54(9), MP 2528, p 1295-1299, 10 refs.
McKim, H.L., LaPotin, N.T., Adams, J.R.
Sensor mapping, Spaceborne photography, Lake water, Suspended sediments, Dredging, Turbidity, Photogrammetry, Data processing, Environmental impact.

44-436
Experiments and evaluations of rule based methods in image analysis.
Niblack, W., et al, Computer Society Conference on Computer Vision and Pattern Recognition, Ann Arbor, MI, June 5-9, 1988. Proceedings, Washington, D.C., Institute of Electrical and Electronics Engineers, 1988, p.123-128, 15 refs.
Petkovic, D., Damian, D.
Computer applications, Computer programs, Ice edge, Photointerpretation, Remote sensing

44-437
Is advanced technology "the gateway to irresponsibility".
Zufelt, J.E., *Journal of professional issues in engineering*, Oct. 1989, 115(4), MP 2529, p.434-437.
Computer applications, Human factors, Accuracy.

44-438
Radar altimetric studies of polar ice.
Drinkwater, M.R., Cambridge, MA, Emmanuel College, Nov. 1987, 231p., Ph.D. thesis. Refs. p.215-231.
Airborne radar, Remote sensing, Topographic surveys, Ice sheets, Sea ice distribution, Surface roughness, Glacier thickness, Ice cover thickness, Glacier surfaces, Ice detection, Analysis (mathematics).

44-439
Small boat harbor Larsen Bay, Alaska. Draft detailed project report with environmental assessment.
Anchorage, U.S. Army Engineer District, Alaska, Sep. 1989, 153p. + appends., 45 refs.
Ports, Cost analysis, Economic development, Shoreline modification, Environmental impact, United States—Alaska—Larsen Bay.

44-440
Technical and symposium papers.
American Society of Heating, Refrigerating and Air-Conditioning Engineers, Winter Meeting, Chicago, IL, Jan. 28-Feb. 1, 1989, *ASHRAE transactions*, 1989, 95(1), 1349p., Refs. passim. For selected papers see 43-2160 and 44-441 through 44-449.
Heating, Cooling, Air conditioning, Refrigeration, Buildings.

44-441
Mass and heat transfer during frost growth.
Sami, S.M., et al, *American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE). Transactions*, 1989, 95(1), p.158-165, 20 refs.
Duong, T.
Mass transfer, Heat transfer, Hoarfrost, Cryogenics, Ice growth, Ice formation, Mathematical models.

44-442
Diurnal ice storage cooling systems in Army facilities.
Sohn, C.W., et al, *American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) Transactions*, 1989, 95(1), p.1079-1085, 7 refs.
Tomlinson, J.J.
Cooling systems, Cold storage, Ice refrigeration, Storage tanks, Military facilities.

44-443
Case study: office building uses ice storage, heat recovery, and cold air distribution.
Tackett, R.K., *American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE). Transactions*, 1989, 95(1), p.1113-1121.
Cold storage, Ice refrigeration, Air conditioning, Cooling systems, Heat recovery, Buildings.

44-444
Optimal control for cool storage.
Spethmann, D.H., *American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE). Transactions*, 1989, 95(1), p.1189-1193.
Cold storage, Cooling systems, Electric power, Utilities, Cost analysis.

44-445
Cold air distribution options with ice storage.
Meckler, G., *American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) Transactions*, 1989, 95(1), p.1194-1205, 2 refs.
Cold storage, Ice refrigeration, Air conditioning, Utilities.

44-446
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Silver, S.C., et al, *American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE). Transactions*, 1989, 95(1), p.1206-1213, 10 refs.
Jones, J.W., Peterson, J.L., Hunn, B.D.
Cold storage, Ice refrigeration, Air conditioning, Cooling systems, Buildings, Computerized simulation.

44-447
Component models for computer simulation of ice storage systems.
Silver, S.C., et al, *American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE). Transactions*, 1989, 95(1), p.1214-1220, 17 refs.
Cold storage, Ice refrigeration, Air conditioning, Cooling systems, Buildings, Computerized simulation.

44-448
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Pearson, F.J., *American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE). Transactions*, 1989, 95(1), p.1308-1316, 11 refs.
Cold storage, Cost analysis, . refrigeration, Air conditioning, Buildings.

44-449
Design of cold air distribution systems with ice storage.
Dorgan, C.E., et al, *American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE). Transactions*, 1989, 95(1), p.1317-1322, 8 refs.
Elleson, J.S.
Cold storage, Ice refrigeration, Air conditioning, Buildings.

44-450
Charge transfer during single crystal interaction with a rimed target.
Kumar, P.P., et al, *Journal of geophysical research*, Sep. 30, 1989, 94(D11), p.13,099-13,102, 15 refs.
Saunders, C.P.R.
Ice crystal growth, Ice electrical properties, Ice crystal collision, Charge transfer, Cloud physics, Hoarfrost, Ice accretion.

44-451
Charge transfer during multiple large ice crystal interactions with a riming target.
Keith, W.D., et al, *Journal of geophysical research*, Sep. 30, 1989, 94(D11), p.13,103-13,106, 8 refs.
Saunders, C.P.R.
Ice crystal growth, Ice electrical properties, Cloud electrification, Charge transfer, Hoarfrost, Ice accretion.

44-452
Role of sea ice and other fresh water in the arctic circulation.
Aagaard, K., et al, *Journal of geophysical research*, Oct. 15, 1989, 94(C10), p.14,485-14,498, 81 refs.
Carmack, E.C.
Ocean currents, Sea ice, Sea water, Salinity, Brines, Water chemistry, Chemical composition, Ice water interface, Sea water freezing.

44-453
Arctic sea ice 1973-1987: seasonal, regional, and interannual variability.
Parkinson, C.L., et al, *Journal of geophysical research*, Oct. 15, 1989, 94(C10), p.14,499-14,523, 31 refs.
Cavalieri, D.J.
Sea ice distribution, Seasonal variations, Ice surveys, Spaceborne photography, Ice detection, Ice reporting.

44-454
Role of ice interaction due to floe collisions in marginal ice zone dynamics.
Lu, Q.M., et al, *Journal of geophysical research,* Oct. 15, 1989, 94(C10), p.14,525-14,537, 24 refs.
Larsen, J., Tryde, P.
Ice floes, Ice cover strength Ice loads, Impact strength, Ice edge, Drift Pack ice, Ice deformation, Mathematical models.

44-455
Empirical functions for atmospheric aerosol size distribution.
Ram, M., et al, *Journal of aerosol science,* 1989, 20(3), p.351-353, 10 refs.
Gayley, R.I., Shaw, G.E.
Aerosols, Ice cores, Solar radiation.
Two- and three-parameter functions are proposed for fitting aerosol size distributions that have a maximum and exhibit log-linear behavior at large radii To demonstrate their usefulness, the functions are fitted to measured size distributions of insoluble particles recovered from sections of Greenland and antarctic ice cores. (Auth)

44-456
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Kawamura, T., Ozawa, H.
Snow surveys, Snow density Snow temperature, Boreholes, Pits (excavations), Statistical analysis, Japan—Sapporo.

44-457
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Kawashima, K., et al, *Low temperature science (Teion kagaku). Series A Physical sciences. Data report,* 1988, No.47, p.11-25, In Japanese. 4 refs.
Snow surveys, Snow temperature, Snow depth, Shores, Statistical analysis.

44-458
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Kodama, Y., et al, *Low temperature science (Teion kagaku). Series A Physical sciences. Data report,* 1988, No.47, p.27-33, In Japanese. 1 ref.
Ishikawa, N
Radiation, Snow depth, Air temperature, Albedo, Statistical analysis, Thermal radiation, Japan Sapporo

44-459
Distribution of pack ice off Okhotsk Sea coast of Hokkaido observed Sea Ice Radar Network, January-May 1988.
Aota, M., et al, *Low temperature science (Teion kagaku). Series A Physical sciences. Data report,* 1988, No.47, p.35-64, In Japanese.
Sea ice distribution, Ice conditions, Pack ice, Shores, Statistical analysis, Ice cover.

44-460
Sea ice margins: a summary of physical phenomena.
Muench, R.D., *U.S. National Oceanic and Atmospheric Administration. NOAA technical memorandum,* May 1989, ERL PMEL-88, 51p., 51 refs.
Ice edge, Ice water interface, Ocean currents, Pack ice, Sea ice distribution Ice air interface

44-461
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Hayes, M.O., et al, International Geological Congress, 28th. Field trip guidebook T101, Washington, D.C., American Geophysical Union, [1989], 42p., 58 refs
Michel, J
Coastal topographic features, Shore erosion, Quaternary deposits Geomorphology Geological surveys United States Alaska Cook Inlet United States Alaska—Cooper River Delta.

44-462
Report of Arctic Summer West 1988 operations USCGC *Polar Star.*
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Icebreakers, Ice navigation.

44-463
Seasonal changes in heterotrophic bacteria under fast ice near Syowa Station, Antarctica.
Satoh, H., et al, *Canadian journal of microbiology,* Feb. 1989, 35(2), p.329-333, With French summary. 21 refs. For a shorter Japanese version see 44-0061 orB-40326.
Fukami, K., Watanabe, K., Takahashi, E.
Bacteria, Marine biology, Fast ice, Microbiology, Algae, Seasonal variations, Antarctica Showa Station.
Seasonal changes in the number of heterotrophic bacteria and the species composition of their communities were investigated in the fast ice area of Showa Station, from May 1983 to Jan. 1984. Numbers of heterotrophic bacteria under the fast ice began to increase in Oct. and the maximum number of colony-forming units/mL (240) occurred in late Dec. The changes in bacterial numbers coincided well with those of particulate organic carbon, suggesting that the growth of heterotrophic bacteria depends on the supply of particulate organic carbon from ice algal assemblages which grow rapidly at the bottom of sea ice during the austral spring Vibrionaceans in the communities in Sep. accounted for as much as 35% of the isolates, whereas in Dec., they were not detected at all. These results indicate that there is a seasonal succession in the bacterial communities between Sep and Dec (Auth.)

44-464
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Kouhi, J., et al, *Finland. Technical Research Centre. Research reports,* 1989, No.614, 174p., In Finnish with English summary. 107 refs.
Koukkari, H.
Concrete structures, Steel structures, Offshore structures, Ice loads, Construction materials.

44-465
International Glaciological Society: fifty years of progress.
Wood, P., Cambridge, England, International Glaciological Society, 1986, 128p
Organizations, Research projects, History

44-466
Chernobyl reference horizon (?) in the Greenland ice sheet.
Dibb, J.E., *Geophysical research letters.* Sep. 1989, 16(9), p.987-990, 14 refs.
Fallout, Ice sheets, Snow composition, Greenland.

44-467
Oceanic heat flux in the Fram Strait measured by a drifting buoy.
Perovich, D.K., et al, *Geophysical research letters,* Sep. 1989, 16(9), MP 2531, p.995-998, 14 refs.
Tucker, W.B., Kirschfield, R.A.
Sea ice, Sea water, Heat flux, Remote sensing, Fram Strait.
As one component of the Arctic Environmental Drifting Buoy, two thermistor strings were installed through the ice to measure ice temperatures and determine oceanic heat fluxes as the buoy drifted from the arctic basin into the Greenland Sea. Ice temperature data between Dec. 14, 1987 and Jan 2, 1988 were retrieved. During this period the AEDB progressed from approximately 81N 4E to 77N 5W. This constituted the most rapid displacement of the entire drift, coinciding with the entry of the floe into the marginal ice zone of Fram Strait. Once in the MIZ, water temperatures increased, most notably at a depth of 16 m, where values changed from -1.8 C to more than 2 C. Bottom ablation rates of 34 mm/day were observed between Dec. 21 and 28. During this excursion into warmer water, the oceanic heat flux increased by a factor of 18, from 7 W/sq m to 128 W/sq m.

44-468
Fractal dimension: a descriptor of ice keel surface roughness.
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Chellis, S.E.
Ice bottom surface, Surface roughness, Ice acoustics, Chukchi Sea.

44-469
Permafrost as an oil and gas bearing measure in the upper part of the sedimentary mantle of the Pechora basin. [Vechnaia merzlota kak kriteril neftegazonosnosti verkhnei chasti osadochnogo chekhla Pechorskogo basseina],
Timonina, N.N., *Akademiia nauk SSSR. Komi filial. Institut geologii. Trudy,* 1985, Vol.52, p.119-124, In Russian. 6 refs.
Permafrost distribution, Natural gas, Frozen rock temperature, Natural resources.

44-470
Prediction of changes in thickness of seasonal freezing of rocks in unfrozen valley grounds with exploitation of deposits of underground waters.
Seregina, N.V., et al, *Moscow University geology bulletin,* 1988, 43(6), p.70-75, 4 refs. Translated from Moscow. Universitet. Vestnik. Geologiia.
Syrovatko, N.M.
Frozen rocks, Ground water, Thickness, Seasonal variations, Active layer, Taliks, Analysis (mathematics)

44-471
Arctic research of the United States, Vol.3.
U.S. Interagency Arctic Research Policy Committee, MP 2530, Washington, D.C., Fall 1989, 71p.
Brown, J., ed, Bowen, S., ed, Cate, D.W., ed, Valliere, D., ed.
Research projects, Organizations, Meetings, Expeditions, Legislation.
This is the first biennial revision to the *United States Arctic Research Plan.* This revision contains accomplishments and updates to agencies' arctic programs, and reflects current and ongoing U.S. activities and national concerns for arctic research. It includes recommendations for several new interagency programs and the initial steps for an Arctic Social Science program. Finally, it provides status reports on cross-cutting activities including logistics and data, which support and enhance U.S. capabilities for conducting an integrated national program of arctic research These revisions have been coordinated with and are responsive to guidance provided by the Arctic Research Commission, appointed by President Reagan in Jan. 1985.

44-472
Arctic program, Office of Naval Research FY 87.
Obrochta, R., ed, *U.S. Office of Naval Research. [Report],* June 1989, OCNR 112589-17, 206p., Refs. passim.
Acoustics, Research projects, Ice air interface, Oceanography, Ice acoustics, Ice water interface, Sea ice, Heat transfer, Bibliographies, Underwater acoustics, Polynyas, Sediments, Models, Remote sensing.

44-473
Arctic sciences program summary. FY 88.
Obrochta, R., ed, *U.S. Office of Naval Research. [Report],* June 1989, OCNR 112589-18, 130p., Refs. passim.
Research projects, Ice air interface, Oceanography, Ice water interface, Bibliographies, Remote sensing, Thermodynamics, Underwater acoustics, Models, Measurement, Sea ice, Ice acoustics.

44-474
Technical feasibility test of field burner unit using diesel fuel.
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Barbiaux, G.R.
Heat sources, Military equipment, Military research, Cold weather tests.

44-475
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Mines (ordnance), Detection, Military equipment, Countermeasures, Cold weather tests.

44-476
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Potuznik, W.J., et al, *U.S. Army Cold Regions Test Center. Final letter report,* July 1989, TECOM Proj. No.8-ES-300-012-013, 31p. + appends.
Hill, K.V.
Air pollution, Warning systems, Military research, Monitors, Remote sensing, Military equipment, Cold weather tests.

44-477
Technical feasibility test (TFT) of mobile oversnow transport (MOST) with sled.
Starnes, D.B., *U.S. Army Cold Regions Test Center. Final report,* Aug. 1989, TECOM Proj. No.8-VS-150-MST-001, 103p. + appends.
Snow vehicles, Sleds, Military equipment, Military transportation, Cold weather tests.

44-478
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Foster, G.K., et al, *U.S. Army Cold Regions Test Center. Final report,* Aug. 1989, TECOM Proj. No.8-VS-150-973-011, 128p. + appends.
Kiker, G.D.
Snow vehicles, Tracked vehicles, Military equipment, Military transportation, Cold weather tests.

44-479
Grazing and sedimentation of ice algae during and immediately after a bloom at the ice-water interface.
Tremblay, C., et al, *Marine ecology progress series,* Aug. 24, 1989, 56(3), p.291-300, Refs. p.299-300.
Runge, J.A., Legendre, L.
Algae, Sea water, Sea ice, Chemical composition, Suspended sediments.

44-480
Solubility and equilibrium vapor pressures of HCl dissolved in polar stratospheric cloud materials; ice and the trihydrate of nitric acid.
Hanson, D.R., et al, *Geophysical research letters,* Dec. 1988, 15(13), p.1507-1510, 13 refs.
Mauersberger, K.
Ice air interface, Atmospheric composition, Ice composition, Polar regions.
Measurements of the pressure-solubility behavior of HCl in water ice and in the nitric acid trihydrate (NAT) crystal at 200 K are reported It is found that HCl is about 20 times more soluble in NAT than in ice for stratospheric conditions. A re-

lation between HCl pressure and substrate composition based on the Gibbs-Duhem equation is developed. This relation, along with other thermodynamic data, can be used to obtain the HCl pressure-solubility behavior at different temperatures. Implications of these results for the south polar ozone hole are discussed. (Auth.)

44-481
Mountain barrier effect and modification of tabular iceberg motion in a coastal ice zone.
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Sackinger, W.M.
Icebergs, Wind direction, Topographic effects, Periodic variations, Coasts.

44-482
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Guslitser, B.I., et al, *Akademiia nauk SSSR. Komi filial. Institut geologii Trudy,* 1985, Vol 54, p 97-107, In Russian. 13 refs.
Duriagina, D.A., Kochev, V.A.
Moraines, Glaciology, Glacier formation, Glacial deposits.

44-483
Climate and vegetation during the Shklov interglacial near the central Pechora according to palynological data. [Klimat i rastitel'nost' shklovskogo nezhlednikov'ia na sredneĭ Pechore po palinologicheskim dannym],
Konovalenko, L.A., *Akademiia nauk SSSR Komi filial. Institut geologii. Trudy,* 1985, Vol.54, p.108-114, In Russian. 5 refs.
Paleoclimatology, Palynology, Paleoecology.

44-484
Periglacial forms and morphodynamics in southern Jameson Land, East Greenland. (Results of the 1980 East Greenland Expedition by the Academy of Sciences in Göttingen. Part 1). [Periglazialformen und Morphodynamik im südlichen Jameson-Land, Ost-Grönland. (Ergebnisse der Ostgrönland-Expedition 1980 der Akademie der Wissenschaften in Göttingen. Teil 1)],
Schunke, E., Göttingen, Vandenhoeck & Ruprecht, 1986, 142p., In German. Refs p 133-142
Periglacial processes, Weathering, Solifluction, Wind erosion, Permafrost structure, Nivation, Altiplanation.

44-485
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Puigdefábregas, J., et al, *Zeitschrift fur Geomorphologie,* 1986, Vol.58 suppl., p.69-80, 15 refs.
Alvera, B.
Meltwater, Chemical analysis, Runoff, Water chemistry, Watersheds.

44-486
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Glacier ice, Magnetic surveys, Geological surveys, Aerial surveys, Greenland.

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Alt, B.T.
Climatic factors, Vegetation patterns, Tundra, Polar atmospheres, Climate, Vegetation, Canada—Northwest Territories—Queen Elizabeth Islands.

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Friele, P.A.
Ground thawing, Thermokarst development, Permafrost hydrology, Permafrost thermal properties, Revegetation, Soil erosion, Canada—Yukon Territory—Mayo.

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Deltas, Lakes, Flood forecasting, Hydrology, Water level, Canada—Northwest Territories—Mackenzie River Delta.

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Snow cover effect, Seismic surveys, Snow depth, Tundra.

44-493
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Ice cores, Ice composition, Climatic changes, China—Qinghai-Xizang Plateau.

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44-495
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Avalanche mechanics, Avalanche erosion, Slope processes, Damage, Geomorphology.

44-496
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Snow water equivalent, Gamma irradiation, Aerial surveys, Accuracy, Biomass, Atmospheric attenuation, Snow cover effect, Flood forecasting.

44-497
Proceedings of the 57th annual meeting, Fort Collins, CO, April 18-20, 1989.
Western Snow Conference, Fort Collins, Colorado State University, 1989, 150p., Refs passim. For individual papers see 44-498 through 44-518.
Shafer, B.A., ed.
Snow surveys, Snow hydrology, Water transport, Remote sensing, Water supply, Environment simulation, Runoff forecasting, Correlation, Computer applications, Meetings, Weather observations, Meteorological data.

44-498
Hydrologic modeling with remotely sensed data.
Kite, G., *Western Snow Conference. Proceedings,* 1989, 57th, p.1-8, 17 refs.
Spaceborne photography, Computerized simulation, River basins, Snow cover effect, Correlation, Hydrology.

44-499
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Sturges, D.L., *Western Snow Conference. Proceedings,* 1989, 57th, p.9-20, 19 refs.
Snow fences, Blowing snow, Reservoirs, Water storage, Seepage, Evaporation, Snow melting, Ablation, Water transport.

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Runoff forecasting, Snow depth, Seasonal variations, Stream flow, Snow cover distribution, Snow surveys, Snow hydrology, Watersheds, Correlation, Rocky Mountains.

44-501
Snow microorganisms and their interaction with the environment.
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Algae, Colored snow, Snow composition, Microbiology, Plant ecology.

44-502
Required accuracy of input data for WRENSS to determine silvicultural treatment effects on annual water yield.
Stednick, J.D., *Western Snow Conference. Proceedings,* 1989, 57th, p.36-44, 11 refs.
Water supply, Runoff forecasting, Computerized simulation, Snow retention, Seasonal variations, Stream flow, Forest land, Watersheds, Snow hydrology.

44-503
Evolution of a research-oriented snowmelt-runoff simulation model into an operational forecasting tool.
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Runoff forecasting, Computerized simulation, Snowmelt, Accuracy, Seasonal variations, Meteorological data, Correlation.

44-504
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Explosion effects, Avalanches, Detection, Acoustic measurement, Accuracy, Sound waves, Correlation.

44-505
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Verdin, J.P., Carroll, T.R.
Sensor mapping, Spaceborne photography, Photogrammetry, Snow cover distribution, Data processing, Remote sensing, Correlation.

44-506
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Reservoirs, Water supply, Runoff forecasting, Snowmelt, Statistical analysis, Watersheds, Water storage.

44-507
Direction toward improved streamflow forecasting in the Western mountains.
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Schaake, J.C., Ellis, J.H.
Runoff forecasting, Stream flow, Long range forecasting, Snowmelt, Snow water equivalent, Water supply, Precipitation (meteorology), Hydrology.

44-508
Estimating the effects of wildfire on water supplies in the northern Rocky Mountains.
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Hartman, R.K.
Environmental impact, Forest fires, Water supply, Runoff forecasting, Snow accumulation, Stream flow, Watersheds, Revegetation.

44-509
Statistical forecast model for Libby Basin, Montana.
Wortman, R.T., *Western Snow Conference. Proceedings,* 1989, 57th, p.100-107, 17 refs.
Accuracy, Water supply, Snowmelt, Statistical analysis, Mathematical models, Water storage, Hydrology, Correlation.

44-510
Good solution to the wilderness snow sensor problem.
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Environmental protection, Legislation, Snow cover distribution, Telemetering equipment, Snow surveys.

44-511
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Runoff forecasting, Environment simulation, Temperature effects, Snowmelt, Stream flow, Snow water equivalent, Precipitation (meteorology), Climatic changes.

44-512
Automated collection of water-quality and discharge data on streams.
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Winter, C.J.
Stream flow, Data processing, Portable equipment, Measurement, Water level, Water temperature, Hydrology.

44-513
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Snow depth, Ultrasonic tests, Acoustic measurement, Telemetering equipment, Periodic variations, Correlation, Temperature effects.

44-514
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Jairell, R.L.
Blowing snow, Photographic techniques, Illuminating, Electric equipment, Experimentation, Portable equipment, Particles.

44-515
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Steppuhn, H.
Windbreaks, Grasses, Snow accumulation, Soil water, Growth, Agriculture, Snow retention.

44-516
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Cost analysis, Snow water equivalent, Gamma irradiation, Aerial surveys, Flood forecasting, Measurement, Accuracy, Soil water.

44-517
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McGurk, B.J.
Runoff, Snow cover stability, Periodic variations, Snow water equivalent, Meltwater, Measurement, Snow hydrology, Weather observations.

44-518
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Allen, M.W., et al, *Western Snow Conference. Proceedings*, 1989, 57th, p.145-148, 5 refs.
Palmer, P.L.
Snow line, Snow cover distribution, Snow surveys, Aerial surveys, Snowmelt, Correlation, Remote sensing, Hydrology, Runoff forecasting, River basins.

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Glacier surveys, Mountain glaciers, Statistical analysis.

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LANDSAT, Glacier oscillation.

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Glacier oscillation, Glacier tongues, Climatic factors.

44-522
Report on the 1985 glaciological survey. [Relazioni della campagna glaciologica 1985], *Comitato glaciologico italiano. Bollettino. Ser.3: Geografia fisica e dinamica quaternaria*, 1986, 9(2), p.81-136, In Italian.
Glacier surveys, Statistical analysis.

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Sea ice, Albedo, Ice cover thickness, Temperature effects, Ice melting, Polar regions, Analysis (mathematics), Variations.

44-524
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Brightness, Spaceborne photography, Terrain identification, Topographic features, Snow cover, Reflectivity, Mathematical models, LANDSAT, Remote sensing.

44-525
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Kömle, N.I., et al, *Planetary and space science*, Feb. 1989, 37(2), p.193-195, 6 refs.
Ulamec, S.
Extraterrestrial ice, Ice thermal properties, Dust, Solar radiation, Transparence, Particles.

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Hailstone growth, Isotope analysis, Hailstone structure, Temperature gradients, Chemical analysis, Meteorological data.

44-527
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He, G.F.
Mathematical models, Cloud physics, Temperature effects, Hailstone growth, Thermodynamics, Precipitation (meteorology).

44-528
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Snow pellets, Ice microstructure, Cloud physics, Hail clouds, Simulation, Precipitation (meteorology).

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Wang, S.W.
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44-530
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Chezhin, S.P.
Steels, Strain tests, Low temperature tests, Tensile properties, Cracks, Thermal stresses, Mechanical tests, Temperature effects.

44-531
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Soil freezing, Frost heave, Mathematical models, Soil water migration, Ice lenses, Soil mechanics, Water transport.

44-532
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Školoud, O.
Freezing nuclei, Heterogeneous nucleation, Measurement, Analysis (mathematics).

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Significant metalliferous lode deposits and placer districts of Alaska.
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Minerals, Placer mining, Natural resources, Geological surveys, United States—Alaska.

44-534
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Ice formation, Water content, Computerized simulation, Aircraft icing, Heat transfer.

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Glacier surveys, Snow surveys, Ice surveys, Glaciology, Damage, Accidents, Safety, Glacial hydrology, Glacier oscillation, Meetings, Snow water content, Snow cover distribution.

44-537
Management of sediment transported by glacial meltwater streams and its significance for the estimation of sediment yield.
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Clark, M.J., Gurnell, A.M., Warburton, J.
Sediment transport, Glacier melting, Meltwater, Suspended sediments, Glacial rivers, Glacier ablation, Seasonal variations, Volume, Statistical analysis.

44-538
Glacial sediment production and development of hydro-electric power in glacierized areas.
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Glacial deposits, River basins, Suspended sediments, Electric power, Sediment transport, Glacial erosion, Floods, Bottom sediment, Glacial lakes, Seasonal variations, Norway.

44-539
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Braithwaite, R.J., et al, *Annals of glaciology*, 1989. Vol.13, Symposium on Snow and Glacier Research relating to Human Living Conditions, Lom, Norway, Sep. 4-9, 1988. Proceedings, p.12-15, 17 refs.
Thomsen, H.H.
Glacial hydrology, Runoff, Ice sheets, Glacier mass balance, Snowmelt, Electric power, Ablation, Ice melting, Seasonal variations, Climatic factors, Ice formation, Greenland.

44-540
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Snow fences, Snowdrifts, Blowing snow, Snow water equivalent, Snow mechanics, Countermeasures, Snow accumulation, Avalanche formation, Wind factors, Roads, Mountains, Meteorological data, Models.

44-541
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Rapin, F.
Avalanche triggering, Explosives, Blasting, Avalanche formation, Avalanche engineering, Safety, Protection.

44-542
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Brun, E., *Annals of glaciology*, 1989, Vol.13, Symposium on Snow and Glacier Research relating to Human Living Conditions, Lom, Norway, Sep. 4-9, 1988. Proceedings, p.22-26, 9 refs.
Metamorphism (snow), Snow water content, Unfrozen water content, Wet snow, Dielectric properties, Avalanche forecasting, Experimentation, Grain size, Snow morphology, Equipment.

44-543
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Charlier, C.
Avalanche formation, Computer applications, Avalanche tracks, Protection, Avalanche modeling, Velocity, Pressure, Meteorological factors.

44-544
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Avalanche forecasting, Computer applications, Meteorological data, Avalanche formation, Statistical analysis, Climatic factors, Avalanche triggering.

44-545
Agricultural use of melt water in Hopar settlement, Pakistan.
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Glacier melting, Meltwater, Irrigation, Agriculture, Runoff, River flow Mountains Altitude, Turbulent flow, Sediment transport, Water supply, Pakistan - Karakoram Range.

44-546
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Narita, H., Maeno, N.
Snow slides, Friction, Adhesion, Avalanche mechanics, Snow compaction, Analysis (mathematics), Velocity, Slope orientation, Viscous flow, Avalanche tracks.

44-547
Seasonal development of subglacial drainage and suspended sediment delivery to melt waters beneath an alpine glacier.
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Subglacial drainage, Mountain glaciers, Suspended sediments, Meltwater, Glacier ablation, Runoff, Seasonal variations, Subglacial caves, Precipitation (meteorology), Glacial hydrology, Switzerland—Gornergletscher.

44-548
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Driedger, C.L., et al, *Annals of glaciology*, 1989, Vol.13, Symposium on Snow and Glacier Research relating to Human Living Conditions, Lom, Norway, Sep 4-9, 1988 Proceedings, p 51-55, 17 refs
Fountain, A.G.
Glacial hydrology, Floods, Mountain glaciers, Snow cover distribution, Subglacial caves, Water storage, Monitors, Damage, Statistical analysis, United States Washington Rainier, Mount.

44-549
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Dozier, J., Michaelsen, J.
Snow accumulation, Snow water equivalent, Watersheds, Ablation, Radiation, Slope orientation, Altitude, Mountains, Topographic features, Snow density, United States—California—Sierra Nevada.

44-550
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Sediment transport, Suspended sediments, Glacier ablation, Flow rate, Stream flow, Seasonal variations, Accuracy, Models, Analysis (mathematics), Tests, Forecasting.

44-551
Storage of water in, and hydraulic characteristics of, the firn of South Cascade Glacier, Washington State, U.S.A.
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Firn, Porosity, Water content, Glacial hydrology, Water storage, Water flow, Snow cover, Permeability, Seasonal variations, Compaction, United States—Washington—South Cascade Glacier.

44-552
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Reservoirs, Glacier tongues, Glacier melting, Glacial hydrology, Flooding, Heat balance, Water storage, Glacier oscillation, Forecasting, Sounding, Seismic reflection, Analysis (mathematics), Switzerland—Unteraargletscher.

44-553
Comparison of three models of avalanche dynamics.
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Avalanche mechanics, Mathematical models, Avalanche tracks, Snow slides, Flow rate, Velocity, Topographic effects.

44-554
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Bader, H.P.
Avalanche formation, Fracturing, Shear strain, Snow density, Snow mechanics, Snow slides, Avalanche modeling, Snow temperature, Snow depth, Shear stress.

44-555
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Glacier melting, Ice mechanics, Floods, Glacier oscillation, Glacier flow, Meteorological factors, Damage, Mountains, Safety, Statistical analysis, Accidents, Switzerland—Alps.

44-556
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Glacial hydrology, Water supply, Meltwater, River flow, Snow accumulation, Glacier ablation, Mountains, Snow water equivalent, Glacier thickness, Subglacial drainage, Snowmelt, Pakistan Biafo Glacier

44-557
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Savage, S.B., Nohguchi, Y.
Avalanche mechanics, Snow slides, Friction, Fluid flow, Basal sliding, Mathematical models, Slope orientation, Velocity, Experimentation, Distribution.

44-558
Development and certification of a visibility-range monitor by image processing.
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Visibility, Stereoscopic cameras, Snow cover effect, Blowing snow, Brightness, Monitors, Optical properties, Roads.

44-559
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Wet snow, Solar radiation, Snow hardness, Snow water content, Snow density, Unfrozen water content, Experimentation, Temperature effects.

44-560
Spatial variability of snow-pack outflow at a site in Sierra Nevada, U.S.A.
Kattelmann, R., *Annals of glaciology*, 1989, Vol.13, Symposium on Snow and Glacier Research relating to Human Living Conditions, Lom, Norway, Sep. 4-9, 1988. Proceedings, p.124-128, 23 refs.
Snow cover structure, Snowmelt, Seepage, Water flow, Snow depth, Penetration, Rain, Volume.

44-561
Experimental studies on a powder-snow avalanche.
Kawada, K., et al, *Annals of glaciology*, 1989, Vol.13, Symposium on Snow and Glacier Research relating to Human Living Conditions, Lom, Norway, Sep. 4-9, 1988. Proceedings, p.129-134, 7 refs.
Nishimura, K., Maeno, N.
Avalanche formation, Impact strength, Physical properties, Avalanche wind, Atmospheric pressure, Avalanche tracks, Slope orientation, Snowfall, Experimentation, Velocity, Spectra, Altitude, Seismology, Temperature effects.

44-562
**Possible radio-echo method of locating englacial and subglacial waterways.**
Kennett, M I, *Annals of glaciology*, 1989, Vol 13, Symposium on Snow and Glacier Research relating to Human Living Conditions, Lom, Norway, Sep. 4-9, 1988. Proceedings, p.135-139, 8 refs.
Subglacial caves, Glacial hydrology, Subglacial drainage, Glacial rivers, Radio echo soundings, Water flow, Glacier surface, Subsurface drainage, Channels (waterways), Distribution.

44-563
**Supporting forces and stability of snow-slab avalanches: a parameter study.**
Lackinger, B., *Annals of glaciology*, 1989, Vol.13, Symposium on Snow and Glacier Research relating to Human Living Conditions, Lom, Norway, Sep. 4-9, 1988. Proceedings, p.140-145, 17 refs.
Avalanche formation, Snow cover stability, Fracturing, Snow strength, Snow loads, Shear stress, Avalanche mechanics, Snow slides, Loads (forces), Models.

44-564
**Flow characteristics of an unconstrained, non-cohesive, granular medium down an inclined, curved surface: preliminary experimental results.**
Lang, R.M., et al, *Annals of glaciology*, 1989, Vol 13, Symposium on Snow and Glacier Research relating to Human Living Conditions, Lom, Norway, Sep. 4-9, 1988. Proceedings, p.146-153, 11 refs.
Leo, B.R., Hutter, K.
Avalanche mechanics, Experimentation, Particles, Surface roughness, Basal sliding, Slope orientation, Flow measurement, Models.

44-565
**Snow-creep pressure on masts.**
Larsen, J.O., et al, *Annals of glaciology*, 1989, Vol.13, Symposium on Snow and Glacier Research relating to Human Living Conditions, Lom, Norway, Sep. 4-9, 1988. Proceedings, p.154-158, 5 refs.
Laugesen, J., Kristensen, K.
Towers, Snow loads, Snow creep, Snow depth, Structures, Snow melting, Wind factors, Temperature effects, Slope orientation.

44-566
**Past and forecast fluctuations of Glacier Blanc (French Alps).**
Letréguilly, A., et al, *Annals of glaciology*, 1989, Vol.13, Symposium on Snow and Glacier Research relating to Human Living Conditions, Lom, Norway, Sep. 4-9, 1988. Proceedings, p.159-163, 9 refs.
Reynaud, L.
Glacier oscillation, Glacier mass balance, Glacier flow, Mathematical models, Forecasting, Statistical analysis, Distribution, Altitude, France—Blanc, Glacier.

44-567
**Calculation of maximum snow-avalanche run-out distance by use of digital terrain models.**
Lied, K., et al, *Annals of glaciology*, 1989, Vol.13, Symposium on Snow and Glacier Research relating to Human Living Conditions, Lom, Norway, Sep. 4-9, 1988. Proceedings, p.164-169, 8 refs.
Toppe, R.
Avalanche formation, Avalanche tracks, Topographic maps, Avalanche forecasting, Topographic features, Distribution, Models, Computer applications, Analysis (mathematics), Norway.

44-568
**Snow-avalanche maps for use by the Norwegian Army.**
Lied, K., et al, *Annals of glaciology*, 1989, Vol.13, Symposium on Snow and Glacier Research relating to Human Living Conditions, Lom, Norway, Sep. 4-9, 1988. Proceedings, p.170-174, 6 refs.
Sandersen, F., Toppe, R.
Avalanche formation, Military operation, Mapping, Accidents, Topographic features, Avalanche deposits, Climatic factors, Distribution, Avalanche forecasting, Norway.

44-569
**Effects of structure boundary conditions and snowpack properties on snow-creep pressures.**
McClung, D M, et al, *Annals of glaciology*, 1989, Vol 13, Symposium on Snow and Glacier Research relating to Human Living Conditions, Lom, Norway, Sep 4-9, 1988 Proceedings, p 175-179, 17 refs
Larsen, J.O.
Snow creep, Snow loads, Snow cover structure, Structures, Snow depth, Strains, Snow slides, Snow deformation, Slope orientation, Accuracy, Mathematical models, Velocity.

44-570
**Extreme avalanche run-out: data from four mountain ranges.**
McClung, D.M., et al, *Annals of glaciology*, 1989, Vol 13, Symposium on Snow and Glacier Research relating to Human Living Conditions, Lom, Norway, Sep. 4-9, 1988. Proceedings, p.180-184, 6 refs.
Mears, A.I., Schaerer, P.
Avalanche formation, Avalanche tracks, Avalanche mechanics, Climatic factors, Slope orientation, Statistical analysis, Mountains, Distribution, Forecasting.

44-571
**Impacts of glacier-related landslides on the settlement at Hopar, Karakoram, Himalaya.**
MacDonald, K.I., *Annals of glaciology*, 1989, Vol.13, Symposium on Snow and Glacier Research relating to Human Living Conditions, Lom, Norway, Sep. 4-9, 1988. Proceedings, p.185 188, 4 refs
Glacier ablation, Landslides, Slope processes, Glacier melting, Glacier flow, Damage, Environmental impact, Irrigation, Channels (waterways), Pakistan—Himalaya Mountains.

44-572
**Advance of Hubbard Glacier and 1986 outburst of Russell Fiord, Alaska, U.S.A.**
Mayo, L.R, *Annals of glaciology*, 1989, Vol.13, Symposium on Snow and Glacier Research relating to Human Living Conditions, Lom, Norway, Sep. 4-9, 1988. Proceedings, p.189-194, 16 refs.
Glacier flow, Glacier surges, Coastal topographic features, Water retention, Water flow, Glacial lakes, Moraines, Ocean bottom, Floods, United States—Alaska—Hubbard Glacier.

44-573
**Influence of strong winds on snow distribution and avalanche activity.**
Meister, R., *Annals of glaciology*, 1989, Vol.13, Symposium on Snow and Glacier Research relating to Human Living Conditions, Lom, Norway, Sep 4-9, 1988. Proceedings, p.195-201, 16 refs.
Snow cover distribution, Avalanche formation, Wind velocity, Snowdrifts, Snow accumulation, Accidents, Wind direction, Snow density, Snow mechanics.

44-574
**Contribution of viscous forces to avalanche dynamics.**
Nishimura, K., et al, *Annals of glaciology*, 1989, Vol.13, Symposium on Snow and Glacier Research relating to Human Living Conditions, Lom, Norway, Sep. 4-9, 1988. Proceedings, p.202-206, 10 refs.
Maeno, N.
Avalanche mechanics, Flow rate, Snow mechanics, Viscosity, Snow density, Velocity, Fluid flow.

44-575
**Internal structure of powder-snow avalanches.**
Nishimura, K., et al, *Annals of glaciology*, 1989, Vol 13, Symposium on Snow and Glacier Research relating to Human Living Conditions, Lom, Norway, Sep 4-9, 1988 Proceedings, p 207-210, 13 refs.
Narita, H., Maeno, N., Kawada, K.
Avalanche formation, Avalanche mechanics, Avalanche wind, Snow loads, Snow cover structure, Impact strength, Velocity, Pressure, Measuring instruments, Wind velocity.

44-576
**Mathematical model for instability in snow gliding motion.**
Nohguchi, Y., *Annals of glaciology*, 1989, Vol.13, Symposium on Snow and Glacier Research relating to Human Living Conditions, Lom, Norway, Sep. 4-9, 1988. Proceedings, p.211-214, 12 refs.
Snow slides, Snow cover stability, Mathematical models, Snow mechanics, Avalanche formation, Velocity, Safety, Forest land.

44-577
**Three-dimensional equations for mass centre motion of an avalanche of arbitrary configuration.**
Nohguchi, Y, *Annals of glaciology*, 989, Vol.13, Symposium on Snow and Glacier Research relating to Human Living Conditions, Lom, Norway, Sep. 4-9, 1988. Proceedings, p.215-217, 14 refs.
Avalanche mechanics, Avalanche tracks, Topographic features, Avalanche forecasting, Velocity, Mathematical models.

44-578
**Simulation of snow-avalanche flow in run-out zones.**
Norem, H., et al, *Annals of glaciology*, 1989, Vol.13, Symposium on Snow and Glacier Research relating to Human Living Conditions, Lom, Norway, Sep. 4-9, 1988. Proceedings, p.218-225, 15 refs.
Irgens, F., Schieldrop, B.
Avalanche mechanics, Avalanche tracks, Shear flow, Shear stress, Slope orientation, Mathematical models, Avalanche deposits, Velocity, Distribution, Computer programs, Snow loads, Structures, Countermeasures.

44-579
**Slush-flow questionnaire.**
Onesti, L.J, et al, *Annals of glaciology*, 1989, Vol 13, Symposium on Snow and Glacier Research relating to Human Living Conditions, Lom, Norway, Sep. 4-9, 1988. Proceedings, p.226-230, 12 refs.
Hestnes, E.
Slush, Fluid flow, Topographic features, Climatic factors, Avalanche formation, Terminology, Seasonal variations, Rain, Damage, Accidents.

44-580
**Assessing avalanche-risk levels on walking tracks in Fiordland, New Zealand.**
Owens, I.F., et al, *Annals of glaciology*, 1989, Vol.13, Symposium on Snow and Glacier Research relating to Human Living Conditions, Lom, Norway, Sep. 4-9, 1988. Proceedings, p.231-236, 8 refs.
Fitzharris, B.B.
Avalanche tracks, Avalanche forecasting, Avalanche formation, Roads, Mapping, Topographic features, Safety, Damage, Accidents, Seasonal variations, Mountains, New Zealand—Fiordland.

44-581
**Process-based model of snow drifting.**
Pomeroy, J W., *Annals of glaciology*, 1989, Vol.13, Symposium on Snow and Glacier Research relating to Human Living Conditions, Lom, Norway, Sep. 4-9, 1988. Proceedings, p.237-240, 19 refs.
Snowdrifts, Snow mechanics, Mass balance, Snow erosion, Friction, Mathematical models, Blowing snow, Wind velocity, Boundary layer.

44-582
**Avalanche-hazard index.**
Schaerer, P., *Annals of glaciology*, 1989, Vol.13, Symposium on Snow and Glacier Research relating to Human Living Conditions, Lom, Norway, Sep 4-9, 1988. Proceedings, p.241-247, 6 refs.
Avalanches, Damage, Vehicles, Avalanche tracks, Indexes (ratios), Road maintenance, Safety, Accidents, Countermeasures.

44-583
**Snow-collection mechanisms and the capacities of snow fences.**
Takeuchi, M., *Annals of glaciology*, 1989, Vol.13, Symposium on Snow and Glacier Research relating to Human Living Conditions, Lom, Norway, Sep. 4-9, 1988. Proceedings, p.248-251, 9 refs.
Snow fences, Snow retention, Climatic factors, Snow accumulation, Wind direction, Snowdrifts, Shear stress, Design, Snow surface, Wind velocity, Snow depth, Snow mechanics.

44-584
**Temporal changes of glacier hydrological systems indicated by isotopic and related observations at Austre Okstindbreen, Okstindan, Norway, 1976-87.**
Theakstone, W.H., et al, *Annals of glaciology*, 1989, Vol 13, Symposium on Snow and Glacier Research relating to Human Living Conditions, Lom, Norway, Sep. 4-9, 1988. Proceedings, p.252-256, 14 refs.
Knudsen, N.T.
Glacial hydrology, Isotope analysis, Subglacial drainage, Glacial rivers, Water storage, Oxygen isotopes, Glacial lakes, Seasonal variations, Drainage, Water chemistry, Statistical analysis, Norway—Okstindan.

44-585
**Applied glacier research for planning hydro-electric power, Ilulissat/Jakobshavn, West Greenland.**
Thomsen, H.H., et al, *Annals of glaciology*, 1989, Vol.13, Symposium on Snow and Glacier Research relating to Human Living Conditions, Lom, Norway, Sep. 4-9, 1988. Proceedings, p.257-261, 29 refs.
Thorning, L., Olesen, O.B.
Glacier surveys, Glacial hydrology, Electric power, Ice sheets, Glacier melting, Meltwater, Subglacial drainage, Drainage, Forecasting, Mapping, Radio echo soundings, Drilling, Mathematical models, Greenland.

44-586
Floods caused by a glacier-dammed lake at the Folgefonni ice cap, Norway.
Tvede, A M., *Annals of glaciology*, 1989, Vol 13, Symposium on Snow and Glacier Research relating to Human Living Conditions, Lom, Norway, Sep. 4-9, 1988 Proceedings, p 262-264, 7 refs
Glacial lakes, Flood control, Subglacial drainage, Glacial hydrology, Damage, Countermeasures, Glacier tongues.

44-587
Numerical simulation of snowdrift development.
Uematsu, T., et al, *Annals of glaciology*, 1989, Vol.13, Symposium on Snow and Glacier Research relating to Human Living Conditions, Lom, Norway, Sep. 4-9, 1988. Proceedings, p.265-268, 9 refs.
Kaneda, Y., Takeuchi, K., Nakata, T., Yukumi, M.
Snowdrifts, Wind velocity, Snow accumulation, Topographic features, Analysis (mathematics), Models.

44-588
Forty years of mass-balance observations on Glacier de Sarennes, French Alps.
Valla, F., *Annals of glaciology*, 1989, Vol.13, Symposium on Snow and Glacier Research relating to Human Living Conditions, Lom, Norway, Sep 4-9, 1988. Proceedings, p.269-272, 9 refs
Glacier mass balance, Glacier ablation, Glacier alimentation, Cirque glaciers, Snow depth, Snow density, Snow water equivalent, Snow accumulation, Glacier oscillation, Statistical analysis, Meteorological factors, Seasonal variations, France—Alps.

44-589
Evolution, water balance, potential hazards, and control of a pro-glacial lake in the French Alps.
Vallon, M., *Annals of glaciology*, 1989, Vol.13, Symposium on Snow and Glacier Research relating to Human Living Conditions, Lom, Norway, Sep. 4-9, 1988 Proceedings, p.273-278, 20 refs.
Glacial lakes, Water balance, Calving, Seepage, Glacier melting, Safety, Glacier thickness, Water level, Dams, Moraines, Ice dams, Channels (waterways), France—Alps.

44-590
Glaciochemical investigations as a tool for determining the spatial and seasonal variation of snow accumulation in the central Karakoram, northern Pakistan.
Wake, C P., *Annals of glaciology*, 1989, Vol.13, Symposium on Snow and Glacier Research relating to Human Living Conditions, Lom, Norway, Sep. 4-9, 1988 Proceedings, p 279-284, 34 refs.
Snow accumulation, Chemical analysis, Snowfall, Geochemistry, Mountain glaciers, Snow stratigraphy, Snow physics, Climatic factors, Seasonal variations, Ice cores, Snow water equivalent, Altitude, Pakistan—Karakoram Range.

44-591
Effects of spatial and temporal variation in snowmelt on nitrate ion and sulfate ion pulses in melt waters within an alpine basin.
Williams, M.W., et al, *Annals of glaciology*, 1989, Vol.13, Symposium on Snow and Glacier Research relating to Human Living Conditions, Lom, Norway, Sep. 4-9, 1988. Proceedings, p.285-288 12 refs.
Melack, J.M.
Snowmelt, Meltwater, Ions, Runoff, Chemical analysis, Mountains, Snow cover distribution, Water chemistry, Sampling, United States—California—Sierra Nevada.

44-592
Ice loss in the ablation area of a Himalayan glacier; studies on Miar Glacier, Karakoram Mountains, Pakistan.
Young, G.J., et al, *Annals of glaciology*, 1989, Vol.13, Symposium on Snow and Glacier Research relating to Human Living Conditions, Lom, Norway, Sep 4-9, 1988 Proceedings, p 289-293, 12 refs.
Schmok, J.P.
Glacier ablation, Glacier mass balance, Stream flow, Glacier flow, Radio echo soundings, Glacier thickness, Glacier alimentation, Forecasting, River flow, Glacier surfaces, Precipitation (meteorology), Pakistan—Karakoram Range.

44-593
Role of gas hydrates in cryolithogenesis of marine deposits in the arctic basin.
Romanovskiĭ, N N., et al, *Moscow University geology bulletin*, 1988, 43(5), p 1-12, 12 refs Translated from Moscow Universitet Vestnik Geologiia
Barkovskaia, E.N., Komarov, I.A.
Marine deposits, Geocryology, Subsea permafrost, Ground ice, Hydrates.

44-594
Copper sulfates from cryogenic zone of genesis of the Udokan deposit.
IAkhontova, L.K., et al, *Moscow Univers geology bulletin*, 1988, 43(5), p.38-43, 8 refs Translated from Moscow. Universitet. Vestnik. Geologiia.
Geocryology, Subsea permafrost, Chemical analysis.

44-595
Remote sensing techniques of the wave propagation laboratory for the measurement of supercooled water: applications to aircraft icing.
Westwater, E.R., et al, *U.S. National Oceanic and Atmospheric Administration. Technical memorandum*, May 1989, NOAA-TM-ERL-WPL-163, 35p. PB89-208102.
Kropfli, R.A.
Aircraft icing, Ice formation, Remote sensing.

44-596
North Pole 1983. History of its conquest and contemporary problems of maritime and air transportation. [Pôle Nord 1983 Histoire de sa conquête et problèmes contemporains de navigation maritime et aérienne],
Malaurie, J., ed, Paris, centre National de la Recherche Scientifique, 1987, 385p., In English and French. Refs. passim For selected papers see 44-597 through 44-604.
Devers, S., ed.
Sea ice, Submarines, Ice navigation, Glaciation, Paleoclimatology, Ice conditions, Legislation, International cooperation.

44-597
Paleoglaciations and paleoenvironments in the boreal regions. [Paléoglaciations et paléoenvironnements des régions Boréales],
Vivian, R., Pôle Nord 1983. Histoire de sa conquête et problèmes contemporains de navigation maritime et aérienne. (North Pole 1983. History of its conquest and contemporary problems of maritime and air transportation). Edited by J. Malaurie and S. Devers, Paris, Centre National de la Recherche Scientifique, 1987, p.51-60, 6 refs., In French with English summary. 6 refs.
Glaciation, Paleoclimatology, Climatic changes.

44-598
Arctic basins physiography. Statement of present knowledge (1983). [Physiographie des bassins arctiques. État des connaissances actuelles (1983)],
Vanney, J.R., Pôle Nord 1983. Histoire de sa conquête et problèmes contemporains de navigation maritime et aérienne. (North Pole 1983. History of its conquest and contemporary problems of maritime and air transportation). Edited by J. Malaurie and S. Devers, Paris, Centre National de la Recherche Scientifique, 1987, p.63-82, In French with English summary. Refs. p.79-82.
Geomorphology, Periglacial processes, Geophysical surveys.

44-599
Sea ice conditions in the Arctic Ocean.
Wadhams, P., Pôle Nord 1983. Histoire de sa conquête et problèmes contemporains de navigation maritime et aérienne. (North Pole 1983. History of its conquest and contemporary problems of maritime and air transportation). Edited by J. Malaurie and S. Devers, Paris, Centre National de la Recherche Scientifique, 1987, p.83-94, 40 refs.
Sea ice, Ice conditions, Drift, Ice surveys, Ice cover thickness, Ice islands.

44-600
Arctic sea ice: climatological distribution and methods of analysis.
Smith, B.P., Pôle Nord 1983. Histoire de sa conquête et problèmes contemporains de navigation maritime et aérienne. (North Pole 1983. History of its conquest and contemporary problems of maritime and air transportation). Edited by J. Malaurie and S. Devers, Paris, Centre National de la Recherche Scientifique, 1987, p.95-100, 6 refs.
Sea ice, Sea ice distribution, Ice growth.

44-601
Design of arctic merchant ships. [La conception des navires de commerce arctiques],
Bonmort, J., et al, Pôle Nord 1983. Histoire de sa conquête et problèmes contemporains de navigation maritime et aérienne (North Pole 1983. History of its conquest and contemporary problems of maritime and air transportation). Edited by J Malaurie and S. Devers, Paris, Centre National de la Recherche Scientifique, 1987, p.307-311, In French with English summary.
Vivier, F., Béghin, D.
Ships, Design criteria, Ice navigation.

44-602
Submarine exploration of the North Pole region: history, problems, positioning and piloting.
Lyon, W.K., Pôle Nord 1983. Histoire de sa conquête et problèmes contemporains de navigation maritime et aérienne. (North Pole 1983. History of its conquest and contemporary problems of maritime and air transportation). Edited by J. Malaurie and S. Devers, Paris, Centre National de la Recherche Scientifique, 1987, p.313-328, Refs. passim.
Submarines, Ice navigation, History.

44-603
Arctic submarine: its evolution and scientific and commercial potential.
McLaren, A.S., Pôle Nord 1983. Histoire de sa conquête et problèmes contemporains de navigation maritime et aérienne. (North Pole 1983. History of its conquest and contemporary problems of maritime and air transportation). Edited by J. Malaurie and S. Devers, Paris, Centre National de la Recherche Scientifique, 1987, p.329-341, 59 refs.
Submarines, Ice navigation.

44-604
Maritime law problems in the Arctic Ocean.
Fleischer, C.A., Pôle Nord 1983. Histoire de sa conquête et problèmes contemporains de navigation maritime et aérienne. (North Pole 1983. History of its conquest and contemporary problems of maritime and air transportation). Edited by J. Malaurie and S. Devers, Paris, Centre National de la Recherche Scientifique, 1987, p.363-373.
Legislation, International cooperation.

44-605
Mechanics of ice crushing by propeller blades.
Beliashov, V A., et al, New York, Engineering Consulting & Translation Center (ECTC), n.d., 10p., ECTC No.T-830-03, 7 refs. For Russian original see 38-1684.
Shpakov, V.S.
Ice breaking, Propellers, Ice mechanics, Ice cutting, Icebreakers, Ships, Mathematical models, Ice navigation.

44-606
Interaction of ice fields with offshore structures.
Vershinin, S.A., New York, Engineering Consulting & Translation Center (ECTC), n.d., 23p., ECTC No.T-830-05, 47 refs. For Russian original see 38-1686.
Compressive properties, Sea ice, Ice mechanics, Ice physics, Ice loads, Ice cover strength, Supports, Mathematical models, Offshore structures.

44-607
Ice cover bending due to ship motion.
Levit, B.M., et al, New York, Engineering Consulting & Translation Center (ECTC), n.d., 4p., ECTC No.T-699-14, 2 refs. Translation from Leningrad. Institut vodnogo transporta. Trudy, 1969.
Segal, Z.B.
Ice mechanics, Ice cover thickness, Ice cover strength, Icebreakers, Ships, Analysis (mathematics).

44-608
Contrast and visibility under winter conditions with application to motion detection systems.
Peck, L., *U.S Army Cold Regions Research and Engineering Laboratory*, Sep. 1989, CR 89-17, 8p., ADB-137 592, 21 refs.
Snow optics, Visibility, Warning systems, Detection, Military equipment, Fog, Analysis (mathematics).
Video motion detection systems are used to automate the detection of intruders for physical security purposes. Wintertime conditions of fog and falling or blowing snow are likely to hinder the detection of objects by either an observer or a motion detection system Theoretical equations of contrast and visibility are reviewed.

44-609
Method for rating unsurfaced roads.
Eaton, R.A., et al, *Northern engineer*, Spring/Summer 1989, 21(1-2), MP 2533, 1989, p.30-40, For another version see 42-804.
Gerard, S., Dattilo, R.S.
Road maintenance.

44-610
Effects of filtering and classification routines on different resolution imagery in distinguishing land use classes.
Merry, C.J., et al, MP 2534, Society for Imaging Science and Technology. Annual Conference, 41st, Arlington, VA, May 22-26, 1988. Advance printing of paper summaries., [1988], p.57-58.
Landscape types, Terrain identification, Remote sensing.

44-611
Remote sensing and water resources.
McKim, H.L., et al, MP 2535, ASPRS-ACSM Fall Convention, Reno, NV, Oct. 4-9, 1987. ASPRS technical papers, [1987], p.186-190.
Merry, C.J.
Water supply, Remote sensing.
In the past 5 years there has been rapid advancement in the use of remote sensing in the area of water resource management. Satellite image data are now available from operational systems such as the NOAA and SPOT satellites. In addition the Landsat series of satellites have taken data over a major portion of the globe. Many procedures and methods have been developed to analyze digital satellite data but the techniques to use them operationally for evaluating water resources on a global scale are in their infancy. A discussion of the methods used by the Corps of Engineers to address water related topics is presented to illustrate how world communities must learn to use remote sensing for collection of data required to manage their water resources.

44-612
Perturbation solution of the flood problem. Discussion and author's reply.
Ferrick, M.G., *Journal of hydraulic research,* 1988, 26(3), MP 2536, p.346-349, 2 refs. For article by B. Hunt, being discussed, see Ibid, 1987, 25(2).
Hunt, B.
Flood control, River flow, Flood forecasting, Mathematical models.

44-613
Framework for control of dynamic ice breakup by river regulation.
Ferrick, M.G., et al, MP 2537, Regulated rivers: research and management, Vol.3, 1989, p.79-92, 18 refs. For another version see 43-4385.
Mulherin, N.D.
River ice, Ice breakup, Ice jams, River flow, Ice control, Flood control.
The entire range of ice breakup behavior, from thermal to dynamic, is described and classified, to provide order to this complex process. The theory and model of Ferrick *et al* (1986) are refined, building on the concept of an intrinsic relationship between river waves and dynamic ice breakup. A force balance is developed for a common dynamic breakup behavior. Empirical criteria that quantify the resistance to breakup of an ice cover are obtained from a case study and compared with published values. Sensitivity studies of ice breakup with the completed model demonstrate insights that follow from the theory presented, and the intuitive nature of the results. The framework for understanding river ice processes provides the option for ice management by river regulation, and focuses on the potential for control of ice breakup. The concept of controlled breakup involves a release of water from a dam that moves the ice downstream of locations with a high potential for damages during breakup. The abrupt, short-duration characteristics of the controlled release, patterned after those of unregulated river breakup, minimize both the volume of water required to cause breakup and the water levels at breakup. The open water created by the breakup collects heat that increases the rate of melting of the ice. The benefits of successful regulation include the prevention of flooding, minimum erosion and decreased potential for ice damage to structures during breakup without adverse affects on the environment.

44-614
Removal of atmospheric ice from broadcast towers using low-frequency, high-amplitude vibrations.
Mulherin, N.D., et al, MP 2538, [1988], 6p., Presented at 4th International Workshop on Atmospheric Icing of Structures, Paris, Sep. 1988. 7 refs.
Donaldson, R.J.F.
Towers, Icing, Ice removal, Low frequencies, Vibration.
Laboratory and field experiments showed that structurally safe levels of low-frequency, high-amplitude (LFHA) vibrations imparted directly to transmission towers under cold temperatures were ineffective in removing appreciable amounts of atmospheric ice. In general, limited ice removal from the test structures occurred only during resonant-mode frequencies when vibration amplitudes were greatest. More importantly, the same vibrations that were incapable of ice removal were structurally damaging to the 18-m-tall guyed towers. Damage resulted in the form of broken welds and crossbracing and cracked tower legs. Experiments with a surface coating showed that while the bond strength of the ice was reduced, debonding and ice removal was still limited to small areas close to the vibration source. Vibrations preceded by melting at the ice/metal interface and weakening of the ice cover by solar radiation led to rapid and extensive ice removal. The possibility of deicing by a combination of vibrations, heat, and/or surface coatings is worthy of additional investigation.

44-615
Smart weapons operability enhancement.
Link, L.E., Jr., MP 2539, DOD Environmental Technical Exchange Conference on Mesoscale Phenomena, Laurel, MD, Jan. 23-27, 1989. Proceedings. Edited by A.A. Barnes, Jr., 1989, p.165-173.
Military engineering, Military research, Detection, Data processing, Atmospheric attenuation.

44-616
Orthogonal curvilinear coordinate generation for internal flows.
Albert, M.R., MP 2540, Numerical grid generation in computational fluid mechanics, edited by S. Sengupta, Pine Ridge Press, 1988, p.425-433, 8 refs.
Fluid dynamics, Fluid mechanics, Fluid flow, Mathematical models.
Generation of boundary-fitted orthogonal coordinates is accomplished by mapping the irregular region in physical space onto a square in the transformed space, where an elliptic equation is solved to find interior physical coordinate locations. It is usual practice to employ rules or restrictions on the distortion function governing the coordinate transformation from physical to transformed space. This can allow control of node spacing on the interior of the region, at the expense of arbitrary specification of node locations along the boundaries. In problems involving internal flows, the specification of boundary node locations is important. This paper investigates some implications of a standard rule used for specification of the distortion function, and explores a simple technique that achieves complete boundary correspondence by allowing natural values of the distortion function to exist on the interior. Sample grids are generated to compare the results of the two techniques.

44-617
Rating unsurfaced roads.
Eaton, R.A., et al, *Public works,* Mar. 1988, 119(3), MP 2541, p.66-69, For another version see 42-804.
Gerard, S., Cate, D.W.
Road maintenance.

44-618
Oceanographic observations in the Scotia Sea marginal ice zone, June-Aug. 1988.
Husby, D.M., et al, *U.S. National Oceanic and Atmospheric Administration. Technical memorandum,* May 1989, NOAA-TM-NMSF-SWFC-127, 70p., PB89-208052, 5 refs.
Muench, R.D., Gunn, J.T.
Hydrography, Sea water, Ice edge, Sea ice distribution, Scotia Sea.
The project was part of the interdisciplinary Antarctic Marine Ecosystem Research at the Ice Edge Zone (AMERIEZ) program. The observations defined the oceanic temperature, salinity, density and current fields associated with the marginal ice zone during a period of accretion at the ice edge and documented the complex mesoscale oceanographic structures associated with the Weddell-Scotia Confluence and the Scotia Front. Particular emphasis was placed on measurements of the upper layer vertical stratification which is considered an important factor in the development of enhanced productivity in the marginal ice zone. Results will be integrated with chemical and biological information obtained by other elements within the AMERIEZ program. The report presents the T, S, density and current (as Lagrangian drift) data obtained in their entirety. Since the report is intended as a data report which can serve as a tool for further analysis, extensive discussion is not presented. (Auth.)

44-619
Mapping seasonal soil freezing and thawing within the USSR. [Kartografirovanie sezonnogo promerzaniia i protaivaniia gruntov v predelakh SSSR],
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Vostokova, A.V., Paperteva, N.A.
Mapping, Soil freezing, Ground thawing, Seasonal freeze thaw, Freeze thaw cycles.

44-620
Determining ejection distances for avalanches of varied volume for the Western Caucasus. [Sposob opredeleniia dal'nosti vybrosa lavin raznoi obespechennosti dlia Zapadnogo Kavkaza],
Ebralidze, Z.N., *Moscow. Universitet. Vestnik Seria 5 Geografiia,* July-Aug 1989, No.4, p 47-51, In Russian. 4 refs.
Avalanche forecasting, Avalanche mechanics, Statistical analysis.

44-621
Entry of pollutants into the snow cover and soils of urban lawns.
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Obukhov, A.I.
Snow impurities, Soil pollution, Snow disposal, Streets, Roads, Snow melting, Snow cover distribution, Grasses.

44-622
Current, CTD, and pressure measurements in possible dispersal regions of the Chukchi Sea.
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Vinelli, J.B.
Ocean currents, Water temperature, Sea ice, Temperature measurement, Oceanography, Water pollution, Environmental impact, Salinity, Chukchi Sea

44-623
Icing risks on roads built with slag. [Ha krisker vid vägar byggda med slagg],
Gustafson, K., *Sweden. Statens Väg- och trafikinstitut. VTI meddelande,* 1988, No.570, 75p., PB89-122808, In Swedish with English summary.
Road icing, Pavements, Thermal insulation, Ice prevention, Pavement bases, Construction materials

44-624
Snow cover, snowmelt and runoff in the Himalayan river basins. Final technical report.
Dey, B., et al, *U.S. National Aeronautics and Space Administration. Contractor report,* July 1988, NASA-CR-182434, 37p. N89-11290.
Sharma, V.K., Goswami, D.C., Rao, P.S.
Snow cover effect, Snowmelt, Runoff forecasting, River basins, Mathematical models, Snow cover distribution, Meltwater, Water supply, Himalaya Mountains.

44-625
Frost protection and insulation for transportation facilities.
Gandahl, R., et al, *Transportation Research Board, Washington, DC. Research report,* 1987, TRB/TRR-1146, 49p. PB89-131643.
Frost protection, Thermal insulation, Frost heave, Roads, Aircraft landing areas, Railroad tracks

44-626
Chemistry of deicing roads: penetrating the ice. Final report 1986-87.
Trost, S.E., et al, *Minnesota Department of Transportation. Report,* Mar. 1988, MN/RC-88/06, 27p., PB89-128284, For another version see 42-2776.
Heng, F.J., Cussler, E.L.
Road icing, Chemical ice prevention, Road maintenance, Ice removal, Salting, Urea

44-627
Unique new cold weather testing facility.
Eaton, R.A., MP 2542, Test Technology Symposium, 1st, Jan. 25-28, 1988. Proceedings. Vol.2, [1988], p.745-750, For another version see 43-2114.
Low temperature research, Cold weather tests, Laboratories, Test chambers, Low temperature tests, Buildings, Refrigeration.
The U.S. Army Cold Regions Research and Engineering Laboratory has a new controlled-environment test facility, the Frost Effects Research Facility (FERF), now in use. The 29,000 sq f (2942 sq m) building comprises a principal test area 182 ft (55 m) long by 45 ft (14 m) wide incorporating 12 test basins, adjacent mobilization areas and equipment rooms, for a total width of 102 ft (31 m), plus fully enclosed ramp areas at each end of the building. Surface panels are used to freeze pavement and soils for the pavement, utility, soil sensor, and mobility test programs. Liquid-to-air heat exchangers are used to test hardware inside enclosures erected in the test basins or on the mobilization area. Currently, coolant is available at -35 deg, 0 deg and +90 deg F (38, -18 and 38 C), allowing test temperatures ranging from -35 F (-37 C) to +90 F (32 C). Lower temperatures can be achieved by using portable units in conjunction with the facility's permanent system.

44-628
Techniques for gas gun studies of shock wave attenuation in snow.
Brown, J.A., et al, MP 2543, Shock waves in condensed matter 1987, edited by S.S. Schmitt and N.C. Holmes, New York, Elsevier, 1988, p.657-660, 8 refs.
Gaffney, E.S., Blaisdell, G.L., Johnson, J.B.
Shock waves, Snow compression, Snow mechanics, Snow strength, Snow acoustics.

44-629
Interpretation of satellite images in some glacial regions of China.
Shi, Y.F., et al, *Academia Sinica. Institute of Glaciology and Geocryology. Memoirs,* 1988, No.6, p.1-11, In Chinese with English summary. 12 refs.
Mi, D.S., Zeng, Q.Z.
Glacier surveys, Remote sensing, Glacier oscillation, Glacier tongues, Mountain glaciers, Topographic maps, Seasonal variations, Accuracy, China.

44-630
Interpretation of some glacial characteristics of the Mount Qomolangma region from satellite images.
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Glacier surveys, Remote sensing, Mountain glaciers, Glacier oscillation, Moraines, LANDSAT, Glacial lakes, Glacier surfaces, China—Qomolangma Mountain.

44-631
Synopsis of sketch map of Landsat image in the Karakoram Mountains.
Mi, D.S., et al, *Academia Sinica. Institute of Glaciology and Geocryology. Memoirs,* 1988, No.6, p.21-22, In Chinese with English summary. 3 refs.
Liu, J.H , Jin, D M
Mountain glaciers, Remote sensing, Mapping, LANDSAT, Topographic maps, Distribution, China—Karakoram Mountains.

44-632
Computer processing and interpretation of glacial feature for Landsat-2 CCT digital image covering Hoh Xil Lake in Qinghai Province.
Feng, X.Z., et al, *Academia Sinica. Institute of Glaciology and Geocryology. Memoirs,* 1988, No.6, p.23-28, In Chinese with English summary 4 refs
Zeng, Q.Z., Jin, D.H.
Glacier surveys, Remote sensing, Snow cover distribution, Glacier oscillation, LANDSAT, Computer applications, Mountain glaciers, Topographic maps, Data processing, China—Hoh Xil Lake.

44-633
Snow survey of the Qilian Mt. from meteorological satellite images.
Liu, Z K , et al, *Academia Sinica Institute of Glaciology and Geocryology. Memoirs,* 1988, No.6, p.29-39, In Chinese with English summary. 3 refs.
Zhang, S Y
Snow surveys, Remote sensing, Snow cover distribution, Computer programs, Accuracy, China—Qilian Mountains.

44-634
Satellite snow cover monitoring in the Qilian Mt. and the characteristics of spring runoff in Hexi region.
Zeng, Q Z., et al, *Academia Sinica Institute of Glaciology and Geocryology Memoirs,* 1988, No.6, p.40-48, In Chinese with English summary. 15 refs.
Snow cover distribution, Runoff forecasting, Remote sensing, Snowmelt, River basins, Meltwater, LANDSAT, Seasonal variations, Mountains, China—Qilian Mountains.

44-635
Analysis of snow cover of the Heihe River in the Qilian Mt. Landsat images.
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Snow cover distribution, River basins, Snow line, Remote sensing, LANDSAT, Altitude, Mountains, China—Qilian Mountains.

44-636
Snow cover distribution in the Heihe River in the Qilian Mt.
Wang, J., *Academia Sinica. Institute of Glaciology and Geocryology. Memoirs,* 1988, No.6, p.55-63, In Chinese with English summary. 4 refs.
Snow cover distribution, Remote sensing, River basins, Snowfall, Mountains, Snow depth, Seasonal variations, Altitude, China—Qilian Mountains.

44-637
Medium-range prediction analysis and equation of snowmelt runoff of the Heihe River in the Qilian Mt.
Feng, X.Z., et al, *Academia Sinica. Institute of Glaciology and Geocryology. Memoirs,* 1988, No.6, p.64-74, In Chinese with English summary. 3 refs
Wang, J.
Runoff forecasting, Snowmelt, River flow, Meteorological factors, Mountains, Analysis (mathematics), Precipitation (meteorology), Computer programs, Accuracy, China Heihe River, China Qilian Mountains.

44-638
Forecasting snowmelt runoff using NOAA, TIROS satellite data for the Huanghe River and the Heihe River.
Zhang, S.Y., et al, *Academia Sinica. Institute of Glaciology and Geocryology. Memoirs,* 1988, No.6, p.75-84, In Chinese with English summary. 6 refs.
Zeng, Q.Z.
Runoff forecasting, Snowmelt, River flow, Remote sensing, Precipitation (meteorology), Air temperature, Seasonal variations, Mountains, Analysis (mathematics), China—Qilian Mountains.

44-639
Estimation method of snow cover area on NOAA/-TIROS-N VHRR images using photoelectric quantitative processing.
Pu, Y.B., et al, *Academia Sinica. Institute of Glaciology and Geocryology. Memoirs,* 1988, No.6, p.85-93, In Chinese with English summary. 10 refs.
Jin, D.H.
Snow cover distribution, Infrared photography, Remote sensing, Cloud cover, River basins, Mountains, Analysis (mathematics).

44-640
Discrimination between snow and clouds using remote sensing digital data from satellites.
Chen, X.Z., et al, *Academia Sinica. Institute of Glaciology and Geocryology. Memoirs,* 1988, No.6, p.94-99, In Chinese with English summary. 6 refs.
Bajzak, D.
Snow optics, Cloud cover, Remote sensing, Snow water equivalent, Ice cover, Mapping, LANDSAT.

44-641
Snow mapping at bigger scale using Landsat CCTs digital data.
Chen, X.Z., et al, *Academia Sinica. Institute of Glaciology and Geocryology. Memoirs,* 1988, No.6, p.100-105, In Chinese with English summary. 6 refs.
Prevost, C., Zeng, Z.Y.
Snow cover distribution, Runoff forecasting, Remote sensing, Snowmelt, Mapping, LANDSAT, Computer applications.

44-642
Research on multispectral distinguishing ability and the best period infrared remote sensing in the permafrost region.
Liang, F.X., et al, *Academia Sinica Institute of Glaciology and Geocryology. Memoirs,* 1988, No.6, p.106-119, In Chinese with English summary 2 refs.
Permafrost, Ground ice, Infrared spectroscopy, Remote sensing, Surface properties, Infrared photography, Seasonal variations, Diurnal variations.

44-643
Method of determining the lower limit of permafrost using correlation information—as exemplified by the Qilian Mt. region.
Liang, F X , et al, *Academia Sinica. Institute of Glaciology and Geocryology Memoirs,* 1988, No.6, p.120-127, In Chinese with English summary. 5 refs.
Wang, J , Feng, X.Z
Permafrost distribution, Remote sensing, Glaciers, Snow line, Snow cover distribution, Seasonal variations, Mapping, Mountains, Altitude, China—Qilian Mountains.

44-644
Enhancement of remote sensing image and the method of extracting permafrost-environmental information.
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Elsey, T.J.
Permafrost distribution, Remote sensing, Environments, LANDSAT, Statistical analysis.

44-645
Design and management of data file bank for data of ground object spectral reflectance.
Feng, X.Z., et al, *Academia Sinica. Institute of Glaciology and Geocryology. Memoirs,* 1988, No.6, p.146-151, In Chinese with English summary. 10 refs.
Zeng, Q.Z., Cao, M.S., Zeng, G.C.
Structures, Remote sensing, Spectroscopy, Reflection, Design, Computer programs, Accuracy.

44-646
Late Quaternary climate changes in eastern China.
Xu, X., *Journal of glaciology and geocryology,* Mar. 1989, 11(1), p.10-19, In Chinese with English summary. 27 refs.
Glaciation, Pleistocene, Ice age theory, Climatic changes, Temperature variations, China.

44-647
Study of regularity and influence factors of displacement of frozen soil wall in freeze sinking.
Ma, Y.M., et al, *Journal of glaciology and geocryology,* Mar. 1989, 11(1), p.20-33, In Chinese with English summary. 2 refs.
Guo, R.P.
Shaft sinking, Pipeline freezing, Linings, Artificial freezing, Frozen ground mechanics, Walls, Frost heave, Dislocations (materials), Mines.

44-648
Statistical characteristics of frozen soil in Jilin Province.
Ni, C.Y., et al, *Journal of glaciology and geocryology,* Mar. 1989, 11(1), p.34-43, In Chinese with English summary.
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Frozen ground temperature, Seasonal freeze thaw, Frost penetration, Snow depth, Air temperature, Mountains, Statistical analysis, Distribution, China—Jilin Province.

44-649
Approach to some problems of the check of anti-frost heaving of bridge pile foundation in seasonally frozen regions.
Sheng, H.F., *Journal of glaciology and geocryology,* Mar. 1989, 11(1), p.44-52, In Chinese with English summary. 4 refs.
Pile structures, Frost heave, Pile extraction, Countermeasures, Seasonal freeze thaw, Frost penetration, Foundations, Friction, Stresses.

44-650
Applications of environmental isotope tritium to research into ground ice in permafrost regions of Qinghai-Xizang Plateau.
Wang, S.L., et al, *Journal of glaciology and geocryology,* Mar 1989, 11(1), p.53-59, In Chinese with English summary. 7 refs.
Wang, P., Zhang, T.J.
Ground ice, Permafrost, Isotopes, Cryogenic structures, Pingos, Water flow, Distribution, China—Qinghai-Xizang Plateau.

44-651
Research of snow temperature and melt-water percolation in the infiltration of a glacier.
Cai, B.L., et al, *Journal of glaciology and geocryology,* Mar. 1989, 11(1), p.60-68, In Chinese with English summary. 4 refs.
Wang, L.W.
Snow temperature, Meltwater, Glacial hydrology, Seepage, Heat transfer, Mathematical models.

44-652
Formation and evolution of permafrost on the Qinghai-Xizang Plateau since the Late Pleistocene.
Wang, S.L., *Journal of glaciology and geocryology,* Mar. 1989, 11(1), p.69-75, In Chinese with English summary. 6 refs.
Periglacial processes, Permafrost distribution, Age determination, Pleistocene, Climatic changes, Carbon isotopes, Pingos, Air temperature, Temperature variations, China—Qinghai-Xizang Plateau.

44-653
Preliminary research of geomorphological and depositional features of Pleistocene glaciations in the east slope of Xiaoxianling Mountain in the southwest of Sichuan Province.
Yi, C.L., *Journal of glaciology and geocryology,* Mar. 1989, 11(1), p.76-81, In Chinese with English summary. 1 ref.
Glaciation, Glacial deposits, Pleistocene, Geomorphology, Cirques, Moraines, Landforms, Sedimentation, Chemical analysis, Particle size distribution, China—Sichuan Province.

44-654
Characteristics of the surface movement of the lobate-shape rock glacier from the debris fabric, Tianshan China.
Zhu, C., *Journal of glaciology and geocryology,* Mar. 1989, 11(1), p.82-88, In Chinese with English summary. 6 refs.
Rock glaciers, Glacier flow, Glacier surfaces, Talus, Mechanical properties, Topographic effects, Climatic factors, Mountain glaciers, China—Tian Shan.

44-655
**Study of surface textures and indicated sedimentary environment of quartz sand from some sediments in the Kunlun Shan region under electronic scanning microscope.**
Li, S.J., *Journal of glaciology and geocryology,* Mar. 1989, 11(1), p.89-91, In Chinese with English summary
Glacial deposits, Scanning electron microscopy, Sedimentation, Geomorphology, China—Kunlun Mountains.

44-656
**Role of ocean-atmosphere reorganizations in glacial cycles.**
Broecker, W.S., et al, *Geochimica et cosmochimica acta,* Oct. 1989, 53(10), p.2465-2501, Refs. p.2497-2501.
Denton, G.H.
Glaciation, Paleoclimatology, Sea water, Climatic changes, Glacier oscillation, Ice cores, Ice models.
A case is made that glacial-to-interglacial transitions involve major reorganizations of the ocean atmosphere system Such reorganizations constitute jumps between stable modes of operation which cause changes in the greenhouse gas content and albedo of the atmosphere Only in this way can the rapidity of glacial terminations, the hemispheric synchroneity and symmetry of mountain glaciation and the large polar air temperature and dustiness variations be accounted for If these reorganizations are driven in some fashion by orbitally induced seasonal insolation changes, then the connection between insolation and climate is most likely through impacts of fresh water transport on the ocean's salinity distribution (Auth.)

44-657
**Yearbook, fiscal year 1988.**
U.S. Geological Survey, 1989, 134p.
Mapping, Remote sensing, Geological surveys, Aerial surveys, Natural resources
Administrative aspects of the Survey, its mission, national and international operations, accomplishments and information activities are described The report includes a review of the Survey's antarctic mapping, from the early reconnaissance efforts in 1959-60, to current large scale topographic mapping, aerial photography and Landsat data. Also discussed is the biogeochemistry of dissolved organic materials in Dry Valleys lakes.

44-658
**Ice thickness changes on Lake Hoare, southern Victoria Land, Antarctica.**
Simmons, G.M., Jr., et al, *Antarctic journal of the United States,* 1987, 22(5), p.235-236, 9 refs
McKay, C.P., Wharton, R.A., Jr.
Lake ice, Ice cover thickness, Antarctica—Hoare, Lake.
Light penetration and ice thickness changes at Lake Hoare are discussed It is shown that not only do the spectral qualities of light passing through the ice covers change during the season, but the ice covers themselves have thinned over the past decade Data collected over the past decade show that Lake Hoare's ice cover has thinned by approx 2.0 m. It is suggested that antarctic lakes are extremely sensitive indicators to changes in local climatic conditions. The thickness of the ice covers appears to be delicately balanced between mean annual temperature (freeze/thaw relationships), water input from glaciers and possibly groundwater, and ablation rates. The factors which control ice thickness, such as ablation, are in turn, determined by prevailing climatic conditions Changes in the ice-cover thickness should be detected quickly by changes in one, or both, of two biological communities—the plankton or benthic microbial community

44-659
**Sand/ice interactions and sediment deposition in perennially ice-covered antarctic lakes.**
Simmons, G.M., Jr., et al, *Antarctic journal of the United States,* 1987, 22(5), p.237-240, 9 refs.
Wharton, R.A., Jr, McKay, C.P., Nedell, S., Clow, G.
Limnology, Lake ice, Ice cover thickness, Ice rafting, Sediments, Antarctica - Hoare, Lake.
Preliminary results are presented of observations and experiments conducted during the 1985-86 austral summer at Lake Hoare, southern Victoria Land on sand-ice interactions and analysis of sediments from the lake bottom. Changes in Lake Hoare's ice cover (thickness and morphology) between 1983 and 1986 are discussed, and a conceptual model is proposed which reflects sand loading on the ice-cover surface to the observed variations in the ice cover on Lake Hoare. The proposed model considers time course of sand accumulation, the stages of which are clean ice, subsurface melting, surface ponding, and instability and dumping The model, if valid, predicts further instability in Lake Hoare's ice cover in the next few years, leading ultimately to the dumping of a significant fraction of the ice-cover sand load

44-660
**Correlating ice crystal types with halo types.**
Tape, W., *Antarctic journal of the United States,* 1987, 22(5), p.262-264, 1 ref.
Ice crystals, Optical phenomena, Antarctica—South Pole.
During the austral summer seasons of 1984-1985 and 1985-1986, ice crystals were collected as they fell during halo displays at the South Pole A major goal was to provide an empirical check of the theoretical correlation of crystal types with halo types. A crystal sample is shown in which all of the crystals are long hexagonal columns A computer simulation is presented, that shows the theoretically expected halos if crystals shaped like those in the sample fell with their axes approximately horizontal. In addition to having their axes approximately horizontal, about 10% of the crystals in the simulation had Parry orientations and were responsible for the Parry arc and heliac arc The presence of the Parry arc and the heliac arc in the actual display, together with the absence of clusters or obviously tabular forms in the crystal sample, indicates that simple columnar crystals by themselves can assume Parry orientations.

44-661
**Blowing snow in eastern Antarctica.**
Wendler, G., *Antarctic journal of the United States,* 1987, 22(5), p.264-265, 8 refs.
Particle size distribution, Blowing snow, Snowdrifts, Antarctica—Adélie Coast.
Blowing snow measurements were taken in eastern Antarctica as part of a large-scale U.S.-French experiment IAGO (Interaction-Atmosphère Glace-Océan) carried out in Adélie Land The number and sizes of the snow particles were measured photoelectrically It is shown that stronger winds not only pick up more particles, but also larger ones The frequency is about 700 particles/sq cm/sec while the size ranges between 150 and 250 nanometers. A linear relationship was found between the logarithm of the flux and the wind speed In summer, when the snow blowing measurements were carried out, the wind speed was somewhat below the annual mean, nevertheless, drifting snow was observed about half of the time Drifting snow was observed with winds speeds of about 8 m/sec, with a speed of 14 m/sec well developed blowing snow was observed, and when the wind speed reached 20 m/sec, visibility went down to 20 m

44-662
**Ice-forming nuclei at Palmer Station, Antarctica.**
Saxena, V.K., et al, *Antarctic journal of the United States,* 1987, 22(5), p.266-267, 12 refs.
Weintraub, D.C.
Aerosols, Ice nuclei, Ice formation, Antarctica—Palmer Station.
The objectives of this experiment were, first, to investigate lognormal distribution of freezing drops and identify aerosol particulates responsible for ice nucleation and, second, to find any correlation between the elemental composition of IFN and the threshold freezing temperature The aerosol samples taken at Palmer Station were analyzed using methodology by Vali (1971a, 1971b). Results show that the range of threshold temperature is -5 C to 014.3 C, with ice forming nuclei concentrations ranging from 8.5/cu m to about 100,000/cu m. A positive correlation is shown between the threshold temperatures and 3 chemical elements, namely, potassium, silicon and zinc. Such a correlation indicates a potential for these elements to serve as good ice nucleants.

44-663
**Antarctic mosaic compiled from DMSP imagery.**
Scharten, G.R., *Antarctic journal of the United States,* 1987, 22(5), p.302.
Spaceborne photography, Snow cover, Ice cover.
The National Snow and Ice Data Center has compiled an antarctic mosaic from imagery held in its Defense Meteorological Satellite Program (DMSP) data collection. The mosaic was compiled from images collected during five passes of the DMSP F-7 satellite in Nov 1986

44-664
**Ship operations, 1986-1987.**
Marthaler, J.G., *Antarctic journal of the United States,* 1987, 22(5), p.306-309.
Logistics, Icebreakers, Cargo, Sea ice, Ice conditions.
Two U.S. Coast Guard icebreakers operated in the Antarctic this season in support of the U.S. Antarctic Program. USCGC *Polar Sea* resupplied Palmer Station, penetrated the channel break in to McMurdo Station, provided station support assist for the resupply vessels M/V *Gus W. Darnell* and M/V *Green Wave* into Winter Quarters Bay at McMurdo Station, and conducted one science cruise in the southern Ross Sea along the Ross Ice Shelf. USCGC *Glacier* conducted an extensive science support program, supporting one science cruise in the northern Antarctic Peninsula and one in the western Ross Sea. A detachment of two HH-52A helicopters was assigned to each icebreaker. The tank ship M/V *Gus W. Darnell,* on its maiden voyage to Antarctica, and the dry cargo vessel M/V *Green Wave,* provided the fuel and supplies to McMurdo Station. Details of the operations are given

44-665
**Theory of heat transfer-irreversible refrigeration plants.**
Bejan, A., *International journal of heat and mass transfer,* Sep 1989, 32(9), p.1631-1639, With French, German, and Russian summaries. 13 refs.
Refrigeration, Heat transfer, Mathematical models.

44-666
**Study of flow boiling heat transfer with refrigerant mixtures.**
Jung, D.S., et al, *International journal of heat and mass transfer,* Sep. 1989, 32(9), p.1751-1764, With French, German, and Russian summaries. 33 refs.
McLinden, M., Radermacher, R., Didion, D.
Refrigeration, Heat transfer, Mathematical models.

44-667
**Transformations and disposition of late-fall applied nitrogen during winter in southern Saskatchewan.**
Selles, F., et al, *Canadian journal of soil science,* Aug. 1989, 69(3), p.551-565, With French summary. 19 refs.
Leyshon, A.J., Campbell, C.A.
Nutrient cycle, Frozen ground chemistry, Soil chemistry, Soil freezing, Agriculture, Snow cover effect.

44-668
**Airframe icing: some classification problems.**
Auld, H., *Canadian aeronautics and space journal,* Sep. 1989, 35(3), p.152-154, 14 refs.
Aircraft icing, Ice forecasting.

44-669
**Sediment flux in a fiord/shelf transect: annual report Oct. 86-Sep. 88.**
Andrews, J.T., *Colorado. University. Technical report,* Sep. 1988, TR-153-0741, 59p. ADA-199 707.
Glacial deposits, Sediment transport, Sedimentation, Drill core analysis, Coastal topographic features.

44-670
**Chicago Transit Authority evaluation of rail borne snow removal vehicle (S-500). Final report 1980-87.**
Torres, W.R., *U.S. Urban Mass Transportation Administration. Report,* May 1988, UMTA-IL-06-0048, 31p. PB89-12163.
Snow removal, Railroad equipment, Railroad tracks, Snow vehicles.

44-671
**Calculation of the effects of ice on the backscatter of a ground plane.**
Lambert, K.M., et al, *U.S. National Aeronautics and Space Administration. Contractor report,* Sep. 1988, NASA-CR-183303, 55p. N89-10213.
Peters, L.
Ice surface, Ice cover thickness, Backscattering, Surface roughness, Radio echo soundings.

44-672
**Root surface acid phosphatases and their role in phosphorus assimilation by *Eriophorum vaginatum.***
Kroehler, C.J., et al, *U.S. Department of Energy. Report,* 1988. DOE/ER/60492-4, 10p. DE88-014136.
Linkins, A.E.
Tundra, Plant physiology, Roots, Soil chemistry, Plant ecology.

44-673
**Environmental influences on the production of arctic halocline and deep water.**
Hill, J.A., Monterey, CA, Naval Postgraduate School, June 1988, 54p., ADA-199 848, M.S. thesis.
Sea water, Salinity, Ocean currents, Polynyas, Ocean environments, Brines.

44-674
**Oceanographic and climatological atlas of Bristol Bay. Final report.**
Wise, J.L., et al, *U.S. Coast Guard. Report,* Oct. 1987, USCG-D-13-88, 192p. ADA-199 298.
Leslie, L.D., Labelle, J.C.
Oceanographic surveys, Marine meteorology, Sea ice distribution, Maps, Tides, Oil spills, United States—Alaska—Bristol Bay.

44-675
**Support for an arctic camp for 10 persons for 30 days. Final report.**
Welsh, J.P., et al, *U.S. Naval Ocean Research and Development Activity. Technical report,* July 1988, NORDA-TN-347, 22p. ADA-199 296.
Burge, R.E.
Drift stations, Logistics, Cold weather operation, Human factors.

44-676
**Repair of bridge deck structures in cold weather. Final report.**
Kudlapur, P., et al, *U.S. Federal Highway Administration. Report,* Dec. 1987, FHWA/NJ-88-012-7710, 219p. PB89-113674.
Hanaor, A., Balaguru, P.N., Nawy, E.G.
Bridges, Repair maintenance, Winter maintenance, Cold weather construction, Concrete admixtures, Concrete pavements.

44-677
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Preliminary research on glacier balance in the area of Terra Nova Bay (Antarctica). [Ricerche preliminari sul bilancio glaciale nell'area della Baia Terra Nova (Antartide)],
Zanon, G., *Comitato Glaciologico Italiano. Bollettino Ser 3 Geografia fisica e dinamica quaternaria,* 1988, 11(1), p.56-58, In Italian with English summary. 5 refs.
Glacier mass balance, Glacier surveys, Glacier tongues, Antarctica—Terra Nova Bay.
This work reports the results of preliminary research on glacier mass balance carried out during the Italian Antarctic expedition to Terra Nova Bay in 1987-88. Investigations were carried out on two glaciers in the area. The main mass balance parameters of the Strandline Glacier, a typical example of a small local formation, were identified and evaluated. On the second, the Campbell Glacier, 140 km long, a maximum time of 55 years of firn accumulation on the surface of the floating ice tongue was measured. Calculations were made of the velocity of the ice tongue itself (270 m/yr) and of its ice discharge (0.345 cu km/yr) at the point where it probably begins to float completely. (Auth.)

44-749
Effect of an ice jam on the morphology of a river channel confluence. [Les effets d'un embâcle sur la morphologie du lit d'une confluence de cours d'eau],
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Roy, A.G.
Ice jams, River flow, Bottom topography, Ice scoring, River ice, Hydrology.

44-750
Spring melt simulation in the Eaux Volées watershed, Montmorency Forest, Quebec. [Simulation de la fonte printanière au bassin des Eaux Volées, Forêt Montmorency, Québec],
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Bouchard, M., Lauzier, D.
Computerized simulation, Snowmelt, Runoff forecasting, Degree days, Heat transfer, Watersheds, Snow hydrology.

44-751
Prospects for winter maintenance machines and equipment. [Talvikunnossapitokaluston kehitysnäkymiä],
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Winter maintenance, Machinery, Snow removal, Road maintenance, Cold weather operation.

44-752
Concerns over cooling. *Heavy duty trucking,* Sep. 1988, 67(9), p.52-68
Motor vehicles, Cold weather operation, Cooling systems, Antifreezes.

44-753
Switch to multi-vis. *Heavy duty trucking,* Sep. 1988, 67(9), p.70-71.
Cold weather performance, Diesel engines, Lubricants, Viscosity, Motor vehicles.

44-754
Lubes boost economy. *Heavy duty trucking,* Sep. 1988, 67(9), p.72-73.
Cold weather performance, Lubricants, Physical properties, Motor vehicles.

44-755
Keep fuel flowing. *Heavy duty trucking,* Sep. 1988, 67(9), p.74-75.
Heating, Diesel engines, Fuels, Temperature control, Countermeasures, Motor vehicles.

44-756
Facing Jack Frost. *Heavy duty trucking,* Sep. 1988, 67(9), p.78-80.
Winter maintenance, Cold weather operation, Motor vehicles, Countermeasures.

44-757
How fleets prepare. *Heavy duty trucking,* Sep. 1988, 67(9), p.85-89.
Winter maintenance, Cold weather performance, Motor vehicles, Countermeasures.

44-758
By the numbers on snow or ice.
Spence, C., *Air line pilot,* Dec. 1988, 57(12), p.18-20.
Runways, Warning systems, Standards. Rubber snow friction, Rubber ice friction, Measurement, Safety, Aircraft.

44-759
Multiple reflections across a linear discontinuity in surface albedo.
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Davies, J.A.
Albedo, Reflection, Measurement, Solar radiation, Snow optics, Cloud cover, Surface energy, Mathematical models, Surface properties.

44-760
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Ground ice, Frozen rocks, Frozen rock temperature, Frozen ground chemistry, Ground water, Frozen ground mechanics, Minerals, Mathematical models, Analysis (mathematics).

44-761
Icing of tall structures in the lowlands of the USSR. [Obledenenie vysotnykh sooruzhenii na ravninnoi territorii SSSR],
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Icing, Structures, Ice loads, Statistical analysis.

44-762
Study of natural environment in the area around the Korean antarctic station, King George Island (II).
Korea Ocean Research and Development Institute, Seoul, 1989, 485p., In Korean with English summary. Refs. passim.
Ice cores, Chemical analysis, Antarctica—King Sejong Station.
The introductory chapter of this report is followed by 2 others dealing, respectively, with the terrestrial environment in the area around the first Korean antarctic research station, King Sejong, and including tectonics of South Shetland Is., structural geology and petrology of King George I., gravity measurements, ice core drilling and chemical analysis in Fildes Peninsula, distribution and reproduction physiology of seals, and meteorological observations from Mar. 1988 to Feb. 1989, and the marine environment of Maxwell Bay, including ocean physical and chemical properties- nutrients, chlorophyll a and primary productivity—plankton distribution, benthic environment, submarine physiography and sedimentary facies, nutrient distribution, diatom identification and radioactivity measurements and estimation of sedimentation rate in core sediments. Numerous tables, charts, photographs and plates of the collected data, with titles and descriptions in English, are included Also in English is a table of contents and a summary of the study s objective, scope, results and suggestions.

44-763
LIMEX '87: international experiment in the Labrador Sea marginal ice zone.
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Digby-Argus, S.A.
Ice edge, Sea ice, Remote sensing, Ice forecasting, Radar echoes.

44-764
Measuring the length of an ice floe trajectory.
Hoeber, H., *Polar record,* Oct. 1989, 25(155), p.347-349, 4 refs.
Ice floes, Drift, Wind (meteorology), Antarctica—Weddell Sea. Fram Strait.
It is shown from experimental data that, both in the Weddell Sea and the northern part of the Greenland Sea, the movement of sea ice particles can be viewed as a semi-random process Although the external forcing of wind and current causes a preferred average direction of ice drift, the trajectories resemble those of particles in a diffusive process. Mandelbrot's concept of a fractal dimension is applied and found to range from 1 10 in a marginal ice zone to 1 19 in a region of highly compacted ice As a consequence it is observed that the length of ice trajectories measured from three-day position data is only about two-thirds of the length measured from one-hourly positions. (Auth.)

44-765
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Cruden, D.M., Thomson, S.
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Water structure, Supercooling, Temperature effects, Amorphous ice, Neutron scattering, Physical properties, Experimentation.

44-767
Snow budgets stable, PR efforts up, survey shows.
Kuennen, T., *Roads and bridges,* June 1989, 27(6), p.40-46, 58.
Surveys, Cost analysis, Snow removal, Winter maintenance, Economic analysis.

44-768
SHRP snow, ice contracts may aid snowfighters.
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Research projects, Snow removal, Road icing, Ice control, Cold weather operations.

44-769
Snowfighters given new options in deicers. *Roads and bridges,* June 1989, 27(6), p.53
Salting, Chemical ice prevention, Manufacturing, Chemical composition

44-770
Snowfighting plan a must for safe, successful winter.
Patyk, S., comp, *Roads and bridges,* June 1989, 27(6), p.56-57.
Surveys, Snow removal, Winter maintenance, Safety.

44-771
Liquid CaCl lends hand in Indiana snow battle.
Heine, M., *Roads and bridges,* June 1989, 27(6), p.63-64.
Salting, Chemical ice prevention, Liquids, Road icing.

44-772
Mapping arctic tundra vegetation types using digital SPOT/HRV-XS data -a preliminary assessment.
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Burns, B., Hope, A.
Sensor mapping, Terrain identification, Tundra, Vegetation patterns, Classifications, Remote sensing

44-773
Mapping very low surface temperature in the Scottish Highlands using NOAA AVHRR data.
Collier, P., et al, *International journal of remote sensing,* Sep. 1989, 10(9), p.1519-1529, 15 refs.
Runacres, A.M.E., McClatchey, J.
Sensor mapping, Snow cover effect, Temperature measurement, Computer applications, Spaceborne photography, Surface temperature, Climatology, Scotland.

44-774
Effects of soil covers on late-fall seedings of four tall fescue varieties.
Palazzo, A J., *U.S. Army Cold Regions Research and Engineering Laboratory,* June 1989, SR 89-17, 5p., ADA-212 203, 20 refs.
Grasses, Cold weather survival.
Soil covers promote seed germination and plant growth at suboptimum temperatures by conserving heat near the soil surface. This conservation of heat results in a higher soil surface temperature than in uncovered soil. The result is succulent seedlings that may be more susceptible to premature death during winter and reduced growth the following season The objectives of this study were to evaluate the effectiveness of soil covers for promoting seed germination in the fall and to observe the effects of soils covers on plant growth and development. A field study was conducted using Clemfine, Mustang, Rebel and Rebel II varieties of tall fescue *(Festuca arundinacea* Schreb.) sown in mid-Oct. in New Hampshire using a randomized block design. Half of each plot was covered with a spun-bonded polypropylene soil cover. The cover remained on the plots until the following June It enhanced seedling emergence in the fall for all four varieties and subsequent regrowth during May for all varieties except Rebel Very little extra growth was observed under the cover during Apr , when average ambient temperatures were about 6.2 C. Analysis of tissue sampled in June showed that the carbohydrate content was lower with the higher-yielding varieties. Higher-yielding varieties that had been covered showed lower concentrations of fructans in leaves, but the levels were not sufficient to affect summer growth. No differences in carbohydrate concentrations between varieties were found. Test results show that the use of soil covers promoted seed germination of late fall seeding and improved grass growth through the following Aug.

44-775
Factors affecting rates of ice cutting with a chain saw.
Coutermarsh, B.A., *U.S. Army Cold Regions Research and Engineering Laboratory,* July 1989, SR 89-24, 14p., ADA-212 405, 8 refs.
Bridges, Ice cutting, Military operation, Saws, Ice models, Ice cover thickness.
Military winter bridging procedures with an ice cover present on the waterway may involve cutting the ice away with chain saws to provide an ice-free crossing zone. This report investigates the cutting rates possible from one type of chain saw with two chain configurations, two operators, three cut lengths and three ice thicknesses. A statistical analysis is used to determine the effect the various factors have upon cutting rate and suggestions are made for chain modifications that might further improve cutting performance.

44-776
Estimation of time to maximum supercooling during dynamic frazil ice formation.
Daly, S.F., et al, *U.S. Army Cold Regions Research and Engineering Laboratory,* July 1989, SR 89-26, 13p., ADA-212 204, 12 refs.
Axelson, K.D.
Frazil ice, Ice formation, River ice, Supercooling, Heat loss, Analysis (mathematics).
Time to maximum supercooling is a parameter that can be easily measured during experiments on the dynamic, nonequilibrium stage of frazil ice formation. Mercier's analytical expression is applied to a number of experiments in which the time to maximum supercooling was measured. In each of the experiments, the heat loss rate and turbulent dissipation rate were reported or could be determined from the experiment description The secondary nucleation was set at the value of 40,000,000,000 nuclei/cm/g suggested by Mercier, and the seeding rate optimized to reproduce the experimental results. An inverse relationship was found between the coldroom temperature at which the experiment was conducted and the seeding rate. The optimized seeding rates varied from 2 7 to .000075 crystals/sq cm s. The implications for frazil ice formation in rivers and streams are discussed.

44-777
Reference guide for building diagnostics equipment and techniques.
McKenna, C.M., et al, *U.S. Army Cold Regions Research and Engineering Laboratory,* July 1989, SR 89-27, 64p., ADA-213 818, Refs. p.61-64.
Munis, R.H.
Buildings, Indoor climates, Heating, Ventilation, Air conditioning, Illuminating, Air pollution, Monitors.
This report is designed for use by facilities engineers as a guide in the initial phases of investigating building diagnostics equipment and techniques. It provides information related to energy management and building environmental considerations resulting from energy conservation measures. Subjects covered include. 1) building enclosure system evaluation, 2) heating, ventilating and air conditioning (HVAC) system evaluation, 3) lighting/illuminating system evaluation, 4) electrical system evaluation, and 5) indoor air quality measurements.

44-778
Cryogenic sampling of frazil ice deposits.
Chacho, E.F., Jr., et al, *U.S. Army Cold Regions Research and Engineering Laboratory,* Aug. 1989, SR 89-28, 6p., ADA-212 207, 18 refs.
Brockett, B.E., Lawson, D.E.
Frazil ice, Ice sampling, River ice, Samplers.
A prototype cryogenic sampler has been used to examine frazil ice deposits beneath the ice-covered Tanana River near Fairbanks, AK. Modification of a streambed sediment sampler has provided full depth, *in-situ* samples of frazil ice deposits, which are suitable for determining structure and overall composition.

44-779
Correlation of Quaternary deposits and events around the margin of the Beaufort Sea.
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Quaternary deposits, Glaciation, Geochronology, Beaufort Sea.

44-780
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Permafrost distribution, Permafrost dating, Quaternary deposits, Canada—Beaufort Sea.

44-781
Permafrost distribution and the Quaternary history of the Mackenzie-Beaufort region: a geothermal perspective.
Judge, A.S., *Canada. Geological Survey. Open file report,* June 1986, No.1237, Correlation of Quaternary deposits and events around the margin of the Beaufort Sea. Edited by J.A. Heginbottom and J.S. Vincent, p.41-45, 17 refs.
Subsea permafrost, Permafrost distribution, Quaternary deposits, Permafrost thermal properties, Geothermy, Permafrost thickness, Canada—Northwest Territories—Mackenzie River Delta

44-782
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Wijkström, C., comp, Stockholm, Swedish Polar Research Secretariat, (1988), 270p., Unpublished manuscript. Preliminary edition.
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Bibliographies, Research projects.
The aim of the Swedish Polar Bibliography is to list publications by Swedish authors active during the period in Sweden or abroad and by foreign authors active in Swedish projects or working at Swedish institutions. This includes Swedish antarctic research This preliminary edition lists monographs, conferences, articles in journals and reports of individuals and organizations. Subject and author indexes are provided.

44-783
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Vinson, T.S., Wilson, J.E.
Bituminous concretes, Degradation, Moisture, Concrete pavements, Freeze thaw tests, Stresses, Aggregates, Concrete durability, Weathering, Fatigue (materials).

44-785
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44-787
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Remote sensing, Sea ice, Ice cover thickness, Measurement, Accuracy, Computer programs.

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Wave propagation, Scattering, Remote sensing, Snow cover effect, Sea ice, Models, Data processing.

44-789
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44-790
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Keith, T.G., Jr.
Wind tunnels, Ice formation, Flow control, Turbulent flow, Fluid dynamics.

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Sleds, Design, Maintenance Bibliographies.

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Larsen, C.E., *U.S. Geological Survey. Bulletin,* 1987, No.1801, 36p., Refs. p.32-35.
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Glacial lakes, Geochronology, Lakes, Glaciation, Glacial geology, Geomorphology, Great Lakes.

44-800
Ice observations on the Allegheny and Monongahela rivers.
Bilello, M.A., et al, *U.S. Army Cold Regions Research and Engineering Laboratory,* Nov 1988, SR 88-25, 43p., ADA-213 028, 10 refs.
Gatto, L.W., Daly, S.F., Gagnon, J.J.
River ice, Ice navigation, Ice conditions, Ice reporting, United States—Allegheny River, United States—Monongahela River.
Corps of Engineers and National Weather Service records of ice conditions on the Allegheny and Monongahela rivers in PA and WVA were analyzed for seven recent winters. The on-ground observations recorded daily at a number of lock and dam locations were assessed in the form of alphanumeric ice codes that included the coverage, type, thickness, structure and extent of river ice. These codes were used to grade conditions throughout the rivers to allow easier analysis of historical ice conditions. In addition, comparisons were made between these observations and aerial videotapes and satellite images of the ice. Results of these comparisons illustrate that ice data from these three sources are complementary and should be used together whenever possible.

44-801
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Hoffmann, H.E., et al, *U.S. National Aeronautics and Space Administration. Translation,* Mar. 1988, ESA-TT-1080, 64p., N88-23346, Translation from German: Die normierte Eisansatzdicke in Abhängigkeit von wolkenphysikalischen Parametern. Deutsche Forschungs- und Versuchsanstalt für Luft- und Raumfahrt, Jan. 1987.
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Easter, R.C., et al, *Battelle Pacific Northwest Laboratories, Richland, WA. Report,* Feb. 1988, PNL-SA-15692, 9p. DE88-008189.
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Air pollution, Scavenging, Clouds (meteorology), Precipitation (meteorology), Chemical properties, Simulation.

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Foundations, Frost protection, Frost resistance, Thermal insulation, Frost action, Bridges, Military engineering.

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44-806
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Hail prevention, Hail clouds, Cloud physics, Hailstones, Hailstone structure, Damage, Statistical analysis, Analysis (mathematics).

44-807
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Fedchenko, L.M., et al, *Nal'chik. Vysokogornyĭ geofizicheskiĭ institut. Trudy,* 1989, Vol.74, p.5-19, In Russian. 10 refs.
Tlisov, M.I., Kalov, Kh.M., Bocharova, V.A.
Hail prevention, Research projects, Hailstone structure.

44-808
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Kalazhokov, Kh.Kh.
Hail clouds, Cloud physics, Analysis (mathematics), Models.

44-809
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Cloud physics, Ice crystal growth, Coalescence, Analysis (mathematics).

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Hailstone structure, Hailstones, Hail prevention, Analysis (mathematics), Statistical analysis.

44-811
Calculating radar reflectivity of hail clouds in their maximum development stage. [Raschet radiolokatsionnoĭ otrazhaemosti gradovykh oblakov v stadii ikh maksimal'nogo razvitiia],
Zhakamukhov, Kh.M., et al, *Nal'chik. Vysokogornyĭ geofizicheskiĭ institut. Trudy,* 1989, Vol.74, p.44-53, In Russian. 8 refs.
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Hail clouds, Cloud physics, Reflectivity, Analysis (mathematics).

44-812
Effect of the dielectric transmissivity function on the attenuation and scattering of radar waves by non-homogeneous hail. ¡Vliianie funktsii dielektricheskoĭ pronitsaemosti na kharakteristiki rasseianiia i oslableniia radiolokatsionnogo izlucheniia neodnorodnogo grada¡
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Hail, Dielectric properties, Attenuation, Scattering, Radar echoes, Analysis (mathematics).

44-813
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Pyt'ev, IU.P., Iniukhin, V.S.
Ice melting, Hail, Polarization (waves), Analysis (mathematics).

44-814
Ultra high frequency radar radiometric methods of determining the phase structure of convective clouds. ¡SVCh-radiolokatsionno-radiometricheskie metody opredeleniia fazovoĭ struktury konvektivnykh oblakov¡
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Cloud physics, Cloud droplets, Analysis (mathematics), Hail clouds, Convection.

44-815
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Radar, Cloud physics, Hail clouds, Hail, Water content, Microstructure.

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Typical paths of supercell hail clouds in the northern Caucasus. ¡Kharakternye traektorii super"iacheĭkovykh gradovykh oblakov na Severnom Kavkaze¡
Gazaeva, Z.A., et al, *Nal'chik Vysokogornyĭ geofizicheskiĭ institut. Trudy*, 1989, Vol.74, p.99-109, In Russian. 5 refs.
Dinaeva, L.M., Makitov, V.S.
Hail clouds, Cloud physics, Statistical analysis

44-817
Determining the duration of the hail hazard condition of clouds based on their thunder activity. ¡Opredelenie prodolzhitel'nosti gradoopasnogo sostoianiia oblakov po ikh grozovoĭ aktivnosti¡
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Cloud physics, Hail clouds, Thunderstorms, Forecasting, Analysis (mathematics), Hail prevention.

44-818
Study of optimal thermodynamic conditions in the development of hail processes of varied intensity. ¡Otsenka optimal'nykh termodinamicheskikh usloviĭ razvitiia gradovykh protsessov razlichnoĭ intensivnosti¡
Goral', G.G., *Nal'chik. Vysokogornyĭ geofizicheskiĭ institut. Trudy*, 1989, Vol.74, p.114-124, In Russian. 9 refs.
Cloud physics, Hail clouds, Thermodynamics, Analysis (mathematics).

44-819
Kinematics of upper air cyclones and the intensity of hail processes in the region of the Caucasus. ¡Kinematika vysotnykh tsiklonov i intensivnost gradovykh protsessov v regione Kavkaza¡
Goral', G.G., et al, *Nal'chik. Vysokogornyĭ geofizicheskiĭ institut. Trudy*, 1989, Vol.74, p.124-132, In Russian. 8 refs.
Barekova, M.V.
Hail clouds, Atmospheric disturbances, Cloud physics, Convection.

44-820
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Ashabokov, B.A., et al, *Nal'chik. Vysokogornyĭ geofizicheskiĭ institut. Trudy*, 1989, Vol.74, p.133-137, In Russian. 5 refs.
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Hail prevention, Hail clouds, Cloud physics, Countermeasures, Analysis (mathematics).

44-821
Physical characteristics of hail and damage to agricultural crops. ¡Fizicheskie kharakteristiki grada i povrezhdaemost' sel'skokhoziaĭstvennykh kul'turˌ
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Hail, Damage, Agriculture, Analysis (mathematics).

44-822
Effect of anti-hail efforts on the polluted atmosphere and of deposits by hail modification products. ¡Vliianie protivogradovykh rabot na zagriaznenie atmosfery i osadkov produktami aktivnykh vozdeĭstviĭ na gradovye protsessy¡
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Gushchina, L.P., Maslovskaia, E.N., Chernak, M.M., Shvedov, S.V.
Hail prevention, Air pollution, Countermeasures.

44-823
Submarine warfare in the Arctic: option or illusion.
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Submarines, Military operation, Ice acoustics, Underwater acoustics, Ice cover effect, Models

44-824
Method of estimating flood-frequency parameters for streams in Idaho.
Kjelstrom, L.C., et al, *U.S. Geological Survey. Open-file report*, Sep. 1981, 81-909, 99p. + maps, 24 refs.
Moffatt, R.L.
Runoff, Snowmelt, Flood forecasting, Flooding.

44-825
Resurvey of Byrd Station drill hole, Antarctica.
Hansen, B.L., et al, *Cold regions science and technology*, Sep. 1989, 17(1), p.1-6, 15 refs.
Kelty, J.R., Gundestrup, N.S.
Ice sheets, Ice deformation, Ice creep, Drilling, Antarctica—Byrd Station.
Directional surveys of the borehole at Byrd Station were made in 1968, 1969, 1975 and 1988. The sensitivity and accuracy of the survey tools used for the first three surveys were less than that used for the 1988 survey. The 1988 survey confirms earlier surveys and supports the conclusion that there has been little deformation in the Holocene ice comprising the upper 1000 m at Byrd Station and that, what deformation is occurring, is taking place in the Wisconsin ice beginning at 1200 m depth. Position measurements in 1972, 1973 and 1988 with satellite navigation equipment show that the surface velocity is 10.9 m/yr in the direction 220 deg. (Auth.)

44-826
Fracture toughness of columnar freshwater ice from large scale DCB tests.
Bentley, D.L., et al, *Cold regions science and technology*, Sep. 1989, 17(1), MP 2545, p.7-20, 30 refs.
Dempsey, J.P., Wei, Y., Sodhi, D.S.
Ice strength, Ice cracks, Flexural strength, Tests, Ice cover thickness.
A series of 4a fracture toughness tests was performed on laboratory-grown S2 columnar freshwater ice at high homologous temperatures (-2 to 0 C). The floating double cantilever beam specimen used and the monitoring of the crack mouth opening displacement in addition to the applied load provided a means for obtaining an apparent fracture toughness, an effective elastic modulus, a lower-bound estimate of the crack speed, and a side-loaded flexural strength of the ice. An expression for the apparent fracture toughness as a function of the applied load, specimen geometry, and ice thickness was developed using a finite-element program. This allowed comparison with previously published values for the toughness of freshwater ice. The small range of scatter in apparent fracture toughness values as well as the ability to measure other mechanical properties of the ice indicates the usefulness of such tests.

44-827
Approximate solutions of heat conduction in snow with linear variation of thermal conductivity.
Yen, Y.C., *Cold regions science and technology*, Sep. 1989, 17(1), MP 2546, p.21-32, 9 refs.
Heat flux, Conduction, Thermal conductivity, Analysis (mathematics), Snow thermal properties.
The approximate heat balance integral method (HBIM) is extended to the case of variable properties media such as snow. The case of linear variation of thermal conductivity was investigated. An alternative heat balance integral method (AHBIM) was developed. Both constant surface temperature and surface heat flux were considered. Comparison of temperature distribution from HBIM, AHBIM and the extension of the analytical solution of Jaeger was given for the case of constant surface temperature. In general, for small values of time, results agree quite well with the analytical solution but as time increases, the difference becomes more pronounced. AHBIM with a quadratic temperature profile gave a somewhat better result especially when the value of *eta* is small. For specific property function of $F(eta)=e^{sup}$ *eta*, closed form solutions were obtained. The results were compared with those from HBIM, AHBIM and the analytical method and agreed exceptionally well with the analytical especially for large values of time.

44-828
Snow creep pressures: effects of structure boundary conditions and snowpack properties compared with field data.
McClung, D.M., et al, *Cold regions science and technology*, Sep. 1989, 17(1), p.33-47, 19 refs.
Larsen, J.O.
Snow creep, Snow loads, Structures, Boundary value problems, Strains.

44-829
Breakup of antarctic fast ice.
Crocker, G.B., et al, *Cold regions science and technology*, Sep. 1989, 17(1), p.61-76, 42 refs.
Wadhams, P.
Fast ice, Ice breakup, Ice cover strength, Mechanical properties, Ocean waves.
The fast ice cover in McMurdo Sound is subjected to numerous mechanical processes which are capable of inducing breakup. Thermal decay plays only a minor role in the destruction of the ice cover, making this region ideal for studying mechanical breakup processes without the complications caused by melting and internal deterioration. A previously developed thermodynamic ice-growth model is used to predict temporal changes in the physical properties of the ice sheet relevant to breakup, allowing the susceptibility of the ice to different destructive processes to be assessed on a seasonal basis. The analyses indicate that during most of the year wind-induced tensile failure is the only likely mode of fracture, while during the short summer period ocean swell incident on the fast ice edge becomes dominant. The importance of the pack ice cover in the Ross Sea in controlling breakup by attenuating potentially destructive ocean swell is clearly shown, and is in agreement with previous qualitative studies of fast ice breakup. (Auth.)

44-830
Investigation into the forces required to tow cables and sledges over antarctic snow.
Smith, A.M., et al, *Cold regions science and technology*, Sep. 1989, 17(1), p.77-82, 2 refs.
King, E.C.
Sleds, Cables (ropes), Antarctica—Georg von Neumayer Station, Antarctica—Ekström Ice Shelf.
The results of trials to investigate the forces required to tow cables and small sledges on antarctic snow are discussed. Once moving, cables which were straight and towed at a constant speed showed drag factors of between 20 and 30%. For non-straight cables the drag factor could rise to 40% or more. A loaded sledge on a firm snow surface showed a drag factor of around 10%. The forces required to start the cables or sledges moving showed a much wider and less predictable range of drag factors. (Auth.)

44-831
Estimation of wet snow accretion on structures.
Makkonen, L., *Cold regions science and technology*, Sep. 1989, 17(1), p.83-88, 29 refs.
Snow loads, Power lines, Meteorological data, Models.

44-832
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Ettema, R., Nixon, W.A.
Ice hardness, Hardness tests, Compressive properties.

44-833
Problems with the segregation potential theory.
Van Gassen, W., et al, *Cold regions science and technology*, Sep. 1989, 17(1), p.95-97, 9 refs.
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Soil freezing, Phase transformations, Freezing rate.

44-834
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Snowmelt, Runoff forecasting, Snow water equivalent, Forest land, Snow accumulation, Snow retention, Snow hydrology, Water supply, Snow cover distribution.

44-835
Effect of uneven snow cover on airborne snow water equivalent estimates obtained by measuring terrestrial gamma radiation.
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Carroll, T.R.
Snow water equivalent, Snow cover effect, Flood forecasting, Snow surveys, Aerial surveys, Runoff forecasting, Analysis (mathematics), Remote sensing, Gamma irradiation.

44-836
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Pavements, Frost protection, Seasonal freeze thaw, Frost heave, Frost action, Frost resistance, Frost forecasting.

44-837
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Laskow, V.
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44-838
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44-839
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Ice acoustics, Sea ice, Ice cover thickness, Sea water freezing.

44-840
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Skagset, O., et al, *U.S. Naval Environmental Prediction Research Facility, Monterey, CA. Report.* June 1988, NEPRF-CR-88-10, 130p. ADA-204 911.
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44-841
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Icebreakers, Fires, Safety.

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Icebreakers, Fires, Safety.

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Icebreakers, Fires, Safety.

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Sea ice distribution, Ice forecasting, Marine meteorology, Ocean environments, Hydrodynamics, Mathematical models.

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Scheifele, P.M.
Ice acoustics, Underwater acoustics, Ice bottom surface, Acoustic measurement, Ice water interface, Subglacial observations, Mathematical models.

44-852
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44-853
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44-855
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Offshore structures, Sea ice, Corrosion, Countermeasures, Ice solid interface, Metal ice friction.

44-856
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Sea ice, Remote sensing, Radar, Radiometry, Scattering.

44-857
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44-858
Real-time environmental arctic monitoring (R-TEAM) deployment cruise.
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Sea ice, Moorings, Ice solid interface, Remote sensing.

44-859
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Underwater ice, Underwater acoustics, Remote sensing.

44-860
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Sackinger, W.M., ed, Jeffries, M.O., ed.
Animals, Ice acoustics, Environmental impact, Underwater acoustics, Noise (sound), Acoustic measurement, Ice solid interface, Icebreakers.

44-861
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Cosens, S.E., et al, International Conference on Port and Ocean Engineering under Arctic Conditions, 9th, Fairbanks, AK, Aug. 17-22, 1987. Proceedings, Vol.2. Edited by W.M. Sackinger and M.O. Jeffries, Symposium on Noise and Marine Mammals. Edited by J.L. Imm and S.D. Treacy, Fairbanks, University of Alaska, Geophysical Institute, 1988, p.39-54, 11 refs.
Dueck, L.P.
Animals, Underwater acoustics, Environmental impact, Noise (sound), Icebreakers, Ice acoustics.

44-862
Evidence of glacial seismic events in the acoustic environment of humpback whales.
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Malme, C.I.
Animals, Environmental impact, Underwater acoustics, Ice acoustics, Acoustic measurement, Ice solid interface.

44-863
Cloud physics. [Fizika oblakov].
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Hailstones, Cloud physics, Hail, Hail clouds, Hail prevention, Countermeasures, Hailstone growth, Hailstone structure, Analysis (mathematics), Radar echoes, Microstructure.

44-864
Initiation of electrical discharges through conducting bodies in the electrostatic field of thunder and hail clouds. [Ob initsiirovanii elektricheskikh razriadov provodiashchimi telami v elektrostaticheskom pole grozovykh i gradovykh oblakov],
Beltuganov, M.N., *Nal'chik. Vysokogornyi geofizicheskii institut. Trudy*, 1989, Vol.72, p.7-13, In Russian. 7 refs.
Thunderstorms, Hail clouds, Cloud electrification, Electrical properties, Analysis (mathematics)

44-865
New method of controlling hail processes. [O novom metode vozdeistviia na gradovye protsessy],
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Hail prevention, Hailstone growth, Cloud dissipation, Cloud seeding, Cloud physics, Countermeasures.

44-866
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Transmissivity, Hailstone structure, Dielectric properties, Analysis (mathematics).

44-867
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Ice melting, Hailstones, Spectra, Radar echoes, Analysis (mathematics).

44-868
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Tolmachev, V.V.
Hailstones, Radar echoes, Analysis (mathematics), Computer programs.

44-869
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Cloud physics, Ice crystal structure, Aggregates, Analysis (mathematics).

44-870
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Kuliev, D.D.
Attenuation, Radio waves, Hail clouds, Cloud physics, Scattering, Mixed water-ice, Analysis (mathematics)

44-871
Effective control of hail processes. [Operativnyi kontrol effektivnosti vozdeistviia na gradovye protsessy].
Abshaev, M.T., *Nal'chik. Vysokogornyi geofizicheskii institut. Trudy*, 1989, Vol.72, p.81-89, In Russian. 3 refs.
Hail prevention, Hail clouds, Cloud physics, Radio echo soundings, Analysis (mathematics).

44-872
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Hail, Falling bodies, Radar, Measurement, Analysis (mathematics).

44-873
Selecting parameters of the main cassette part of the anti-hail rocket "Crystal". [Vybor parametrov kassetnoi golovnoi chasti protivogradovoi rakety "Kristall"],
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Volodin, A.I., Grishin, IU.P., Lantsov, A.V., Nesmeianov, P.A., Serov, V.D.
Hail prevention, Cloud dissipation, Cloud physics, Countermeasures, Analysis (mathematics).

44-874
Methods and some results of studies of the microstructure, ice-forming properties, elemental and chemical composition of giant and super-giant aerosol particles. [Metodika i nekotorye rezul'taty issledovaniia mikrostruktury, l'doobrazuiushchikh svoistv, elementnogo i khimicheskogo sostava gigantskikh i sverkhgigantskikh aerozol'nykh chastits],
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long-term, continuing research effort. The focus of this paper is the concepts involved and the results of that effort, especially as they apply to both polar regions. The major points are as follows: expected tropospheric temperature increases from greenhouse gases will be accompanied by temperature decreases, on a different time scale, in the stratosphere, classical mechanisms of high-latitude amplification by means of positive feedback processes involving the temperature lapse rate and planetary albedo are important; the projected magnitude of high-latitude warming is strongly dependent on the seasonal cycle, horizontal transport of heat by both the atmosphere and oceans has an important effect on high latitude temperatures, vertical energy transfer, as modeled by convective parameterization, also has a significant role for high-latitude temperatures; high-latitude cloud cover has a key role through its effect on planetary albedo, sea ice distribution has a critical feedback role and needs to be modeled correctly, and permafrost and seasonal land ice have significant roles and also should be included in a comprehensive model. (Auth.)

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Lake ice, Docks, Freeze thaw cycles, Ice breakup, Ice cover, Water level.

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The global thermohaline circulation is driven by negative buoyancy sources associated with surface cooling and salinity enhancement, with subsequent upwelling over all the world's oceans. Relatively shallow thermally-driven convective overturning occurring at high latitudes which arises from heating of the atmosphere by the oceans is fairly well represented in current numerical ocean models, but deep convection from surface salinity sources including North Atlantic Deep Water (NADW) and particularly Antarctic Bottom Water (AABW) is not. A schematic model is developed for ASBW incorporating brine rejection during the seasonal sea ice cycle and sinking in boundary layers along the continental shelf and slope of Antarctica which predicts the formation of 30-40 Sv of bottom water from an annual sea ice freezing rate of order 1 Sv. These values and the predicted top-to-bottom potential density increment in the southern ocean are in reasonable accord with observations When the amount of sea ice freezing is expressed as a function of hemispheric mean sea surface temperature (calibrated from the seasonal cycle), the model predicts the possible cutoff of AABW and most of the thermohaline circulation for a four degree C global mean warming, an event which could be triggered in the next century by anthropogenic greenhouse gases. (Auth)

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Dielectric stratigraphy of ice: a new technique for determining total ionic concentrations in polar ice cores.
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Ice electrical properties, Ice cores, Ice composition, Antarctica—Dolleman Island
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Meteorological data of the Georg-von-Neumayer-Station (Antarctica) for 1985, 1986 and 1987.
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Oil spills, Water pollution, Environmental protection, Countermeasures.

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Oil spills, Water pollution, Environmental protection, Countermeasures.

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Ice edge, Ice navigation, Marine meteorology, Sea ice distribution, Ice surveys, Meteorological factors, Meteorological data, Ocean environments, Bering Sea.

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Ice edge, Ice navigation, Ice breaking, Sea ice distribution, Ice surveys, Ice loads, Bering Sea.

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Icebergs, Ice scoring, Ice rafting, Ocean bottom, Bottom topography, Ice conditions, Bottom sediment, Mapping, Statistical analysis, Acoustic measurement, Analysis (mathematics), Canada—Newfoundland—Grand Banks.

44-1144
Chukchi Sea ice motion 1981-82.
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Hanzlick, D.J.
Ice mechanics, Drift, Sea ice Ocean currents, Wind factors, Velocity, Seasonal variations, Analysis (mathematics), Chukchi Sea.

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Sackinger, W.M.
Ice mechanics, Drift, Pack ice, Calving, Wind velocity, Ice shelves, Ice islands, Wind direction, Pressure.

44-1146
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Thomson, N.R., Sykes, J.F.
Drift, Ice forecasting, Ice floes, Ice mechanics, Sea ice distribution, Wind factors, Seasonal variations, Mathematical models, Statistical analysis, Ice cover thickness, Beaufort Sea.

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Drift, Forecasting, Sea ice, Meteorological data, Wind velocity, Wind direction, Remote sensing, Weather stations, Beaufort Sea.

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Hallam, S.D., Baldwin, J.T., Thomas, G.A.N.
Ice loads, Impact strength, Ice strength, Offshore structures, Ice floes, Ice pressure, Stresses, Velocity, Models, Ice cover thickness.

44-1150
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Xu, J.Z., Fan, Y.L., Lu, M.C.
Offshore structures, Ice loads, Strength, Ice jams, Protection, Damage, Ice cover thickness, Design, China—Bohai Gulf.

44-1153
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Karr, D.G.
Ice sheets, Ice loads, Offshore structures, Compressive properties, Stresses, Impact strength, Floating ice, Ice floes, Flexural strength, Velocity.

44-1156
Pilot experiment to measure arctic pack-ice driving forces.
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Bercha, F.G.
Ice formation, Ice loads, Ice pressure, Offshore structures, Ice mechanics, Drift, Icebergs, Analysis (mathematics), Ice conditions.

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Timco, G.W.
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Gadd, P.E., Horn, D.E.
Offshore structures, Slope protection, Ice loads, Artificial islands, Ocean waves, Bearing strength, Concrete structures, Offshore drilling, Gravel, Design, Exploration, Erosion, Countermeasures, Floating ice, Beaufort Sea.

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Fitzpatrick, J.
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Moorings, Anchors, Floating structures, Offshore structures, Ice loads, Ice mechanics, Ice conditions, Floating ice, Pipelines, Ocean bottom.

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Shi, Q.Z.
Anchors, Offshore structures, Ice loads, Bearing strength, Ocean bottom, Design, Tests, Analysis (mathematics).

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Takeda, H.
Caissons, Ocean waves, Footings, Pressure, Distribution, Experimentation.

44-1165
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Frozen ground mechanics, Soil creep, Rheology, Compressive properties, Frozen ground physics, Ground ice, Frozen ground strength, Particle size distribution, Volume, Tests, Grain size, Ice deformation, Cracking (fracturing), Strains.

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Rydén, C.G.
Frost heave, Ground thawing, Pressure, Porous materials, Bearing strength, Soil strength, Soil mechanics, Rheology, Temperature distribution, Compressive properties, Tests, Settlement (structural).

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Frozen ground settling, Compressive properties, Ground ice, Sands, Loads (forces), Cold weather construction, Stresses, Temperature effects, Data processing, Tests, Design, Artificial freezing, Soil freezing, Ice melting.

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Drake, S.R.
Concrete strength, Low temperature tests, Water cement ratio, Water content, Dynamic loads, Prestressed concretes, Strains, Compressive properties, Elastic properties, Loads (forces).

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Muggeridge, D.B., Cheema, P.S.
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Smith, T.R., Masterson, D.M.
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Foster, R.J., Stevens, G.S.
Ice islands, Ice formation, Grounded ice, Cold weather construction, Ice mechanics, Spray freezing, Offshore drilling, Design, Stability, Temperature distribution.

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Horjen, I., Löset, S.
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Sackinger, P.A.
Artificial ice, Sea ice, Sea spray, Heat transfer, Oil spills, Countermeasures, Ice growth, Spray freezing, Design, Drops (liquids), Temperature effects, Brines.

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Lozowski, E.P.
Ship icing, Ice loads, Ice accretion, Superstructures, Wind velocity, Heat balance, Ice growth, Sea spray, Mathematical models, Velocity, Ice forecasting, Ice cover thickness, Water temperature, Air temperature.

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Ship icing, Ice accretion, Wind tunnels, Sea spray, Ice growth, Ice sanding, Analysis (mathematics), Velocity, Temperature effects, Ocean waves, Tests.

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Ports, Cold weather construction, Offshore structures, Slope protection, Ice override, Ocean waves, Tides, Quarries, Roads, Design, Statistical analysis, Rocks, Protection, United States—Alaska—Nome.

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Lawrence, S.A.
Ports, Offshore structures, Cold weather construction, Ice loads, Sea ice, Cellular materials, Docks, Ice cover thickness, Design, Ice pressure, Ocean waves, United States—Alaska—Kivalina.

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Mizuno, Y.
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Lubricants, Viscosity, Low temperature tests, Degradation, Rheology, Engines, Chemical properties.

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In this study four well casing materials are examined, polyvinyl chloride (PVC), Teflon, stainless steel 304 (SS 304) and stainless steel 316 (SS 316), to determine their suitability for monitoring selected trace level organic constituents in ground water. Analyte solutions containing pieces of the different well casings were compared to controls that did not contain any well casing material. The aqueous test solution contained approximately 2 mg/L of each of the following organic substances: hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX), trinitrobenzene (TNB), cis- and trans-1,2-dichlorethylene (CDCE and TDCE), m-nitrotoluene (MNT), trichlorocthylene (TCE), chlorobenzene (CLB), and o-, p-, and m-dichlorobenzene (ODCB, and MDCB). Mercuric chloride was added to prevent biodegradation of the analytes. Two sets of isomers for DCE and DCB were selected to examine the effect of structure on sorption. Samples were taken after 0 hour, 1 hour, 8 hours, 24 hours, 72 hours, 7 days (168 hours), and approximately 6 weeks (1000 hours). There was no loss of any analyte in the samples that contained either type of stainless steel casing, although both types of casing rusted. The greatest losses were seen in samples that contained Teflon casings, especially for the chlorinated organics. Losses of PDCB and MDCB were the greatest, 16% and 18%, respectively, after only 8 hours. While losses were also observed for the samples containing PVC casing, the rate of loss was much slower, and usually 24 hours or more elapsed before losses were significant (more than 5%). After the 1000-hour samples were taken, the casings were rinsed and placed in clean vials containing fresh water and left for three days to allow for desorption. From both plastic casings measurable quantities of all the organics that had been lost from solution were recovered. We were able to correlate the loss of hydrophobic organic constituents in the ground water containing the Teflon casings with the substance's octanol-water partition coefficients, although this correlation overestimates losses of hydrophilic

organics. The results indicate that Teflon casings are probably not suitable for monitoring trace level organics. For wells that are purged and sampled within an 8- to 24-hour period, PVC well casings probably are suitable for monitoring trace level organics.

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Icebreakers, Ice cover strength, Ice cover thickness, Ice breaking, Ice navigation, Sea ice.
Five days of icebreaker performance testing were conducted aboard the USCGC *Polar Star* during Jan. 1985 as part of the ship's Antarctic Deployment. The performance testing was comprised of two phases: icebreaking dynamics and, maneuvering tests. The objectives of the icebreaking dynamics phase were to: determine distribution on magnitude and frequency of ship motions as a function of ice thickness and vessel speed, measure icebreaking pattern and broken ice cusp size and measure ship level ice resistance. The objectives of the maneuvering tests were to quantify maneuvering capability of POLAR class vessels in ice as a function of ship speed, rudder angle in 3 to 6 ft of level first year ice, and to obtain maneuvering coefficients for use in maneuvering simulation model. (Auth.)

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Icebreakers, Ice cover strength, Ice cover thickness, Ice breaking, Sea ice, Ice navigation, Flexural strength.
Five days of icebreaker performance testing were conducted aboard the USCGC *Polar Star* during Jan. 1985 as part of the ship's Antarctic Deployment. The performance testing was comprised of two phases: icebreaking dynamics and maneuvering tests. The volume of technical appendices contains the following information: ice core data and estimates of flexural strength; meteorological conditions during test period from pilot house logs; ship icebreaking dynamics; ship resistance data; instrumentation and sampling and recording equipment. (Auth.)

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Polar regions, International cooperation, Legislation
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Cloud physics, Marine meteorology, Atmospheric circulation, Air masses, Synoptic meteorology, Weather forecasting, Snowfall, Japan, Sea.

44-1304
**Detection of clouds in Antarctica from infrared multispectral data of AVHRR.**
Yamanouchi, T., et al, *Meteorological Society of Japan. Journal*, Dec. 1987, 65(6), p.949-962, With Japanese summary 22 refs
Suzuki, K., Kawaguchi, S.
Cloud cover, Snow cover distribution, Remote sensing, Analysis (mathematics), Brightness, Antarctica
A method to detect cloud cover in the Antarctic using only the infrared channels of AVHRR is discussed From the data of NOAA-7 received at Showa Station, the difference in the brightness temperature of channels 3 (3.7 micron) and 4 (11 micron) shows positive difference when the thickness of clouds is in some particular range, and then tends to show negative difference for the thick cloud From the arch, clouds can be distinguished from the ground surface. The particle size, temperature and thickness of the cloud can also be inferred. At low temperature over the inland snow surface, many problems arise. The channel 3 brightness temperature accompanies poor resolution and large noise at low temperature The brightness temperature difference between channels 4 and 5 shows strong dependence on temperature and viewing angle at low temperature due to the nonlinearity error and variation of snow surface emissivity. An empirical correction is applied to the low temperature data for automatic cloud detection (Auth.)

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**Vertical distributions of the concentration of submicron aerosol particles near the ground surface.**
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44-1307
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Snow electrical properties, Electric potential, Charge transfer, Precipitation (meteorology), Snowfall, Atmospheric electricity.

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44-1309
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Tires, Skid resistance, Rubber snow friction, Rubber ice friction, Metal snow friction, Metal ice friction, Traction.

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Chemical ice prevention, Road maintenance, Road icing.

44-1311
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Steels, Offshore structures, Plates, Cold tolerance, Frost resistance, Cold weather tests.

44-1312
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Steels, Low temperature tests, Cryogenics.

44-1313
Designing a new science facility for McMurdo Station.
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Cold weather construction, Laboratories, Antarctica—McMurdo Station.
The development of McMurdo's new science facility is traced from initial meetings in the Fall of 1984 The architect surveyed the McMurdo site and interviewed the scientists working there in numerous disciplines. Following a series of meetings with scientists, NSF officials, Naval Facilities Engineering Command representatives and a continuing review of the climate and geological states prevailing at McMurdo, the architect presented the initial plan in Mar. 1985. The final design calls for a 45,650 sq ft facility consisting of five pods linked by a circulation spine. Four pods of varying size will provide working space in biology, an aquarium, earth sciences, and atmospheric sciences. The core pod will house general offices, library, conference rooms, photo lab, storage, shipping/receiving rooms, and special equipment rooms. Full occupancy is planned for the austral summer, 1993-1994

44-1314
Evaluation of the Amundsen-Scott South Pole Station power source.
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Electric power, Measuring instruments, Antarctica—Amundsen-Scott Station.
In Jan. 1986, a team installed the South Pole optical telescope (SPOT) at Amundsen-Scott Station. The objective was to monitor variable stars photometrically for long uninterrupted periods of time and to test whether making night time astronomical observations was feasible from this site. Because the telescope is automated an uninterrupted power supply is needed to protect the computer system from power outages This system also made it possible to measure and evaluate the quality of South Pole Station's power generation. The data analyzed in this paper include nearly 46 days from Apr. to Sep. 1986 The database consists of 622 readings, each of voltages and frequencies, measured and recorded typically once an hour. Resulting voltage and frequency distribution graphs are shown along with corresponding statistical information In general, variations in voltage and frequency were not correlated with time but were randomly distributed around their respective means. (Auth. mod.)

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Influence of environmental factors on aircraft wing performance.
Carbonaro, M., ed, *Rhode-Saint Genèse, Belgium Von Karman Institute for Fluid Dynamics. Lecture series,* Feb. 1987, VKI-LS-1987-03, 250p., N88-15771/4, Refs. passim. For selected papers see 44-1316 through 44-1318
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Aircraft icing, Surface roughness, Computerized simulation, Ice formation, Fluid dynamics.

44-1317
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Ice prevention, Ice removal, Wind tunnels, Antifreezes, Aircraft icing.

44-1318
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Frost penetration, Aircraft, Ground ice, Performance.

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Volcanoes, Glacier ice, Topography, Glacial hydrology, Subglacial drainage, Temperature effects, Glacial lakes, Glacial rivers, Thermal regime, Radio echo soundings, Topographic maps.

44-1320
Estimation of average under-ice reflection amplitudes and phases using matched-field processing.
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Diachok, O.I.
Acoustic measurement, Subglacial observations, Ice acoustics, Low frequencies, Reflectivity.

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Aircraft icing, Ice removal, Inflatable structures, Helicopters, Ice solid interface, Protection, Ice adhesion, Design criteria.

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Seepage, Frozen ground mechanics, Soil temperature, Water content, Soil tests, Soil structure, Clay soils, Temperature effects, Snowmelt.

44-1323
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Runoff forecasting, Snow cover distribution, Snowmelt, Simulation, Accuracy, Snow hydrology, Watersheds, Degree days.

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Scattering, Snow electrical properties, Dielectric properties, Analysis (mathematics), Spheres, Remote sensing.

44-1325
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Sea ice Snow cover, Brightness, Microwaves, Atmospheric attenuation, Remote sensing, Computerized simulation.

44-1326
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Ichimiya, K., et al, *Japanese Association of Refrigeration. Transactions,* 1984, 1(1), p.37-42, In Japanese with English summary. 7 refs.
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Supercooling, Drops (liquids), Freezing rate, Salt water, Solutions, Analysis (mathematics), Cooling rate.

44-1327
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Soil freezing, Heat pipes, Frozen ground, Artificial freezing, Analysis (mathematics), Heat transfer.

44-1328
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Pipeline freezing, Pipe flow, Ice formation, Water pipes, Unsteady flow, Analysis (mathematics).

44-1329
Fracture of pipes due to freezing of water enclosed inside.
Oiwake, S., et al, *Japanese Association of Refrigeration. Transactions,* 1985, 2(2), p.149-154, In Japanese with English summary. 7 refs.
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Pipeline freezing, Water pipes, Ice pressure, Ice formation, Analysis (mathematics).

44-1330
Frost formation and defrosting for heat pump systems.
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Heat sources, Defrosting, Hoarfrost, Heat transfer, Ice formation, Frost, Analysis (mathematics)

44-1331
Numerical method for multidimensional freezing problems with arbitrary geometry.
Sasaki, T., *Japanese Association of Refrigeration. Transactions,* 1986, 3(2), p.105-114, In Japanese with English summary. 46 refs.
Freezing, Analysis (mathematics), Freezing rate, Boundary value problems.

44-1332
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Trunov, O.K., *Airline pilot,* Jan 1986, 55(1), p 10-15
Aircraft icing, Ice formation, Ice prevention, Ice removal, Chemical ice prevention, Safety.

44-1333
Helicopter icing—testing and certification.
Wilson, G.W., *American Helicopter Society. Journal,* Apr. 1982, 27(2), p.66-72, 8 refs.
Aircraft icing, Ice formation, Ice removal, Ice prevention, Helicopters, Safety, Standards, Tests.

44-1334
Prediction of fuel freezing in airplane fuel tanks of arbitrary geometry—Pts. 1 and 2.
McConnell, P.M., et al, *Aircraft engineering,* Sep. 1986, Oct. 1986, 58(9, 10), p 20-23, 2-6, 22 refs
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Fuels, Tanks (containers), Freezing, Computerized simulation, Airplanes, Heat transfer, Liquid cooling.

44-1335
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Hoarfrost, Ice crystal growth, Artificial freezing, Condensation nuclei, Freezing rate, Thermal conductivity, Temperature effects, Experimentation.

44-1336
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Ichimiya, K., et al, *Heat transfer. Japanese research,* Oct.-Dec. 1985, 14(4), p.83-98, Translated from Japanese Association of Refrigeration. Transactions. 7 refs.
Mochizuki, Y.
Salt water, Supercooling, Freezing points, Freezing rate, Liquid cooling, Physical properties, Experimentation, Drops (liquids).

44-1337
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Hasegawa, E., et al, *Heat transfer Japanese research,* Jan -Feb 1987, 16(1), p 32-48, Translated from Japanese Society of Mechanical Engineers. Transactions. 15 refs.
Nagashima, F., Washizaki, T.
Fluid flow, Freezing, Phase transformations, Analysis (mathematics), Liquid solid interfaces, Temperature effects, Heat flux.

44-1338
**Effect of the onset of ice-band structure upon the freezing of flowing water in a pipe.**
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Water flow, Pipe flow, Ice formation, Heat transfer coefficient, Ice water interface, Experimentation, Thermodynamics, Cooling rate.

44-1339
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Okada, M., et al, *Heat transfer: Japanese reserach,* July-Aug. 1987, 16(4), p.40-54, Translated from Japanese Society of Mechanical Engineers Transactions 10 refs.
Fukumoto, T.
Artificial melting, Phase transformations, Heat transfer, Porous materials, Experimentation, Ice solid interface, Analysis (mathematics).

44-1340
**Development of the chairs of engineering geology, hydrogeology and geocryology in the geology department.** [Razvitie kafedr inzhenernoĭ geologii, gidrogeologii i geokriologii na geologicheskom fakul'tete],
Sergeev, E.M., et al, *Moscow Universitet. Vestnik. Seriia 4 Geologiia,* Mar.-Apr. 1989, No.2, p.86-110, In Russian.
Vsevolozhskiĭ, V.A., Ershov, E.D.
Education, Engineering geology, Geocryology, Hydrogeology.

44-1341
**Chemogenic heaving of frozen rocks during their interaction with aqueous solutions.** [Khemogennoe puchenie merzlykh porod pri vzaimodeĭstvii ikh s vodnymi rastvorami],
Lebedenko, IU P, *Moscow Universitet Vestnik. Seriia 4 Geologiia,* May-June 1989, No.3, p.60-70, In Russian 14 refs.
Frost heave, Frozen rock strength, Deformation, Frozen rock temperature.

44-1342
**First All-Union congress of engineering geologists, hydrogeologists and geocryologists.** [O pervom Vsesoiuznom s"ezde inzhenerov-geologov, gidrogeologov i geokriologov],
Trofimov, V T, *Moscow Universitet Vestnik Seriia 4 Geologiia,* July-Aug. 1989, No.4, p.88-91, In Russian.
Meetings, Engineering geology, Hydrogeology, Geocryology

44-1343
**Acoustic control of ground ice using beam pattern emission.** [Ob akusticheskom kontrole ledogruntovykh ograzhdeniĭ s ispol'zovaniem diagramm napravlennosti izluchateliia],
Baukov, IU.N., *Izvestiia vysshikh uchebnykh zavedeniĭ. Gornyĭ zhurnal,* Oct. 1988, No.10, p.8-13, In Russian 3 refs
Ground ice, Sound waves, Ice acoustics, Analysis (mathematics).

44-1344
**Natural and artificial antifreeze proteins.**
Arai, S, et al, *Japanese Association of Refrigeration Transactions,* 1986, 3(3), p.137-144, In Japanese with English summary. 30 refs.
Hirao, N.
Antifreezes, Marine biology, Chemical ice prevention, Cold tolerance, Cold weather survival, Acclimatization.
In the blood of winter polar fish an antifreeze glycoprotein (AFGP) occurs which acts to protect the fish from freezing to death The AFGP has a unique hydrophilic-hydrophobic conformation, involved in non-colligative depression of the freezing temperature of water without altering the melting point of ice This phenomenon is reportedly a reflection of the ice crystal growth inhibition by the adsorption of the AFGP onto a-axial surfaces of the ice crystal The authors, on the other hand, have developed an enzymatically modified protein (EMG-12) by covalent attachment of leucine dodecyl ester to the C-terminal position of gelation with the aid of a reverse reaction catalyzed by a protease. EMG-12, having a hydrophilic-hydrophobic structure, is highly surface-active and acts to stabilize a supercooling state of water by antinucleation Discussions are made on similarities and dissimilarities of structure-function relationships of these natural and artificial antifreeze proteins. The significance of using them as antifreeze agents is also discussed. (Auth.)

44-1345
**Melting behavior of snow layers by an aqueous solution with a low solidification temperature.**
Sugawara, M., et al, *Japanese Association of Refrigeration. Transactions,* 1986, 3(3), p.161-165, In Japanese with English summary. 6 refs.
Inaba, H., Konda, Y.
Snow melting, Artificial melting, Snow removal, Salting, Solutions, Analysis (mathematics).

44-1346
**Melting of ice around a horizontal circular cylinder.**
Hattori, M., et al, *Japanese Association of Refrigeration. Transactions,* 1986, 3(3), p.193-196, In Japanese with English summary. 1 ref.
Aoki, K., Ikeura, E.
Ice melting, Pipeline freezing, Ice water interface.

44-1347
**Artificial permafrost and its application for low temperature food storage.**
Ryokai, K., et al, *Japanese Association of Refrigeration. Transactions,* 1987, 4(1), p.1-9, In Japanese with English summary. 26 refs.
Fukuda, M.
Cold storage, Artificial freezing, Permafrost preservation, Soil freezing, Analysis (mathematics).

44-1348
**Study of freezing behavior in a pipe with water flow.**
Inaba, H., et al, *Japanese Association of Refrigeration. Transactions,* 1987, 4(2), p.141-149, In Japanese with English summary 7 refs.
Fukuda, T., Saito, H., Tokura, I.
Pipeline freezing, Water pipes, Pipe flow, Water flow, Ice formation.

44-1349
**Acceleration of dielectric relaxation by KOH-doping and phase transition in ice Ih.**
Kawada, S., *Journal of physics and chemistry of solids,* 1989, 50(11), p.1177-1184, 21 refs.
Doped ice, High pressure ice, Ice electrical properties, Ice crystals, Ice physics, Phase transformations, Dielectric properties.

44-1350
**Isotopic composition of ice formed by water freezing.**
Souchez, R., et al, Antarctica: Belgian scientific research programme on Antarctica. Scientific results of Phase One (Oct. 85-Jan. 89). Edited by S Caschetto Vol.3, Pt. 1, Brussels, Science Policy Office of Belgium, 1989, 52p., Refs. p.49-52.
Tison, J.L., Lorrain, R.
Ice formation, Freezing rate, Chemical analysis, Ice models, Ice water interface, Ice composition, Ice crystal growth, Oxygen isotopes.
Factors involved in apparent isotopic fractionation during water/ice phase changes are investigated Stable isotopes of oxygen and hydrogen have been considered. A combined approach is used. Models and computer simulations are used to predict the isotopic distribution in ice formed by water freezing in various environmental settings. Development of a box diffusion model combined with the boundary layer concept leads to a possibility of determining freezing rates from the isotopic composition of the ice The model is tested experimentally and the method successfully used in the interpretation of field results. Implications on antarctic glaciology are outlined (Auth.)

44-1351
**Flow simulation in the Weddell Sea.**
Fettweis, M., et al, Antarctica. Belgian scientific research programme on Antarctica Scientific results of Phase One (Oct. 85-Jan. 89). Edited by S. Caschetto. Vol.3, Pt. 2, Brussels, Science Policy Office of Belgium, 1989, 69p., Refs. p.65-69.
Yu, C.S., Berlamont, J.
Ice models, Ice navigation, Thermodynamics, Sea ice distribution, Tidal currents, Mathematical models, Hydrothermal processes, Antarctica—Weddell Sea.
A numerical model for hydrodynamics (surface current and water elevation) and thermodynamics (surface temperature) of the Weddell Sea region is presented. The knowledge of currents is necessary to predict the evolution of icefields, which is important for shipping and off-shore works in polar waters A 2D numerical model has been used to simulate the currents in the Weddell Sea. The model uses a falsified alternating direction implicit (FADI) scheme. The numerical scheme gives rise to a very efficient computer implementation The boundaries of the Weddell Sea model are situated at 50S, 80S, 80W and 30E, including the Antarctic Peninsula, the Drake Passage and the southern tip of South America The model has been used to calculate the wind induced and the tidal induced flows. (Auth. mod.)

44-1352
**Numerical study of the air sea interactions in the antarctic coastal zone and their implications on deep sea formation in the case of katabatic wind.**
Gallée, H, et al, Antarctica: Belgian scientific research programme on Antarctica. Scientific results of Phase One (Oct. 85-Jan. 89). Edited by S. Caschetto. Vol.3, Pt. 3, Brussels, Science Policy Office of Belgium, 1989, 40p + 21p., 47 refs
Air water interactions, Mathematical models, Polynyas, Wind factors, Antarctica—Adélie Coast.
A study of the ocean atmosphere interactions in the antarctic coastal zone, under polar night conditions, is discussed. The spatial evolution of katabatic winds is investigated using an atmospheric two-dimensional primitive equation model The importance of the reversal of the pressure gradient force in the coastal zone, causing the sudden decay of katabatic winds and the onset of sea ice breeze, is examined and the cause attributed to the accumulation of cold katabatic air The consequences of the absence of sea ice cover, or of a polynya on Adélie Coast, regarding atmospheric circulation are studied and are found to be insignificant. A model shows that the computed salt fluxes in the polynya contribute to the formation of deep sea water if the atmospheric circulation is maintained during 2 months. (Auth. mod.)

44-1353
**Dynamics of the antarctic ice cap.**
Decleir, H., et al, Antarctica. Belgian scientific research programme on Antarctica. Scientific results of Phase One (Oct. 85-Jan. 89). Edited by S. Caschetto. Vol.3, Pt. 4, Brussels, Science Policy Office of Belgium, 1989, 51p., Refs. p.49-51.
Huybrechts, P., De Vos, L., Pattyn, F.
Ice sheets, Ice models, Glacier oscillation, Thermodynamics, Subglacial observations, Ice mechanics, Mathematical models, Antarctica—Sör Rondane Mountains, Antarctica—East Antarctica
A complete 3-D model, covering the entire Antarctic Ice Sheet, has been implemented on a CRAY-2 super computer and experiments with this model are still in progress. First results of some diagnostic runs seem to indicate the following: the model yields stable solutions, the diagnostic flow field cannot possibly be in accordance with steady state requirements; and basal ice at pressure melting is confined to West Antarctica, the Antarctic Peninsula, outlet glaciers and the thick interior ice areas of East Antarctica. However, it appears that for a good evaluation of the present state of the ice cap a long time integration over the 160,000 year long Vostok signal is necessary. Interpreting the glacier variations as observed in the marginal mountain areas and explaining the role of those changes in the dynamics of the ice sheet was the second objective of this research program carried out during the summer of 1986-87 in Sör Rondane Mountains The subglacial relief of the mountains in the central part of the area was mapped The results indicate a subglacial fiord landscape with overdeepened glacial valleys. One-dimensional flow line models were developed to simulate the glacier behavior. It shows that some glaciers are in the process of being cut off from the main ice supply. (Auth. mod.)

44-1354
**Simulations of the annual sea ice cover in the Weddell Sea.**
Demuth, C., et al, Antarctica: Belgian scientific research programme on Antarctica Scientific results of Phase One (Oct 85-Jan 89) Edited by S Caschetto Vol.3, Pt. 5, Brussels, Science Policy Office of Belgium, 1989, 47p., Refs. p.26-29
Van Ypersele, J.P.
Ice models, Air water interactions, Sea ice distribution, Ice air interface, Ice cover, Climatic factor, Antarctica—Weddell Sea, Drake Passage.
A model of sea-ice formation has been developed and applied to the Weddell Sea and the Drake Passage, it describes the annual cycle of sea-ice thickness and its spatial extent and it consists of two parts the thermodynamical component, which manages the freezing and melting processes due to energy fluxes between the atmosphere, ice and ocean, and computes also the heat and salt transfers between mixed layer and deep ocean; and the dynamical component, limited in the present version of the model to the computation of ice movement due to wind and surface current. The surface energy budget, heat and salt exchanges and momentum transfers are modelled and/or parameterized from monthly-averaged climatological data and annually-averaged values of temperature and salinity in the ocean These data and the results of the sea-ice model, including ice thickness, temperature, mixed-layer depth and ice extent, are presented and discussed at specific points (offshore and coastal) and for the whole area (Auth mod)

44-1355
**Frozen earth: fundamentals of geocryology.**
Williams, P.J., et al, Cambridge, England, University Press, 1989, 306p., Refs p.280-302
Smith, M.W.
Geocryology, Permafrost hydrology, Frozen ground, Permafrost, Ground ice, Permafrost distribution, Frozen ground physics, Frozen ground mechanics, Frozen ground thermodynamics.

44-1356
Proceedings.
ASHRAE/DOE/BTECC/CIBSE Conference on the Thermal Performance of the Exterior Envelopes of Buildings, 4th, Orlando, FL, Dec. 4-7, 1989, Atlanta, GA, American Society of Heating, Refrigerating, and Air-Conditioning Engineers 1989, 820p., Refs. passim. for selected papers see 44-1357 through 44-1362.
Buildings, Thermal insulation, Moisture transfer, Air flow, Heat transfer, Ventilation, Windows, Walls, Roofs, Foundations.

44-1357
**Hygrothermal influence of air convection in wall structures.**
Ojanen, T., et al, ASHRAE/DOE/BTECC/CIBSE Conference on the Thermal Performance of the Exterior Envelopes of Buildings, 4th, Orlando, FL, Dec 4-7, 1989 Proceedings, Atlanta, GA, American Society of Heating, Refrigerating, and Air-Conditioning Engineers, 1989, p.234-249, 2 refs.
Kohonen, R.
Walls, Thermal insulation, Heat loss, Moisture transfer, Heat transfer, Air flow, Convection, Mathematical models.

44-1358
**Passive tracer gas measurement of air exchange in a large multi-celled building in Alaska.**
Flanders, S.N., et al, MP 2557, ASHRAE/DOE/BTECC/CIBSE Conference on the Thermal Performance of the Exterior Envelopes of Buildings, 4th, Orlando, FL, Dec 4-7, 1989 Proceedings, Atlanta, GA, American Society of Heating, Refrigerating, and Air-Conditioning Engineers, 1989, p.433-444, 11 refs.
Song, B.H.
Residential buildings, Air flow, Military facilities, Ventilation, Air pollution.
A 2963 cu m residence for transient military personnel at Fort Richardson, AK, was subjected to a passive perfluorocarbon tracer gas measurement of air exchange for 3 days. The building was treated as having three separate zones corresponding to the three floors Each zone received constant tracer gas emission sources of the same type of gas unique to that zone The concentrations of each tracer gas were measured throughout the building. As a consequence, it was possible to calculate the average air exchange of each zone with each other zone and the outdoors The measurement took place during a period when the average temperature of -19 C varied approximately 5 C up or down The first and second floors had air exchange rates of 0 21 and 0 28 ach (air changes per hour), respectively, whereas the basement had 0 70 ach The higher exchange rate for the basement was attributed to the configuration of the main entry doors and interior doors, which allowed cold air to descend to the basement, but discouraged mixing on the first floor. The measurement was significant because it represents the upper end of building size and complexity that lends itself to this measurement technique Measurement precision was good. The accuracy depended on adequate mixing and on minimum variation of wind and outdoor temperature Both objectives were met reasonably well.

44-1359
**Transient moisture and heat transfer in multi-layer non-isothermal walls—comparison of predicted and measured results.**
Burch, D.M., et al, ASHRAE/DOE/BTECC/CIBSE Conference on the Thermal Performance of the Exterior Envelopes of Buildings, 4th, Orlando, FL, Dec 4-7, 1989 Proceedings, Atlanta, GA, American Society of Heating, Refrigerating, and Air-Conditioning Engineers, 1989, p.513-531, 15 refs.
Thomas, W C Mathena, L.R., Licitra, B.A., Ward, D.B.
Walls, Thermal insulation, Moisture transfer, Heat transfer, Mathematical models.

44-1360
**Moisture transfer through walls.**
Forest, T.W, ASHRAE/DOE/BTECC/CIBSE Conference on the Thermal Performance of the Exterior Envelopes of Buildings, 4th, Orlando, FL, Dec 4-7, 1989 Proceedings, Atlanta, GA, American Society of Heating, Refrigerating, and Air-Conditioning Engineers, 1989, p.532-542, 10 refs.
Walls, Moisture transfer, Thermal insulation.

44-1361
**Vapor retarders to control summer condensation.**
Tobiasson, W., MP 2558, ASHRAE/DOE/BTECC-/CIBSE Conference on the Thermal Performance of the Exterior Envelopes of Buildings, 4th, Orlando, FL, Dec. 4-7, 1989. Proceedings, Atlanta, GA, American Society of Heating, Refrigerating, and Air-Conditioning Engineers, 1989, p 566-572, 15 refs
Buildings, Vapor barriers, Walls, Thermal insulation, Condensation, Countermeasures, Air flow, Indoor climates.
Prior work by the CRREL has determined that vapor retarders are needed in cold regions to avoid detrimental accumulation of moisture in walls whenever the winter wetting potential exceeds 0 6 in. of Hg/month (2 03 kPa/month) In the hot, humid regions of the United States the summer wetting potential ranges up to 0 9 in of Hg month (3 04 kPa month) Summer wetting potentials of 0 4 through 0 9 in of Hg month (1 34 through 3 04 kPa/month) have been mapped. The zone south of the "0 6" isoline (i e , a portion of the coasts of Texas and Louisiana and much of southern Florida) may be a reasonable representation of where air-conditioned buildings need vapor retarders to defend against summer wetting from outside air. However, feedback is solicited on which isoline best corresponds to the collective expertise of designers and builders Problems associated with summer condensation are often related to wetting of exterior cladding and subsequent solar heating, not just simple vapor drive. Nonetheless, in some hot humid areas, vapor retarders may be used

44-1362
**Frost protection of a shallow building foundation with thermal insulation—a case study.**
Greeley, D.S, ASHRAE/DOE/BTECC/CIBSE Conference on the Thermal Performance of the Exterior Envelopes of Buildings, 4th, Orlando, FL, Dec 4-7, 1989 Proceedings, Atlanta, GA, American Society of Heating, Refrigerating, and Air-Conditioning Engineers, 1989, p.695-710, 15 refs.
Foundations, Frost protection, Thermal insulation, Buildings.

44-1363
Wetlands of Canada. *Environment Canada, Ottawa, Ontario Ecological land classification series,* 1988, No 24, 452p., Numerous refs. passim. For selected chapters see 44-1364 and 44-1365.
Swamps, Peat, Landscape types, Ecosystems, Hydrology, Environmental protection, Ground water, Canada.

44-1364
Wetlands of arctic Canada.
Tarnocai, C , et al, *Environment Canada, Ottawa, Ontario. Ecological land classification series,* 1988, No.24, Wetlands of Canada, p.27-53, 56 refs.
Zoltai, S.C.
Swamps, Arctic landscapes, Polygonal topography, Permafrost hydrology, Peat, Canada.

44-1365
Wetlands of subarctic Canada.
Zoltai, S.C., et al, *Environment Canada, Ottawa, Ontario. Ecological land classification series,* 1988. No.24, Wetlands of Canada, p.55-96, 76 refs
Tarnocai, C., Mills, G.F, Veldhuis, H.
Swamps, Subarctic landscapes, Peat, Polygonal topography, Permafrost hydrology, Canada.

44-1366
Ice-nucleating bacteria.
Obata, H., *Japanese Association of Refrigeration. Transactions,* 1988, 5(2), p.143-152, In Japanese with English summary. 31 refs.
Organic nuclei, Bacteria, Artificial nucleation, Microbiology, Artificial freezing, Snow manufacturing, Nucleating agents, Ice nuclei.

44-1367
Fundamental research on supercooling phenomenon on heat transfer surface; investigation of an effect of characteristics of surface and cooling rate on a freezing temperature of supercooled water.
Saito, A., et al, *Japanese Association of Refrigeration Transactions,* 1988, 5(2), p.207-217, In Japanese with English summary. 2 refs.
Utaka, Y., Okawa, S., Matsuzawa, K., Tamaki, A.
Supercooling, Heat transfer, Ice formation, Freezing points, Cooling rate, Phase transformations.

44-1368
Freezing around a vertical cylinder.
Okada, M , et al, *Japanese Association o. Refrigeration Transactions,* 1988, 5(2), p.235-246, In Japanese with English summary 24 refs.
Nakamura, S.
Freezing, Heat transfer, Liquid solid interfaces, Analysis (mathematics), Convection, Water flow, Latent heat, Temperature distribution.

44-1369
Study on the freezing process of water blocked in a capsule, basic research on the effect of the blockage on the freezing process of the water and the stress on a capsule.
Saito, A , et al, *Japanese Association of Refrigeration Transactions,* 1988, 5(3), p 325-333, In Japanese with English summary. 49 refs.
Okawa, S., Saito, S.
Freezing, Ice loads, Ice solid interface, Ice pressure, Ice deformation, Analysis (mathematics).

44-1370
**Method of efficient ice cold energy storage using a heat transfer of direct contact phase change and a natural circulation of a working medium in an enclosure.**
Utaka, Y , et al, *Japanese Association of Refrigeration. Transactions,* 1988, 5(1), p.117-131, In Japanese with English summary. 2 refs.
Saito, A., Niimi, M , Nakata, N.
Ice thermal properties, Heat transfer, Phase transformations, Cold storage.

44-1371
Growth of Greenland ice sheet: measurement.
Zwally, H.J., et al, *Science,* Dec. 22, 1989, 246(4937), p.1587-1589, 11 refs.
Brenner, A.C., Major, J.A., Bindschadler, R.A., *Marsh, J.G.*
Ice sheets, Ice accretion, Altitude, Remote sensing.

44-1372
Growth of Greenland ice sheet: interpretation.
Zwally, H J., *Science,* Dec. 22, 1989, 246(4937), p.1589-1591, Numerous refs.
Ice sheets, Ice growth, Ice cover thickness, Precipitation (meteorology).

44-1373
Thermomolecular pressure in surface melting: motivation for frost heave.
Dash, J.G., *Science,* Dec. 22, 1989, 246(4937), p.1591-1593, 24 refs.
Soil pressure, Ground thawing, Frost heave.

44-1374
Sea ice deformation as a source of surface air aerosol according to data from the expedition aboard the nuclear icebreaker *Sibir'* (May-June 1987). [Deformatsii morskogo l'da kak istochnik prilednogo aerozolia po dannym ekspeditsii na atomnom ledokole "Sibir" (Mai-Iiun' 1987g.)],
Nagurnyĭ, A.P., *Akademiia nauk SSSR. Doklady, 1989, 308(3),* p.582-584, In Russian.
Sea ice, Ice deformation, Aerosols, Periglacial processes.

44-1375
Frost growth and heat transfer for a row of vertical cylindrical tubes located outdoors—general trends.
Monaghan, P.F , et al, World Conference on Experimental Heat Transfer, Fluid Mechanics, and Thermodynamics, 1st Dubrovnik, Yugoslavia, Sep. 4-9, 1988. Proceedings Edited by R.K Shah, E.N. Ganić and K.T. Yang, New York, Elsevier, 1988, p.963-972, 21 refs.
Grealish, F., Oosthuizen, P.H.
DLC QC319.8.W67 1988
Hoarfrost, Ice crystal growth, Heat transfer coefficient, Surface temperature, Convection, Measurement, Wind factors, Temperature effects.

44-1376
Frost formation and defrosting of tube-array evaporators in a fluidized bed and an impinging jet.
Aihara, T , et al, World Conference on Experimental Heat Transfer, Fluid Mechanics, and Thermodynamics, 1st, Dubrovnik, Yugoslavia, Sep. 4-9, 1988. Proceedings Edited by R.K. Shah, E.N. Ganić, and K.T. Yang, New York, Elsevier, 1988, p.973-980, 22 refs.
Gakumasawa, H , Maruyama, S., Hongoh, M.
DLC QC319.8.W67 1988
Hoarfrost, Ice crystal growth, Defrosting, Temperature measurement, Heat transfer coefficient, Wind tunnels, Fluid dynamics, Temperature effects.

44-1377
Ice-accretion characteristics along a circular cylinder immersed in cold air stream with seawater spray.
Fukusako, S., et al, World Conference on Experimental Heat Transfer, Fluid Mechanics, and Thermodynamics, 1st, Dubrovnik, Yugoslavia, Sep. 4-9, 1988. Proceedings. Edited by R K. Shah, E.N. Ganić and K.T. Yang, New York, Elsevier, 1988, p.981-988, 14 refs.
Horibe, A., Tago, M.
DLC QC319.8.W67 1988
Ice accretion, Spray freezing, Surface structure, Brines, Liquid solid interfaces, Drops (liquids), Temperature effects, Wind tunnels.

44-1378
Optimization of mechanical/physical properties for rubber/epoxy composite coating on asphalt concrete.
Lhymn, C., *Journal of materials science letters,* Sep. 1989, 8(9), p.1019-1022, 7 refs.
Rubber, Freeze thaw cycles, Adhesion, Compressive properties, Mechanical tests, Interfaces.

44-1379
X-ray analysis and ice nucleating behavior of the AgI-CuI-KI system.
Sivanesan, S., et al, *Journal of materials science,* Nov 1989, 24(11), p.4160-4163, 18 refs.
Baskar, K., Gobinathan, R., Ramasamy, P., Palanisamy, M.
X ray analysis, Nucleating agents, Heterogeneous nucleation, Freezing points, Supercooling, Artificial nucleation, Solutions, Ice formation.

44-1380
Study of the process of heating adfreezing excavated material through a metallic plate. [Issledovanie protsessa nagreva merzloĭ sviaznoĭ gornoĭ massy cherez metallicheskuiu plastinu],
Dugartsyrenov, A.V., et al, *Izvestiia vysshikh uchebnykh zavedeniĭ Gornyĭ zhurnal,* Nov 1988, No.11, p.31-36, In Russian. 7 refs.
Shubin, G.B.
Frozen ground physics, Frozen ground temperature, Ground thawing, Analysis (mathematics).

44-1381
Designing E-plane funnels, used in the combined method of working frozen ground. [K raschetu E-ploskostnykh ruporov, ispol'zuemykh v kombinirovannom metode razrabotki merzlykh porod],
Rikenglaz, L.E., et al, *Izvestiia vysshykh uchebnykh zavedeniĭ. Gornyĭ zhurnal,* Mar 1989, No 3, p.1-4, In Russian. 2 refs.
Shonin, O.B.
Equipment, Design, Earthwork, Frozen ground.

44-1382
Shear strength of frozen saline soils. [Soprotivlenie sdvigu merzlykh zasolennykh gruntov],
Brovka, G.P., et al, *Izvestiia vysshykh uchebnykh zavedeniĭ. Gornyĭ zhurnal,* Apr. 1989, No.4, p.30-33, In Russian. 3 refs.
Romanenko, I.I.
Soil strength, Frozen ground strength, Shear strength, Saline soils.

44-1383
Water vapor transfer during freezing of peat moisture. [Perenos vodianogo para pri promerzanii vlazhnogo torfa],
Gamaiunov, N.I., et al, *Izvestiia vysshykh uchebnykh zavedeniĭ. Gornyĭ zhurnal,* June 1989, No.6, p.19-25, In Russian. 18 refs.
Stotland, D.M., Kuz'min, B.A.
Water vapor, Vapor transfer, Soil water, Peat, Soil freezing, Analysis (mathematics).

44-1384
Glaciers, snow cover, and avalanches in the mountains of Kazakhstan. [Ledniki, snezhnyĭ pokrov i laviny v gorakh Kazakhstana],
Gorbunov, A.P., ed, Alma-Ata, Nauka, 1989, 224p., In Russian. Refs. passim. For selected papers see 44-1385 through 44-1398.
Avalanches, Glacier mass balance, Glaciers, Snow cover, Mountain glaciers, River basins, Rock glaciers, Statistical analysis, Analysis (mathematics), USSR—Kazakhstan.

44-1385
Water reserves in Kazakhstan glaciers and prospects for their use. [Zapasy vody v lednikakh Kazakhstana i perspektivy ikh ispol'zovaniia],
Tokmagambetov, G.A., et al, Ledniki, snezhnyĭ pokrov i laviny v gorakh Kazakhstana (Glaciers, snow cover, and avalanches in the mountains of Kazakhstan). Edited by A.P. Gorbunov, Alma-Ata, Nauka, 1989, p.5-17, In Russian. 15 refs.
Erasov, N.V., Tokmagambetov, T.G.
Water reserves, Glaciers, Glacial hydrology, Glacier ice, Statistical analysis, USSR—Kazakhstan.

44-1386
Method for calculating the size of mountain glaciers using data from land-based and airborne radar surveys (in the example of Dzhungarskiy Alatau). [K metodike rascheta ob"ema gornykh lednikov po dannym nazemnoĭ i vozdushnoĭ radiolokatsionnoĭ s'emki (na primere Dzhungarskogo Alatau)],
Cherkasov, P.A., et al, Ledniki, snezhnyĭ pokrov i laviny v gorakh Kazakhstana (Glaciers, snow cover, and avalanches in the mountains of Kazakhstan). Edited by A.P. Gorbunov, Alma-Ata, Nauka, 1989, p.18-37, In Russian. 8 refs.
Nikitin, S.A.
Glacier surveys, Mountain glaciers, Airborne radar, Analysis (mathematics), USSR—Dzhungarskiy Alatau.

44-1387
Mass balance of the Korzheneveskiĭ glacier. [Balans massy lednika Korzhenevskogo],
Fedulov, I.IA., et al, Ledniki, snezhnyĭ pokrov i laviny v gorakh Kazakhstana (Glaciers, snow cover, and avalanches in the mountains of Kazakhstan). Edited by A.P. Gorbunov, Alma-Ata, Nauka, 1989, p.38-47, In Russian. 9 refs.
Shul'ts, A.G.
Glacier mass balance, River ice, River basins, Analysis (mathematics), Statistical analysis.

44-1388
Volume of glacial runoff in the Balkhash-Alakul' basin. [Ob emlednikovogo stoka rek Balkhash-Alakul'skoĭ vpadiny],
Tokmagambetov, G.A., et al, Ledniki, snezhnyĭ pokrov i laviny v gorakh Kazakhstana (Glaciers, snow cover, and avalanches in the mountains of Kazakhstan). Edited by A.P. Gorbunov, Alma-Ata, Nauka, 1989, p.47-68, In Russian. 17 refs.
Erasov, N.V., Tokmagambetov, T.G.
Glacial rivers, River basins, Runoff, Statistical analysis, Analysis (mathematics), Snowmelt.

44-1389
Liquid runoff from the Tuyuksu basin in Zailiskiy Alatau for 1964-1984. [Zhidkiĭ stok iz basseĭna Tuiuksu v Zailiĭskom Alatau za 1964-1984 gg.],
Makarevich, K.G., Ledniki, snezhnyĭ pokrov i laviny v gorakh Kazakhstana (Glaciers, snow cover, and avalanches in the mountains of Kazakhstan). Edited by A.P. Gorbunov, Alma-Ata, Nauka, 1989, p.68-79, In Russian. 4 refs.
Runoff, Glacier mass balance, Water balance, Mountain glaciers, Statistical analysis, Snowmelt, Ice melting, USSR—Zailiskiy Alatau.

44-1390
Possibility of forecasting avalanche formation from a snow slab in Zailiskiy Alatau as a factor in the dynamics of the structure-strength characteristics of snow. [Vozmozhnosti prognoza obrazovaniia lavin iz snezhnoĭ doski v Zailiĭskom Alatau kak faktora dinamiki strukturno-prochnostnykh svoĭstv snega],
Girovka, N.N., Ledniki, snezhnyĭ pokrov i laviny v gorakh Kazakhstana (Glaciers, snow cover, and avalanches in the mountains of Kazakhstan). Edited by A.P. Gorbunov, Alma-Ata, Nauka, 1989, p.80-87, In Russian. 10 refs.
Avalanche forecasting, Snow slides, Snow strength, Snow cover structure.

44-1391
Cost evaluation of anti-avalanche measures. [Otsenka zatrat na protivolavinnye meropriiatiia],
Blagoveshchenskiĭ, V.P., et al, Ledniki, snezhnyĭ pokrov i laviny v gorakh Kazakhstana (Glaciers, snow cover, and avalanches in the mountains of Kazakhstan). Edited by A.P. Gorbunov, Alma-Ata, Nauka, 1989, p.88-100, In Russian. 7 refs.
Severskiĭ, I.V.
Avalanches, Countermeasures, Cost analysis, Statistical analysis.

44-1392
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Avalanche deposits, Sediment transport, Periodic variations, Surface structure, Rock properties, Slope processes, New Zealand -Torlesse Range.

44-1452
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Mars (planet), Ice lenses, Ground ice, Permafrost, Extraterrestrial ice, Geomorphology, Surface structure.

44-1453
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Mahaney, W.C., *Zeitschrift für Geomorphologie*, Dec 1987, 31(4), p.411-418, With German and French summaries. 12 refs.
Lichens, Weathering, Glacier mass balance, Measurement, Glacier oscillation, Time factors, Vegetation factors, Glacial deposits, Pleistocene, France—Mer de Glace.

44-1454
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Electric power, Electric equipment, Electrical properties, Cold weather performance, Telecommunications, Specifications, Temperature effects.

44-1455
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DLC TK6271 I57a 1986
Radio communication, Cold weather performance, Electric power, Design criteria, Towers, Temperature effects, Electric equipment, Telecommunications.

44-1456
Wind-generators in hybrid systems powering remote telecommunication sites in the far north.
Bredesen, B.R., et al, International Telecommunications Energy Conference, 9th, Stockholm, Sweden, June 14-17, 1987 Proceedings, New York, Institute of Electrical and Electronics Engineers, 1987, p.437-442.
Van Lieshout, P.
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Wind power generation, Electric equipment, Electric power, Telecommunications, Polar regions, Specifications, Cold weather tests.

44-1457
Arctic data compilation and appraisal. Vol.6. Queen Elizabeth Islands: physical geography—temperature, salinity, currents and water levels.
Fissel, D.B., et al, Canadian data report of hydrography and ocean sciences, No 5, Sidney, BC, Institute of Ocean Sciences, Department of Fisheries and Oceans, 1983, 214p., Refs. p.45-49.
Water temperature, Water level, Salinity, Ocean currents, Hydrography, Oceanographic surveys, Channels (waterways), Sea ice, Ice cover thickness, Canada —Northwest Territories—Queen Elizabeth Islands

44-1458
Arctic data compilation and appraisal. Vol.7. Canadian Basin-Arctic Ocean: physical geography—temperature, salinity, current and water levels.
Birch, J.R., et al, Canadian data report of hydrography and ocean sciences, No.5, Sidney, BC, Institute of Ocean Sciences, Department of Fisheries and Oceans, 1984, 624p.
Fissel, D.B., Cornford, A.B
Salinity, Hydrography, Water temperature, Water level Ocean currents, Oceanographic surveys, Statistical analysis, Arctic Ocean.

44-1459
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Smiley, B.D.
Bacteria, Plankton, Oceanographic surveys, Marine biology, Sea ice, Beaufort Sea.

44-1460
Arctic data compilation and appraisal. Vol.12. Beaufort Sea and Amundsen Gulf: physical geography —temperature, salinity, currents, water levels, and waves. Revised and updated to include 1914 through 1986.
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Hydrography, Water temperature, Ocean currents, Oceanographic surveys, Salinity, Water waves, Sea ice, Ice cover thickness, Pack ice, Beaufort Sea, Canada Northwest Territories—Amundsen Gulf.

44-1461
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Fissel, D.B., Lemon, D.D., Lake, R.A.
Water temperature, Water level, Water waves, Ocean currents, Salinity, Hydrography, Oceanographic surveys, Northwest Passage

44-1462
Arctic data compilation and appraisal. Vol.16. Queen Elizabeth Islands: chemical oceanography 1952 through 1985.
Thomas, D.J., et al, Canadian data report of hydrography and ocean sciences, No.5, Sidney, BC, Institute of Ocean Sciences, Department of Fisheries and Oceans, 1986, 125p., Refs. p.36-39.
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Hydrocarbons, Sediments, Ecology, Oxygen, Oceanography, Hydrography, Chemical analysis, Sea ice, Ice composition.

44-1463
Drama under the snow.
Burdasov, V., *Science in the USSR*, 1988, No.4, p.42-45, 1 ref.
Snow cover effect, Plant physiology, Decomposition, Plant ecology, Temperature effects, Damage.

44-1464
Ice-penetrating buoy developed by Navy.
Pickett, R.L., *Sea technology*, Aug. 1989, 30(8), p.79-81.
Projectile penetration, Telemetering equipment, Ice melting, Oceanography, Measuring instruments.

44-1465
Physicochemical and mechanical properties of saline soils during temperature change.
Chen, X.B., et al, *Science in China. Series A*, Feb. 1989, 32(2), p.234-245, 7 refs.
Saline soils, Cooling, Compressive properties, Soil tests, Water content, Temperature effects, Soil mechanics.

44-1466
Mathematical model of lake acidification.
Goldstein, R A, et al, *Scientific Honeywell*, Oct 1985, 6(3), p.1-8.
Gherini, S.A.
Environment simulation, Water pollution, Computer programs, Snowmelt, Watersheds, Lakes, Chemical properties, Computer applications, Environmental impact.

44-1467
Water desalination by freezing.
Khodakov, V., et al, *Science in the USSR*, 1988, No.5, p.103-105.
Markin, V.
Artificial freezing, Artificial ice, Desalting, Firn, Water treatment, Water transport.

44-1468
Preliminary performance and benefit analysis of the UK national road ice prediction system.
Thornes, J.E., *Meteorological magazine*, May 1989, 118(1402), p.93-99.
Ice forecasting, Road icing, Salting, Ice models, Computer applications, Accuracy, Economic analysis.

44-1469
Dating of snow/ice cores by means of instrumental analyses.
Fujii, Y., et al, *Antarctic record*, July 1989, 33(2), p.156-190, In Japanese with English summary. 28 refs.
Kamiyama, K., Watanabe, O.
Ice cores, Chemical analysis, Ice dating.
Snow-ice cores obtained from ice sheets and glaciers are formed from deposited snow and other materials of terrestrial, cosmic and artificial origin Depositional mode of these materials is presumed to be a good indicator of climatic and environmental changes during the past 10-100,000 years. In this paper, sample preparation procedures, instrumental analyses, active and stable isotope analyses, and stratigraphic analysis relating to the core dating are reviewed with reference to cores obtained from the Antarctic and the Arctic (Auth.)

44-1470
Meteorological observations at Syowa Station in 1985 by the 26th Japanese Antarctic Research Expedition.
Meshida, S., et al, *Antarctic record*, July 1989, 33(2), p.191-219, In Japanese with English summary. 10 refs.
Fukusawa, S., Shimamoto, T., Wakabayashi, M.
Meteorological data, Sea ice distribution, Snowfall, Antarctica—Showa Station.
Results of meteorological observations at Showa Station Feb. 1, 1985 to Jan 31, 1986, are described, including observation by sunphotometer. Helium gas was used for all aerological observation balloons instead of hydrogen gas. Remarkable characteristics are as follows. total amount of ozone was low in Sep. and Oct. and 176 (m atm-cm) observed on Oct. 11, 1985 was the lowest recorded since observation started Annual mean temperature above 100-mb height in the stratosphere recorded the lowest value in 1985. Sea ice around the Ongul Is. almost flowed away during Mar. to May. Minimum temperature at Mizuho Station, -61.9 C (July 16, 1985), was the lowest recorded since observation started. (Auth. mod.)

44-1471
Activities of the first wintering party at Asuka Station by the 28th Japanese Antarctic Research Expedition in 1987.
Ayukawa, M., *Antarctic record*, July 1989, 33(2), p.234-268, In Japanese with English summary. 6 refs.
Research projects, Cold weather construction, Logistics, Snow accumulation, Ice, Antarctica—Asuka Station.
The scientific programs carried out at Asuka Station by field and airborne surveys included observations of meteorological conditions, geomagnetism, earthquake and icequake, gravity earth tide and building strain by snow accumulation. The field surveys were carried out with an airborne magnetometer and ice radar around Sör Rondane Mountains during Nov. and Dec. 1987. Gravity and snow accumulation were measured over a span of 160 km, from Breid Bay to the foot of the mountains. A preliminary survey of terrestrial fauna and flora was also made in the ice free areas of the mountains. Details regarding logistics, and information on weather and snowdrift conditions around Asuka Station throughout the year, are given. (Auth. mod.)

44-1472
Report on the geomorphological, paleomagnetic, geodetic, zoological and botanical field work in the Sör Rondane Mountains, 1988-89 summer season (JARE-30).
Moriwaki, K., et al, *Antarctic record*, July 1989, 33(2), p.293-319, In Japanese with English summary. 12 refs.
Research projects, Logistics, Snow surface, Ice surface, Antarctica—Sör Rondane Mountains, Antarctica —Asuka Station.
The summer party of JARE-30 carried out geomorphological, paleomagnetic, geodetic, zoological and botanical field work in the western part of Sör Rondane Mountains from Dec. 29, 1988 to Feb 1, 1989, and around Asuka Station from Feb. 2-9, 1989 This report presents the results of field operations including logistics, a summary of the field work, and some information on weather and surface conditions of snow and ice around the Mountains during this period. (Auth. mod)

44-1473
Prolonged anabiosis for sporogenous bacteria in the interior of the Central Antarctic Glacier.
Abyzov, S.S., et al, *Akademiia nauk SSSR. Biology bulletin*, Nov.-Dec. 1988 (Pub. Sep 1989), 15(6), p.566-571, Translated from its Izvestiia. Seriia biologicheskaia. 33 refs.
Kirillova, N.F., Cherkesova, G.V.
Cryobiology, Ice cores, Antarctica—Vostok Station.
The interior of permanent glaciers can provide reliable experimental data on particles of cosmic and terrestrial origin embedded in it, as well as on viable microorganisms that have made their way to the glacier from other regions of the planet and are in a state of profound anabiosis at its consistently low temperatures. Proceeding on this basis, the present authors and the Department of Well-Drilling Engineering and Technology of the Leningrad Mining Institute developed a method for aseptic collection of microbiological samples from glacial cores taken from different strata of the Central Antarctic Glacier in the vicinity of Vostok Station. (Auth.)

44-1474
Arctic data inventory and appraisal. Vol.18. Canada Basin: chemical oceanography 1926 through 1983.
Thomas, D.J., et al, Canadian data report of hydrography and ocean sciences, No.5, Sidney, BC, Institute of Ocean Sciences, Department of Fisheries and Oceans, 1986, 109p., Refs. p.76-109.
Macdonald, R.W., Robinson, M.
Hydrocarbons, Oceanographic surveys, Oxygen, Ecology, Sediments, Sea ice, Sea water, Chemical composition, Ice composition, Arctic Ocean

44-1475
NOGAP B.6; Vol.1: Beaufort Sea current measurements, March-August 1987.
McCullough, D., et al, Canadian data report of hydrography and ocean sciences, No.60, Sidney, BC, Institute of Ocean Sciences, Department of Fisheries and Oceans, 1988, 19p., 6 refs.
Macdonald, R.W., Iseki, K., Carmack, E.C
Oceanography, Water temperature, Salinity, Ocean currents, Light transmission, Sea ice, Ice cover, Measurement, Measuring instruments, Beaufort Sea.

44-1476
Fundamental aspects of analytical and numerical methods on freezing and melting heat-transfer problems.
Fukusako, S., et al, Annual review of numerical fluid mechanics and heat transfer Vol 1 Edited by T C Chawla, Washington, Hemisphere Publishing, 1987, p.351-402, 184 refs.
Seki, N.
Heat transfer, Freezing, Enthalpy, Heat capacity, Stefan problem, Ice melting, Analysis (mathematics), Mathematical models.

44-1477
Handbook of soil mechanics. Vol.3. Soil mechanics of earthworks, foundations and highway engineering.
Kézdi, Á., et al, Amsterdam, Elsevier Science Publishers, 1988, 363p., Translation of Handbuch der Bodenmechanik. Band 2: Bodenmechanik im Erd-, Grund- und Strassenbau (rev and enl) Budapest, Akadémiai Kiadó, 1979. Refs. passim
Réthâti, L.
Soil mechanics, Construction, Earthwork, Foundations, Roads, Manuals

44-1478
Program and abstracts.
North American Sea Ice Workshop, Amherst, MA, June 26-28, 1989, Amherst, MA, University of Massachusetts, [1989], n.p
Sea ice, Sea ice distribution, Ice edge, Ice forecasting, Ice reporting, Ice models, Remote sensing, Ice air interface, Ice water interface, Drift.

44-1479
Response of a sea ice microalgal community to a gradient in under-ice irradiance.
Grossi, S.M., Los Angeles, CA, University of Southern California, 1985, 324p., Ph.D. thesis. Refs. p.206-230.
Algae, Photosynthesis, Marine biology, Microbiology, Sea ice, Ice optics, Ice cover effect, Light effects, Biomass.
The effect of under-ice irradiance on *in situ* growth, production and species composition of sea ice microalgae was investigated at McMurdo Sound, Antarctica between Oct. and Dec., 1982. Five 100 sq m quadrats were delimited with 0 (Q-0) 5 (Q-5), 10 (Q-10) 25 (Q-25) and 100 (Q-100) cm snow cover. mean under-ice irradiances ranged 2000-fold, from 8.3 to <0.004 E/sq m/d. Highest quantum yield, 0.059, was measured for Q-25 platelet ice, indicating very efficient utilization of the extremely low light field (0.23 uE/sq m/s). By contrast, microalgae in Q-0 were well-adapted to their relatively high light environment and demonstrated maximum photosynthetic rates of 1-2 mg C/mg chl/h. The light gradient produced distinctly different algal assemblages beneath snow-free and snow-covered quadrats. Both cluster and principal components analysis discriminated groups of high and low light species. The former group was characterized by very rapid growth under Q-0 and a ubiquitous distribution, while the low light species grew more slowly, reached maximum abundance under Q-5, and failed to grow in the snow-free quadrat. (Auth. mod.)

44-1480
Data reduction of GOES information from DCP networks.
DeCoff, G.W., et al, *U.S. Army Cold Regions Research and Engineering Laboratory*, Sep. 1989, SR 89-29, 15p., ADA-215 844, 1 ref.
Daly, S.F., Pangburn, T., Thomson, C.
Ice reporting, Remote sensing, Data processing, Computer programs
A software system, DCP FOR, was developed to provide a convenient and efficient method of decoding, reducing, and storing data from Data Collection Platform (DCP) networks transmitted through the Geostationary Operational Environmental Satellite (GOES) data collection system. The software system includes a simple means of defining the arrangement of sensors at a DCP site that can be easily updated if the sensor arrangement is changed or the sensors modified. Any linear data reduction procedure can be processed. Precise temperature measurements using individually calibrated thermistors can be processed through the use of voltage divider circuits, nonlinear resistance to temperature calibration, and impedance mismatch detection and correction. The system can process data from DCPs manufactured by four companies. User-defined maximum and minimum limits determine the acceptability of the processed data. Data values not within these limits or missing data are flagged with a missing value marker. The database created by the system is independent of the particular sensor arrangement at any DCP site. The data can be easily transferred to other database systems.

44-1481
Vehicle mobility on thawing soils.
Shoop, S.A., *U.S. Army Cold Regions Research and Engineering Laboratory*, Sep. 1989, SR 89-31, 16p., ADA-215 148, 21 refs.
Ground thawing, Soil trafficability, Freeze thaw tests, Soil tests, Soil strength, Thaw depth, Frost action, Traction.
Although vehicle mobility in soft and wet soil has been studied in the past, the more complex problem of vehicle mobility on thawing soils has not been addressed. This problem is being examined in CRREL's Frost Effects Research Facility (FERF), where field-scale testing can be conducted under controlled conditions. The soil is frozen and then thawed to the desired test conditions. Traction and motion resistance are measured using an instrumented vehicle. To date, mobility testing has been conducted for nine different thawing conditions of a frost-susceptible silt. The failure mechanisms of the tire-soil interaction were observed, the soil strength was calculated, and vehicle performance was analyzed. For the tire and soil conditions tested, the initial failure of the tire-soil interaction is totally within the soil. At higher tire slip the failure occurs at or near the tire-soil interface. The shear strength data calculated from the vehicle test results indicate that the soil is basically frictional in behavior, with little or no cohesion, however, there is apparent cohesion from soil tension at low moisture contents. Of the soil parameters measured, vehicle traction is most strongly influenced by the soil friction. In turn, soil friction and cohesion are influenced by moisture content, density and thaw depth.

44-1482
Leaching of metal pollutants from four well casings used for ground-water monitoring.
Hewitt, A.D., *U.S. Army Cold Regions Research and Engineering Laboratory*, Sep 1989, SR 89-32, 11p., ADA-215 239, 18 refs.
Water pollution, Ground water, Well casings, Leaching, Chemical analysis, Impurities, Water pipes.
Polytetrafluorethylene (PTFE), polyvinylchloride (PVC), stainless steel 304 (SS 304) and stainless steel 316 (SS 316) well casings were tested for suitability for ground-water monitoring. A laboratory experiment, testing for the leaching of Ag, As, Ba, Cd, Cr, Hg, Pb, Se and Cu, was run in triplicate by exposing sections of the well casings to ground water for four periods ranging from 1 to 40 days. The results showed that PTFE did not leach any of the nine analytes studied, while SS 316 and PVC showed significant leaching of Cr, Cd and Pb; SS 316 also leached significant amounts of Ba and Cu. Stainless steel 304 showed significant leaching of Cr and Pb. In every case where contamination was observed, the release of metal analyte, when averaged over all of the exposure periods, was the greatest from either SS 304 or SS 316. Released contaminants were sorbed back onto the well casings in several cases.

44-1483
Winter habitats of Atlantic salmon, brook trout, brown trout and rainbow trout: a literature review.
Calkins, D.J., *U.S. Army Cold Regions Research and Engineering Laboratory*, Oct. 1989, SR 89-34, 9p., ADA-214 832, 44 refs.
Animals, River ice, Physiological effects, Ecology, Ice conditions, Ice cover effect, Cold weather survival.
A review of winter habitat studies in ice-covered streams for four species of salmonid provided some general information on substrate conditions and focal point velocities and depths. All species of fry are found at depths less than 40 cm and at velocities of 10 cm/s or less; juveniles of all species are found at velocities of less than 15 cm/s. A lack of continuous physical, chemical and biological measurements throughout the ice-covered season was a common deficiency of the studies reviewed. The interaction of the ice cover with other physical processes in the stream was rarely addressed.

44-1484
Stress and buckling analysis of grain silos under snow or wind loads.
Khazra, A., Urbana-Champaign, IL, University of Illinois, 1989, 598p., University Microfilms order No.-DA8924859, Ph.D. thesis. For abstract see Dissertation abstracts international, Sec. B, Jan. 1990, 50(7), p.3053.
Snow loads, Structures, Wind pressure, Storage tanks, Computer programs, Shells, Mathematical models

44-1485
Seasonal and interannual variations of sea ice motion in the Canada Basin and their relationships with the arctic atmospheric circulation.
Serreze, M.C., Boulder, CO, University of Colorado, 1989, 199p., University Microfilms order No.-DA8923529, Ph.D. thesis. For abstract see Dissertation abstracts international, Sec. B, Jan. 1990, 50(7), p.2824.
Atmospheric circulation, Ice air interface, Sea ice distribution, Ice forecasting, Drift, Wind factors, Ice models, Mathematical models, Seasonal variations.

44-1486
Green icebergs: a problem in geophysics and atmospheric optics.
Lee, R.L., Jr., University Park, PA, Pennsylvania State University, 1989, 245p., University Microfilms order No.DA8922076, Ph.D. thesis. For abstract see Dissertation abstracts international, Sec. B, Jan. 1990, 50(7), p.2976.
Icebergs, Ice optics, Ice spectroscopy.

44-1487
Beaufort Sea ice scour data base (SCOURBASE) update to 1986.
Gilbert, G.R., et al, *Environmental Studies Research Funds. Report*, Mar. 1989, No.97, 99p., With French summary. 27 refs.
DeLory, S.J., Pedersen, K.A.
Ice scoring, Bottom topography, Data processing, Oceanographic surveys, Topographic surveys, Grounded ice, Ice erosion, Beaufort Sea.

44-1488
Ice data management systems.
Terry, B.F., et al, *Environmental Studies Research Funds. Report*, July 1989, No.104, 154p. + appends., With French summary.
Lapp, D.J., Balko, C.L., Hancock, K.E., Lapp, P.A
Ice reporting, Ice forecasting, Sea ice distribution, Data processing.

44-1489
Algae concentrated by frazil ice: evidence from laboratory experiments and field measurements.
Garrison, D.L., et al, *Antarctic science*, Dec. 1989, 1(4), p.313-316, 19 refs.
Close, A.R., Reimnitz, E.
Frazil ice, Sea ice, Ice crystal adhesion, Ice composition, Algae, Cryobiology.
A number of studies have suggested that high concentrations of organisms in sea ice may be the result of harvesting and concentration by frazil ice. Laboratory experiments have shown that frazil ice can concentrate organisms from two to four times above levels in the underlying water. The concentrations in nature, however, can be considerably higher. The apparent discrepancy between laboratory results and field observations can be explained by the longer temporal and spatial scales that allow more contact of ice crystals with particles and with one another in the sea. It is also likely that small-scale circulation features, such as Langmuir circulation, enhance the ability of frazil ice to concentrate organisms in a natural setting. (Auth.)

44-1490
Two-dimensional model for the thermohaline circulation under an ice shelf.
Hellmer, H.H., et al, *Antarctic science*, Dec. 1989, 1(4), p.325-336, 33 refs.
Olbers, D.J.
Ice shelves, Ice melting, Ice models, Ocean currents, Antarctica—Filchner Ice Shelf.
The production of Antarctic Bottom Water is influenced by Ice Shelf Water which is formed due to the modification of shelf water masses under huge ice shelves. The coupling of inflow conditions, thermohaline processes at the ice shelf base and the sub-ice shelf circulation is studied with a two-dimensional thermohaline circulation model which has been developed for a section perpendicular to the ice shelf edge. Different boundary conditions appropriate to the Filchner Ice Shelf regime are considered. The model results indicate that, in general, shelf water is transported toward the grounding line, where at the ice shelf base melting occurs with a maximum rate of 1.5 m/y. Accumulation of ice takes place at the end of the melting zone close to the ice shelf edge with a rate on the order of 0.1 m/y. The location of this accumulation zone determines whether or not the density increase by salt rejection causes an upper circulation cell and the separation of the modified water mass from

the ice shelf base at mid-range depth. Non-linear processes in the accumulation zone cause variabilities which can be described by an ice shelf edge oscillator influencing the entire circulation regime. (Auth. mod.)

44-1491
Road over permafrost: design of access road in Alaska.
Hartely, M.C., et al, *Geotechnical fabrics report*, July-Aug. 1988, 6(4), p.19-22.
Bannister-Parks, M.
Roads, Permafrost beneath roads, Thermal insulation, Geotextiles.

44-1492
Physical characteristics and hydrothermal regime of the soils in the Amga River valley. (Fizicheskie svoistva i gidrotermicheskii rezhim pochv doliny reki Amgi),
Savvinov, D.D., et al, Yakutsk, IAkutskii filial SO AN SSSR, 1988, 99p., In Russian. 47 refs.
Savvinov, G.N.
Hydrothermal processes, Climatic factors, Frozen ground mechanics, Frozen ground physics, Environmental protection, Statistical analysis.

44-1493
Electromagnetic methods of studying permafrost; a review. (Elektromagnitnye metody issledovanii kriolitozony: obzor),
Akimov, A.T., et al, Yakutsk, Institut merzlotovedeniia, 1988, 46p. In Russian. 375 refs.
Klishes, T.M., Mel'nikov, V.P., Snegirev, A.M.
Electromagnetic prospecting, Permafrost physics, Electromagnetic properties, Bibliographies

44-1494
Forecasting ice fogs. (Prognoz moroznykh tumanov),
Kononenko, S.M., et al, *Zapadno-sibirskii regional'nyi nauchno-issledovatel'skii gidrometeorologicheskii institut. Trudy*, 1989, Vol.89, p.121-127, In Russian. 6 refs.
Osipov, D.A., Riabko, B.IA.
Ice fog, Weather forecasting, Air temperature, Analysis (mathematics), Statistical analysis.

44-1495
Icebreaker design synthesis, analysis of contemporary icebreaker performance.
Keinonen, A.J., et al, *Transport Canada. Report*, Sep. 1989, TP-9992E, Var.p., With French summary. 34 refs.
Browne, R.P., Revill, C.R.
Icebreakers, Ice breaking, Ice navigation.

44-1496
Norman Wells to Zama oil pipeline permafrost and terrain research and monitoring program: site establishment report.
Pilon, J., et al, *Canada. Geological Survey. Open file report*, (1989), No.2044, 331p., With French summary. 36 refs.
Burgess, M.M., Judge, A., Allen, V., MacInnes, K., Harry, D., Tarnocai, C., Baker, H.
Underground pipelines, Permafrost beneath structures, Permafrost preservation, Discontinuous permafrost, Site surveys, Permafrost thermal properties, Permafrost distribution, Canada

44-1497
Method of making ice with given physical properties.
Petrov, I.G., et al, New York, Engineering Consulting & Translation Center (ECTC), 1989, 11p., ECTC No.T-881-10, 7 refs. For Russian original see 43-807.
Fedotov, V.I., Cherepanov, N.V.
Artificial ice, Ice models, Test equipment, Ships, Hydraulic structures, Ice formation indicators, Ice jams.

44-1498
Sea ice behavior at elastic, elasto-plastic and plastic stages of its deformation.
Gladkov, M.G., et al, New York, Engineering Consulting & Translation Center, n.d., 6p., ECTC No.T-833-15, 8 refs. For Russian original see 38-322.
Nikitin, V.A., Smirnov, V.N., Fedorov, B.A., Shushlebin, A.I.
Ice physics, Ice plasticity, Ice deformation, Ice cover strength, Sea ice, Ice elasticity, Measuring instruments, Analysis (mathematics).

44-1499
Devices measuring deformations and stresses in ice fields.
Smirnov, V.M., et al, New York, Engineering Consulting & Translation Center (ECTC), n.d., 5p., ECTC No.T-833-16, 7 refs. For Russian original see 38-323.
Shushlebin, A.I.
Stresses, Ice cover strength, Ice deformation, Measuring instruments.

44-1500
External water exchange in lakes of the USSR. (Vneshnii vodoobmen ozer SSSR),
Sorokin, I.N., Leningrad, Nauka, 1988, 144p., In Russian. Refs. p.136-140
Lake water, Water balance, Reservoirs, Water flow, Lakes, Water chemistry, Runoff, Glacial lakes, Statistical analysis, Glacial hydrology.

44-1501
Study of thermal processes and technological systems in processing open freight cars using an induction assembly for mechanizing the unloading of frozen coal. (Issledovanie teplovykh protsessov i tekhnologicheskikh rezhimov obrabotki poluvagonov induktsionnoi ustanovkoi dlia mekhanizatsii vygruzki smerzshegosia uglia),
Koval'chuk, V.M., et al, Razrushenie uglei i gornykh porod, nauchnye soobshcheniia (Drilling of coal and rocks; scientific reports). Edited by L.B. Glatman and E.Z. Pozin, Moscow, Institut gornogo dela, 1988, p.67-74, In Russian.
Cherepanova, R.G., Vasil'ev, S.E., Karpova, T.A.
Railroad cars, Railroad equipment, Unloading, Frozen cargo, Temperature effects, Thermal regime.

44-1502
Subgrade freezing rate. (Skorost' promerzaniia zemlianogo polotna),
Migliachenko, V.P., *Izvestiia vysshikh uchebnykh zavedenii. Stroitel'stvo i arkhitektura*, 1989, No.10, p.91-95, In Russian. 3 refs.
Subgrades, Roadbeds, Freezing rate, Analysis (mathematics).

44-1503
Some characteristics of the interaction of surface foundations with heaving soil under deep seasonal freeze conditions. (Nekotorye osobennosti vzaimodeistviia nezaglublennykh fundamentov s puchinistymi gruntami v usloviiakh glubokogo sezonnogo promerzaniia),
Babello, V.A., et al, *Izvestiia vysshikh uchebnykh zavedenii. Stroitel'stvo i arkhitektura*, 1989, No.10, p.117-120, In Russian. 3 refs.
Zhuravlev, N.A., Mukhomedshin, A.V.
Frost heave, Frozen ground expansion, Foundations.

44-1504
AC withstand voltage characteristics of snow covered insulator strings.
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Snow cover effect, Snow electrical properties, Power lines, Electrical insulation, Transmission lines, Electrical resistivity.

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44-1506
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Dredging, Artificial islands, Offshore drilling, Oceanographic surveys, Environmental impact, Beaufort Sea.

44-1507
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Seismic surveys, Offshore drilling, Environmental impact, Oceanographic surveys, Ice cover effect, Sea ice distribution, Canada, Northwest Territories—Sverdrup Basin.

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Ice bottom surface, Ice water interface, Bottom topography, Water flow, Ocean currents, Subglacial observations, Oceanographic surveys.

44-1509
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Oceanographic surveys, Offshore drilling, Salinity, Water temperature, Subglacial observations, Environmental impact, Beaufort Sea.

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Ice elasticity, Tensile properties, Strain tests, Ice mechanics, Temperature effects, Ice strength.

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Subsurface drainage, Cold weather construction, Ground thawing, Culverts, Tundra, Aufeis, Active layer.

44-1514
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Hailstone growth, Heat transfer, Surface roughness, Statistical analysis, Artificial hailstones, Computer applications, Accuracy, Ice water interface, Surface properties.

44-1515
Numerical investigation and self-similar solutions of the glacier-ocean interaction problem.
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Glacier mass balance, Glacier surfaces, Glacier flow, Ice edge, Ice water interface, Glacial hydrology, Mass transfer, Mathematical models.

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Ground thawing, Phase transformations, Heat transfer, Stefan problem, Analysis (mathematics), Frozen ground thermodynamics, Temperature effects.

44-1517
Evolution of wave packets in three-wave interaction in a heavy liquid under an ice cover.
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Ice cover effect, Wave propagation, Scattering, Fluid dynamics, Analysis (mathematics).

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Self-similar solution of the thawing soil problem.
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Ground thawing, Unfrozen water content, Frozen rocks, Solid phases, Phase transformations, Mathematical models, Permeability, Frozen ground thermodynamics, Liquid solid interfaces.

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Propagation of long nonlinear waves in a ponderable fluid beneath an ice sheet.
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Wave propagation, Liquid solid interfaces, Ice cover effect, Water waves, Fluid dynamics, Analysis (mathematics), Periodic variations.

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Ice forecasting, Sea ice distribution, Ice models, Mathematical models, Drift, Barents Sea.

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Rough transform technique for extracting lead features from sea ice imagery.
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Pack ice, Remote sensing, Sea ice distribution, Data processing.

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Ice growth, Liquid cooling, Heat transfer coefficient, Surface properties, Pipes (tubes), Heat transfer, Ice models, Heat transfer, Coolants.

44-1526
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Air temperature, Statistical analysis, Temperature variations, Freezing, Temperature measurement, Weather forecasting, Periodic variations, Climatic factors.

44-1527
Submersed macrophyte communities before and after an episodic ice jam in the St. Clair and Detroit rivers.
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Ice scoring, Littoral zone, Plant ecology, Damage, Environmental impact, Ice jams, Growth.

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Mosses, Vegetation factors, Arctic landscapes, Plant ecology, Vegetation patterns, Correlation, Canada—Northwest Territory—Ellesmere Island.

44-1529
Synoptic ice motion from AVHRR imagery: automated measurements versus wind-driven theory.
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Sea ice, Velocity measurement, Spaceborne photography, Wind factors, Remote sensing, Correlation.

44-1530
Spectral signature of alpine snow cover from the Landsat thematic mapper.
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Spaceborne photography, Snow surface, Snow optics, Cloud cover, Reflectivity, LANDSAT, Snow optics, Remote sensing, Alpine landscapes, Surface properties.

44-1531
Comparison of *in situ* and Landsat derived reflectance of Alaskan glaciers.
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Chang, A.T.C., Foster, J.L., Benson, C.S., Kovalick, W.M.
Spaceborne photography, Glacier surfaces, Reflectivity, Albedo, LANDSAT, Glacier mass balance, Snow optics, Correlation, Glacier oscillation.

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Merits of statistical criteria for the performance of hydrological models.
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Rango, A.
Runoff forecasting, Simulation, Accuracy, Snowmelt, Hydrology, Models, Seasonal variations, Statistical analysis.

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Catastrophic outburst floods.
Clague, J., *Geos*, Spring 1987, 16(2), p.18-21, With French summary.
Lake bursts, Ice dams, Glacial lakes, Floods, Glacial hydrology.

44-1534
Snow freezes moments in time.
Koerner, R.M., et al, *Geos*, Spring 1988, 17(2), p.1-5, With French summary.
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Glacier ice, Ice cores, Isotope analysis, Glacier surveys.

44-1535
Spitsbergen faces modernity.
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History, Human factors, Mining, Norway—Spitsbergen.

44-1536
Investigation into the post-stable behavior of a tube array in cross-flow.
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Pipes (tubes), Air flow, Stability, Mechanical properties, Vibration, Mechanical tests, Turbulent flow, Velocity measurement, Design criteria, Wind tunnels, Fluid dynamics.

44-1537
Palaeoclimatological and chronological implications of the Vostok core dust record.
Petit, J.R., et al, *Nature*, Jan. 4, 1990, 343(6253), p.56-58, 32 refs.
Mounier, L., Jouzel, J., Korotkevich, E.S., Kotiakov, V.I., Lorius, C.
Ice cores, Paleoclimatology, Geochronology, Dust.
The 2,083-m Vostok ice core recovered by the Soviet Antarctic Expeditions has provided much information of climatic and environmental interest, for a period covering a full glacial-interglacial cycle. Here are presented and discussed the dust record obtained down to 2,202 m, the final depth to which this core was extended in 1986. Major changes in aeolian deposits, as recorded in the Vostok core, appear to be of global significance and confirm the existence of a link between high-latitude aeolian deposits and the Earth's orbital parameters. Dust is proposed as a stratigraphic marker to compare timing with other records of paleoclimate, and the magnetic-susceptibility profile measured along the RC11-120 Indian Ocean core is used for this purpose, assuming that major dust events correspond to common aeolian inputs. This approach indicates that the Vostok and marine records were roughly in phase at the previous glacial-interglacial transition. (Auth.)

44-1538
Comparison of two recent Jökulhlaups from an ice-dammed lake, Söndre Strömfjord, West Greenland.
Russell, A.J., *Journal of glaciology*, 1989, 35(120), p.157-162, 14 refs.
Subglacial drainage, Icebound lakes, Floods, Glacial lakes, Ice sheets, Ice dams.

44-1539
Spatial patterns of mass-balance fluctuations of North American glaciers.
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Reynaud, L.
Glacier mass balance, Glacier oscillation, Glacier surveys, Mathematical models.

44-1540
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Lozowski, E.P.
Artificial islands, Floating structures, Artificial ice, Ice islands, Mathematical models, Offshore drilling, Ice (construction material), Ice models.

44-1541
Waves on glacier beds.
Mazo, V.L., *Journal of glaciology*, 1989, 35(120), p.179-182, 12 refs.
Glacier beds, Glacial erosion, Glacier flow, Mathematical models

44-1542
Dynamics of the late Pleistocene Big Timber glacier, Crazy Mountains, Montana, U.S.A.
Murray, D.R., et al, *Journal of glaciology*, 1989, 35(120), p.183-190, 23 refs.
Locke, W.W., III.
Glacier mass balance, Paleoclimatology, Glacier surveys, Mathematical models, Pleistocene, United States—Montana—Big Timber Glacier.

44-1543
Fracture toughness of ice in contact with salt water.
Sabol, S.A., et al, *Journal of glaciology*, 1989, 35(120), p.191-192, 4 refs.
Schulson, E.M.
Ice strength, Ice water interface, Ice cracks, Crack propagation, Salt water.

44-1544
"Striations" produced by catastrophic subglacial drainage of a glacier-dammed lake, Mjölkedalsbreen, southern Norway.
McCarroll, D., et al, *Journal of glaciology*, 1989, 35(120), p.193-196, 19 refs.
Matthews, J.A., Shakesby, R.A.
Subglacial drainage, Glacial erosion, Icebound lakes, Ice dams, Floods, Striations, Norway.

44-1545
VLF surface-impedance measurements for ice-depth mapping in the Antarctic.
Thiel, D.V., et al, *Journal of glaciology*, 1989, 35(120), p.197-200, 6 refs.
Neall, F.
Glacier thickness, Radio echo soundings, Ice sheets, Very low frequencies, Glacier surveys, Antarctica—Casey Station.
VLF surface-impedance measurements were made along four traverses on the antarctic ice sheet in the vicinity of Casey base. Computer modeling of the surface-impedance data allowed ice depth predictions to be made: predictions which are almost independent of ice temperature for ice depths less than 800 m. Results agree with ice-radar and other ice-depth data. Surface-impedance anomalies were observed close to moraines and crevasses in the ice sheet. The technique is fast and the instrumentation sufficiently portable for single person operation. (Auth.)

44-1546
Short-term variations in strain and surface tilt on Storglaciären, Kebnekaise, northern Sweden.
Jansson P et al *Journal of glaciology*, 1989, 35(120), p 201-208, 17 refs
Hooke, R.L.
Glacier surfaces, Glacier flow, Glacial hydrology, Subglacial drainage, Glacier surveys, Sweden—Storglaciären

44-1547
Air movement in snow due to windpumping.
Colbeck, S C , *Journal of glaciology*, 1989. 35(120), MP 2562, p.209-213, 12 refs.
Snow air interface, Snow thermal properties, Analysis (mathemat'-s), Air flow, Atmospheric pressure, Wind factors, Snow surface.
Strong winds can disrupt the thermal regime in seasonal snow because of the variation in surface pressure associated with surface features like dunes and ripples Topographical features of shorter wavelengths produce stronger surface flows, but the flow decays rapidly with depth Longer-wavelength features produce weaker surface flows but the flow decays more slowly with depth. The flow may only be strong enough to disrupt the temperature field for features of wavelengths on the scale of meters or tens of meters at wind speeds of 10 m/s or more. Other possible causes of windpumping have been examined but they do not appear to be as significant Rapid pressure perturbations due to turbulence produce very little displacement of the air because of the high frequency and low amplitude Barometric pressure changes cause compression and expansion of the air in the pore space but the rate is too low to have much effect

44-1548
Stacking of basal debris layers without bulk freezing-on: isotopic evidence from West Greenland.
Knight, P.G., *Journal of glaciology*, 1989. 35(120), p 214-216. 16 refs
Glacier formation, Firn stratification, Ice sheets, Glacier beds, Glacier ice, Isotope analysis, Greenland.

44-1549
Development of aligned columnar sea ice: a field investigation.
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Michel, B.
Ice crystal structure, Ice crystal growth, Sea ice, Ice surveys, Ice growth

44-1550
On the nature of Svalbard icebergs.
Dowdeswell, J.A., *Journal of glaciology*, 1989. 35(120), p.224-234, 30 refs.
Icebergs, Calving, Glacier surveys, Norway—Svalbard.

44-1551
Three year record of seasonal variations in surface velocity, Storglaciären, Sweden.
Hooke, R.L., et al, *Journal of glaciology*, 1989. 35(120), p.235-247, 30 refs.
Calla, P., Holmlund, P., Nilsson, M., Stroeven, A.
Glacier flow, Glacier surfaces, Glacier surveys, Analysis (mathematics), Seasonal variations, Velocity measurement, Sweden—Storglaciären.

44-1552
Evaluation of avalanche-mass determination approaches: an example from the Himalaya, Pakistan.
De Scally, F.A., et al, *Journal of glaciology*, 1989. 35(120), p.248-252, 8 refs
Gardner, J.S.
Avalanche forecasting, Avalanche modeling, Analysis (mathematics), Pakistan—Himalaya Mountains.

44-1553
Detection of climate signal by inter-stake correlations of annual ablation data Qamanârssûp sermia, West Greenland.
Braithwaite, R.J., et al, *Journal of glaciology*, 1989. 35(120), p.253-259, 17 refs
Olesen, O.B
Glacier ablation, Climatic changes, Mathematical models, Glacier mass balance, Glacier surveys, Glacial hydrology, Greenland.

44-1554
Bending shear: the rate-controlling mechanism for calving ice walls.
Hughes, T., et al, *Journal of glaciology*, 1989. 35(120), p.260-266, 16 refs
Nakagawa, M
Calving, Ice sheets, Glacier ablation, Shear stress, Analysis (mathematics), Antarctica Deception Island.
Bending shear was observed to produce nearly vertical shear bands in a calving ice wall standing on dry land on Deception I., and slabs calved straight downward when shear rupture occurred along these shear bands A formula for the calving rate was developed from the Deception I data, and it was attempted to justify generalizing this formula to include ice walls standing along beaches or in water. These are environments in which a wave-washed groove develops along the base of the ice wall or along a water line above the base The rate of wave erosion provides an alternative mechanism for controlling the calving rate in these environments It was determined that the rate at which bending creep produces nearly vertical shear bands, along which shear rupture occurs, controls the calving rate in all environments Shear rupture occurs at a calving shear stress of about 1 bar The results justify using the calving formula to compute the calving rate of ice walls in computer models of ice-sheet dynamics. This is especially important in simulating retreat of Northern Hemisphere ice sheets during the last deglaciation when marine and lacustrine environments were common along retreating ice margins These margins would have been ice walls standing along beaches or in water, because floating ice shelves are not expected in the ablation zone of retreating ice sheets. (Auth.)

44-1555
Observations of the surface properties of the ice sheets by satellite radar altimetry.
Partington, K.C., et al, *Journal of glaciology*, 1989. 35(120), p.267-275, 19 refs.
Ridley, J.K., Rapley, C.G., Zwally, H.J.
Glacier surfaces, Ice sheets, Mathematical models, Remote sensing, Height finding, Glacier surveys, Topographic surveys.
By comparing modelled and averaged satellite altimeter return, it is demonstrated that time profiles of altimeter return can be used to provide important information on the surface properties of the ice sheets. Altimeter ice-sheet radar echoes from low altitudes and/or relatively low latitudes are, in general, dominated by surface scattering and, in Greenland, the area of surface-dominated return broadly coincides with the zone of summer melting. Seasonal variations in the echo wave-form shapes are negligible in all regions studied, with the possible exception of an area near the margin of the Greenland dry-snow zone In general, the model explains well the observed variations in mean wave-form shape, but small discrepancies between the model wave forms and the recorded wave forms indicate that sub-surface layers may be influencing the shape of the return. The possibility of deriving quantitative estimates of surface properties is explored by fitting model returns to averaged altimeter wave forms from the Wilkes Land plateau in Antarctica Surface roughness can be measured unambiguously from the wave-form data, but estimations of other parameters, such as grain-size, snow density, and snow temperature are found to be ambiguous because different surface parameters have a similar influence on the shape of the return. Despite this, the derived estimates compare well with ground-based observations and suggest that the satellite altimeter may have an important role to play in providing information on the surface properties of the ice sheets. (Auth.)

44-1556
Structure and debris characteristics of medial moraines in Jotunheimen, Norway: implications for moraine classification.
Vere, D.M., et al, *Journal of glaciology*, 1989, 35(120), p.276-280, 16 refs.
Benn, D.I.
Moraines, Mountain glaciers, Glacier surveys, Glacial deposits, Glacial geology, Norway Jotunheimen.

44-1557
X-ray topographic observations of edge dislocation glide on non-basal planes in ice.
Shearwood, C., et al, *Journal of glaciology*, 1989. 35(120), p.281-283, 7 refs.
Whitworth, R.W.
Ice crystal growth, Ice crystal structure, X ray analysis.

44-1558
River-ice mounds on Alaska's North Slope.
Arcone, S.A., et al, *Journal of glaciology*, 1989. 35(120), MP 2563, p.288-290, 5 refs.
Delaney, A.J., Calkins, D.
River ice, Ice surface, Ice cover thickness, Surface roughness, Unfrozen water content, Naleds, United States—Alaska—North Slope.

44-1559
Comprehensive satellite and airborne investigation of radar characteristics of fresh-water ice sheets.
Kondrat'ev, K.IA., et al, *USSR Academy of Sciences. Transactions. Earth science sections*, Jan.-Feb. 1988, 298(1), p.6-8, 7 refs. For Russian original see 42-2768.
Ice sheets, Scattering, Radar photography, Surface roughness, Lake ice, Correlation.

44-1560
Predicting snowmelt runoff on sagebrush rangeland using a calibrated SPUR hydrology model.
Wilcox, B.P., et al, *American Society of Agricultural Engineers Transactions*, July-Aug. 1989, 32(4), p 1351-1357, 20 refs.
Cooley, K.R., Hanson, C.L.
Snowmelt, Runoff forecasting, Snow cover distribution, Environment simulation, Watersheds, Accuracy, Correlation, Snow hydrology.

44-1561
Estimate of sensitivity of permafrost to change in global thermal regime of the earth's surface.
Anisimov, O.A., *Soviet meteorology and hydrology*, 1989, No.1, p.65-69, 9 refs. For Russian original see 43-4557.
Permafrost forecasting, Permafrost transformation, Climatic changes, Mathematical models, Thermal regime, Temperature effects.

44-1562
All-Union Conference on Avalanches, 3rd, Kirovsk, USSR, Sep. 1986. Proceedings. [Trudy].
Vsesoiuznoe soveshchanie po lavinam, 3rd, Kirovsk, USSR, Sep. 1986, Leningrad, Gidrometeoizdat, 1989, 247p., In Russian. Refs. passim. For selected papers see 44-1563 through 44-1594.
Chernous, P.A., ed.
Avalanches, Snowstorms, Meteorological factors, Countermeasures, Cost analysis, Roads, Snow stratigraphy, Analysis (mathematics), Mapping, Statistical analysis, Snow cover, Data processing.

44-1563
50 years of the anti-avalanche department, the first anti-avalanche service of the USSR. [50 let tsekhu protivolavinnoi zashchity—pervoi protivolavinnoi sluzhby SSSR].
Ziuzin, IU.L., Vsesoiuznoe soveshchanie po lavinam, 3rd. Kirovsk, USSR, Sep. 1986. Trudy (All-Union Conference on Avalanches, 3rd, Kirovsk, USSR, Sep. 1986. Proceedings). Edited by P.A. Chernous, Leningrad, Gidrometeoizdat, 1989, p.6-14, In Russian. 6 refs.
Avalanches, Countermeasures, Organizations.

44-1564
Preliminary results of an evaluation of the cost effectiveness of the anti-avalanche department for avalanche prevention in the Apatit industrial complex quarries. [Predvaritel'nye rezul'taty otsenki ekonomicheskoi effektivnosti zatrat tsekha protivolavinnoi zashchity na protivolavinnuiu zashchitu karerov proizvodstvennogo ob"edineniia "Apatit"].
Chmereva, G.V., Vsesoiuznoe soveshchanie po lavinam, 3rd, Kirovsk, USSR, Sep. 1986. Trudy (All-Union Conference on Avalanches, 3rd, Kirovsk, USSR, Sep. 1986. Proceedings). Edited by P.A. Chernous, Leningrad, Gidrometeoizdat, 1989, p.14-19, In Russian.
Cost analysis, Countermeasures, Avalanches, Economic analysis.

44-1565
Testing the cost effectiveness of anti-avalanche engineering structures in the Khibiny Mountains. [Opyt otsenki effektivnosti inzhenernykh protivolavinnykh sooruzhenii v Khibinakh].
Zhigul'skii, A.A., Vsesoiuznoe soveshchanie po lavinam, 3rd, Kirovsk, USSR, Sep. 1986. Trudy (All-Union Conference on Avalanches, 3rd, Kirovsk, USSR, Sep. 1986. Proceedings). Edited by P.A. Chernous, Leningrad, Gidrometeoizdat, 1989, p.19-28, In Russian. 7 refs.
Cost analysis, Countermeasures, Avalanche engineering, Analysis (mathematics).

44-1566
Possible means of protecting the city of Petropavlovsk-Kamchatski from avalanches. [O vozmozhnosti zashchity g Petropavlovska-Kamchatskogo ot snezhnykh lavin].
Shalkhutdinov, R.Sh., Vsesoiuznoe soveshchanie po lavinam, 3rd, Kirovsk, USSR, Sep. 1986. Trudy (All-Union Conference on Avalanches, 3rd, Kirovsk, USSR, Sep 1986 Proceedings). Edited by P.A. Chernous, Leningrad, Gidrometeoizdat, 1989, p.28-33, In Russian.
Avalanches, Countermeasures, Avalanche engineering.

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Sato, N., et al, *Hokkaido University. Faculty of Science. Journal. Series 7 Geophysics,* Feb. 1988, 8(3), p.259-280, 23 refs.
Kikuchi, K.
Snow crystal growth, Snow crystal structure, Snow crystal nuclei, Snow crystals, Snow ... phology.

44-1621
***In situ* growth experiments of snow crystals of low temperature types observed at Inuvik in arctic Canada.**
Sato, N., et al *Hokkaido University. Faculty of Science. Journ... Series 7 Geophysics,* Feb. 1989, 8(4), p.333-354, 12 refs.
Kikuchi, K.
Snow crystal growth, Snow crystal structure, Snow crystals

44-1622
**Measurement of the rimirg amount on snowflakes.**
Harimaya, T., et al, *Hokkaido University. Faculty of Science. Journal. Series 7 Geophysics,* Feb. 1989, 8(4), p.355-366, 6 refs.
Sato, M.
Hoarfrost, Snow crystal growth, Snowflakes, Snow crystal structure.

44-1623
**Measurements and analyses of aerosol particles in arctic Canada.**
Taniguchi, T., et al, *Hokkaido University. Faculty of Science. Journal. Series 7 Geophysics,* Feb. 1989, 8(4), p.397-414, 14 refs.
Kikuchi, K.
Air pollution, Aerosols, Polar regions, Haze, Atmospheric composition.

44-1624
**Antarctic stratospheric ice crystals.**
Goodman, J., et al, *Journal of geophysical research,* Nov 30, 1989, 94(D14), p 16,449-16,457, Refs p.16,456-16,457.
Toon, O.B., Pueschel, R.F., Snetsinger, K.G., Verma, S.
Ice crystal size, Ice crystal growth
Ice crystals were replicated over the Palmer Peninsula on 6 occasions during the 1987 Airborne Antarctic Ozone Experiment. The sampling altitude was between 12.5 and 18.5 km (45-65 thousand ft pressure altitudes) with the temperature between 190 and 201 K. The atmosphere was subsaturated with respect to ice in all cases. The collected crystals were predominantly solid and hollow columns. The largest crystals were sampled at lower altitudes where the potential temperature was below 400 K. While the crystals were larger than anticipated, their low concentration results in a total surface area that is less than one tenth of the total aerosol surface area. The large ice crystals may play an important role in the observed stratospheric dehydration processes through sedimentation. Evidence of scavenging of submicron particles further suggests that the ice crystals may be effective in the removal of stratospheric chemicals. (Auth.)

44-1625
**Measurements of size and composition of particles in polar stratospheric clouds from infrared solar absorption spectra.**
Kinne, S., et al, *Journal of geophysical research,* Nov. 30, 1989, 94(D14), p.16,481-16,491, 27 refs.
Toon, O.B., Toon, G.C., Farmer, C.B., Browell, E.V., McCormick, M.P.
Ice crystal size, Ice crystal structure, Clouds (meteorology).
The attenuation of solar radiation between 1.8- and 15-micron wavelength was measured with the airborne (DC-8) Jet Propulsion Laboratory Mark IV interferometer during the Airborne Antarctic Ozone Expedition in 1987. Thirty-three PSC cases were analyzed and categorized into two types. Type I clouds contain particles with radii of about 0.5 micron and nitric acid concentrations greater than 40%. Type II clouds contain particles composed of water ice with radii of 6 micron and larger. Based on the PSC geometrical thickness, both mass and particle density were estimated. Type I clouds typically had visible wavelength optical depths of about 0.008, mass densities of about 20 ppb, and about 2 particles/cu cm. The observed type II clouds had optical depths of about 0.03, mass densities of about 400 ppb mass, and about 0.05 particles/cu cm. The detected PSC type I clouds extended to altitudes of 21 km and were nearly in the ozone-depleted region of the polar stratosphere. Although PSC type II clouds under different temperature regimes may extend to similar high altitudes, the observed type II cases during Sep. were predominantly found at altitudes below 15 km. Simultaneous spectroscopic measurements of nitric acid vapor within the polar vortex (Toon et al., this issue) display lower concentrations in the presence of PSC type I clouds, the deficit being close to the amount of solid nitric acid inferred from the optical depths of these PSCs. This further supports the view that the type I PSCs contain frozen nitric acid. (Auth. mod.)

44-1626
**Heterogeneous physicochemistry of the polar ozone hole.**
Turco, R.P., et al, *Journal of geophysical research,* Nov. 30, 1989, 94(D14), p.16,493-16,510, Refs. p.16,509-16,510.
Toon, O.B., Hamill, P.
Ice composition, Clouds (meteorology), Ice crystals, Water vapor, Aerosols, Polar regions.
The heterogeneous physical and chemical processes that occur in the presence of polar stratospheric clouds (PSCs) are investigated. First, the characteristics of PSCs that affect chemical processes are described, such as particle composition, cloud surface area and mass, and aerosol mechanical time constants. The vapor pressures of trace compounds measured over ice in laboratory settings are discussed and shown to be consistent with in situ observations and simple thermodynamics. The mechanism for the formation of nitric acid haze (type I PSC) is elucidated. By comparing relative rates of physical and chemical processes, together with data and simulations on the seasonal evolution of polar ice clouds (in a companion paper (Toon et al, 1989)), several important conclusions are reached. Also discussed are nonlinearities in the combined heterogeneous/-homogeneous chemical system and, using a simple model, it is shown that the decadal evolution of the antarctic ozone hole may be understood in connection with the accumulation of fluorocarbons in the atmosphere, through nonlinearities in the heterogeneous chemistry, with possible contributing effects of variations in stratospheric temperatures and water vapor concentrations, which appear to have caused an increase in PSC frequency, extent, and duration in recent years. (Auth. mod.)

44-1627
**Determination of elastic moduli of sea ice.**
Williams, K.L., et al, *U.S. Naval Ocean Research and Development Activity. Contribution,* Sep. 1989, No.NORDA-CONTRIB-PR-89:048 242, 6p. ADA-213 582.
Stein, R.P., Wen, T., Francois, R.E.
Ice acoustics, Acoustic measurement, Sea ice, Sound transmission, Shear properties, Mechanical properties.

44-1628
**Propagation of sound generated on the ice surface into water.**
Francois, R.E., et al, *U.S. Naval Ocean Research and Development Activity. Contribution,* Sep. 1989, NORDA-CONTRIB-PR-89.046.242, 5p. ADA-213 583.
Wen, T.
Sea ice, Noise (sound), Acoustic measurement, Underwater acoustics, Models, Sound transmission.

44-1629
**Path averaged boundary layer measurements beneath ice using acoustic scintillation.** Sidney, B.C., Institute of Ocean Sciences, 1989, 6p. ADA-213 596.
Underwater acoustics, Scintillation, Turbulent boundary layer, Correlation, Polar regions, Data processing, Measurement.

44-1630
**Towed resistance trials in ice of the USCGC *Mobile Bay* (WTGB 103). Final report Jan.-Sep. 1986.**
Zahn, P.B., et al, *U.S. Maritime Administration. Report,* Aug. 1987, MA-RD-760-87049, 463p. PB88-104526.
Phillips, L.
Ships, Icebreakers, Performance, Design criteria.

44-1631
**Remote sensing of earth terrain. Semiannual report, March 1-August 31, 1987.**
Kong, J.A. *U.S. National Aeronautics and Space Administration. Contractor report,* Oct. 1987, NASA-CR-181370, 15p. N87-28957/5.
Remote sensing, Snow optics, Terrain identification

44-1632
**Underwater acoustic backscatter from a model of arctic ice open leads and pressure ridges.**
Browne, M.J., Monterey, CA, U.S. Naval Postgraduate School, 1987, 161p., ADA-184 693, M.S. thesis.
Ice acoustics, Underwater acoustics, Backscattering, Sea ice, Ice models, Pressure ridges, Polar regions, Acoustic measurement.

44-1633
**Report of the Saint Mary's River-Little Rapids cut ice boom and its effects on levels and flows in the Soo Harbor area. Final report 79-80.** Detroit, MI, U.S. Army Corps of Engineers, Aug. 1980, 63p. ADA-213 745.
Rivers, Water level, Ice booms, Water flow, Navigation, Ice cover thickness, Ice formation, River ice

44-1634
**Saint Mary's River-Little Rapids cut ice boom: winter of 1983-1984. Final report.** Detroit, MI, U.S. Army Corps of Engineers, Nov. 1984, 50p. ADA-213 836.
Ice openings, Ice booms, Water level, Water flow, Ice prevention, Electric power.

44-1635
Saint Mary's River Little Rapids cut ice boom, winter 1982-1983. Final report. Detroit, MI, U.S. Army Corps of Engineers, Oct 1983, 59p. ADA 213 746.
Ice openings, Ice booms, Augers, Water level, Sea ice, Rivers

44-1636
State of the art of pavement response monitoring systems for roads and airfields.
Symposium on State of the Art of Pavement Response Monitoring Systems for Roads and Airfields, 1st, Hanover, NH, Mar. 6-9, 1989, *U.S. Army Cold Regions Research and Engineering Laboratory,* Sep. 1989, SR 89-23, 401p., ADA-214 957, Refs. passim. For individual papers see 44-1637 through 44-1675
Janoo, V.C., ed, Eaton, R., ed.
Pavements, Loads (forces), Roads, Airports, Frost action, Measuring instruments, Monitors, Design, Meetings, Deformation.

44-1637
Instrumentation and pavement design.
White, T., *U.S. Army Cold Regions Research and Engineering Laboratory. Special report,* Sep. 1989, SR 89-23, Symposium on State of the Art of Pavement Response Monitoring Systems for Roads and Airfields, 1st, Hanover, NH, Mar. 6-9, 1989. Proceedings Edited by V Janoo and R. Eaton, p.2-8, ADA-214 957, 8 refs
Pavements, Loads (forces), Instruments, Frost penetration, Freeze thaw cycles, Roads, Design criteria, Moisture, Temperature effects, Computer applications, Deformation.

44-1638
Monitoring pavement performance in seasonal frost areas.
Berg, R.L., *U.S. Army Cold Regions Research and Engineering Laboratory. Special report,* Sep. 1989, SR 89-23, MP 2564, Symposium on State of the Art of Pavement Response Monitoring Systems for Roads and Airfields, 1st, Hanover, NH, Mar 6-9, 1989 Proceedings Edited by V Janoo and R Eaton, p.10-19, ADA-214 957, 10 refs.
Pavements, Monitors, Freeze thaw cycles, Frost penetration, Soil water, Thaw depth, Measuring instruments, Design, Thermocouples, Temperature measurement.
As pavement design and evaluation procedures become increasingly complex, additional instrumentation and more frequent observations may be necessary to provide the data required to verify and refine these more sophisticated procedures. This additional instrumentation may be increased numbers of previously used devices or more sophisticated equipment to measure parameters not monitored in the past. For example, subsurface temperatures and frost heave have been measured at the pavement surface for years Within about the last 10 years we have also measured *in-situ* moisture contents versus depth and time, but an inexpensive and universal device for making these measurements is not yet available In this paper, measurements currently made, measurements we plan to make in the next few years, and measurements we would like to make but have not because the necessary equipment is not available, are discussed

44-1639
Instrumentation needs—SHRP's view.
Irwin, L.H., et al, *U.S. Army Cold Regions Research and Engineering Laboratory. Special report,* Sep. 1989, SR 89-23, Symposium on State of the Art of Pavement Response Monitoring Systems for Roads and Airfields, 1st, Hanover, NH, Mar. 6-9, 1989. Proceedings Edited by V Janoo and R. Eaton, p.20-22 ADA-214 957
Pelzner, A
Pavements, Roads, Frost penetration, Freeze thaw cycles Moisture, Environments, Climatic factors, Soil water, Strains, Stresses.

44-1640
Soil suction monitoring for roads and airfields.
Fredlund, D.G, *U S Army Cold Regions Research and Engineering Laboratory. Special report,* Sep. 1989, SR 89-23, Symposium on State of the Art of Pavement Response Monitoring Systems for Roads and Airfields, 1st, Hanover, NH, Mar 6-9, 1989. Proceedings. Edited by V. Janoo and R. Eaton, p.24-39, ADA-214 957, 19 refs.
Capillarity, Soil water migration, Thermal conductivity, Roads, Airports, Subgrade soils, Porosity, Water pressure, Electrical resistivity, Analysis (mathematics), Measuring instruments.

44-1641
Measurement of *in-situ* pore pressures.
Sellers, J.B., *U.S. Army Cold Regions Research and Engineering Laboratory. Special report,* Sep. 1989, SR 89-23, Symposium on State of the Art of Pavement Response Monitoring Systems for Roads and Airfields, 1st, Hanover, NH, Mar. 6-9, 1989. Proceedings. Edited by V. Janoo and R. Eaton, p.40-44, ADA-214 957, 1 ref.
Soil water, Water pressure, Freeze thaw cycles, Soil mechanics, Porosity, Stability, Measuring instruments.

44-1642
*In-situ* measurement of soil water content in the presence of freezing/thawing conditions.
Nieber, J.L., et al, *U.S. Army Cold Regions Research and Engineering Laboratory. Special report,* Sep 1989, SR 89-23, Symposium on State of the Art of Pavement Response Monitoring Systems for Roads and Airfields, 1st, Hanover, NH, Mar. 6-9, 1989 Proceedings. Edited by V. Janoo and R. Eaton, p.45-62, ADA-214 957, 21 refs.
Baker, J.M.
Soil water, Freeze thaw cycles, Water content, Thermal conductivity, Gravimetric prospecting, Measuring instruments, Electrical resistivity, Psychrometers.

44-1643
*In situ* permeability measurements.
Moulton, L.K., *U.S. Army Cold Regions Research and Engineering Laboratory. Special report,* Sep. 1989, SR 89-23, Symposium on State of the Art of Pavement Response Monitoring Systems for Roads and Airfields, 1st, Hanover, NH, Mar 6-9, 1989. Proceedings. Edited by V. Janoo and R. Eaton, p.63-73, ADA-214 957, 26 refs.
Pavement bases, Permeability, Soil physics, Roadbeds, Water content, Equipment, Drainage, Tests, Measuring instruments.

44-1644
Experimental project No. 12: concrete pavement drainage rehabilitation.
Kelly, R.C., *U.S. Army Cold Regions Research and Engineering Laboratory. Special report,* Sep. 1989, SR 89-23, Symposium on State of the Art of Pavement Response Monitoring Systems for Roads and Airfields, 1st, Hanover, NH, Mar. 6-9, 1989. Proceedings. Edited by V. Janoo and R. Eaton, p.74-75. ADA-214 957.
Concrete pavements, Drainage, Surface waters, Seepage, Countermeasures, Runoff.

44-1645
Temperature and thaw depth monitoring of pavement structures.
Esch, D.C., *U.S. Army Cold Regions Research and Engineering Laboratory. Special report,* Sep. 1989, SR 89-23, Symposium on State of the Art of Pavement Response Monitoring Systems for Roads and Airfields, 1st, Hanover, NH, Mar. 6-9, 1989. Proceedings. Edited by V. Janoo and R. Eaton, p.78-86, ADA-214 957, 5 refs.
Pavements, Temperature measurement, Thaw depth, Subgrade soils, Freeze thaw cycles, Soil water, Water content, Roads, Measuring instruments, Airports, Monitors.

44-1646
Determination of frost penetration by soil resistivity measurements.
Atkins, R.T., *U.S. Army Cold Regions Research and Engineering Laboratory. Special report,* Sep. 1989, SR 89-23, MP 2565, Symposium on State of the Art of Pavement Response Monitoring Systems for Roads and Airfields, 1st, Hanover, NH, Mar. 6-9, 1989. Proceedings. Edited by V. Janoo and R. Eaton, p.87-100. ADA-214 957.
Frost penetration, Pavements, Subgrade soils, Thermocouples, Thermistors, Electrical resistivity, Frost resistance, Temperature distribution, Seasonal variations, Tests, Measuring instruments, Salinity, Subsurface investigations, Antifreezes.
Because of freezing point depression and isothermal springtime conditions, frost penetration measurements using temperature-sensing devices can become unreliable In recognition of this problem two frost penetration sensors that depend on changes in soil resistivity were tested. Tests were conducted on a parking area with an asphalt-concrete surface where salt was periodically applied as part of snow removal operations For comparison, data were obtained from a resistivity probe, a thermocouple probe and a thermistor probe. Results indicated that measuring temperature to determine frost penetration can lead to large errors under some conditions, for instance, when salt is applied or when frost is coming out of the ground The resistivity probe performed reliably during the entire measurement program Conclusions from this study indicate that resistivity probes have definite advantages that should be considered when future frost penetration measurement programs are designed

44-1647
Thermocouple and thermistor temperature measurement systems.
Briggs, R., *U.S. Army Cold Regions Research and Engineering Laboratory. Special report,* Sep. 1989, SR 89-23, Symposium on State of the Art of Pavement Response Monitoring Systems for Roads and Airfields, 1st, Hanover, NH, Mar. 6-9, 1989. Proceedings. Edited by V. Janoo and R. Eaton, p.101-107, ADA-214 957, 10 refs.
Thermocouples, Thermistors, Temperature measurement, Roadbeds, Pavements, Thermal conductivity, Electrical resistivity, Accuracy, Measuring instruments.

44-1648
Simple and economical thermal conductivity measurement system.
Atkins, R.T., *U.S. Army Cold Regions Research and Engineering Laboratory. Special report,* Sep. 1989, SR 89-23, MP 2566, Symposium on State of the Art of Pavement Response Monitoring Systems for Roads and Airfields, 1st, Hanover, NH, Mar. 6-9, 1989. Proceedings. Edited by V. Janoo and R. Eaton, p.108-116, ADA-214 957, 3 refs.
Thermal conductivity, Thermistors, Soil physics, Construction materials, Sludges, Analysis (mathematics), Grain size, Temperature effects, Tests, Accuracy
This report describes a recently patented method for using commercially available thermistors to make *in-situ* thermal conductivity measurements with commonly available electronic equipment such as digital voltmeters The emphasis is on the use of a single thermistor to measure the thermal conductivity of soils. Calibration techniques are explained and examples provided. Limits on this technique are discussed, including measurement range, material grain size, the amount of material needed for a valid measurement, and temperature stability. Specific examples of the use of this technique are provided for thermal conductivity measurements of soils, building materials, and the sludges in a sewage treatment plant. Data analysis is provided including a statistical approach to finding the thermal conductivity in large volumes of material.

44-1649
Information management-state of the art—the SHRP LTPP experience.
Clarke, D.B., et al, *U.S. Army Cold Regions Research and Engineering Laboratory. Special report,* Sep. 1989, SR 89-23, Symposium on State of the Art of Pavement Response Monitoring Systems for Roads and Airfields, 1st, Hanover, NH, Mar. 6-9, 1989. Proceedings. Edited by V. Janoo and R. Eaton, p 118-127. ADA-214 957
Margiotta, R.A.
Pavements, Road maintenance, Research projects, Construction materials, Freeze thaw cycles, Climatic factors, Computer applications, Design.

44-1650
High speed data acquisition system for PCC pavement testing.
Okamoto, P.A., *U.S. Army Cold Regions Research and Engineering Laboratory. Special report,* Sep. 1989, SR 89 23, Symposium on State of the Art of Pavement Response Monitoring Systems for Roads and Airfields, 1st, Hanover, NH, Mar. 6-9, 1989. Proceedings. Edited by V. Janoo and R. Eaton, p.128-135, ADA-214 957, 5 refs.
Pavements, Temperature gradients, Loads (forces), Strains, Thermocouples, Road maintenance, Deformation, Tests, Design, Computer applications, Measuring instruments, Construction.

44-1651
Data acquisition: first the FERF then the world.
Knuth, K.V., *U.S. Army Cold Regions Research and Engineering Laboratory. Special report,* Sep. 1989, SR 89-23, MP 2567, Symposium on State of the Art of Pavement Response Monitoring Systems for Roads and Airfields, 1st, Hanover, NH, Mar. 6-9, 1989. Proceedings. Edited by V. Janoo and R. Eaton, p.136-138, ADA-214 957, 4 refs.
Frost heave, Frost action, Laboratories, Temperature measurement, Thermocouples, Water content, Pavements, Soil water, Measuring instruments, Accuracy, Data processing.
A review of the measurement systems and the data collection techniques as applied to the laboratory, the Frost Effects Research Facility and finally the real world will be presented. In the beginning there was the ruler, thermometer, pencil and paper Then came electricity, motors, etc till now there is the computer, fiber optics, lasers, ultrasound and the satellite. The author presents the current as well as future data collection techniques for temperature, moisture content, pressure, stress, strain and displacement as used in the FERF and in remote sites

44-1652
Cold regions weather data systems.
Bates, R.E., et al, *U.S. Army Cold Regions Research and Engineering Laboratory. Special report,* Sep. 1989, SR 89-23, MP 2568, Symposium on State of the Art of Pavement Response Monitoring Systems for Roads and Airfields, 1st, Hanover, NH, Mar. 6-9, 1989. Proceedings. Edited by V. Janoo and R. Eaton, p.139-145, ADA-214 957, 13 refs.
Gerard, S.
Meteorological data, Cold weather operation, Measuring instruments, Climatic factors, Snow surveys, Computer applications, Temperature distribution, Temperature effects, Equipment.
The northern temperate climatic zones experience a varying scenario of winter environmental extremes of cold, icing, and precipitation, which severely influence people, equipment and operations Even instruments used to measure cold and/or wet adverse environments may be incapable of operation if employed during severe cold weather. It is important to know the equipment s environmental restrictions and to evaluate the frequency and duration of disabling weather In some instances, functional impairments persist after the causative meteorological conditions have subsided, e g glaze, rime and heavy snow and ice accumulation For over 25 years, CRREL has studied environmental conditions in winter weather. These efforts have concentrated on providing field-measured meteorological data and historical climatological data, as well as instrumentation support for many experiments conducted throughout cold regions of the Northern Hemisphere These efforts have involved characterizing atmospheric conditions as well as surface conditions. Some of the measurements made are snow temperature profiles, depth of the snow on the ground with varying terrain and vegetation, temperature at the snow/ground interface, near-surface ground temperature and wind profiles, snow cover properties, solar radiation, visibility and sky conditions.

44-1653
State-of-the-art stress, strain and deflection measurements.
Ullidtz, P , et al, *U S. Army Cold Regions Research and Fngineering Laboratory Special report,* Sep 1989, SR 89-23, Symposium on State of the Art of Pavement Response Monitoring Systems for Roads and Airfields, st, Hanover, NH, Mar 6-9, 1989 Proceedings. Edited by V Janoo and R Eaton, p.148-161, ADA-214 957, 11 refs.
Ertman Larsen, H.J.
Pavements, Frost action, Deformation, Loads (forces), Construction materials, Freeze thaw cycles, Stresses, Strains, Climatic factors, Cracking (fracturing), Design.

44-1654
*In situ* stress measurements.
Selig, E.T., *U.S. Army Cold Regions Research and Engineering Laboratory. Special report,* Sep. 1989, SR 89-23, Symposium on State of the Art of Pavement Response Monitoring Systems for Roads and Airfields, 1st, Hanover, NH, Mar. 6-9, 1989 Proceedings. Edited by V. Janoo and R Eaton. p.162-169, ADA-214 957, 11 refs.
Soil strength, Stresses, Pavements, Measuring instruments, Accuracy.

44-1655
Pavement design with the pavement pressuremeter.
Briaud, J.L., et al, *U.S. Army Cold Regions Research and Engineering Laboratory. Special report,* Sep. 1989, SR 89-23, Symposium on State of the Art of Pavement Response Monitoring Systems for Roads and Airfields, 1st, Hanover, NH, Mar. 6-9, 1989. Proceedings. Edited by V. Janoo and R. Eaton, p.170-179, ADA-214 957, 20 refs.
Cosentino, P.J.
Pavements, Pressure, Foundation , Airports, Roads, Loads (forces), Measuring instruments, Design, Tests, Strains, Stresses.

44-1656
Monitoring pavement responses to traffic loads.
Christison, J.T., *U.S. Army Cold Regions Research and Engineering Laboratory. Special report,* Sep. 1989, SR 89-23, Symposium on State of the Art of Pavement Response Monitoring Systems for Roads and Airfields, 1st, Hanover, NH, Mar. 6-9, 1989. Proceedings. Edited by V. Janoo and R. Eaton, p.180-185, ADA-214 957, 6 refs.
Pavements, Loads (forces), Strains, Monitors, Roads, Tensile properties, Bearing strength, Temperature effects, Tests, Deformation, Measuring instruments, Construction materials.

44-1657
Use of the multidepth deflectometer for deflection measurements.
Scullion, T., et al, *U.S. Army Cold Regions Research and Engineering Laboratory. Special report,* Sep. 1989, SR 89-23, Symposium on State of the Art of Pavement Response Monitoring Systems for Roads and Airfields, 1st, Hanover, NH, Mar. 6-9, 1989. Proceedings. Edited by V. Janoo and R. Eaton, p.186-196, ADA-214 957, 7 refs.
Bush, A.J., III.
Pavements, Loads (forces), Deformation, Strains, Compressive properties, Monitors, Temperature effects, Bearing strength, Measuring instruments, Tests.

44-1658
NDT in cold regions: a review of the state-of-the-art of deflection testing.
Coetzee, N F., et al, *U.S. Army Cold Regions Research and Engineering Laboratory. Special report,* Sep. 1989, SR 89-23, Symposium on State of the Art of Pavement Response Monitoring Systems for Roads and Airfields, 1st, Hanover, NH, Mar. 6-9, 1989. Proceedings. Edited by V. Janoo and R. Eaton, p.198-209, ADA-214 957, 28 refs.
Hicks, R.G.
Pavements, Loads (forces), Deformation, Thaw weakening, Structural analysis, Measuring instruments, Tests, Dynamic loads, Static loads.

44-1659
Applicability of spectral-analysis-of-surface-waves method in determining moduli of pavements.
Nazarian, S., *U.S. Army Cold Regions Research and Engineering Laboratory. Special report,* Sep. 1989, SR 89-23, Symposium on State of the Art of Pavement Response Monitoring Systems for Roads and Airfields, 1st, Hanover, NH, Mar. 6-9, 1989. Proceedings. Edited by V. Janoo and R Eaton, p 210-225, ADA-214 957, 21 refs.
Pavements, Construction materials, Deformation, Permafrost, Strains, Loads (forces), Bearing strength, Models, Measuring instruments, Tests, Subgrades.

44-1660
Alaska's experiences with non-destructive testing.
Connor, B , *U.S Army Cold Regions Research and Engineering Laboratory. Special report,* Sep. 1989, SR 89-23, Symposium on State of the Art of Pavement Response Monitoring Systems for Roads and Airfields, 1st, Hanover, NH, Mar. 6-9, 1989. Proceedings Edited by V Janoo and R Eaton, p 226-233, ADA-214 957, 6 refs.
Pavements, Bearing strength, Loads (forces), Freeze thaw cycles, Thaw depth, Roads, Deformation, Frozen ground, Design, Tests, Seasonal variations, Measuring instruments, Accuracy.

44-1661
Experience with nondestructive testing of two instrumented airfield pavements in Manitoba, Canada.
Ganapathy, G.V., *U.S. Army Cold Regions Research and Engineering Laboratory Special report,* Sep 1989, SR 89-23, Symposium on State of the Art of Pavement Response Monitoring Systems for Roads and Airfields, 1st, Hanover, NH, Mar. 6-9, 1989. Proceedings. Edited by V. Janoo and R. Eaton, p.234-265, ADA-214 957, 18 refs.
Pavements, Airports, Loads (forces), Deformation, Strains, Stresses, Flexural strength, Aircraft landing areas, Measuring instruments, Tests, Water pressure

44-1662
Applications of field instrumentation and performance monitoring of rigid pavements.
Rollings, R S., et al, *U S Army Cold Regions Research and Engineering Laboratory Special report,* Sep. 1989, SR 89-23, Symposium on State of the Art of Pavement Response Monitoring Systems for Roads and Airfields, 1st, Hanover, NH, Mar. 6-9 1989. Proceedings Edited by V Janoo and R Eaton, p 268-277, ADA-214 957, 19 refs
Pittman, D.W.
Pavements, Bearing strength, Loads (forces), Stresses, Temperature effects, Moisture, Roads, Monitors, Models, Design, Tests, Strains, Flexural strength.

44-1663
*In-situ* measurements in hot-mix asphalt pavements.
Anderson, D.A., et al, *U.S. Army Cold Regions Research and Engineering Laboratory. Special report,* Sep. 1989, SR 89-23, Symposium on State of the Art of Pavement Response Monitoring Systems for Roads and Airfields, 1st, Hanover, NH, Mar. 6-9, 1989. Proceedings. Edited by V. Janoo and R. Eaton, p.278-285, ADA-214 957, 5 refs.
Sebaaly, P.E.
Pavements, Bitumens, Strains, Loads (forces), Measuring instruments, Tests.

44-1664
Iowa Department of Transportation weigh-in-motion.
McCall, B., *U.S. Army Cold Regions Research and Engineering Laboratory. Special report,* Sep. 1989, SR 89-23, Symposium on State of the Art of Pavement Response Monitoring Systems for Roads and Airfields, 1st, Hanover, NH, Mar. 6-9, 1989. Proceedings. Edited by V. Janoo and R. Eaton, p.286-295, ADA-214 957, 7 refs.
Dynamic loads, Roads, Vehicles, Pavements, Surface roughness, Design, Loads (forces), Accuracy, Velocity, Static loads.

44-1665
SHRP prototype procedures for calibrating falling weight deflectometers.
Richter, C A , et al, *U S. Army Cold Regions Research and Engineering Laboratory. Special report,* Sep. 1989, SR 89-23, Symposium on State of the Art of Pavement Response Monitoring Systems for Roads and Airfields, 1st, Hanover, NH, Mar. 6-9, 1989. Proceedings. Edited by V. Janoo and R. Eaton, p.296-303, ADA-214 957, 1 ref.
Irwin, L.H.
Pavements, Loads (forces), Deformation, Temperature effects, Construction materials, Tests, Measuring instruments, Accuracy, Equipment.

44-1666
Iowa Department of Transportation pavement instrumentation.
Dankbar, R., *U.S. Army Cold Regions Research and Engineering Laboratory. Special report,* Sep. 1989, SR 89-23, Symposium on State of the Art of Pavement Response Monitoring Systems for Roads and Airfields, 1st, Hanover, NH, Mar. 6-9, 1989. Proceedings. Edited by V Janoo and R. Eaton, p.304-307. ADA-214 957.
Pavements, Temperature effects, Loads (forces), Moisture, Subgrades, Drainage, Design, Road maintenance, Measuring instruments, Research projects.

44-1667
Direct comparison of nondestructive, laboratory, and *in situ* testing.
Anderson, M., et al, *U.S. Army Cold Regions Research and Engineering Laboratory. Special report,* Sep. 1989, SR 89-23, Symposium on State of the Art of Pavement Response Monitoring Systems for Roads and Airfields, 1st, Hanover, NH, Mar. 6-9, 1989. Proceedings. Edited by V. Janoo and R. Eaton, p.310-319, ADA-214 957, 11 refs.
Timian, D.A.
Pavements, Equipment, Deformation, Shear properties, Compressive properties, Subgrades, Temperature effects, Shear strength, Wave propagation, Measuring instruments, Tests.

44-1668
Resilient modulus determination for frost conditions.
Chamberlain, E.J., et al, *U.S. Army Cold Regions Research and Engineering Laboratory. Special report,* Sep. 1989, SR 89-23, MP 2569, Symposium on State of the Art of Pavement Response Monitoring Systems for Roads and Airfields, 1st, Hanover, NH, Mar. 6-9, 1989. Proceedings. Edited by V. Janoo and R. Eaton, p.320-333, ADA-214 957, 5 refs.
Cole, D.M., Durell, G.F.
Pavements, Freeze thaw cycles, Loads (forces), Compressive properties, Deformation, Water content, Temperature effects, Tests, Stresses, Ground thawing, Measuring instruments, Analysis (mathematics).
Resilient moduli for pavements subject to freezing and thawing can be obtained from laboratory repeated load triaxial tests. We have found that for the frozen condition, the resilient modulus is very sensitive to temperature or unfrozen water content For the thawed condition, the modulus is primarily dependent upon the water content or moisture stress The modulus is also dependent upon the applied stresses, particularly for the newly thawed condition and the recovery period that follows. We empirically relate the moduli to the environmental and stress conditions using a multiple linear regression analysis Resilient moduli obtained with this procedure typically vary over 3 or 4 orders of magnitude for a complete freeze-thaw cycle. It is difficult to obtain meaningful data for the thawed condition where the pore pressure is greater than or equal to zero. The empirical equations are used in elastic layered models to calculate pavement deflections.

44-1669
Backcalculation of layer moduli and runway overlay design: U.S. Coast Guard Air Station, Kodiak, Alaska.
Vinson, T S , et al, *U S. Army Cold Regions Research and Engineering Laboratory Special report,* Sep 1989, SR 89-23, Symposium on State of the Art of Pavement Response Monitoring Systems for Roads and Airfields, 1st, Hanover, NH, Mar 6-9, 1989 Proceedings Edited by V Janoo and R Eaton, p.334-345, ADA-214 957, 13 refs.
Zhou, H.P., Alexander, R., Hicks, R.G.
Runways, Pavements, Drainage, Deformation, Subgrades, Aircraft landing areas, Bearing strength, Road maintenance, Design, Safety

44-1670
Variability of pavement layer moduli from NDT measurements.
Rada, G.R., et al, *U.S. Army Cold Regions Research and Engineering Laboratory. Special report,* Sep. 1989, SR 89-23, Symposium on State of the Art of Pavement Response Monitoring Systems for Roads and Airfields, 1st, Hanover, NH, Mar. 6-9, 1989. Proceedings. Edited by V. Janoo and R. Eaton, p.346-357, ADA-214 957, 25 refs.
Uddin, W., Witczak, M.W.
Pavements, Deformation, Dynamic loads, Structural analysis, Subgrades, Drainage, Construction materials, Climatic factors, Stresses, Temperature effects, Temperature variations, Moisture, Tests.

44-1671
Minnesota cold regions pavement test facility.
Newcomb, D.E., et al, *U.S. Army Cold Regions Research and Engineering Laboratory. Special report,* Sep. 1989, SR 89-23, Symposium on State of the Art of Pavement Response Monitoring Systems for Roads and Airfields, 1st, Hanover, NH, Mar. 6-9, 1989. Proceedings. Edited by V. Janoo and R. Eaton, p.360-369, ADA-214 957, 5 refs.
Wolters, R O., Lund, S
Pavements, Construction materials, Subgrades, Cold weather tests, Precipitation (meteorology), Freezing indexes, Roads, Cold weather operation, Concrete pavements, Climatic factors.

44-1672
Full scale pavement test international joint research.
Dumont, A.G., et al, *U.S. Army Cold Regions Research and Engineering Laboratory Special report,* Sep 1989, SR 89-23, Symposium on State of the Art of Pavement Response Monitoring Systems for Roads and Airfields, 1st, Hanover, NH, Mar 6-9, 1989 Proceedings. Edited by V Janoo and R. Eaton, p.370-375, ADA-214 957, 3 refs.
Addis, R.
Pavements, Structural analysis, Equipment, Loads (forces), Deformation, Stresses, Roads, Temperature effects, Tests, Research projects, Measuring instruments.

44-1673
Case studies in application of pavement instrumentation.
Bentsen, R.A., et al, *U.S. Army Cold Regions Research and Engineering Laboratory. Special report,* Sep. 1989, SR 89-23, Symposium on State of the Art of Pavement Response Monitoring Systems for Roads and Airfields, 1st, Hanover, NH, Mar. 6-9, 1989. Proceedings. Edited by V. Janoo and R. Eaton, p.376-384. ADA-214 957.
Bush, A.J., III.
Pavements, Measuring instruments, Dynamic loads, Deformation, Aircraft landing areas, Loads (forces), Bitumens, Airports, Damage, Tests.

44-1674
Experience of pavement instrumentation at TRRL.
Addis, R.R., *U.S. Army Cold Regions Research and Engineering Laboratory. Special report,* Sep. 1989, SR 89-23, Symposium on State of the Art of Pavement Response Monitoring Systems for Roads and Airfields, 1st, Hanover, NH, Mar 6-9, 1989 Proceedings. Edited by V. Janoo and R. Eaton, p.385-393, ADA-214 957, 8 refs.
Pavements, Measuring instruments, Loads (forces), Moisture, Subgrades, Stresses, Strains, Deformation, Thermocouples, Accuracy, Temperature effects, Tests.

44-1675
Construction of fully instrumented test pavements in North Carolina.
Stubstad, R.N., et al, *U.S. Army Cold Regions Research and Engineering Laboratory. Special report,* Sep. 1989, SR 89-23, Symposium on State of the Art of Pavement Response Monitoring Systems for Roads and Airfields, 1st, Hanover, NH, Mar. 6-9, 1989. Proceedings. Edited by V. Janoo and R. Eaton, p.394-401, ADA-214 957, 6 refs.
Khosla, N.P., Wynn, W.W.
Pavements, Measuring instruments, Loads (forces), Stresses, Strains, Construction materials, Subgrades, Dynamic loads, Moisture, Design, Thermocouples, Bitumens, Experimentation.

44-1676
Study on the determination of external forces for designing buildings at Showa Station: design frequencies of wind velocity. [Showa kichi tatemono no sekkeiyo gairyoku joken settei ni kansuru kenkyu. fusoku no saigen kitaichi],
Mitsuhashi, H., *Nihon daigaku riko gakubu gakujutsu koenkai koen ronbunshu (Nihon University College of Science and Technology. Scientific lecture meeting. Papers),* 1984, Vol.28, p.39-40, In Japanese.
Buildings, Wind factors, Wind velocity, Design criteria, Loads (forces), Antarctica—Showa Station.
Observations of wind velocity at Showa Station from 1957 to 1982 showed an average annual maximum wind velocity of 37 9 m/s with gusts of 48.7 m/s. The highest recorded maximum was 47.2 m/s with gusts of 50.2 m/s in 1975. The least squares method predicts a maximum wind velocity of 48.2 m/s and gusts of 62.3 m/s sometime within the next 50 years. It is recommended that buildings at Showa Station be able to withstand winds of 60 m/s likely to occur sometime within the next 30 years.

44-1677
Electron spin resonance imaging study of spatial distribution of paramagnetic species produced by gamma-irradiation in sulfuric acid ices.
Ohno, K , et al, *Journal of physical chemistry,* Feb. 23, 1989, 93(4), p.1657-1660, 23 refs.
Yonezawa, J., Morita, Y.
Artificial ice, Ice spectroscopy, Gamma irradiation, Ice composition, Electron paramagnetic resonance, Ice physics, Isotopes.

44-1678
Inventory of water on Mars.
Carr, M H , *Solar system research,* Oct. 1988, 22(2), p 71-80, Originally published in Astronomicheskii vestnik. 68 refs.
Mars (planet), Atmospheric composition, Ground ice, Water vapor, Planetary environments, Climatic factors, Water.

44-1679
Structural inhomogeneities of the Martian cryolithosphere.
Kuz'min, R.O., et al, *Solar system research,* Jan. 1989, 22(3), p.121-133, Translated from Astronomicheskii vestnik. 40 refs.
Bobina, N N , Zabalueva, E V , Shashkina, V P
Mars (planet), Photointerpretation, Frozen rocks, Ground ice, Permafrost thickness, Vapor diffusion, Planetary environments, Surface properties, Geocryology, Geomorphology, Extraterrestrial ice, Ice detection

44-1680
Influence of heavy fractions on low-temperature properties of diesel fuels.
Tumanian, B P , et al, *Chemistry and technology of fuels and oils,* Sep. 1989, 25(1-2), p.39-41, Translated from Khimiia i tekhnologiia topliv i masel. 7 refs.
Kolesnikov, S.I., Elagin, D.D., Gureev, A.A.
Fuel additives, Viscosity, Chemical properties, Temperature effects, Countermeasures, Low temperature research, Liquid cooling, Petroleum products.

44-1681
Eurasian snow cover and seasonal forecast of Indian summer monsoon rainfall.
Bhanu Kumar, O.S.R.U., *Hydrological sciences journal,* Oct. 1988, 33(5), p.515-525, With French summary. 23 refs.
Snow cover distribution, Snowmelt, Rain, Correlation, Precipitation (meteorology), Weather forecasting, Seasonal variations.

44-1682
Estimation of melt rate in seasonally snow-covered mountainous areas.
Moussavi, M., et al, *Hydrological sciences journal,* June 1989, 34(3), p.249-263, With French summary. 11 refs.
Wyseure, G., Feyen, J.
Runoff forecasting, Snowmelt, Mathematical models, Degree days, Periodic variations, Snow hydrology, Radiation balance, Mountains.

44-1683
Problems of snowmelt runoff modelling for a variety of physiographic and climatic conditions.
Leavesley, G.H., *Hydrological sciences journal,* Dec. 1989, 34(6), p.617-634, With French summary. Refs. p.631-634.
Snowmelt, Runoff forecasting, Simulation, Accuracy, Hydrologic cycle, Meteorological data, Models.

44-1684
Frost wedges in an eolian sand sheet near Sondre Stromfjord, W. Greenland and their paleoenvironmental implications.
Dijkmans, J.W.A., *Zeitschrift fur Geomorphologie,* Sep. 1989, 33(3), p.339-353, With German and French summaries. 31 refs.
Frost action, Eolian soils, Wedges, Patterned ground, Permafrost indicators, Polygonal topography, Geomorphology, Soil structure.

44-1685
Moscow's campaign to cut deficit jolts Soviet petroleum operations. *Oil & gas journal,* Oct. 16, 1989, 87(42), p.17-20.
Petroleum industry, Economic analysis, Natural resources.

44-1686
Chemical dynamics of N-containing ionic species in a boreal forest snowcover during the spring melt period.
Jones, H.G., et al, *Hydrological processes,* June 1987, 1(3), p.271-282, 23 refs.
Deblois, C.
Snow composition, Meltwater, Ion diffusion, Chemical analysis, Laboratory techniques, Hydrogeochemistry, Microbiology.

44-1687
Ice management: auxiliary propulsion and maneuvering system. *Canadian shipping and marine engineering,* Oct-Nov. 1988, 59(4), p.10,17.
Icebreakers, Ice control, Hydraulic jets, Ships, Design, Countermeasures.

44-1688
Study on controllability of the PPO5A hovercraft for the Antarctic. [Nankyokuyo hobakurafuto PPO5A no sojusei ni kansuru ikkosatsu],
Nojiri, T., et al, *Hikoki shinpojumu koenshu (Aircraft symposium. Lectures),* 1984, Vol.22, p.90-93, In Japanese. 3 refs.
Murao, R., Moriwaki, K.
Air cushion vehicles.
The PPO5A hovercraft for the Antarctic, built in Japan in 1980 and first tested at Showa Station in Jan. 1981, is described. Net weight: 2.8 metric tons; length: 8.1 m (7.1 m not counting the skirt), width: 4.8 m (3.8 m not counting the skirt). Directional control is by two rudders and two puff ports, one on each side in the rear. Directional stability is maintained better with both rudder and puff port control than with puff port only and turning is shorter with both than than with rudder only. An English-language diagram of the hovercraft showing top, front and side views, and graphs of directional and turning controls are included.

44-1689
Airborne gravimetry: a new tool for antarctic geophysical studies.
Brozena, J., et al, *Antarctic journal of the United States,* 1988, 23(5), p.42-44, 3 refs.
Peters, M., LaBrecque, J., Bell, R.
Gravimetric prospecting, Sea ice, Aerial surveys, Antarctica—Bellingshausen Sea, Antarctica—Weddell Sea.
Following brief explanations of the utility of gravity data for probing the earth's crust and the difficulties of stationary and shipboard surv 'port is given of three field deployments to obtain gra om airborne instrumentation The system was use., ights over the Bellingshausen and Weddell Seas ice pacl aeving data quickly and accurately in an area that w * * . almost impossible to survey by conventional me

44-1690
Ice chronology at meteorite stranding sites, Antarctica.
Fireman, E.L., *Antarctic journal of the United States,* 1988, 23(5), p.49-50, 10 refs.
Ice dating, Cosmic dust, Antarctica—Allan Hills.
The ages of dust-laden polar ice samples were measured by the uranium-series method The ages at the four Allan Hills loca-

tions shown in a figure range from 66,000 years to 300,000 years The older ice is closer to the western margin of the land barrier as expected from the ice-flow pattern The chronology of this ice field overlaps the chronologies of both the deep ice core from Vostok Station and sediment cores from the Indian Ocean. The dust particles are tephra, mainly fine volcanic glass shards, and are confined to a narrow band several centimeters wide that can extend over distances greater than 100 m The continuity of the dust bands over significant distances indicates that neighboring ice samples have the same age. The ice chronology when combined with the terrestrial ages of the meteorites gives information about the history of the ice movement. In addition to the uranium-series dating work, carbon-14 terrestrial age determinations were made on 10 antarctic meteorites in collaboration with the University of Toronto Isotrace Laboratory.

44-1691
**Seismic studies on the Siple Coast, 1987-1988.**
Bentley, C.R., et al, *Antarctic journal of the United States,* 1988, 23(5), p.54-55, 7 refs.
Anandakrishnan, S., Rooney, S.T.
Ice sheets, Subglacial observations, Sediments, Seismic reflection, Antarctica—Siple Coast.
A field program in 1987-1988, conducted at Downstream B camp and comprising active (explosive-charge-generated) and passive (natural-event) seismic studies, is reported. A sketch of seismic reflection coverage is presented, as are seismic reflection sections along the transverse- and parallel-to-flow line circled on the sketch, with interpretation of the ice bottoms, the bottom of the active till layer and forset bedding planes inked in A layout of the passive seismic array is shown

44-1692
**Electromagnetic studies on the Siple Coast, 1987-1988.**
Bentley, C R , et al, *Antarctic journal of the United States,* 1988, 23(5), p.56-58, 3 refs.
Blankenship, D.D., Moline, G.
Ice sheets, Electrical resistivity, Radar echoes, Ice bottom surface, Topographic surveys, Antarctica—Siple Coast.
Outlined is the airborne and surface-based radar sounding and electrical resistivity profiling conducted in a field program in 1987 1988 at Downstream B camp A map is presented showing the airborne radar flight coverage of the lower reaches of ice streams B and C and the grid southeastern end of Crary Ice Rise Two DNB resistivity profiles are also presented, the presence of a deep high-resistivity layer, similar to that observed at Upstream B and other locations in Antarctica, is suggested by the shape of the resistivity curves. A high degree of internal consistency in the data is reported.

44-1693
**Siple Coast firn and ice studies: conclusion and prospects.**
Alley, R B., et al, *Antarctic journal of the United States,* 1988, 23(5), p.58-59, 12 refs.
Bentley, C.R.
Ice cores, Firn stratification, Grain size, Ice density, Antarctica—Siple Coast.
The results of a completed analysis of data from two 100-m cores from Siple Coast are highlighted The findings are presented from the surface downward concerning the deposition and diagenesis of firn strata, the texture and stratification of near-surface firn, occurrence of densification in low density firn, grain size increase in ordinary glacial ice, ice deformation effects, melt events in the ridge BC core and interpretation of the temperature profile at that ridge Ongoing projects on the ridge BC core include study of oxygen isotope ratios and study of impurity distributions

44-1694
**Analysis of data from ice streams B and C.**
Whillans, I.M., *Antarctic journal of the United States,* 1988, 23(5), p.59-60, 12 refs.
Glacier thickness, Glacier flow
The research team has focused its efforts mainly on the trunks of ice streams B and C, with ancillary studies on the intervening ridges and the snow-catchment areas A major endeavor has been the determination of the mass balance of ice stream B by comparing the input from snow accumulation with discharge by ice flow. Results indicate that ice stream B and its catchment are slowly thinning. The thinning is not uniform, it is especially large and irregular near the transition from inland ice flow to streaming flow The main portion of ice stream C is nearly stagnant The interstream ridges are, in contrast, relatively steady in flow.

44-1695
**Drilling on Crary Ice Rise, Antarctica.**
Bindschadler, R.A., et al, *Antarctic journal of the United States,* 1988, 23(5), p.60-62, 5 refs.
Koci, B., Iken, A.
Ice temperature, Grounded ice, Ice dating, Ice shelves, Antarctica—Crary Ice Rise.
During the 1987 [illegible] field season, two holes were drilled through Crary Ice Rise After the holes were drilled, cables with thermistors were installed in the holes and allowed to freeze in. Freezing took only a few days after which each thermistor continued cooling to a final equilibrium temperature The temperature data is used to date the time since the ice rise grounded The premise of this technique, first applied by Lyons, Ragle, and Tamburi (1972), is that the bases of ice rises are colder than floating ice shelves An illustration of the surface elevation of Crary Ice Rise is presented. An additional, and significant achievement in drilling the holes was the unexpected recovery of a rock 5 cm long and a mud clast 4 cm long Analyses of this subglacial material are underway.

44-1696
**Hot-water drilling on the Siple Coast.**
Boller, W.L., et al, *Antarctic journal of the United States,* 1988, 23(5), p.62-63, 3 refs
Sonderup, J.M
Drilling, Thermal drills, Borehole instruments, Antarctica—Siple Coast.
Drilling is reported which focused not on the traditional electromechanical ice core drilling but rather on hot water drilling. A record number of seismic shot holes were drilled on the Siple Coast, and a unique sample of glacial till mud was retrieved from a deep access hole through the Crary Ice Rise The drill system measured hole diameter, inclination, depth of drill, water temperature inside and outside the drill, and inlet water temperature All measurements were displayed and recorded on a Compaq portable computer.

44-1697
**Modern radar for ice-sheet sounding.**
Demarest, K.R., et al, *Antarctic journal of the United States,* 1988, 23(5), p.63-64.
Raju, G., Moore, R.K.
Ice sheets, Radar echoes, Computer programs, Antarctica—Siple Coast.
A new very-high-frequency ice-sheet sounding radar has been developed at the University of Kansas and field tested at the Siple Coast Downstream B from both a sled and an aircraft The radar was designed to make full use of state-of-the-art radio frequency and digital technology Its operation is described in detail the radar is completely computer driven The field test data from the 1987 season demonstrated the successful operation of the radar The records obtained from both the ground and aircraft traverses very clearly showed the bottom echoes, and also the internal layers The "A scope" displays allowed estimates of the roughness at the ice/bedrock interface.

44-1698
**Ice-core records and ozone depletion—potential for a proxy ozone record.**
Mayewski, P.A., et al, *Antarctic journal of the United States,* 1988, 23(5), p.64-68, 31 refs.
Spencer, M J , Lyons, W B., Twickler, M S., Dibb, J
Chemical analysis, Ice cores, Atmospheric composition, Ice composition, Snow composition, Antarctica—Dominion Range.
In 1984, a detailed glaciochemical program was conducted that included collecting a 201-m core, collecting snowpit-samples, and taking surface-snow samples at a site 500 km from the South Pole, in the Dominion Range. It is proposed that measurements of nitrate and/or chloride in polar snow/ice samples may provide proxy records of ozone depletion because of the role these species play in the ozone cycle Results of examination of the general trends in the time-series of nitrate ion and chlorine ion in the snowpit/ice cores are highlighted The record discussed in this paper is considered suitable as a pilot study; it is pointed out that the South Pole provides an optimal site for a study that would firmly demonstrate and develop a proxy record of ozone depletion

44-1699
**Detailed glaciochemical investigations in southern Victoria Land, Antarctica—a proxy climate record.**
Mayewski, P A., et al, *Antarctic journal of the United States,* 1988, 23(5), p.68-69.
Twickler, M.S.
Paleoclimatology, Ice cores, Glacier surfaces, Glacier thickness, Antarctica—Newall Glacier.
Detailed ice-core records provide the resolution necessary to assess, expand, and utilize the longer, less-detailed glacial geologic records and allow to compare in detail the modern environment in Antarctica with the paleoenvironment adding significantly to the understanding of global change. For this purpose, detailed investigations in the Convoy Range and Newall Glacier were undertaken, including radio echo sounding and snow sampling for oxygen isotopes, stratigraphy, conductivity and spectroscopy. A preliminary ice thickness map was developed for the 1988-1989 study region in the upper Newall Glacier, and is included.

44-1700
**Isotopic oxygen-18 results from blue-ice areas.**
Grootes, P.M., et al, *Antarctic journal of the United States,* 1988, 23(5), p.70, 4 refs.
Stuiver, M.
Paleoclimatology, Ice cores, Ice composition, Antarctica—Transantarctic Mountains.
Measurements of the oxygen isotope abundance ratio oxygen-18/oxygen-16 were carried out in three sets of samples from blue-ice ablation areas west of the Transantarctic Mountains Samples were collected at the Reckling Moraine, the Lewis Cliff Ice Tongue and the Allan Hills. Most samples were cut out of the ice at 5-10 cm below the surface. In addition, several 1-m cores were taken. The preliminary delta O-18 data indicate that ice exposed at the surface in a blue-ice area may have originated in different areas of the ice sheet during different climates.

44-1701
**Biogenic particles in antarctic ice cores and the source of antarctic dust.**
Burckle, L.H., et al, *Antarctic journal of the United States,* 1988, 23(5), p.71-72, 10 refs.
Gayley, R.I., Ram, M., Petit, J.R.
Aerosols, Ice cores, Paleoclimatology, Algae.
To address questions on the origin of dust in antarctic ice cores, levels were sampled representing the Holocene and last glacial maximum in Dome C and Vostok cores from the central Antarctic Plateau. The intention was to examine and identify biogenic particles (mainly diatoms) in the dust and determine, if possible, their source Diatoms, although rare in Vostok and Dome C ice, were present in both the Holocene and last glacial maximum, but concentrations were greater during the last glacial maximum. Species present included *Navicula muticopsis, N shackletonii, N Mutica* var. *cohnii, N deltaica,* and *Cyclotella stellaris,* as well as *Pinnularia* sp and *Cocconeis* sp In addition to diatoms, also found were pollen grains (though their occurrence was rare), including a chenopod and a grass pollen (Graminae) which could not have had an antarctic source. It is suggested that the dust originated from the southern part of South America.

44-1702
**Eastern Weddell Sea ocean/meteorological drifters.**
Martinson, D.G., *Antarctic journal of the United States,* 1988, 23(5), p.73-74, 1 ref.
Sea ice, Ice air interface, Ice water interface, Drift stations, Antarctica—Weddell Sea.
Two Argos transmitting ocean/meteorological drifters were deployed from the FS *Polarstern* on Mar. 5, 1987 at approximately 62S 0W within approximately 2 nautical miles of one another These drifters were designed to collect time-series data revealing the seasonal evolution of the upper ocean in response to atmospheric forcing and sea-ice growth/decay. The drifter contains sensors for measuring atmospheric temperature, pressure, wind speed, and magnetic orientation of the hull The latter variable provides information related to the ice field. During ice-free periods, magnetic direction changes rapidly over 360 deg. A coherent ice cover greatly dampens the movement. Measured ocean variables include temperature, conductivity, and pressure (depth). Observations collected thus far include: the rate of mixed layer cooling and expansion, the coherency of temperature fluctuations across the entire pycnocline, possibly indicating passage of a warm core eddy through the region in one instance, and the linearity of the thermocline as it increases from the freezing point in the mixed layer to approximately 0 4 C at 155 m depth near the temperature maximum. Sample data are presented.

44-1703
**Ross Sea data buoy project, 1986-1988.**
Moritz, R E., *Antarctic journal of the United States,* 1988, 23(5), p.78-80.
Icebergs, Ocean currents, Sea ice distribution, Drift stations, Antarctica—Ross Sea.
Arrays of drifting data buoys deployed annually on the ice canopy provides the first synoptic measurements of surface air pressure, temperature, and sea-ice motion over the Ross Sea during winter. Air deployments of the buoys are carried out during June, as part of the Antarctic Midwinter Airdrop mission conducted by the U S. Air Force. Each buoy reports approximately 5 times per day. Raw measurements are transmitted by satellite data link, using the ARGOS data-collection system Buoy positions are also determined by ARGOS In 1986, the buoys reported position only. In 1987-1988, the buoys were equipped with sensitive barometers. A port in the buoy hull allows changes in surface air pressure to communicate directly with the barometer. The thermistor measures temperature within the buoy hull. In general, the measured temperature differs from the ambient air temperature, depending on snow depth, ice thickness, incident solar radiation flux, and the buoy's thermal inertia With one exception, the buoys are designed to operate for 1 year, by which time they typically reach the marginal ice zone, where they are destroyed by colliding floes Buoy 3883, deployed on iceberg B-9 in 1988, has a 3-year design life

44-1704
**Subsurface currents in the southeast Ross Sea.**
Jacobs, S., *Antarctic journal of the United States,* 1988, 23(5), p.80-81, 7 refs.
Icebergs, Ocean currents, Sea ice distribution, Antarctica—Ross Sea.
Crary (1961) reported the results of ocean current observations made through the sea ice on Kainan Bay a few dozen good measurements were obtained over 15-120-min intervals at depths of 250-300 m, mostly below the level of shelf ice near Kainan Bay The maximum recorded velocity was 35.7 cm/s, the average 12.2 cm/s and the average direction near 330 deg. In Feb. 1985, Oregon State University recovered Aanderaa current meters from a mooring site about 10 km north of the Ross Ice Shelf and 75 km northeast of Kainan Bay. Both meters on that mooring, at 255- and 540-m depths, showed prevailing currents between 310 and 350 deg. At 255 m, a mean drift toward approximately 320 deg for most of 1984 agreed remarkably well with the earlier Crary results. In Oct. 1987, a large section of the eastern Ross Ice Shelf broke away to form a 150 by 35 km iceberg, a figure shows the location of that iceberg at the time of calving, in relation to the current-meter sites.

44-1705
Fish story from the Antarctic, II.
Kellogg, T.B., et al, *Antarctic journal of the United States,* 1988, 23(5), p.82-84, 20 refs
Kellogg, D.E.
Ablation, Sea ice, Ice formation, Antarctica—McMurdo Ice Shelf.
During the course of geological investigations on the western part of the McMurdo Ice Shelf in 1978, eight live and several dead Weddell seals *(Leptonychotes weddelli)* were observed near the tide crack along the north shore of Bratina I., and their access holes to the sea were located. Rare fresh fish remains were also observed on the McMurdo Ice Shelf near the north end of Black I. adjacent to a crack or rift, but no live seals were seen although a mummified specimen was found These observations suggest at least one location for future research on isolated seal populations and bear on the origin of organic remains on the McMurdo Ice Shelf surface. Anchor ice may contribute sediment and biotic remains to the McMurdo Ice Shelf. From the ages of fossil material, it is concluded that the Shelf has not disintegrated during the Holocene. Because almost the entire western part of the Shelf consists of frozen sea water, basal freezing must be widespread, and probably occurs at a rate comparable to or greater than the surface ablation rate

44-1706
Sedimentation history of the Terra Nova Bay region, Ross Sea, Antarctica.
Krissek, L.A., *Antarctic journal of the United States,* 1988, 23(5), p.104-106, 8 refs
Polynyas, Ice cover effect, Sea ice distribution, Antarctica—Terra Nova Bay.
A suite of 41 piston cores was obtained from the western Ross Sea during the summer 1979-1980 cruise of the U.S. Coast Guard icebreaker *Glacier.* The core-top samples were examined from sub-ice and sub-polynya environments of Terra Nova Bay to identify distinctive compositional signatures for these environments. They showed that the ratio of terrigenous to biogenous (T/B) sediment components (the T/B) ratio), determined from smear slides, is a consistent indicator of polynya-vs ice-influenced environments, with high T/B ratios beneath the polynya and low T/B ratios in sub-ice settings. A subsequent study has examined downcore variations in the T/B ratio along two east-west transects which extend from the modern polynya to the ice-covered region to the east. The objective of the downcore study is to trace the position and extent of the polynya through time, thereby identifying past conditions of the katabatic windfield and past extent of the Drygalski ice tongue. The results of this study are summarized, showing that T/B downcore profiles are plotted by geographic position within the transects Cores 105, 115, 116, and 117 are located beneath the modern polynya, and T/B ratios in these cores remain high throughout the recovered intervals While the expanded polynya cannot be dated accurately, it can be estimated to have existed during the Late Quaternary, and perhaps as recently as 6,000 years ago

44-1707
Speculations on the origin of low frequency Arctic Ocean noise.
Dyer, I., NATO Advanced Research Workshop on Sea Surface Sound, Lerici, Italy, 15-19 June, 1987. Proceedings Sea Surface Sound, natural mechanisms of surface generated noise in the ocean. Edited by B.R. Kerman, NATO Advanced Science Institutes, Series C. Mathematical and Physical Sciences. Vol.238, Dordrecht, Kluwer Academic Publishers, 1988, p.513-532, 18 refs.
DLC QC242.N34 1987
Sea ice, Ice acoustics, Ice breaking, Cracking (fracturing), Acoustic measurement, Low frequencies, Noise (sound), Polar regions, Ice mechanics, Analysis (mathematics).

44-1708
Observation of the sound radiated by individual ice fracturing events.
Stein, P.J., NATO Advanced Research Workshop on Sea Surface Sound, Lerici, Italy, 15-19 June, 1987. Proceedings. Sea Surface Sound, natural mechanisms of surface generated noise in the ocean. Edited by B.R. Kerman, NATO Advanced Science Institutes, Series C. Mathematical and Physical Sciences. Vol.238, Dordrecht, Kluwer Academic Publishers, 1988, p.533-544, 3 refs.
DLC QC242.N34 1987
Floating ice, Acoustic measurement, Ice breaking, Wave propagation, Statistical analysis, Cracking (fracturing), Sound transmission, Ice water interface, Velocity measurement.

44-1709
Correlation of mid-frequency pack ice noise with environmental parameters.
Keenan, R.E., NATO Advanced Research Workshop on Sea Surface Sound, Lerici, Italy, 15-19 June, 1987. Proceedings. Sea Surface Sound, natural mechanisms of surface generated noise in the ocean. Edited by B.R. Kerman, NATO Advanced Science Institutes, Series C. Mathematical and Physical Sciences. Vol.238, Dordrecht, Kluwer Academic Publishers, 1988, p 545-554, 7 refs.
DLC QC242.N34 1987
Sea ice, Acoustic measurement, Ice air interface, Ice breaking, Periodic variations, Correlation, Pressure ridges, Noise (sound), Polar regions, Meteorological factors, Arctic Ocean.

44-1710
High frequency ambient sound in the Arctic.
Farmer, D.M., et al, NATO Advanced Research Workshop on Sea Surface Sound, Lerici, Italy, 15-19 June, 1987. Proceedings. Sea Surface Sound; natural mechanisms of surface generated noise in the ocean. Edited by B.R. Kerman, NATO Advanced Science Institutes, Series C. Mathematical and Physical Sciences. Vol.238, Dordrecht, Kluwer Academic Publishers, 1988, p.555-563, 7 refs.
Waddell, S.R.
DLC QC242.N34 1987
Sea ice, Seasonal variations, Acoustic measurement, Ice breaking, Polar regions, Ice acoustics, Thermal stresses, Noise (sound), Remote sensing, Canada—Amundsen Gulf.

44-1711
Arctic Ocean noise generation due to pack ice kinematics and heat fluxes.
Lewis, J.K., et al, NATO Advanced Research Workshop on Sea Surface Sound, Lerici, Italy, 15-19 June, 1987. Proceedings. Sea Surface Sound; natural mechanisms of surface generated noise in the ocean. Edited by B.R. Kerman, NATO Advanced Science Institutes, Series C. Mathematical and Physical Sciences. Vol.238, Dordrecht, Kluwer Academic Publishers, 1988, p.565-581, 16 refs.
Denner, W.W.
DLC QC242.N34 1987
Sea ice, Noise (sound), Ice heat flux, Acoustic measurement, Subglacial observations, Cracking (fracturing), Ice acoustics, Seasonal variations, Thermal stresses, Ice mechanics, Polar regions, Arctic Ocean.

44-1712
Acoustic ambient noise in the Arctic Ocean below the marginal ice zone.
Buckingham, M.J., et al, NATO Advanced Research Workshop on Sea Surface Sound, Lerici, Italy, 15-19 June, 1987. Proceedings. Sea Surface Sound; natural mechanisms of surface generated noise in the ocean. Edited by B.R. Kerman, NATO Advanced Science Institutes, Series C. Mathematical and Physical Sciences Vol 238, Dordrecht, Kluwer Academic Publishers, 1988, p.583-598, 8 refs.
Chen, C.F.
DLC QC242.N34 1987
Sea ice, Ice edge, Subglacial observations, Acoustic measurement, Ice breaking, Spectra, Mathematical models, Sound transmission, Ice floes, Ice mechanics, Fram Strait.

44-1713
Ice eddy ambient noise.
Johannessen, O.M., et al, NATO Advanced Research Workshop on Sea Surface Sound, Lerici, Italy, 15-19 June, 1987. Proceedings. Sea Surface Sound, natural mechanisms of surface generated noise in the ocean. Edited by B.R. Kerman, NATO Advanced Science Institutes, Series C. Mathematical and Physical Sciences. Vol.238, Dordrecht, Kluwer Academic Publishers, 1988, p.599-605, 10 refs.
Payne, S.G., Starke, K.V., Gotthardt, G.A., Dyer, I.
DLC QC242.N34 1987
Sea ice, Ice acoustics, Ice floes, Ice edge, Ocean currents, Acoustic measurement, Ice water interface, Polar regions, Climatic factors, Ice surveys

44-1714
Reduced rise in sea level.
Meier, M.F., *Nature,* Jan. 11, 1990, 343(6254), p.115-116.
Sea level, Ice melting, Ground water.
A brief commentary provides a summary of participants' current views on changes in sea level as expressed during a symposium convened by the American Geophysical Union in San Francisco on Dec. 6, 1989. Three processes are the principal causes of sea level changes: changes in ice masses on land, changes in ocean water temperature, and changes in liquid water stored on land in reservoirs or in groundwater aquifers. These topics were addressed and comments by various presenters are identified and assessed. The great ice sheets of Greenland and Antarctica are presently increasing and the processes which would tend to melt them also produce the meteorological conditions in which more snow will fall on those sheets, while temperatures will be such that meltwater which does form will re-freeze before it reaches the sea. The consensus was that it is unlikely that sea level will rise 1 m by 2050, it was also noted, however, that a rise of 30 m could create social and economic problems in low lying areas.

44-1715
Atomic icebreaker *Taimyr. Soviet shipping,* 1989, 9(2), p.12-15.
Icebreakers, Nuclear power, Design.

44-1716
Polar hydrography in the USSR.
Burkov, G., et al, *Soviet shipping,* 1989, 9(2), p.34-37.
Eliseev, B.
Hydrography, Polar regions, History, Navigation.

44-1717
Distribution of the phase front in the freezing of finely-dispersed soils.
Bronfenbrener, L.E., et al, *Journal of engineering physics,* May 1989 (Pub. Nov. 89), 56(5), p.575-579, 8 refs. Translated from Inzhenerno-fizicheskiĭ zhurnal.
IArin, L.P.
Soil freezing, Frozen ground physics, Moisture transfer, Active layer, Analysis (mathematics), Unfrozen water content, Mathematical models.

44-1718
Ice regime of rivers in the USSR. [Ledovyĭ rezhim rek SSSR],
Donchenko, R.V., Leningrad, Gidrometeoizdat, 1987, 246p., In Russian. 222 refs.
Rivers, River ice, Ice cover thickness, Ice breakup, Ice formation, Ice jams, Ice dams, Runoff, Analysis (mathematics).

44-1719
Interrelations of forest and swamp in a taiga zone. [Vzaimootnoshenia lesa i bolota v taezhnoĭ zone],
Glebov, F.Z., Novosibirsk, Nauka, 1988, 182p., In Russian. Refs p 169-182.
DLC QK374.G54 1988
Taiga, Classifications, Swamps, Ecosystems, Forest land, Frozen ground temperature, Models, Ground thawing, Thermal regime.

44-1720
Nearshore and coastal circulation in the northeastern Chukchi Sea. Final report.
Hachmeister, L.E., et al, Outer Continental Shelf Environmental Assessment Program. Final report of principal investigators, vol.57, Anchorage, AK, Alaska Outer Continental Shelf Office, Ocean Assessments Division, July 1985, p.1-104. PB89-123624.
Vinelli, J.B.
Ocean currents, Sea ice, Ice cover effect, Oceanographic surveys, Chukchi Sea.

44-1721
General equations for the motions of ice crystals and water drops in gravitational and electric fields.
Nisbet, J.S., *U.S. National Aeronautics and Space Administration. Contractor report,* 1988, NASA-CR-183229, 63p., N88-30070, For another source see 43-2902.
Cloud physics, Cloud droplets, Ice crystals, Precipitation (meteorology), Drops (liquids), Mathematical models, Velocity measurement.

44-1722
Definition of research needs to address airport pavement distress in cold regions.
Vinson, T.S., et al, *U.S. Army Cold Regions Research and Engineering Laboratory,* May 1989, CR 89-10, 142p., ADA-212 238, 17 refs.
Berg, R.L., Zomerman, I., Haas, W.M.
Runways, Pavements, Frost action, Damage, Airports, Cracks.
In early fall 1984, a questionnaire was sent to over 325 general aviation airports in cold regions The results from over 200 responses were compiled and evaluated and over 20 airport managers were contacted for additional details. Site visits were made to 36 airports to obtain additional information. The most common pavement problems identified in the study were associated with non-traffic-related phenomena and include 1) pre-existing cracks reflecting through asphalt concrete overlays (in two years or less), 2) thermal cracking, and 3) longitudinal cracking (at a construction joint). Most of the airports experienced 1) water pumping up through cracks and joints in the pavements during spring thaw, or 2) additional roughness due to differential frost heave in the winter, or both problems. Many airport managers reported that debris was generated at cracks during the winter and spring. Many pavement problems can be traced to the evolutionary history of general aviation airports and the lack of consideration for site drainage. Based on the recognition of these problems, several future research programs are identified.

44-1723
Model tests in ice of a Canadian Coast Guard R class icebreaker: high friction model.
Tatinclaux, J C , et al, *U S Army Cold Regions Research and Engineering Laboratory*, July 1989, SR 89-25, 41p , ADA-212 898, 8 refs
Martinson, C.R
Icebreakers, Ice navigation, Metal ice friction, Test chambers, Ice models, Ice friction.
This report presents the results of resistance and propulsion tests in level ice of a roughened 1 20 scale model of the Canadian Coast Guard R-class icebreaker The test conditions were the same as those previously reported for the smooth model The present test results and those with the smooth model are compared, as are the results obtained at all facilities participating in the comparative study proposed by the Committee on Performance of Ships in Ice Covered Waters of the International Towing Tank Conference

44-1724
Porosity influence on the strength and elasticity of first-year sea ice. Final report June-Sep. 1986.
Brown, J H., *U S Naval Ocean Systems Center Report*, July 1987, NOSC-TD-1109, 18p ADA-184 493
Sea ice, Ice strength, Ice elasticity, Ice models, Ice physics, Brines, Ice plasticity, Porosity, Viscoelasticity.

44-1725
Laboratory and wind tunnel evaluations of the Rosemount Icing Detector.
Baumgardner, D., et al, *Journal of atmospheric and oceanic technology*, Dec. 1989, 6(6), p.971-979, 10 refs.
Rodi, A.
Ice detection, Measuring instruments.

44-1726
Highly frost-resistant cement concretes. (Tsementnye betony vysokoĭ morozostoĭkosti),
Shelkin, A.E., et al, Leningrad, Strolizdat, 1989, 127p., In Russian. 67 refs.
Dobshits, L.M.
Cements, Concretes, Frost resistance

44-1727
Features of mine shaft-borehole thermo-prospecting in perennially frozen rocks (Osobennosti shakhtno-skvazhinnoĭ termorazvedki v mnogoletnemerzlykh gornykh porodakh),
Maslennikov, A.L , *Izvestiia vysshikh uchebnykh zavedeniĭ. Geologiia i razvedka*, May 1989, No.5, p.110-114, In Russian. 6 refs
Borehole instruments, Frozen rock temperature, Mine shafts, Thermal regime, Temperature measurement, Exploration, Mathematical models

44-1728
Methods and instruments for measuring the thermophysical properties of (frozen) soil.
Zaltsev, V.S., *Soviet journal of applied physics*, Jan -Feb 1987, 1(1), p 165-169, 7 refs For Russian original see 41-4466
Frozen ground temperature, Frozen fines, Sands, Clays, Peat, Measuring instruments, Thermal conductivity.

44-1729
Prediction of the effect of a flare on permafrost.
Rubtsov, N.A., et al, *Soviet journal of applied physics*, Mar.-Apr. 1987, 1(2), p.33-37, 3 refs. For Russian original see 42-36.
Danielian, IU.S., Gamarnik, V.B., Varichenko, S.A.
Petroleum industry, Gas wells, Oil wells, Continuous permafrost, Natural gas.

44-1730
Promising avenues of research on machines and structures suitable for operation in cold regions.
Larionov, V P., *Soviet journal of applied physics*, Nov.-Dec. 1987, 1(6), p.139-150, 12 refs. Translated from Akademiia nauk SSSR. Sibirskoe otdelenie. Izvestiia. Seriia tekhnicheskikh nauk.
Research projects, Cold weather operation, Cold weather performance, Machinery, Structures, Welding, Bearing strength

44-1731
Effects of forests on snow reserves and snow melting in the middle taiga of the European North.
Rubtsov, M.V., et al, *Soviet forest sciences*, 1986, No.1, p.8-13, 5 refs. For Russian original see 41-2598.
Deriugin, A A , Gurtsev, V I
Taiga, Forest canopy Snow retention, Snow depth, Snow water equivalent, Snow melting.

44-1732
Correlation of Freundlich *Kd* and *n* retention parameters with soils and elements.
Buchter, B., et al, *Soil science*, Nov. 1989, 148(5), MP 2570, p.370-379, 22 refs.
Davidoff, B., Amacher, M.C , Hinz, C., Iskandar, I.K., Selim, H.M.
Soil chemistry, Soil pollution, Soil composition, Water pollution, Ions, Analysis (mathematics).
We studied the retention of 15 elements by 11 soils from 10 soil orders to determine the effects of element and soil properties on the magnitude of the Freundlich parameters *Kd* and *n* The magnitude of *Kd* and *n* was related to both soil and element properties. Strongly retained elements, such as Cu, Hg, Pb, V, and P had the highest *Kd* values The transition metal cations Co and Ni had similar *Kd* and *n* values, as did the group IIB elements Zn and Cd Oxyanion species tended to have lower *n* values than did cation species. Soil pH and CEC were significantly correlated with log *Kd* values for cation species. High pH and high CEC soils retained greater quantities of the cation species than did low pH and low CEC soils A significant negative correlation between soil pH and the Freundlich parameter *n* was observed for cation species, whereas a significant positive correlation between soil pH and *n* for Cr(VI) was found Greater quantities of anion species were retained by soils with high amounts of amorphous iron oxides, aluminum oxides, and amorphous material than were retained by soils with low amounts of these minerals. Several anion species were not retained by high pH soils. Despite the facts that element retention by soils is the result of many interacting processes and that many factors influence retention, significant relationships among retention parameters and soil and element properties exist even among soils with greatly different characteristics

44-1733
Pleistocene evolution: Northern Hemisphere ice sheets and North Atlantic Ocean.
Ruddiman, W.F., et al, *Paleoceanography*, Aug. 1989, 4(4), p.353-412, 52 refs.
Raymo, M.E., Martinson, D.G., Clement, B.M., Backman, J.
Ice sheets, Drill core analysis, Paleoclimatology, Ice volume.

44-1734
Late Pliocene variation in Northern Hemisphere ice sheets and North Atlantic deep water circulation.
Raymo, M.E., et al, *Paleoceanography*, Aug. 1989, 4(4), p 413-446, 72 refs.
Ruddiman, W.F., Backman, J., Clement, B.M., Martinson, D.G.
Ice sheets, Ocean currents, Paleoclimatology, Drill core analysis, Chemical analysis.

44-1735
Simple ice-ocean model for the Greenland Sea.
Wood, R G , et al, *Journal of physical oceanography*, Dec. 1989, 19(12), p.1865-1880, 32 refs.
Mysak, L.A.
Sea ice, Ocean currents, Water temperature, Wind (meteorology), Models, Greenland Sea.

44-1736
Fracture of concrete at cryogenic temperatures.
Elices, M., et al, International Conference on Fracture of Concrete and Rock, Houston, TX, June 7-9, 1987. Edited by S.P. Shah and S.E. Swartz, New York, Springer, 1989, p 106-116, 2 refs.
Planas, J., Maturana, P.
DLC TA440.S4576 1987
Concrete strength, Fracturing, Strain tests, Tensile properties, Low temperature tests, Physical properties, Cooling rate.

44-1737
Sagebrush rangeland hydrology and evaluation of the SPUR hydrology model.
Wilcox, B.P., et al, *Water resources bulletin*, June 1989, 25(3), p.653-666, 34 refs.
Hanson, C.L., Wight, J.R., Blackburn, W.H.
Snowmelt, Runoff forecasting, Environment simulation, Watersheds, Hydrologic cycle, Precipitation (meteorology), Accuracy.

44-1738
Thermal and durability considerations for composite steel/concrete sandwich structures.
Gerwick, B.C., Jr , et al, Conference on Performance of Concrete in Marine Environment, 2nd, St Andrews by-the-Sea, Canada, Aug. 1988. Proceedings. Edited by E.M Malhotra, Detroit, American Concrete Institute, 1988, p.73-83, 2 refs.
Berner, D.
DLC TA440.C624 1988
Walls, Reinforced concretes, Concrete durability, Thermal stresses, Ice loads, Ice solid interface, Concrete structures, Offshore structures, Structural analysis.

44-1739
Development of a test method to determine the resistance of concrete to ice abrasion and/or impact.
Nawwar, A.M., et al, Conference on Performance of Concrete in Marine Environment, 2nd, St. Andrews by-the-Sea, Canada, Aug. 1988. Proceedings, Edited by E.M. Malhotra, Detroit, American Concrete Institute, 1988, p.401-426, 1 ref.
Malhotra, V.M.
DLC TA440.C624 1988
Concrete durability, Impact tests, Ice scoring, Surface properties, Abrasion, Ice solid interface, Mechanical tests, Laboratory techniques.

44-1740
Resistance of concrete to ice abrasion—a review.
Hoff, G.C., Conference on Performance of Concrete in Marine Environment, 2nd, St. Andrews by-the-Sea, Canada, Aug 1988 Proceedings. Edited by E.M. Malhotra, Detroit, American Concrete Institute, 1988, p.427-455, 16 refs.
DLC TA440.C624 1988
Concrete durability, Impact strength, Ice loads, Ice scoring, Ice solid interface, Concrete structures, Abrasion, Mechanical tests, Lightweight concretes.

44-1741
*In-situ* measurement of elastic properties of sea ice.
Brooke, G.H., et al, Nato ASI series, E. Vol.161, NATO Advanced Study Institute on Underwater Acoustic Data Processing, Ontario, Canada, July 8-29, 1988. Proceedings. Edited by Y.T. Chan, Dordrecht, Kluwer Academic Publishers, 1989, p.113-118, Includes discussion. 6 refs.
Ozard, J.M.
DLC QC242.2.N37 1989
Sea ice, Elastic properties, Seismic velocity, Wave propagation, Impact tests, Ice elasticity, Surface roughness, Shear properties.

44-1742
Propagation of seismic and acoustic waves in horizontally stratified media with stochastically rough interfaces.
Schmidt, H., ICA Associated Symposium on Underwater Acoustics, 12th, Halifax, Nova Scotia, Canada, July 6-8, 1986. Proceedings. Progress in underwater acoustics. Edited by H.M. Merklinger, New York, Plenum, 1987, p.473-483, 10 refs.
DLC QC242.S96 1986
Floating ice, Acoustic measurement, Wave propagation, Scattering, Shear properties, Ice water interface, Mathematical models, Sound waves, Surface roughness.

44-1743
Acoustic measurements and applications of kinetic impacts on ice.
De Heering, P , ICA Associated Symposium on Underwater Acoustics, 12th, Halifax, Nova Scotia, Canada, July 6-8, 1986 Proceedings Progress in underwater acoustics Edited by H M Merklinger, New York, Plenum, 1987, p 611-617, 5 refs.
DLC QC242.S96 1986
Acoustic measurement, Floating ice, Impact tests, Subglacial observations, Projectile penetration, Wave propagation, Mechanical tests, Sounding

44-1744
Low frequency attenuation in the Arctic Ocean.
DiNapoli, F R , et al, Symposium on Ocean Seismo-Acoustics, La Spezia, Italy, June 10-14, 1985. Proceedings. Edited by T. Akal and J.M. Berkson, New York, Plenum, 1986, p.387-395, 11 refs.
Mellen, R.H.
DLC QC242.O24 1986
Attenuation, Subglacial observations, Wave propagation, Scattering, Underwater acoustics, Low frequencies, Sound waves, Ice water interface, Mathematical models.

44-1745
Propagator matrix for acoustic wave propagation through anisotropic porous media.
Yamamoto, T., et al, Symposium on Ocean Seismo-Acoustics, La Spezia, Italy, June 10-14, 1985. Proceedings. Edited by T. Akal and J.M. Berkson, New York, Plenum, 1986, p.463-472, 12 refs.
Badiey, M.
DLC QC242.O24 1986
Underwater acoustics, Wave propagation, Sea ice, Anisotropy, Ice water interface, Sound waves, Analysis (mathematics), Ocean bottom.

44-1746
Volcanic ash layers in blue ice fields (Beardmore Glacier area, Antarctica): iridium enrichments.
Koeberl, C., Global catastrophes in earth history: an interdisciplinary conference on impacts, volcanism, and mass mortality. Abstracts, Houston, TX, Lunar and Planetary Institute, (1988), p.93-94. N89-21340.
Ice cores, Drill core analysis, Volcanic ash, Geochronology, Isotope analysis
Dust bands on blue ice fields in Antarctica have been studied and identified to originate from two main sources bedrock debris scraped up from the ground by the glacial movement (these bands are found predominantly at fractures and shear zones in the ice near moraines), and volcanic debris deposited on and incorporated in the ice by large-scale eruptions of antarctic (or sub-antarctic) volcanoes During a recent field expedition samples of several dust bands found on blue ice fields at the Lewis Cliff Ice Tongue were taken. These dust band samples were divided for age determination using the uranium series method, and chemical investigations were done to determine the source and origin of the dust bands The investigations have shown that most of the dust bands found at the Ice Tongue are of volcanic origin and, for chemical and petrological reasons, may be correlated with Cenozoic volcanoes in the Melbourne volcanic province, Northern Victoria Land, which is at least 1500 km away. Major and trace element data have been obtained and used for identification and correlation purposes Recently, some additional trace elements were determined in some of the dust band samples, including Ir Iridium determinations were made using INAA, with synthetical and natural (meteorite) standards. These findings are discussed. (Auth. mod.)

44-1747
Search for the Tunguska event in the antarctic snow.
Rocchia, R., et al, Global catastrophes in earth history: an interdisciplinary conference on impacts, volcanism, and mass mortality. Abstracts, Houston, TX, Lunar and Planetary Institute, (1988), p.156-157. N89-21378.
DeAngelis, M., Boclet, D., Bonté, P., Jéhanno, C., Robin, E.
Ice cores, Drill core analysis, Cosmic dust, Geochronology.
The Tunguska explosion in 1908 is supposed to have been produced by the impact of a small celestial body The absence of any identifiable crater together with the huge energy released by the event suggest that the impactor exploded in mid-air and that its material was widely spread over the earth. Samples were chosen in a core electromechanically drilled in 1984 near South Pole Station The iridium infall averaged over 45 samples is given. No significant systematic increase above the average level is observed in the part of the core corresponding to the Tunguska event The presence of Tunguska explosion debris in the antarctic snow is not confirmed. (Auth. mod.)

44-1748
Radar observations of snowfalls in 1985 over the Shinjo basin—vertical scanning.
Uyeda, H., et al, *Hokkaido University. Faculty of Science. Journal. Series 7 Geophysics*, Feb. 1987, 8(2), p.121-130, 11 refs.
Yagi, T.
Snowfall, Radar echoes, Weather observations, Velocity measurement, Wind factors.

44-1749
Temperature drops produced by microbursts from snow clouds in the winter monsoon season in Hokkaido, Japan.
Shirooka, R., et al, *Hokkaido University. Faculty of Science. Journal. Series 7 Geophysics*, Feb. 1989, 8(4), p.367-380, 10 refs.
Uyeda, H., Kikuchi, K.
Snowstorms, Wind factors, Air temperature, Radar echoes, Weather observations, Wind (meteorology)

44-1750
Climate change: high latitude regions.
Roots, E.F., *Climate change*, Oct. 1989, 15(1-2), p.223-253, Refs. p.249-253.
Climatic changes, Environmental impact, Human factors, Snow cover effect, Ice cover, Permafrost.
The distinctive physical setting of high latitude regions results not only in enhanced change in mean surface temperature for a given perturbation of planetary heat balance, but an enhanced regional and seasonal environmental response due to non-uniformity in poleward heat flux, and to the energy relationships of phase change and albedo change connected with ice and snow cover. The environmental response of the Arctic is characteristically different from that of the Antarctic because of differences in planetary geography and energy circulation Ecosystems that have adapted to the low natural energy flows of high latitudes are relatively more sensitive to a given change in magnitude and timing of available energy, and to changes in physical and geochemical conditions, than most of those in lower latitudes. These natural sensitivities have a profound influence on human activities in polar areas Careful research to understand the environmental response to climate change is essential as arctic and antarctic regions assume a greater importance in world affairs. (Auth. mod.)

44-1751
Geocryology of the USSR: mountain regions of southern USSR. (Geokriologiia SSSR: gornye strany iuga SSSR),
Ershov, E.D., ed, Moscow, Nedra, 1989, 359p., In Russian. 95 refs.
Geocryology, Permafrost, Seasonal freeze thaw.

44-1752
Transport organizatioa during the extended navigation period. (Organizatsiia perevozok v period prodleniia navigatsii),
Atlas, B.A., et al, Moscow, Transport, 1989. 125p., In Russian. 26 refs.
Morozov, A.I., Nazarov, N.N., Tinkel'man, I.A.
Icebreakers, Ice navigation, Marine transportation, Statistical analysis.

44-1753
Forecasting the structural characteristics of soils. (Prognozirovanie stroitel'nykh svoĭstv gruntov),
Busel, I.L., Minsk, Nauka i Tekhnika, 1989, 245p, In Russian. 177 refs.
Forecasting, Soil surveys, Soil structure, Glacial deposits, Statistical analysis, Analysis (mathematics).

44-1754
Intensive concrete technology. (Intensivnaia tekhnologiia betonov),
Solomatov, V.I., et al, Moscow, Stroĭizdat, 1989, 261p, In Russian with English summary and table of contents. 136 refs.
Takhirov, M.K., Shakh, T.M.
Concretes, Frost resistance, Concrete admixtures, Waterproofing.

44-1755
Physical-chemical modeling of sedimentation processes during the transition stage from interglacial to glacial conditions. (Fiziko-khimicheskoe modelirovanie protsessov osadkonakopleniia pri perekhode ot mezhlednikovykh uslovĭ k lednikovym),
Melnichuk, V.I., *Akademiia nauk SSSR. Izvestiia. Seriia geologicheskaia*, Oct. 1989, No.10, p.108-114, In Russian. 27 refs.
Sedimentation, Paleoclimatology, Mathematical models, Carbon dioxide.

44-1756
Gas hydrate formation as a special type of oceanic cryolithogenesis. (Gazogidratoobrazovanie kak osobyĭ tip kriolitogeneza v okeane),
Solov'ev, V.A., et al, *Akademiia nauk SSSR Izvestiia. Seriia geologicheskaia*, Oct. 1989, No.10, p.115-120, In Russian. 18 refs.
Ginsburg, G.D.
Hydrates, Geocryology, Natural gas, Ocean bottom, Bottom sediment.

44-1757
Numerical simulation of glacial periods. (Chislennaia imitatsiia lednikovykh periodov),
Verbitskiĭ, M.IA., et al, *Akademiia nauk SSSR. Doklady*, 1989, 308(6), p.1336-1341, In Russian. 15 refs.
Chalikov, D.V.
Paleoclimatology, Glaciation, Mathematical models, Simulation

44-1758
Total ozone content variability in the north polar area based on data from the expedition aboard the nuclear icebreaker *Sibir'* (May-June 1987). (Izmenchivost' obshchego soderzhaniia ozona v severnom okolopolusnom prostranstve po dannym ekspeditsii na atomnom ledokole "Sibir'" (mai-iiun' 1987g.)),
Nagurnyĭ, A.P., et al, *Akademiia nauk SSSR. Doklady*, 1989, 308(5), p.1099-1103, In Russian. 4 refs.
Shirochkov, A.V.
Polar atmospheres, Atmospheric composition, Expeditions, Icebreakers.

44-1759
Development and design of sludge freezing beds.
Martel, C.J., *Journal of environmental engineering*, Aug. 1989, 115(4), MP 2556, p.799-808, 22 refs. For another version see 43-4597
Sludges, Waste treatment, Design, Structures, Seasonal freeze thaw, Cold weather operations, Moisture transfer, Temperature effects, Analysis (mathematics).
A new unit operation called a sludge freezing bed is proposed for dewatering sludges produced by treatment facilities in cold regions. This unit operation uses natural freeze-thaw to condition the sludge for dewatering. It can dewater all types of aqueous sludges up to a depth of 2.0 m Basic construction details are identified, and procedures for operating the bed are discussed. Equations for predicting the design depth are presented along with an example of how they can be used. Convection was found to be the controlling heat transfer mechanism during freezing. Solar radiation, ambient air temperature, and the thermal conductivity of the settled sludge layer over the frozen sludge are important parameters controlling the thawing rate. Data from various sludge freezing operations indicate that the design equations are valid

44-1760
Analytical models of local concrete-steel bond at low temperature.
Huang, X.P., et al, *Journal of cold regions engineering*, Dec. 1989, 3(4), p.159-171, 7 refs.
Chang, K.C., Shih, T.S., Lee, G.C.
Reinforced concretes, Mechanical tests, Concrete strength, Compressive properties, Temperature effects, Low temperature tests, Dynamic loads, Analysis (mathematics), Concrete structures.

44-1761
Cold regions engineering research—strategic plan.
Carlson, R.F., et al, *Journal of cold regions engineering*, Dec. 1989, 3(4), MP 2571, p.172-190, 4 refs.
Zarling, J.P., Link, L.E.
Research projects, Engineering.
The Arctic and cold regions of the United States present many unique and difficult engineering problems that demand a coordinated fundamental research program As a response to the Arctic Research and Policy Act, the National Science Board commissioned a study (the Colwell Report) that examined the role of the National Science Foundation (NSF) in polar regions. The report's recommendation 14 called for the conduct of basic engineering research in polar regions and suggested it be a specifically targeted research component within the Engineering Directorate of NSF The report presents the type of fundamental research programs that would aid in the solution of long-term cold regions engineering problems. Over 40 participants in a 2-1/2-day period suggested 14 research programs within four broad groupings—offshore technology, watersheds, rivers, and coastal zones, facilities infrastructure technology, and transportation infrastructure technology.

44-1762
CO modeling in Alaska.
Johnson, R.A., et al, *Journal of cold regions engineering*, Dec. 1989, 3(4), p.191-207, 26 refs.
Anderson, A.M., Lilly, E.K.
Atmospheric composition, Air pollution, Temperature inversions, Environmental impact, Ice fog, Motor vehicles, Environment simulation, Temperature effects, United States—Alaska—Anchorage.

44-1763
Characterization of snowmelt from a dump site. (Caractérisation des eaux de fonte d'un dépôt à neiges usées),
Pinard, D., et al, *Sciences et techniques de l'eau*, Aug. 1989, 22(3), p.211-215, In French with English summary. 12 refs.
Sérodes, J.P., Côté, P.A.
Snow disposal, Snowmelt, Snow impurities, Soil pollution, Chemical analysis, Snow composition, Environmental tests.

44-1764
Patterned ground.
Krantz, W.B., et al, *Scientific American*, Dec 1988, 259(6), p.68-76, 3 refs.
Gleason, K.J., Caine, N.
Patterned ground, Ground freezing, Soil freezing, Polygonal topography, Convection, Frost action, Geologic processes, Geomorphology.

44-1765
Five faces of freezing.
Bohren, C.F., *Weatherwise*, Dec. 1989, 42(6), p.315-319, Includes photographs.
Ice formation, Hoarfrost, Surface properties.

44-1766
Geography and military confrontation in the North.
Östreng, W., *International challenges*, 1989, 9(4), p.11-15, 1 ref.
Military operation, Geography.

44-1767
Threats to the Arctic environment.
Stokke, O.S., *International challenges*, 1989, 9(4), p.21-27, 1 ref.
Air pollution, Ecology, Ocean environments, Countermeasures, Environmental impact.

44-1768
Early environment and its evolution on Mars: implications for life.
McKay, C.P., et al, *Reviews of geophysics*, May 1989, 27(2), p.189-214, Refs. p.210-214.
Stoker, C.R.
Mars (planet), Water transport, Ground ice Atmospheric composition, Planetary environments, Hydrologic cycle, Water erosion, Theories.

44-1769
Role of seawater freezing in the formation of subsurface brines.
Herut, B., et al, *Geochimica et cosmochimica acta*, Jan. 1990, 54(1), p.13-21, 49 refs.
Starinsky, A., Katz, A., Bein, A.
Sea water freezing, Brines, Ground water, Subsurface drainage, Chemical composition, Artificial freezing, Evaporation, Liquid solid interfaces, Spectroscopy, Geologic processes.

44-1770
Influence of vessel movements on stability of restricted channels.
Hochstein, A.B., et al, *Journal of waterway, port, coastal, and ocean engineering*, July 1989, 115(4), p.444-465, 18 refs
Adams, C E., Jr
Ice navigation, River ice, Channel stabilization, Ice mechanics, Ships, Mathematical models.

44-1771
Unconventional power sources for ice control at locks and dams.
Nakato, T., et al, *Journal of cold regions engineering*, Sep. 1989, 3(3), MP 2572, p.107-126, 15 refs.
Ettema, R., Ashton, G.D.
Dams, Locks (waterways), Ice control, Electric power, Ice prevention, Ice removal, Ice growth, Analysis (mathematics).
Assessed herein are the feasibilities of using several unconventional power sources for ice control in navigation locks and dams. Included in this assessment are sensible heat from groundwater, solar power, wind power and portable hydroelectric-power sources. Operation of lock and dam installations is made troublesome and risky by ice growth along lock walls and by freezing of gates to ice covers. Considerable amounts of power are required for force ice control, and therefore, lock operators are interested in utilizing economical alternative power sources other than that generated by commercial power utilities. However, the present study concludes that of all unconventional power sources, portable hydroelectric-power is the most viable. Groundwater is at best of marginal viability and solar and wind power sources are unreliable.

44-1772
Note on new ice gouge events in Alaskan Beaufort Sea.
Machemehl, J.L., et al, *Journal of cold regions engineering*, Sep. 1989, 3(3), p.145-149, 3 refs.
Jo, C.H.
Ice scoring, Oceanographic surveys, Site surveys, Beaufort Sea.

44-1773
Note on nearshore ice gouge depths in Alaskan Beaufort Sea.
Machemehl, J.L., et al, *Journal of cold regions engineering*, Sep. 1989, 3(3), p.150-153, 1 ref.
Jo, C.H.
Ice scoring, Oceanographic surveys, Site surveys, Beaufort Sea.

44-1774
Statistical and theoretical analyses for icicle formation domain on tunnel.
Okada, K., *Railway Technical Reserch Institute, Tokyo. Quarterly reports*, Feb. 1988, 29(1), p.1-8, 6 refs.
Railroad tunnels, Ice formation, Icing, Ice prevention, Ice forecasting, Mathematical models, Statistical analysis.

44-1775
Optimization of heat insulator in adiabatic double lining for icicle prevention of tunnel.
Okada, K., *Railway Technical Research Institute, Tokyo Quarterly reports*, Feb. 1988, 29(1), p.9-15, 9 refs.
Railroad tunnels, Ice prevention, Thermal insulation, Ice formation, Icing, Linings, Mathematical models.

44-1776
Snow physics, avalanches, mudflows. [Fizika snega, laviny, selj.
Bolov, V.R., ed. *Nal'chik Vysokogornyĭ geofizicheskiĭ institut. Trudy*, 1989, Vol.78, 107p., In Russian.
For selected papers see 44-1777 through 44-1784.
Avalanche formation, Avalanche forecasting, Snow cover distribution, Snow depth, Snow density, Snow cover stability, Glaciation, Slope protection, Analysis (mathematics), Statistical analysis.

44-1777
Avalanches and avalanche-prone regions in Chechen-Ingush ASSR. [Laviny i lavinoopasnye raiony Checheno-Ingushskoĭ ASSR],
Kozhaev, D.A., *Nal'chik. Vysokogornyĭ geofizicheskiĭ institut. Trudy*, 1989, Vol.78, p.3-10, In Russian. 4 refs
Avalanche formation, Avalanche forecasting.

44-1778
Characteristics of correlational relationships between multiyear monthly totals of solid precipitation during the cold period of the year for high altitude zones in the Elbrus Mountain region. [Ob osobennostiakh korreliatsionnykh sviazeĭ mezhdu mnogoletnimi mesiachnymi summami tverdykh osadkov za kholodnyĭ period goda dlia vysotnykh zon Priel'brus ia],
Samukashvili, R.D., *Nal'chik. Vysokogornyĭ geofizicheskiĭ institut. Trudy*, 1989, Vol.78, p.10-19, In Russian. 2 refs.
Snow cover distribution, Snow depth, Statistical analysis.

44-1779
Regularities of space-time distribution of air temperature during the cold period in avalanche formation zones in the Elbrus Mountain region. [Zakonomernosti prostranstvenno-vremennogo raspredeleniia temperatury vozdukha za kholodnyĭ period v zonakh lavinoobrazovaniia Priel'brus'ia],
Samukashvili, R.D., *Nal'chik. Vysokogornyĭ geofizicheskiĭ institut. Trudy*, 1989, Vol.78, p.19-28, In Russian. 2 refs.
Distribution, Avalanche formation, Air temperature, Statistical analysis.

44-1780
Optical method of determining snow moisture. [Opticheskiĭ metod opredeleniia vlazhnosti snega],
Zalikhanov, M.Ch., et al, *Nal'chik. Vysokogornyĭ geofizicheskiĭ institut. Trudy*, 1989, Vol.78, p.29-33, In Russian. 4 refs.
Snow water content, Snow optics, Remote sensing, Moisture detection.

44-1781
Calculating the zone of instability in snow layers during spontaneous failure. [K raschetu zon neustoĭchivosti v snezhnykh plastakh pri spontannom razrusheniĭ],
Bolov, V.R., et al, *Nal'chik. Vysokogornyĭ geofizicheskiĭ institut. Trudy*, 1989, Vol.78, p.33-37, In Russian. 3 refs.
Zimin, M.I.
Snow cover stability, Avalanche formation, Analysis (mathematics), Computer programs.

44-1782
Recent and older glaciation in the Ardon River valley. [Sovremennoe i bolee drevnee oledenenie doliny r.Ardon],
Gerasimov, V.A., *Nal'chik. Vysokogornyĭ geofizicheskiĭ institut. Trudy*, 1989, Vol.78, p.55-66, In Russian. 8 refs.
Glaciation, Geomorphology, Paleoclimatology, Valleys.

44-1783
Natural conditions and the problems in protecting the environment near the construction site of a railroad line through the Caucasian mountain pass. [Prirodnye usloviia i problemy okhrany okruzhaiushchei sredy zony stroitel'stva Kavkazskoĭ pereval'noĭ zheleznoĭ dorogi],
Rubtsov, E.A., et al, *Nal'chik. Vysokogornyĭ geofizicheskiĭ institut. Trudy*, 1989, Vol.78, p.67-77, In Russian. 5 refs.
Vorokov, V.Kh.
Slope protection, Construction, Drainage, Snow cover, Railroads.

44-1784
Simple system of searching for avalanche abstracting information. [Prostaia sistema poiska snegolavinnoĭ referativnoĭ informatsii],
Balkarev, B.B., et al, *Nal'chik. Vysokogornyĭ geofizicheskiĭ institut. Trudy*, 1989, Vol.78, p.84-92, In Russian. 4 refs.
Popovtseva, I.N.
Avalanches, Research projects, Computer programs.

44-1785
Analytical methods for determining nitroguanidine in soil and water.
Walsh, M.E., *U.S. Army Cold Regions Research and Engineering Laboratory*, Nov 1989, SR 89-35, 27p., ADA-216 615, 9 refs.
Soil pollution, Soil chemistry, Water pollution, Ground water, Explosives, Chemical analysis.
Methods were developed for determining nitroguanidine in soil and water. The soil method involves extracting a 2-g sample with water using an ultrasonic bath. Soil extracts and water samples are filtered through a 45-micron membrane prior to determination by RP-HPLC. Separations are achieved on a mixed-mode RP18/cation column eluted with 1.5 mL/min of water; detection is by UV (lambda = 263 nm). Certified reporting limits were estimated at 5.0 micrograms/L for water and 0.5 microgram/L for soil.

44-1786
Why does ice grow faster from salt water than from fresh water.
Barduhn, A.J., et al, *Desalination*, Dec. 1987, Vol.67, p.99-106, 8 refs.
Huang, J.S.
Ice crystal growth, Salinity, Water chemistry, Temperature effects, Solutions, Convection, Liquid solid interfaces, Cooling rate.

44-1787
Ice crystallization developments for the butane direct-contact process.
Wiegandt, H.F., et al, *Desalination*, Dec. 1987, Vol.67, p.107-126, 23 refs.
Madani, A., Harriott, P.
Ice crystal growth, Slush, Vapor diffusion, Ice crystal size, Desalting, Water treatment, Brines, Dendritic ice, Permeability.

44-1788
Vacuum freezing multiple phase transformation processes.
Cheng, C.Y., et al, *Desalination*, Dec. 1987, Vol.67, p.139-153, 2 refs.
Cheng, W.C., Yang, M.D.
Vacuum freezing, Water treatment, Ice melting, Sea water, Desalting, Phase transformations, Vapor pressure, Heat transfer coefficient, Solutions.

44-1789
Fresh water from the sea, a new process.
Maguire, J.B., *Desalination*, Dec. 1987, Vol.67, p.155-162.
Desalting, Ice crystal growth, Ice crystal size, Slush, Supercooling, Surface properties, Freezing, Sea water, Water treatment, Phase transformations, Liquid phases, Molecular structure.

44-1790
Cold regions environmental engineering: tomorrow's challenges.
Smith, D.W., *Journal of cold regions engineering*, Sep. 1989, 3(3), p.134-142, 7 refs.
Human factors engineering, Environmental protection, Cold weather survival, Low temperature research.

44-1791
Nucleation on cylindrical nuclei.
Knight, C.A., et al, *Journal of colloid and interface science*, Oct. 2, 1987, 119(2), p.599-601, 9 refs.
Weinheimer, A.J.
Supercooling, Heterogeneous nucleation, Ice nuclei, Nucleation rate, Thermodynamics, Surface properties, Ice solid interface.

44-1792
New standards for pavement design in Finland.
Lehtonen, K., International Conference on Bearing Capacity of Roads and Airfields, 2nd, Plymouth, England, Sep. 16-18, 1986. Proceedings. Edited by C. Ward and C.K. Kennedy, Bristol, England, WDM Limited, 1986, p.39-48, 4 refs.
Pavements, Frost heave, Design criteria, Bearing strength.

44-1793
Properties of surface runoff in the High Arctic.
Cogley, J.G., Hamilton, Ontario, McMaster University, 1975, 358p., National Library of Canada. Canadian Theses Division. Microfiche No.26111, Ph.D. thesis. Refs. p.342-358.
River basins, Water balance, Hydrology, Runoff, Sediment transport, Models, Snowmelt, Evaporation.

44-1794
Low temperature starting of diesel engines using timed spark discharge.
Dale, J.D., et al, *Society of Automotive Engineers. Technical paper series*, Feb. 25-Mar. 1, 1985, No.850049, 10p., 3 refs. Presented at International Congress and Exposition, Detroit, MI, Feb. 25-Mar. 1, 1985.
Wilson, J.D., Santiago, J., Smy, P., Clements, R.
Diesel engines, Cold weather performance, Low temperature tests.

44-1795
Low temperature starting of a diesel engine.
Dale, J.D., et al, Edmonton, University of Alberta, Department of Mechanical Engineering, 1984, 80p. DSS File No.03SU.97714-2-1262.
Santiago, J.
Diesel engines, Low temperature tests, Cold weather performance, Engine starters.

44-1796
Surface velocity variations of the lower part of Columbia Glacier, Alaska, 1977-1981.
Rasmussen, L.A., *U.S. Geological Survey. Professional paper*, 1989, No.1258-H, 52p., 27 refs.
Topography, Glacier flow, Glacier mass balance, Glacier beds, Glacier oscillation, Glacier surfaces, Velocity, Aerial surveys, Statistical analysis, Photogrammetry, United States—Alaska—Columbia Glacier.

44-1797
Marine phytoplankton at the Weddell Sea ice edge: seasonal changes at the specific level.
Fryxell, G A , *Polar biology*, Oct 1989, 10(1), p 1-18, Refs p 17-18
Sea ice, Ice edge, Algae, Ice cover effect, Antarctica Weddell Sea.
Austral spring and autumn cruises to the Weddell Sea ice edge provided the opportunity to compare phytoplankton at the beginning of biological spring and at the end of biological autumn In both seasons cell numbers were low under the ice, and single cells or short chains were the common growth habit. In spring in the open ocean, long chains of vegetative cells with large vacuoles and gelatinous colonies of diatoms and of prymnesiophytes dominated, in autumn in the open ocean close to the accreting ice edge, short chains, single cells, and resting spores were mostly packed with storage products. Enlarged cell diameters and auxospores also occurred near the ice cover in the autumn. Species from the following genera are included. the diatoms *Leptocylindrus, Stellarima, Thalassiosira, Eucampia, Corethron*, and *Chaetoceros*, the prymnesiophyte *Phaeocystis*, and the chrysophyte *Distephanus*. (Auth. mod.)

44-1798
Effects of freezing and desiccation on photosynthesis and survival of terrestrial antarctic algae and cyanobacteria.
Davey, M.C., *Polar biology*, Oct. 1989, 10(1), p.29-36, Refs. p.35-36.
Photosynthesis, Algae, Bacteria, Low temperature research, Antarctica— Signy Island
Net photosynthesis per unit dry weight, measured by gas exchange, and the vital stain Auramine O were used to monitor recovery from stress Photosynthetic rates by *Prasiola* were an order of magnitude higher than those by *Phormidium*, although both continued photosynthesis at sub-zero temperatures. *Prasiola* survived freezing more readily, but in both cases survival was dependent upon the prevailing light conditions and the presence/absence of free water *Phormidium* readily survived desiccation, whereas high mortality occurred in *Prasiola*, particularly at high light intensities. The results obtained are discussed in relation to the habitat and ecology of the organisms. (Auth. mod )

44-1799
Proceedings of the NIPR Symposium on Polar Meteorology and Glaciology, No.2.
Kawaguchi, S., ed, Tokyo, National Institute of Polar Research, 1989, 182p., For individual papers see F-41247 through F-41255 and I-41241 through I-41246 or 44-1800 through 44-1813.
Nishio, F., ed, NIPR Symposium on Polar Meteorology and Glaciology, 10th, Tokyo, Dec. 8-9, 1987.
Meetings, Atmospheric composition, Snow, Ice cores.
This is a collection of papers presented at the 10th Symposium on Polar Meteorology and Glaciology held on Dec. 8-9, 1987, in Tokyo It consists of 21 full length papers and 14 abstracts, the former are arranged in areas of meteorology, glaciology and physical oceanography They include studies of atmospheric constituents and aerosols, ozone, atmospheric circulation and instrumentation, sea ice, ice sheet, snow crystals and snow constituents, and ice core studies as part of the research programs of the East Queen Maud Land Glaciological Project, 1982-1987 and the Middle Atmospheric Program, 1982-1985

44-1800
Vertical structure in convective clouds producing graupels and snowflake aggregates.
Konishi, H., et al, NIPR Symposium on Polar Meteorology and Glaciology, Proceedings No.2, Tokyo, National Institute of Polar Research, 1989, p.41-47, 4 refs.
Endoh, T., Wakahama, G.
Snowfall, Particle size distribution, Wind velocity.

44-1801
Measurement of snowflake size and falling velocity by image processing.
Muramoto, K., et al, NIPR Symposium on Polar Meteorology and Glaciology, Proceedings. No 2, Tokyo, National Institute of Polar Research, 1989, p.48-54, 14 refs
Shina, T., Endoh, T., Konishi, H., Kitano, K
Snowflakes, Snowfall, Measurement.

44-1802
Preliminary estimate of inertia effects in a bulk model of katabatic wind.
Kikuchi, T., et al, NIPR Symposium on Polar Meteorology and Glaciology, Proceedings. No.2, Tokyo, National Institute of Polar Research, 1989, p.61-69, 18 refs.
Ageta, Y.
Sastrugi, Wind (meteorology), Models, Antarctica—Mizuho Station.
Observed sastrugi orientations showed considerable deviation from a bulk theory of katabatic wind in lee sides of troughs in ice sheet undulations of which the wavelength is about 400 km on the Mizuho Plateau, East Antarctica. The effect of the inertia term, which may account for the deviations but is often neglected in the equation of motion for katabatic wind, is estimated with the perturbation method. A sinusoidally undulating slope with ridges and troughs is assumed for the model calculation instead of an infinite flat slope for the inertia-free model The calculated results, in a typical inversion, suggest that the inertia term is significant if the wavelength of the undulations is smaller than about 200 km while the effect of the undulations can be neglected if the wavelength is smaller than about 50 km Observed variability in the wind direction in the lee of the troughs may be accounted for by the effect of the inversion height which enhances the inertia effect (Auth.)

44-1803
Chemical composition of snow drift on Mizuho Plateau.
Osada, K., et al, NIPR Symposium on Polar Meteorology and Glaciology, Proceedings. No.2, Tokyo, National Institute of Polar Research, 1989, p.70-78, 20 refs.
Ohmae, H., Nishio, F., Higuchi, K., Kanamori, S.
Snowdrifts, Snow composition, Chemical analysis, Antarctica—Mizuho Station.
The chemical composition was determined of snow drift which was sampled at Mizuho Station (2230 m a.s.l.) and Mizuho Plateau (1800-3000 m a.s.l.) in 1986. Na+, Cl-, NO3- and SO4 2- were determined by ion chromatography on 44 samples. Electroconductivity and H+ concentration were also measured on 85 samples. The concentrations of NO3- and SO4 2- of snow drift showed maximum values in summer. It is considered that the concentrations of both Na+ and Cl- of snow drift during winter are dependent on not only the amount of sea-salt in the atmosphere but also on the dilution effect through mixing with falling snow. It is pointed out that increase in their concentrations of snow drift in late summer results from aerosol scavenged by drifting snow particles rather than sublimation of drifting snow particles. (Auth.)

44-1804
Distribution of chemical elements in the snow at the site S25 in Antarctica.
Kanamori, S., et al, NIPR Symposium on Polar Meteorology and Glaciology, Proceedings. No.2, Tokyo, National Institute of Polar Research, 1989, p.79-87, 8 refs.
Snow impurities, Snow composition, Aerosols, Antarctica—Showa Station.
Firn block samples 50 cm deep, and covering nearly one-year formation, were taken at site S25 on the ice sheet near Showa Station. The vertical distribution of Cl, Na, and SO4 showed high and nearly constant level in the upper 37.5 cm (766 ppb, 425 ppb, and 119 ppb, respectively) accumulated from autumn, 1985, to early summer of 1986 Very low concentration levels of these species (219 ppb, 117 ppb, and 64 ppb, respectively), but with high SO4/Na ratio, were found in the lower 12.5 cm layer which accumulated in the late summer of 1985, when concentration of SO4 aerosols was high NO3 showed several peaks in the upper 37.5 cm and K and NH4 low level The mean concentrations of Al, Fe, Zn, and cu were 323 ppt, 251 ppt, 435 ppt, and 118 ppt, respectively These concentration levels are much higher than those reported for snow and ice from inland. (Auth. mod.)

44-1805
Geomorphological and glaciological aspects around the highest dome in Queen Maud Land, East Antarctica.
Ageta, Y., et al, NIPR Symposium on Polar Meteorology and Glaciology, Proceedings. No.2, Tokyo, National Institute of Polar Research, 1989, p.88-96, 14 refs.
Kamiyama, K., Okuhira, F., Fujii, Y.
Ice sheets, Topographic features, Subglacial observations, Ice dating, Antarctica —Queen Maud Land.
The second highest dome in the Antarctic Ice Sheet, located at 77S and 39E, with an elevation of 3807 m, was surveyed. A ridge of the ice divide runs from the dome top in a west-northwest direction, and a narrow subsurface basin lower than 500 m above the sea-level extends in a scale of 100 km long below the dome top in a similar direction to that of the surface ridge. In view of the larger scale of 1000 km order on the subsurface topography, this dome is classified into "the subglacial basin type" in contrast with "the subglacial mountain type" such as Dome A, the highest dome in the Antarctic Ice Sheet. The direction of prevailing winds around the dome, and the lapse rates of snow temperature at 10 m depth (annual mean air temperature), are described The effect of the surface slope on such surface environments is discussed briefly. Annual mean air temperature at the dome top is estimated to be -58.0 C. The age of the dome ice is also estimated (Auth. mod.)

44-1806
Dynamical behavior of the ice sheet in Mizuho Plateau, East Antarctica.
Nishio, F., et al, NIPR Symposium on Polar Meteorology and Glaciology, Proceedings. No.2, Tokyo, National Institute of Polar Research, 1989, p.97-104, 14 refs.
Mae, S., Ohmae, H., Takahashi, S., Nakawo, M., Kawada, K.
Ice sheets, Glacier melting, Glacier oscillation, Antarctica—Mizuho Station.
A new 5-year glaciological program on Mizuho Plateau and East Queen Maud Land, which started in 1981, disclosed the following. the ice sheet in the downstream region, where ice elevation is lower than about 2800 m, is thinning, based upon data on horizontal and vertical flow velocity, strain rate, inclination of ice surface, accumulation rate and densification of snow, results of the radio-echo soundings suggest that the base of the ice sheet in the downstream region is wet, the calculated bottom temperature shows that the ice temperature at the base of the ice sheet in the glacier downstream is at the pressure melting point. A possible explanation of ice sheet variations on Mizuho Plateau is as follows. the thinning of the ice sheet, caused by the basal sliding due to melting of the ice base, started at the mouth of the Shirase Glacier and has been expanding upstream to reach the present state. A simple calculation, using flow velocities, shows that the thinning started at Shirase Glacier a few thousand years ago. (Auth. mod.)

44-1807
Dating the Mizuho 700-m core from core ice fabric data.
Nakawo, M., et al, NIPR Symposium on Polar Meteorology and Glaciology, Proceedings. No.2, Tokyo, National Institute of Polar Research, 1989, p.105-110, 11 refs.
Ohmae, H., Nishio, F., Kameda, T.
Ice dating, Ice density, Ice sheets, Strains, Antarctica —Mizuho Station.
The vertical strain rate of the ice sheet has been estimated from the longitudinal total strain derived from Mizuho core fabric data. The vertical strain rate is considered to be the average value in the past while the ice sheet has experienced a significant thinning. With use of the obtained vertical strain rate, the age of ice in the Mizuho core has been dated. It was shown that the 700-m core corresponds with the time period of the past 9400 years. (Auth.)

44-1808
Temperature measurements of first-year sea ice in the sea of Okhotsk using an airborne infrared radiometer.
Aota, M., et al, NIPR Symposium on Polar Meteorology and Glaciology, Proceedings. No.2, Tokyo, National Institute of Polar Research, 1989, p.111-116, 5 refs.
Shirasawa, K., Ishikawa, M., Ikeda, S., Suehiro, K.
Sea ice, Brightness, Infrared equipment.

44-1809
Rapid frazil ice production in coastal polynya: laboratory experiments.
Ushio, S., et al, NIPR Symposium on Polar Meteorology and Glaciology, Proceedings. No.2, Tokyo, National Institute of Polar Research, 1989, p.117-126, 9 refs.
Wakatsuchi, M.
Convection, Frazil ice, Polynyas, Sea ice, Laboratory techniques.
Laboratory experiments were carried out to clarify the production processes of frazil ice in a wind-generated polynya. The production rate was measured of frazil ice formed from salt water in a test tank as a function of air temperature and wind speed. Results show that the production rate increased with increasing wind speed and with falling air temperature, and was about 4-5 times greater than that of sheet ice growing vertically. It is found that wind blowing continuously on the open water surface plays an important role in the process of rapid ice production Convection phenomena in the tank were observed with a Schlieren optical system. Most brine excluded on the open water surface was transported with the ice crystals downwind through the wind-driven current and then fell vigorously mixing with surrounding water near the edge of accumulated frazil ice layer. (Auth. mod.)

44-1810
Step frequency radar experiments on the antarctic sea ice.
Uratsuka, S., et al, NIPR Symposium on Polar Meteorology and Glaciology, Proceedings. No.2, Tokyo, National Institute of Polar Research, 1989, p.127-132, 7 refs.
Nishio, F., Okamato, K., Mineno, H., Mae, S.
Sea ice, Ice structure, Airborne radar, Measuring instruments, Antarctica—Showa Station.
Step frequency radar experiments have been carried out on sea ice near Showa Station to develop an airborne sensor for measuring vertical sea ice structures. The radar transmits 32 different frequencies in a stepwise fashion between 300 and 796 MHz and measures the amplitude and phase of reflected waves at each frequency. The discrete Fourier transform of the 32 complex values of signals indicates the distance of vertical sea ice structures. The range resolution is about 15 cm in sea ice. Experimental results show that the radar system can successfully measure vertical sea ice structures. The distance between

the surface and the snow/ice interface or between the surface and the sea ice bottom deduced by this method coincided with direct measurements in sample holes. Snow depth was measured very clearly by the radar system. (Auth. mod.)

44-1811
Comparative study on ice thickness determination in valley glaciers of the Sör Rondane, Antarctica: radio echo sounding and gravimetric method.
Decleir, H., et al, NIPR Symposium on Polar Meterology and Glaciology, Proceedings. No.2, Tokyo, National Institute of Polar Research, 1989, p.133-141, 7 refs.
Nishio, F., Ohmae, H.
Glacier thickness, Gravity, Radio echo soundings, Antarctica—Sör Rondane Mountains.
In the summer of 1986-1987 comparative radio echo sounding and gravity surveys were carried out for measuring ice thickness in the Sör Rondane Mountains across two outlet glaciers, Gjelbreen and Gunnestadbreen. Taking the radar thicknesses as standard, the reliability of the gravity method depends highly on the number of gravity stations, especially near the side, and on the modeling procedure employed. An underestimate of 10% in ice thickness and ice discharge is inferred regarding previous gravity results. (Auth. mod.)

44-1812
Radio scattering characteristics of Antarctic Ice Sheet using airborne radio echo sounding data.
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Sea ice, Height finding, Ice sheets, Computer programs, Radar echoes, Radio echo soundings, Mapping, Greenland.

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Ice sheets, Height finding, Sea ice, Radar echoes, Radio echo soundings, Computer programs, Antarctica.
A gridded surface elevation data set and a geo-referenced data base for the Seasat radar altimeter data over Antarctica are described in this volume. It is intended to be a "user's guide" to accompany the data provided to data centers and other users. The grid points are on a polar stereographic projection with a nominal spacing of 20 km. The gridded elevations are derived from the elevation data in the geo-referenced data base by a weighted fitting of a surface in the neighborhood of each grid point. The gridded elevations are useful for the creation of large-scale contour maps, and the geo-referenced data base is useful for regridding, creating smaller-scale contour maps, and examining individual elevation measurements in specific geographic areas. Tape formats are described, and a FORTRAN program for reading the data tape is listed and provided on the tape. For more details of the data processing procedures and corrections that were derived and applied to the data, see Volume 3 of this series. (Auth.)

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Biota of antarctic pack ice in the Weddell Sea and Antarctic Peninsula regions.
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Buck, K.R.
Pack ice, Algae, Ice composition, Cryobiology, Antarctica—Weddell Sea, Antarctica—Antarctic Peninsula.
Although organisms are found throughout the ice, the richest concentrations often occur in the surface layer. The ice flora consists of diatoms and flagellates. Chrysophyte cysts (archaeomonads) of unknown affinity and dinoflagellate cysts are abundant and may serve as overwintering stages in ice. The ice fauna includes a variety of heterotrophic flagellates, ciliates, and micrometazoa. The abundance of heterotrophs indicates an active food web within the ice community. Ice may serve as a temporary habitat or refuge for many of the microbial forms and some of these appear to provide an inoculum for planktonic populations when ice melts. Larger consumers, such as copepods and krill are often found on the underside of ice floes and within weathered floes. (Auth. mod.)

44-1865
Isolates of *Arthrobacter* from the soils of Schirmacher Oasis, Antarctica.
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Bacteria, Cryobiology, Limnology, Geocryology, Antarctica—Schirmacher Ponds.

Thirteen isolates of bacteria from the soils of Schirmacher Ponds have been identified as members of the genus *Arthrobacter*. All the isolates exhibited a rod-coccus cycle during growth, were gram positive, catalase positive, non-motile and non-fermentative; did not form endospores; and contained MK-8(H2) as the major menaquinone. The mole%G+C in DNA of the isolates ranged from 58% to 72%. The isolates were identified as *A. globiformis*, *A. pascens* and *A. protophormiae*. However, unlike the mesophilic isolates, the antarctic *Arthrobacter* could be considered to be unique as they were psychrotrophic, contained glucose and lysine in the cell wall, and did not hydrolyze starch. (Auth. mod.)

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Observations of sorted patterned ground features, High Valley/Tangle Lakes region, central Alaska, U.S.A.
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Surface and subsurface water contributions during snowmelt in a small Precambrian Shield watershed, Muskoka, Ontario.
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Taylor, C.H.
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Shkhinek, K.N.
Piles, Ice loads, Water level, Mechanical properties, Ice sheets, Offshore structures, Ice solid interface, Analysis (mathematics), Loads (forces).

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Pipelines, Electric equipment, Cold weather construction, Protection, Design, Electrical grounding, Corrosion, River crossings, Canada—Northwest Territories—Mackenzie River.

44-1871
Effect of static loads and of factors of cold climate on the deformability, strength, and life of polyester wound glass-reinforced plastic.
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Evaluation of various processing techniques applied to seismic data recorded from an ice island in the Arctic Ocean, Canada.
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Kirichenko, A.V.
Snow depth, Snow cover distribution, Avalanches, Air temperature, Countermeasures, Precipitation (meteorology), Permafrost, Statistical analysis, Analysis (mathematics), USSR—Charskaya Basin.

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Oases of the North. [Oazisy Severa].
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44-1877
Acoustic pulse propagation above grassland and snow: comparison of theoretical and experimental waveforms.
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Orcutt, J.A.
Snow acoustics, Sound transmission, Sound waves, Analysis (mathematics).
Theoretical predictions are made of the effect of an absorbing ground surface on acoustic impulsive waveforms propagating in a homogeneous atmosphere for frequencies below 500 Hz. The lower frequencies of the pulse are enhanced as the effective flow resistivity of the ground surface decreases and as the propagation distance increases. The pulse waveforms and peak amplitude decay observed for propagation distances of 40 to 274 m over grassland were satisfactorily matched by calculations using an assumed effective flow resistivity of 200 kN/s/0001 m. Measurements over snow gave much greater amplitude decay rates, and the waveforms were radically changed in appearance, being dominated by the lower frequencies. These waveforms were satisfactorily matched only when a layered ground was incorporated into the calculations; then, an assumed surface effective flow resistivity of 20 kN/s/.0001 m gave good agreement with the observed waveforms and peak amplitude decay.

44-1878
Performance of wall coatings for concrete and masonry buildings in Alaska.
Korhonen, C.J., et al, *U.S. Army Cold Regions Research and Engineering Laboratory*, Nov. 1989, SR 89-36, 27 refs., ADB-139 753, 8 refs.
Bayer, J.J., Jr.
Protective coatings, Walls, Military facilities, Vapor barriers, Buildings, Thermal insulation, Weatherproofing.
Coatings traditionally have been applied to the Army's concrete and masonry buildings in Alaska to improve their appearance and to increase their weather resistance. Unfortunately, these materials have not always lasted as long as desired, resulting in high maintenance costs. A visual examination of 15 buildings at three military installations in Alaska revealed that water vapor condensation was a major cause of premature coating failure. This moisture not only caused coatings to deteriorate, but when it froze, it caused spalling of the wall. Laboratory tests proved that coatings with the best field performance had the highest permeance to water vapor. This suggested that more attention be given to defining and selecting breathable coatings.

44-1879
CBR operations in cold weather: a bibliography, Vol.1.
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Birenzvige, A., D'Eramo, P.A., Parker, L.V.
Military operation, Pollution, Military research, Cold weather operation, Bibliographies.
Complex military operations can be severely hampered in cold weather. An extensive search of the literature has been completed, from which more than 60 reports and references have been selected for the comprehensive bibliography that is presented here in two volumes. Volume 1 includes only *unclassified* entries for convenient desktop reference, whereas Volume 2 includes citations at the *restricted, confidential,* and *secret* levels. Both volumes are cross-indexed by several schemes, including title, subject, author, and year. Abstracts for all references are provided where available. This report is intended to provide an up-to-date guide to CBR operations in cold weather and to offer users the most authoritative information available concerning this topic.

44-1880
Oil in the sea: inputs, fates, and effects. Washington, D.C., National Academy Press, 1985, 601p., Refs. passim.
Oil spills, Water pollution, Sea water, Environmental impact, Crude oil, Hydrocarbons.

44-1881
Fatigue strength at subzero temperature of films made of polymer mixtures based on thermoplastic polyurethane.
Parfeev, V.M., et al, *Mechanics of composite materials*, May 1988, 23(6), p.685-693, Translated from Mekhanika kompozitnykh materialov. 13 refs.
Borisova, E.IU., Vladychina, S.V., Erykalova, T.A.
Plastics, Low temperature tests, Fatigue (materials), Mechanical properties, Chemical composition, Mechanical tests, Films, Flexural strength, Light scattering.

44-1882
Experimental investigation of the strength and deformability of wound fiberglasses and organoplastics under low climatic temperatures.
Kuz'min, S.A., et al, *Mechanics of composite materials*, July 1989, 25(1), p.49-53, Translated from Mekhanika kompozitnykh materialov. 20 refs.
Bulmanis, V.N., Struchkov, A.S.
Plastics, Low temperature tests, Mechanical tests, Tensile properties, Temperature effects, Cold weather performance, Static stability.

44-1883
Model and algorithm for calculating river flow formation in a forest drainage area. [Model' i algoritmy rascheta formirovaniia rechnogo stoka na lesnom vodosbore].
Nazarov, N.A., et al, Moscow, AN SSSR, Mezhduvedomstvennyĭ geofizicheskiĭ komitet, 1988, 107p., In Russian with English summary and table of contents. 152 refs.
Sirin, A.A.
River flow, Snow water equivalent, Drainage, Snowmelt, Hydrology, Thermal regime, Swamps, Mathematical models.

44-1884
Cold tolerance of microarthropods.
Cannon, R.J.C., et al, *Cambridge philosophical Society. Biological reviews*, Feb. 1988, 63(1), p.23-77, Refs. p.65-77.
Block, W.
Nucleation, Supercooling, Cold stress, Acclimatization.
Microarthropods (Acari and Collembola) are dominant components of the terrestrial fauna in the Antarctic. Their cold tolerance, which forms the mainspring of their adaptational strategy, is reviewed against a background of their structure and function, and by comparisor with other arthropods. Two species, the isotomid collembolan *Cryptopygus antarcticus* Willem and the oribatid mite *Alaskozetes antarcticus* (Michael), are examined in detail, and afford a comparative approach to the mechanisms underlying cold tolerance in insect and arachnid types. Thermal hysteresis proteins, acting colligatively, occur in many arthropods including Collembola, they depress both the freezing point of body fluids and the whole-body supercooling point of freezing-susceptible and freezing-tolerant species. Microarthropods fall within the spectrum of cold tolerance observed for arthropods and other invertebrates. No special adaptations are found in antarctic species, and similar strategies and mechanisms are present in both insects and arachnids. The colonization and maintenance of microarthropod populations of polar land habitats seem not to have required the evolution of any novel features with respect to cold tolerance. (Auth. mod.)

44-1885
Freeze-thaw repairs to Haweswater Dam.
Barfoot, J., *Concrete*, Nov. 1989, 23(10), p.44-45.
Dams, Concrete freezing, Damage, Protection, Construction materials, Freeze thaw cycles, Air flow.

44-1886
Surface activity of anti-icing additives.
Urianskaia, N.I., et al, *Chemistry and technology of fuels and oils*, Mar.-Apr. 1989, 25(3-4), p.162-167, Translated from Khimiia i tekhnologiia topliv i masel. 12 refs.
Solubility, Chemical ice prevention, Fuel additives, Standards, Chemical properties, Surfactants, Interfacial tension, Evaporation, Aircraft.

44-1887
Environmental impacts of oil and hazardous material spills with emphasis on winter conditions in the upper Great Lakes region. Final report.
Baca, B.J., et al, Columbia, SC, Coastal Science and Engineering, Inc., Nov. 1986, 63p., ADA-214 349, 191 refs.
Lankford, T.E., Gundlach, E.R.
Oil spills, Water pollution, Lake ice, Ice conditions, Ecosystems, Environmental impact, Great Lakes.

44-1888
Age of the Arctic: hot conflicts and cold realities.
Osherenko, G., et al, Cambridge, Cambridge University Press, 1989, 316p., Refs passim
Young, O.R.
Environmental protection, Economic development, Polar regions, International cooperation, Legislation.

44-1889
Satellite radar altimetry over ice, Vol.I: Processing and corrections of Seasat data over Greenland.
Zwally, H.J., et al, *U.S. National Aeronautics and Space Administration. Reference publication*, Jan. 1990, NASA RP-1233, Vol.I, 145p., 18 refs.
Brenner, A.C., Major, J.A., Martin, T.V., Bindschadler, R.A.
Ice sheets, Glacier surfaces, Height finding, Radar echoes, Radio echo soundings, Sea ice, Data processing, Topographic surveys, Remote sensing, Analysis (mathematics), Greenland.

44-1890
Topographic and surface characteristics of the Larsen Ice Shelf, Antarctica, using satellite altimetry.
Ridley, J.K., et al, *Journal of glaciology*, 1989, 35(121), p.299-310, 29 refs.
Cudlip, W., McIntyre, N., Rapley, C.G.
Ice shelves, Topographic surveys, Height finding, Mapping, Radar echoes, Radio echo soundings, Antarctica—Larsen Ice Shelf.
A comprehensive survey of the Larsen Ice Shelf has been conducted using precise orbit and retracked Seasat radar-altimeter data with editing of erroneous values resulting from instrumental artefacts. Contour maps of elevation and radar back-scatter have been produced and it has also been possible to map rifts, grounding points, rough terrain, and about 30% of the ice shelf's seaward margin. Ice thicknesses derived from these elevation data show broad agreement with those derived from previous airborne radio-echo surveys. Maps of parameters measured by Seasat represent a very substantial improvement over those previously available. They thus provide a reference against which comparison may be made with a view to detecting substantial climatic changes. This is of particular interest since the Larsen Ice Shelf may be more sensitive than others to global climatic trends. (Auth.)

44-1891
Effects of climatic perturbations on the surface-ablation regime of the Greenland ice sheet, West Greenland.
Ambach, W., *Journal of glaciology*, 1989, 35(121), p.311-316, 14 refs.
Ice sheets, Ablation, Temperature variations, Heat balance, Greenland.

44-1892
Apron entrainment at the margins of sub-polar glaciers, north-west Ellesmere Island, Canadian High Arctic.
Evans, D.J.A., *Journal of glaciology*, 1989, 35(121), p.317-324, 36 refs.
Glacial deposits, Thermal regime, Canada—Northwest Territories—Ellesmere Island.

44-1893
Ice flow and mass changes of Lewis Glacier, Mount Kenya, East Africa: observations 1974-86, modelling, and predictions to the year 2000 A.D.
Hastenrath, S., *Journal of glaciology*, 1989, 35(121), p.325-332, 23 refs.
Glacier mass balance, Glacier flow, Models, Africa—Kenya, Mount, Africa Lewis Glacier.

44-1894
Energy and mass model of snow cover suitable for operational avalanche forecasting.
Brun, E., et al, *Journal of glaciology*, 1989, 35(121), p.333-342, 14 refs.
Martin, E., Simon, V., Gendre, C., Coleou, C.
Snow physics, Avalanche forecasting, Snow cover, Solar radiation, Models.

44-1895
Surface roughness and bulk heat transfer on a glacier: comparison with eddy correlation.
Munro, D.S., *Journal of glaciology*, 1989, 35(121), p.343-348, 27 refs.
Glacier ice, Surface roughness, Heat transfer.

44-1896
Estimates of peak discharge from the drainage of ice-dammed Ape Lake, British Columbia, Canada.
Desloges, J.R., et al, *Journal of glaciology*, 1989, 35(121), p.349-354, 18 refs.
Jones, D.P.
Lake ice, Ice dams, Floods, Canada British Columbia—Ape Lake.

44-1897
Time-scale for adjustment of glaciers to changes in mass balance.
Jóhannesson, T., et al, *Journal of glaciology*, 1989, 35(121), p.355-369, 43 refs.
Raymond, C., Waddington, E.
Glacier mass balance, Periodic variations, Models.

44-1898
Distribution of net mass balance in the vicinity of Crary Ice Rise, Antarctica.
Bindschadler, R.A., et al, *Journal of glaciology*, 1989, 35(121), p.370-377, 18 refs.
Roberts, E.P., MacAyeal, D.R.
Ice sheets, Mass balance, Ice cover thickness, Antarctica—Crary Ice Rise.
Calculations of the regional variation of net mass balance around Crary Ice Rise show significant rates of thickening upstream of the ice rise and significant thinning down-stream (assuming zero basal melting or freezing). Thickening also is occurring on the southwest side of the ice rise nearest the Transantarctic Mountains. These imbalances imply migration of the rise and help explain its current non-equilibrium shape. The pattern of a suture line down-stream of the rise indicates a quasi-periodic mechanism of rift formation. (Auth.)

44-1899
Effect of the specimen-platen interface on internal cracking and brittle fracture of ice under compression: high-speed photography.
Schulson, E.M., et al, *Journal of glaciology*, 1989, 35(121), p.378-382, 8 refs.
Gies, M.C., Lasonde, G.J., Nixon, W.A.
Ice, Compressive properties, Ice cracks, Fracturing, Photography.

44-1900
On the development of transverse ridges on rock glaciers.
Loewenherz, D.S., et al, *Journal of glaciology*, 1989, 35(121), p.383-391, 47 refs.
Lawrence, C.J., Weaver, R.L.
Rock glaciers, Stratification, Models.

44-1901
Crystalline texture of the 2083 m ice core at Vostok Station, Antarctica.
Lipenkov, V.I.A., et al, *Journal of glaciology*, 1989, 35(121), p.392-398, 33 refs.
Barkov, N.I., Duval, P., Pimienta, P.
Ice cores, Ice crystal structure, Antarctica—Vostok Station.
Crystalline texture and c-axis orientation of the 2083 m ice core at Vostok Station, covering more than 150 kyear, reveal the existence of strong anisotropies. Changes in crystal size with depth are compatible with the growth of grains driven by the free energy of grain boundaries. A smaller growth rate appears to be associated with cold periods. A gradual increase in the horizontal elongation of grains was observed between 350 and 680 m. But the mean value of the coefficient of the linear dimensional orientation of grains does not change below 700 m. The c-axis orientation of ice grains tends to align perpendicular to the direction of the elongation of grains, forming a vertical girdle pattern. This characteristic fabric has been interpreted as resulting from the gradual rotation of grains by basal glide under uniaxial longitudinal tension. The rotation of grains was calculated with respect to the total strain, simulating the formation of the girdle fabric pattern. The fabric-enhancement factor was calculated at various depths. It appears that Vostok ice hardens gradually with depth when considering the transverse convergent flow. No significant variation of the enhancement factor was observed with changes in climate and impurity content. (Auth.)

44-1902
Mass-balance gradients and climatic change.
Oerlemans, J., et al, *Journal of glaciology*, 1989, 35(121), p.399-405, 24 refs.
Hoogendoorn, N.C.
Glacier mass balance, Climatic changes, Altitude, Models, Austria—Oetztal Alps.

44-1903
Age-depth profile in the upper part of a steady-state ice sheet.
Reeh, N., *Journal of glaciology*, 1989, 35(121), p.406-417, 31 refs.
Ice sheets, Geochronology, Ice cover thickness, Models.

44-1904
Early discoverers XXXVI. W.J. McGee on glacial erosion laws and the development of glacial valleys.
Harbor, J.M., *Journal of glaciology*, 1989, 35(121), p.419-425, 60 refs.
Valleys, Glaciers, Glacial erosion, Theories, History.

44-1905
Antarctic phytoplankton—dominants, life stages, and indicators.
Fryxell, G.A., et al, *Antarctic journal of the United States*, 1988, 23(5), p.129-131, 8 refs.
Reap, M.E., Kang, S.H.
Ice edge, Ice cover effect, Algae.
*Nitzschia cylindrus* has been found in water samples throughout the Antarctic Marine Ecosystem Research at the Ice Edge Zone spring (1983) and autumn (1986) cruises. In spring ice-melt regions, the surface water reached near-bloom proportions. Under the ice, the maximum integrated numbers of full cells from the surface to 105 m were higher in autumn than in spring. In water columns under the ice in the fall, *Phaeocystis* and *N. cylindrus* were dominants. Life stages provide seasonal contrast. Strong vegetative growth was seen in the spring. Auxospores, isolated cells often of maximum size, and resting spores were observed in the autumn. In the summer field work (1988), an unexpected variant of resting spore transport was seen when fecal pellets with intact spores were found throughout the water column. *Coscinodiscus oculoides* Karsten, a large-celled diatom was the only species in the genus to be common near the pack ice. *Asperitia tabularis* was seen mainly north of the Antarctic Convergence Zone, as were varieties of *Thalassiosira tumida* and *Eucampia antarctica*. Far to the south, in Prydz Bay, in an area recently cleared of ice by a gale, the ice-edge varieties of the latter two were seen.

44-1906
Antifreeze glycoproteins: structure-function studies.
Feeney, R.E., et al, *Antarctic journal of the United States*, 1988, 23(5), p.136-138, 14 refs.
Osuga, D.T., Yeh, Y.
Ice crystal nuclei, Ice crystal growth, Ice water interface.
The discussed studies of the antifreeze glycoproteins have involved 4 primary endeavors, initiating a program on the effects of the attachment of amino acids to the C-6 hydroxyls of the side chains sugars of antifreeze glycoproteins; finishing the main phase of a study on the influence of nucleation conditions on the growth and crystal habits of ice; initiating laser interaction studies at the interface between the antifreeze glycoprotein solution and a single c-axis-grown crystal, and initiating studies on the attachment of different derivatives of sialic acid to the carbohydrate side chains of antifreeze glycoproteins.

44-1907
Summary of WINCRUISE II to the Antarctic Peninsula during June and July 1987.
Quetin, L.B., et al, *Antarctic journal of the United States*, 1988, 23(5), p.149-151, 1 ref.
Ross, R.M.
Sea ice distribution, Low temperature research, Marine biology
Seventeen scientists (representing 5 projects), 12 crew, and 3 employees of ANSMTT participated in WINCRUISE II from June 7 to July 19, 1987 aboard the *Polar Duke*. WINCRUISE II was staged to increase knowledge of the marine ecosystem west of the Antarctic Peninsula and included midwater observations of the physiology and composition of adult and larval *Euphausia superba*, factors affecting the community structure of seabirds, and factors affecting primary productivity, algal physiology, and pigment composition, bacterial growth and abundance, and protistan communities in relation to the water column and sea-ice composition and distribution. The projects, including a brief summary of their aims, collections, and preliminary results, are listed.

44-1908
Identification of lunar rock types and search for polar ice by gamma ray spectroscopy.
Metzger, A.E., et al, *Journal of geophysical research*, Jan. 10, 1990, 95(B1), p.449-460, 38 refs.
Drake, D.M.
Moon, Extraterrestrial ice, Ice spectroscopy, Gamma irradiation, Planetary environments, Ice detection.

44-1909
Use of satellite imagery for tracking the *Kurdistan* oil spill.
Dawe, B.R., et al, *Canada. Environmental Protection Service. Technology development report*, Dec. 1981, EPS 4-EC-81-6, 31p., With French summary, 10 refs.
Parashar, S.K., Ryan, J.P., Worsfold, R.D.
Oil spills, Water pollution, Sea ice, Tanker ships, Detection, Remote sensing, Canada—Nova Scotia—Cape Breton Island.

44-1910
Quaternary paleoecology and geology of the seas of northern Europe. [Chetvertichnaia paleoekologiia i geologiia morei severnoi Evropy].
Matishov, G.G., et al, Apatity, AN SSSR, Kol'skii nauchnyi tsentr, 1989, 114p., In Russian. Refs. p.106-114.
Paleoclimatology, Paleoecology, Marine geology, Quaternary deposits, Glaciation, Water chemistry, Ecosystems, Statistical analysis, USSR White Sea, Barents Sea, Norwegian Sea.

44-1911
Paleoclimates and glaciation during the Pleistocene. [Paleoklimaty i oledeneniia v pleistotsene].
Velichko, A.A., ed, Moscow, Nauka, 1989, 247p., In Russian with English table of contents. Refs. passim.
For selected papers see 44-1912 through 44-1928.
Gurtovaia, E.E., ed, Faustova, M.A., ed.
Glaciation, Paleoclimatology, Pleistocene, Climatic changes, Quaternary deposits, Air temperature, Ice sheets, Moraines.

44-1912
Glacial meltwater inflow into the Gulf of Mexico, its impact on the Gulfstream regime and late glacial climates of Europe. [Vliianie pritoka lednikovykh vod v Meksikanskiĭ zaliv na rezhim Gol'fstrima i klimat Evropy v pozdneledenikov'e],
Kvasov, D.D., Paleoklimaty i oledeneniia v pleistotsene (Paleoclimates and glaciation during the Pleistocene). Edited by A.A. Velichko, E.E. Gurtovaia, and M.A. Faustova, Moscow, Nauka, 1989, p.28-33, In Russian. 14 refs.
Paleoclimatology, Meltwater, Glacier ice, Pleistocene.

44-1913
Landscape-climatic changes in the late glacial period in USSR territory. [Landshaftno-klimaticheskie izmeneniia v pozdneledenikovoe vremia na territorii SSSR],
Khotinskiĭ, N.A., Paleoklimaty i oledeneniia v pleistotsene (Paleoclimates and glaciation during the Pleistocene). Edited by A.A. Velichko, E.E. Gurtovaia, and M.A. Faustova, Moscow, Nauka, 1989, p.39-47, In Russian. 7 refs.
Pleistocene, Landscape development, Climatic changes, Paleoclimatology, Air temperature.

44-1914
Changes in climate and vegetation during the Shklov interglacial in Byelorussia. [Izmenenie klimata i rastitel'nogo pokrova v techenie shklovskogo mezhledenikov'ia na territorii Belorussii],
Elovicheva, IA.K., Paleoklimaty i oledeneniia v pleistotsene (Paleoclimates and glaciation during the Pleistocene). Edited by A.A. Velichko, E.E. Gurtovaia, and M.A. Faustova, Moscow, Nauka, 1989, p.66-70, In Russian. 8 refs.
Climatic changes, Paleoclimatology, Vegetation patterns, Air temperature.

44-1915
Correlation of Pleistocene glaciations with transgressions of the Black and Caspian seas. [Korreliatsiia oledenenii pleistotsena s transgressiiami Chernogo i Kaspiĭskogo morei],
Zubakov, V.A., Paleoklimaty i oledeneniia v pleistotsene (Paleoclimates and glaciation during the Pleistocene). Edited by A.A. Velichko, E.E. Gurtovaia, and M.A. Faustova, Moscow, Nauka, 1989, p.105-110, In Russian. 14 refs.
Paleoclimatology, Pleistocene, Glaciation, Correlation, USSR—Caspian Sea, Black Sea.

44-1916
Glaciations in the east European region of the USSR. [Oledeneniia vostochno-evropeĭskogo regiona SSSR],
Velichko, A.A., et al, Paleoklimaty i oledeneniia v pleistotsene (Paleoclimates and glaciation during the Pleistocene). Edited by A.A. Velichko, E.E. Gurtovaia, and M.A. Faustova, Moscow, Nauka, 1989, p.137-146, In Russian. 25 refs.
Faustova, M.A.
Glaciation, Pleistocene, Paleoclimatology

44-1917
Glaciations and transgressions on the northeastern Baltic shield. [Oledeneniia i transgressii na severo-vostoke Baltiĭskogo shchita],
Tyzerov, V.IA., et al, Paleoklimaty i oledeneniia v pleistotsene (Paleoclimates and glaciation during the Pleistocene). Edited by A.A. Velichko, E.E. Gurtovaia, and M.A. Faustova, Moscow, Nauka, 1989, p.149-154, In Russian. 15 refs.
Lebedeva, R.M.
Glaciation, Pleistocene, Paleoclimatology.

44-1918
Correlation and reconstruction of Pleistocene glaciations in the Baltic region. [Korreliatsiia i rekonstruktsiia pleistotsenovykh oledenenii pribaltiĭskogo regiona],
Gaĭgalas, A.I., et al, Paleoklimaty i oledeneniia v pleistotsene (Paleoclimates and glaciation during the Pleistocene). Edited by A.A. Velichko, E.E. Gurtovaia, and M.A. Faustova, Moscow, Nauka, 1989, p.154-160, In Russian. 9 refs.
Raukas, A.V.
Glaciation, Quaternary deposits, Pleistocene, Correlation.

44-1919
Some results of the correlation of Byelorussian Pleistocene glaciations. [Nekotorye itogi korreliatsii pleistotsenovykh oledenenii Belorussii],
Astapova, S.D., et al, Paleoklimaty i oledeneniia v pleistotsene (Paleoclimates and glaciation during the Pleistocene). Edited by A.A. Velichko, E.E. Gurtovaia, and M.A. Faustova, Moscow, Nauka, 1989, p.160-165, In Russian. 13 refs.
Rylova, T.B., San'ko, A.F., Khursevich, G.K.
Pleistocene, Glaciation, Correlation.

44-1920
Indicators of Late Cenozoic ice sheets and paleoclimates in the Ukraine. [Indikatory pozdnekainozoĭskikh materikovykh oledenenii i paleoklimata na territorii Ukrainy],
Veklich, M.F., Paleoklimaty i oledeneniia v pleistotsene (Paleoclimates and glaciation during the Pleistocene). Edited by A.A. Velichko, E.E. Gurtovaia, and M.A. Faustova, Moscow, Nauka, 1989, p.167-173, In Russian. 11 refs.
Pleistocene, Paleoclimatology, Quaternary deposits, Stratigraphy.

44-1921
Correlation of glacial deposits within the European USSR using lithological data. [Problemy korreliatsii lednikovykh otlozheniĭ Evropeĭskoĭ chasti SSSR po dannym litologii],
Gaĭgalas, A.I., et al, Paleoklimaty i oledeneniia v pleistotsene (Paleoclimates and glaciation during the Pleistocene). Edited by A.A. Velichko, E.E. Gurtovaia, and M.A. Faustova, Moscow, Nauka, 1989, p.179-185, In Russian. 5 refs.
Sudakova, N.G., Maudina, M.I.
Lithology, Glacial deposits, Moraines, Pleistocene, Correlation.

44-1922
Correlation of the glacial complex in the central Russian plain based on integrated analysis. [Korreliatsiia lednikovogo kompleksa tsentra russkoĭ ravniny po dannym sopriazhennogo analiza],
Sudakova, N.G., et al, Paleoklimaty i oledeneniia v pleistotsene (Paleoclimates and glaciation during the Pleistocene). Edited by A.A. Velichko, E.E. Gurtovaia, and M.A. Faustova, Moscow, Nauka, 1989, p.185-191, In Russian. 1 ref.
Glaciation, Moraines, Pleistocene, Correlation.

44-1923
Comparative description of Late Pleistocene glacial formations and terraces of the northern Pechora Lowland and Western Siberia. [Sravnitel'naia kharakteristika pozdnepleĭstotsenovykh lednikovykh obrazovaniĭ i terras severa Pechorskoĭ nizmennosti i Zapadnoĭ Sibiri],
Lavrov, A.S., et al, Paleoklimaty i oledeneniia v pleistotsene (Paleoclimates and glaciation during the Pleistocene). Edited by A.A. Velichko, E.E. Gurtovaia, and M.A. Faustova, Moscow, Nauka, 1989, p.204-211, In Russian. 11 refs.
Potapenko, L.M.
Pleistocene, Glaciation, Terraces.

44-1924
Paleographic regionalization of the glacial zone of Western Siberia in relation to correlation questions. [Paleogeograficheskoe raĭonirovanie lednikovoĭ zony Zapadnoĭ Sibiri v sviazi s voprosami korreliatsii],
Sukhorukova, S.S., Paleoklimaty i oledeneniia v pleistotsene (Paleoclimates and glaciation during the Pleistocene). Edited by A.A. Velichko, E.E. Gurtovaia, and M.A. Faustova, Moscow, Nauka, 1989, p.211-216, In Russian. 10 refs.
Glaciation, Pleistocene, Moraines, Correlation.

44-1925
Pleistocene glaciations of the Altai-Sayan region: correlation and reconstruction. [Pleistotsenovye oledeneniia Altae-Saianskoĭ oblasti, ikh korreliatsiia i rekonstruktsiia],
Borisov, B.A., et al, Paleoklimaty i oledeneniia v pleistotsene (Paleoclimates and glaciation during the Pleistocene). Edited by A.A. Velichko, E.E. Gurtovaia, and M.A. Faustova, Moscow, Nauka, 1989, p.217-223, In Russian. 8 refs.
Minina, E.A.
Pleistocene, Glaciation, Correlation.

44-1926
Pleistocene glaciations of northeastern USSR. [Pleistotsenovye oledeneniia severo-vostoka SSSR],
Glushkova, O.IU., et al, Paleoklimaty i oledeneniia v pleistotsene (Paleoclimates and glaciation during the Pleistocene). Edited by A.A. Velichko, E.E. Gurtovaia, and M.A. Faustova, Moscow, Nauka, 1989, p.224-231, In Russian. 19 refs.
Prokhorova, T.P.
Pleistocene, Glaciation, Paleoclimatology.

44-1927
Pleistocene glaciations in the upper and middle Kolyma drainage basin. [Pleistotsenovye oledeneniia v basseĭne verkhnogo i srednego techeniia Kolymy],
Voskresenskiĭ, S.S., et al, Paleoklimaty i oledeneniia v pleistotsene (Paleoclimates and glaciation during the Pleistocene). Edited by A.A. Velichko, E.E. Gurtovaia, and M.A. Faustova, Moscow, Nauka, 1989, p.232-238, In Russian. 1 ref.
Chanysheva, M.N., Karevskaia, I.A., Voskresenskiĭ, I.S.
Pleistocene, Glaciation, River basins, Paleoclimatology.

44-1928
Ice sheet development on the arctic and subarctic continental shelves. [Razvitie lednikovykh pokrovov na kontinental'nykh shel'fakh Arktiki i Subarktiki],
Matishov, G.G., Paleoklimaty i oledeneniia v pleistotsene (Paleoclimates and glaciation during the Pleistocene). Edited by A.A. Velich. E.E. Gurtovaia, and M.A. Faustova, Moscow, Nauka, 1989, p.238-244, In Russian. 17 refs.
Glaciation, Pleistocene, Ice sheets.

44-1929
Johnny Mountain gold mine—the high art of winter construction.
Dick, R.C., *Canadian consulting engineer*, Sep.-Oct. 1989, p.54.
Cold weather construction, Mining, Ponds, Tailings, Embankments, Mountain glaciers.

44-1930
Icequakes: a model technique for liquefaction potential assessment.
Kolhn Leonoff Ltd., *Canadian consulting engineer*, Sep.-Oct. 1989, p.56.
Artificial islands, Icequakes, Ice loads, Sands, Thixotropy, Soil composition, Dynamic loads

44-1931
Presence of heavy metals in urban snow.
Sakai, H., et al, *Environmental science—Hokkaido*, Dec. 1985, 8(2), p.141-149, 21 refs.
Sasaki, T., Saito, K.
Snow impurities, Air pollution, Metals, Chemical analysis, Wind factors, Snow composition.

44-1932
Rare second year—lake ice cover in the Canadian High Arctic.
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Ice cover effect on the hydraulic characteristics of impoundment reservoirs on low-lying rivers in the example of the Wloclawek reservoir. [Wplyw pokrywy lodowej na charakterystyke hydrauliczna zbiornikow przeplywowych na rzekach nizinnych na przykladzie zbiornika Wloclawek],
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Multiple Miocene marine productivity events in West Antarctica as recorded in Upper Miocene sediments beneath the Ross Ice Shelf (Site J-9).
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Scherer, R.P., Webb, P.N.
Fossils, Algae, Paleoecology, Ice shelves, Antarctica—Ross Ice Shelf.
Diatom fragmentation, sediment reworking and microfossil assemblage mixing have led to conflicting interpretations regarding the age and depositional history of sediments collected as part of the Ross Ice Shelf Project (R.I.S.P.). This biostratigraphic approach differs from previous analyses of R.I.S.P. sediments by differentiating between microfossil assemblages recovered from the sediment matrix and from within abundant semi-indurated sediment clasts, in addition to rare reworked Paleogene and Cretaceous microfossils, 3 distinct Miocene diatom assemblages are recognized—2 from sediment clasts (middle lower Miocene and early middle Miocene) and a third restricted to matrix sediments (middle upper Miocene) No microfossils unequivocally younger than middle late Miocene are present, other than modern subice-shelf benthic foraminifera and ostracodes found in the uppermost sediments New data presented here support deposition by glacial marine processes during the middle late Miocene, an age indicated by foraminifera and the younger diatom assemblage in R.I.S.P. Reworked sedimentary clasts of diatomite suggest a highly productive, open marine environment in West Antarctica with intense productivity and limited glacial ice at sea level in the Ross Sea embayment during the middle early Miocene (Auth mod.)

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Atmospheric and depositional environments traced from unique chemical compositions of the snow over an inland high plateau, Antarctica.
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Surface snow samples from the inland high plateau, eastern Queen Maud Land, are characterized by high acidity accompanying the high electrical conductivity, so that the hydrogen ion is the dominant ion, coupling with chloride and nitrate ions. The chemical composition differs sharply from sea salts The tritium content increases in the inland high area, especially in the region higher than 3600 m above sea level, in the vertical profile at a snow pit which corresponds to the snow deposition in 1966. Results suggest that most of the ions contained in snow samples from the inland high plateau, especially higher than 3600 m, are not brought directly through the troposphere from the sea around Antarctica but from the higher atmosphere and that they are under the influence of the physicochemical reactions occurring there. (Auth mod)

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Sedimentation beneath ice shelves—the view from ice stream B.
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Sediment transport, Ice shelves, Glacial deposits, Rheology, Antarctica—Ross Ice Shelf.
Evidence from ice stream B, draining into the Ross Ice Shelf of West Antarctica, suggests that the rapid ice velocity arises from deformation of a several-meter-thick, water-saturated basal till layer that is eroding an unconformity on sediments beneath and that has deposited a "till delta" tens of meters thick and tens of kilometers long at the grounding line Sea-level fall would cause "conveyor belt" recycling of this till delta and grounding-line advance across the Ross Sea to the edge of the continental shelf, forming an ice sheet with a low, ice-stream profile resting on a several meter thick deforming till layer eroding an unconformity The modern Ross Sea is characterized by a regional unconformity overlain by a diamicton of probable latest Pliocene-Pleistocene age measuring several meters to tens of meters thick. It is hypothesized that this diamicton is a deformed glacial till and that the Ross Sea sediments record one or more expansions of the till-lubricated West Antarctic ice sheet to the edge of the continental shelf. (Auth. mod.)

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Sea ice, Ice breaking, Impact tests, Flexural strength, Ice cover thickness, Antarctica—McMurdo Sound.
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Cryogenic soils, Frozen ground temperature, Soil water, Unfrozen water content, Moisture, Statistical analysis.

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Thermal conductivity, Meadow soils, Soil water, Moisture, Density (mass/volume), Heat transfer coefficient, Nomographs

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Long range forecasting, Thermal regime, Thermal properties, Snow cover effect, Soil temperature, Soil physics, Air temperature.

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44-2039
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Tesaker, E., Ice Seminar, Warsaw, Apr. 10-14, 1989. Proceedings. Edited by M. Bagińska and W. Majewski, Gdańsk, 1989, p.233-245, 3 refs.
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Salinity, Hydrography, Ocean currents, Surface temperature, Ice edge, Greenland Sea, Norwegian Sea.

44-2042
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Ice edge, Upwelling, Ice water interface, Ocean currents, Oceanographic surveys, Sea ice distribution, Mathematical models, Canada—Newfoundland.

44-2046
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Manak, D.K., et al, *Atmosphere-ocean*, Dec. 1989, 27(4), p.682-691, With French summary. 13 refs.
Mysak, L.A.
Sea ice distribution, Ice air interface, Ice forecasting, Marine meteorology, Air temperature, Ice water interface, Ice edge, River flow.

44-2047
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Barry, R.G., ed.
Bibliographies, Ice cores, Permafrost.
This report contains an extensive bibliography of ice core studies for 1980-1989 worldwide and a summary of a workshop on permafrost literature reviews. The ice core bibliography, which includes studies of 55 core sites in Antarctica, is divided into nine subject categories: chemistry, drill technology, general, miscellaneous related topics, particulates, physical and mechanical properties, radio isotopes, stable isotopes, and trapped gas composition.

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Chichagov, V.P., ed.
Correlation, Geomorphology, Paleoclimatology, Moraines, Pleistocene, Glacier formation, Terraces, Shores.

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Correlation, Geomorphology, Moraines, Pleistocene.

44-2051
Geomorphological correlation of marginal ice zones, lake shore formation and river terraces of the Pskov-Chudskoye basins. (Geomorfologicheskaia korreliatsiia kraevykh lednikovykh zon, ozernykh beregovykh obrazovaniĭ i rechnykh terras Pskovsko-Chudskoĭ vpadiny),
Raukas, A.V., et al, Problema geomorfologicheskoĭ korreliatsii (Problem of geomorphological correlation). Edited by D.A. Timofeev and V.P. Chichagov, Moscow, Nauka, 1989, p.208-217, In Russian. 19 refs.
Karukiapp, R.IA., Tavast, E.Kh., Khang, T.E.
Correlation, Geomorphology, Terraces, Shores, Glacier formation.

44-2052
Physicochemical processes in the cryolithozone. (Fiziko-khimicheskie protsessy v kriolitozone),
Mel'nikov, P.I., et al, *Geologiia i geofizika*, July 1989, No.7, p.3-8, In Russian with English summary 15 refs.
Mel'nikov, V.P., Tsarev, V.P.
Saturation, Frozen rocks, Geocryology, Hydrates.

44-2053
Physical properties of carbonate rocks in Western Yakutia based on results of measurements of a naturally-frozen drill core. (Fizicheskie svoĭstva karbonatnykh porod Zapadnoĭ IAkutii po dannym izmereniĭ na estestvenno-merzlom kerne),
Bondarenko, A.T., et al, *Geologiia i geofizika*, July 1989, No.7, p.121-128, In Russian with English summary. 17 refs.
Kovalev, IU.D., Stogova, V.A.
Frozen rocks, Measurement, Drill core analysis.

44-2054
Sorption concentration of mercury (II) on silica gel chemically modified with 2,5-dimerkapto-1,3,4-thiadiazole. (Sorbtsionnoe kontsentrirovanie rtuti (II) silikageliem, khimicheski modifitsirovanny, 2,5-dimerkapto-1,3,4-tiadiazolom),
Simonova, L.N., et al, *Zhurnal analiticheskoĭ khimii*, June 1987, 42(6), p.1047-1050, In Russian with English summary. 7 refs.
Kudriavtsev, G.V., Briskina, I.M., Ispravnikova, V.V.
Snowmelt, Meltwater, Snow physics, Chemical analysis.

44-2055
Changes in the glacier cover of Severnaya Zemlya in the twentieth century.
Govorukha, L.S., et al, *Polar geography and geology*, Oct.-Dec. 1987, 11(4), p.300-305, 12 refs. For Russian original see 42-2479.
Maps, Mountain glaciers, Glacier mass balance, Glacier ice, Ice volume.

44-2056
Amplification of acoustic waves during rapid crystallization.
Nesterov, A.I., et al, *Soviet physics· solid state*, Jan. 1988, 30(1), p.103-104, 14 refs. Translated from Fizika tverdogo tela.
Ovchinnikov, S.G.
Sound waves, Shock waves, Ice cracks, Analysis (mathematics).

44-2057
Dynamics of Bjerrum defects and the proton conduction in a one-dimensional model of ice.
Sergienko, A.I., *Soviet physics solid state*, Mar 1988, 30(3), p.496-498, 13 refs. Translated from Fizika tverdogo tela. For another version see 42-2666.
Ice electrical properties, Electrical resistivity, Ice models, Water structure, Molecular structure, Protons

44-2058
Light attenuation matrices for certain types of ice.
Bogorodskiĭ, V.V., et al, *Optics & spectroscopy*, Mar. 1987, 62(3), p.361-363, 3 refs. Translated from Optika i spektroskopiia.
Volodin, E.S.
Ice crystals, Attenuation, Light scattering, Polarization (waves), Ice crystal structure.

44-2059
Global annual snow accumulation by months
Schutz, C., et al, *Rand note*, Feb 1988, No.N-2687-RC, 85p., 35 refs.
Bregman, L.D.
DLC QC929.S7S38 1988
Snow accumulation, Snow cover distribution, Meteorological data, Seasonal variations, Snow depth
A pseudoclimatology of monthly snow accumulations was developed at RAND for the 4 deg latitude by 5 deg longitude grid points through the data-sparse areas of China, Greenland, the Arctic basin, and the Antarctic. The methodology included an empirical evaluation of many regularly observed weather variables, including precipitation and temperature, taking into account cyclone tracks, weather source regions, and other items Air mass modification as related to latitude and terrain was also considered It is found that in the middle of the antarctic continent, about 150 mm of snow and rime accumulate annually throughout the entire plateau. No effort was made to scale down this area toward the central plateau. (Auth mod)

44-2060
Determination of one or two unknown thermal coefficients of a semi-infinite material through a two-phase Stefan problem.
Stampella, M.B., et al, *International journal of engineering science*, 1989, 27(11), p.1407-1419, 38 refs.
Tarzia, D.A.
Solids, Stefan problem, Melting, Solid phases, Liquid phases, Analysis (mathematics), Phase transformations, Thermal properties

44-2061
Ice warning systems cut the cost of winter maintenance.
Halverson, D., *Surveyor*, Jan. 16, 1986, 166(4877), p.8-9.
Warning systems, Ice detection, Telecommunication, Safety, Winter maintenance.

44-2062
Advances in winter maintenance techniques.
Farquhar, B., *Municipal journal*, Oct. 1984, 92(42), p.1631
Ice detection, Machinery, Snow removal, Ice prevention, Salting, Winter maintenance

44-2063
Development of new steel and welding procedure for hull structure of ice breaking vessels.
Toyosada, M., et al, *Naval architecture and ocean engineering*, 1986, Vol.24, p.199-210, 16 refs
Icebreakers, Welding, Mechanical properties, Materials, Performance, Steel structures, Specifications, Chemical composition, Mechanical tests.

44-2064
Guide for building and classing steel vessels intended to navigate in ice.
American Bureau of Shipping, Paramus, NJ, 1986, 50p.
DLC VM287.A45 1986b
Icebreakers, Design criteria, Standards, Specifications, Ships, Ice loads, Structural analysis, Construction, Steels.

44-2065
Geomorphic processes on scree slopes during winter in Gaspésie, Quebec. [La dynamique des éboulis schisteux au cours de l'hiver, Gaspésie septentrionale, Québec],
Hétu, B., et al, *Géographie physique et Quaternaire*, 1989, 43(3), p.389-406, In French with English and German summaries. 61 refs.
Vandelac, P.
Talus, Slope processes, Sediment transport, Climatic factors, Snow mechanics, Avalanches, Geologic processes, Glaze, Canada—Quebec—Gaspésie.

44-2066
Pandemonium Creek rock avalanche, British Columbia.
Evans, S.G., et al, *Canadian geotechnical journal*, Aug. 1989, 26(3), p.427-446, With French summary. 43 refs.
Clague, J.J., Woodsworth, G.J., Hungr, O
Avalanche mechanics, Sediment transport, Rock mechanics, Mass movement (geology), Mountains, Glacial deposits, Velocity, Canada—British Columbia—Coast Mountains

44-2067
Arctic oases.
Struzik, E., *Equinox*, Nov.-Dec. 1989, 8(6), p.38-49.
Polynyas, Ecosystems, Exploration, Polar regions, Ocean environments.

44-2068
Landscape-geochemical analysis of frozen-taiga geosystems. [Landshaftno-geokhimicheskiĭ analiz merzlotno-taezhnykh geosistem],
Shchetnikov, A.I., Novosibirsk, Nauka, 1989, 127p., In Russian. Refs. p.119-127.
Taiga, Cryogenic soils, Sediments, Geochemistry, Landscape types, Surface waters, Soil composition, Soil chemistry, Microelement content, Models, River basins.

44-2069
Studies on periglacial landscape formation in Finnmark (northern Norway). [Studien zur periglaziären Landschaftsformung in Finnmark (Nordnorwegen)],
Meier, K.D., *Geographische Gesellschaft zu Hannover. Jahrbuch. Sonderheft*, 1987, No.13, 298p., In German with English summary. Refs. p.194-226.
Periglacial processes, Landscape types, Geological surveys, Topographic surveys, Landforms, Geomorphology, Frost mounds, Norway—Finnmark

44-2070
Glacial Lake Wisconsin.
Clayton, L., et al, *Geological Society of America. Memoirs*, 1989, No.173, 80p., 49 refs.
Attig, J.W.
DLC QE3.5.P3C53 1989
Glacial lakes, Glaciation, Paleoclimatology, Pleistocene, Geochronology, Geomorphology, Lacustrine deposits, Glacial deposits, United States—Wisconsin.

44-2071
Neutrino astronomy.
Halzen, F., et al, American Institute of Physics Conference proceedings, No.198. Astrophysics in Antarctica. Edited by D.J. Mullan, M.A. Pomerantz, and T. Stanev, New York, American Institute of Physics, 1989, p.39-51, 18 refs.
Learned, J., Stanev, T.
Neutron probes, Gamma irradiation, Ice optics, Ice sheets, Microwaves, Experimentation, Electronic equipment, Antarctica—Amundsen-Scott Station.
The arguments are reviewed supporting the claim that the observation of PeV gamma rays from cosmic sources, and the flux levels recently reported, guarantee the detection of neutrinos by detectors with an effective area of order 1 sq km. The unique opportunities of neutrino astronomy are emphasized, as well as its multi-disciplinary facets touching astronomy, astrophysics, cosmology, and particle physics At present, no cost-effective method to commission neutrino telescopes with O (1 sq km) effective area is known. Attention is drawn to the possibility of instrumenting antarctic ice as a deep underground telescope detecting Cerenkov, radio or acoustic radiation from neutrino-induced electromagnetic showers (Auth)

44-2072
ICEMAN: microwave detection of ultra-high energy neutrinos in ice.
Ralston, J.P., et al, American Institute of Physics Conference proceedings, No.198. Astrophysics in Antarctica. Edited by D.J. Mullan, M.A. Pomerantz, and T. Stanev, New York, American Institute of Physics, 1989, p.52-60, 10 refs.
McKay, D.W.
Neutron probes, Gamma irradiation, Ice optics, Ice sheets, Electronic equipment, Microwaves, Experimentation, Antarctica Amundsen-Scott Station
A muon from an ultra-high energy neutrino interaction produces an electromagnetic shower of considerable length. Coherent Cerenkov emission at microwave frequencies from the electric charge imbalance developing in such a shower serves as an efficient signal of the event Detecting is discussed of upward going UHE neutrinos in the antarctic ice by detecting this microwave signal with comparatively cheap and simple antennas located on the ice surface. It is concluded that a pilot experiment to measure UHE neutrinos from point sources such as Cygnus X-3 is feasible. (Auth)

44-2073
New ideas in South Pole experiments.
Seckel, D., American Institute of Physics Conference proceedings, No.198. Astrophysics in Antarctica. Edited by D.J. Mullan, M.A. Pomerantz, and T. Stanev, New York, American Institute of Physics, 1989, p.61-63, 3 refs.
Experimentation, Neutron probes, Gamma irradiation, Antarctica—Amundsen-Scott Station
Most of the discussions in the New Ideas workshop centered around the role of antarctic ice as shield, target and detector in high energy cosmic ray experiments Experiments measuring gravitational gradients in ice are also discussed

44-2074
Physico-geological modeling of the upper profile under permafrost conditions. [Fiziko-geologicheskoe modelirovanie verkhneĭ chasti razreza v usloviiakh mnogoletneĭ merzloty],
Tabulevich, V.N., ed, Novosibirsk, Nauka, 1989, 128p., In Russian. Refs. p.124-128.
Geocryology, Soil composition, Frozen ground physics, Seismic velocity, Wave propagation, Mathematical models, Seasonal freeze thaw.

44-2075
Technology of industrial construction using cast-in-situ concrete. [Tekhnologiia industrial'nogo stroitel'stva iz monolitnogo betona],
Ataev, S.S., Moscow, Stroĭizdat, 1989, 335p., In Russian with English summary. 50 refs.
Winter concreting, Cold weather construction, Concrete admixtures, Surface temperature, Air temperature.

44-2076
Thermodynamics of irreversible processes applied to ice.
Jaccard, C., *Physik der kondensierten Materie*, 1964, 3(2), p.99-118, With French and German summaries. 18 refs.
Ice microstructure, Ice electrical properties, Proton transport, Ice physics, Latticed structures, Ion exchange, Thermodynamics, Analysis (mathematics), Ice models.

44-2077
Proceedings, Vol.5.
International Conference on Offshore Mechanics and Arctic Engineering, 9th, Houston, TX, Feb 18-23, 1990, New York, American Society of Mechanical Engineers, 1990, 198p., Refs. passim. For selected papers see 44-2078 through 44-2081
Pipelines, Loads (forces), Strength, Analysis (mathematics), Meetings, Pipes (tubes), Hydraulic structures, Underground pipelines

44-2078
High-toughness age-hardenable copper-bearing steel for large-diameter line pipe.
Tamehiro, H., et al, International Conference on Offshore Mechanics and Arctic Engineering, 9th, Houston, TX, Feb. 18-23, 1990. Proceedings, Vol.5, New York, American Society of Mechanical Engineers, 1990, p.13-20, 6 refs.
Nishioka, K., Murata, M., Kawada, Y., Takahashi, A.
Pipelines, Steels, Pipes (tubes), Cold tolerance, Low temperature tests.

44-2079
Case history of the first pipeline installed in the Arctic and subsequent developments.
Brown, R.J., International Conference on Offshore Mechanics and Arctic Engineering, 9th, Houston, TX, Feb. 18-23, 1990. Proceedings, Vol.5, New York, American Society of Mechanical Engineers, 1990, p.165-172.
Pipelines, Pipe laying, Hydraulic structures, Cold weather construction.

44-2080
Analysis of reliability of pol pipelines.
Kharionovskiĭ, V.V., International Conference on Offshore Mechanics and Arctic Engineering, 9th, Houston, TX, Feb. 18-23, 1990. Proceedings, Vol.5, New York, American Society of Mechanical Engineers, 1990, p.173-177, 3 refs.
Underground pipelines, Bearing strength, Permafrost beneath structures, Frost heave, Analysis (mathematics).

44-2081
Ice scour models.
Been, K., et al, International Conference on Offshore Mechanics and Arctic Engineering, 9th, Houston, TX, Feb. 18-23, 1990. Proceedings, Vol.5, New York, American Society of Mechanical Engineers, 1990, p.179-188, 10 refs.
Kosar, K., Hachey, J., Rogers, B.T., Palmer, A.C.
Ice scoring, Pipelines, Ice models, Mathematical models, Bottom topography.

44-2082
Guidelines for weather, snowpack and avalanche observations. *National Research Council, Canada Associate Committee on Geotechnical Research Technical memorandum,* 1989, No 132, 49p., NRCC No.30544, 6 refs.
Weather observations, Avalanche forecasting, Snow cover stability, Avalanche formation, Avalanche tracks.

44-2083
Action of sea ice on near-shore bottom sediment in the Beaufort Sea (NWT, Canada). [Action de la glace de mer sur les fonds sédimentaires pré-littoraux de la mer de Beaufort (NWT, Canada)],
Héquette, A., *Centre de géomorphologie de Caen. Bulletin,* July 1989, No 36, p.129-133, In French with English summary. 8 refs.
Ice scoring, Bottom sediment, Shore erosion, Ice erosion, Ice push, Ice pileup, Beaufort Sea.

44-2084
Forecasting of superstructure icing for Alaskan waters.
Feit, D.M., *National weather digest,* May 1987, 12(2), p.5-10, 17 refs.
Superstructures, Ice accretion, Ice forecasting, Ship icing, Marine meteorology, Icing rate, Wind factors, United States—Alaska.

44-2085
Aid to forecasting heavy snowfall episodes.
Auer, A.H., Jr., *National weather digest,* May 1987, 12(2), p.11-14, 2 refs.
Snowfall, Forecasting, Air flow, Air temperature, Precipitation (meteorology), Atmospheric pressure.

44-2086
Major Arctic outbreaks affecting Louisiana.
Mortimer, E.B., et al, *National weather digest,* Feb. 1988, 13(1), p.5-14, 5 refs
Johnson, G.A., Lau, H W N
Frost forecasting, Air masses, Air temperature, Atmospheric pressure, Periodic variations, Records (extremes), Air flow, Climatology, United States—Louisiana

44-2087
Predicting severe agricultural freezes.
Brotak, E.A., *National weather digest,* Feb 1988, 13(1), p.15-19, 9 refs.
Frost forecasting, Wind factors, Air masses, Agriculture, Synoptic meteorology, Atmospheric pressure, Periodic variations, Records (extremes)

44-2088
DDT II: computerized lake-effect snow forecasts.
Dockus, D.F. *National weather digest,* Aug 1988, 13(3), p.18-29, 2 refs.
Snowfall, Snow accumulation, Forecasting, Lake effects, Precipitation (meteorology), Synoptic meteorology, Computer applications, Wind factors, Great Lakes.

44-2089
Magic chart for forecasting snow amounts.
Chaston, P.R., *National weather digest,* Feb 1989, 14(1), p.20-22, 1 ref.
Snowfall, Snow depth, Snow accumulation, Weather forecasting, Synoptic meteorology, Humidity, Atmospheric pressure.

44-2090
Normality and variability of seasonal snowfall in the eastern two-thirds of the United States.
Faiers, G.E., *National weather digest,* Feb. 1989, 14(1), p.23-25, 5 refs.
Snow accumulation, Seasonal variations, Meteorological data, Weather forecasting, Climatology.

44-2091
Refractive index structure parameter for a year over the frozen Beaufort Sea.
Andreas, E.L., *Radio science,* Sep.-Oct. 1989, 24(5), MP 2575, p.667-679, 50 refs.
Ice surface, Floating ice, Refractivity, Light transmission, Atmospheric attenuation, Electromagnetic properties, Seasonal variations, Ice heat flux, Statistical analysis, Wave propagation, Beaufort Sea.

44-2092
Ice detection system for roads could save money and lives.
Edwards, B.D., *Municipal journal,* Oct 19, 1984, 92(42), p.1626.
Ice detection, Roads, Meteorological factors, Electronic equipment, Safety, Surface properties.

44-2093
Kinetic energy transfer through impact and its role in entrainment by wind of particles from frozen surfaces.
Neuman, C.M., *Sedimentology,* Dec. 1989, 26(6), p.1007-1015, 20 refs.
Frozen ground strength, Particles, Wind factors, Abrasion, Surface structure, Eolian soils, Impact tests, Sediment transport, Particle size distribution.

44-2094
Basal ice formation and deformation: a review.
Hubbard, B., et al, *Progress in physical geography,* Dec. 1989, 13(4), p.529-558, Refs. p.553-558.
Sharp, M.
Glacier ice, Ice formation, Glacier beds, Ice composition, Subglacial observations, Glaciology, Rheology, Glacier flow, Basal sliding, Isotope analysis, Ice deformation, Ice accretion, Substrates.

44-2095
Iceman cometh.
McClellan, J.M., *Flying,* Dec. 1988, 115(12), p.56-60.
Aircraft icing Ice forecasting, Countermeasures, Safety.

44-2096
Operating a power station in arctic conditions.
Feit, E., *Diesel & gas turbine worldwide,* Dec. 1989, 21(10), p 38-41.
Diesel engines, Electric equipment, Cold weather operation, Electric power.

44-2097
Variations of Italian glaciers, 1985-1986. [Variazioni dei ghiacciai italiani 1985-1986],
Zanon, G., comp, *Geografia fisica e dinamica quaternaria,* 10 7, 10(2), p.229-276, In Italian.
Armando, E., Smiraglia, C.
Glacier oscillation, Glacier surveys, Glacier surfaces, Measurement, Italy.

44-2098
Geomorphological and glaciological investigations in Victoria Land (Second expedition of the Italian Antarctic Research Program, 1986-1987). [Indagini geomorfologiche e glaciologiche nella Terra Vittoria (Seconda spedizione del Programma Nazionale di Richerche in Antartide, 1986-1987)],
Baroni, C., et al, *Geografia fisica e dinamica quaternaria,* 1987, 10(2), p.321-336, In Italian with English summary 24 refs.
Orombelli, G.
Glacial geology, Glacier mass balance, Glacier oscillation, Antarctica—Terra Nova Bay, Antarctica—Victoria Land
During the 2nd Italian Antarctic Expedition, 1986-87, geomorphological and glaciological research concerning Cenozoic glacial deposits, Holocene glacier fluctuations and Holocene raised beaches was carried out Three main glacial drifts have been recognized the oldest being associated with well developed red paleosol The youngest drift all along the coastal belt is composed of till with a muddy matrix, locally rich in fragments of Pelecypods and Serpulids deposited by a grounded ice shelf At Black Ridge a lateral moraine is present marking the boundary between the youngest and the older drifts, elsewhere identifiable only by weathering evidences. Holocene raised beaches have been observed along the coast of Wood Bay, up to an elevation of about 7 m Numerous new samples of organic remains associated with the raised beaches have been collected C-14 ages (not corrected) range from 5,770 B.P to the present Preliminary glaciological observations and measurements have been conducted on Strandline Glacier and a geomorphological map at a scale 1:10,000 has been surveyed for an area of the Northern Foothills near the Italian station. (Auth mod.)

44-2099
Strandline Glacier, Terra Nova Bay, Antarctica. [Il Ghiacciaio Strandline (Baia Terra Nova, Antartide)],
Baroni, C., et al, *Geografia fisica e dinamica quaternaria,* 1987, 10(2), p.337-350, In Italian with English summary. 22 refs.
Orombelli, G.
Glacier surveys, Moraines, Geomorphology, Glacial geology, Antarctica—Terra Nova Bay.
The Strandline Glacier is a small local alpine glacier (0.79 sq km) on the coast of Gerlache Inlet, Terra Nova Bay It is a cold glacier with accumulation and ablation areas controlled by wind and irregularly distributed The main ablation area coincides with the terminal convex zone, crossed by transverse and splaying crevasses The AAR is about 0.8 The front of the glacier in the central part is an ice cliff 25 m high, changing laterally into a short dome and ramp margin The foliation is well evident along the frontal margin, showing a syncline structure A small and discontinuous apron of snow and ice is present at the foot of the ice cliff. Inner moraines, ice cored moraines and a sheet of basal melt out till (sublimation till) are present along the marginal zone, partially resting on Holocene raised beaches Two Holocene ice advances, possibly younger than 4,500 yr B.P., can be recognized. The front of the glacier advanced more than 60 m the first time and about 50 m the second time, the two advances being separated by a consistent lapse of time, judging from weathering and lichen development. The glacier is presently in a retreat phase, although small push moraines near the front document minor recent advances (Auth)

44-2100
Moisture distribution in wastewater sludges.
Tsang, K.W.R., Durham, NC, Duke University, 1989, 170p., University Microfilms order No.AAD90-01073, Ph.D. thesis. For abstract see Dissertation abstracts international, Sec. B, June 1989, p.3665.
Sludges, Moisture, Freeze thaw cycles, Sanitary engineering.

44-2101
Alpine proglacial fluvial sediment transfer.
Warburton, J., University of Southampton, England, 1989, 471p., University Microfilms order No.AADX-86445, Ph.D. thesis. For abstract see Dissertation abstracts international, Sec. B, June 1989, p.3366.
Sediment transport, Glacial deposits, Ablation.

44-2102
Using systems analysis for modeling optimal regimes in operating natural gas production installations. [Sistemnoe modelirovanie optimal'nykh rezhimov ekspluatatsii ob"ektov dobychi prirodnogo gaza],
Korotaev, IU P., et al, Moscow, Nedra, 1989, 263p., In Russian. 55 refs.
Tagiev, V.G., Kergedava, Sh.K.
Natural gas, Cold weather operation, Gas production, Mathematical models.

44-2103
Record of Holocene summer climate from a Canadian high-arctic ice core.
Koerner, R.M., et al, *Nature,* Feb. 15, 1990, 343(6259), p.630-631, 32 refs.
Fisher, D.A.
Ice cores, Snow melting, Climatic changes, Canada—Northwest Territories—Ellesmere Island.

44-2104
Estimates of antarctic precipitation.
Bromwich, D.H., *Nature,* Feb. 15, 1990, 343(6259), p.627-629, 23 refs.
Precipitation (meteorology), Measurement, Moisture transfer, Snow water content, Antarctica.
Precipitation fluctuations over Antarctica are a potentially important contributor to variations in global sea level. Direct measurement of precipitation is, however, fraught with practical difficulties Two methods may be used to calculate indirectly the net flux of water (precipitation minus sublimation rate) to the surface of Antarctica: the first uses values of poleward atmospheric moisture transport obtained from climatological studies, and the second uses glaciological measurements of the accumulation rate Here it is shown that the two estimates so derived are in marked disagreement for the entire continent but concur for the interior area between 80S and the pole It is concluded that the large discrepancy near the coast is due to a calculated poleward moisture transport that is smaller than the actual value, as a result of deficiencies in evaluating the effects of cyclones and surface winds at the coast Improvements in the climatological atmospheric database should therefore make possible reliable estimates of antarctic precipitation variations. (Auth.)

44-2105
Waste management practices of the United States Antarctic Program.
Reed, S.C., et al, *U.S. Army Cold Regions Research and Engineering Laboratory,* Feb. 1989, SR 89-3, 28p., ADA-205 560, 20 refs.
Sletten, R.S.
Waste treatment, Waste disposal, Water supply, Antarctica.
The United States operates research facilities in Antarctica, at Coastal locations, inland sites, and on the interior snowfield. This report documents the results of 1988 investigations and evaluations of present waste management practices at these stations and recommends future action. In addition to liquid and solid waste management, the report discusses related water supply issues. (Auth.)

44-2106
One-half millennia of tropical climate variability as recorded in the stratigraphy of the Quelccaya ice cap, Peru.
Thompson, L.G., et al, *American Geophysical Union. Geophysical monographs,* 1989, No.55, p.15-31, 37 refs.
Mosley-Thompson, E.
Ice cores, Climatic changes, Paleoclimatology, Drill core analysis, Isotope analysis, Peru.

44-2107
Barrow Arch environment and possible consequences of planned offshore oil and gas development: proceedings of a synthesis meeting held at Girdwood, AK, Oct. 30-Nov. 1, 1983.
Truett, J.C., ed, Outer Continental Shelf Environmental Assessment Program, Anchorage, U.S National Oceanic and Atmospheric Administration, Aug. 1984, 229p., PB85-202240, Refs passim
Oil spills, Environmental impact, Water pollution, Petroleum industry, United States—Alaska—Barrow.

44-2108
Sources, fates and effects of aromatic hydrocarbons in the Alaskan marine environment with recommendations for monitoring strategies.
Anderson, J.W., et al, *U.S. Environmental Protection Agency*, Mar. 1986, EPA/600/3-86/018, 123p., PB86-168291, Refs p.99-123
Neff, J.M., Boehm, P.D
Hydrocarbons, Water pollution, Oil spills, Ocean environments, Environmental impact, Marine biology, United States—Alaska

44-2109
ROOFER: a management tool for maintaining built-up roofs.
Bailey, D.M , et al, *U.S. Army Construction Engineering Research Laboratory. Technical manuscript*, Oct 1989, CERL-M-90/02, MP 2576, 9p., ADA-214 032, 5 refs. For another source see 43-2691.
Brotherson, D.E., Tobiasson, W.
Roofs, Maintenance, Military facilities.
This paper describes ROOFER, a roofing maintenance management system for built-up roofs being developed by the U S Army Construction Engineering Research Laboratory with the assistance of the U S Army Cold Regions Research and Engineering Laboratory and the U S Army Engineering and Housing Support Center ROOFER provides building managers with a practical tool for evaluating built-up roofs, determining maintenance priorities, and selecting repair strategies that ensure the maximum return on investment. ROOFER comprises procedures for dividing the building roof into manageable sections, collecting and managing inventory information, inspecting and evaluating condition, and managing networks and projects.

44-2110
Alternative methods of using STB for decontamination at low temperatures.
Walsh, M.E , et al, *U S Army Cold Regions Research and Engineering Laboratory*, Sep. 1989, SR 89-33, 13p., ADB-139 077, 7 refs.
Parker, L.V.
Surfactants, Pollution, Military research, Military equipment, Cold weather operation, Cold weather tests, Countermeasures, Waste disposal.
Alternative methods of using STB (Super Tropical Bleach) for cold weather decontamination of metal surfaces were investigated Surfaces contaminated with the chemical agent simulant, Bis, were treated with STB, fuller's earth, snow and diesel fuel, separately or in combination Of the decontaminants tested, STB mixed with snow and diesel fuel achieved the max imum neutralization

44-2111
Curtailing usage of de-icing agents in winter maintenance. Paris, Organisation for Economic Co-operation and Development, 1989, .25p., 70 refs
Chemical ice prevention, Road maintenance, Winter maintenance, Road icing.

44-2112
Snow and avalanches in the Swiss Alps, winter 1987-88. [Schnee und Lawinen in den Schweizer Alpen, Winter 1987/88]. *Davos, Switzerland. Eidgenössisches Institut fur Schnee- und Lawinenforschung. Winterberichte*, 1989, No.52, 156p., In German.
Avalanches, Snow accumulation, Snowfall, Snow depth, Avalanche formation, Accidents, Damage, Snow cover stability, Switzerland Alps.

44-2113
Groundwater resources protection from drilling waste, Northwest Territories and Yukon.
Piteau Engineering Ltd., *Canada. Department of Indian and Northern Affairs. Environmental studies*, 1989, No.62, 93p., With French summary. 94 refs.
Ground water, Water pollution, Waste disposal, Drilling, Oil spills, Environmental protection, Canada—Yukon Territory, Canada—Northwest Territories

44-2114
Pre-development distribution patterns of cesium-137, uranium and companion elements in lichen heath near Baker Lake N.W.T.
Kershaw, K.A., et al, *Canada. Department of Indian and Northern Affairs. Environmental studies*, 1989, No 63, 42p., With French summary. 29 refs.
Thieboer, E., Webber, C.E., Looney, J.H.H., Stetsko, P.I.
Air pollution, Fallout, Radioactive wastes, Monitors, Lichens, Mining, Canada—Northwest Territories—Baker Lake.

44-2115
Density-functional theory for the freezing of water.
Ding, K , et al, *Physical review letters*, Oct. 12, 1987, 59(15), p.1698-1701, 13 refs.
Chandler, D., Smithline, S.J., Haymet, A.D.J.
Water structure, Freezing, Phase transformations, Ice density, Theories, Lattice models, Proton transport, Liquids.

44-2116
Structure of high-density amorphous water. II. Neutron scattering study.
Bellissent-Funel, M.C., et al, *Journal of chemical physics*, Aug. 15, 1987, 87(4), p.2231-2235, 13 refs.
Teixeira, J., Bosio, L.
Water structure, Amorphous ice, Ice density, Statistical analysis, High pressure ice, Neutron scattering, Molecular structure, Ice physics.

44-2117
Characterization of CO2-CH4-H2O fluid inclusions by microthermometry and laser Raman microprobe spectroscopy: inferences for clathrate and fluid equilibria.
Seitz, J.C., et al, *Geochimica et cosmochimica acta*, June 1987, 51(6), p.1651-1664, 42 refs.
Pasteris, J.D., Wopenka, B.
Clathrates, Chemical composition, Temperature measurement, Artificial nucleation, Fluid dynamics, Low temperature tests, Spectroscopy.

44-2118
Frost bitten.
Owings, T., *Flying*, Mar. 1987, 114(3), p.110.
Aircraft icing, Weather observations, Ice accretion, Physical properties, Safety.

44-2119
Weather satellite views iceberg.
Brandli, H.W., *National weather digest*, May 1988, 13(2), p.16.
Icebergs, Spaceborne photography, Iceberg towing, Water supply, Antarctica—Ross Ice Shelf.
This note includes and describes a satellite photograph, made by the Defense Meteorological Satellite in Nov of 1987, of a large iceberg calved from the Ross Ice Shelf in Antarctica The article suggests the utility of satellites in locating icebergs suitable for towing to temperate regions for use as a fresh water resource

44-2120
Development of tugs for operation in the Canadian western Arctic.
Mattsor, J., *Diesel & gas turbine worldwide*, Apr 1989, 21(3), p.52-53. Condensed version of a paper presented at 10th International Tug Convention, Sydney, 1988.
Icebreakers, Design criteria, Polar regions, Marine transportation.

44-2121
Density-functional theory of freezing for quantum systems: the Wigner crystallization.
Senatore, G., et al, *Physical review letters*, Jan. 15, 1990, 64(3), p.303-306, 23 refs.
Pastore, G.
Freezing, Liquid phases, Physical properties, Theories, Lattice models, Ice physics, Thermodynamics, Crystals.

44-2122
Simple apparatus for maintaining low temperature.
Ansari, M.S., et al, *Journal of chemical education*, Feb. 1989, 66(2), p.180, 3 refs.
Saleem, M.
Instruments, Temperature control, Laboratory techniques, Low temperature research.

44-2123
Salt redistribution during freezing of saline sand columns at constant rates.
Baker, G.C., et al, *Water resources research*, Aug. 1989, 25(8), p.1825-1831, 24 refs.
Osterkamp, T.E.
Soil freezing, Saline soils, Chemical properties, Soil water, Ice solid interface, Electrical resistivity, Soil tests, Brines, Freezing rate.

44-2124
Uncertainties in streamflow measurement under winter ice conditions—a case study: the Red River at Emerson, Manitoba, Canada.
Pelletier, P.M., *Water resources research*, Aug. 1989, 25(8), p.1857-1867, 23 refs For another version see 44-255.
Stream flow, Flow measurement, Subglacial observations, Measuring instruments, Accuracy, Velocity measurement, Canada—Manitoba—Red River

44-2125
Ion elution through shallow homogeneous snow.
Bales, R.C., et al, *Water resources research*, Aug. 1989, 25(8), p.1869-1877, 34 refs.
Davis, R.E., Stanley, D.A.
Ion diffusion, Snow composition, Meltwater, Chemical analysis, Snow impurities, Snow cover, Ice vapor interface, Freeze thaw cycles.

44-2126
Estimating the features of maximum spring runoff of unexplored rivers and intermittent streams in the southwest of the Ukraine and Moldavia. [Otsenka kharakteristik maksimal'nogo vesennego stoka neizuchennykh rek i vremennykh vodotokov iugo-zapada USSR i MSSR],
Fomenko, IA.A., et al, *Kiev. Ukrainskii regional'nyi nauchno-issledovatel'skii gidrometeorologicheskii institut. Trudy*, 1988, Vol.228, p.19-33, In Russian. 8 refs.
Kulachinskaia, L.N., Il'ina, T.A.
Runoff forecasting, Snow water equivalent, Rivers, Streams, Snow depth, Frozen ground.

44-2127
Calculating the effect of karst on water reserves in the Severskiy Donets River basin. [Ob uchete vliianiia karsta na vodnye resursy v basseine r. Severskogo Dontsa],
Gopchenko, E D., et al, *Kiev Ukrainskii regional'nyi nauchno-issledovatel'skii gidrometeorologicheskii institut. Trudy*, 1988, Vol.228, p.82-89, In Russian 8 refs.
Loboda, N.S.
Water reserves, River basins, Karst, Snow cover effect, Snow accumulation.

44-2128
Factors in the formation of spring runoff from small rivers in forest areas. [Faktory formirovaniia vesennego stoka malykh rek poles'ia],
Pavlenko, G.V., et al, *Kiev. Ukrainskii regional'nyi nauchno-issledovatel'skii gidrometeorologicheskii institut. Trudy*, 1988, Vol.228, p.114-119, In Russian. 6 refs.
Shendrik, S.P.
Runoff, Rivers, Snowmelt, Snow water equivalent.

44-2129
Surface and downhole geophysics for permafrost mapping in Ungava, Quebec.
Seguin, M.K., et al, *Physical geography*, July-Sep 1989, 10(3), p.201-232, 41 refs.
Allard, M., Gahé, E.
Permafrost distribution, Permafrost thickness, Permafrost physics, Discontinuous permafrost, Active layer, Permafrost depth, Mapping, Geophysical surveys, Canada—Quebec—Ungava.

44-2130
Permafrost zonation in eastern Canada: a review of published maps.
Nelson, F.E., *Physical geography*, July-Sep. 1989, 10(3), p.233-248, 66 refs.
Permafrost distribution, Mapping, Maps, Canada.

44-2131
Permafrost mapping at Schefferville, Quebec.
Granberg, H.B., *Physical geography*, July-Sep 1989, 10(3), p.249-269, 57 refs.
Permafrost distribution, Mining, Mapping, Discontinuous permafrost, Canada—Quebec—Schefferville

44-2132
Continentality index: its uses and limitations applied to permafrost in the Canadian Cordillera.
Harris, S.A., *Physical geography*, July Sep 1989, 10(3), p.270-284, 26 refs.
Permafrost distribution, Permafrost forecasting, Air temperature, Climatic factors.

44-2133
Changing climate and permafrost distribution in the Soviet Arctic.
Anisimov, O.A., *Physical geography*, July-Sep. 1989, 10(3), p 285-293, 9 refs
Permafrost distribution, Climatic changes, Climatic factors, Thawing, Mathematical models, USSR.

44-2134
On optimal heating and cooling strategies for melting and freezing.
Gordon, J.M., et al, *Journal of applied physics*, Jan. 1, 1990, 67(1), p.81-84, 32 refs.
Rubinstein, I., Zarmi, Y
Artificial freezing, Artificial melting, Thermodynamics, Phase transformations, Stefan problem, Heat transfer, Analysis (mathematics)

44-2135
Comparison of soil freezing curve and soil water curve data for Windsor sandy loam.
Black, P.B., et al, *Water resources research*, Oct 1989, 25(10), MP 2577, p.2205-2210, 16 refs. For another version see 43-1843
Tice, A.R.
Soil freezing, Soil water, Loams, Unfrozen water content, Ground ice, Frozen ground temperature, Soil temperature, Temperature effects, Analysis (mathematics).
Unfrozen water content as a function of temperature was measured in the laboratory using pulsed nuclear magnetic resonance (PNMR) for a Windsor sandy loam soil The PNMR data were related to previously measured soil moisture retention data through the modified Clausius-Clapeyron equation with suitable adjustment for surface tension The transformed measured unfrozen water content data and the previously measured soil moisture retention data were expressed by a Brooks and Corey type of equation with the required set of regression parameters determined It was found that a single set of parameters were sufficient to correctly express the behavior of these data when suitable constraints were imposed on the unfrozen water content data Additional insight into the traditional form of expressing unfrozen water content data is presented in terms of air or ice entry pressure

44-2136
Forecasting Bering Sea ice edge behavior.
Pritchard, R.S., et al, *Journal of geophysical research*, Jan. 15, 1990, 95(C1), p.775-788, 51 refs.
Mueller, A.C., Hanzlick, D.J., Yang, Y.S.
Ice edge, Ice forecasting, Sea ice distribution, Offshore drilling, Ice loads, Ice mechanics, Ice conditions, Ice models, Mathematical models, Ice water interface, Bering Sea.

44-2137
Opening and closing of sea ice leads: digital measurement from synthetic aperture radar.
Fily M et al *Journal of geophysical research*, Jan 15, 1990, 95(C1), p 789-796, 16 refs
Rothrock, D.A.
Polynyas, Ice openings, Sea ice distribution, Ice cover thickness, Ice conditions, Ice forecasting, Ice reporting, Radar tracking, Ice models, Mathematical models.

44-2138
Characteristics and classification of volcanic-ash-derived soils in Alaska.
Ping, C L., et al. *Soil science*, July 1989, 148(1), p.8-28, 39 refs.
Shoji, S., Ito, T., Takahashi, T., Moore, J.P.
Volcanic ash, Soil formation, Soil classification, Soil analysis, Soil chemistry, Soil surveys, United States – Alaska.

44-2139
Landsat Thematic Mapper imagery of the Siple Coast, Antarctica.
Bindschadler, R.A., et al, *Antarctic journal of the United States*, 1988, 23(5), p.214-215, 4 refs.
Brownworth, F.S., Stephenson, S.N.
Topographic maps, Ice sheets, Ice mechanics, Antarctica—Siple Coast.
Landsat Thematic Mapper images have been acquired over the region of West Antarctica, broadly referred to as the Siple Coast, where multiple ice streams feed the Ross Ice Shelf The goals of a joint project by the U S Geological Survey and the National Aeronautics and Space Administration are to produce multicolor image maps at scales of 1 250,000 (some selected areas at 1 100,000), to demonstrate the utility of thematic mapper imagery in planning future field programs, and to use the digital data in the analysis of the ice dynamics of this region

44-2140
Polar Research Board: Antarctic-related activities, July 1987 through June 1988.
Smith, A.L., *Antarctic journal of the United States*, 1988, 23(5), p.216-217.
Polar regions, Low temperature research
Since its establishment in 1958, the Polar Research Board has monitored the status and needs of domestic and international polar sciences Accordingly, the board assists in the formulation and maintenance of strong research programs that are responsive to U S national interests and scientific opportunities The board also serves as U S National Committee for the Scientific Committee on Antarctic Research (SCAR) of the International Council of Scientific Unions (ICSU), ensuring participation of the U S polar research community in SCAR s activities and encouraging international cooperation in antarctic research endeavors recommended by SCAR During July 1987-June 1988, the Board exercised its oversight responsibilities in the U S. polar research effort through a series of reports, evaluations, and a conference, all emphasizing its long-term, international viewpoint and the role of Antarctica in the scientific programs

44-2141
World Data Center-A for Glaciology/National Snow and Ice Data Center antarctic-related activities for 1987.
Hanson, C.S., et al, *Antarctic journal of the United States*, 1988, 23(5), p.218-219, 1 ref.
Scharfen, G.R., Brennan, A.M.
Data processing, Snow, Ice.
The Polar Coordination and Information Section of the Division of Polar Programs at the National Science Foundation sponsored a meeting of 28 representatives from organizations that collect, process, transmit, archive, or use meteorological data collected at U S antarctic stations This workshop, convened by the World Data Center-A for Glaciology, and the National Snow and Ice Data Center met at the University of Colorado at Boulder on 10-11 Sep 1987 Workshop participants considered the present flow of data from antarctic stations to end users A set of recommendations was drafted to address problem areas in collecting, archiving, and accessing the data The recommendations pertain to data collection, entry, and display at observing stations, transmission of real-time data from Antarctica, the flow of data into permanent archives, and data access for the user The types of data and data products considered included surface, and upper-air data, data from satellites buoys and automatic weather stations, numerical analyses, and historical data sets The formation of a huge tabular iceberg in the Bay of Whales was observable from the polar-orbiting platforms of the U S Air Force Defense Meteorological Satellite Program (DMSP) DMSP visible and infrared data are archived at the NSIDC in Boulder, CO The DMSP image archive at NSIDC contains over 1.25 million pieces of visible and thermal infrared-band hard-copy transparencies, with coverage of up to four times per day globally since 1973.

44-2142
Antarctic support operations, 1987-1988.
Becker, R.A., *Antarctic journal of the United States*, 1988, 23(5), p.219-221.
Logistics, Cold weather operation, Antarctica.
ITT Antarctic Services, Inc. (ANS) activities during 1987-1988 marked the eighth year of providing support services to the United States Antarctic Program (USAP) These services encompass two areas of responsibility: continental Antarctica and the Antarctic Peninsula Project management oversees the provision of personnel, materials, and specialized logistics for USAP's four major stations as well as remote field sites Offices in Port Hueneme, CA, and Christchurch, New Zealand, are operated in support of continental antarctic activities while support of peninsular Antarctica and its ship operations are provided through maritime agents in Chile and Argentina. ANS's principal tasks are support of USAP-sponsored scientific research projects and visitor events, operation and maintenance of facilities at McMurdo Station, Williams Field, Amundsen-Scott Station, Siple Station, Palmer Station, and field camp engineering and construction of new facilities and the renovation of existing infrastructure systems throughout the Antarctic and operation of the research vessel R/V *Polar Duke* and other ice-strengthened vessels, which are subcontracted by ANS for the National Science Foundation Details of some of these activities are outlined

44-2143
U.S. Navy activities in Antarctica, 1987-1988.
Fisher, D.D., *Antarctic journal of the United States*, 1988, 23(5), p.222-224.
Logistics, Cold weather operation, Icebreakers.
U.S. Naval Support Force, Antarctica, more than 700 U.S Navy and Army men and women, spent the austral summer season deployed to McMurdo Station and outlying stations dotted around Antarctica. While deployed, they satisfied the mission requirements of Operation Deep Freeze '88: to respond to the requests of the National Science Foundation, providing logistical support for the United States Antarctic Program Operation Deep Freeze, which consists of elements from the U.S Navy, Army, Coast Guard, and Air Force, provided direct support for stations and facilities in Antarctica In meeting this mission the men and women of Naval Support Force Antarctica (NSFA) provided communications facilities, weather information services flight planning and scheduling, air traffic control services, port services, medical and dental care galley services, material support, base operation support, and fire-fighting capabilities. Details of some of the activities are sketched.

44-2144
Engineering-geocryological safeguarding of the building of structures. Collection of papers. (Inzhenerno-geokriologicheskoe obespechenie stroitel'stva sooruzhenii Sbornik trudov).
Mel'nikov V P., ed, Novosibirsk, Nauka, 1989, 135p., In Russian Refs passim For individual papers see 44-2145 through 44-2164.
Gorelik, IA.B., ed.
Structures, Frozen rocks, Frozen ground temperature, Cold weather construction Geocryology, Soil physics, Ice physics Frozen ground mechanics, Frozen ground strength, Freeze thaw cycles, Analysis (mathematics), Nuclear magnetic resonance, Frost heave, Ice (construction material), Laboratory techniques, Phase transformations, Frozen ground physics.

44-2145
Geothermal investigations of the cryolithozone of Western Siberia. (O geotermicheskikh issledovaniiakh kriolitozony Zapadnoĭ Sibiri),
Deviatkin, V.N., Inzhenerno-geokriologicheskoe obespechenie stroitel'stva sooruzhenii Sbornik trudov (Engineering-geocryological safeguarding of the building of structures. Collection of papers). Edited by V.P. Mel'nikov and IA.B. Gorelik, Novosibirsk, Nauka, 1989, p.5-11, In Russian. 14 refs.
Geocryology, Frozen rock temperature.

44-2146
Strength of ice adhesion to solid bodies. (Sily adgezii i'da s tverdymi telami),
Golubev, V.N., Inzhenerno-geokriologicheskoe obespechenie stroitel'stva sooruzhenii. Sbornik trudov (Engineering-geocryological safeguarding of the building of structures. Collection of papers). Edited by V.P Mel'nikov and IA.B. Gorelik, Novosibirsk, Nauka, 1989, p.11-19, In Russian. 13 refs.
Ice adhesion, Ice strength, Ice physics, Ice solid interface, Deformation.

44-2147
Effect of cryogenic anisotropy on deformation-strength properties of frozen ground. (Vliianie kriogennoĭ anizotropii na deformatsionno-prochnostnye svoĭstva merzlykh gruntov),
Lefkam, A.B., et al, Inzhenerno-geokriologicheskoe obespechenie stroitel'stva sooruzhenii. Sbornik trudov (Engineering-geocryological safeguarding of the building of structures. Collection of papers). Edited by V.P. Mel'nikov and IA.B. Gorelik, Novosibirsk, Nauka, 1989, p.19-29, In Russian. 8 refs.
Zuev, A.G.
Anisotropy, Geocryology, Frozen ground mechanics, Frozen ground strength.

44-2148
Studying the effect of chemical reagents and pliability of container walls on the stress of the phase equilibrium of freezing solutions. (Issledovanie vliianiia khimicheskikh reagentov i podatlivosti stenok sosuda na davleniia fazovogo ravnovesiia zamerzaiushchikh rastvorov),
Strigotskiĭ, S V , Inzhenerno-geokriologicheskoe obespechenie stroitel'stva sooruzhenii. Sbornik trudov (Engineering-geocryological safeguarding of the building of structures. Collection of papers). Edited by V.P. Mel'nikov and IA.B. Gorelik, Novosibirsk, Nauka, 1989, p.29-35, In Russian. 5 refs.
Phase transformations, Solutions, Walls, Freezing.

44-2149
Kinetics of the crystallization of water in capillary-porous media according to data from a microcalorimeter and nuclear magnetic resonance. (Kinetika kristallizatsii vody v kapilliarno-poristykh sredakh po dannym mikrokalorimetrii i IAMR),
Podenko, L.S., et al, Inzhenerno-geokriologicheskoe obespechenie stroitel'stva sooruzhenii. Sbornik trudov (Engineering-geocryological safeguarding of the building of structures. Collection of papers). Edited by V.P. Mel'nikov and IA.B. Gorelik, Novosibirsk, Nauka, 1989, p.36-41, In Russian. 12 refs.
Zavodovskiĭ, A.G., Blashchanitsa, V.F., Kutergin, O.B.
Temperature measurement, Nuclear magnetic resonance, Unfrozen water content, Ice crystal growth.

44-2150
Laboratory method of determining the frost heave of soils. (Laboratornyĭ metod opredeleniia moroznoĭ puchinistosti gruntov),
Ganeles, L.B., et al, Inzhenerno-geokriologicheskoe obespechenie stroitel'stva sooruzhenii. Sbornik trudov (Engineering-geocryological safeguarding of the building of structures. Collection of papers). Edited by V P. Mel'nikov and IA.B. Gorelik, Novosibirsk, Nauka, 1989, p.41-46, In Russian. 2 refs.
Orzhekhovskiĭ, IU.R., IUrganov, M.M.
Laboratory techniques, Frost heave, Soil freezing, Frost penetration, Measuring instruments, Soil physics.

44-2151
Thermocompressive method of testing frozen soils by thawing. (Termopressiometricheskiĭ metod izpytaniĭ merzlykh gruntov s ottaivaniem),
Orzhekhovskiĭ, IU R., Inzhenerno-geokriologicheskoe obespechenie stroitel'stva sooruzhenii. Sbornik trudov (Engineering-geocryological safeguarding of the building of structures. Collection of papers). Edited by V.P. Mel'nikov and IA.B. Gorelik, Novosibirsk, Nauka, 1989, p.46-52, In Russian. 3 refs.
Frozen ground compression, Ground thawing, Frozen ground strength, Measuring instruments, Compressive properties.

44-2152
Comparative analysis of nuclear-magnetic methods for determining the phase composition of moisture in frozen disperse systems. [Sravnitel'nyi analiz iaderno-magnitnykh metodov opredeleniia fazovogo sostava vlagi v merzlykh dispersnykh sistemakh],
Podenko, L.S., et al, Inzhenerno-geokriologicheskoe obespechenie stroitel'stva sooruzhenii. Sbornik trudov (Engineering-geocryological safeguarding of the building of structures. Collection of papers). Edited by V.P. Mel'nikov and IA.B. Gorelik, Novosibirsk, Nauka, 1989, p.52-56, In Russian. 15 refs.
Blashchanitsa, V.F.
Phase transformations, Nuclear magnetic resonance, Soil water, Unfrozen water content, Frozen ground physics.

44-2153
Studying the moisture in frozen rocks using sound methods. [Issledovanie vlazhnosti merzlykh porod shumovymi metodami],
Tsibul'skii, V.R., et al, Inzhenerno-geokriologicheskoe obespechenie stroitel'stva sooruzhenii. Sbornik trudov (Engineering-geocryological safeguarding of the building of structures. Collection of papers). Edited by V.P. Mel'nikov and IA.B. Gorelik, Novosibirsk, Nauka, 1989, p.56-63, In Russian. 20 refs.
Ageeva, O.S., Lebedev, V.P.
Noise (sound), Frozen rocks, Moisture, Analysis (mathematics).

44-2154
Gas-kinetic processes during ice formation. [Gazokineticheskie protsessy pri l'doobrazovanii],
Amel'kin, S.V., et al, Inzhenerno-geokriologicheskoe obespechenie stroitel'stva sooruzhenii. Sbornik trudov (Engineering-geocryological safeguarding of the building of structures. Collection of papers). Edited by V.P. Mel'nikov and IA.B. Gorelik, Novosibirsk, Nauka, 1989, p.63-71, In Russian. 7 refs.
Smorygin, G.I.
Ice formation, Gas inclusions, Analysis (mathematics).

44-2155
Formation of frozen-ground conditions in the foundations of buildings and oil field structures during operations. [Formirovanie merzlotno-gruntovykh uslovii osnovanii zdanii i sooruzhenii neftepromyslovogo naznacheniia v protsesse ekspluatatsii],
Gurinov, V.N., et al, Inzhenerno-geokriologicheskoe obespechenie stroitel'stva sooruzhenii. Sbornik trudov (Engineering-geocryological safeguarding of the building of structures. Collection of papers). Edited by V.P. Mel'nikov and IA.B. Gorelik, Novosibirsk, Nauka, 1989, p.72-79, In Russian. 2 refs.
Pavlunin, V.B., Mikhal'chenko, O.A., Ksenzhuk, L.I.
Foundations, Frozen ground temperature, Frozen ground physics, Structures, Seasonal freeze thaw, Buildings.

44-2156
Calculating the inter-relationship of frozen rocks with oil field equipment in the outlet area of wells. [Raschet vzaimodeistviia merzlykh porod s neftepromyslovym oborudovaniem v priust'evoi zone skvazhiny],
Bel'mas, O.M., et al, Inzhenerno-geokriologicheskoe obespechenie stroitel'stva sooruzhenii. Sbornik trudov (Engineering-geocryological safeguarding of the building of structures. Collection of papers). Edited by V.P. Mel'nikov and IA.B. Gorelik, Novosibirsk, Nauka, 1989, p.79-88, In Russian. 12 refs.
Gorelik, IA.B., Dzik, M.I.
Frozen rocks, Equipment, Analysis (mathematics).

44-2157
Estimations of stresses on a shaft during the thawing of rocks around a single well and around a cluster of wells. [Otsenki nagruzok na kolonnu pri ottaivanii porod vokrug odinochnoi skvazhiny i v kustej],
Kul'tikov, A.M., Inzhenerno-geokriologicheskoe obespechenie stroitel'stva sooruzhenii. Sbornik trudov (Engineering-geocryological safeguarding of the building of structures. Collection of papers). Edited by V.P. Mel'nikov and IA.B. Gorelik, Novosibirsk, Nauka, 1989, p.88-96, In Russian. 7 refs.
Stresses, Frozen rocks, Thawing, Wells, Forecasting, Analysis (mathematics).

44-2158
Calculating tangential and normal forces of heaving with regard to rheological properties of freezing ground. [Raschet kasatel'nykh i normal'nykh sil puchenna s uchetom reologicheskikh svoistv promerzaiushchego grunta],
Konovalov, A.A., Inzhenerno-geokriologicheskoe obespechenie stroitel'stva sooruzhenii. Sbornik trudov (Engineering-geocryological safeguarding of the building of structures. Collection of papers). Edited by V.P. Mel'nikov and IA.B. Gorelik, Novosibirsk, Nauka, 1989, p.96-101, In Russian. 4 refs.
Rheology, Soil freezing, Frost heave, Soil mechanics, Analysis (mathematics).

44-2159
Investigation of thermal exchange in frozen ground and ice masses. [Issledovanie teploobmena v merzlykh gruntakh i massivakh l'da],
Danielian, IU.S., et al, Inzhenerno-geokriologicheskoe obespechenie stroitel'stva sooruzhenii. Sbornik trudov (Engineering-geocryological safeguarding of the building of structures. Collection of papers). Edited by V.P. Mel'nikov and IA.B Gorelik, Novosibirsk, Nauka, 1989, p.101-108, In Russian. 8 refs
Aksenov, B.G.
Heat transfer, Frozen ground physics, Frozen ground thermodynamics, Ice physics, Ice thermal properties, Soil water, Freeze thaw cycle, Analysis (mathematics)

44-2160
Simultaneous use of integral and finite differential methods in solving problems of freezing-thawing. [Sovmestnoe ispol'zovanie integral'nykh i konechnoraznostnykh metodov v reshenii zadach promerzaniia-protaivaniia],
Zviagin, V.V, et al, Inzhenerno-geokriologicheskoe obespechenie stroitel'stva sooruzhenii. Sbornik trudov (Engineering-geocryological safeguarding of the building of structures. Collection of papers). Edited by V.P. Mel'nikov and IA.B. Gorelik, Novosibirsk, Nauka, 1989, p.108-114, In Russian. 9 refs.
Medvedskii, R.I.
Freeze thaw cycles, Analysis (mathematics).

44-2161
Characteristics of the starter in a two-phase thermosiphon with a long evaporative zone. [Osobennosti zapuska dvukhfaznogo termosifona s dlinnoi isparitel'noi zonoi],
Shirikhin, IU.N., Inzhenerno-geokriologicheskoe obespechenie stroitel'stva sooruzhenii. Sbornik trudov (Engineering-geocryological safeguarding of the building of structures. Collection of papers). Edited by V.P. Mel'nikov and IA.B. Gorelik, Novosibirsk, Nauka, 1989, p.114-118, In Russian. 2 refs.
Engine starters, Cooling systems, Engineering, Analysis (mathematics), Design.

44-2162
Experiments in the application of granular ice in erecting structures of complex forms. [Opyty po primeneniiu granulirovannogo l'da dlia vozvedeniia konstruktsii slozhnoi konfiguratsiig.
Smorygin, G.I., Inzhenerno-geokriologicheskoe obespechenie stroitel'stva sooruzhenii. Sbornik trudov (Engineering-geocryological safeguarding of the building of structures. Collection of papers). Edited by V.P. Mel'nikov and IA.B. Gorelik, Novosibirsk, Nauka, 1989, p.118-127, In Russian. 3 refs.
Ice (construction material), Tunnels, Air temperature, Wind velocity.

44-2163
Thermophysical basis for selecting methods of eliminating hydrated locks in gas pipelines. [Teplofizicheskoe obosnovanie vybora metodov likvidatsii gidratnykh probok v gazoprovodakh],
Malysheva, G.N., et al, Inzhenerno-geokriologicheskoe obespechenie stroitel'stva sooruzhenii. Sbornik trudov (Engineering-geocryological safeguarding of the building of structures. Collection of papers). Edited by V.P. Mel'nikov and IA.B. Gorelik, Novosibirsk, Nauka, 1989, p.128-132, In Russian. 8 refs.
Malyshev, A.G.
Gas pipelines, Heat capacity, Temperature effects, Analysis (mathematics).

44-2164
Modeling the standard cycle of designing bases and foundations on permafrost [Modelirovanie normativnogo tsikla proektirovaniia osnovanii i fundamentov na vechnomerzlykh gruntakh],
Agalakov, S.E., et al, Inzhenerno-geokriologicheskoe obespechenie stroitel'stva sooruzhenii. Sbornik trudov (Engineering geocryological safeguarding of the building of structures. Collection of papers) Edited by V.P. Mel'nikov and IA.B Gorelik, Novosibirsk, Nauka, 1989, p.132-135, In Russian 3 refs
Levkovich, V.R., Linkov, A.S.
Foundations, Permafrost bases, Design, Computer programs.

44-2165
NOAA WP-3D instrumentation and flight operations on AGASP-II.
Schnell, R.C., et al, *Journal of atmospheric chemistry*, July-Oct. 1989, 9(1-3), p.3-16, 13 refs.
Watson, T.B., Bodhaine, B.A.
Haze, Atmospheric composition, Measuring instruments, Airborne equipment, Aerial surveys, Meteorological data, Polar regions, Chemical analysis

44-2166
Meteorology and haze structure during AGASP-II, Part 1: Alaskan Arctic flights, 2-10 April 1986.
Herbert, G.A., et al, *Journal of atmospheric chemistry*, July-Oct. 1989, 9(1-3), p.17-48, 39 refs.
Atmospheric composition, Haze, Chemical properties, Air pollution, Polar regions, Aerosols, Condensation nuclei, Atmospheric circulation, Beaufort Sea.

44-2167
Meteorology and haze structure during AGASP-II, Part 2: Canadian Arctic flights, 13-16 April 1986.
Bridgman, H.A., et al, *Journal of atmospheric chemistry*, July-Oct. 1989, 9(1-3), p.49-70, 33 refs
Atmospheric composition, Haze, Chemical properties, Measurement, Air pollution, Aerosols, Polar regions, Temperature inversions, Sampling, Canada - Northwest Territories—Alert.

44-2168
Shortwave aerosol optical depth of arctic haze measured on board the NOAA WP-3D during AGASP II, April 1986.
Dutton, E.G., et al, *Journal of atmospheric chemistry*, July-Oct. 1989, 9(1-3), p.71-79, 9 refs.
DeLuisi, J.J., Herbert, G.A.
Atmospheric composition, Haze, Optical properties, Measurement, Aerosols Polar regions Atmospheric attenuation, Solar radiation

44-2169
Carbon dioxide and methane in the arctic atmosphere.
Conway, T.J., et al, *Journal of atmospheric chemistry*, July-Oct. 1989, 9(1-3), p.81-99, 36 refs.
Steele, L.P.
Haze, Atmospheric composition, Carbon dioxide, Chemical analysis, Aerosols, Air pollution, Organic nuclei, Sampling, Polar regions, Aerial surveys.

44-2170
Anthropogenic aerosols and gases in the lower troposphere at Alert, Canada in April 1986.
Barrie, L.A., et al, *Journal of atmospheric chemistry*, July-Oct. 1989, 9(1-3), p.101-127, 37 refs.
Den Hartog, G., Bottenheim, J.W., Landsberger, S.
Haze, Atmospheric composition, Aerosols, Measurement, Physical properties, Air pollution, Particle size distribution, Polar regions, Photochemical reactions, Chemical analysis, Canada—Northwest Territories—Alert.

44-2171
Arctic hazes in summer over Greenland and the North American Arctic. I: Incidence and origins.
Brock, C.A., et al, *Journal of atmospheric chemistry*, July-Oct. 1989, 9(1-3), p.129-148, 40 refs.
Radke, L.F., Lyons, J.H., Hobbs, P.V.
Particles, Atmospheric composition, Haze, Chemical properties, Air pollution, Origin, Polar regions, Particle size distribution, Aerial surveys, Condensation nuclei, Light scattering, Aerosols, Greenland.

44-2172
Arctic hazes in summer over Greenland and the North American Arctic: II: Nature and concentrations of accumulation-mode and giant particles.
Ishizaka, Y., et al, *Journal of atmospheric chemistry*, July-Oct. 1989, 9(1-3), p.149-159, 15 refs
Hobbs, P.V., Radke, L.F.
Atmospheric composition, Light scattering, Haze, Measurement, Particles, Air pollution, Polar regions, Aerosols, Physical properties, Sampling, Atmospheric attenuation, Greenland.

44-2173
Arctic hazes in summer over Greenland and the North American Arctic. III: A contribution from the natural burning of carbonaceous materials and pyrites.
Radke, L.F., et al, *Journal of atmospheric chemistry*, July-Oct. 1989, 9(1-3), p.161-167, 13 refs.
Hobbs, P.V.
Atmospheric composition, Haze, Fires, Measurement, Air pollution, Polar regions, Aerial surveys, Aerosols, Light scattering, Canada—Northwest Territories—Cape Bathurst.

44-2174
Studies of ice nucleation by arctic aerosol on AGASP-II.
Borys, R.D., *Journal of atmospheric chemistry*, July-Oct. 1989, 9(1-3), p.169-185, 33 refs.
Haze, Atmospheric composition, Aerosols, Ice nuclei, Nucleation rate, Air pollution, Chemical analysis, Polar regions, Temperature effects, Aerial surveys.

44-2175
Airborne and lidar measurements of aerosol and cloud particles in the troposphere over Alert, Canada in April 1986.
Leaitch, W.R., et al, *Journal of atmospheric chemistry*, July-Oct. 1989, 9(1-3), p.187-211, 22 refs.
Hoff, R.M., MacPherson, J.I.
Haze, Atmospheric composition, Aerosols, Light scattering, Measurement, Lidar, Aerial surveys, Particles, Polar regions, Ice crystal optics, Statistical analysis, Canada—Northwest Territories—Alert.

44-2176
Surface aerosol measurements at Barrow during AGASP-II.
Bodhaine, B.A., et al, *Journal of atmospheric chemistry*, July-Oct. 1989, 9(1-3), p.213-224, 27 refs.
Haze, Atmospheric composition, Radiometry, Aerosols, Atmospheric attenuation, Air pollution, Radiation absorption, Polar regions, Solar radiation, Aerial surveys, Climatic effects.

44-2177
Effects of the arctic haze as determined from airborne radiometric measurements during AGASP II.
Valero, F.P.J., et al, *Journal of atmospheric chemistry*, July-Oct. 1989, 9(1-3), p.225-244, 24 refs.
Ackerman, T.P., Gore, W.J.Y.
Haze, Atmospheric composition, Aerosols, Radiometry, Radiation balance, Radiation absorption, Air pollution, Aerial surveys, Polar regions, Solar radiation, Climatology.

44-2178
On the transfer of stratospheric ozone into the troposphere near the North Pole.
Oltmans, S.J., et al, *Journal of atmospheric chemistry*, July-Oct. 1989, 9(1-3), p.245-253, 10 refs.
Raatz, W.E., Komhyr, W.D.
Atmospheric composition, Oxygen, Measurement, Aerial surveys, Polar regions, Atmospheric circulation, Periodic variations, Gases

44-2179
In-situ measurements of the aerosol size distributions, physicochemistry and light absorption properties of arctic haze.
Clarke, A.D., *Journal of atmospheric chemistry*, July-Oct. 1989, 9(1-3), p.255-266, 6 refs.
Haze, Atmospheric composition, Aerosols, Particle size distribution, Chemical properties, Light scattering, Air pollution, Measuring instruments, Polar regions, Atmospheric attenuation, United States—Alaska—Barrow

44-2180
Analytical electron microscope studies of size-segregated particles collected during AGASP-II, flights 201-203.
Sheridan, P.J., *Journal of atmospheric chemistry*, July-Oct. 1989, 9(1-3), p.267-282, 13 refs.
Haze, Atmospheric composition, Aerosols, Particles, Electron microscopy, Volcanic ash, Chemical analysis, Correlation, Air pollution, Polar regions, Aerial surveys.

44-2181
Correlations among combustion effluent species at Barrow, Alaska: aerosol black carbon, carbon dioxide, and methane.
Hansen, A.D.A., et al, *Journal of atmospheric chemistry*, July-Oct. 1989, 9(1-3), p.283-299, 24 refs.
Atmospheric composition, Air pollution, Aerosols, Condensation nuclei, Polar regions, Fuels, Atmospheric circulation, Periodic variations, Correlation, United States—Alaska—Barrow.

44-2182
PAN over the Arctic, observations during AGASP-2 in April 1986.
Bottenheim, J.W., et al, *Journal of atmospheric chemistry*, July-Oct. 1989, 9(1-3), p.301-316, 26 refs.
Gallant, A.J.
Haze, Atmospheric composition, Gases, Measurement, Aerial surveys, Stratification, Polar regions, Human factors, Air pollution.

44-2183
Concentrations of atmospheric constituents observed at Alert, Canada, in relation to air trajectories and synoptic systems.
Chung, Y.S., *Journal of atmospheric chemistry*, July-Oct. 1989, 9(1-3), p.317-330, 12 refs.
Volcanic ash, Air pollution, Atmospheric composition, Aerosols, Meteorological factors, Periodic variations, Atmospheric circulation, Haze, Correlation, Synoptic meteorology, Polar regions, Canada—Northwest Territories—Alert.

44-2184
Sulfur dioxide in the North American Arctic.
Thornton, D.C., et al, *Journal of atmospheric chemistry*, July-Oct. 1989, 9(1-3), p.331-346, 12 refs.
Bandy, A.R., Driedger, A.R., III.
Atmospheric composition, Chemical analysis, Aerosols, Sampling, Air pollution, Polar regions, Condensation nuclei, Distribution, Haze.

44-2185
Aerosol black carbon measurements in the arctic haze during AGASP-II.
Hansen, A.D.A., et al, *Journal of atmospheric chemistry*, July-Oct. 1989, 9(1-3), p.347-361, 41 refs.
Novakov, T.
Haze, Atmospheric composition, Aerosols, Sampling, Air pollution, Particles, Polar regions, Time factors, Aerial surveys.

44-2186
Elemental composition of particulate material sampled from the arctic haze aerosol.
Shaw, Jan, P.J., et al, *Journal of atmospheric chemistry*, July-Oct. 1989, 9(1-3), p.363-381, 36 refs.
Zoller, W.H.
Atmospheric composition, Aerosols, Sampling, Chemical composition, Particles, Haze, Air pollution, Polar regions, Aerial surveys, Atmospheric circulation, Meteorological data, Correlation.

44-2187
Surface measurements of carbon dioxide and methane at Alert during an arctic haze event in April 1986.
Trivett, N.B.A., et al, *Journal of atmospheric chemistry*, July-Oct. 1989, 9(1-3), p.383-397, 18 refs.
Worthy, D.E.J., Brice, K.A.
Haze, Atmospheric composition, Carbon dioxide, Aerosols, Sampling, Gases, Air pollution, Polar regions, Measuring instruments, Computer applications, Periodic variations, Canada—Northwest Territories—Alert.

44-2188
Economical approach to receiving coal by rail in the sub-arctic environment.
Swigart, B., et al, *Structural engineering practice*, 1986, 3(1), p.45-56.
Peratrovich, R., Jr.
Railroad equipment, Design, Cold weather construction, Subpolar regions, United States—Alaska—Seward.

44-2189
Laboratory calibration of a vibrating wire device for measuring concentrations of supercooled liquid water.
Hill, G.E., *Journal of atmospheric and oceanic technology*, Dec. 1989, 6(6), p.961-970, 13 refs.
Measuring instruments, Cloud droplets, Ice accretion, Supercooled clouds, Airborne equipment, Vibration, Clouds (meteorology), Temperature effects.

44-2190
New directions for surface water modeling.
Kavvas, M.L., ed, *International Association of Hydrological Sciences. IAHS publication*, 1989, No.181, 444p., Refs. passim. For selected papers see 44-2191 through 44-2194., Proceedings of a Symposium held during the 3rd Scientific Assembly of IAHS in Baltimore, MD, May 1989.
Models, Surface waters, Snowmelt, Runoff, Simulation, Floods, Snow accumulation.

44-2191
Floods and droughts in Labe River basin—the hydrograph shape.
Buchtele, J., *International Association of Hydrological Sciences. IAHS publication*, 1989, No.181, New directions for surface water modeling. Edited by M.L. Kavvas, p.133-142, 5 refs.
Floods, Snowmelt, Runoff, River basins, Czechoslovakia—Elbe River.

44-2192
Modeling snowfall-to-snowmelt delay.
Yevjevich, V., et al, *International Association of Hydrological Sciences. IAHS publication*, 1989, No.181, New directions for surface water modeling. Edited by M.L. Kavvas, p.203-211, 2 refs.
Sivapathasundram, R.
Snowfall, Time factor, Snowmelt, Mathematical models, Runoff.

44-2193
Operational snow accumulation and snowmelt modeling.
Vehviläinen, B., *International Association of Hydrological Sciences. IAHS publication*, 1989, No.181, New directions for surface water modeling. Edited by M.L. Kavvas, p.213-222, 7 refs.
Snowmelt, Snow accumulation, Forecasting, Snow water equivalent, Snow cover, Simulation.

44-2194
EXSRM, an expert system for snowmelt runoff model (SRM).
Engman, E.T., et al, *International Association of Hydrological Sciences. IAHS publication*, 1989, No.181, New directions for surface water modeling. Edited by M.L. Kavvas, p.417-426, 10 refs.
Rango, A., Martinec, J.
Snowmelt, Runoff, Simulation, Computer programs.

44-2195
Arctic groans from ice adhesion.
Voevodin, V., *Sovbloc naval news*, Dec. 1989, 1(5), p.86-90, For Russian original see 44-116.
Ship icing, Icebreakers, Ice adhesion, Salinity.

44-2196
Rate of ice nucleation by atmospheric ice-forming nuclei. [Skorost' nukleatsii l'da atmosfernymi l'doobrazuiushchimi iadrami].
Berezinskiĭ, N.A., et al, *Nal'chik. Vysokogornyĭ geofizicheskiĭ institut. Trudy*, 1989, Vol.76, p.5-8, In Russian. 8 refs.
Stepanov, G.V.
Ice nuclei, Aerosols, Silver iodide.

44-2197
Equipment, methodology and some results of a study on the dispersiveness and ice-forming properties of aerosols in growing cumulus clouds. [Apparatura, metodika i nekotorye rezul'taty issledovaniĭ dispersnosti i l'doobrazuiushchikh svoĭstv aerozoleĭ v rastushchikh kuchevykh oblakakh].
Berezinskiĭ, N.A., et al, *Nal'chik. Vysokogornyĭ geofizicheskiĭ institut. Trudy*, 1989, Vol.76, p.35-45, In Russian. 8 refs.
Stepanov, G.V.
Aerosols, Ice nuclei, Cloud physics.

44-2198
Mechanism of aerosol transfer and the transformation of its microstructure and ice-forming features during the development of frontal convective clouds. [Mekhanizm perenosa aerozolia i transformatsiia ego mikrostruktury i l'doobrazuiushchikh svoĭstv pri razvitii frontal'noĭ konvektivnoĭ oblachnosti].
Berezinskiĭ, N.A., et al, *Nal'chik. Vysokogornyĭ geofizicheskiĭ institut. Trudy*, 1989, Vol.76, p.45-52, In Russian. 10 refs.
Aerosols, Microstructure, Cloud physics.

44-2199
Proceedings. Vol.4.
International Conference on Offshore Mechanics and Arctic Engineering, 9th, Houston, TX, Feb. 18-23, 1990, MP 2584, New York, American Society of Mechanical Engineers, 1990, 339p., Refs. passim. For individual papers see 44-2200 through 44-2244.
Ayorinde, O.A., ed, Sinha, N.K., ed, Sodhi, D.S., ed.
Ice loads, Offshore structures, Ice mechanics, Offshore drilling, Meetings, Engineering, Icebergs, Icing, Ice conditions, Mathematical models, Sea ice, Oil spills, Ice strength, Ice pressure.

44-2200
Foundation performance of gravity base structures.
McCarron, W.O., International Conference on Offshore Mechanics and Arctic Engineering, 9th, Houston, TX, Feb. 18-23, 1990. Proceedings. Vol.4. Edited by O.A. Ayorinde, N.K. Sinha and D.S. Sodhi, New York, American Society of Mechanical Engineers, 1990, p.1-8, 8 refs.
Offshore structures, Foundations, Sliding, Ice loads, Soil strength, Bearing strength, Ocean bottom, Cohesion, Analysis (mathematics), Models, Stress strain diagrams, Beaufort Sea.

44-2201
Karluk ice island.
Bugno, W., et al, International Conference on Offshore Mechanics and Arctic Engineering, 9th, Houston, TX, Feb. 18-23, 1990. Proceedings. Vol.4. Edited by O.A. Ayorinde, N.K. Sinha and D.S. Sodhi, New York, American Society of Mechanical Engineers, 1990, p.9-17, 5 refs
Masterson, D.M., Kenny, J., Gamble, R.
Ice islands, Offshore structures, Offshore drilling, Artificial freezing, Ice loads, Weather forecasting, Ice temperature, Artificial islands, Design, Engineering, Wind velocity, Air temperature, United States—Alaska—Prudhoe Bay.

44-2202
Application of local area network technology in an engineering environment.
Powell, A.D., et al, International Conference on Offshore Mechanics and Arctic Engineering, 9th, Houston, TX, Feb 18-23, 1990 Proceedings Vol 4 Edited by O.A. Ayorinde, N.K. Sinha and D.S. Sodhi, New York, American Society of Mechanical Engineers, 1990, p.19-23, 3 refs.
Sokolowski, M.A.
Offshore drilling, Computer applications, Offshore structures, Cold weather construction, Design, Engineering.

44-2203
Arctic research program related to exploration drilling and production in the Barents Sea.
Løset, S., et al, International Conference on Offshore Mechanics and Arctic Engineering, 9th, Houston, TX, Feb. 18-23, 1990. Proceedings. Vol.4. Edited by O.A. Ayorinde, N.K. Sinha and D.S. Sodhi, New York, American Society of Mechanical Engineers, 1990, p.25-30, 15 refs.
Wold, M
Offshore drilling, Research projects, Icebergs, Ice conditions, Ice loads, Ice solid interface, Strains, Icing, Exploration, Petroleum industry, Petroleum transportation, Meteorological data, Barents Sea.

44-2204
Modelling the behaviour of an oil saturated sand.
Evgin, E., et al, International Conference on Offshore Mechanics and Arctic Engineering, 9th, Houston, TX, Feb. 18-23, 1990. Proceedings. Vol.4. Edited by O.A. Ayorinde, N.K. Sinha and D.S. Sodhi, New York, American Society of Mechanical Engineers, 1990, p.31-37, 9 refs.
Altaee, A., Lord, S., Konuk, I.
Oil spills, Sands, Soil strength, Compressive properties, Stress strain diagrams, Offshore structures, Engineering, Deformation, Soil poliution, Mathematical models, Tests, Foundations.

44-2205
Arctic and Antarctic development.
Byford, A.N., International Conference on Offshore Mechanics and Arctic Engineering, 9th, Houston, TX, Feb. 18-23, 1990. Proceedings. Vol.4. Edited by O.A. Ayorinde, N.K. Sinha and D.S. Sodhi, New York, American Society of Mechanical Engineers, 1990, p.39-49, 6 refs.
Offshore structures, Icebergs, Ice control, Petroleum industry, Gas production, Design, Meteorological factors, Safety.
Development of platforms and techniques for Arctic and Antarctic oil production, in safety, is studied. Iceberg tracks and methods of monitoring control and destruction are examined. A method of destroying icebergs is proposed and the merits of fixed and moveable platforms discussed. Three new types of jacket are also shown for cheaper installations; the last two have applications for spread and faulted fields where normally 2 or 3 satellite platforms and sub-sea installations are required. Low temperature, long days and nights and distance are also considered. (Auth. mod.)

44-2206
Cryogenic scanning electron microscopy research applications in Arctic and polar regions.
Lilly, M.R., et al, International Conference on Offshore Mechanics and Arctic Engineering, 9th, Houston, TX, Feb. 18-23, 1990. Proceedings. Vol.4. Edited by O.A. Ayorinde, N.K. Sinha and D.S. Sodhi, New York, American Society of Mechanical Engineers, 1990, p.51-60, 8 refs.
Sargent, J.A.
Cryogenics, Scanning electron microscopy, Crystal growth, Freeze thaw cycles, Ice crystal structure, Soil freezing, Brines, Ice sublimation, Sea ice, Subsea permafrost, Experimentation, Temperature effects, Measuring instruments, Air entrainment.
The study of biological and physical systems in arctic and antarctic regions may be enhanced by cryogenic scanning electron microscopy (SEM). Cryogenic conditions are defined in this application as liquid nitrogen temperatures (-180 C). Water is a dominant component in these systems and cryogenic SEM techniques make it possible to study materials in their hydrated state. The reduction of SEM stage temperatures to that of liquid nitrogen causes a stable environment in which ice and ice-rich components may be observed. Biological systems are hydrated and susceptible to vaporization and decomposition under standard SEM analysis. Cryogenic SEM analysis of physical systems is useful because water and ice-rich components are presented. Snow, ice fog, sea ice and subsea permafrost may be observed in this fashion. (Auth. mod.)

44-2207
Some applications of a numerical model of floating sea ice platforms.
Sznider, K., et al, International Conference on Offshore Mechanics and Arctic Engineering, 9th, Houston, TX, Feb. 18-23, 1990. Proceedings. Vol.4. Edited by O.A. Ayorinde, N.K. Sinha and D.S. Sodhi, New York, American Society of Mechanical Engineers, 1990, p.61-66, 8 refs.
Lozowski, E.P., Forest, T.W.
Floating ice, Sea ice, Ice growth, Artificial freezing, Thermodynamics, Offshore structures, Mathematical models, Heat transfer, Heat flux, Thermal conductivity, Tests, Meteorological factors.

44-2208
Nonlinear response of undrained soil under unsymmetric loading.
Prasad, K.S.R., et al, International Conference on Offshore Mechanics and Arctic Engineering, 9th, Houston, TX, Feb. 18-23, 1990. Proceedings. Vol.4. Edited by O.A. Ayorinde, N.K. Sinha and D.S. Sodhi, New York, American Society of Mechanical Engineers, 1990, p.67-74, 24 refs.
Swamidas, A.S.J.
Offshore drilling, Soil strength, Loads (forces), Offshore structures, Foundations, Bearing strength, Plastic properties, Stability, Design, Models.

44-2209
Finite element calculations of ice pressure on rigid structures.
Derradji-Aouat, A., et al, International Conference on Offshore Mechanics and Arctic Engineering, 9th, Houston, TX, Feb. 18-23, 1990. Proceedings. Vol.4. Edited by O.A. Ayorinde, N.K. Sinha and D.S. Sodhi, New York, American Society of Mechanical Engineers, 1990, p.75-81, 7 refs.
Evgin, E., Sinha, N.K.
Ice pressure, Offshore structures, Ice loads, Ice crystal structure, Ice creep, Viscoelasticity, Ice cracks, Ice mechanics, Mathematical models, Grain size, Temperature effects, Computer applications.

44-2210
Analysis of stress distributions in an ice floe.
Frederking, R.M.W., et al, International Conference on Offshore Mechanics and Arctic Engineering, 9th, Houston, TX, Feb. 18-23, 1990. Proceedings. Vol.4. Edited by O.A. Ayorinde, N.K. Sinha and D.S. Sodhi, New York, American Society of Mechanical Engineers, 1990, p.83-87, 5 refs.
Evgin, E.
Ice floes, Stress concentration, Offshore structures, Ice loads, Drift, Pack ice, Ice cover thickness, Tests.

44-2211
Tests of ice crushing on a flexible structure.
Singh, S.K., et al, International Conference on Offshore Mechanics and Arctic Engineering, 9th, Houston, TX, Feb. 18-23, 1990. Proceedings. Vol.4. Edited by O.A. Ayorinde, N.K. Sinha and D.S. Sodhi, New York, American Society of Mechanical Engineers, 1990, p.89-94, 20 refs.
Timco, G.W., Frederking, R.M.W., Jordaan, I.J.
Offshore structures, Ice breaking, Flexural strength, Ice loads, Ice mechanics, Ice pressure, Ice solid interface, Velocity Ice cover thickness, Models, Tests.

44-2212
Theoretical dynamic ice structure interaction model for crushing with extrusion.
Marcellus, R.W., et al, International Conference on Offshore Mechanics and Arctic Engineering, 9th, Houston, TX, Feb. 18-23, 1990. Proceedings. Vol.4. Edited by O.A. Ayorinde, N.K. Sinha and D.S. Sodhi, New York, American Society of Mechanical Engineers, 1990, p.95-101, 18 refs.
Sander, M., Sinha, N.K., Shah, V.K.
Ice solid interface, Offshore structures, Ice mechanics, Ice breaking, Ice cracks, Stress strain diagrams, Velocity, Compressive properties, Dynamic properties, Temperature effects, Models.

44-2213
Creep buckling analysis of a floating ice sheet moving against a vertical cylindrical structure.
Luk, C.H., International Conference on Offshore Mechanics and Arctic Engineering, 9th Houston, TX, Feb. 18-23, 1990. Proceedings. Vol.4. Edited by O.A. Ayorinde, N.K. Sinha and D.S. Sodhi, New York, American Society of Mechanical Engineers, 1990, p.103-110, 6 refs
Ice mechanics, Offshore structures, Ice creep, Floating ice, Stresses, Ice loads, Ice pressure, Strains, Ice deformation, Ice solid interface, Ice strength, Analysis (mathematics).

44-2214
Theoretical investigation of the icebreaking cycle in 2-D.
Valanto, P., International Conference on Offshore Mechanics and Arctic Engineering, 9th, Houston, TX, Feb. 18-23, 1990. Proceedings. Vol.4. Edited by O.A. Ayorinde, N.K. Sinha and D.S. Sodhi, New York, American Society of Mechanical Engineers, 1990, p.111-126, 20 refs.
Icebreakers, Ice breaking, Floating ice, Flexural strength, Ice loads, Ice cover strength, Mathematical models, Velocity.

44-2215
Ship icebreaking resistance with flooding water effect.
Wang, S.L., et al, International Conference on Offshore Mechanics and Arctic Engineering, 9th, Houston, TX, Feb. 18-23, 1990 Proceedings Vol 4 Edited by O.A Ayorinde, N.K Sinha and D.S Sodhi, New York, American Society of Mechanical Engineers, 1990, p.127-134, 12 refs.
Hsiung, C.C., Hazell, C.R.
Icebreakers, Ice breaking, Flooding, Dynamic properties, Loads (forces), Velocity, Analysis (mathematics).

44-2216
Straightforward technique for analysing structural response to dynamic ice action.
Kärnä, T., et al, International Conference on Offshore Mechanics and Arctic Engineering, 9th, Houston, TX, Feb. 18-23, 1990. Proceedings. Vol.4. Edited by O.A. Ayorinde, N.K. Sinha and D.S. Sodhi, New York, American Society of Mechanical Engineers, 1990, p.135-142, 16 refs.
Turunen, R.
Offshore structures, Ice mechanics, Vibration, Ice solid interface, Ice breaking, Ice loads, Drift, Velocity, Design, Analysis (mathematics), Dynamic loads.

44-2217
Study of ice shedding phenomenon on cables.
Druez, J., et al, International Conference on Offshore Mechanics and Arctic Engineering, 9th, Houston, TX, Feb. 18-23, 1990. Proceedings. Vol.4. Edited by O.A. Ayorinde, N.K. Sinha and D.S. Sodhi, New York, American Society of Mechanical Engineers, 1990, p.143-148, 10 refs.
Louchez, S., Bouchard, G.
Power line icing, Transmission lines, Ice removal, Ice melting, Ice sublimation, Ice breaking, Ice loads, Air temperature, Wind velocity, Humidity, Ice structure, Statistical analysis.

44-2218
Evaluation of shear strength of freshwater ice adhered to icephobic coatings.
Mulherin, N.D., MP 2578, International Conference on Offshore Mechanics and Arctic Engineering, 9th, Houston, TX, Feb. 18-23, 1990. Proceedings. Vol.4. Edited by O.A. Ayorinde, N.K. Sinha and D.S. Sodhi, New York, American Society of Mechanical Engineers, 1990, p.149-154, 13 refs.
Ice adhesion, Shear strength, Coatings, Ice removal, Ice prevention, Ship icing, Ice solid interface, Ice growth, Protective coatings, Tests, Temperature effects, Sea spray, Meteorological factors.
This paper discusses a study that was undertaken to discriminate between four icephobic coatings for ease of ice removal.

The method of discrimination was to compare the shear force required to remove a buildup of freshwater ice from flat plate test surfaces measuring 22.9 x 38.1 cm. Twelve replicates each of the four different coatings and two different control surfaces (a total of 72 samples) were subjected to spray icing in an environmental chamber. The samples were iced and sheared tested at 10 C. The tests were performed using a constant displacement rate of 0.0381 cm/s. This shear rate ensured a brittle failure at the ice-coating interface and produced virtually 100% ice removal in every test. Results showed that all four of the experimental coatings exhibited higher mean shear values than either of the two controls. Although the mean shear values for the various coatings were very similar in absolute magnitude, ranging from 71 to 119 kPa, statistical analysis showed that there was a significant difference in coating performance with greater than 96% confidence. The relative standard deviation in shear values ranged from 15 to 29% of the total stress. The distinction is emphasized between deicing and anti-icing surfaces relative to coating performance.

44-2219
Field measurements of ice drag coefficients.
Bruno, M.S., International Conference on Offshore Mechanics and Arctic Engineering, 9th, Houston, TX, Feb. 18-23, 1990. Proceedings. Vol.4. Edited by O.A. Ayorinde, N.K. Sinha and D.S. Sodhi, New York, American Society of Mechanical Engineers, 1990, p.155-159, 6 refs.
Ice mechanics, Sea ice, Stresses, Drift, Ice air interface, Ice water interface, Ice floes, Wind factors, Ocean currents, Analysis (mathematics).

44-2220
Crowd induced deflection of Dows Lake ice cover during Winterlude festival—1985.
Sinha, N.K., International Conference on Offshore Mechanics and Arctic Engineering, 9th, Houston, TX, Feb 18-23, 1990 Proceedings. Vol.4 Edited by O.A Ayorinde, N.K. Sinha and D.S. Sodhi, New York, American Society of Mechanical Engineers, 1990, p.161-167, 7 refs.
Ice deformation, Lake ice, Floating ice, Loads (forces), Bearing strength, Ice cover strength Ice structure Monitors, Ice sheets, Strains.

44-2221
Modelling bridge induced ice jams.
Brown, T.G., International Conference on Offshore Mechanics and Arctic Engineering, 9th, Houston, TX, Feb 18-23, 1990 Proceedings. Vol.4. Edited by O.A. Ayorinde, N.K. Sinha and D.S. Sodhi, New York, American Society of Mechanical Engineers, 1990, p.169-175, 11 refs.
Ice jams, Bridges, Ice conditions, Ice floes, Ice mechanics, Piers, Models, Seasonal variations, Wind factors, Design, Ice breakup.

44-2222
Field measurement of pack ice stresses.
Comfort, G., et al, International Conference on Offshore Mechanics and Arctic Engineering, 9th, Houston, TX, Feb. 18-23, 1990. Proceedings. Vol.4. Edited by O.A. Ayorinde, N.K. Sinha and D.S. Sodhi, New York, American Society of Mechanical Engineers, 1990, p.177-181, 9 refs.
Ritch, R.
Ice loads, Ice pressure, Pack ice, Stresses, Offshore structures, Ice floes, Pressure ridges, Measuring instruments, Ice cover thickness, Ice salinity, Beaufort Sea.

44-2223
Visco-elastic model for the prediction of creep and relaxation behavior of floating ice structures.
Kenny, J., et al, International Conference on Offshore Mechanics and Arctic Engineering, 9th, Houston, TX, Feb. 18-23, 1990. Proceedings. Vol.4. Edited by O.A. Ayorinde, N.K. Sinha and D.S. Sodhi, New York, American Society of Mechanical Engineers, 1990, p.183-193, 16 refs.
Masterson, D.M.
Floating structures, Floating ice, Loads (forces), Ice creep, Ice relaxation, Artificial freezing, Flooding, Offshore structures, Viscoelasticity, Mathematical models, Offshore drilling, Ice cover thickness, Design.

44-2224
Dynamic analysis of a floating ice sheet undergoing vertical indentation.
McGilvery, W.R., et al, MP 2579, International Conference on Offshore Mechanics and Arctic Engineering, 9th, Houston, TX, Feb. 18-23, 1990. Proceedings. Vol.4. Edited by O.A. Ayorinde, N. Sinha and D.S Sodhi, New York, American Society Mechanical Engineers, 1990, p.195-203, 13 refs.
Sodhi, D.S., Lever, J.H.
Ice mechanics, Floating ice, Dynamic properties, Loads (forces), Ice deformation, Bearing strength, Offshore structures, Velocity, Models, Offshore drilling, Ice roads, Tests.
This paper describes a finite-element model of a floating ice sheet subjected to rapid vertical indentation. We modeled the ice sheet using small-deflection, elastic-plate theory and modeled the fluid using incompressible potential flow. The objectives were to assess the validity of this coupled model to predict indentor loads and to determine the relative importance of fluid inertia versus ice-sheet inertia. The model's validity is assessed by comparing its predictions with previously obtained laboratory data. It is found that the model yields reasonably good predictions of indentor loads and sheet deflection profiles provided the ice sheet's characteristic length is reduced to account for damage caused by large deflection. The model also clearly demonstrates the predominance of fluid inertia over ice-sheet inertia for the case of rapid vertical indentation. Indeed, it was found that the ice sheet essentially behaves as a massless, elastic plate on a fluid foundation.

44-2225
Wave-induced bergy bit motion near a floating oil production platform.
Mak, L.M., et al, MP 2580, International Conference on Offshore Mechanics and Arctic Engineering, 9th, Houston, TX, Feb. 18-23, 1990. Proceedings. Vol.4. Edited by O.A. Ayorinde, N.K. Sinha and D.S. Sodhi, New York, American Society of Mechanical Engineers, 1990, p.205-215, 24 refs.
Lever, J.H., Hinchey, M.J., Duthinh, D.
Floating structures, Ice mechanics, Ice conditions, Water waves, Ice strength, Impact strength, Offshore structures, Icebergs, Wave propagation, Statistical analysis, Tests, Velocity.
This paper describes an experimental study at model scale of wave-induced impacts of bergy bits with a floating oil production platform intended for use on the Grand Banks of Newfoundland, Canada. The tests in the 58 m wave tank were conducted at Memorial University using techniques developed in an earlier pilot study but refined in the present program to improve data quality. The objective was to collect and analyze a statistically valid set of bergy bit impact velocities and locations, with a view to providing the design information necessary to ice-strengthen the platform. It is concluded from the study that (1) open-water iceberg significant velocities can provide conservative estimates of the significant impact velocities, (2) relative motion between the platform and the iceberg tends, on average, to mitigate impacts; (3) the berg rotational kinetic energy at the time of an impact is a small portion of the translational kinetic energy; (4) the most probable impact location on the platform is the upper corner of the pontoon facing the oncoming waves; (5) wave diffraction from the structure can reduce impact velocities and change iceberg trajectories; and (6) wave diffraction has more influence on the smaller bergy bit, resulting in fewer impacts. The paper compares the impact results obtained for this floating production platform with results obtained previously for a more transparent, exploration-style semi-submersible.

44-2226
Effect of specimen size on the bending strength of alluvium reinforced ice.
Nixon, W.A., et al, International Conference on Offshore Mechanics and Arctic Engineering, 9th, Houston, TX, Feb. 18-23, 1990. Proceedings. Vol.4. Edited by O.A. Ayorinde, N.K. Sinha and D.S. Sodhi, New York, American Society of Mechanical Engineers, 1990, p.217-222, 24 refs.
Weber, L.J.
Ice strength, Ice composition, Ice deformation, Ice mechanics, Sea spray, Soils, Tests, Brittleness, Flexural strength, Strains.

44-2227
Failure stress and failure modulus of natural ice island ice under uniaxial compression at constant strain rates.
Jeffries, M.O., et al, International Conference on Offshore Mechanics and Arctic Engineering, 9th, Houston, TX, Feb. 18-23, 1990. Proceedings. Vol.4. Edited by O.A. Ayorinde, N.K. Sinha and D.S. Sodhi, New York, American Society of Mechanical Engineers, 1990, p.223-229, 16 refs.
Sinha, N.K., Sackinger, W.M.
Ice islands, Compressive properties, Stress strain diagrams, Ice mechanics, Ice physics, Offshore structures, Icebergs, Fatigue (materials), Tests.

44-2228
Discussion of recent work to develop a more realistic pressure-area model for ice.
Winkler, S.L.M., et al, International Conference on Offshore Mechanics and Arctic Engineering, 9th, Houston, TX, Feb. 18-23, 1990. Proceedings. Vol.4. Edited by O.A. Ayorinde, N.K. Sinha and D.S. Sodhi, New York, American Society of Mechanical Engineers, 1990, p.231-235, 7 refs.
Dorris, J.F.
Ice models, Offshore structures, Ice pressure, Ice loads, Ice solid interface, Strains, Tests, Engineering, Design, Shear stress.

44-2229
Confined compressive test on multi-layer sea-ice.
Yue, Q.J., et al, International Conference on Offshore Mechanics and Arctic Engineering, 9th, Houston, TX, Feb. 18-23, 1990. Proceedings. Vol.4. Edited by O.A. Ayorinde, N.K. Sinha and D.S. Sodhi, New York, American Society of Mechanical Engineers, 1990, p.237-240, 7 refs.
Li, H.S., Shen, W., Zhang, T.
Sea ice, Compressive properties, Ice formation, Ice structure, Strains, Ice strength, Loads (forces), Pressure, Temperature effects, Ice salinity, Tests, Stresses.

44-2230
Fracture toughness of porous ice with and without particles.
Smith, T.R., et al, International Conference on Offshore Mechanics and Arctic Engineering, 9th, Houston, TX, Feb. 18-23, 1990. Proceedings. Vol.4. Edited by O.A. Ayorinde, N.K. Sinha and D.S. Sodhi, New York, American Society of Mechanical Engineers, 1990, p.241-246, 20 refs.
Schulson, M.E., Schulson, E.M.
Ice cracks, Fracturing, Ice structure, Porosity, Ice composition, Tensile properties, Ice strength, Loads (forces), Cellular plastics, Temperature effects, Brittleness, Compressive properties.

44-2231
Preliminary mixed mode fracture experiments on S2 columnar freshwater ice.
DeFranco, S.J., et al, International Conference on Offshore Mechanics and Arctic Engineering, 9th, Houston, TX, Feb. 18-23, 1990. Proceedings. Vol.4. Edited by O.A. Ayorinde, N.K. Sinha and D.S. Sodhi, New York, American Society of Mechanical Engineers, 1990, p.247-252, 17 refs.
Dempsey, J.P.
Ice cracks, Fracturing, Loads (forces), Stresses, Ice crystal structure, Analysis (mathematics), Experimentation.

44-2232
Notch acuity effects on the fracture toughness of freshwater ice.
Wei, Y., et al, International Conference on Offshore Mechanics and Arctic Engineering, 9th, Houston, TX, Feb. 18-23, 1990 Proceedings. Vol.4. Edited by O.A. Ayorinde, N.K. Sinha and D.S. Sodhi, New York, American Society of Mechanical Engineers, 1990, p.253-257, 22 refs.
DeFranco, S.J., Dempsey, J.P.
Ice cracks, Fracturing, Ice strength, Crack propagation, Microstructure, Ice salinity, Tests.

44-2233
Compressive properties of sea ice in a harbour in Liaodong Gulf.
Li, Z.J., et al, International Conference on Offshore Mechanics and Arctic Engineering, 9th, Houston, TX, Feb. 18-23, 1990. Proceedings. Vol.4. Edited by O.A. Ayorinde, N.K. Sinha and D.S. Sodhi, New York, American Society of Mechanical Engineers, 1990, p.259-263, 10 refs.
Sui, J.X., Meng, G.L.
Sea ice, Compressive properties, Ice strength, Ice creep, Ice temperature, Offshore structures, Ice loads, Temperature distribution, Ice cover thickness, Tests, Flexural strength, Shear strength, Ice cracks.

44-2234
Cyclic loading of saline ice: initial experimental results.
Cole, D.M., MP 2581 International Conference on Offshore Mechanics and Arctic Engineering, 9th, Houston, TX, Feb. 18-23, 1990. Proceedings. Vol.4. Edited by O.A. Ayorinde, N.K. Sinha and D.S. Sodhi, New York, American Society of Mechanical Engineers, 1990, p.265-271, 10 refs.
Ice loads, Ice salinity, Stress strain diagrams, Loads (forces), Compressive properties, Ice elasticity, Tensile properties, Measuring instruments, Experimentation, Ice cores, Temperature effects.
This paper describes the initial experimental results on the cyclic loading of saline ice specimens obtained under fully reversed (tension-compression) stress loading conditions. The apparatus used to grip the 100-m-diameter specimens is similar to one described in Cole and Gould (1989) for performing reversed direct stress tests on 50-m-diameter specimens. Results were obtained for sinusoidally varying axial stresses ranging from 0.3 to 0.9 MPa and for loading frequencies in the range of 0.0025 to 10 Hz. The test temperatures were -10 and -25 C. The specimens were saline ice cores taken from an outdoor facility at CRREL. The ice exhibited varying degrees of inelastic behavior under all conditions experienced in these experiments: the initial cycle of loading at frequencies in the range of 0.1 to 10 Hz resulted in closed hysteresis loops, while lower frequencies produced open loops. The net strain at the end of the open hysteresis loops was virtually all recovered within a

short time after the end of a single loading cycle for the 100s period waveforms However, for the loading periods of 1000 and 4000s, the bulk of the strain required to close the hysteresis loop was generally not recoverable The loading sequences were such that all specimens ultimately failed in tension with the fracture occurring in the deformation measurement gauge length.

44-2235
Crack nucelation in polycrystalline ice—a comparison of two nucleation criteria.
Wu, M.S., et al, International Conference on Offshore Mechanics and Arctic Engineering, 9th, Houston, TX, Feb. 18-23, 1990. Proceedings. Vol.4. Edited by O.A. Ayorinde, N.K Sinha and D.S Sodhi, New York, American Society of Mechanical Engineers, 1990, p.273-282, 30 refs.
Sunder, S.S.
Ice cracks, Ice crystal structure, Stresses, Microstructure, Loads (forces), Tensile properties, Strains, Grain size, Analysis (mathematics), Anisotropy, Ice elasticity.

44-2236
Is minimum creep rate a fundamental material property.
Sinha, N.K, International Conference on Offshore Mechanics and Arctic Engineering, 9th, Houston, TX, Feb. 18-23, 1990. Proceedings. Vol.4. Edited by O.A Ayorinde, N K Sinha and D S Sodhi, New York, American Society of Mechanical Engineers, 1990, p.283-288, 20 refs.
Ice creep, Stresses, Strains, Ice loads, Ice mechanics, Ice deformation, Ice crystal structure, Temperature effects, Damage, Engineering, Design, Analysis (mathematics).

44-2237
Study of design criteria of level ice compressive strength in the north of Bohai Sea.
Meng, G.L., et al, International Conference on Offshore Mechanics and Arctic Engineering, 9th, Houston, TX, Feb. 18-23, 1990. Proceedings. Vol.4. Edited by O.A. Ayorinde, N.K. Sinha and D.S. Sodhi, New York, American Society of Mechanical Engineers, 1990, p.289-292, 6 refs.
Ice strength, Compressive properties, Sea ice, Ice temperature, Heat transfer, Ice salinity, Offshore structures, Temperature distribution, Design criteria, Engineering, Ice cover thickness, Analysis (mathematics), Air temperature, China—Bohai Gulf.

44-2238
Characteristics of ridges in Northumberland Strait.
Brown, T G , et al International Conference on Offshore Mechanics and Arctic Engineering, 9th, Houston, TX, Feb. 18-23, 1990. Proceedings. Vol.4. Edited by O.A. Ayorinde, N.K. Sinha and D.S. Sodhi, New York, American Society of Mechanical Engineers, 1990, p.293-299, 7 refs.
Bruce, J., Currie, D.
Pressure ridges, Ice strength, Bridges, Ice cover thickness, Ice temperature, Compressive properties, Ice crystal structure, Tests, Temperature effects, Ice density, Ice salinity.

44-2239
Barents Sea Ice SAR survey.
Bercha, F G., et al, International Conference on Offshore Mechanics and Arctic Engineering, 9th, Houston, TX, Feb. 18-23, 1990. Proceedings. Vol.4. Edited by O.A. Ayorinde, N.K. Sinha and D.S. Sodhi, New York, American Society of Mechanical Engineers, 1990, p.301-307, 5 refs.
Dechka, J.A., Spring, W.
Ice surveys, Sea ice, Remote sensing, Ice conditions, Ice mechanics, Drift, Airborne radar, Icebergs, Mapping, Data processing, Barents Sea.

44-2240
Airborne measurement of sea ice thickness using electromagnetic induction during LIMEX 89.
Holladay, J.S., et al, MP 2590, International Conference on Offshore Mechanics and Arctic Engineering, 9th, Houston, TX, Feb. 18-23, 1990. Proceedings. Vol.4. Edited by O.A Ayorinde, N.K. Sinha and D.S. Sodhi, New York, American Society of Mechanical Engineers, 1990, p.309-315, 13 refs.
Rossiter, J.R., Kovacs, A.
Ice cover thickness, Sea ice, Remote sensing, Electromagnetic prospecting, Airborne equipment, Ice mechanics, Offshore structures, Airborne radar, Ice navigation, Meteorological data, Accuracy.

44-2241
Determination of the undersaturation in thawed permafrost at the beginning of freezeback.
Ayorinde, O.A., MP 2582, International Conference on Offshore Mechanics and Arctic Engineering, 9th, Houston, TX, Feb. 18-23, 1990. Proceedings. Vol.4. Edited by O.A. Ayorinde, N.K. Sinha and D.S. Sodhi, New York, American Society of Mechanical Engineers, 1990, p 317-321, 3 refs
Permafrost, Freeze thaw cycles, Drilling, Saturation, Porosity, Gas wells, Oil wells, Mathematical models, Well casings, Soil compaction, Unfrozen water content.
In permafrost, the initial undisturbed degree of saturation can be significantly reduced when subjected to several cycles of thaw-subsidence and freezeback usually encountered during oil/gas well drilling and production operations. The changes in saturation and the resulting undersaturation should be considered in the analysis and modelling of permafrost properties Consideration of the reduction in saturation is lacking in most of the published freezeback and thaw-subsidence models. A mathematical relation is derived to evaluate the undersaturation in the permafrost at the beginning of each freezeback process during several thaw-subsidence-freezeback cycles. The undersaturation is related to the initial unfrozen water content and the permafrost compaction caused by thaw-subsidence The mathematical analysis shows how the effects of the initial unfrozen water content and the permafrost compaction due to subsidence can be taken into account in determining the freezeback pressures. A relationship for the initial gas fraction is also developed which can be incorporated in the freezeback model. Furthermore, upper limits are established for the permafrost compaction or thaw consolidation (volumetric strain) for various possible conditions that may be encountered.

44-2242
Thermal stabilization of permafrost with thermosyphons.
Zarling, J.P., et al, MP 2583, International Conference on Offshore Mechanics and Arctic Engineering, 9th, Houston, TX, Feb. 18-23, 1990. Proceedings. Vol.4. Edited by O.A. Ayorinde, N.K. Sinha and D.S. Sodhi, New York, American Society of Mechanical Engineers, 1990, p.323-328, 18 refs.
Haynes, F.D., Gagnon, J.J.
Permafrost thermal properties, Cooling, Foundations, Subgrades, Heat transfer, Wind tunnels, Design, Thermal conductivity, Analysis (mathematics).
Foundation design techniques in cold regions include the use of thermosyphons for subgrade cooling. These passive heat transfer devices have been used under buildings, roads, railroads, pipelines and airfields Laboratory tests were conducted on a full-size commercial, two-phase thermosyphon in CRREL's atmospheric wind tunnel. The unit was tested at evaporator angles of 9, 7, 3, and 0 degree and condenser angles of 90, 45 and 9 degrees from the horizontal. The condenser section was subjected to wind speeds ranging from 0 to 7 m/s. Performance of the thermosyphon as a function of these variables is presented The component thermal resistances of an in-place thermosyphon were calculated. It was determined that the thermal resistances associated with conduction through the soil and heat transfer from the fins to the air are dominant.

44-2243
Response of a Beaufort Sea clay to monotonic and cyclic loading.
McCarron, W.O., et al, International Conference on Offshore Mechanics and Arctic Engineering, 9th, Houston, TX, Feb 18-23, 1990 Proceedings Vol.4 Edited by O.A Ayorinde, N K Sinha and D.S. Sodhi, New York, American Society of Mechanical Engineers, 1990, p.329-336, 9 refs.
Been, K.
Offshore structures, Clay soils, Soil strength, Foundations, Loads (forces), Ocean bottom, Shear stress, Cohesion, Tests, Design, Beaufort Sea.

44-2244
Variations in ice gouge parameters related to different seabed soil types.
Ticken, E.J., et al, International Conference on Offshore Mechanics and Arctic Engineering, 9th, Houston, TX, Feb. 18-23, 1990. Proceedings. Vol.4. Edited by O.A. Ayorinde, N.K. Sinha and D.S. Sodhi, New York, American Society of Mechanical Engineers, 1990, p.337-339.
Toimil, L.J.
Ice scoring, Ocean bottom, Soil strength, Bottom topography, Soil composition, Ice mechanics, Sea ice, Particle size distribution, Grain size, Drift, Acoustic measurement, Bathymetry, Bottom sediment, Beaufort Sea.

44-2245
Uranium-series dating of tephra-banded Allan Hills ice.
Fireman, E.L., NIPR Symposium on Antarctic Meteorites, Proceedings. No.2, Tokyo, National Institute of Polar Research, 1989, p.335-343, 13 refs.
Ice dating, Ice sheets, Flow rate, Glacier flow, Ice composition, Antarctica—Allan Hills.
Tephra-banded ice samples from the main Allan Hills icefield are dated by a uranium-series method, which is based on the Ra-226/Th-230 and Ra-226/U-234 ratios dissolved in ice from tephra For ice from a location at the western border of the 50-sq km area that is richly laden with meteorites, the Ra-226/Th-230 and Ra-226/U-234 ages differ from those for ice from a location within this meteorite-rich area near its eastern border (approximately 5 km closer to the Allan Hills land barrier). The ice flow is from west to east; the dates indicate that the age of the ice increases in the flow direction, as theoretically predicted for ice approaching a land barrier. The comparison of this ice chronology with the terrestrial age of meteorites leads to a number of conclusions about the meteorite fall rate and history of the ice movement (Auth mod)

44-2246
Characteristics of the movement of talus in a periglacial region. [Osobennosti dvizhenia osypei periglatsial'noi oblasti],
Nikulin, F.V., *Moscow. Universitet. Vestnik. Serna 5. Geografiia*, Nov.-Dec. 1989, No.6, p.36-43, In Russian. 3 refs.
Talus, Periglacial processes, Glaciers.

44-2247
Primary glacial relief of interfluves in a boundary region (as in the example of the Protva River basin). [Pervichnyi ledrikovyi rel'ef mezhdurechii kraevoi oblasti (na primere basena r. Protvy)],
Antonov, S.I., *Moscow. Universitet. Vestnik. Serna 5: Geografiia*, Nov.-Dec. 1989, No.6, p.43-47, In Russian. 7 refs.
Moraines, Glacial deposits, Topographic features, Glaciation.

44-2248
Optimal distintegration method of frozen and thawed sandy and clayey soils. [Optimal'nyi sposob dezintegratsii merzlykh i protaiannykh peschano-glinistykh porod],
Shirman, V.G., et al, *Akademiia nauk SSSR. Doklady*, Dec. 1989, 309(4), p.962-964, In Russian. 3 refs.
Zakharova, S.M., Rumiantsev, G.V.
Clay soils, Sands, Soil physics, Ground thawing, Frozen ground physics.

44-2249
Proceedings.
International Symposium on Arctic Air Chemistry, 4th, Hurdal, Norway, Sep 29-Oct 2, 1987, *Atmospheric environment*, 1989, 23(11), 285p., Refs pass im. For individual papers see 44-2250 through 44 2271.
Rahn, K.A., ed.
Air pollution, Haze, Aerosols, Climatic factors, Atmospheric circulation, Chemical composition, Atmospheric attenuation, Particles, Polar regions, Seasonal variations, Measurement, Chemical analysis, Meteorological data, Weather observations.

44-2250
Arctic air pollution: a Norwegian perspective.
Ottar, B., *Atmospheric environment*, 1989, 23(11), p.2349-2356, 50 refs.
Air pollution, Atmospheric composition, Haze, Aerosols, Atmospheric circulation, Periodic variations, Climatic changes, Particle size distribution, Meteorological factors, Norway.

44-2251
Barrow surface aerosol: 1976-1986.
Bodhaine, B.A., *Atmospheric environment*, 1989, 23(11), p.2357-2369, 31 refs.
Atmospheric composition, Aerosols, Measurement, Light scattering, Haze, Air pollution, Condensation nuclei, Periodic variations, Sampling, Atmospheric circulation. United States—Alaska—Barrow.

44-2252
Characterization of size segregated particles collected over Alaska and the Canadian High Arctic, AGASP-II flights 204-206.
Sheridan, P.J., *Atmospheric environment*, 1989, 23(11), p.2371-2386, 17 refs.
Atmospheric composition, Aerosols, Physical properties, Chemical properties, Particles, Haze, Electron microscopy, Air pollution, Particle size distribution, Polar regions.

44-2253
Resolution of ionic components of late winter arctic aerosols.
Li, S.M., et al, *Atmospheric environment*, 1989, 23(11), p.2387-2399, 21 refs.
Winchester, J.W.
Atmospheric composition, Aerosols, Haze, Chemical composition, Ion density (concentration), Air pollution, Chemical analysis, Salinity, Statistical analysis, United States—Alaska—Barrow.

44-2254
Geochemistry of organic and inorganic ions of late winter arctic aerosols.
Li, S.M., et al, *Atmospheric environment*, 1989, 23(11), p.2401-2415, 57 refs.
Winchester, J.W.
Atmospheric composition, Aerosols, Ion density (concentration), Chemical composition, Haze, Air pollution, Polar regions, Chemical analysis, Statistical analysis, Temperature effects, United States—Alaska—Barrow.

44-2255
Aerosol and lidar measurements of hazes in mid-latitude and polar airmasses.
Radke, L.F., et al, *Atmospheric environment*, 1989, 23(11), p.2417-2430, 41 refs.
Atmospheric composition, Aerosols, Measurement, Haze, Particle size distribution, Airborne radar, Air pollution, Polar regions, Aerial surveys, Lidar, Light scattering, Stratification.

44-2256
Seasonal surface ozone and filterable bromine relationship in the high Arctic.
Oltmans, S.J., et al, *Atmospheric environment*, 1989, 23(11), p.2431-2441, 34 refs.
Atmospheric composition, Oxygen, Haze, Photochemical reactions, Chemical properties, Air pollution, Polar regions, Chemical analysis, Aerosols, Seasonal variations.

44-2257
Boundary layer ozone depletion during AGASP-II.
Mickle, R.E., et al, *Atmospheric environment*, 1989, 23(11), p.2443-2449, 12 refs.
Bottenheim, J.W., Leaitch, W.R., Evans, W.
Atmospheric composition, Oxygen, Measurement, Boundary layer, Ion density (concentration), Air pollution, Aerosols, Temperature inversions, Aerial surveys, Chemical analysis, United States—Alaska—Alert.

44-2258
Some statistical properties of ground level air pollution at Norwegian Arctic stations and their relation to large scale atmospheric flow systems.
Iversen, T., *Atmospheric environment*, 1989, 23(11), p.2451-2462, 18 refs.
Atmospheric composition, Chemical properties, Air pollution, Aerosols, Haze, Particles, Atmospheric circulation, Sampling, Periodic variations.

44-2259
Major ions and scavenging of sulphate in the Norwegian Arctic.
Joranger, E., et al, *Atmospheric environment*, 1989, 23(11), p.2463-2469, 24 refs
Semb, A.
Chemical composition, Atmospheric composition, Ions, Scavenging, Aerosols, Sampling, Air pollution, Polar regions, Chemical analysis, Periodic variations, Precipitation (meteorology)

44-2260
Light hydrocarbons in the Norwegian Arctic.
Hov, Ø., et al, *Atmospheric environment*, 1989, 23(11), p.2471-2482, 21 refs.
Schmidbauer, N., Oehme, M.
Atmospheric composition, Chemical composition, Aerosols, Hydrocarbons, Sampling, Polar regions, Chemical analysis, Wind factors, Air pollution, Photochemical reactions, Norway.

44-2261
Seasonal variations in sulfate, nitrate and chloride in the Greenland Ice Sheet: relation to atmospheric concentrations.
Davidson, C.I., et al, *Atmospheric environment*, 1989, 23(11), p.2483-2493, 34 refs.
Atmospheric composition, Snow composition, Aerosols, Haze, Snow impurities, Polar regions, Air pollution, Chemical properties, Seasonal variations, Ice sheets, Sampling.

44-2262
Size distribution of large aerosol particles during AGASP-II: absence of Mt Augustine eruptive particles in the Alaskan Arctic.
Sievering, H., et al, *Atmospheric environment*, 1989, 23(11), p.2495-2499, 14 refs.
Sheridan, P.J., Schnell, R.C.
Atmospheric composition, Aerosols, Particle size distribution, Measurement, Aerial surveys, Particles, Volcanic ash, Physical properties, United States—Alaska.

44-2263
Anticyclonic point of view on low-level tropospheric long-range transport.
Raatz, W.E., *Atmospheric environment*, 1989, 23(11), p.2501-2504, 24 refs.
Haze, Atmospheric composition, Atmospheric circulation, Polar regions, Air pollution, Seasonal variations, Meteorological factors, Atmospheric pressure.

44-2264
Flux of anthropogenic sulphur into the Arctic from mid-latitudes in 1979/80.
Barrie, L.A., et al, *Atmospheric environment*, 1989, 23(11), p.2505-2512, 17 refs.
Olson, M.P., Oikawa, K.K
Atmospheric composition, Air pollution, Simulation, Haze, Atmospheric circulation, Chemical properties, Polar regions, Seasonal variations, Models, Chemical analysis.

44-2265
Stable lead isotope ratios in arctic aerosols: evidence for the origin of arctic air pollution.
Sturges, W.T., et al, *Atmospheric environment*, 1989, 23(11), p.2513-2519, 27 refs.
Barrie, L.A.
Atmospheric composition, Air pollution, Haze, Aerosols, Isotope analysis, Chemical composition, Polar regions, Sampling, Chemical analysis.

44-2266
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Snow removal, Drainage, Snowmelt, Runoff, Analysis (mathematics).

44-2327
Degradation mechanism of pavement aggregates by antifreezes and snow melting agents.
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Road maintenance, Road icing, Chemical ice prevention, Pavements, Aggregates, Antifreezes, Degradation.

44-2328
Slope erosion in cold regions.
Fukue, M., et al, Cold Region Technology Conference, Sapporo, Japan, Nov. 21-22, 1985. Proceedings. (Kanchi gijutsu shinpojiumu koen ronbunshu), Sapporo, Japan, Kanchi kaihatsu kenkyukai (Cold Regions Development Society), 1985, p.298-302, In Japanese.
Anma, S.
Soil erosion, Slope processes, Slope stability

44-2329
Snow melting and deicing system using heat pipes.
Takaoka, M., et al, Cold Region Technology Conference, Sapporo, Japan, Nov. 21-22, 1985. Proceedings. (Kanchi gijutsu shinpojiumu koen ronbunshu), Sapporo, Japan, Kanchi kaihatsu kenkyukai (Cold Regions Development Society), 1985, p.314-319, In Japanese. 2 refs.
Heat pipes, Snow melting, Artificial melting.

44-2330
Frozen ground formation by heat pipe and its application.
Fukuda, M., et al, Cold Region Technology Conference, Sapporo, Japan, Nov. 21-22, 1985. Proceedings. (Kanchi gijutsu shinpojiumu koen ronbunshu), Sapporo, Japan, Kanchi kaihatsu kenkyukai (Cold Regions Development Society), 1985, p.362-367, In Japanese. 4 refs.
Ryokai, K.
Heat pipes, Artificial freezing, Soil freezing, Soil stabilization, Analysis (mathematics).

44-2331
Control and preservation of agricultural soil freezing. (Nochi, no dojo toketsu no yokusei to toketsu hozon).
Tsuchiya, F., Cold Region Technology Conference, Sapporo, Japan, Nov. 21-22, 1985. Proceedings. (Kanchi gijutsu shinpojiumu koen ronbunshu), Sapporo, Japan, Kanchi kaihatsu kenkyukai (Cold Regions Development Society), 1985, p.378-382, In Japanese. 7 refs.
Soil freezing, Soil conservation, Agriculture, Analysis (mathematics).

44-2332
Theoretical assessment for microwave propagation in snowfall.
Asari, E., Cold Region Technology Conference, Sapporo, Japan, Nov. 21-22, 1985. Proceedings. (Kanchi gijutsu shinpojiumu koen ronbunshu), Sapporo, Japan, Kanchi kaihatsu kenkyukai (Cold Regions Development Society), 1985, p.383-388, In Japanese.
Snowfall, Snow electrical properties, Microwaves, Radio waves, Wave propagation, Analysis (mathematics), Snow survey tools.

44-2333
Propagation characteristics of electromagnetic waves in snow pack.
Watanabe, K., et al, Cold Region Technology Conference, Sapporo, Japan, Nov. 21-22, 1985. Proceedings. (Kanchi gijutsu shinpojiumu koen ronbunshu), Sapporo, Japan, Kanchi kaihatsu kenkyukai (Cold Regions Development Society), 1985, p.389-393, In Japanese. 1 ref.
Abe, T., Yamaguchi, Y., Sengoku, M., Adachi, T., Kidou, Y.
Snow electrical properties, Microwaves, Radio waves, Wave propagation, Analysis (mathematics), Snow survey tools.

44-2334
Some applications of microwave remote sensing techniques for snow survey.
Suzuki, M., Cold Region Technology Conference, Sapporo, Japan, Nov. 21-22, 1985. Proceedings. (Kanchi gijutsu shinpojiumu koen ronbunshu), Sapporo, Japan, Kanchi kaihatsu kenkyukai (Cold Regions Development Society), 1985, p.394-397, In Japanese.
Snow survey tools, Snow electrical properties, Radio waves, Wave propagation, Snow surveys.

44-2335
Automated measuring system designed for determining the snow stratigraphy.
Motoi, K., et al, Cold Region Technology Conference, Sapporo, Japan, Nov. 21-22, 1985. Proceedings. (Kanchi gijutsu shinpojiumu koen ronbunshu), Sapporo, Japan, Kanchi kaihatsu kenkyukai (Cold Regions Development Society), 1985, p.401-406, In Japanese. 8 refs.
Suzuki, M.
Snow stratigraphy, Snow survey tools.

44-2336
Development of under snow radar.
Sakamoto, Y., et al, Cold Region Technology Conference, Sapporo, Japan, Nov 21-22, 1985 Proceedings. (Kanchi gijutsu shinpojiumu koen ronbunshu), Sapporo, Japan, Kanchi kaihatsu kenkyukai (Cold Regions Development Society), 1985, p.407-412, In Japanese.
Aoki, Y.
Radio echo soundings, Snow electrical properties, Snow survey tools, Snow surveys, Radar.

44-2337
On the possibility of construction of "snow-dam".
Takahara, H., et al, Cold Region Technology Conference, Sapporo, Japan, Nov. 21-22, 1985. Proceedings. (Kanchi gijutsu shinpojiumu koen ronbunshu), Sapporo, Japan, Kanchi kaihatsu kenkyukai (Cold Regions Development Society), 1985, p.440-445, In Japanese. 8 refs.
Higuchi, K.
Snow melting, Snow water equivalent, Water supply, Artificial melting, Snowmelt.

44-2338
Studies on the dynamics of the two-phase flow composed of snow and water.
Kuriyama, H., et al, Cold Region Technology Conference, Sapporo, Japan, Nov. 21-22, 1985. Proceedings. (Kanchi gijutsu shinpojiumu koen ronbunshu), Sapporo, Japan, Kanchi kaihatsu kenkyukai (Cold Regions Development Society), 1985, p.452-457, 6 refs.
Nohara, I., Kobayashi, T.
Water flow, Snow hydrology, Hydraulics, Liquid solid interfaces, Phase transformations, Snow removal, Wet snow, Analysis (mathematics).

44-2339
Example of very-short-term prediction experiments of snowfall in Sapporo City.
Asuma, Y., et al, Cold Region Technology Conference, Sapporo, Japan, Nov. 21-22, 1985. Proceedings. (Kanchi gijutsu shinpojiumu koen ronbunshu), Sapporo, Japan, Kanchi kaihatsu kenkyukai (Cold Regions Development Society), 1985, p.480-485, In Japanese. 12 refs.
Kikuchi, K., Taniguchi, T., Miyashita, T.
Snowfall, Weather forecasting, Analysis (mathematics).

44-2340
Snow accretion experiments on hot metallic plate.
Fujii, T., et al, Cold Region Technology Conference, Sapporo, Japan, Nov. 21-22, 1985. Proceedings. (Kanchi gijutsu shinpojiumu koen ronbunshu), Sapporo, Japan, Kanchi kaihatsu kenkyukai (Cold Regions Development Society), 1985, p.513-515, In Japanese.
Sudo, I., Endo, T., Ebisawa, K
Snow accumulation, Blowing snow, Railroad cars

44-2341
Visual range monitor used for blowing snow.
Fukuzawa, Y., et al, Cold Region Technology Conference, Sapporo, Japan, Nov. 21-22, 1985. Proceedings. (Kanchi gijutsu shinpojiumu koen ronbunshu), Sapporo, Japan, Kanchi kaihatsu kenkyukai (Cold Regions Development Society), 1985, p.516-521, In Japanese. 3 refs.
Takeuchi, M., Ishimoto, K., Nohara, T.
Snowfall, Blowing snow, Visibility, Precipitation gages, Snow optics, Analysis (mathematics).

44-2342
Effect of snow break forest to improve visibility in blowing snow.
Ishimoto, K., et al, Cold Region Technology Conference, Sapporo, Japan, Nov. 21-22, 1985. Proceedings. (Kanchi gijutsu shinpojiumu koen ronbunshu), Sapporo, Japan, Kanchi kaihatsu kenkyukai (Cold Regions Development Society), 1985, p.527-532, In Japanese. 5 refs.
Takeuchi, M., Fukuzawa, Y., Nohara, T
Windbreaks, Blowing snow, Visibility, Roads, Analysis (mathematics), Protective vegetation

44-2343
Snowbreaking capacity of road cuts.
Ishimoto, K., et al, Cold Region Technology Conference, Sapporo, Japan, Nov. 21-22, 1985. Proceedings. (Kanchi gijutsu shinpojiumu koen ronbunshu), Sapporo, Japan, Kanchi kaihatsu kenkyukai (Cold Regions Development Society), 1985, p.533-538, In Japanese. 3 refs.
Takeuchi, M., Nohara, T., Fukuzawa, Y.
Blowing snow, Windbreaks, Roads, Mathematical models, Road maintenance.

44-2344
New prevention technique of snow drifting.
Matsuda, M., et al, Cold Region Technology Conference, Sapporo, Japan, Nov. 21-22, 1985. Proceedings. (Kanchi gijutsu shinpojiumu koen ronbunshu), Sapporo, Japan, Kanchi kaihatsu kenkyukai (Cold Regions Development Society), 1985, p.547-552, In Japanese. 9 refs.
Nishimura, H.
Blowing snow, Windbreaks, Snowdrifts.

44-2345
Liquid chromatographic method for determination of extractable nitroaromatic and nitramine residues in soil.
Jenkins, T.F., et al, *Association of Official Analytical Chemists. Journal*, 1983, 72(6), MF 2586, p.890-899, 47 refs.
Walsh, M.E., Schumacher, P.W., Myares, P.H., Bauer, C.F., Grant, C.L.
Soil pollution, Soil composition, Chemical analysis, Chemical properties, Soil science, Laboratory techniques.

44-2346
Calculation of the Auger spectrum of liquid water.
Liegener, C.M., et al, *Journal of chemical physics*, Feb. 15, 1988, 88(4), p.2618-2623, 29 refs.
Chen, R.
Water structure, Spectra, Liquid phases, Molecular structure, Simulation, Chemical properties, Ice composition.

44-2347
Thermal conductivity of ice and ice clathrate.
Ahmad, N., et al, *Solid state communications*, July 1987, 63(2), p.167-171, 22 refs.
Phillips, W.A.
Ice thermal properties, Clathrates, Thermal conductivity, Ice physics, Proton transport, Molecular structure, Latticed structures, Temperature measurement, Cooling rate.

44-2348
Estimating the effects of rain and snow on potential reactor accident consequences.
ApSimon, H.M., et al *Nuclear energy*, Aug. 1986, 25(4), p.235-242, 10 refs.
Simms, K.L.
Snowfall, Fallout, Atmospheric composition, Rain, Accidents, Nuclear power, Air pollution, Wind factors, Radar tracking, Mathematical models, Meteorological factors, Precipitation (meteorology).

44-2349
Depression of freezing temperature of water and water solutions in porous materials.
Schneider, P., et al, *Collection of Czechoslovak chemical communications*, 1989, Vol.54, p.2644-2647, 4 refs.
Rathousky, J.
Porous materials, Freezing points, Water, Solutions, Physical properties, Water vapor, Temperature effects, Thermodynamics, Structural analysis

44-2350
Swift snowmelt and floods (lahars) caused by great pyroclastic surge at Mount St. Helens volcano, Washington, 18 May 1980.
Waitt, R.B., *Bulletin of volcanology*, 1989, Vol.52, p.138-157, 71 refs.
Volcanoes, Snowmelt, Floods, Fluid flow, Soil erosion, Geologic processes Rheology Sediment transport. Flood forecasting, United States—Washington—Saint Helens, Mount.

44-2351
Circulation and property distributions in the central Bering Sea, spring 1988.
Reed, R.K., et al, *U.S. National Oceanic and Atmospheric Administration. NOAA technical report*, Oct. 1989, ERL 439-PMEL 39, 13p., 13 refs.
Stabeno, P.J.
Ocean currents, Oceanographic surveys, Seasonal variations, Sea water, Water temperature, Salinity, Bering Sea.

44-2352
Snow cover, freezing and thawing of soil in pine forests of the Kama River region. (Snezhnyi pokrov, promerzanie i ottaivanie pochvy v sosnovykh lesakh Prikam'ia),
Korepanov, A.A., *Lesovedenie*, Sep.-Oct. 1989, No.5, p.64-68, In Russian with English summary. 15 refs.
Snow depth, Snow accumulation, Freeze thaw cycles, Soil freezing, Ground thawing, Snow cover effect, Soil water, Forest soils.

44-2353
Fundamental study on standard design methods of snow-conveyance gutter systems and snow-melting gutter systems.
Okuma, T., et al, *Seppyo*, Dec. 1989, 51(4), p.239-251, In Japanese with English summary. 8 refs.
Ohkawa, H., Koudate, H., Miya, T., Mizuochi, N., Nakamura, I.
Snow removal, Snow melting, Artificial melting, Drains, Hydraulics, Water flow, Analysis (mathematics).

44-2354
On the characteristics of snowfall at Aomori City.
Rikiishi, K., et al, *Seppyo*, Dec. 1989, 51(4), p.253-264, In Japanese with English summary. 20 refs.
Sugaya, J., Maeda, H.
Snowfall, Snow depth, Precipitation (meteorology), Snow surveys, Weather stations, Weather observations, Japan—Aomori City.

44-2355
Feasibility study of a system of urban snow removal and storage, integrated with air conditioning. Part III: An improvement of the system for Nagaoka City.
Umemura, T., et al, *Seppyo*, Dec. 1989, 51(4), p.265-274, In Japanese with English summary. 5 refs.
Snow removal, Air conditioning, Snowfall, Cost analysis, Japan—Nagaoka City.

44-2356
Frost heave of over-consolidated soil.
Yamamoto, H., et al, *Seppyo*, Dec. 1989, 51(4), p.275-284, In Japanese with English summary. 14 refs.
Ohrai, T., Izuta, H
Soil freezing, Frost heave, Soil water migration, Soil compaction, Soil water, Clay soils, Analysis (mathematics)

44-2357
One-dimensional mixed layer model beneath the Ross Ice Shelf with tidally induced vertical mixing.
Scheduikat, M., et al, *Antarctic science*, Mar 1990, 2(1), p.29-42, 25 refs.
Olbers, D.J.
Ice shelves, Ablation, Ice water interface, Heat flux, Antarctica—Ross Ice Shelf
The dense High Salinity Shelf Water (HSSW) which spreads out below parts of the Ross Ice Shelf represents a heat-reservoir that can induce ablation if it comes into contact with the ice shelf base. Based on an extended three-layer model, ablation rates exceeding 0.4 m/yr are obtained in the southeastern part of the Ross ice shelf. Advection processes in the mixed layer directly beneath the ice shelf base are not considered. These results can therefore be regarded as indicating the maximum amount of ablation occurring in the deeper reaches of the ice shelf cavity. Application of the three-layer model to the J9-area in the central Ross Ice Shelf indicates a tidally induced vertical heat flux of 1.8 W/sq m and a corresponding melting rate of 0.71 m/yr. As supported by ice core measurements, however, an accumulation rate of 0.03-0.05 m/yr is estimated due to advection of freshwater produced immediately south of the J9-area. (Auth. mod.)

44-2358
Review of the climate of Mawson—a representative strong wind site in East Antarctica.
Streten, N.A., *Antarctic science*, Mar 1990, 2(1), p.79-89, 24 refs.
Sea ice distribution, Meteorological data, Wind (meteorology), Antarctica—Mawson Station.
An analysis is made of the climate of Mawson Station and its hinterland in the light of 30 years of observations and of previous investigations. Data are presented on free atmosphere temperature and wind structure, the synoptic meteorology of the region, solar radiation, surface temperature, sea ice, wind and weather. Emphasis is placed on the characteristics of the shallow south easterly katabatic winds averaging 11.1 m/s throughout the year and the frequent periods of intense gale associated with the effects of major southern ocean depressions. The climate of Mawson is believed to be typical of much of the coast of East Antarctica—regions where the ice cap falls steeply to sea level. (Auth.)

44-2359
Sensitivity and uncertainty analysis of a short-term sea ice motion model.
Thomson, N.R., et al, *Journal of geophysical research*, Feb. 15, 1990, 95(C2), p.1713-1739, 25 refs.
Sykes, J.F.
Sea ice distribution, Mathematical models, Simulation, Drift.

44-2360
Ice drift and momentum exchange in winter antarctic pack ice.
Martinson, D.G., et al, *Journal of geophysical research*, Feb. 15, 1990, 95(C2), p.1741-1755, 21 refs.
Air water interactions, Ice cover effect, Sea ice, Drift, Velocity measurement, Stresses, Antarctica—Weddell Sea.
This paper uses the Winter Weddell Sea Project 1986 winter antarctic data set to describe the nature of observed sea ice drift and momentum exchange and determine relevant drag coefficients (linear and quadratic) and parameter values for three formulations of the momentum balance. The large-scale mean drift of the ice justifies, with some penalty, use of the steady free drift equation in which the air-ice stress is balanced by ice-ocean drag and the Coriolis force. Three forms of the free drift equation are considered: stresses are parameterized with a quadratic drag law, stresses are parameterized with a linear drag law (useful because of its analytically manageable form), and the Coriolis force is ignored (owing to the thin, 0.6-m ice), so ice speed is proportional to wind speed at a specified angle. All three formulations simulate the observed ice drift with the same degree of accuracy. Both true drag coefficient values and effective values are estimated. The effective values show a strong correlation to the 4-day average large-scale ice divergence. They also show that the ice-water stress is typically about 1/3 the air-ice stress, indicating a significant role of ice interaction (free drift still provides an excellent parameterization of ice drift but at the expense of neglecting the details of these physics). (Auth.mod.)

44-2361
Thermal response of downhill skis.
Warren, G.C., et al, *U.S. Army Cold Regions Research and Engineering Laboratory*, Dec. 1989, CR 89-23, 40p., ADA-219 279, 15 refs.
Colbeck, S.C., Kennedy, F.E.
Skis, Metal snow friction, Thermal conductivity, Snowmelt.
Large temperature increases were measured in downhill skis. A steady-state temperature was observed at the base, indicating that melting occurs over some portion of the base. This steady-state temperature increases with the ambient temperature and depends on ski speed and load, and the type of snow on the surface. Heat was observed to propagate up through the ski in both the field measurements and in a finite element model of a Rossignol DH ski. In that particular ski, much heat propagates along an aluminum plate that connects with the steel edges of the ski. This combination about doubles the heat loss from the base and could reduce the thickness of the layer of lubricating meltwater, especially at lower temperatures. These large temperature increases provide further evidence of the existence of a layer of meltwater that would control the friction. The finite element model allows the predictions of material properties and geometry in the design of sliders for snow and ice.

44-2362
Methods of studying seasonally freezing and frozen ground. Collection of scientific papers. (Metody izucheniia sezonnopromerzaiushchikh i merzlykh gruntov. Sbornik nauchnykh trudov).
Orlov, V.O., ed, Moscow, Strolizdat, 1985, 76p., In Russian. Refs. passim. For individual papers see 44-2363 through 44-2376.
Seasonal freeze thaw, Frozen ground physics, Frozen ground temperature, Frost heave, Soil physics, Electric fields, Temperature effects, Soil freezing, Frost penetration, Soil water, Ground ice.

44-2363
Method of studying the migration process of moisture and heaving in peat soils. (Metodika issledovaniĭ protsessa migratsii vlagi i pucheniia torfianykh gruntov).
Gamaiunov, N.I., et al, Metody izucheniia sezonnopromerzaiushchikh i merzlykh gruntov. Sbornik nauchnykh trudov (Methods of studying seasonally freezing and frozen ground. Collection of scientific papers). Edited by V.O. Orlov, Moscow, Strolizdat, 1985, p.3-8, In Russian. 6 refs.
Ispirian, R.A., Orlov, V.O., Puzyrev, N.M.
Frost heave, Moisture transfer, Peat, Soil physics.

44-2364
Method of studying the effect of an electric field on cryogenic migration in finely dispersed soils. (Kmetodike izucheniia vliania elektricheskogo polia na kriogennuiu migratsiiu v tonkodispersnykh gruntakh).
Novikova, E.V., Metody izucheniia sezonnopromerzaiushchikh i merzlykh gruntov. Sbornik nauchnykh trudov (Methods of studying seasonally freezing and frozen ground. Collection of scientific papers). Edited by V.O. Orlov, Moscow, Strolizdat, 1985, p.9-13, In Russian. 4 refs.
Electric fields, Migration.

44-2365
Changes in structure and properties of frozen soils under the effect of pressure and temperature. (Izmenenie stroeniia i svoĭstv merzlykh gruntov pod vozdeĭstviem davleniia i temperatury).
Zykov, IU.D., et al, Metody izucheniia sezonnopromerzaiushchikh i merzlykh gruntov. Sbornik nauchnykh trudov (Methods of studying seasonally freezing and frozen ground. Collection of scientific papers). Edited by V.O. Orlov, Moscow, Strolizdat, 1985, p.13-20, In Russian. 5 refs.
Khimenkov, A.N., Chervinskaia, O.P.
Frozen ground physics, Frozen ground temperature, Anisotropy, Temperature effects, Ground ice.

44-2366
Problem of determining the volume of unfrozen moisture by centrifugal separation. (K voprosu opredeleniia soderzhaniia nezamerzshei vlagi metodom tsentrifugirovaniia).
Sheveleva, N.N., Metody izucheniia sezonnopromerzaiushchikh i merzlykh gruntov. Sbornik nauchnykh trudov (Methods of studying seasonally freezing and frozen ground. Collection of scientific papers). Edited by V.O. Orlov, Moscow, Strolizdat, 1985, p.21-26, In Russian. 3 refs.
Unfrozen water content, Soil water, Moisture, Fines.

44-2367
Frontal freezing of ground with frost heave. (Frontal noe promerzanie grunta s pucheniem).
Sarkisian, R.M., Metody izucheniia sezonnopromerzaiushchikh i merzlykh gruntov. Sbornik nauchnykh trudov (Methods of studying seasonally freezing and frozen ground. Collection of scientific papers). Edited by V.O. Orlov, Moscow, Strolizdat, 1985, p.26-31, In Russian. 2 refs.
Frost heave, Frost penetration, Frozen ground temperature, Stefan problem, Analysis (mathematics).

44-2368
Reliability of snow cover estimates through calculations of mid-year ground temperature and frost depth. (Dostovernost' otsenki snezhnogo pokrova pri raschetakh srednegodovoĭ temperatury i glubiny promerzaniia grunta).
Cherniad'ev, V.P., Metody izucheniia sezonnopromerzaiushchikh i merzlykh gruntov. Sbornik nauchnykh trudov (Methods of studying seasonally freezing and frozen ground. Collection of scientific papers). Edited by V.O. Orlov, Moscow, Strolizdat, 1985, p.31-37, In Russian. 2 refs.
Frost penetration, Soil freezing, Snow cover distribution, Accuracy, Snow thermal properties, Heat transfer coefficient, Snow density.

44-2369
Using the rank method in evaluating the effect of natural factors on ground freezing. (Primenenie metoda rangov pri otsenke vliianna prirodnykh faktorov na promerzanie gruntov).
Onishchenko, N.A., et al, Metody izucheniia sezonnopromerzaiushchikh i merzlykh gruntov. Sbornik nauchnykh trudov (Methods of studying seasonally freezing and frozen ground. Collection of scientific papers). Edited by V.O. Orlov, Moscow, Strolizdat, 1985, p.37-41, In Russian.
Nurmagambetov, E.K., Dukhin, I.E., Zil'bergleĭt, A.M.
Soil freezing, Climatic factors.

44-2370
Method of estimating thermal settlement in calculating thaw depth. (Metod ucheta teplovo osadki grunta pri raschete glubiny protaivaniia).
Sheikin, I.V., Metody izucheniia sezonnopromerzaiushchikh i merzlykh gruntov. Sbornik nauchnykh trudov (Methods of studying seasonally freezing and frozen ground. Collection of scientific papers). Edited by V.O. Orlov, Moscow, Strolizdat, 1985, p.42-48, In Russian.
Settlement (structural), Thaw depth, Stefan problem.

44-2371
Thermal and moisture regime of seasonally freezing soils in central and eastern Transbaikal. (Termovlazhostnyĭ rezhim sezonnopromerzaiushchikh gruntov Tsentral'nogo i Vostochnogo Zabaĭkal'iia).
Zheleznĭak, I.I., Metody izucheniia sezonnopromerzaiushchikh i merzlykh gruntov. Sbornik nauchnykh trudov (Methods of studying seasonally freezing and frozen ground. Collection of scientific papers). Edited by V.O. Orlov, Moscow, Strolizdat, 1985, p.48-50, In Russian.
Soil freezing, Thermal regime, Soil water, Moisture, Seasonal variations, USSR—Transbaikal.

44-2372
Characteristics of the dynamics of tangential forces of frost heave in the Chita region. (Osobennosti dinamiki kasatel'nykh sil pucheniia v usloviiakh Chitinskoĭ oblasti).
Elgin, B.B., Metody izucheniia sezonnopromerzaiushchikh i merzlykh gruntov. Sbornik nauchnykh trudov (Methods of studying seasonally freezing and frozen ground. Collection of scientific papers). Edited by V.O. Orlov, Moscow, Strolizdat, 1985, p.50-54, In Russian. 2 refs.
Frost heave, Loads (forces), Frozen ground mechanics, Seasonal freeze thaw, Thermal regime, Deformation.

44-2373
Seasonal variations in porosity and density of ice in Yenkey Bay. (Sezonnoe izmenenie poristosti i plotnosti l'da Eniseĭskogo zaliva).
Latalin, D.A., Metody izucheniia sezonnopromerzaiushchikh i merzlykh gruntov. Sbornik nauchnykh trudov (Methods of studying seasonally freezing and frozen ground. Collection of scientific papers). Edited by V.O. Orlov, Moscow, Strolizdat, 1985, p.54-58, In Russian. 4 refs.
Sea ice, Ice density, Porosity, Seasonal variations, USSR—Yenisey Bay.

44-2374
Possibility of building ice platforms on shelves in the arctic seas. [O vozmozhnosti sozdaniia ledianykh platform na shel'fakh Arkticheskikh morej].
Savel'ev, B.A., et al, Metody izucheniia sezonno-promerzaiushchikh i merzlykh gruntov Sbornik nauchnykh trudov (Methods of studying seasonally freezing and frozen ground Collection of scientific papers). Edited by V O. Orlov, Moscow, Strolizdat, 1985, p.58-62, In Russian.
Gagarin, V.E., Razumov, V.V.
Ice (construction material), Sea ice, Arctic Ocean.

44-2375
Primary factors affecting the radar image tint. [Osnovnye faktory vliiaiushchie na ton radiolokatsionnogo izobrazheniia].
Klishes, T.M., Metody izucheniia sezonnopromerzaiushchikh i merzlykh gruntov. Sbornik nauchnykh trudov (Methods of studying seasonally freezing and frozen ground. Collection of scientific papers). Edited by V.O. Orlov, Moscow, Strolizdat, 1985, p.62-68, In Russian. 5 refs.
Radar photography, Snow cover effect, Permafrost, Vegetation factors.

44-2376
Recommendations for selecting apparatus for thermometric systems. [Rekomendatsii po vyboru apparatury dlia termometricheskikh kompleksov].
Pakulin, V.A., Metody izucheniia sezonnopromerzaiushchikh i merzlykh gruntov Sbornik nauchnykh trudov (Methods of studying seasonally freezing and frozen ground. Collection of scientific papers). Edited by V.O. Orlov, Moscow, Strolizdat, 1985, p.68-76, In Russian. 4 refs.
Bridges, Thermal regime, Soil temperature, Temperature measurement, Measuring instruments.

44-2377
Avalanche sedimentation on the Black Sea shelf. [Lavinnaia sedimentatsiia na shel'fe Chernogo moria].
Afbulatov, N.A., et al, *Akademiia nauk SSSR. Izvestiia Seriia geologicheskaia.* Dec 1989. No 12. p 21-28, In Russian. 16 refs.
Shcherbakov, F.A.
Sediment transport, Sediments, Avalanche deposits, Black Sea.

44-2378
1988-89 Australian Antarctic Research Program. Initial summary of research activity.
Australia. Antarctic Division, Kingston, Tasmania, 1989, 126p., Refs. passim.
Research projects, Ice.
Brief summaries are provided of research conducted in summer 1988-89 by ANARE in earth sciences, environmental studies, glaciology, human biology and medicine, life sciences, meteorology oceanography physics and social sciences. Each summary shows, with variations, title, principal investigator with affiliation, location of research site, project description, aim of research, field work carried out, difficulties encountered, significance of findings, planned dissemination of results, and collections acquired. Following the summaries is an index by geographic location of projects, showing author, title and page number, and including Casey Station, Heard I., Law Base, Macquarie I., Mawson Station and Prince Charles Mountains. A list of names and addresses of principal investigators concludes this report.

44-2379
1989-90 Australian Antarctic Research Program. Antarctic Treaty exchange information: Supplement A to particulars for Australian National Antarctic Research Expeditions.
Australia. Antarctic Division, Kingston, Tasmania, 1989, 262p., Refs. passim. for selected papers see B-41518, B-41519, B-41521, and H-41520.
Ice, Research projects.
Described are research projects proposed to be carried out by ANARE during summer 1989-90 and winter 1990, in chemistry, earth sciences, environmental studies, glaciology, heritage and archeology, history, human biology and medicine, life sciences, meteorology, oceanography, physics, political sciences, and technology and support. Included are indexes by author and by area, an ASAC Grant scheme and a list of names and addresses of principal investigators. Locations where the research was carried out include Casey, Davis and Mawson stations, Macquarie Is., and the Prince Charles Mountains.

44-2380
Energy-active zones: conceptual basis. Pt. 1. [Energoaktivnye zony. kontseptual'nye osnovy. Ch. 1].
Mikhinov, A.E., ed, *Itogi nauki i tekhniki. Seriia Atmosfera, okean, kosmos—programma "Razrezy"*, 1989, Vol.10, 239p., In Russian. 123 refs.
Oceanography, Heat transfer, Air water interactions, Ocean currents, Sea ice, Models.
This study presents climatic circulation models of the World Ocean (including the antarctic and arctic basins), analyzes the estimated circulation of waters in the World Ocean, and discusses the heat exchange between the ocean and atmosphere. Particular attention is paid to energo-active zones of the ocean, key areas that show the greatest influence on the Earth's climate system.

44-2381
Mathematical modeling of heat and moisture transfer in the seasonal thawing of frozen soils.
Permiakov, P.P., et al, *Journal of engineering physics*, July 1989(pub. Jan. 90), 57(1), p.828-832, 20 refs. Translated from Inzhenerno-fizicheskii zhurnal.
Romanov, P.G., Stepanov, A.V.
Mathematical models, Seasonal freeze thaw, Moisture transfer, Heat transfer, Ground thawing.

44-2382
Offshore placer drilling technology: a case study from Nome, Alaska.
Bronston, M.A., *Mining engineering*, Jan 1990, 42(1), p.26-31, 8 refs.
Offshore drilling, Gold, Placer mining, Ice drills, United States—Alaska—Nome

44-2383
Soot in the atmosphere and snow surface of Antarctica.
Warren, S.G., et al, *Journal of geophysical research*, Feb. 20, 1990, 95(D2), p.1811-1816, 30 refs.
Clarke, A.D.
Snow composition, Snow impurities, Albedo, Antarctica—Amundsen-Scott Station.
Samples of snow collected near the South Pole during Jan. and Feb. 1986 were analyzed for the presence of light-absorbing particles by passing the melted snow through a nuclepore filter. Transmission of light through the filter showed that snow far from the station contains the equivalent of 0.1-0.3 ng of carbon per gram of snow (ng/g). Samples of ambient air were filtered and found to contain about 1.2 ng of carbon per kg of air giving a scavenging ratio of about 150. The snow downwind of the station exhibited a well-defined plume of soot due to the burning of diesel fuel, but even in the center of the plume 1 km downwind the soot concentration was only 3 ng/g, too small to affect snow albedo significantly. Measurements of snow albedo near large inland stations are therefore probably representative of their surrounding regions. (Auth.)

44-2384
Global monitoring at the United States baseline stations with emphasis on precipitation chemistry measurements.
Artz, R.S., *Environmental monitoring and assessment*, July 1989, 12(3), p.255-267, 14 refs.
Snow impurities, Snow composition, Polar regions, Antarctica—Amundsen-Scott Station.
The National Oceanic and Atmospheric Administration Geophysical Monitoring for Climatic Change program has operated four remote precipitation chemistry stations at two polar and two tropical Pacific locations for over a decade. Station geography and meteorology is discussed and a summary of the hydrogen, sulfate, and nitrate ion data collected since 1980 is presented. Results show that at all four locations, the ions which have major anthropogenic sources were far less concentrated than in samples collected in heavily industrialized areas in the northeastern United States and Europe. Concentrations at American Samoa and the South Pole showed little variability over the year whereas concentrations at Point Barrow, Alaska and Mauna Loa, Hawaii were highly variable. (Auth.)

44-2385
Climate and chronology of Antarctica and adjacent South America over the past 30,000 yr.
Heusser, C.J., *Palaeogeography, palaeoclimatology, palaeoecology*, Dec. 1989, 76(1/2), p.31-37, 30 refs.
Ice cores, Ice dating, Paleoclimatology.
Well-dated records of paleoclimate, essential for developing general circulation models of the atmosphere during the Quaternary, are limited in the subpolar Southern Hemisphere. For Antarctica, where dating is particularly restricted, records from distal South America provide a measure to assess antarctic ice sheet chronology and to establish the timing of past climatic events. Close-interval dating of a pollen record at Harberton in southern Tierra del Fuego strengthens implications drawn from paleoecological data and from fluctuations of glaciers to show a climatic paralle with isotope temperature climate data developed from antarctic ice cores. Over the time span of approximately 30,000 yr since before the full glacial, coldest conditions both in Antarctica and South America appear centered at 20,000 yr B.P. Warming of climate occurred in the late-glacial after 15,000 yr B.P., interrupted by a cold episode between about 13,000 and 10,500 yr B.P., with maximum warmth at 9000 yr B.P. in the early Holocene, after which temperatures were lower, varying only moderately until the present. This deglacial pattern, although inconsistent in other Southern Hemisphere records, is reproducible on a global scale. (Auth. mod.)

44-2386
Southern ocean circulation and global climate in the Middle Pleistocene (early Brunhes).
Kuijpers, A., *Palaeogeography, palaeoclimatology, palaeoecology*, Dec. 1989, 76(1/2), p.67-83, Refs. p.80-83.
Air water interactions, Paleoclimatology, Sea ice.
Compilation of published data has enabled the reconstruction of the southern ocean circulation regime in the Middle Pleistocene between approx. 0.7 and 0.4 m.y. B.P. (early Brunhes). Possible links with Northern Hemisphere climate are indicated. These data show that southern ocean circulation was characterized by an enhanced Antarctic Circumpolar Current, expansion of Antarctic Surface Water, Antarctic Bottom Water, and a reduction of Antarctic Intermediate Water flow at levels of its present depth stratum. Sea ice formation around Antarctica was probably retarded. Enhanced southern ocean convection is assumed to have been linked to a change of the North Atlantic Deep Water *T S* signature. A larger antarctic ice volume to be ascribed to increased precipitation is proposed to explain lower interglacial sea level stands reported. In addition to generally enhanced convection, larger floating ice shelves may also have favored Antarctic Bottom Water formation. (Auth. mod.)

44-2387
Denudation rates in the Arctic estimated from lake sediments on Spitsbergen, Svalbard.
Svendsen, J.I., et al, *Palaeogeography, palaeoclimatology, palaeoecology*, Dec. 1989, 76(1/2), p.153-168, Refs. p.167-168.
Mangerud, J., Miller, G.H.
Glacial erosion, Soil erosion, Lacustrine deposits, Sediments, Age determination, Stratigraphy.

44-2388
Seismic observation with local telemetry network around Syowa Station, East Antarctica.
Akamatsu, J., et al, NIPR Symposium on Antarctic Geosciences, Proceedings. No.3, Tokyo, National Institute of Polar Research, 1989, p.1-12, 19 refs.
Ichikawa, N., Kaminuma, K.
Seismic surveys, Earthquakes, Icequakes, Glacier ice, Ice shelves, Antarctica—Lutzow-Holm Bay, Antarctica—Prince Olav Coast.
A local telemetry seismic network was established around Showa Station to study local seismicity and characteristics of seismic waves in the Lützow-Holm Bay and Prince Olav Coast region, East Antarctica. The observation system utilizes an event detection algorithm for monitoring small earthquakes by coping with noise conditions peculiar to Antarctica. More than 4400 events were recorded during the period from June 1987 to Jan. 1988. Most of them were icequakes and continuous vibrations caused by glacier movements. However, 477 earthquakes were identified. Several shallow crustal earthquakes with *S-P* times of 5-6 s and 20 s are located around Showa Station, near possible faults inferred from surface topography and geology. Although the East Antarctic shield has long been considered to be an aseismic area, local earthquakes occur under some tectonic conditions. (Auth.)

44-2389
Solidification around a cylinder in laminar cross flow.
Chiang, H., et al, *International journal of heat and fluid flow*, Dec. 1989, 10(4), p.322-327, 12 refs.
Kleinstreuer, C.
Laminar flow, Ice formation, Ice growth, Ice solid interface, Analysis (mathematics), Heat transfer, Solidification, Layers.

44-2390
Possible influence of an existing snow field on the track of a surface low pressure center—a case study.
Morris, T.R., *National weather digest*, Nov. 1989, 14(4), p.14-18, 6 refs.
Weather forecasting, Snow cover effect, Atmospheric circulation, Meteorological factors, Atmospheric pressure, Air masses.

44-2391
Facies model for deglaciation in an overdeepened alpine valley (Bulle area, western Switzerland).
Pugin, A., *Palaeogeography, palaeoclimatology, palaeoecology*, Apr. 1989, 70(1-3), p.235-248, 28 refs.
Glacial deposits, Alpine glaciation, Stratigraphy, Soil structure, Geomorphology, Lacustrine deposits, Soil classification, Outwash, Glacier flow, Switzerland—Alps.

44-2392
Cloud classification from satellite data using a fuzzy sets algorithm: a polar example.
Key, J.R., et al, *International journal of remote sensing*, Dec. 1989, 10(12), p.1823-1842, 19 refs.
Maslanik, J.A., Barry, R.G.
Cloud cover, Ice detection, Spaceborne photography, Classifications, Polar regions, Ice air interface, Photointerpretation, Sea ice, Analysis (mathematics), Surface properties.

44-2393
Approximate prediction of ice accretion on an overhead transmission line which rotates with constant angular velocity.
Skelton, P.L.J., et al, *IMA journal of applied mathematics*, 1988, 40(1), p.23-35, 6 refs.
Poots, G.
Transmission lines, Ice accretion, Air flow, Ice loads, Ice models, Surface properties, Mechanical properties.

44-2394
Mathematical models for ice accretion on conductors using free streamline theory Part I. Single conductor.
Larcombe, P J , et al, *IMA journal of applied mathematics*, 1988, 41(3), p.217-236, 29 refs.
Poots, G , Skelton, P L I , Shillor, M
Transmission lines, Ice accretion, Snow loads, Mathematical models, Air flow, Ice models, Snowflakes, Cloud droplets.

44-2395
Differential equation connected with the dendritic growth of crystals.
Hammersley, J.M., et al, *IMA journal of applied mathematics*, 1989, 42(1), p 43-75, 6 refs
Mazzarino, G.
Crystal growth, Liquid phases, Mathematical models, Supercooling, Computer applications, Dendritic ice.

44-2396
Martian dust particles as condensation nuclei: a preliminary assessment of mineralogical factors.
Gooding, J.L., *Icarus*, Apr. 1986, 66(1), p.56-74, 38 refs.
Mars (planet), Condensation nuclei, Ice formation, Minerals, Dust, Physical properties, Temperature measurement, Substrates, Atmospheric composition, Mineralogy, Extraterrestrial ice, Frost.

44-2397
Composition and stability of the condensate observed at the Viking Lander 2 site on Mars.
Hart, H.M., et al, *Icarus*, Apr. 1986, 66(1), p.134-142, 25 refs.
Jakosky, B.M.
Mars (planet), Frost, Ice sublimation, Surface properties, Condensation, Carbon dioxide, Surface temperature, Stability, Diurnal variations.

44-2398
Thermodynamics and kinetics of intracellular ice formation during freezing of biological cells.
Toner, M., et al, *Journal of applied physics*, Feb. 1, 1990, 67(3), p.1582-1593, 56 refs.
Cravalho, E.G., Karel, M.
Ice crystal growth, Cellular materials, Ice solid interface, Cryobiology, Analysis (mathematics), Heterogeneous nucleation, Surface properties, Ice models, Thermodynamics.

44-2399
Effects of advancing freeze fronts on distributions of fine-grained sediment particles in seawater- and freshwater-slush ice slurries.
Clayton, J.R., Jr., et al, *Journal of sedimentary petrology*, Jan. 1990, 60(1), p.145-151, 32 refs.
Reimnitz, E., Payne, J.R., Kempema, E.W.
Slushes, Suspended sediments, Sediment transport, Freezing, Ice rafting, Particles, Migration, Ice water interface, Sea ice, Artificial freezing.

44-2400
Protective construction methods on permafrost areas.
*Alaskan update*, 1989, 7(2), p.1-3, 6-7.
Permafrost, Cold weather construction, Protection, Research projects, Physical properties, Permafrost preservation.

44-2401
Use of a model basin in tests of sea ice moving against a cone-shape structure. *Alaskan update*, 1988, 6(2), p.3, 7, 2 refs.
Ice mechanics, Ice strength, Impact tests, Mechanical properties, Test equipment.

44-2402
Finite element simulation of behavior of laterally loaded piles in permafrost.
Fortier, A., et al, *Journal of geotechnical engineering*, Feb 1990, 116(2), p 266-284, 31 refs
Ladanyi, B.
Permafrost beneath structures, Soil creep, Loading, Computerized simulation, Piles, Analysis (mathematics), Dislocation (materials), Viscoelastic materials, Mechanical properties.

44-2403
Rock streams in bald-peak mountain belts. (Kurumy gol'tsovogo poiasa gor).
Romanovskii, N.N., et al, Novosibirsk, Nauka, 1989, 148p , In Russian with English summary and table of contents. Refs. p.145-148.
Tiurin, A.I., Sergeev, D.O., Afonskaia, L.G., Bolkov, S A Volkova, V P , Volchenkov, S IU , Zaltsev, V N , Klimov, I.V., Lisitsyna, O.M., Solov'ev, V.P., IAvelov, A.V., Gorbunov, A.P., ed.
Slopes, Geocryology, Rock streams, Engineering geology, Mountains, Seasonal freeze thaw, Frozen rocks.

44-2404
Building structures on swelling clayey soils. (Stroitel'stvo sooruzhenii na naoolkhaiashchikh gruntakh).
Sorochan, E.A., Moscow, Strolizdat, 1989, 309p., In Russian. 11 refs. Revised and enlarged edition. For 1st edition see 29-2881.
Piles, Structures, Deformation, Clay soils, Foundations, Engineering geology, Soil mechanics, Construction, Climatic factors.

44-2405
Pollen profile from the permafrost region in Southwest Yukon Territory and its paleoenvironmental significance.
Wang, X.C., *Journal of glaciology and geocryology*, June 1989, 11(2), p.99-112, 23 refs., In Chinese with English summary.
Pollen, Permafrost, Geomorphology, Palynology, Peat, Paleoclimatology, Frost mounds, Stratigraphy, Canada—Yukon Territory.

44-2406
Preliminary study on existing snowline timber line and their relations in southeastern part of the Qinghai-Xizang Plateau.
Wu, X.H., *Journal of glaciology and geocryology*, June 1989, 11(2), p.113-124, 12 refs., In Chinese with English summary.
Snow line, Glaciers, Forest lines, Altitude, Climatic factors, Air temperature, Precipitation (meteorology), Growth, Distribution, China—Qinghai Xizang Plateau.

44-2407
Characteristics of the present glaciers on the northern slope of Mt. Qiaogeli.
Qin, D.H., et al, *Journal of glaciology and geocryology*, June 1989, 11(2), p.125-136, 13 refs., In Chinese with English summary.
Thwaites, R.J., Xie, Z.C., Liu, Y.P.
Glacier surveys, Mountain glaciers, Avalanche deposits, Glacier mass balance, Glacier flow, Glacier ablation, Glacier alimentation, Landscape types, Topographic features, Firn, Altitude, Velocity, Air temperature China Qiaogeli Mountains.

44-2408
Field observations of water intake flow in unsaturated freezing soils with different groundwater tables.
Gao, W Y , et al, *Journal of glaciology and geocryology*, June 1989, 11(2), p.137-147, 6 refs., In Chinese with English summary.
Xu, X.Z.
Water intakes, Soil freezing, Water table, Ground water, Clays, Sediments, Water flow, Freezing rate, Tests, Water content, Saturation.

44-2409
Ice-snow-melt water debris flows in the Dongru Longba (gully) Bomi County, Xizang (Tibet).
Lu, R R., et al, *Journal of glaciology and geocryology*, June 1989, 11(2), p.148-160, 7 refs., In Chinese with English summary.
Li, D.J.
Glacier melting, Ice melting, Snowmelt, Drainage, Talus, Topographic features, Mountains, Meltwater, Gullies, Meteorological factors, Velocity, Temperature effects, China—Dongru Longba.

44-2410
Analysis on the palaeogeographic environment and periglacial geomorphy during the Quaternary of Mount Huangshan.
Zhou, B.G., et al, *Journal of glaciology and geocryology*, June 1989, 11(2), p.161-166, 3 refs., In Chinese with English summary.
Zou, X.Y.
Periglacial processes, Quaternary deposits, Paleoecology, Geomorphology, Mountains, Alpine glaciation, Frost shattering, Landforms, Paleoclimatology, China—Huangshan Mountains.

44-2411
Application of raised and unventilated pile foundation in permafrost regions.
Li, Y.W., et al, *Journal of glaciology and geocryology*, June 1989, 11(2), p.167-171, In Chinese with English summary.
Ma, W.F.
Permafrost beneath structures, Foundations, Pile structures, Ground thawing, Permafrost preservation, Rheology, Damage, Degradation, Ventilation.

44-2412
Characteristics and forming process of glacial peripheral moraines at Gongba Glaciers in Mt. Gongga.
Kang, J.C., *Journal of glaciology and geocryology*, June 1989, 11(2), p.172-176, 4 refs., In Chinese with English summary.
Moraines, Glacial deposits, Talus, Glacier ablation, Grain size, Velocity, Distribution, China—Gongba Glaciers.

44-2413
General aspect of correction of errors in precipitation measurements abroad.
Yang, D.Q., *Journal of glaciology and geocryology*, June 1989, 11(2), p.177-183, In Chinese. 28 refs.
Precipitation (meteorology), Measuring instruments, Precipitation gages, Accuracy.

44-2414
Climatic changes during the past century.
Li, P.J., *Journal of glaciology and geocryology*, Sep. 1989, 11(3), p.193-202, 13 refs., In Chinese with English summary.
Climatic changes, Paleoclimatology, Ice conditions, Snow cover, Temperature variations, Volcanic ash, Carbon dioxide, Sea level.

44-2415
Study on seasonally thawed layer in the basin of Huola River in northern Da Hinggan Ling.
Wang, J.C., et al, *Journal of glaciology and geocryology*, Sep. 1989, 11(3), p.203-214, 5 refs., In Chinese with English summary.
Guo, D.X., Huang, Y.Z., Zheng, Z.G.
Active layer, Ground thawing, Thaw depth, Permafrost thermal properties, Seasonal freeze thaw, Ground ice, Water content, Soil temperature, Time factor, Geocryology, Air temperature, China Da Hinggan Ling.

44-2416
Function of geologic structure in the formation of permafrost conditions in Huola River basin, North Da Hinggan Ling.
Guo, D.X., et al, *Journal of glaciology and geocryology*, Sep. 1989, 11(3), p.215-222, 6 refs., In Chinese with English summary.
Permafrost thickness, Permafrost thermal properties, Taliks, Permafrost structure, Geologic structures, Erosion, Topographic features, China—Da Hinggan Ling.

44-2417
Influences of frost heaving on the determination of pollen accumulation rates.
Wang, X.C., et al, *Journal of glaciology and geocryology*, Sep. 1989, 11(3), p.223-229, 16 refs., In Chinese with English summary.
Geurts, M.A.
Frost heave, Pollen, Palynology, Frozen ground, Ice lenses, Fossils, Sedimentation, Water content, Canada—Yukon Territory.

44-2418
Salt redistribution and heave of saline soil during cooling.
Chen, X.B., et al, *Journal of glaciology and geocryology*, Sep. 1989, 11(3), p.231 238, 3 refs., In Chinese with English summary.
Qiu, G.Q., Wang, Y.Q., Sheng, W.K.
Evaporation, Saline soils, Frost heave, Soil mechanics, Freeze thaw cycles, Damage, Salinity, Roads, Structures, Countermeasures, Water content.

44-2419
Ground temperature method—the method for calculating the depth of permafrost table.
Yuan, X.H., *Journal of glaciology and geocryology*, Sep. 1989, 11(3), p.239-248, In Chinese with English summary.
Permafrost depth, Thermal conductivity, Seasonal freeze thaw, Soil temperature, Geothermy, Air temperature, Permafrost thermal properties.

44-2420
Research on glacial erosional landforms: case study of Luojishan Mt. Western Sichuan.
Liu, G.N., *Journal of glaciology and geocryology*, Sep. 1989, 11(3), p.249-259, 11 refs., In Chinese with English summary.
Landforms, Glacial erosion, Mountain glaciers, Freeze thaw cycles, Glacier flow, Cirques, Glacier ablation, Moraines, Climatic factors, Statistical analysis, Altitude, China—Luojishan Mountain.

44-2421
Quaternary glacial geomorphology in the Sigong River Valley, Mt. Bogda region, Xinjiang.
Lou, T.M., *Journal of glaciology and geocryology*, Sep. 1989, 11(3), p.261-268, In Chinese. 6 refs.
Glacial geology, Geomorphology, Paleoclimatology, Climatic changes, China—Bogda Mountain.

44-2422
Discussion on the pedogenesis and environment of paleosols on the moraine platform in Nyalam, Xizang.
Shen, Y P., et al. *Journal of glaciology and geocryology*, Sep. 1989, 11(3), p.269-278, 6 refs. In Chinese with English summary.
Jiao, K.Q
Soil formation, Paleoecology, Moraines, Pleistocene, Leaching, Weathering, Paleoclimatology, Chemical analysis, Grain size, X ray diffraction, China—Xizang.

44-2423
Stochastic meltwater runoff model of Heigou Glacier No.8 in the southern slope of Mt. Bogda.
Hu, X.G., et al. *Journal of glaciology and geocryology*, Sep. 1989, 11(3), p.279-286, 5 refs. In Chinese with English summary.
Li, N.J.
Glacier melting, Runoff, Meltwater, Air temperature, Mathematical models, China—Bogda Mountain.

44-2424
Complex formation in ice-like structures on interaction with fluoride, chloride, and bromide ions. [Kompleksoobrazovanie v l'dopodobnykh strukturakh pri vzaimodeistvii s ionami F-, Cl-, Br-].
Pinchuk, V.M., et al. *Zhurnal fizicheskoĭ khimii*, May 1987, 61(5), p.1407-1410. In Russian. 11 refs.
Shevardina, L.B.
Ions, Water chemistry, Molecular structure, Models.

44-2425
Crystallization of water in cooled solutions caused by heating the solutions at rates exceeding the cooling rate. [Kristallizatsiia vody v okhlazhdennykh rastvorakh, vyzvannaia ikh nagrevom so skorostiami, prevyshaiushchimi skorost' okhlazhdeniia].
Kazarova, E.B., et al. *Zhurnal fizicheskoĭ khimii*, June 1987, 61(6), p.1656-1658. In Russian. 7 refs.
Mikhalev, O.I., Trofimov, V.I.
Cooling rate, Solutions, Crystal growth.

44-2426
Clathrate polyhydrates of peralkylonium salts and their analogs. [Klatratnye poligidraty peralkilonievykh solei i ikh analogov].
Diadin, IU.A., et al. *Zhurnal strukturnoĭ khimii*, May-June 1987, 28(3), p.75-116. In Russian. 171 refs.
Udachin, K.A.
Hydrates, Clathrates, Stability, Structural analysis, Temperature effects.

44-2427
Effect of hypomagnetic fields on the dielectric losses in water and ice.
Semikhina, L.P. *Russian journal of physical chemistry*, June 1988 (pub Jan 89), 63(1), p.153-155, 6 refs. Translated from Zhurnal fizicheskoĭ khimii.
Ice electrical properties, Dielectric properties, Distilled water, Gases, Isotopes.

44-2428
Impact of the winter environment on infrared target signatures and EO sensor performance.
Lacombe, J., MP 2587, Hanover, NH, U.S. Army Cold Regions Research and Engineering Laboratory, 1989, n.p., 10 refs. Presented at the 57th Military Operations Research Society Symposium, Fort Leavenworth, Kansas, 6-8 June 1989.
Cold weather performance, Cold weather tests, Military operation, Infrared photography, Infrared reconnaissance, Snow cover effect.

44-2429
Evaluation of a water jet barrier in ice conditions.
Laperrière, F. *Spill technology newsletter*, Jan.-Mar 1989, 14(1), p.8-11, 3 refs. For another version see 43-3650.
Oil spills, Mechanical tests, Hydraulic jets, Countermeasures, Ice conditions, Floating ice.

44-2430
New airborne tool for arctic hydrography. *Canada. Supply and Services. Research and development bulletin*, Jan. 1988, No.178, p.1-2.
Hydrography, Airborne equipment, Ice thickness, Echo sounding, Electronic equipment.

44-2431
Oil recovery systems in ice.
Smrke, D.J., et al. *Spill technology newsletter*, Mar-Apr 1984, 9(2), p.26-35, 19 refs.
Buist, I.A., Solsberg, L.B.
Oil spills, Oil recovery, Equipment, Floating ice, Mechanical tests, Subsurface investigations, Physical properties, Crude oil, Viscosity, Design.

44-2432
Atmospheric dispersion in the Arctic: winter-time boundary-layer measurements.
Guenther, A., et al. *Boundary-layer meteorology*, Dec. 1989, 49(4), p.339-366, 22 refs.
Lamb, B.
Atmospheric disturbances, Boundary layer, Measurement, Wind velocity, Turbulence, Snow cover effect, Insolation, Temperature gradients, Air pollution, United States—Alaska—Prudhoe Bay.

44-2433
Extension of a density current model of katabatic winds to include the effects of blowing snow and sublimation.
Gosink, J.P., *Boundary-layer meteorology*, Dec. 1989, 49(4), p.367-394, 31 refs.
Wind velocity Atmospheric density Blowing snow, Snow air interface, Air flow, Models, Sublimation, Wind (meteorology), Temperature gradients, Antarctica—Adélie Coast.
A density current model was extended for use in katabatic flow over the steep slopes of Antarctica through the inclusion of the Coriolis effect and weight flux terms corresponding to blowing snow and cooling caused by sublimation. The model was calibrated and tested against data obtained during two flights in Adélie Land, along a trajectory starting about 170 km inland and extending to Dumont d'Urville. The predicted trend in water vapor flux agrees with measurements of this flux, lending support to empirical formulae for both snow flux and sublimation rate. Model predictions of velocity were in good agreement with measured quantities when reasonable estimates of radiation divergence and surface heat exchange were provided as input to the model. The potential temperature gradient above the katabatic layer was found to play a major role in flow stability for high velocity and deep katabatic flows. Velocity predictions were in better agreement with the data when a locally determined value was used for the coefficient in the empirical snow flux expression. (Auth.)

44-2434
Automatic monitoring of short duration snowmelt events in a Nova Scotia headwater stream.
Howell, G.D., et al. *Water, air, and soil pollution*, July-Aug. 1989, 46(1-4), p.145-152, 6 refs.
Springer, T.A.
Stream flow, Meltwater, Snowmelt, Chemical properties, Chemical analysis, Water chemistry, Insolation, Seasonal variations, Recording instruments, Temperature effects, Canada—Nova Scotia.

44-2435
Recent arctic shelf foraminifera: seasonally ice covered vs. perennially ice covered areas.
Schröder-Adams, C.J., et al. *Journal of foraminiferal research*, Jan. 1990, 20(1), p.8-36, Refs. p.21-36.
Animals, Bottom sediment, Ice cover effect, Ocean environments, Sea ice distribution, Seasonal variations, Distribution, Ocean bottom, Sampling, Statistical analysis, Canada—Northwest Territories—Axel Heiberg Island.

44-2436
Other cold war.
McDowell, J.S., *Mariners weather log*, Winter (1990, 34(1), p.2-7.
Ice navigation, Ice forecasting, Data transmission, Sea ice, Polar regions.

44-2437
International Ice Patrol: the battle continues.
Christian, M.B., *Mariners weather log*, Winter 1990, 34(1), p.8-10.
Data transmission, Ice conditions, Sea ice.

44-2438
Former glaciation and permafrost in Asia.
Danilov, I.D., et al. *Polar geography and geology*, Apr.-June 1989, Vol.13, p.92-103. Translated from Akademiia nauk SSSR. Izvestiia. Seriia geologicheskaia. 20 refs.
Ershov, E.D.
Glaciation, Ground ice, Permafrost, Pleistocene, Geocryology, Extraterrestrial ice, Asia.

44-2439
Discussion of urgent problems in the Arctic: results of the Conference of Arctic-Rim Countries, Leningrad, December 1988.
Kotliakov, V.M., et al. *Polar geography and geology*, Apr.-June 1989, Vol.13, p.104-110. Translated from Akademiia nauk SSSR. Izvestiia. Seriia geograficheskaia.
Zlotin, R.I.
International cooperation, Meetings, Ecology, Environmental protection.

44-2440
Snow-and-ice phenomena in the Polar Urals.
Khodakov, V.G., et al. *Polar geography and geology*, Apr.-June 1989, Vol.13, p.119-130, 15 refs. For Russian original see 44-344.
Il'ina, E.A.
Mountain glaciers, Snowdrifts, Snow cover distribution, Avalanche formation, Mudflows, Naleds, Ice formation, Floods, Snowfall, Glacial rivers.

44-2441
Buffering effect of snow cover to the impact of vehicles on the soil and vegetation cover in the North.
Zhidkov, V.A., et al. *Polar geography and geology*, Apr.-June 1989, Vol.13, p.131-141, 20 refs. For Russian original see 44-346.
Samoilov, R.S., Khodakov, V.G.
Permafrost preservation, Permafrost beneath roads, Tracked vehicles, Snow cover effect, Vegetation, Environmental impact, Transportation, Snow compaction, Active layer, Snow melting.

44-2442
Results of twenty-five years of soundings from the ice in Alasheyev Bight.
Petrov, N.M., *Polar geography and geology*, Apr.-June 1989, Vol.13, p.142-148, 5 refs. For Russian original see 43-4545 or 17F-40183.
Ice surveys, Bottom topography, Antarctica—Alasheyev Bight, Antarctica Molodezhnaya Station.
Results of ice surveys and bottom topography studies in Alasheyev Bight, carried out at Molodezhnaya Station from 1962 through 1987, are summarized. A map showing the areas covered by the sounding traverses is presented, and some of the major hazards to navigation are discussed. It is found that the Bight's submarine ridges, especially along the shores, contribute greatly to navigational dangers in the area.

44-2443
Intensity of destruction of fields in inter-*alas* landscapes, Central Yakutia.
Bosikov, N.P., *Polar geography and geology*, Apr.-June 1989, Vol.13, p.149-154, Translated from Geografiia i prirodnye resursy. 13 refs.
Ponds, Thermokarst development, Thermokarst lakes.

44-2444
Former extension of the East Antarctic ice sheet.
Lundqvist, J., *Polar research*, Dec. 1989, 7(2), p.109-117, 18 refs.
Glacial deposits, Quaternary deposits, Glacial geology, Ice sheets, Antarctica—East Antarctica.
Knowledge about the Quaternary geology of the Australian sector of Antarctica is very incomplete. Scattered observations of glacial deposits in that area, made during the ANARE 6 expedition in 1987, indicate that the inland ice had formerly a considerably wider extension than today. The ice was more than 200 m thicker, probably on the order of 1,000 m. This maximum stage cannot yet be dated, but conditions seem to favor a late Wisconsin-Weichselian maximum age. However, a much higher age cannot be excluded. (Auth.)

44-2445
Proceedings. [Kanchi gijutsu shinpojiumu koen ronbunshu 1986].
Cold Region Technology Conference, 2nd, Sapporo, Japan, Nov. 27-29, 1986, Sapporo, Japan, Kanchi kaihatsu kenkyukai (Cold Regions Development Society), [1986], 666p., In Japanese. Refs. passim. For selected papers see 44-2446 through 44-2511
Sea ice, Ice loads, Offshore structures, Avalanches, Snow removal, Soil freezing, Snowfall, Snow cover, Ice cover, Snow melting, Road maintenance, Concrete freezing, Meetings.

44-2446
Radar observation of snowfall.
Yoshino, F., et al. Cold Region Technology Conference, 2nd, Sapporo, Japan, Nov. 27-29, 1986. Proceedings (Kanchi gijutsu shinpojiumu koen ronbunshu 1986), Sapporo, Japan, Kanchi kaihatsu kenkyukai (Cold Regions Development Society), [1986], p.55-60, In Japanese. 2 refs.
Mizuno, M., Kouzeki, D., Okuyama, K.
Snowfall, Snow depth, Snow accumulation, Snow cover distribution, Weather observations, Precipitation (meteorology), Radar echoes, Weather forecasting.

44-2447
Protection against blowing snow damage on traffic by weather forecast.
Sato, S., et al, Cold Region Technology Conference, 2nd, Sapporo, Japan, Nov. 27-29, 1986. Proceedings (Kanchi gijutsu shinpojiumu koen ronbunshu 1986), Sapporo, Japan, Kanchi kaihatsu kenkyukai (Cold Regions Development Society), [1986], p.71-75, In Japanese. 9 refs.
Tsuchiya, Y.
Weather forecasting, Snowdrifts, Blowing snow, Road maintenance, Analysis (mathematics).

44-2448
Survey of the roof snow depth by aerial photogrammetry (Part I. Accuracy of the measurement).
Sakurai, S., et al, Cold Region Technology Conference, 2nd, Sapporo, Japan, Nov. 27-29, 1986. Proceedings (Kanchi gijutsu shinpojiumu koen ronbunshu 1986), Sapporo, Japan, Kanchi kaihatsu kenkyukai (Cold Regions Development Society), (1986), p.79-81, In Japanese.
Joh, O., Shibata, T.
Snow depth, Photogrammetry, Roofs.

44-2449
Automatic weather station at Asuka Camp, Antarctica.
Kawaguchi S. et al Cold Region Technology Conference, 2nd, Sapporo, Japan, Nov 27-29, 1986 Proceedings (Kanchi gijutsu shinpojiumu koen ronbunshu 1986), Sapporo, Japan, Kanchi kaihatsu kenkyukai (Cold Regions Development Society), (1986), p.82-85, In Japanese
Sano, M., Kitajima, K., Kawazome, T., Wakahama, G., Endoh, T.
Weather stations, Weather observations, Air temperature, Wind velocity, Antarctica—Asuka Station.
Wind velocity, air temperature, and snow temperature observations made by the automatic weather station at Asuka Camp in 1985 are briefly described. The data is summarized in graphs, including a graph of selected air temperatures in the Canadian Arctic for comparison.

44-2450
Some measuring methods of snowfall rate for radar snow gauge.
Endoh, T., et al, Cold Region Technology Conference, 2nd, Sapporo, Japan, Nov. 27-29, 1986. Proceedings (Kanchi gijutsu shinpojiumu koen ronbunshu 1986), Sapporo, Japan, Kanchi kaihatsu kenkyukai (Cold Regions Development Society), (1986), p.92-97, In Japanese.
Yamada, T., Fujiyoshi, Y., Tsuboki, K., Konishi, H.
Snowfall, Precipitation gages, Radar echoes, Snow accumulation, Visibility, Precipitation (meteorology).

44-2451
On the collection efficiency of snow drift collectors.
Kobayashi, S., Cold Region Technology Conference, 2nd, Sapporo, Japan, Nov. 27-29, 1986. Proceedings (Kanchi gijutsu shinpojiumu koen ronbunshu 1986), Sapporo, Japan, Kanchi kaihatsu kenkyukai (Cold Regions Development Society), (1986), p.98-102, In Japanese. 2 refs.
Blowing snow, Meteorological instruments, Snow density, Snow air interface, Analysis (mathematics).

44-2452
High sensitive snow cover measuring system.
Nishikawa, Y., et al, Cold Region Technology Conference, 2nd, Sapporo, Japan, Nov. 27-29, 1986. Proceedings (Kanchi gijutsu shinpojiumu koen ronbunshu 1986), Sapporo, Japan, Kanchi kaihatsu kenkyukai (Cold Regions Development Society), (1986), p.103-106, In Japanese. 1 ref.
Snowfall, Snow pillows, Snow density, Snow survey tools.

44-2453
Three dimensional under snow radar system.
Sakamoto, Y., et al, Cold Region Technology Conference, 2nd, Sapporo, Japan, Nov 27-29, 1986 Proceedings (Kanchi gijutsu shinpojiumu koen ronbunshu 1986), Sapporo, Japan, Kanchi kaihatsu kenkyukai (Cold Regions Development Society), (1986), p.107-110, In Japanese.
Aoki, Y.
Snow cover effect, Radar, Avalanches, Detection, Rescue operations.

44-2454
Estimation of the maximal ice thickness in Ogawara Lake.
Hirayama, K., et al, Cold Region Technology Conference, 2nd, Sapporo, Japan, Nov. 27-29, 1986. Proceedings (Kanchi gijutsu shinpojiumu koen ronbunshu 1986), Sapporo, Japan, Kanchi kaihatsu kenkyukai (Cold Regions Development Society), (1986), p.138-141, In Japanese. 3 refs.
Takeuchi, N., Sakamoto, N., Sasamoto, M.
Lake ice, Ice cover thickness, Ice surveys, Analysis (mathematics).

44-2455
Estimation of permeability coefficient of sea ice.
Okuhara, N., et al, Cold Region Technology Conference, 2nd, Sapporo, Japan, Nov. 27-29, 1986. Proceedings (Kanchi gijutsu shinpojiumu koen ronbunshu 1986), Sapporo, Japan, Kanchi kaihatsu kenkyukai (Cold Regions Development Society), (1986), p.142-147, In Japanese. 5 refs.
Izumi, K., Yamashita, T., Saeki, H.
Ice cover strength, Ice pressure, Permeability, Sea ice, Ice models, Mathematical models, Ice water interface, Ice loads.

44-2456
Triaxial compression tests on saline ice.
Kato, K., et al, Cold Region Technology Conference, 2nd, Sapporo, Japan, Nov. 27-29, 1986. Proceedings (Kanchi gijutsu shinpojiumu koen ronbunshu 1986), Sapporo, Japan, Kanchi kaihatsu kenkyukai (Cold Regions Development Society), (1986), p.148-153, In Japanese. 3 refs.
Kishimoto, H., Mita, S.
Ice cover strength, Ice pressure, Sea ice, Salt ice, Compressive properties, Ice loads, Analysis (mathematics).

44-2457
Indentation tests of laboratory and field ice sheets.
Kawasaki, T., et al, Cold Region Technology Conference, 2nd, Sapporo, Japan, Nov 27-29, 1986 Proceedings (Kanchi gijutsu shinpojiumu koen ronbunshu 1986), Sapporo, Japan, Kanchi kaihatsu kenkyukai (Cold Regions Development Society), (1986), p.154-159, In Japanese. 8 refs.
Ishikawa, S., Kayo, Y., Tozawa, S., Yano, S.
Ice cover strength, Ice deformation, Ice models, Ice loads, Impact tests, Penetration tests.

44-2458
Ice pressure distribution acting on vertical structures.
Takeuchi, T., et al, Cold Region Technology Conference, 2nd, Sapporo, Japan, Nov 27-29, 1986 Proceedings (Kanchi gijutsu shinpojiumu koen ronbunshu 1986), Sapporo, Japan, Kanchi kaihatsu kenkyukai (Cold Regions Development Society), (1986), p.160-165, In Japanese. 3 refs.
Tanaka, S., Ono, T., Saeki, H
Ice pressure, Ice loads, Offshore structures, Ice solid interface.

44-2459
Vertical ice forces acting on multi-legs offshore structures due to changes in water level.
Tsuchiya, M., et al, Cold Region Technology Conference, 2nd, Sapporo, Japan, Nov. 27-29, 1986. Proceedings (Kanchi gijutsu shinpojiumu koen ronbunshu 1986), Sapporo, Japan, Kanchi kaihatsu kenkyukai (Cold Regions Development Society), (1986), p.166-171, In Japanese. 6 refs.
Takeuchi, T., Nakazawa, N., Saeki, H.
Ice loads, Offshore structures, Water level, Ice pressure, Ice solid interface, Ice cover effect, Ice floes, Analysis (mathematics).

44-2460
Estimation method for vertical ice forces acting on multilegs offshore structures due to changes in water level.
Tsuchiya, M., et al, Cold Region Technology Conference, 2nd, Sapporo, Japan Nov. 27-29, 1986. Proceedings (Kanchi gijutsu shinpojiumu koen ronbunshu 1986), Sapporo, Japan, Kanchi kaihatsu kenkyukai (Cold Regions Development Society), (1986), p.172-177, In Japanese.
Takeuchi, T., Nakazawa, N., Saeki, H.
Ice loads, Offshore structures, Water level, Ice solid interface.

44-2461
Design of an observation tower in the Sea of Okhotsk.
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Ice loads, Offshore structures, Ice solid interface, Towers, Ice pressure, Analysis (mathematics).

44-2462
On the design of bridge for river ice sheet (I).
Hara, F., et al, Cold Region Technology Conference, 2nd, Sapporo, Japan, Nov. 27-29, 1986. Proceedings (Kanchi gijutsu shinpojiumu koen ronbunshu 1986), Sapporo, Japan, Kanchi kaihatsu kenkyukai (Cold Regions Development Society), (1986), p.185-191, In Japanese. 5 refs.
Saeki, H.
River ice, Ice loads, Bridges, Ice sond interface, Piers, Analysis (mathematics).

44-2463
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Sasaki, K., et al, Cold Region Technology Conference, 2nd, Sapporo, Japan, Nov. 27-29, 1986. Proceedings (Kanchi gijutsu shinpojiumu koen ronbunshu 1986), Sapporo, Japan, Kanchi kaihatsu kenkyukai (Cold Regions Development Society), (1986), p.192-200, In Japanese. 6 refs.
Hibi, Y., Kato, H., Fujita, S., Saeki, H.
Ice cover strength, Ice loads, Bearing strength, Trafficability, Analysis (mathematics), Safety.

44-2464
Weatherability of laminal roofing materials in Hokkaido.
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Mantoku, A., Goto, S., Ogasawara, K., Sogoh, T.
Roofs, Weatherproofing, Construction materials.

44-2465
Application of new metal "titanium" for winter living.
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Metals, Construction materials, Low temperature research, Cold tolerance, Cryogenics.

44-2466
Areal gradation in regard to avalanche in its habitual district.
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Matsuda, M.
Avalanche formation, Avalanche forecasting, Avalanche tracks, Topographic effects, Analysis (mathematics).

44-2467
Forecasting of direct-action avalanches in dry new snow.
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Avalanche forecasting, Avalanche formation, Snow cover effect, Slope processes, Analysis (mathematics).

44-2468
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Avalanche mechanics, Avalanche models, Impact strength, Impact tests, Analysis (mathematics).

44-2469
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Asai, Y., Shimomura, C.
Avalanche mechanics, Avalanche engineering, Avalanche models, Snow loads, Mathematical models.

44-2470
On the tier distance of snow barrier.
Matsuba, Y., et al, Cold Region Technology Conference, 2nd, Sapporo, Japan, Nov. 27-29, 1986. Proceedings (Kanchi gijutsu shinpojiumu koen ronbunshu 1986), Sapporo, Japan, Kanchi kaihatsu kenkyukai (Cold Regions Development Society), (1986), p.284-289, In Japanese. 4 refs.
Akiyama, H.
Avalanche mechanics, Avalanche engineering, Snow loads, Snow fences, Slope processes, Avalanche models, Analysis (mathematics).

44-2471
Afforestation at the full depth avalanche site.
Shimizu, H., et al, Cold Region Technology Conference, 2nd, Sapporo, Japan, Nov. 27-29, 1986. Proceedings (Kanchi gijutsu shinpojiumu koen ronbunshu 1986), Sapporo, Japan, Kanchi kaihatsu kenkyukai (Cold Regions Development Society), (1986), p.290-294, In Japanese. 3 refs.
Minato, K.
Avalanches, Revegetation, Forestry, Environmental protection.

44-2472
Development of guard fence used in snowy area.
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Ishidaira, S., Muranishi, M., Yamamoto, M.
Snow fences, Snow loads, Avalanche engineering, Analysis (mathematics).

44-2473
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Snow fences, Blowing snow.

44-2474
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Precast concretes, Shelters, Snowsheds.

44-2475
On the stress measurement of the snow-shelter.
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Yoshida, K.
Snow loads, Shelters, Snowsheds.

44-2476
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Air pollution, Snow composition, Snowfall, Snow impurities.

44-2477
Chemical dynamics of snowmelt runoff.
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Kobayashi, D.
Snowmelt, Runoff, Water chemistry.

44-2478
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Sewage treatment, Sludges, Water treatment, Waste treatment, Bacteria, Microbiology.

44-2479
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Snowmelt, Water supply, Snow cover effect, Snow water equivalent, Shores, Snow hydrology, Runoff.

44-2480
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Heat pipes, Cold storage, Permafrost preservation, Frozen ground thermodynamics, Underground storage.

44-2481
Promotion and preservation of ground freezing using cold weather in winter.
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Soil freezing, Artificial freezing, Frozen ground strength.

44-2482
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Cold storage, Ice refrigeration, Ice thermal properties, Latent heat.

44-2483
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Kobiyama, M., Hashimoto, Y.
Cold storage, Ice thermal properties, Ice refrigeration, Heat transfer, Analysis (mathematics).

44-2484
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Motoyama, H.
Snow melting, Snow thermal properties, Cold storage, Heat transfer, Snow cover effect.

44-2485
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Road icing, Snow cover structure, Ice structure.

44-2486
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Hayashi, Y., Suzuki, M.
Road icing, Chemical ice prevention, Road maintenance, Antifreezes, Artificial melting, Ice melting.

44-2487
Deformation of concrete u-trough caused by ground freezing.
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Frost action, Soil freezing, Concrete freezing, Roads, Road icing.

44-2488
Practical consideration for mass concreting in construction of ice infested sea structures.
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Offshore structures, Concrete structures, Concrete placing, Cold weather construction, Ice loads, Sea ice, Concrete strength.

44-2489
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Ohashi, T.
Concrete freezing, Concrete strength, Acoustic measurement, Frost action.

44-2490
Frost and sea water resistance of concrete structures in frozen sea areas.
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Concrete strength, Concrete freezing, Offshore structures, Concrete structures, Frost resistance, Sea ice, Sea water.

44-2491
Resistance to frost damage of concrete exposed at coastal zone.
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Saeki, N., Fujita, Y.
Concrete strength, Concrete freezing, Offshore structures, Frost resistance, Frost action.

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Road icing, Heat balance, Ice heat flux, Snow heat flux.

44-2533
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Rescue equipment, Cold weather survival, Cold tolerance, Thermal insulation, Inflatable structures, Floating structures.

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44-2544
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Ice loads, Offshore structures, Concrete structures, Concrete strength, Ice pressure, Ice solid interface.

44-2545
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Ice jams, River ice, Ice loads, Bridges, River flow.

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Lake ice, Ice loads, Ice override.

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Ice loads, Ice pressure, Offshore structures, Ice models, Mathematical models, Ice mechanics.

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The Coast Guard has recently completed a Contract Design for a Polar Icebreaker Replacement (PIR) to take the place of the decommissioned WIND Class icebreakers which were built in the 1940's. This design represents a multi-mission icebreaker which incorporates capabilities defined by the needs of DOD, NSF, NOAA, UNOLS, MARAD and the USCG. The design incorporates proven technology to provide a reliable platform to perform escort, resupply and scientific missions in both polar regions. The characteristics and capabilities of the vessel, as well as a brief synopsis of the design process completed at the time of the preparation of this paper, are discussed. (Auth. mod)

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Clouds (meteorology), Particle size distribution, Polar regions, Antarctica—McMurdo Station.
Balloonborne measurements of stratospheric clouds using optical particle counters in the Arctic and the Antarctic are compared in terms of particle size distribution. There appear to be two distinct classes of particles, a small mode (r 0.2 micron) in which at least half of the available condensation nuclei have grown and a large mode (r 2-3 micron) in which fewer than 1% of the available condensation nuclei have grown. The latter particles appear in thin layers (0.1 to 0.3 km) while the former appear in relatively thicker layers (2 to 5 km). Temperatures dictate a nitric acid trihydrate composition for most of the layers and the inferred HNO3 vapor in the large particles is comparable to that available. While the small particle mode is probably related to fast cooling events such as those associated with mountain ice waves, the origin of the thin layers of large particles is not apparent. (Auth.)

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Icebreakers, Ice navigation.

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Possibility of freezing sea bottom deposits in the arctic seas. [O vozmozhnosti promerzaniia donnykh otlozhenii v arkticheskikh moriakh],
Shpolianskaia, N.A., *Moscow. Universitet. Vestnik. Seriia: geografiia,* Sep.-Oct. 1989, No.5, p.72-78, In Russian. 13 refs.
Freezing, Bottom sediment, Bottom ice, Underwater ice, Water temperature.

44-2613
25 years of the avalanche and mudflow control laboratory. [25 let problemnoĭ laboratorii snezhnykh lavin i selei],
Laptev, M.N., et al, *Moscow. Universitet. Vestnik. Seriia: geografiia,* Sep.-Oct. 1989, No.5, p.94-96, In Russian.
Troshkina, E.S.
Mudflows, Avalanches, Laboratories, History.

44-2614
Frozen peat soil drainage in the Baikal-Amur Main line zone. [Osushenie torfianykh merzlotnykh pochv v zone BAMa],
Alekseĭko, I.S., *Gidrotekhnika i melioratsiia,* Aug. 1987, No.8, p.8-13, In Russian. 6 refs.
Drainage, Peat, Frozen ground mechanics, Soil water, Active layer.

44-2615
Evaluating pre-winter soil preparation for reclamation construction. [Otsenka predzimneĭ podgotovki grunta v meliorativnom stroitel'stve],
Kaliuzhnyĭ, I.I , et al, *Gidrotekhnika i melioratsiia,* Oct. 1987, No.10, p.24-27, In Russian. 8 refs.
Surikov, V.V.
Frozen ground, Freezing rate, Construction, Earthwork, Frost penetration.

44-2616
Freezing of winter roads in swamps. [Promerzanie zimnikh dorog na bolotakh],
Morozov, V.S., *Izvestiia vysshikh uchebnykh zavedenii. Lesnoĭ zhurnal,* 1989, No.4, p.51-56, In Russian. 3 refs.
Roads, Freezing, Peat, Freeze thaw cycles, Temperature.

44-2617
Nature of glacitectonic structures and sediments at sub-polar glacier margins, northwest Ellesmere Island, Canada.
Evans, D.J.A., *Geografiska annaler Series A Physical geography,* 1989, 71A(3-4), p.113-123, 36 refs.
Glacier tongues, Moraines, Glacial deposits, Canada—Northwest Territories—Ellesmere Island.

44-2618
Pleistocene ice wedge casts at 34S eastern Andes piedmont, south-west of South America.
Grosso, S.A., et al, *Geografiska annaler. Series A Physical geography,* 1989, 71A(3-4), p.125-136, Refs. p.134-136.
Corte, A.E.
Geocryology, Ice wedges, Pleistocene.

44-2619
Forest transitions and buried glacial outwash within the beech-maple region of Michigan, USA.
Dodge, S.L., *Geografiska annaler. Series A Physical geography,* 1989, 71A(3-4), p.137-144, 34 refs.
Outwash, Trees (plants), Glacial deposits, Forest ecosystems.

44-2620
Horton River breakthrough and resulting geomorphic changes in a permafrost environment, Western Arctic coast, Canada.
Mackay, J.R., et al, *Geografiska annaler. Series A Physical geography,* 1989, 71A(3-4), p.171-184, 24 refs.
Slaymaker, O.
Age determination, Geomorphology, Rivers, Sea ice.

44-2621
Observations of slushflows and their geomorphological effects in the Swedish mountain area.
Nyberg, R., *Geografiska annaler. Series A Physical geography,* 1989, 71A(3-4), p.185-198, 28 refs.
Slush, Geomorphology, Outwash, Wet snow, Snowmelt.

44-2622
Hoffellssandur IV. A glacial outwash plain revisited.
Jonsson, J., *Geografiska annaler. Series A Physical geography,* 1989, 71A(3-4), p.199-209, 21 refs.
Outwash, Stratigraphy, Glacial deposits

44-2623
Lake sediment cores from the Antarctic Peninsula and surrounding islands.
Zale, R , et al, *Geografiska annaler Series A Physical geography,* 1989, 71A(3-4), p 211-220, 29 refs.
Karlén, W.
Climatic changes, Sediments, Glacier oscillation, Moraines, Antarctica—Antarctic Peninsula
Sediment cores from two lakes on the Antarctic Peninsula, Hidden Lake on James Ross I and Lake Boeckella in Hope Bay, are described, analyzed and dated with regard to climatic changes during the Holocene. It was found that lichenometry, using *Rhizocarpon geographicum,* can be used locally to separate moraines of different age. Minimum datings of the deglaciation were found to be 8680 B.P. in Hope Bay and 3900 B.P. in the Hidden Lake area. A cold period, culminating around 5000 B.P., can be dated in the sediment from Lake Boeckella. A slightly lower content of organic material in the lakes around 2100 B.P. might be caused by a slightly colder climate at that time. Evidence of a very distinct climatic deterioration around 800 B.P. can be found in the sediment from Hidden Lake. Weaker traces of a colder climate can be found in Lake Boeckella around 500 B.P. (Auth.)

44-2624
Cold surface layer on Storglaciären.
Holmlund, P., et al, *Geografiska annaler. Series A Physical geography*, 1989, 71A(3-4), p.241-244, 16 refs.
Eriksson, M.
Geomorphology, Glacial hydrology, Glacier surfaces, Sweden—Storglaciären.

44-2625
Further catastrophic break-up of a calving glacier: observations at Austerdalsisen, Svartisen, Norway, 1983-87.
Theakstone, W H., *Geografiska annaler Series A Physical geography*, 1989, 71A(3-4), p.245-253, 17 refs.
Calving, Ice breakup, Glacier tongues, Glacial erosion, Norway—Austerdalsisen Glacier.

44-2626
Geoecological aspects of episodic permafrost expansion in North Sweden.
Kullman, L., *Geografiska annaler. Series A Physical geography*, 1989, 71A(3-4), p.255-262, 36 refs.
Forest ecosystems, Permafrost distribution, Climatic changes, Discontinuous permafrost, Sweden.

44-2627
For use in the Arctic. Developments in ice stations of the US and other NATO countries. [Dlia ispol'zovaniia v arktike O razrabotkakh v SShA i drugikh stranakh NATO ledovykh stantsiĭ],
Stoliarov, N., *Morskoĭ sbornik*, Oct. 1989, No.10, p.72-73, In Russian.
Probes, Laboratories, Equipment, Subglacial observations.

44-2628
Vertical structure and dynamics of the ocean's subglacial layer. [Vertikal'naia struktura i dinamika podlednogo sloia okeana],
Timokhov, L.A., ed, Leningrad, Gidrometeoizdat, 1989, 141p., In Russian. 199 refs.
Oceanographic surveys, Subglacial observations, Ice cover, Sea ice, Polar regions.
A review is presented of current thinking on the circulation and dynamics of subglacial waters in polar regions. Presented are experimental and theoretical data on the formation and development of ocean phenomena and processes under the ice cover. Investigations include the characteristics of vertical distribution of temperature and salinity under the ice and in polynyas, subsurface currents, eddies, internal waves, turbulences and convections, and ice properties and variations.

44-2629
Ice shores of Antarctica. [Ledianye berega Antarktidy],
Dubrovin, L I Leningrad, Gidrometeoizdat, 1989, 156p., In Russian 148 refs
Ice shelves, Coastal topographic features, Ice navigation, Moorings.
Four types of antarctic ice shores are identified, based on the analysis of their formation, morphology, development, and spatial and temporal changes, classification criteria used are morphology, genetics, coastline dynamics, and degree of thermal influence of coastal waters. After discussing the hydrometeorological and climatic conditions, the possibility is pointed out of using the ice shores as natural moorings, not only for ships supplying the Soviet stations, but also for operations concerning the economic development through exploitation of natural resources.

44-2630
Chemical and structural properties of sea ice in the southern Beaufort Sea.
Meese, D.A., *U.S. Army Cold Regions Research and Engineering Laboratory*, Dec. 1989, CR 89-25, 134p., ADA-219 746, 63 refs. For Ph.D. thesis of same title see 43-4573.
Sea ice, Ice composition, Ice cores, Chemical analysis, Sea water freezing, Beaufort Sea
The purpose of this study is to provide a detailed chemical and structural profile of first-year and multiyear arctic sea ice Ice cores were collected during Apr.-May 1986 and 1987 near Prudhoe Bay, AK. Concentrations of Cl, Br, SO4, Na, Ca, K, Mg, PO4, SiO4, NO3, NO2 and NH4 were determined for samples chosen on the basis of structural ice type. Chemical and statistical analyses indicate that finer grained structures incorporate more impurities and that major ion chemistry is controlled almost entirely by salinity. Mg is enriched in the ice indicating precipitation is occurring at temperatures higher than previously reported. K is depleted in the ice suggesting preferential drainage Ratios of the major ions are the same for first year and multiyear ice and are similar to that of seawater indicating that as the ice ages no significant changes occur in ice chemistry Nutrient concentrations in the ice are enriched with respect to the underlying water, indicating that biological activity occurs in the ice and processes other than the overall salinity effect and brine drainage are affecting nutrient concentrations within the ice.

44-2631
Ice conditions along the Illinois waterway as observed on Landsat images, 1972-1985.
Gatto, L.W., *U.S. Army Cold Regions Research and Engineering Laboratory*, Dec. 1989, CR 89-20, 112p., ADA-219 745, 11 refs.
Ice conditions, River ice, Ice surveys, Remote sensing, LANDSAT, United States—Illinois Waterway.
Landsat images were used to map ice distributions along the navigable portions of the Illinois Waterway from the Mississippi River to Lake Michigan, and air temperature and discharge data were used to characterize the conditions under which the observed ice formed and changed. The presence or absence of ice on adjacent water bodies, i.e., lakes, channels and sloughs, is also discussed but not mapped Ice was observed on the waterway during 10 of the 13 winters from 1972 to 1985, with the most severe ice conditions in 1981-82 when 79% of the waterway was ice covered, of which 68% was white ice on Feb 4. The most extensive ice was observed during 1984-85 when 83% of the waterway was ice covered, but only 38% was white ice. Ice was observed on the adjacent water bodies every winter for about 100 days from early to mid-Dec to mid-Mar Ice conditions changed frequently on the navigation channel of the waterway and usually lasted an average of 63 days from middle to late Dec. to middle to late Feb. Air temperature discharge data and data from Landsat images, when used together, provide a reasonably reliable method to study river ice conditions and changes.

44-2632
Fundameatal study on slush avalanche on the slope of Mt. Fuji.
Dohi, N., et al, *Niigata. University. Research Institute for Hazards in Snowy Areas. Annual report*, 1989, No.11, p.17-23, In Japanese with English summary. 4 refs.
Fukue, M., Anma, S.
Avalanche forecasting, Slush, Avalanche modeling, Japan—Fuji Mountain.

44-2633
Observations on avalanche at Rogers Pass, British Columbia, Canada in 1989.
Kobayashi, S., et al, *Niigata. University. Research Institute for Hazards in Snowy Areas Annual report*, 1989, No.11, p.37-48, In Japanese with English summary. 9 refs.
Akitaya, E., Schaerer, P.A., McClung, D.M., Anhorn, P., Whalley, C
Avalanches, Avalanche tracks, Avalanche modeling, Canada—British Columbia—Rogers Pass

44-2634
Report on the facilities for snow avalanche prevention in Europe.
Izumi, K., *Niigata. University. Research Institute for Hazards in Snowy Areas. Annual report*, 1989, No.11, p.83-88, In Japanese with English summary.
Avalanche engineering, Snow retention.

44-2635
Discharge and sediment-load characteristics of the Hilda rock-glacier stream, Canadian Rocky Mountains, Alberta.
Bajewsky, I., et al, *Physical geography*, Oct.-Dec. 1989, 10(4), p.295-306, 23 refs.
Gardner, J.S.
Rock glaciers, Water flow, Suspended sediments, Subsurface drainage, Mountains, Meltwater, Ground ice, Hydrologic cycle, Sediment transport, Canada—Alberta—Hilda Rock Glacier.

44-2636
Weathering trends in fine debris beneath a snow patch, Niwot Ridge, Front Range, Colorado.
Thorn, C.E., et al, *Physical geography*, Oct.-Dec. 1989, 10(4), p.307-321, 34 refs.
Dixon, J.C., Darmody, R.G., Rissing, J.M.
Alpine tundra, Soil chemistry, Slope processes, Weathering, Periglacial processes, Snow cover effect, Soil composition, Hydrogeochemistry, Chemical analysis, United States—Colorado—Front Range.

44-2637
Night-frost modulation of near-surface soil-water ion concentration and thermal fields.
Outcalt, S I., et al, *Physical geography*, Oct.-Dec 1989, 10(4), p.336-348, 18 refs.
Hinkel, K.M
Soil freezing, Frost penetration, Heat transfer, Soil water content, Ion density (concentration), Temperature effects, Thermal diffusion.

44-2638
Climatology of statewide extreme temperatures during winter months in the coterminous United States.
Parker, A.J., *Physical geography*, Oct.-Dec. 1989, 10(4), p.349-367, 23 refs.
Air temperature, Winter, Records (extremes), Meteorological data, Snow cover effect, Atmospheric circulation, Temperature variations, Climatology, United States.

44-2639
Effect of pulse length changes on Weibull clutter of sea ice.
Sekine, M., et al, *Institution of Electrical Engineers. Proceedings*, Feb. 1990, 137(F1), p.15-18, 15 refs.
Musha, T., Ogawa, H., Chikara, M.
Sea ice, Radar echoes, Statistical analysis, Backscattering, Wave propagation.

44-2640
Periglacial form group of southwestern Denmark.
Svensson, H., *Geografisk tidsskrift*, 1984, No.84, p.25-34, With Danish summary. 26 refs.
Patterned ground, Photointerpretation, Ice wedges, Periglacial processes, Cryoturbation, Ground ice, Surface structure, Denmark—Jutland

44-2641
Altitudinal trends of talus-derived lobate rock glaciers on Disko, central West Greenland.
Humlum, O., *Geografisk tidsskrift*, 1984, No.84, p.35-39, With Danish summary. 17 refs.
Rock glaciers, Climatic factors, Geological processes, Altitude, Air temperature, Geomorphology, Paleoclimatology, Talus, Greenland—Disko.

44-2642
Design requirement for ice forces.
Wong, T T., et al, *Canadian geotechnical journal*, Nov. 1989, 26(4), p.524-535, With French summary. 64 refs.
Sego, D.C.
Ice loads, Offshore structures, Design criteria, Ice solid interface, Ice deformation, Ice strength, Mechanical properties, Specifications.

44-2643
Streamline solution for rigid laterally loaded piles in permafrost.
Fortero, A., et al, *Canadian geotechnical journal*, Nov. 1989, 26(4), p.568-574, With French summary. 20 refs.
Ladanyi, B.
Piles, Frozen ground mechanics, Stability, Permafrost beneath structures, Soil creep, Dynamic loads, Analysis (mathematics), Dislocations (materials).

44-2644
*In situ* determination of creep properties of sea ice with the pressuremeter.
Murat, J.R., et al, *Canadian geotechnical journal*, Nov 1989, 26(4), p.575-594, With French summary 25 refs.
Ladanyi, B., Huneault, P.
Sea ice, Ice creep, Mechanical properties, Mechanical tests, Boreholes, Ice cover strength, Ice crystal structure, Ice relaxation, Measurement.

44-2645
Effect of backfill properties and surface treatment on the capacity of adfreeze pipe piles.
Sego, D.C., et al, *Canadian geotechnical journal*, Nov 1989, 26(4), p.718-725, With French summary. 8 refs.
Smith, L.B.
Piles, Ice adhesion, Frozen ground strength, Permafrost beneath structures, Steel structures, Ice solid interface, Dislocations (materials), Soil texture, Mechanical tests, Structural analysis, Cold weather construction.

44-2646
Hydraulic conductivity and unfrozen water content of air-free frozen silt.
Black, P.B., et al, *Water resources research*, Feb. 1990, 26(2), MP 2551, p.323-329, 25 refs.
Miller, R.D.
Frozen ground, Unfrozen water content, Hydraulics, Soil water.
Unfrozen water content and hydraulic conductivity data were obtained for an air-free frozen Alaskan silt using a new form of an ice sandwich diatometer/permeameter that was designed to allow control of effective stress in the granular matrix through appropriate adjustments of pressure in liquid surrounding a specimen confined as in a triaxial test apparatus. Experimental complications included rejuvenation of conductivity during prolonged periods of equilibrium (no flow) after each temperature step immediately followed by very slow but continuing decay, as if without limit. When a formula of the Brooks and Corey type was fitted to unfrozen water content data, hydraulic conductivities inferred from the formula parameter, through the model of Mualem, provided an acceptable description of observed conductivity values, as measured immediately after the equilibrium period.

44-2647
Advisability of using drying drums for reclamation of frozen and water-saturated soils. [O tselesoobraznosti primeneniia sushil'nykh barabanov pri melioratsii merzlykh i pereuvlazhnennykh gruntov].
D'iakonov, P.IU., et al, *Energeticheskoe stroitel'stvo*, Dec 1989, No 12, p.53-55, In Russian. 6 refs
Godcheva, E.A
Land reclamation, Drying, Soil water, Frozen ground thermodynamics.

44-2648
Tuned perfect prognosis forecasts of mesoscale snowfall for southern Ontario.
Burrows, W.R., *Journal of geophysical research*, Feb. 1990, 95(D3), p.2127-2141, 23 refs.
Snowfall, Precipitation (meteorology), Weather forecasting, Statistical analysis, Models.

44-2649
Natural icing re-evaluation of the EH-60A Quick Fix helicopter.
Downey, D.A., et al, *U.S. Army Aviation Engineering Flight Activity, Edwards AFB, CA. Report*, May 1989, USAAEFA-88-06-1, 65p. ADA-214 728.
Tailby, A.J., Piotrowski, J.L.
Helicopters, Aircraft icing, Ice formation.

44-2650
Hazards following ground deicing and ground operations in conditions conducive to aircraft icing. *U.S. Federal Aviation Administration. Advisory circular*, Dec. 1982, FAA/AC-20-117, 38p. ADA-214 696.
Aircraft icing, Ice formation, Ice removal, Antifreezes.

44-2651
Polar ice prediction system—a sea ice forecasting system. Final report.
Preller, R.H., et al, *U.S. Naval Ocean Research and Development Activity, NSTL Station, MS. Report*, Apr. 1989, NORDA-212, 42p. ADA-214 600.
Posey, P.G.
Sea ice, Ice forecasting, Drift, Thermodynamics, Ice models.

44-2652
Inventory of river training structures in shallow-draft waterways. Final report.
Derrick, D.L., et al, *U.S Army Engineer Waterways Experiment Station, Vicksburg, MS. Hydraulics laboratory. Technical report*, Oct. 1989, WES/TR/REMR/HY-6, 36p. ADA-214 566.
Gernand, H W., Crutchfield, J.P.
Structures, Channels (waterways), Damage, Ice, Cost analysis, Rivers.

44-2653
Airborne electromagnetic sensing of sea ice thickness. Final report.
Becker, A., et al, Berkeley, University of California, Department of Materials Science and Mineral Engineering, Dec. 1988, 129p. ADA-214 460.
Liu, G.
Sea ice, Aerial surveys, Ice cover thickness, Airborne radar, Remote sensing, Electromagnetic prospecting, Nomographs, Data processing.

44-2654
Active and passive remote sensing of ice. Final report 1 Oct. 88-30 Sep. 89.
Kong, J.A., Cambridge, Massachusetts Institute of Technology, Research Laboratory of Electronics, Nov. 21, 1989, 15p. ADA-214 863.
Sea ice, Snow cover, Airborne radar, Remote sensing, Dielectric properties, Microwaves, Backscattering

44-2655
Saving the beauty and wealth of the North. Notes from the international symposium on geocryology. [Sberech' krasotu i bogatstva Severa].
Kliuchnikova, L.P., *Stroitel'stvo truboprovodov*, Dec. 1989, No. 12, p.16-23, In Russian.
Meetings, Ecology, Environmental protection, Geocryology.

44-2656
Is the North facing a catastrophe? Ecological consequences of the expected warming. [Sever pered katastrofoi? Ekologicheskie posledstviia ozhidaemogo potepleniia].
Tsarev, V.P., et al, *Stroitel'stvo truboprovodov*, Jan. 1990, No.1, p.15-19, In Russian.
Povileiko, R P
Ecology, Climatic changes, Permafrost.

44-2657
Making oil and gas development in arctic regions ecological. [Ekologizatsiia neftegazovogo stroitel'stva v arkticheskikh raionakh].
Shishov, V.N., et al, *Stroitel'stvo truboprovodov*, Jan. 1990, No.1, p.19-22, In Russian.
Chlenov, A.V., Grodzinskiĭ, V.V., Lanetskiĭ, N.K.
Natural resources, Ecology, Permafrost, Gas production.

44-2658
Technology of building underwater pipelines in arctic regions. [Tekhnologiia stroitel'stva podvodnykh truboprovodov v arkticheskikh raionakh].
Kamyshev, M.A, *Stroitel'stvo truboprovodov*, Jan. 1990, No.1, p.23-25, In Russian
Hydraulic structures, Cold weather construction, Pipelines, Sea ice, Analysis (mathematics).

44-2659
Late Pleistocene glaciers and the climate of western Montana, U.S.A.
Locke, W W, III, *Arctic and alpine research*, Feb 1990, 22(1), p.1-13, 44 refs.
Snow line, Glacier oscillation, Climatic factors, Alpine glaciation, Cirque glaciers, Paleoclimatology, Precipitation (meteorology), Mountain glaciers, Seasonal variations, United States—Montana.

44-2660
Fabric and origin of diamictons in end moraines, Animas River valley, Colorado, U.S.A.
Johnson, M.D., *Arctic and alpine research*, Feb. 1990, 22(1), p.14-25. 32 refs.
Moraines, Sediments, Particle size distribution, Soil analysis, Soil texture, Glacial deposits, Rock properties, Glacier flow, United States—Colorado—Animas River.

44-2661
Sedimentation in proglacial Ivory Lake, Southern Alps, New Zealand.
Hicks, D.M, et al, *Arctic and alpine research*, Feb. 1990, 22(1), p.26-42, 34 refs.
McSaveney, M.J., Chinn, T.J.H.
Glacial lakes, Lacustrine deposits, Sediment transport, Glacial hydrology, Subsurface investigations, Runoff, Statistical analysis, Geologic processes, Mountain glaciers, New Zealand—Ivory Lake.

44-2662
Space and time distribution of glacier mass-balance in the Northern Hemisphere.
Letréguilly, A., et al, *Arctic and alpine reserach*, Feb. 1990, 22(1), p.43-50, 19 refs.
Reynaud, L.
Glacier mass balance, Glacier oscillation, Distribution, Measurement, Climatic changes, Periodic variations, Time factor, Correlation

44-2663
Lichen mortality due to late-lying snow: results of a transplant study.
Benedict, J.B., *Arctic and alpine research*, Feb. 1990, 22(1), p.81-89, 29 refs.
Lichens, Survival, Growth, Snow cover effect, Plants (botany), Snow accumulation, United States—Colorado.

44-2664
Atmospheric icing rates with elevation on northern New England mountains, U.S.A.
Ryerson, C.C., *Arctic and alpine research*, Feb. 1990, 22(1), MP 2589, p.90-97, 19 refs.
Ice accretion, Icing rate, Altitude, Mountains, Wind factors, Topographic effects, Cloud cover, Ice formation, Measurement, Measuring instruments, Frost, United States—New Hampshire—Mount Washington.
Atmospheric rime icing, resulting primarily from supercooled cloud droplet impaction on objects at the Earth's surface, was monitored and analyzed as a function of elevation on the west faces of Madonna Peak and Mount Mansfield in the Green Mountains, Vermont, and at the summit of Mount Washington, New Hampshire. Measurements were made of ice accretion rates on passive, manually operated collection baskets and automatic ice detectors. Icing rates increase exponentially with elevation above about 800 m, with secondary controls of rate suggested by microtopographic relief exposure. The illustrated dependence of icing rate upon elevation is largely a function of New England wind and cloud regimes and differs from other selected mountainous locations. The relationships presented may help assess the magnitude of frozen moisture inputs to high-elevation mountain ecosystems.

44-2665
Effect of weather variability on the energy balance of a lake in the Hudson Bay lowlands, Canada.
Bello, R., et al, *Arctic and alpine research*, Feb. 1990, 22(1), p.98-107, 23 refs.
Smith, J.D.
Lakes, Water balance, Evaporation, Subpolar regions, Climatic changes, Heat flux, Moisture transfer, Advection, Microclimatology, Canada—Manitoba—Churchill.

44-2666
Proceedings. [Kanchi gijutsu shinpojiumu koen ronbunshu 1988].
Cold Region Technology Conference, 4th, Sapporo, Japan, Nov. 8-10, 1988, Sapporo, Japan, Kanchi kaihatsu kenkyukai (Cold Regions Development Society), [1988], 676p., In Japanese. Refs. passim. For selected papers see 44-2667 through 44-2738.
Snowfall, Snow removal, Snow melting, Road icing, Road maintenance, Offshore structures, Ice loads, Snow cover, Sea water freezing, Artificial melting, Concrete strength, Concrete freezing, Cold storage, Municipal engineering, Thermal insulation, Water pipes, Meetings.

44-2667
Durability of external wall coatings in cold region.
Inoue, S., et al, Cold Region Technology Conference, 4th, Sapporo, Japan, Nov. 8-10, 1988. Proceedings (Kanchi gijutsu shinpojiumu koen ronbunshu 1988), Sapporo, Japan Kanchi kaihatsu kenkyukai (Cold Regions Development Society), [1988], p.67-74, In Japanese. 3 refs.
Sogoh, T., Goto, S., Mantoku, A., Ogasawara, K.
Walls, Protective coatings, Weatherproofing, Frost protection.

44-2668
Subject and improvement of auto-valves on water pipe in cold district.
Nagashima, Y., Cold Region Technology Conference, 4th, Sapporo, Japan, Nov. 8-10, 1988. Proceedings (Kanchi gijutsu shinpojiumu koen ronbunshu 1988), Sapporo, Japan, Kanchi kaihatsu kenkyukai (Cold Regions Development Society), [1988], p.93-98, In Japanese. 5 refs.
Water pipes, Valves, Frost protection.

44-2669
On auto drain system for water-piping.
Yumita, S., Cold Region Technology Conference, 4th, Sapporo, Japan, Nov. 8-10, 1988. Proceedings (Kanchi gijutsu shinpojiumu koen ronbunshu 1988), Sapporo, Japan, Kanchi kaihatsu kenkyukai (Cold Regions Development Society), [1988], p.99-103, In Japanese.
Water pipes, Flow control, Frost protection.

44-2670
On the utilization of E, P, S as a draining material, one of methods against freeze control measures.
Nakamura, T., et al, Cold Region Technology Conference, 4th, Sapporo, Japan, Nov. 8-10, 1988. Proceedings (Kanchi gijutsu shinpojiumu koen ronbunshu 1988), Sapporo, Japan, Kanchi kaihatsu kenkyukai (Cold Regions Development Society), [1988], p.114-119, In Japanese. 5 refs.
Hirano, T.
Thermal insulation, Frost protection, Waterproofing.

44-2671
Radio-meteorological forecast method for concentrate heavy snow in coastal districts facing northern Japan.
Asari, E., Cold Region Technology Conference, 4th, Sapporo, Japan, Nov. 8-10, 1988. Proceedings (Kanchi gijutsu shinpojiumu koen ronbunshu 1988), Sapporo, Japan, Kanchi kaihatsu kenkyukai (Cold Regions Development Society), [1988], p.125-130, In Japanese.
Snowstorms, Snowfall, Weather forecasting, Radio waves, Radio echo soundings.

44-2672
Development of snow survey by aerial photogrammetry.
Shimura, K., et al, Cold Region Technology Conference, 4th, Sapporo, Japan, Nov. 8-10, 1988. Proceedings (Kanchi gijutsu shinpojiumu koen ronbunshu 1988), Sapporo, Japan, Kanchi kaihatsu kenkyukai (Cold Regions Development Society), [1988], p.131-135, In Japanese. 1 ref.
Kobayashi, S., Takeuchi, M., Ishimoto, T.
Snow surveys, Snow depth, Photogrammetric surveys, Photogrammetry.

44-2673
Snowfall forecasting method and its accuracy.
Shimomura, C., et al, Cold Region Technology Conference, 4th, Sapporo, Japan, Nov. 8-10, 1988. Proceedings (Kanchi gijutsu shinpojiumu koen ronbunshu 1988), Sapporo, Japan, Kanchi kaihatsu kenkyukai (Cold Regions Development Society), [1988], p.136-141, In Japanese.
Ishidaira, S.
Snowfall, Weather forecasting.

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Fence booms made of wire mesh screen have been proposed as economical, temporary frazil ice control structures. These screens incorporate frazil ice as it freezes to the screen material, eventually forming a frazil ice dam and raising the water level at a specified location. The purpose of raising the water level is to allow the formation of a stable ice cover that will incorporate still more frazil ice through hydraulic thickening of the cover and deposition beneath the cover. A series of experiments examining the freezeup and blocking dynamics of an expanded metal frazil ice screen were conducted using both an impermeable barrier and frazil ice. A qualitative analysis of the complex frazil ice accumulation process indicated three phases of blocking—an orifice flow stage, a transition stage, and a permeable flow stage. A fourth phase, weir flow, was observed in some cases, and is expected to occur in prototype structures. High downstream flow velocities were associated with the orifice and transition stages. Downstream velocities decreased during the permeable flow stage, although piping resulted in velocity jets. The test results indicate that a rapidly and completely blocked screen is desirable to minimize the time during which high downstream velocities, which lead to bed scour, occur.

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Long-term climatic and environmental records from antarctic ice.
Lorius, C., et al, *American Geophysical Union. Geophysical monograph*, 1989, No.52, Understanding climate change. Edited by A. Berger, R.E. Dickinson and J.W. Kidson, p.11-16, 32 refs.
Paleoclimatology, Ice cores, Precipitation (meteorology), Carbon dioxide, Air temperature, Aerosols, Antarctica—East Antarctica, Antarctica—Vostok Station.
Various records obtained from the Vostok (East Antarctica) ice core allow reconstruction of temperature, accumulation (precipitation), aerosol loading and atmospheric CO2 concentration histories over the last climatic cycle (160,000 years). The results agree with those previously obtained from two other deep antarctic ice cores going back to the Last Glacial Maximum. The Vostok isotope-based temperature and CO2 records show a large 100 ky signal with changes of the order of 10 deg C and 70 ppmv respectively. They are closely associated and show periodicities characteristic of the earth orbital parameters. The accumulation (precipitation) record appears to be governed by temperature with values during the coldest stages reduced to about 50% of the current rate. Ice deposited during these coldest stages is also characterized by high concentrations of marine and terrestrial aerosols, these peaks likely reflect strengthened sources and meridional transport during full glacial conditions, linked to higher wind speeds, more extensive and areas on surrounding continents and the greater exposure of continental shelves. On the other hand there is no indication of a long term relationship between volcanism and climate. (Auth.)

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Atmospheric circulation, Models, Paleoclimatology.

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Progress and future developments in modelling the climate system with general circulation models.
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Paleoclimatology, Air water interactions, Models, Atmospheric circulation, Climatic changes, Ice sheets, Snow accumulation, Sea ice.
The author reviews the capability of three-dimensional models of the atmosphere and ocean to simulate existing and past climates. Calculated snow budget data as well as annual snow accumulation in Antarctica were considered.

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Aerosols, Heterogeneous nucleation, Ice crystal growth, Computerized simulation, Molecular structure, Ice physics, Substrates, Hydrogen bonds.

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Elemental carbon concentration in air and its influence on attenuation of incoming solar radiation and snow cover albedo in Katowice, southern Poland.
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Aerosols, Atmospheric attenuation, Snow cover, Albedo, Hydrocarbons, Air pollution, Particles, Radiation absorption, Poland—Katowice.

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Heterogeneous nucleation of ice at the liquid-liquid interface.
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Aerosols, Ice formation, Heterogeneous nucleation, Condensation nuclei, Interfaces, Phase transformations, Molecular structure, Atmospheric composition, Hydrocarbons.

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Bacteria at the heart of a good snowfall.
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Snow manufacturing, Snow crystal nuclei, Bacteria, Organic nuclei, Artificial snow, Environmental impact.

44-2789
High-pressure freezing for the preservation of biological structure: theory and practice.
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Staehelin, L.A.
Materials, Freezing, Laboratory techniques, Cryogenics, Preserving, Instruments, Microstructure, Electron microscopy, High pressure tests.

44-2790
Anomalous 'freezing' of water in hydrophilic polymeric structures.
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Knight, C., Probert, S.D.
Polymers, Hydrates, Thermal properties, Hygroscopic water, Materials, Heat sinks, Freeze thaw cycles, Hygroscopicity, Heat flux, Unfrozen water content.

44-2791
Mathematical model of the ocean boundary layer under drifting melting ice.
Svensson, U., et al, *Journal of physical oceanography*, Feb. 1990, 20(2), p.161-171, 34 refs.
Omstedt, A.
Sea ice, Sea water, Melting, Boundary layer, Mathematical models, Ice bottom surface, Ice melting, Ice floes, Heat transfer coefficient, Turbulent diffusion, Ice water interface, Salinity.

44-2792
Temperature and salinity staircases in the northwestern Weddell Sea.
Muench, R.D., et al, *Journal of physical oceanography*, Feb. 1990, 20(2), p.295-306, 33 refs.
Fernando, H.J.S., Stevens, G.R.
Chemical composition, Salinity, Subglacial observations, Temperature gradients, Sea ice, Temperature measurement, Chemical analysis, Oceanographic surveys, Antarctica—Weddell Sea.
Temperature and salinity data obtained from the northwestern Weddell Sea during Mar. 1986 reveal numerous thermohaline staircases in the thermocline separating warm deep water from the overlying colder, lower salinity winter water. Staircases in the upper steeper portion of the thermocline were characterized by layers having vertical extents of 1-5 m. Layer thicknesses in the deeper, weaker portion of the thermocline were far greater, sometimes exceeding 100 m. The former staircases are referred to as Type A, and the latter as Type B. Vertical gradients in temperature and salinity decreased abruptly across the boundary between Type A and Type B staircase regions. Type A staircases were present at all sites sampled, whereas Type B staircases were present over approximately the central 50% of the area sampled. Laboratory-derived results show that the observed time and vertical space scales for the Type B staircases are consistent with the notion that they are maintained by double diffusive processes. These results, combined with temperature-salinity analyses, lead us to suggest that the Type B staircase regime may have originated as a vertically convective feature within which staircases have formed and evolved continually through double diffusion. The broad areal coverage of Type B staircases, coupled with previous observation of these features at scattered sites throughout much of the Weddell Sea, suggests that they are widespread there and may play a significant role in regional vertical heat transfer. (Auth.)

44-2793
Dielectric and C-13 NMR studies of the carbon monoxide clathrate hydrate.
Desando, M.A., et al, *Journal of inclusion phenomena and molecular recognition in chemistry*, Jan.-Feb. 1990, 8(1-2), p.3-16, 46 refs.
Hydrates, Dielectric properties, Molecular structure, Clathrates, Latticed structures, Nuclear magnetic resonance, Orientation, Low temperature research

44-2794
Brief and vigorous $N_2O$ production by soil at spring thaw.
Christensen, S., et al, *Journal of soil science*, Mar. 1990, 41(1), p.1-4, 9 refs.
Tiedje, J.M.
Ground thawing, Soil chemistry, Soil analysis, Chemical properties, Seasonal variations, Nutrient cycle.

44-2795
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Ice thermal properties, Snow thermal properties, Sea ice, Thermal expansion, Thermal conductivity, Thermal diffusion, Ice salinity, Metamorphism (snow), Temperature effects.

44-2796
Natural cold. [Prirodnyĭ kholod],
Poplavskiĭ, V.A., Kiev, Naukova dumka, 1989, 171p., In Russian.
Glaciers, Sea ice, River ice, Lake ice, Permafrost, Glaze.

44-2797
Rocks and soil of the martian surface. [Porody i grunt poverkhnosti Marsa],
Sidorov, IU.I., et al, Moscow, Nauka, 1989, 222p., In Russian with English table of contents. 575 refs.
Zolotov, M.IU.
Mars (planet), Rock properties, Frozen rocks, Extraterrestrial ice, Minerals, Weathering.
A review of the structure, physical properties and chemical and mineral composition of martian surface rocks is presented. Current insight on igneous rocks and magmatic evolution is given. Including such examples as weathering in Antarctica, the authors consider the processes of chemical weathering of the martian surface as well as probable scenarios of atmospheric evolution and climatic changes. (Auth. mod.)

44-2798
Physiographic characteristics of snowmelt and its initial phases in the central chernozem regions. [Fiziko-geograficheskaia kharakteristika snegotaianiia i ego osnovnykh faz na territorii tsentral'no-chernozemnykh oblastei],
Riazantsev, V.K., et al, Voprosy gidrometeorologii Urala. Mezhvuzovskiĭ sbornik nauchnykh trudov (Hydrometeorological problems in the Urals. Collected scientific papers). Edited by M.S. Akhmetov, et al, Perm', Gosudarstvennyĭ universitet, 1984, p.74-78, In Russian.
Zherdev, V.N.
Snowmelt, Snow water equivalent.

44-2799
Air temperature, wind velocity and direction in southern cyclone regions during the formation of ice-hoarfrost phenomena in the Urals. [Temperatura vozdukha, napravlenie i skorost' vetra v oblasti tuzhnykh tsiklonov pri obrazovanii gololedno-izmorozevykh iavleniĭ na Urale],
Pospelova, V.F., et al, Voprosy gidrometeorologii Urala. Mezhvuzovskiĭ sbornik nauchnykh trudov (Hydrometeorological problems in the Urals. Collected scientific papers). Edited by M.S. Akhmetov, et al., Perm', Gosudarstvennyĭ universitet, 1984, p.94-104, In Russian. 2 refs.
Pospelova, T.A.
Ice formation, Air temperature, Hoarfrost, Wind direction, Glaze, Wind velocity, Atmospheric disturbances.

44-2800
Introduction to drilling technology.
Mellor, M., MP 2591, International Workshop on Physics and Mechanics of Cometary Materials, Münster, FRG, Oct. 9-11, 1989. Proceedings, European Space Agency, Dec. 1989, p.95-114. ESA SP-302.
Drilling, Frozen ground, Ice coring drills, Extraterrestrial ice, Planetary atmospheres.
Terrestrial drilling technology is reviewed. The general requirements for a drilling system are given and conventional drilling techniques (rotary drag-bit, rotary roller-bit, percussive, rotary-percussive) are described. Unconventional techniques for penetrating solids are outlined, including thermal drilling (spalling or melting), projectile penetration, high-pressure liquid jets, explosive jets, erosion by projectile streams, and chemical penetration. Special attention is given to drilling in ice and frozen soils; performance data are given, including values for penetration rate and specific energy consumption. The principles, theory and equipment relating to each drilling technique are indicated by means of diagrams.

44-2801
First impressions of the comet drilling problem.
Mellor, M., MP 2592, International Workshop on Physics and Mechanics of Cometary Materials, Münster, FRG, Oct. 9-11, 1989. Proceedings, European Space Agency, Dec. 1989, p.229-232. ESA SP-302.
Extraterrestrial ice, Planetary environments, Ice sampling, Ice density, Ice coring drills, Cosmic dust.

44-2802
Thermal effect of power plants on an aqueous medium. [Teplovoe vliianie ob"ektov energetiki na vodnuiu sredu],
Braslavskiĭ, A.P., et al, Leningrad, Gidrometeoizdat, 1989, 251p., In Russian. 206 refs.
Kumarina, M.N., Smirnova, M.E.
Electric power, Freezeup, Ice cover, Temperature effects, Computer programs.

44-2803
Response of the ocean-atmosphere system to external influences. [Reaktsiia sistemy okean-atmosfera na vneshnie vozdeĭstviia],
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Riabchenko, V.A., Safral, A.S.
Sea ice, Air water interactions, Glaciation, Paleoclimatology, Models, Albedo, Carbon dioxide, Analysis (mathematics).

44-2804
Snow cover affected by a city. [Snezhnyĭ pokrov v sfere vliianiia goroda],
Prokacheva, V.G., et al, Leningrad, Gidrometeoizdat, 1989, 176p. + appends., In Russian. 72 refs.
Usachev, V.F.
Snow cover, Impurities, Snowmelt, Hydrologic cycle, Pollution, Spaceborne photography, Snow impurities, Albedo.

44-2805
Ice budget of the Greenland Sea.
Moritz, R.E., New Haven, Yale University, 1988, 189p., University Microfilms order No.AAD90-09415, Ph.D. thesis. For abstract see Dissertation abstracts international, Sec. B, 1989, p.4958.
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44-2806
Computer simulation of two-dimensional frost heaving in soils.
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Frost heave, Culverts, Soil mechanics, Computerized simulation, Cold weather performance, Roads.

44-2807
Use of air-entraining and plasticizing admixtures for producing concrete with good salt-frost resistance.
Petersson, P.E., *Sweden. Statens Provningsanstalt. Report*, June 1989, SP-RAPP-1989.37, 18p. PB90-132036.
Air entrainment, Ice prevention, Frost protection, Concrete admixtures

44-2808
Droplet sizing instrumentation used for icing research: operation, calibration, and accuracy. Final report.
Hovenac, E.A., *U.S. National Aeronautics and Space Administration. Contractor report*, Aug. 1989, NASA-CR-182293, 53p. N90-11999.
Icing, Drops (liquids), Light scattering, Probes, Clouds, Accuracy, Particle size distribution.

44-2809
Measurement of fluctuations in the tilt of arctic ice at the CEAREX Oceanography Camp: experiment review, data catalog and preliminary results.
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Sea ice, Ice mechanics, Ocean waves, Spectra, Oceanography, Pack ice.

44-2810
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Luers, J.K., *Dayton University. Research Institute. Technical report*, Feb. 1987, UDR-TR-87-23, 65p. ADA-215 056.
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44-2811
Convective heat transfer measurements from a NACA 0012 airfoil in flight and in the NASA Lewis Icing Research Tunnel.
Poinsatte, P.E., et al, *U.S. National Aeronautics and Space Administration. Technical memorandum*, 1989, NASA-TM-102448, 20p., N90-13750, Presented at the 28th Aerospace Sciences Meeting, Reno, NV, Jan. 8-11, 1990.
Vanfossen, G.J., Dewitt, K.J.
Ice formation, Temperature measurement, Heat transfer coefficient, Surface roughness, Test chambers, Turbulent flow, Boundary layer.

44-2812
Liquid water content and droplet size calibration of the NASA Lewis Icing Research Tunnel.
Ide, R.F., *U.S. National Aeronautics and Space Administration. Technical memorandum*, 1989, NASA-TM-102447, 28p., N90-13797, Presented at the 28th Aerospace Sciences Meeting, Reno, NV, Jan. 8-11, 1990.
Drops (liquids), Water content, Ice formation, Moisture, Tunnels, Test chambers, Spectroscopy.

44-2813
Effect of concrete shoulders, land widening and frozen subgrade on concrete pavement performance. Final report 1982-88.
Korfhage, G.R., *U.S. Federal Highway Administration. Research and development report*, July 1988, FHWA/MN/RD-88/02, 21p. PB90-148818.
Concrete pavements, Concrete durability, Subgrades, Loads (forces), Frost action, Design criteria, Deformation.

44-2814
Resilient properties of Arkansas subgrades. Final report.
Elliott, R.P., et al, *U.S Federal Highway Administration. Report*, Nov. 1988, FHWA/AR-89/004, 116p. PB90-148305
Thornton, S.I., Foo, K.Y., Siew, K.W., Woodbridge, R.
Soil water, Soil analysis, Subgrades, Frost penetration, Freeze thaw cycles.

44-2815
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Philleo, R.E., et al, *National Institute of Standards and Technology. Report*, Nov 1989, NISTIR-89/4186, 18p. PB90-149683.
Clifton, J.R.
Concrete freezing, Water cement ratio, Concrete durability, Porosity, Admixtures, Frost protection, Frost penetration, Permeability.

44-2816
Frost-resistance of concrete.
Clifton, J.R., *National Institute of Standards and Technology. Report*, Jan 1990, NISTIR-90/4229, 22p. PB90-162116.
Forecasting, Concrete freezing, Frost resistance, Frost action, Mathematical models.

44-2817
Effects of cryogenic temperatures on materials properties. January 1972-January 1990. A Bibliography from the International Aerospace Abstracts Database. Report for Jan 72-Jan 90. Springfield, VA, National Technical Information Service, Feb 1990, 94p. PB90-858614
Bibliographies, Cryogenics, Metals, Steels.

44-2818
Physical conditions at the base of a fast moving antarctic ice stream.
Engelhardt, H., et al, *Science*, Apr. 6, 1990, 248(4951), p.57-59, 42 refs.
Humphrey, N., Kamb, B., Fahnestock, M.
Ice sheets, Glacier flow, Ice pressure, Antarctica—Marie Byrd Land.
Borenoles drilled to the bottom of ice stream B in the West Antarctic Ice Sheet reveal that the base of the ice stream is at the melting point and the basal water pressure is within about 1.6 bars of the ice overburden pressure. These conditions allow the rapid ice streaming motion to occur by basal sliding or by shear deformation of unconsolidated sediments that underlie the ice in a layer at least 2 m thick. The mechanics of ice streaming plays a role in the response of the ice sheet to climatic change. (Auth.)

44-2819
Icebreaker *Vladivostok* rescue expedition. [Spasatel'naia ekspeditsiia na ledokole *Vladivostok*].
Chilingarov, A.I., *Sovetskaia antarkticheskaia ekspeditsiia. Informatsionnyi biulleten'*, 1989, No.112, p.10-16, In Russian
Icebreakers, Ice navigation, Rescue operations, Sea ice distribution.
Early in Mar. 1985 the flagship of the 30th Soviet Antarctic Expedition, *Mikhail Somov*, was trapped in a mass of heavy ice in the Pacific Ocean near Russkaya Station. After drifting 560 miles, on July 26 the ship was freed by the icebreaker *Vladivostok*. Details of the rescue operation were described. Results of meteorological and glaciological investigations carried out during the expedition, particularly the sea ice thickness and drifting velocity and direction, are given.

44-2820
Regularity of ice formation conditions in Russkaya Station coastal zone. [Zakonomernosti formirovaniia ledovykh uslovii v pribrezhnoi zone raiona stantsii Russkoi].
Korotkov, A.I., *Sovetskaia antarkticheskaia ekspeditsiia. Informatsionnyi biulleten'*, 1989, No.112, p.6-29, In Russian. 14 refs.
Fast ice, Sea ice distribution, Ice navigation, Antarctica—Russkaya Station.
The stability of the sea ice distribution in the Russkaya Station area is discussed, with illustrations showing the following: extreme positions of the fast ice borders, ice thickness and snow accumulation, mean monthly air temperature and surface water temperature variations for 1981-1986 and navigation conditions, such as position of polynyas, fast ice, drifting ice and ice free areas from Oct. through Mar. Tabulated data on ice formation stages for 1980-1986 and characteristics of stationary polynyas, are also presented. It is concluded that the best navigation conditions in the western coastal region are to be found during the Jan. 15-Feb. 15 period.

44-2821
Provision of hydrometeorological information to the rescue expedition on board the icebreaker *Vladivostok*. [Nauchno-operativnoe gidrometeorologicheskoe obespechenie spasatel'noi ekspeditsii na l/k *Vladivostok*].
Krutskikh, B.A., et al, *Sovetskaia antarkticheskaia ekspeditsiia. Informatsionnyi biulleten'*, 1989, No.112, p.40-51, In Russian.
Proborkin, A.V., Smirnov, V.I.
Sea ice distribution, Ice navigation, Icebreakers, Mapping.
The coordinated efforts to gather and provide meteorological, glaciological and oceanographic data for the use of the icebreaker *Vladivostok* during its rescue operations of the *Mikhail Somov*, trapped in heavy ice in the Pacific Ocean in 1985, are described. Compilation of 225 maps, recording various ice conditions and meteorological events between June 13 and Aug. 10, is reported. Adverse navigation conditions, tides, waves, ice thickness and distribution, and the ship's manner of dealing with them, are discussed.

44-2822
Drift of the *Mikhail Somov* in the Pacific ice massif (Mar.-July 1985). [Dreif nes *Mikhail Somov* v Tikhookeanskom ledianom massive (mart-iiul' 1985 g.)].
Chuguĭ, I.V., et al, *Sovetskaia antarkticheskaia ekspeditsiia. Informatsionnyi biulleten'*, 1989, No.112, p.52-56, In Russian. 6 refs.
Khromov, IU.N., IUlin, A.V.
Icebergs, Sea ice distribution, Ice navigation.
The flagship of the 30th Soviet Antarctic Expedition *Mikhail Somov*, was trapped in a mass of heavy ice in the Pacific Ocean near Russkaya Station, drifting between Mar. 26 and July 26, 1985. A scheme of the drift is presented, along with tables with statistics on the drift velocity and direction stability, the frequency of daily drift and wind in the same direction, and parameters of wind and surface currents. Generally, the highest drift velocity values, going WSW along the coast at an average of 0.10 m/s, were recorded between end of Mar. and middle of May. From May 11 to June 23, the drift direction changed to SW, at a speed of 0.06 m/s, achieving the highest speed recorded (0.52 m/s) on May 25. Sea ice distribution including occurrence and characteristics of drifting icebergs observed along the way, is also discussed.

44-2823
Ice conditions for navigation in the Pacific Ocean ice massif in winter. [Ledovye usloviia plavaniia sudov v Tikhookeanskom ledianom massive zimoĭ].
Smirnov, V.I., *Sovetskaia antarkticheskaia ekspeditsiia. Informatsionnyi biulleten'*, 1989, No.112, p.56-64, In Russian
Ice cover thickness, Sea ice distribution, Ice navigation, Rescue operations, South Pacific Ocean
A day-by-day account is given, and a scheme is presented, of the ice conditions, and trajectory, of the icebreaker *Vladivostok* during rescue operations of the *Mikhail Somov* in winter 1985. Navigation techniques used to avoid collision with icebergs, and to minimize damage to the ship from ice pressure, are described.

44-2824
Ships' speed in the Pacific ice massif in winter. [Skorosti dvizhenia sudov zimoĭ vo l'dakh Tikhookeanskogo ledianogo massiva].
Smirnov, V.I., *Sovetskaia antarkticheskaia ekspeditsiia. Informatsionnyi biulleten'*, 1989, No.112, p.64-68, In Russian.
Ice navigation, Icebreakers, Rescue operations, South Pacific Ocean.
Tabulated average daily speed of the *Mikhail Somov* navigating through ice, and of the icebreaker involved in its rescue, is discussed. It is found that speed variations did not depend so much on variations of ice conditions as on the winding of the track.

44-2825
Possibility of determining winter sea ice characteristics from satellite IR and radar imaging data. [O vozmozhnosti opredeleniia razlichnykh kharakteristik antarkticheskikh morskikh l'dov v zimnii period po dannym infrakrasnoĭ i radiolokatsionnoĭ s"emki s ISZ].
Provorkin, A.V., *Sovetskaia antarkticheskaia ekspeditsiia. Informatsionnyi biulleten'*, 1989, No.112, p.68-74, In Russian. 5 refs.
Infrared mapping, Sea ice, Remote sensing, Radar echoes.
From satellite radar sea ice images in winter, it was found possible to determine the following: the ice edge position, young, to one-year-old ice, old ice; ice compactness; and presence, form and dimensions of giant breccia fields and icebergs.

44-2826
Giant and extensive ice and breccia fields in the Pacific and Atlantic oceans. [O gigantskikh i obshirnykh ledianykh poliakh i poliakh smorozi Tikhookeanskogo i Atlanticheskogo ledianykh massivov].
Kozlovskiĭ, A.M., et al, *Sovetskaia antarkticheskaia ekspeditsiia. Informatsionnyi biulleten'*, 1989, No.112, p.74-81, In Russian. 2 refs.
Leont'ev, E.B.
Sea ice distribution, Ice volume, Ice surveys, South Pacific Ocean.
Coordinates, dimensions, spatial structure, snow cover and other characteristics of breccia fields, investigated by the icebreaker *Vladivostok* navigating through the Pacific Ocean ice massif in the drifting area of *Mikhail Somov* in 1985, are discussed and shown on graphs. Also presented are data obtained on flights over the Atlantic Ocean, in an area near the Druzhnaia-1 base, in summer 1975-76 and in 1984. Data include direction of ice drifts and measurements of breccia fields covering 40-50% of the ice massif surface of the southern Weddell Sea, at 150-250 km from the coast.

44-2827
Distribution of icebergs in the South Pacific Ocean according to observations from the icebreaker *Vladivostok*. [Raspredelenie aisbergov v Tikhookeanskom sektore IUzhnogo okeana po nabliudeniiam s borta l/k *Vladivostok*].
Kozlovskiĭ, A.M., *Sovetskaia antarkticheskaia ekspeditsiia. Informatsionnyi biulleten'*, 1989, No.112, p.81-84, In Russian.
Sea ice distribution, Icebergs, South Pacific Ocean.
From observations obtained on a round trip voyage of the icebreaker *Vladivostok*, navigating between 64-75S and 149-152W from July 14 to Aug. 13, 1985, a total of 1,918 icebergs were sighted, 828 on the way south, and 1090 on the way back. The majority of sightings occurred between 75-67S, with a sharp decrease between 69-70S, the region of the cyclonic circulation center. The iceberg distribution is shown on a graph. Icebergs and ice drift were found to follow the same general direction.

44-2828
Snow covered ice in the Pacific ice massif. [Zasnezhennost' l'dov Tikhookeanskogo ledianogo massiva].
Kozlovskiĭ, A.M., et al, *Sovetskaia antarkticheskaia ekspeditsiia. Informatsionnyi biulleten'*, 1989, No.112, p.84-87, In Russian. 5 refs.
Romanov, A.A.
Sea ice, Snow ice interface, Ice water interface, Snow cover structure, South Pacific Ocean.
Observations of snow covering the sea ice, carried out on board the icebreaker *Vladivostok* in the Pacific Ocean, July-Aug. 1985, are discussed. A table shows that one year old ice is covered by 20-70 cm of snow; multi-year ice, by 40-100 cm. The occurrence of a layer of water on the upper surface of fast ice is noted on ice 100-150 cm thick, covered with 30-50 cm of snow. It is suggested that where snow depth on ice exceeds 25% of the ice thickness, the ice is pushed below sea level and an upward infiltration of sea water through cracks in the ice occurs, along with the water congelation in the snow covering the ice surface.

44-2829
Study of possibilities for simultaneous determination of ice cover and ship speed characteristics by instrumental means. [Issledovanie vozmozhnosti sinkhronnogo opredeleniia kharakteristik ledianogo pokrova i skorosti sudna instrumental'nymi metodami].
Tarashkevich, V.N., et al, *Sovetskaia antarkticheskaia ekspeditsiia. Informatsionnyi biulleten'*, 1989, No.112, p.100-108, In Russian. 13 refs.
Khromov, IU.N., IUlin, A.V.
Ice navigation, Velocity measurement, Ice cover thickness, Measuring instruments.
Data are interpreted of instrumental methods used to determine the sea ice cover thickness and temperature, and the ship's speed in relation to ice conditions. Fragments of simultaneous recordings, and their functional complexities, are illustrated and discussed.

44-2830
Automatic information system in support of operations at antarctic stations. [Avtomatizirovannaia informatsionno-kontrol'naia sistema po obespecheniiu operatsiĭ u antarkticheskikh stantsiĭ].
IUlin, A.V., et al, *Sovetskaia antarkticheskaia ekspeditsiia. Informatsionnyi biulleten'*, 1989, No.112, p.108-115, In Russian. 4 refs.
Tarashkevich, V.N.
Ice navigation, Data processing.
Projected duration of, and factual time spent on, sea operations carried out in different ice conditions are discussed. This is illustrated by a table showing operations carried out by *Mikhail Somov* at Mirnyy Station during the 30th Soviet Antarctic Expedition. Flow charts are presented for data processing on the automatic information system.

44-2831
Investigation of ice navigation capabilities and drift performance of the *Mikhail Somov* in antarctic waters. (Issledovanie ledovykh kachestv nes *Mikhail Somov* pri plavanii i dreife v antarkticheskikh vodakh l'dov).
Dubov, A.A., et al. *Sovetska a antarkticheskaia ekspeditsiia. Informatsionny, biulleten'*. 1989, No.112, p.115-123, In Russian. 6 refs.
Lednev, V.A., Ulin, A.V.
Ships, Ice navigation, Ice adhesion, Ice pressure.
Data on hull vibrations of the *Mikhail Somov* during its entrapment and drift near Russkaya Station in winter 1985, its passage and speed through different ice conditions, the stress to which the ship was subjected from floating ice and ice adhesions, are analyzed to assess the effectiveness of vessels of that type for resupply operations and other work in drifting pack ice.

44-2832
Ion-pairing RP-HPLC method for determining tetrazene in water and soil.
Walsh, M.E., et al. *Journal of energetic materials*, 1989, 7(3), MP 2593, p.159-179, 18 refs.
Jenkins, T.F.
Water chemistry, Soil chemistry, Chemical analysis, Explosives, Soil analysis, Laboratory techniques, Soil pollution, Chemicals.
Ion-pairing reversed phase-high performance liquid chromatography methods were developed to determine tetrazene in water and soil. Determinations were achieved using an LC-18 column, a mobile phase of 7:3 v v methanol-water containing 0.0, M 1-decane-sulfonic acid sodium salt, and a UV detector set at 280 nm. The pH of the mobile phase was adjusted to 3 with glacial acetic acid, which was optimal for separation of tetrazene from potential interferences by other explosives. The retention time for tetrazene was 2.8 minutes. A linear model with zero intercept was found to adequately describe the calibration data for concentration ranges of 6.1 to 722 micrograms/L for water samples and 0.204 to 40.8 micrograms/g for soil samples. Tetrazene was found to be unstable in an aqueous medium at room temperature. Concentrations decreased by 96-100% over 24 hours. The rate of degradation was reduced significantly when solutions were maintained near 0 deg C.

44-2833
Cold-climate nitrifying biofilters: design and operation considerations.
Gullicks, H.A., et al. *Water Pollution Control Federation Research journal*, Jan.-Feb. 1990, 62(1), p.50-57, 25 refs.
Cleasby, J.L.
Water treatment, Cold weather operation, Filters, Seepage, Design, Towers, Water films, Surface properties, Fluid flow.

44-2834
MTCLIM: a mountain microclimate simulation model.
Hungerford, R.D., et al. *U.S. Forest Service. Intermountain Research Station. Research paper*, Nov 1989, INT-414, 52p., 57 refs.
Nemani, R.R., Running, S.W., Coughlan, J.C.
Microclimatology, Mountains, Computerized simulation, Data processing, Meteorological data, Environment simulation, Computer programs, Correlation, Analysis (mathematics), Models.

44-2835
Work scheduling on Canadian Coast Guard ships: physiological and psychological impacts.
Boulard, R., et al. *Transport Canada. Publication*, Sep. 1989, TP-10048E, 17p., 7 refs.
Telle-Lamberton, M.A., Vézina, M.
Marine transportation, Labor factors, Human factors, Physiological effects, Health, Periodic variations.

44-2836
Reduction of low-temperature cracking in asphalt pavement through the use of large stone mixtures.
Davis, R.L., *Canadian Technical Asphalt Association Proceedings*, Nov. 1988, Vol.33, its 33rd Annual Conference, Calgary, Alberta, 1988. Edited by E. Thompson, p.42-55, 2 refs.
Bituminous concretes, Pavements, Cold weather performance, Cracking (fracturing), Countermeasures, Aggregates, Deformation, Mechanical properties, Temperature variations, Viscosity.

44-2837
Cracking mechanisms of asphalt concrete pavements at low service temperatures.
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44-2838
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44-2839
Low temperature benefits of polymer modified asphalts.
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44-2840
Study of low temperature transverse cracking in Alberta.
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44-2841
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44-2842
Extending McLeod's PVN concept to the temperature susceptibility characterization of asphalt mixes.
Haas, R., et al. *Canadian Technical Asphalt Association Proceedings*, Nov. 1989, Vol.34, Its 34th Annual Conference, Halifax, Nova Scotia, Canada, 1989. Edited by E. Thompson, p.178-192, With French summary. 7 refs.
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44-2843
Evaluation of low temperature and permanent deformation characteristics of some engineered asphalts.
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Hussain, S.R., Jardine, K.G.
Bituminous concretes, Polymers, Low temperature tests, Tensile properties, Aggregates, Pavements, Loading, Thermal stresses, Modification.

44-2844
Development of standard CAN-CGSB-16.3-M asphalt cement for road purposes.
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Pavements, Bituminous concretes, Cold weather performance, Standards, Specifications, Physical properties, Construction.

44-2845
PVN as a measure of paving asphalt temperature susceptibility, and its relationship to paving asphalt specifications, paving mixture design and pavement performance.
McLeod, N.W., *Canadian Technical Asphalt Association. Proceedings*, Nov. 1989, Vol.34, Its 34th Annual Conference, Halifax, Nova Scotia, Canada, 1989. Edited by E. Thompson, p.382-452, With French summary. 30 refs.
Pavements, Bituminous concretes, Strength, Thermal properties, Tensile properties, Cold weather performance, Penetration tests, Stability, Viscosity, Cooling, Compaction, Temperature effects.

44-2846
Accuracy and precision of GOES data collection platforms for temperature measurements.
Daly, S.F., et al, *U.S. Army Cold Regions Research and Engineering Laboratory*, Dec. 1989, SR 89-37, 14p. ADA-218 798.
Clark, C.H., Pangburn, T.
Remote sensing, Accuracy, Data transmission, Temperature measurement, Equipment.
This report describes an analysis of the accuracy and precision of data transmitted by 12 Data Collection Platforms (DCPs) over a one-month period. The DCPs were installed on the Monongahela, Ohio and Illinois rivers. A reference resistor with a known and stable resistance was installed at each DCP site. Comparison of the resistance calculated from the transmitted information with the actual resistance of the reference resistor allowed the accuracy and precision of the measurements made by the DCP to be determined. Four brands of DCPs were included in the test; two had 8-bit resolution and two had 12-bit resolution. The results were analyzed with respect to the nominal accuracy provided by the manufacturer and the expected analog-to-digital quantizing error. This error explained most of the imprecision of the 8-bit DCPs but only part of the imprecision of the 12-bit DCPs. A large bias for some of the results was apparently caused by an impedance mismatch. A means for correcting the data based on the reference resistor measurement is proposed.

44-2847
Low-temperature effects on systems for composting of explosives-contaminated soils. Part I: Literature review.
Ayorinde, O.A., et al, *U.S. Army Cold Regions Research and Engineering Laboratory*, Dec. 1989, SR 89-38, 18p., ADA-219 352, 48 refs.
Reynolds, C.M.
Thermodynamics, Low temperature research, Temperature effects, Explosives, Waste treatment, Soil physics.
This report reviews literature on the influence of major parameters on composting, with emphasis on temperature and explosives. Heat energy is produced by composting as a result of the microbial conversion of chemical energy to thermal energy. Hence heat production and transfer, the influence of composting g on compost pile temperatures, and the control and measurement of compost pile temperatures are also examined. In addition, the report includes a general discussion on composting, the essential composting principles, available types of compost ng systems, applications of composting technology, and the established parameters influencing composting under various environmental conditions that may be applicable to cold regions treatment of hazardous waste.

44-2848
Estimating sea ice thickness using time-of-flight data from impulse radar soundings.
Kovacs, A., et al, *U.S. Army Cold Regions Research and Engineering Laboratory*, Dec. 1989, CR 89-22, 10p., ADA-218 736, 1 ref.
Morey, R.M.
Sea ice, Dielectric properties, Radio echo soundings, Remote sensing, Ice floes, Radar echoes.
Two second-year sea ice floes were probed using "impulse" radar sounding and direct drilling methods. The resulting two-way time of flight of the impulse radar EM wavelet, traveling from the surface to the ice "bottom" and back to the surface, was compared with snow and ice thickness data obtained from a drill hole. From this comparison, simple relationships are presented that provide an estimate of the thickness of sea ice, from about 1 to 8 m thick, with or without a snow cover. Relations are also presented that show the bulk or apparent dielectric constant of the ice floes vs ice thickness, again with or without the snow cover. The data revealed that the apparent dielectric constant of the sea ice decreased with increasing ice thickness from a value of about 7 for ice 1 m thick to about 3.5 for ice 6 m thick.

44-2849
Spatial variability of pollutants in snow cover in the USSR. (Prostranstvennaia izmenchivost' soderzhania zagriaznitelchikh veshchestv v snezhnom pokrove na territorii SSSR).
Belikova, T.V., et al, *Problemy fonovogo monitoringa sostoianiia prirodnoi sredy*, 1989, Vol.7, p.45-55, In Russian with English summary. 8 refs.
Snow impurities, Snow composition, Pollution, Statistical analysis.

44-2850
Vertical distribution characteristics of sulphate deposition in snow cover in the mountain areas of the USSR. [Osobennosti vertikal'nogo raspredeleniia sul'fatov v snezhnom pokrove gornykh raionov SSSR].
Vasilenko, V.N., et al, *Problemy fonovogo monitoringa sostoianiia prirodnoĭ sredy*, 1989, Vol.7, p.86-89, In Russian with English summary. 4 refs.
Nazarov, I.M., Fridman, Sh.D.
Snow impurities, Pollution, Altitude, Statistical analysis.

44-2851
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Machleder, W.H., et al, Society of Automotive Engineers. International Congress and Exposition, Detroit, MI, Feb 27-Mar 3, 1989, Warrendale, Society of Automotive Engineers, 1989, 16p, SAE technical paper series No.890240, 13 refs.
Kopko, R.J.
Lubricants, Diesel engines, Cold weather performance, Viscosity, Low temperature tests, Temperature effects, Chemical admixtures, Rheology.

44-2852
Electric vehicle design considerations for cold weather operations.
Adams, W.A., et al, Future Transportation Technology Conference and Exposition, Vancouver, British Columbia, Canada, Aug 7-10, 1989, Warrendale, Society of Automotive Engineers, 1989, 4p, SAE technical paper series No.891662, 8 refs
Song, G.S.
Vehicles, Electric equipment, Cold weather performance, Design criteria, Performance, Environmental impact, Electrical insulation, Electric charge.

44-2853
Low temperature performance characteristics of elastomers.
Thoman, R.A., Jr., Earthmoving Industry Conference, 40th Annual, Peoria, IL, Apr. 11-13, 1989, Warrendale, Society of Automotive Engineers, 1989, 8p., SAE technical paper series No.890988, 7 refs.
Rubber, Elastic properties, Sealing, Low temperature tests, Compressive properties, Chemical admixtures, Temperature effects, Plastic deformation, Brittleness.

44-2854
Requirements of diesel engine oil as it relates to low temperature operation.
Roth, R.J.G., Earthmoving Industry Conference, 40th Annual, Peoria, IL, Apr. 11-13, 1989, Warrendale, Society of Automotive Engineers, 1989, 12p., SAE technical paper series No.890993, 27 refs.
Lubricants, Diesel engines, Cold weather performance, Specifications, Viscosity, Temperature effects, Chemical analysis, Wind factors, Construction equipment.

44-2855
Cold starting capabilities of petroleum and synthetic lubricants in heavy-duty diesel engines.
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Beimesch, B.J.
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44-2856
Army arctic engine oil performance in high ambient temperatures.
Lestz, S.J., et al, International Fuels and Lubricants Meeting and Exposition, Baltimore, MD, Sep. 25-28, 1989, Warrendale, Society of Automotive Engineers, 1989, 14p., SAE technical paper series No.892051, 24 refs.
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44-2857
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44-2858
Effect of volatility changes on vehicle cold-start drive ability.
Abramo, L., et al, International Fuels and Lubricants Meeting and Exposition, Baltimore, MD, Sep. 25-28, 1989, Warrendale, Society of Automotive Engineers, 1989, 20p., SAE technical paper series No.892088, 4 refs.
Baxter, C.E., Costello, P.J., Kouhi, F.A.
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44-2859
Proceedings. [Kanchi gijutsu shinpojiumu koen ronbunshu 1989],
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Snow removal, Snow melting, Road icing, Road maintenance, Snow retention, Ice loads, Offshore structures, Snowfall, Cold storage, Power line icing, Ice cover strength, Artificial melting, Concrete structures, Frost protection, Meetings, Blowing snow.

44-2860
How deep is the ground frozen.
Yahagi, H., Cold Region Technology Conference, 5th, Sapporo, Japan, Nov. 6-8, 1989. Proceedings (Kanchi gijutsu shinpojiumu koen ronbunshu 1989), Sapporo, Japan, Kanchi kaihatsu kenkyukai (Cold Regions Development Society), [1989], p.38-43, In Japanese. 2 refs.
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44-2861
Risk probability map of wet snow accretion on power line.
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44-2862
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Tadokoro, Y.
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44-2864
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44-2865
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Uematsu, T., et al, Cold Region Technology Conference, 5th, Sapporo, Japan, Nov. 6-8, 1989. Proceedings (Kanchi gijutsu shinpojiumu koen ronbunshu 1989), Sapporo, Japan, Kanchi kaihatsu kenkyukai (Cold Regions Development Society), [1989], p.115-120, In Japanese. 4 refs.
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44-2866
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Kubota, H., et al, Cold Region Technology Conference, 5th, Sapporo, Japan, Nov. 6-8, 1989. Proceedings (Kanchi gijutsu shinpojiumu koen ronbunshu 1989), Sapporo, Japan, Kanchi kaihatsu kenkyukai (Cold Regions Development Society), [1989], p.121-125, In Japanese. 3 refs.
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44-2867
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Shimomura, C., et al, Cold Region Technology Conference, 5th, Sapporo, Japan, Nov. 6-8, 1989. Proceedings (Kanchi gijutsu shinpojiumu koen ronbunshu 1989), Sapporo, Japan, Kanchi kaihatsu kenkyukai (Cold Regions Development Society), [1989], p.126-131, In Japanese. 4 refs.
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Osawa, H.
Snowsheds, Road maintenance, Blowing snow, Snow fences, Concrete structures.

44-2869
On development of light weight shelter.
Gotoh, Y., Cold Region Technology Conference, 5th, Sapporo, Japan, Nov. 6-8, 1989. Proceedings (Kanchi gijutsu shinpojiumu koen ronbunshu 1989), Sapporo, Japan, Kanchi kaihatsu kenkyukai (Cold Regions Development Society), [1989], p.138-143, In Japanese.
Snowsheds, Concrete structures.

44-2870
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Snowsheds, Concrete structures.

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Power line icing, Computer applications, Snow melting, Artificial melting.

44-2872
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Snow removal, Air flow, Pipe flow, Snow air interface.

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Ito, T., et al, Cold Region Technology Conference, 5th, Sapporo, Japan, Nov. 6-8, 1989. Proceedings (Kanchi gijutsu shinpojiumu koen ronbunshu 1989), Sappor , Japan, Kanchi kaihatsu kenkyukai (Cold Regions Development Society), [1989], p.162-166, In Japanese. 2 refs.
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Snow removal, Road maintenance, Snowfall, Snow depth, Weather forecasting.

44-2874
Detection method of snow flow removed by rotary snow remover.
Ikegami, M., et al, Cold Region Technology Conference, 5th, Sapporo, Japan, Nov 6-8, 1989. Proceedings (Kanchi gijutsu shinpojiumu koen ronbunshu 1989), Sapporo, Japan, Kanchi kaihatsu kenkyukai (Cold Regions Development Society), [1989], p.167-170, In Japanese. 2 refs.
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Snow removal, Road maintenance.

44-2875
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He, T.J., et al, Cold Region Technology Conference, 5th, Sapporo, Japan, Nov 6-8, 1989. Proceedings (Kanchi gijutsu shinpojiumu koen ronbunshu 1989), Sapporo, Japan, Kanchi kaihatsu kenkyukai (Cold Regions Development Society), [1989- p.171-176, In Japanese 3 refs.
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44-2876
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44-2877
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44-2878
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44-2879
Characteristics of heat balance on snow-accumulated roads.
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Road icing, Heat balance, Snow heat flux, Snow thermal properties.

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Road icing, Surface temperature.

44-2881
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Tires, Skid resistance.

44-2882
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Cold storage, Ice refrigeration, Artificial freezing, Ponds, Artificial ice.

44-2883
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44-2885
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44-2886
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44-2887
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44-2888
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44-2890
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Snow melting, Snow removal, Artificial melting.

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Air change measurements of five Army buildings in Alaska.
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Buildings, Ventilation, Air flow, Air leakage, Measurement, Indoor climates, Military facilities, Wind factors, Cold weather tests, Sampling.
The air change rates of five buildings (four barracks and one vehicle maintenance garage) were measured, using the tracer gas dilution techniq The median air change rate for all zones measured wa e to 0.5 air change per hour (ACH) The range of air change ates was between 0 05 and 1.75 ACH. Most of this range was attributable to variation in the effectiveness of the buildings' ventilation systems. Outdoor temperatures were between -15 and -20 deg C (5 and -4 deg F). The wind was calm for all but one barracks measurement. The maintenance facility, a large single-zone building, permitted good results from the tracer gas technique. The barracks, multi-zone buildings, varied in the ea , with which the tracer gas technique could be applied. The barracks ventilation systems were in operation when air change measurements were made. These systems incorporated air-to-air heat exchangers with intakes and exhausts mounted in rooftop penthouses

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Association between ice nuclei and fracture interfaces in sucrose:water glasses.
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Carnahan, D.L.
Frozen liquids, Solutions, Ice formation, Countermeasures, Cracking (fracturing), Phase transformations, Temperature effects, Heterogeneous nucleation, Thermal stresses, Cryobiology, Interfaces, Liquid cooling.

44-2946
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Plant tissues, Freezing, Thawing, Fracturing, Ultrasonic tests, Interstitial ice, Acoustic measurement, Temperature effects, Low temperature tests, Plants (botany), Cavitation.

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Huang, Q.
Frozen liquids, Chemical properties, Electrical properties, Temperature effects, Solutions, Electrical measurement, Liquid phases, Low temperature tests, Electrical resistivity.

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Zwally, H.J., Major, J.A., Brenner, A.C.
Ice sheets, Topographic maps, Spaceborne photography, Sensor mapping, Height finding, Airborne radar, Surface properties, Altitude, Data processing, Glaciology, Accuracy, Greenland.

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44-2950
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Vegetation patterns, Remote sensing, Classifications, Mapping, Terrain identification, Data processing, LANDSAT, Research projects, Distribution, United States—Alaska.

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Research projects, International cooperation, Economic development, Environmental protection, Polar regions.

44-2956
Jerry Brown urges cooperation. [Razvivat' sotrudnichestvo predlagaet rri Braun], *Stroitel'stvo truboprovodov*, Nov No 11, p 11, In Russian
Research projects, International cooperation, Environmental protection, Polar regions.

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Ice wedges, Isotope analysis, Ice dating, Permafrost dating, Ice veins, Geochemistry, Pleistocene.

44-2958
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Soil freezing, Frozen ground physics, Freeze thaw cycles, Frost penetration, Soil water, Climatic factors, Heat transfer, Water flow, Meetings, Agriculture, Frost action.

44-2959
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Formanek, G.E., Molnau, M.
Frozen ground physics, Freeze thaw cycles, Soil freezing, Forest land, Agriculture, Impact strength, Landscapes, Heat transfer, Frost action, Climatic factors, Soil water

44-2960
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Pikul, J.L., Jr.
Frozen ground, Soil erosion, Runoff, Floods, Sedimentation, Freeze thaw cycles, Damage, Agriculture, Frost action, Time factor, Frost penetration, Thaw depth, Heat flux, Snowmelt, Computer applications.

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44-2962
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Fox, J.D., Kane, D.L.
Soil freezing, Forest soils, Soil temperature, Soil water migration, Frost penetration, Unfrozen water content, Thermal regime, Hydrology, Climatic factors, Phase transformations, Temperature variations, Heat transfer, Thermistors, Mathematical models, Water content.

44-2963
Tillage and crop residue effects on soil frost depth.
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Smolik, J.D.
Soil freezing, Snow cover effect, Frost penetration, Vegetation factors, Snow accumulation, Ground thawing, Freeze thaw cycles, Agriculture, Seasonal variations, Thermal insulation.

44-2964
Comparison of numerical simulations with experimental data for a prototype artificial ground freezing.
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Stefanov, L.A.
Soil freezing, Artificial freezing, Waste treatment, Soil pollution, Thermal properties, Latent heat, Experimentation, Mathematical models, Thermocouples.

44-2965
**Effect of freeze-thaw activity on water retention, hydraulic conductivity, density, and surface strength of two soils frozen at high water content.**
Benoit, G R , et al, *U.S Army Cold Regions Research and Engineering Laboratory Special report,* Mar 1990, SR 90-01, International Symposium. Frozen Soil Impacts on Agricultural, Range, and Forest Lands, Spokane, WA, March 21-22, 1990. Proceedings. Edited by K.R. Cooley, p.45-53, ADA-219 687, 13 refs.
Voorhees, W.B.
Frozen ground, Soil water, Freeze thaw cycles, Permeability, Density (mass/volume), Soil strength, Soil aggregates, Water content, Soil physics, Frost action, Surface properties.

44-2966
**Predicting unfrozen water content behavior using freezing point depression data.**
Black, P.B., et al, *U.S. Army Cold Regions Research and Engineering Laboratory Special report,* Mar 1990, SR 90-01, MP 2677, International Symposium. Frozen Soil Impacts on Agricultural, Range, and Forest Lands, Spokane, WA, March 21-22, 1990. Proceedings. Edited by K.R. Cooley, p.54-60, ADA-219 687, 16 refs.
Tice, A.R.
Unfrozen water content, Soil freezing, Antifreezes, Nuclear magnetic resonance, Soil water, Soil physics, Temperature effects, Mathematical models, Clays, Sediments.
This paper presents a framework by which freezing point depression data are interpreted to determine the unfrozen water content behavior of a soil The transformed data are then fitted to a Brooks and Corey type function and compared to the unfrozen water content behavior determined by separate warming curve data that were measured by NMR.

44-2967
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Sojka, R.E., Carter, D.L., Jolley, P.M.
Soil freezing, Freeze thaw cycles, Soil aggregates, Frost action, Soil texture, Organic soils, Water content, Stability, Mineralogy, Experimentation, Particle size distribution, Density (mass/volume).

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**Freeze thaw effects on soil strength.**
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McCool, D.K.
Soil strength, Freeze thaw cycles, Soil erosion, Frost action, Soil water, Runoff, Frozen ground, Water content, Agriculture, Snowmelt, Rain, Shear strength, Tests.

44-2969
**Soil freezing and thawing simulation with the SHAW model.**
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Cullum, R.F., Hanson, C.L., Saxton, K.E.
Freeze thaw cycles, Soil freezing, Ground thawing, Frost penetration, Snow depth, Runoff, Soil temperature, Soil water, Models, Ground ice, Evaporation, Heat transfer, Water transport.

44-2970
**Simulating the freezing and thawing of arable land in Sweden.**
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Soil structure, Soil freezing, Ground thawing, Freeze thaw cycles, Frost action, Meltwater, Soil water migration, Water transport, Frost heave, Climatic factors, Soil erosion, Agriculture, Hydrology, Runoff, Models, Soil temperature, Water content.

44-2971
**Modeling the effects of soil frost and snowmelt on runoff and erosion.**
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Benoit, G.R., Onstad, C.A.
Soil freezing, Snowmelt, Runoff, Soil erosion, Freeze thaw cycles, Sediment transport, Soil water, Watersheds, Soil aggregates, Snow cover distribution, Heat transfer, Analysis (mathematics).

44-2972
**Conservation applications impacted by soil freeze thaw.**
Formanek, G.E , et al, *U.S. Army Cold Regions Research and Engineering Laboratory. Special report,* Mar. 1990, SR 90-01, International Symposium· Frozen Soil Impacts on Agricultural, Range, and Forest Lands, Spokane, WA, March 21-22, 1990. Proceedings. Edited by K.R. Cooley, p.108-112, ADA-219 687, 9 refs.
Muckel, G.B., Evans, W.R.
Freeze thaw cycles, Soil freezing, Ground thawing, Frost action, Soil water, Soil erosion, Watersheds, Ice lenses, Soil strength, Climatic factors, Hydrology, Countermeasures, Runoff, Agriculture, Soil surveys.

44-2973
**Heat and water flux in a diurnally freezing and thawing soil.**
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Zuzel, J.F.
Soil freezing, Ground thawing, Heat flux, Soil aggregates, Freeze thaw cycles, Soil water, Soil temperature, Ground ice, Frost penetration, Water content, Diurnal variations, Water flow, Mathematical models, Climatic factors, Runoff.

44-2974
**Influence of management practices on snowmelt runoff.**
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Woytowich, C.P.
Runoff, Snowmelt, Snow depth, Climatic factors, Soil physics, Soil water, Soil erosion, Agriculture, Soil temperature, Snow water equivalent, Snow accumulation.

44-2975
**Environmental conditions and processes associated with runoff from frozen soils at Reynolds Creek watershed.**
Seyfried, M S , et al, *U.S. Army Cold Regions Research and Engineering Laboratory Special report,* Mar 1990, SR 90-01, International Symposium Frozen Soil Impacts on Agricultural, Range, and Forest Lands, Spokane, WA, March 21-22, 1990. Proceedings. Edited by K.R. Cooley, p.125-134, ADA-219 687, 20 refs.
Wilcox, B.P., Cooley, K.R.
Frozen ground, Runoff, Snowmelt, Seepage, Climatic factors, Vegetation factors, Frost penetration, Mountains, Rain, Watersheds, Precipitation (meteorology).

44-2976
**Effect of frozen soil on erosion—a model approach.**
Botterweg, P.F , *U.S. Army Cold Regions Research and Engineering Laboratory Special report,* Mar. 1990, SR 90-01, International Symposium. Frozen Soil Impacts on Agricultural, Range, and Forest Lands, Spokane, WA, March 21-22, 1990. Proceedings. Edited by K R Cooley, p.135-144, ADA-219 687, 28 refs.
Frozen ground, Soil erosion, Runoff, Pollution, Mass balance, Heat balance, Snowmelt, Climatic factors, Agriculture, Models, Soil chemistry.

44-2977
**Effect of freeze-thaw cycles on the permeability and macrostructure of soils.**
Chamberlain, E., et al, *U.S. Army Cold Regions Research and Engineering Laboratory. Special report,* Mar. 1990, SR 90-01, MP 2678, International Symposium: Frozen Soil Impacts on Agricultural, Range, and Forest Lands, Spokane, WA, March 21-22, 1990 Proceedings Edited by K.R Cooley, p.145-155, ADA-219 687, 6 refs.
Iskandar, I K., Hunsicker, S.E.
Freeze thaw cycles, Soil structure, Permeability, Soil aggregates, Waste treatment, Clay soils, Soil compaction, Measuring instruments, Stresses, Countermeasures, Radioactive wastes, Construction materials, Tests, Grain size, Settlement (structural).
Hazardous waste treatment and disposal is one of the major environmental concerns In the United States alone, about 50 million tons of hazardous waste is produced each year. Clay liners and clay caps are commonly recommended and used for containing and covering hazardous and toxic waste as well as solid municipal waste. The purpose of the liners is to impede the flow of contaminants to ground water and to sorb the chemicals, thus protecting the ground water from contamination. The purpose of the caps is to prevent water infiltration into the contaminated soil and the release of toxic gases The objective of this study is to investigate the effect of freeze-thaw cycling on the permeability and structure of compacted clay soils used as caps or barriers for containing hazardous waste materials.

44-2978
**Infiltration into a seasonally frozen clay soil.**
Thunholm, B., et al, *U.S. Army Cold Regions Research and Engineering Laboratory Special report,* Mar 1990, SR 90-01, International Symposium. Frozen Soil Impacts on Agricultural, Range, and Forest Lands, Spokane, WA, March 21-22, 1990. Proceedings. Edited by K.R. Cooley, p.156-160, ADA-219 687, 18 refs.
Lundin, L.C.
Clay soils, Frozen ground, Seepage, Seasonal freeze thaw, Soil water, Water content, Ground ice, Soil structure, Soil chemistry, Soil temperature, Models.

44-2979
**Snowmelt infiltration into completely frozen subsoiled soils.**
Gray, D.M., et al, *U.S. Army Cold Regions Research and Engineering Laboratory. Special report,* Mar. 1990, SR 90-01, International Symposium: Frozen Soil Impacts on Agricultural, Range, and Forest Lands, Spokane, WA, March 21-22, 1990. Proceedings. Edited by K.R. Cooley, p.161-170, ADA-219 687, 12 refs.
Granger, R.J., Nicholaichuk, W.
Snowmelt, Seepage, Frozen ground, Snow depth, Water reserves, Soil water, Vegetation factors, Snow water equivalent, Meltwater, Agriculture, Heat transfer, Mass transfer.

44-2980
**Crop management effects on runoff and soil loss.**
McCool, D.K., *U.S. Army Cold Regions Research and Engineering Laboratory. Special report,* Mar. 1990, SR 90-01, International Symposium. Frozen Soil Impacts on Agricultural, Range, and Forest Lands, Spokane, WA, March 21-22, 1990. Proceedings. Edited by K.R. Cooley, p.171-176, ADA-219 687, 3 refs.
Ground thawing, Runoff, Freeze thaw cycles, Soil erosion, Frozen ground, Agriculture, Vegetation factors.

44-2981
**Effect of freezing on mass and heat transfer in porous media.**
Eldin, N N , et al, *U.S. Army Cold Regions Research and Engineering Laboratory Special report,* Mar. 1990, SR 90-01, International Symposium. Frozen Soil Impacts on Agricultural, Range, and Forest Lands, Spokane, WA, March 21-22, 1990 Proceedings. Edited by K.R. Cooley, p.177-185, ADA-219 687, 18 refs.
Massie, L.R., Aggour, N.S.
Soil freezing, Frost action, Mass transfer, Heat transfer, Porous materials, Freeze thaw cycles, Soil water, Frost heave, Salting, Water content, Damage, Experimentation, Frost penetration.

44-2982
Application of time domain reflectometry to measure solute redistribution during soil freezing.
Van Loon, W.K.P., et al, *U.S. Army Cold Regions Research and Engineering Laboratory. Special report,* Mar 1990, SR 90-01, International Symposium. Frozen Soil Impacts on Agricultural, Range, and Forest Lands, Spokane, WA, March 21-22, 1990. Proceedings. Edited by K.R. Cooley, p.186-194, ADA-219 687, 20 refs.
Perfect, E., Groenevelt, P.H., Kay, B.D.
Soil freezing, Soil chemistry, Unfrozen water content, Antifreezes, Frost heave, Ground ice, Subsea permafrost, Soil water, Distribution, Ice formation, Ice lenses, Saline soils, Engineering, Agriculture, Mass transfer, Solutions, Electrical resistivity.

44-2983
Modeling of solute rejection in freezing soils.
Panday, S.M., et al, *U.S. Army Cold Regions Research and Engineering Laboratory. Special report,* Mar 1990, SR 90-01, International Symposium Frozen Soil Impacts on Agricultural, Range, and Forest Lands, Spokane, WA, March 21-22, 1990. Proceedings Edited by K.R. Cooley, p.195-201, ADA-219 687, 16 refs.
Corapcioglu, M.Y.
Soil freezing, Saline soils, Solutions, Freeze thaw cycles, Freezing points, Unfrozen water content, Mathematical models, Distribution, Temperature effects, Tests, Phase transformations, Ice lenses.

44-2984
Fate and transport of contaminants in frozen soils.
Ayorinde, O.A., et al, *U.S. Army Cold Regions Research and Engineering Laboratory Special report,* Mar 1990, SR 90-01, MP 2679, International Symposium: Frozen Soil Impacts on Agricultural, Range, and Forest Lands, Spokane, WA, March 21-22, 1990. Proceedings. Edited by K.R. Cooley, p.202-211, ADA-219 687, 18 refs.
Perry, L.B.
Frozen ground, Soil pollution, Explosives, Mechanical properties, Waste disposal, Soil water migration, Freeze thaw cycles, Soil chemistry, Countermeasures, Water transport, Mathematical models, Tests.
The objective of this investigation is to evaluate the effect of freezing on the fate and transport of 2,6-DNT, O-NT and M-NT explosive residues in soils. This paper describes (a) the development of experimental methods for obtaining reliable data that can be used to model freezing-induced transport of contaminants in soils and (b) the analytical approach used to interpret these data.

44-2985
Effects of freezing on sulfate salts in North Dakota soils and wetlands.
Richardson, J.L., et al, *U.S. Army Cold Regions Research and Engineering Laboratory. Special report,* Mar. 1990, SR 90-01, International Symposium. Frozen Soil Impacts on Agricultural, Range, and Forest Lands, Spokane, WA, March 21-22, 1990. Proceedings. Edited by K.R. Cooley, p.212-215, ADA-219 687, 12 refs.
Arndt, J.L., Enz, J.W.
Soil freezing, Soil chemistry, Chemistry, Solubility, Solutions, Salt lakes, Cooling, Temperature effects, Brines, Sublimation, Soil water.

44-2986
An SCS perspective on using research models in planning and applying conservation measures.
Herndon, L.P., *U.S. Army Cold Regions Research and Engineering Laboratory. Special report,* Mar. 1990, SR 90-01, International Symposium. Frozen Soil Impacts on Agricultural, Range and Forest Lands, Spokane, WA, March 21-22, 1990. Proceedings. Edited by K.R. Cooley, p.216-219 ADA-219 687, 6 refs.
Soil conservation, Soil erosion, Water erosion, Freeze thaw cycles, Countermeasures.

44-2987
Frozen soil impacts: research needs.
Papendick, R.I., et al, *U.S. Army Cold Regions Research and Engineering Laboratory. Special report,* Mar. 1990, SR 90-01, International Symposium. Frozen Soil Impacts on Agricultural, Range, and Forest Lands, Spokane, WA, March 21-22, 1990. Proceedings. Edited by K.R. Cooley, p.220-223, ADA-219 687, 4 refs.
Saxton, K.E.
Frozen ground, Freeze thaw cycles, Soil water, Frost action, Soil erosion, Water flow, Environmental impact, Forest land, Agriculture, Models, Countermeasures, Runoff.

44-2988
Runoff and erosion during simulated rainfall on frozen field plots with different depths of surface thaw and level of erodibility.
Benoit, G.R., et al, *U.S Army Cold Regions Research and Engineering Laboratory. Special report,* Mar. 1990, SR 90-01, International Symposium. Frozen Soil Impacts on Agricultural, Range, and Forest Lands, Spokane, WA, March 21-22, 1990. Proceedings. Edited by K.R. Cooley, p.224-230, ADA-219 687, 15 refs.
Young, R.A., Wilts, A.
Soil erosion, Frozen ground, Runoff, Ground thawing, Thaw depth, Freeze thaw cycles, Frost action, Soil physics, Snowmelt, Rain, Water erosion, Seepage, Sediment transport.

44-2989
Seed zone temperature and moisture conditions in a partially frozen soil-crop residue system.
Bidlake, W.R., et al, *U.S. Army Cold Regions Research and Engineering Laboratory. Special report,* Mar. 1990, SR 90-01, International Symposium. Frozen Soil Impacts on Agricultural, Range, and Forest Lands, Spokane, WA, March 21-22, 1990. Proceedings. Edited by K.R. Cooley, p.231-238, ADA-219 687, 8 refs.
Campbell, G.S., Papendick, R.I.
Frozen ground, Heat transfer, Water transport, Vegetation factors, Soil temperature, Frost penetration, Mathematical models, Climatic factors.

44-2990
Tillage and residue management systems affect winter soil temperatures.
Cullum, R.F., et al, *U.S. Army Cold Regions Research and Engineering Laboratory. Special report,* Mar. 1990, SR 90-01, International Symposium: Frozen Soil Impacts on Agricultural, Range, and Forest Lands, Spokane, WA, March 21-22, 1990. Proceedings. Edited by K.R. Cooley, p.239-246, ADA-219 687, 12 refs
Sharratt, B.S., Lewis, C.E.
Soil temperature, Soil erosion, Soil freezing, Snow depth, Snow accumulation, Frost penetration, Agriculture, Vegetation factors.

44-2991
Impact of frozen soil on prairie hydrology.
Granger, R.J., et al, *U.S. Army Cold Regions Research and Engineering Laboratory. Special report,* Mar. 1990, SR 90-01, International Symposium: Frozen Soil Impacts on Agricultural, Range, and Forest Lands, Spokane, WA, March 21-22, 1990. Proceedings. Edited by K.R. Cooley, p.247-256, ADA-219 687, 23 refs
Gray, D.M.
Frozen ground, Soil water migration, Hydrology, Soil freezing, Snow accumulation, Snowmelt, Frost penetration, Climatic factors, Seasonal variations, Soil temperature, Air temperature, Seepage.

44-2992
Comparison of three methods for measuring depth of soil freezing.
Hanson, C.L., et al, *U.S. Army Cold Regions Research and Engineering Laboratory. Special report,* Mar. 1990, SR 90-01, International Symposium: Frozen Soil Impacts on Agricultural, Range, and Forest Lands, Spokane, WA, March 21-22, 1990. Proceedings. Edited by K.R. Cooley, p.257-262, ADA-219 687, 12 refs.
Flerchinger, G.N.
Soil freezing, Frost penetration, Soil erosion, Runoff, Watersheds, Soil water, Climatic factors, Flooding, Seasonal variations, Measuring instruments, Soil temperature.

44-2993
Redistribution of soil water and solutes in fine and coarse textured soils after freezing.
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Knighton, R.E., Richardson, J.L.
Soil freezing, Soil water migration, Solutions, Soil texture, Frost penetration, Snow cover effect, Soil chemistry, Electrical resistivity, Distribution, Water content.

44-2994
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Kok, H.
Soil freezing, Ground thawing, Frost penetration, Freeze thaw cycles, Floods, Soil erosion, Snowmelt, Soil water, Roads, Rain, Countermeasures, Experimentation, Shear strength, Soil strength

44-2995
Comparison of runoff occurring on frozen and unfrozen soils.
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Cherry, J.G.
Runoff, Frozen ground, Watersheds, Frost penetration, Hydrology, Soil temperature, Rain, Climatic factors, Statistical analysis.

44-2996
Frost data in the Pacific Northwest.
Molnau, M., et al, *U.S. Army Cold Regions Research and Engineering Laboratory. Special report,* Mar. 1990, SR 90-01, International Symposium Frozen Soil Impacts on Agricultural, Range, and Forest Lands, Spokane, WA, March 21-22, 1990 Proceedings Edited by K.R. Cooley, p.286-289, ADA-219 687, 13 refs.
McCool, D.K., Formanek, G.E
Frost penetration, Frozen ground, Engineering, Subsurface structures, Frost heave, Runoff, Soil erosion, Utilities, Foundations, Hydrology.

44-2997
Soil thaw as influenced by small grain residue color.
Sharratt, B.S., et al, *U.S. Army Cold Regions Research and Engineering Laboratory Special report,* Mar 1990, SR 90-01, International Symposium: Frozen Soil Impacts on Agricultural, Range, and Forest Lands, Spokane, WA, March 21-22, 1990. Proceedings Edited by K.R. Cooley, p.290-294, ADA-219 687, 5 refs.
Campbell, G.S.
Ground thawing, Vegetation factors, Soil water, Heat balance, Freeze thaw cycles, Water balance, Thaw depth, Soil erosion, Countermeasures, Climatic factors, Soil temperature.

44-2998
Soil structure and frost depth as affected by soil compaction.
Voorhees, W.B., et al, *U.S. Army Cold Regions Research and Engineering Laboratory Special report,* Mar. 1990, SR 90-01, International Symposium: Frozen Soil Impacts on Agricultural, Range, and Forest Lands, Spokane, WA, March 21-22, 1990 Proceedings. Edited by K.R. Cooley, p.295-303, ADA-219 687, 18 refs.
Benoit, G.R.
Frost penetration, Soil structure, Soil compaction, Heat transfer, Water flow, Soil freezing, Time factor, Military equipment, Density (mass/volume), Snow depth, Agriculture.

44-2999
Strength and durability of concretes containing 50% Portland cement replacement by fly ash and other materials.
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Joshi, R.C., Ward, M.A.
Concrete admixtures, Concrete durability, Concrete strength, Freeze thaw tests, Concrete freezing, Compressive properties, Chemical composition. Construction materials.

44-3000
Modelling water temperature beneath river ice covers.
Marsh, P., *Canadian journal of civil engineering,* Feb. 1990, 17(1), p.36-44, With French summary. 36 refs.
River ice, Ice cover effect, Water temperature, Mathematical models, Subglacial observations, Temperature measurement, Heat flux, Ice melting, Temperature gradients, Ice water interface, Solar radiation.

44-3001
Initial cooling of pavements and the development of pavement cooling charts.
White, S., et al, *Canadian journal of civil engineering*, Feb. 1990, 17(1), p.94-101, With French summary. 4 refs.
Bituminous concretes, Pavements, Cooling, Compaction, Computerized simulation, Paving, Cold weather construction, Heat transfer, Wind factors, Charts.

44-3002
Durability of concrete containing chloride-based accelerating admixtures.
Rezansoff, T., et al, *Canadian journal of civil engineering*, Feb. 1990, 17(1), p.102-112, With French summary. 23 refs.
Stott, D.
Concrete admixtures, Concrete durability, Chemical properties, Freeze thaw tests, Winter concreting, Concrete hardening, Tensile properties, Standards, Chemical analysis.

44-3003
Causes of deformation of buildings on permafrost in railroad district of Vorkuta.
Belotserkovskaia, G.V., et al, *Soil mechanics and foundation engineering*, Nov. 1989, 26(3), p.102-106, Translated from Osnovaniia, fundamenty i mekhanika gruntov. 1 ref.
Fedoseev, IU.G., IAnchenko, O.M.
Industrial buildings, Permafrost beneath structures, Frozen ground settling, Ground thawing, Settlement (structural), Deformation, Frozen ground mechanics, Cold weather construction, Stability

44-3004
Soil management and vegetation effects on measured and estimated soil thermal regimes in Canada.
Hayhoe, H.N., et al, *Canadian journal of soil science*, Feb. 1990, 70(1), p.61-71, With French summary. 11 refs.
Tarnocai, C., Dwyer, L.M.
Soil temperature, Vegetation factors, Insulation, Temperature variations, Site surveys, Correlation, Models, Thermal regime.

44-3005
Alternative approach to the study of pedogenic chronosequences.
Messer, A.C., *Norsk geografisk tidsskrift*, Dec. 1989, 43(4), p.221-229, 28 refs.
Soil analysis, Moraines, Time factor, Geologic processes, Soil surveys, Glaciation, Soil chemistry.

44-3006
Development and testing of a snowmelt-runoff forecasting technique.
Rango, A., et al, *Water resources bulletin*, Feb. 1990, 26(1), p.135-144, 7 refs.
Van Katwijk, V.F.
Snowmelt, Runoff forecasting, Simulation, Models, Meteorological data, Snow water equivalent, Degree days.

44-3007
Glacial-process model: the role of spatial and temporal variations in glacier thermal regime.
Mooers, H.D., *Geological Society of America Bulletin*, Feb. 1990, 102(2), p.243-251, 50 refs.
Glacial deposits, Glacier oscillation, Landforms, Glacial erosion, Moraines, Ice sheets, Outwash, Glacial hydrology.

44-3008
Radar data gathering on M.V. Arctic—Final report.
Gautier, C., *Transport Canada Publication*, Feb. 1990, TP 10156E, 23p., With French summary.
Sea ice, Ice navigation, Radar photography, Data processing, Ice conditions, Electronic equipment, Oceanographic surveys, Marine transportation, Canada – Baffin Bay

44-3009
Influence of low temperatures on tribotechnical characteristics in vacuum of friction assemblies with multicomponent solid lubricant coatings.
Gamulia, G.D., et al, *Soviet journal of friction and wear*, 1989, 10(2), p.60-65, Translated from Trenie i iznos. 12 refs.
Kopteva, T.A., Lebedeva, I.L., Sentiurikhina, L.N.
Metals, Protective coatings, Lubricants, Low temperature tests, Friction, Substrates, Surface properties, Hardness tests, Temperature effects, Abrasion.

44-3010
Surface influence on adhesion of ice.
Igoshin, V.A., et al, *Soviet journal of friction and wear*, 1989, 10(2), p.111-114, Translated from Trenie i iznos. 10 refs.
Postol, V.I., Paasivuori, P., Khakala, R.
Materials, Ice crystal adhesion, Shear properties, Ice solid interface, Mechanical tests, Low temperature tests, Surface energy, Molecular structure, Friction.

44-3011
SAR image statistics related to atmospheric drag over sea ice.
Burns, B.A., *IEEE transactions on geoscience and remote sensing*, Mar. 1990, 28(2), p.158-165, 31 refs. For another version see 43-1515.
Sea ice, Air flow, Surface roughness, Radar echoes, Spaceborne photography, Remote sensing, Data processing, Topographic effects, Ice air interface, Boundary layer, Backscattering, Surface properties.

44-3012
Only two polar icebreakers left.
Story, J.F., *U.S. Naval Institute Proceedings*, Oct. 1989, 115(10), p.84-88, 16 refs.
Icebreakers, Military operation, Ships.

44-3013
Decline of the icebreaker fleet.
Story, J.F., *U.S. Naval Institute Proceedings*, Oct. 1989, 115(10), p.86, 6 refs.
Icebreakers, Military operation

44-3014
On the use of the phi-variable to describe the state of water in porous media.
Black, P.B., *U.S. Army Cold Regions Research and Engineering Laboratory*, Feb. 1989, CR 89-03, 7p., ADA-206 869, 11 refs.
Soil freezing, Soil water migration, Frost heave, Ice pressure, Water pressure, Ice water interface, Air water interface, Analysis (mathematics).
The concepts of Gibbs free energy and surface tensions are developed to describe the state of water in two-phase porous soil systems in terms of the phi-variable. This approach differs from previous attempts at describing the thermodynamic behavior of water in porous materials by offering a simple and intuitive framework. In this framework, the phi-variable is found to control the microscopic interfaces between the pore constituents: ice or air and water.

44-3015
Statistical analysis of building wall materials distribution in four northeastern cities.
Merry, C.J., et al, *U.S. Army Cold Regions Research and Engineering Laboratory*, Jan. 1989, SR 89-01, 156p., ADA-205 754, 19 refs.
LaPotin, P.J.
Construction materials, Buildings, Pollution, Rain, Precipitation (meteorology), Chemical properties, Statistical analysis, Urban planning.
The overall purpose of this research was to develop a data base of building material types sensitive to acid deposition. The objective of this study was to address several statistical questions about the data base of sampled building materials for four cities, which included New Haven, Connecticut; Portland, Maine; Pittsburgh, Pennsylvania; and Cincinnati, Ohio. The four cities were mapped into sampling frames, which divided the city into similar areas. Use of the sampling frames assumed that the location, form and function of buildings, and the amount and kind of building materials, are related to the land use. Information on building materials for about 70 buildings per sampling frame were inventoried for each city. The statistical analyses of the data base for each city included comparing building sizes with the size of the sampling footprint, determining the distribution of buildings per footprint for each sampling frame, and examining the distribution of material types as a function of building size and building type for each sampling frame.

44-3016
Dynamic light scattering at the ice-solution interface.
Vesenka, J.P., Davis, University of California, 1989, 103p., University Microfilms order No.AAD90-09272, Ph.D. thesis. For abstract see Dissertation abstracts international, Sec. B, 1989, p.5150.
Ice crystal growth, Ice optics, Ice spectroscopy, Light scattering.

44-3017
Proceedings.
American Towing Tank Conference, 22nd, St. John's, Newfoundland, Aug. 8-11, 1989, Ottawa, National Research Council, Canada, (1989), 522p., Refs. passim. For selected papers see 44-3018 through 44-3024.
Icebreakers, Ice navigation, Ice breaking, Ice models, Ships, Models, Test chambers, Offshore structures, Meetings, Marine transportation.

44-3018
Current view on sea ice modelling.
Jones, S.J., et al, American Towing Tank Conference, 22nd, St. John's, Newfoundland, Aug. 8-11, 1989. Proceedings. Ottawa, National Research Council, Canada (1989), p.1-120, 26 refs.
Timco, G.W., Frederking, R.M.W.
Ice models, Sea ice, Artificial ice, Ice navigation, Ice mechanics.

44-3019
Ridge modelling: Model scale simulation of ridge ramming event with the USCG Polar Star.
Comfort, G., et al, American Towing Tank Conference, 22nd, St. John's, Newfoundland, Aug. 8-11, 1989. Proceedings, Ottawa, National Research Council, Canada (1989), p.121-126, 2 refs.
Keinonen, A.J., Spencer, D., Peirce, T.
Pressure ridges, Ice breaking, Icebreakers, Ice navigation, Ice models.

44-3020
Effect of normal pressure on kinetic friction coefficient: myth or reality?.
Tatinclaux, J.C., MP 2680, American Towing Tank Conference, 22nd, St. John's, Newfoundland, Aug. 8-11, 1989. Proceedings, Ottawa, National Research Council, Canada (1989), p.127-134, 8 refs.
Ice friction, Ice pressure, Ice loads.

44-3021
Preliminary investigation of model ice failure pattern and piece size generated by an icebreaker bow form.
Newbury, S., American Towing Tank Conference, 22nd, St. John's, Newfoundland, Aug. 8-11, 1989. Proceedings, Ottawa, National Research Council, Canada (1989), p.135-138, 5 refs.
Ice breaking, Icebreakers, Ice models, Ice cover strength.

44-3022
Chaotic dynamics in continuous-mode icebreaking.
Ettema, R., et al, American Towing Tank Conference, 22nd, St. John's, Newfoundland, Aug. 8-11, 1989. Proceedings, Ottawa, National Research Council, Canada (1989), p.139-146, 17 refs.
Sharifi, M.B., Georgakakos, K.P., Stern, F.
Ice breaking, Icebreakers, Ice models, Ice cover strength.

44-3023
Ship model testing in simulated ice floe covered waters.
Aboulazm, A.F., et al, American Towing Tank Conference, 22nd, St. John's, Newfoundland, Aug. 8-11, 1989. Proceedings, Ottawa, National Research Council, Canada (1989), p.147-154, 7 refs.
Muggeridge, D.B.
Ice navigation, Ice floes, Ice models, Ships, Ice loads.

44-3024
Self-propulsion experiments for icebreakers in ice and open water.
Molyneux, W.D., American Towing Tank Conference, 22nd, St. John's, Newfoundland, Aug. 8-11, 1989. Proceedings, Ottawa, National Research Council, Canada (1989), p.326-331, 7 refs.
Icebreakers, Ice navigation, Ice models, Propellers.

44-3025
Effect of extreme snowcover on feeding-site selection by woodland caribou.
Brown, W.K., et al, *Journal of wildlife management*, Jan. 1990, 54(1), p.161-168, 34 refs.
Theberge, J.B.
Animals, Snow depth, Snow hardness, Vegetation factors, Snow cover distribution, Snow surveys, Ecosystems.

44-3026
Dynamical structure of water: low-frequency Raman scattering from a disordered network and aggregates.
Rousset, J.L., et al, *Journal of chemical physics*, Feb. 15, 1990, 92(4), p.2150-2154, 32 refs.
Duval, E., Boukenter, A.
Water structure, Light scattering, Molecular structure, Supercooling, Low temperature tests, Temperature effects, Scattering, Low frequencies.

44-3027
2H-nuclear magnetic resonance study of the host lattice dynamics in the clathrate of Dianin's compound. Concerted rotational jumps of six hydroxyl groups.
Bernhard, T., et al, *Journal of chemical physics*, Feb. 15, 1990, 92(4), p.2178-2186, 19 refs.
Zimmermann, H., Haeberlen, U.
Clathrates, Hydrogen bonds, Low temperature tests, Molecular structure, Latticed structures, Nuclear magnetic resonance, Physical properties, Chemical composition.

44-3028
Automated systems aid the Soil Conservation Service in predicting and managing for drought.
Shafer, B.A., et al, Drought water management, Washington, D.C., Nov 2, 1988. Proceedings. Edited by N.S. Grigg and E.C. Vlachos, Fort Collins, Colorado State University, 1990, p.41-46, 1 ref.
Fecke, W.C.
Snowmelt, Runoff forecasting, Weather stations, Precipitation (meteorology), Water supply, Meteorological data.

44-3029
Seasonal distribution of low flow events in New Hampshire streams with emphasis on the winter period.
Melloh, R.A., MP 2681, Drought water management, Washington, D.C., Nov. 1-2, 1988. Proceedings. Edited by N.S. Grigg and E.C. Vlachos, Fort Collins, Colorado State University, 1990, p.47-53, 3 refs.
Stream flow, Seasonal variations, Water level, Winter, Surface drainage, Hydrologic cycle, Climatic factors, United States—New Hampshire.
An analysis of the seasonal distribution of low flow events in various geographic provinces of New Hampshire is presented. The objectives of the analysis are to describe the annual hydrologic cycle and its regional variations and to identify streams or regions where the winter's influence is most severe

44-3030
Analysis of ice formation with flow reversal for application to a water source heat pump.
Aceves-Saborio, S.M., et al, *American Society of Heating, Refrigerating and Air Conditioning Engineers. Transactions*, 1989, 95(2), p.366-374, Technical paper No.3292, 7 refs.
Reistad, G.M., Nakamura, H.
Water flow, Ice formation, Ice removal, Heat transfer, Heat pipes, Mathematical models, Defrosting, Liquid cooling, Heat transfer coefficient, Surface energy.

44-3031
Model to compare freezing control strategies for residential air-to-air heat recovery ventilators.
Phillips, E.G., et al, *American Society of Heating, Refrigerating and Air Conditioning Engineers. Transactions*, 1989, 95(2), p.475-483, Symposium paper No.-VA-89-2-3, 16 refs.
Chant, R.E., Bradley, B.C., Fisher, D.R.
Heat pipes, Hoarfrost, Ice formation, Defrosting, Computerized simulation, Air flow, Transition heating, Computer applications, Thermal conductivity, Heat recovery, Ventilation, Ice air interface, Residential buildings.

44-3032
Comparison of freezing control strategies for residential air-to-air heat recovery ventilators.
Phillips, E.G., et al, *American Society of Heating, Refrigerating and Air Conditioning Engineers. Transactions*, 1989, 95(2), p.484-490, Symposium paper No.-VA-89-2-4, 3 refs
Chant, R.E., Fisher, D.R., Bradley, B.C.
Transition heating, Heat pipes, Air flow, Defrosting, Computerized simulation, Residential buildings, Heat recovery, Degree days, Climatic factors, Heat transfer, Performance, Residential buildings.

44-3033
Versatile procedure for calculating heat transfer through windows.
Arasteh, D.K., et al, *American Society of Heating, Refrigerating and Air Conditioning Engineers. Transactions*, 1989, 95(2), p.755-765, Symposium paper No.VA-89-11-2, 36 refs.
Reilly, M.S., Rubin, M.D.
Windows, Heat transfer, Analysis (mathematics), Thermal insulation, Thermal conductivity, Layers, Coatings, Solar radiation, Gases.

44-3034
Inhibited glycols for corrosion and freeze protection in water-based heating and cooling systems.
Born, D.W., *American Society of Heating, Refrigerating and Air Conditioning Engineers. Transactions*, 1989, 95(2), p.969-975, Symposium paper No.VA-89-17-2, 9 refs.
Antifreezes, Physical properties, Freezing points, Corrosion, Heat transfer, Solutions, Air conditioning.

44-3035
Simple method for modeling the frost formation phenomenon in different geometries.
Padki, M.M., et al, *American Society of Heating, Refrigerating and Air Conditioning Engineers. Transactions*, 1989, 95(2), p.1127-1137, Symposium paper No.VA-89-22-1, 109 refs.
Sherif, S.A., Nelson, R.M.
Hoarfrost, Ice formation, Heat transfer, Surface properties, Analysis (mathematics), Ice air interface, Thermal conductivity, Surface structure, Air flow

44-3036
Monitoring atmospheric deposition in California's Sierra Nevada: a comparison of methods.
McGurk, B.J., et al, Atmospheric deposition Edited by J. Delleur, International Association of Hydrological Sciences, 1989, p.71-79, IAHS publication No.179, 12 refs., Proceedings of a symposium held during the Third Scientific Assembly of the International Association of Hydrological Sciences, Baltimore, MD, May, 1989.
Snow impurities, Snow samplers, Chemical analysis, Aerosols, Snow survey tools, Snow chemistry, Precipitation (meteorology), United States—Sierra Nevada

44-3037
Chemical composition of precipitation, dew and frost, and fog in Denver, Colorado.
Schroder, L.J., et al, Atmospheric deposition. Edited by J. Delleur, International Association of Hydrological Sciences, 1989, p.83-90, IAHS publication No.179, 16 refs., Proceedings of a symposium held during the Third Scientific Assembly of the International Association of Hydrological Sciences, Baltimore, MD, May, 1989.
Willoughby, T.C., See, R.B., Malo, B.A.
Frost, Precipitation (meteorology), Chemical composition, Aerosols, Sampling, Fog, Scavenging, Ion density (concentration), Chemical analysis, Air pollution

44-3038
Leaching of strong acid anions from snow during rain-on-snow events: evidence for two component mixing.
Jones, H.G., et al, Atmospheric deposition. Edited by J. Delleur, International Association of Hydrological Sciences, 1989, p.239-250, IAHS publication No.179, 20 refs., Proceedings of a symposium held during the Third Scientific Assembly of the International Association of Hydrological Sciences, Baltimore, MD, May, 1989.
Tranter, M., Davies, T.D.
Snow melting, Rain, Meltwater, Leaching, Chemical analysis, Runoff, Snow hydrology, Snow chemistry, Artificial precipitation, Streams, Ion density (concentration), Water pollution.

44-3039
Mixing of acid meltwater with groundwater in a forested basin in Finland.
Bengtsson, L., et al, Atmospheric deposition. Edited by J. Delleur, International Association of Hydrological Sciences, 1989, p.251-258, IAHS publication No.179, 10 refs., Proceedings of a symposium held during the Third Scientific Assembly of the International Association of Hydrological Sciences, Baltimore, MD, May, 1989.
Lepistö, A., Saxena, R.K., Seuna, P.
Meltwater, Runoff, Ground water, Chemical properties, Forest soils, Subsurface drainage, Hydrogeochemistry, Isotope analysis, Soil pollution.

44-3040
Biggest chill.
Broecker, W.S., Global climate change linkages. Acid rain, air quality and stratospheric ozone Edited by J.C. White, New York, Elsevier, 1989, p.13-22, 1 ref., Proceedings of a conference sponsored by the Air Resources Information Clearinghouse, Washington, D.C., 1988.
DLC QC981.8C5G65 1989
Climatic changes, Atmospheric circulation, Periodic variations, Climatology, Glaciation, Ice melting.

44-3041
Report of pit-wall observations of snow cover in Sapporo 1988-89.
Akitaya, E., et al, *Low temperature science (Teion kagaku). Series A Physical sciences. Data report*, 1989, No.48, p.1-6, 3 refs., In Japanese
Kawamura, T., Ozawa, H.
Snow surveys, Snow depth, Snow water equivalent, Snow density, Snow hardness, Snow temperature, Japan—Sapporo.

44-3042
Report of pit-wall observations of snow cover in Moshiri, Hokkaido (December, 1979-January, 1989).
Kojima, K., et al, *Low temperature science (Teion kagaku). Series A Physical sciences Data report*, 1989, No.48, p.7-22, 5 refs., In Japanese
Motoyama, H., Kodama, Y.
Snow surveys, Snow depth, Snow water equivalent, Snow density, Snow temperature, Japan—Hokkaido

44-3043
Hydrological and meteorological environment of the perennial "Hisago Snowpatch" in Daisetsu Mountains (1989).
Yamada, T., et al, *Low temperature science (Teion kagaku). Series A Physical sciences. Data report*, 1989, No.48, p.23-63, 5 refs., In Japanese.
Kawamura, T., Nishimura, K., Kodama, Y., Nomura, M.
Runoff, Snow surveys, Snowmelt, Snow hydrology, Meteorological factors, Water level, Japan—Daisetsu Mountains.

44-3044
Survey of the perennial "Yukikabe Snowpatch" in Daisetsu Mountains (1989).
Takahashi, S., et al, *Low temperature science (Teion kagaku). Series A Physical sciences. Data report*, 1989, No.48, p.65-70, 12 refs., In Japanese
Enomoto, H., Hyakutake, K., Kameda, T., Yamada, T.
Snow surveys, Snow cover distribution, Japan—Daisetsu Mountains.

44-3045
Distribution of pack ice off Okhotsk Sea coast of Hokkaido observed with Sea Ice Radar Network, January-April, 1989.
Aota, M., et al, *Low temperature science (Teion kagaku). Series A Physical sciences. Data report*, 1989, No.48, p.71-82, In Japanese.
Ishikawa, M., Takatsuka, T., Ikeda, M., Shirasawa, K.
Sea ice distribution, Radar, Ice floes, Japan—Hokkaido, Okhotsk Sea.

44-3046
Prediction of rates of freezing, thawing or cooling in solids of arbitrary shape using the finite element method.
Cleland, D.J., et al, *International journal of refrigeration*, Jan. 1984, 7(1), p.6-13, With French summary. 28 refs.
Cleland, A.C., Earle, R.L., Byrne, S.J.
Solids, Freezing rate, Physical properties, Computer programs, Analysis (mathematics), Thermal properties, Thawing rate, Phase transformations, Computer applications, Heat transfer.

44-3047
Calcium magnesium acetate for snow-and-ice control.
Doody, M.E., *New York State Department of Transportation. Quarterly R&D digest*, Spring 1990, No.42, 2p.
Ice removal, Chemical ice prevention, Road maintenance, Road icing.

44-3048
Alaska starts repairing miles of corroded pipes.
Bloomberg, R., *Engineering news-record*, Mar 8, 1990, 224(10), p.35-36.
Underground pipelines, Corrosion, Maintenance, Cold weather construction, Environmental impact, Detection, Design.

44-3049
Use of off-road vehicles and mitigation of effects in Alaska permafrost environments: a review.
Slaughter, C.W., et al, *Environmental management*, Jan.-Feb. 1990, 14(1), MP 2682, p.63-72, 46 refs.
Racine, C.H., Walker, D.A., Johnson, L.A., Abele, G.
All terrain vehicles, Permafrost, Environmental impact, Countermeasures, Soil structure, Damage, Protection, United States—Alaska.
Use of off-road vehicles in permafrost-affected terrain of Alaska has increased sharply over the past two decades. Until the early 1960s, most ORV use was by industry or government, which employed heavy vehicles such as industrial tractors and tracked carriers. Smaller, commercial ORVs became available in the 1960s, with the variety and number in use rapidly increasing. Wheeled and tracked ORVs, many used exclusively for recreation or subsistence harvesting by individuals, are now ubiquitous in Alaska. This increased use has led to concern over the cumulative effects of such vehicles on vegetation, soils, and environmental variables including off-site values Factors affecting impact and subsequent restoration include specific environmental setting; vegetation, presence and ice content of permafrost; microtopography; vehicle design; weight, and ground pressure; traffic frequency, season of traffic, and individual operator practices. Approaches for mitigating adverse effects of ORVs include regulation and zoning, terrain analysis and sensitivity mapping, route selection, surface protection, and operator training.

44-3050
Radio echo sounding in north Victoria Land, Antarctica.
Engelhardt, H., et al, *Geologisches Jahrbuch, Reihe E,* 1989, No 38, p 111-117, With German summary 7 refs.
Schomburg, O., Thyssen, F
Ice sheets, Ice cover thickness, Radio echo soundings, Airborne radar, Antarctica—Victoria Land.
The thickness of the ice sheet in parts of north Victoria Land was measured using an airborne radio echo sounding system. Although the system was capable of measuring depths of as much as 1500 m this was often not sufficient to obtain reflections from the bottom of the ice sheet on the inland plateau (Auth.)

44-3051
Report on a reconnaissance of the glaciers of Terra Nova Bay area.
Chinn, T J H , et al, *Geologisches Jahrbuch, Reihe E,* 1989, No 38, p 299-319, With German summary 28 refs.
Whitehouse, I E , Hofle, H C
Glacier flow, Glacier mass balance, Glacier thickness, Glacial deposits, Antarctica Terra Nova Bay.
In the Terra Nova Bay area, predominantly snow-free low coastal foothills lie between large outlet glaciers which drain from the inland ice sheet and local high inland ranges. Individual small glaciers on the coastal foothills, which are frequently connected by snowfields, have none of the ice-cliff terminal characteristic of polar glaciers Glaciers of the Northern Foothills have had strong positive mass balances over recent decades and are currently expanding, but no indications of past greater ice extents during the Holocene were found. Many of the coastal glaciers carry an extensive debris cover and behave in a manner similar to rock glaciers, while numerous true rock glaciers occur close to sea level in coastal bays. The large quantities of entrained and surficial debris carried by many of the glaciers is a boulder-clay material deduced to be till of Ross Sea I Glaciation Age entrained as growing Holocene glaciers expanded into and over a blanket of ice-cored Ross drift The massive outlet glaciers form floating ice tongues which extend many kilometres out to sea. At a few snow-free margins of these glaciers, associated moraines indicate that these outlet glaciers are at their maximum thickness since Pleistocene times. (Auth.)

44-3052
Radio echo sounding and geothermal investigations in the crater area of Mt. Melbourne, North Victoria Land, Antarctica.
Delisle, G , et al, *Geologisches Jahrbuch, Reihe E,* 1989, No 38, p.435-453, With German summary. 10 refs.
Thierbach, R.
Radio echo soundings, Snow depth, Firn, Geothermy, Antarctica—Melbourne, Mount.
Radio echo soundings (RES) and geothermal measurements were made in the crater area of Mt. Melbourne to determine the limiting values of the parameters of a mathematical model of the geothermal conditions at the summit of the volcano. The snow and firn field of the crater was shown to have an average thickness of less than 50 m. No evidence of bottom melting was found Nevertheless, a constant gradient of 1 K/m was determined in a borehole in the snow A numerical model is presented that demonstrates that current geothermal conditions can be explained by assuming the intrusion of several 30-m-wide dikes within the last 200 years. (Auth.)

44-3053
Electromagnetic soundings with a vertical magnetic dipole and low-frequency Schlumberger soundings on Campbell Glacier and at Gondwana Station.
Kuhnke, F.K., et al, *Geologisches Jahrbuch, Reihe E,* 1989, No.38, p.455-481, With German summary. 8 refs.
Blohm, E.K.
Glacier ice, Ice electrical properties, Electromagnetic properties, Antarctica—Campbell Glacier.
An electromagnetic sounding method using a vertical magnetic dipole supplemented by low-frequency geoelectric soundings was tested during GANOVEX IV The measurements, done mainly on Campbell Glacier, yielded the following results: The resistivity of the ice was in the range of 20-30 kOhm (about 22.4 kOhm by the VMD method, 35 kOhm by geoelectrics). A change in conductivity between the ice and rock was not observed However, a boundary was found at a depth of 2.2 km the resistivity of the lower layer was about two orders of magnitude smaller than that of the upper layer An attempt to measure the electric field on the high-resistivity ice was not successful The same difficulties arose with the geoelectric soundings with large distances between the electrodes. The system of fissures in the glacier produces uninterpretable sounding curves. The gneiss at Gondwana Station has a resistivity of 2000 Ohm below a depth of about 15 m Weathered layers near the surface have resistivities of up to 60 kOhm: these layers are presumably within the permafrost zone. The VMD method is very sensitive to any misalignment of the vertical axes of the instruments, particularly for small distances between transmitter and receiver (Auth )

44-3054
Meteorite finds near the Frontier Mountain Range in north Victoria Land.
Delisle, G., et al, *Geologisches Jahrbuch, Reihe E,* 1989, No.38, p.483-513, With German summary. 54 refs.
Ice sheets, Glacier flow, Glaciology, Radio echo soundings, Ice cover thickness, Glaciology, Antarctica —Frontier Mountain.
On a field of blue ice in a valley at the southeast end of the Frontier Mountain Range (FMR) in north Victoria Land, 42 meteorites were discovered near the site of a GANOVEX IV camp The find was totally unexpected at this particular location Other meteorite finds in the Antarctic were on blue ice fields in front of an ice flow barrier. In contrast, the FMR site is behind such a barrier. Radio echo soundings along profiles across the blue ice field and field observations have clarified to a large degree the local ice dynamics. The FMR acts as a barrier to the regional ice flow, which is forced to move around the mountain range at both ends. Fall winds cause high ablation rates on the surface of the ice on the northeast side of the FMR (i e the back side of the ice barrier) The ice mass removed by ablation is replaced by ice flowing around the ends of the barrier, a process driven by tensional stress. The highest rates of ablation are in the valley with a high concentration of meteorite finds This valley, whose axis is in the direction of the prevailing winds, acts as a narrow channel for the nearly constant winds across the range, locally enhancing the wind velocity and thus the ablation rate. To compensate for the high losses due to enhanced ablation, blue ice flows into the valley in a direction that is almost opposite to the regional ice flow. The ablation in the valley uncovers the meteorites in the blue ice, concentrating them at the surface (Auth. mod.)

44-3055
Glacial deposits of the northern region adjacent to Petuniabukta in the light of mineralogical and chemical studies, central Spitsbergen.
Stankowska, A., *Polish polar research,* 1989, 10(3), p.303-316, 13 refs., With Polish summary.
Glacial deposits, Minerals, Mineralogy, Chemical analysis, Geochemistry, Glacier surveys, Geochronology, Norway—Spitsbergen.

44-3056
Dynamics and rate of denudation of glaciated and non-glaciated catchments, central Spitsbergen.
Kostrzewski, A., et al, *Polish polar research,* 1989, 10(3), p.317-367, 45 refs., With Polish summary
Kaniecki, A , Kapuściński, J., Klimczak, R., Stach, A., Zwoliński, Z.
Sediment transport, Glacial hydrology, Proglacial drainage, Surface drainage, Glacial rivers, Runoff, Erosion, Glacier surveys, Norway—Spitsbergen.

44-3057
Development of the marginal zone of the Hörbyebreen Petuniabukta, central Spitsbergen.
Karczewski, A., *Polish polar research,* 1989, 10(3), p.371-377, 4 refs., With Polish summary.
Glacier surveys, Periglacial processes, Glacier ablation, Norway—Spitsbergen.

44-3058
Development and relief of the Petuniabukta tidal flat, central Spitsbergen.
Borówka, M., *Polish polar research,* 1989, 10(3), p.379-384, With Polish summary.
Outwash, Glacial deposits, Coastal topographic features, Tides, Geochronology, Norway—Spitsbergen

44-3059
Sedimentation in small proglacial lakes in the Hörbyebreen marginal zone, central Spitsbergen.
Wojciechowski, A., *Polish polar research,* 1989, 10(3), p.385-399, 18 refs., With Polish summary.
Glacial lakes, Sedimentation, Sediment transport, Glacier surveys, Lacustrine deposits, Norway—Spitsbergen.

44-3060
Main stages of development of glacier margin morphology in the region between Billefjorden and Austfjorden, central Spitsbergen.
Gonera, P , et al, *Polish polar research,* 1989, 10(3), p.419-427, 3 refs , With Polish summary
Kasprzak, L.
Periglacial processes, Glacial geology, Glacier surveys, Geochronology, Norway—Spitsbergen.

44-3061
Geochemical characteristics of Hoglandvatnet and Alandvatnet, central Spitsbergen.
Stankowska, A., *Polish polar research,* 1989, 10(3), p.429-442, 4 refs., With Polish summary
Water chemistry, Glacial lakes, Lake water, Geochemistry, Norway—Spitsbergen.

44-3062
Diversity of the valley natural environment in the arctic region, Ebbadalen in Olav V Land, central Spitsbergen.
Mizgajski, A., *Polish polar research,* 1989, 10(3), p.443-456, 5 refs., With Polish summary.
Arctic landscapes, Valleys, Topographic surveys, Glacial geology, Norway—Spitsbergen.

44-3063
Hydrology of the mouth section of the Ebbaelva and the Petuniabukta, Billefjorden, central Spitsbergen.
Choiński, A., *Polish polar research,* 1989, 10(3), p.457-464, With Polish summary.
Glacial rivers, Runoff, Salinity, River flow, Glacial hydrology, Drainage, Norway—Spitsbergen.

44-3064
Hydrochemistry of water basins on raised marine terraces in the lower part of Ebbadalen, Billefjorden, central Spitsbergen.
Stankowska, A., *Polish polar research,* 1989, 10(3), p.465-473, 2 refs., With Polish summary.
Glacial rivers, Water chemistry, River basins, Norway —Spitsbergen.

44-3065
Types of sediments and evolution of conditions for sedimentation in the Barents Sea in late- and postglacial time. (Tipy osadkov i evoliutsiia obstanovok osadkonakopleniia Barentseva moria v pozdne- i poslelednikovoe vremia),
Lavrushin, IU.A., et al, *Akademiia nauk SSSR. Izvestiia. Seriia geologicheskaia,* Feb. 1990, No.2, p.82-90, In Russian. 15 refs.
Alekseev, V.V., Chistiakova, I.A., Khasankaev, V.B.
Sedimentation, Glacial deposits, Marine deposits, Bottom sediment, Paleoclimatology, Paleoecology, Barents Sea.

44-3066
Outline of the geomorphological expedition to Svalbard, 1988-1989.
Ono, Y., et al, Japanese scientific expeditions to Svalbard 1983-1988. Edited by T. Tatsumi, Tokyo, Kyoikusha, 1990, p.215-234, 30 refs.
Shimokawa, K., Sawaguchi, S.
Periglacial processes, Permafrost distribution.., Permafrost structure, Geological surveys, Geomorphology, Expeditions, Pingos, Norway—Svalbard.

44-3067
Greenland ice sheet: is it growing or shrinking.
Douglas, B.C., et al, *Science,* Apr. 20, 1990, 248(4953), p.288-289, 6 refs.
Zwally, H.J.
Ice sheets, Ice accretion, Remote sensing, Sea level, Greenland.
The item is basically a critique of the methods used for and the results of measuring the increase or decrease of the Greenland ice sheet, instrumental calibration is particularly faulted. The reply and rebuttal are included. For the papers under consideration see 44-1371 and 44-1372

44-3068
Origins and variations of nitrate in south polar precipitation.
Legrand, M R , et al, *Journal of geophysical research,* Mar 20, 1990, 95(D4), p.3493-3507, Refs. p.3505-3507.
Kirchner, S.
Ice cores, Snow composition, Atmospheric composition, Polar regions, Antarctica—Amundsen-Scott Station.
South polar firn spanning the last millennium has been analyzed to determine the nitrate background level of high-latitude precipitation and its temporal variations. The resulting data reveal no evidence of a positive correlation between solar activity (11 year solar cycle, low solar activity time periods, and solar proton events) and the NO3 content of south polar snow. These data therefore suggest that NOx production in the upper stratosphere, mesosphere, and thermosphere does not contribute significantly to the antarctic NO3 budget This study of the NO3 content of high latitude precipitation suggests a major contribution by lightning (from a third to a half of the total) and by NOx produced in the lower stratosphere (approximately a third from N2O oxidation and to a lesser extent galactic cosmic rays) to the NO3 budget of this background atmosphere, the remaining portion being related to the present NOx surface sources of the southern hemisphere. The role played by particles (volcanic ash, terrestrial impurities, or ice particles) to enhance the uptake of odd nitrogen from the atmosphere by heterogeneous processes is discussed. In particular, it is suggested that in late winter, under certain meteorological conditions leading to ice particle formation, a significant uptake of HNO3 from the lower stratosphere can occur. (Auth. mod.)

44-3069
Dependence of antarctic surface mass balance on temperature, elevation, and distance to open ocean.
Giovinetto, M.B., et al, *Journal of geophysical research,* Mar. 20, 1990, 95(D4), p.3517-3531, Refs. p.3530-3531.
Waters, N.M., Bentley, C.R.
Ice models, Ice surveys, Mass balance, Ice sheets, Temperature effects, Grounded ice, Ice air interface, Paleoclimatology.
The latest compilations of surface mass balance, mean annual surface temperature, and elevation for the antarctic ice sheet, have been used to obtain areally integrated means for 24 ice drainage systems and 329 grid point values covering the whole ice sheet. Monthly summaries of remotely sensed sea ice data for 1973-1976 have been used to obtain mean annual distance to open ocean. Results show correlation coefficients of between 0.63 and 0.81, and they provide bases for descriptive models of the present antarctic ice sheet, as well as for predictive models of the response of the ice sheet to air temperature changes and variations in meridional mass and energy transfers. Second-order models are recommended for paleoclimatic reconstructions of ice sheets in high latitudes System means are shown to be reliable for these purposes. Incidental results are new estimates of the mean annual surface temperature for the whole ice sheet (-36 deg C) and mean surface elevation for the coterminous grounded ice (2290 m) (Auth mod)

44-3070
Twenty-sixth Soviet Antarctic Expedition. Winter studies 1981 and 1982. [Dvadtsat' shestaia Sovetskaia antarkticheskaia ekspeditsiia Zimovochnye issledovaniia 1981-1982 gg.],
Sovetskaia antarkticheskaia ekspeditsiia, *Sovetskaia antarkticheskaia ekspeditsiia. Trudy,* 1989, Vol.85, 144p., In Russian Refs passim For individual papers see F-41783, 41787-88, G-41789, H-41790 through 41792, I-41781-82, 41784-85, L-41786.
Lentovskaia, L.L., ed.
Expeditions, Ice navigation, Polar regions.
This volume contains information on observations and results of scientific efforts carried out by the 26th Soviet Antarctic Expedition in 1981 and 1982 at the 7 Soviet antarctic stations. Activities and organization of the expedition, including logistic support and contact with non-Soviet expeditions, are outlined in the first part of the book The second part consists of 12 individual papers giving the scientific results of projects in meteorology, ice navigation, and human physiology in antarctic winter.

44-3071
Management of satellite data reception at Molodezhnaya Station. [Organizatsiia priema sputnikovoĭ informatsii v AMTs Molodezhnaia],
Evseev, V.V., *Sovetskaia antarkticheskaia ekspeditsiia. Trudy,* 1989, Vol.85, p.84-89, In Russian.
Data processing, Sea ice distribution, Meteorological data, Spaceborne photography.
Results are discussed of investigations on satellite meteorological and glaciological information received at Molodezhnaya Station. Equipment installed at reception points, and the sequence of retrieval and data processing, are described.

44-3072
Application of satellite ice information to assist navigation during scientific research in the Antarctic. [Ispol'zovanie sputnikovoĭ ledovoĭ informatsii pri nauchno-operativnom obsluzhivanii moreplavaniia v Antarktike],
Evseev, V.V., et al, *Sovetskaia antarkticheskaia ekspeditsiia. Trudy,* 1989, Vol.85, p.89-94, In Russian.
Shamont'ev, V.A.
Ice navigation, Sea ice distribution, Meteorological data, Spaceborne photography, Data processing.
The processing of satellite information on ice conditions, supplied to research vessels and fishing expeditions in antarctic waters, is discussed. Data received in form of images are decoded at Molodezhnaya Station and forwarded to the ship, by radio, in the form of ice maps and outlines. This is found to be very useful to Soviet expeditions navigating through fields of drifting ice near antarctic shores

44-3073
Interannual variations of ice conditions in the Bellingshausen Station area. [Mezhgodovye izmeneniia ledovykh uslovii v raĭone na stantsii Bellinsgauzen],
IAnes, A.V., *Sovetskaia antarkticheskaia ekspeditsiia Trudy,* 1989, Vol.85, p.97-103, In Russian. 5 refs.
Sea ice, Synoptic meteorology, Antarctica Bellingshausen Station, Antarctica—Ardley Island
Data obtained at Ardley I in 1968-1983 are reviewed Relations of synoptic processes to extreme annual values of meteorological elements and sea ice conditions are discussed and illustrated by charts and tabulated data.

44-3074
Large scale bottom topography survey from ice approaching Molodezhnaya Station. [Krupnomasshtabnaia s'emka rel'efa dna so l'da na podkhodakh k AMTs Molodezhnaia],
Kniazev, IU.A., *Sovetskaia antarkticheskaia ekspeditsiia. Trudy,* 1989, Vol.85, p.108-114, In Russian.
Bottom topography, Subglacial observations, Sea ice, Antarctica—Alasheyev Bight.
Details of a bottom topography survey, conducted in Alasheyev Bight by the 26th Soviet Antarctic Expedition in 2 stages—on Jan 3-Mar 7 and July 23-Oct 23, 1981 are discussed including the description of methods used, the process of laying out of the main lines on fast ice, subglacial depth measurements, and determination of coordinates of sounding points.

44-3075
Ice conditions at Russkaya Station in 1980-1981. [Ledovye usloviia v raĭone stantsii Russkoĭ v 1980-1981 gg.],
Bulatov, L.V., *Sovetskaia antarkticheskaia ekspeditsiia. Trudy,* 1989, Vol.85, p.115-119, In Russian. 1 ref.
Sea ice distribution, Ice cover thickness, Snow depth, Antarctica—Russkaya Station
Results of investigations carried out by the 26th Soviet Antarctic Expedition in the Russkaya Station area in 1980 and 1981 show that, in winter, the ice cover belt is approximately 1,500 km wide, decreasing in summer to about 350 km. A chart showing perennial, 2-yr old and 1-yr old ice, as well as ice free areas on Feb 15, 1981, is presented Tabulated data is given showing ice cover thickness and snow depth on ice profiles for Aug 17 and 24, Sep 13 and Oct 14, 1982 Significant variability of shore ice conditions from one year to another is found

44-3076
Installation of light-optical beacon equipment for navigation signals at Molodezhnaya Station. [Ustanovka maiachnoĭ svetoopticheskoĭ apparatury na navigatsionnykh znakakh AMTs Molodezhnaia],
Kolodiazhnyĭ, V.A., *Sovetskaia antarkticheskaia ekspeditsiia. Trudy,* 1989, Vol.85, p.120-125, In Russian.
Instruments, Ligh. transmission, Ice navigation, Antarctica—Molodezhnaya Station.
Beacon equipment with 3 pairs of signal ranges, designed to operate in very low temperature and in strong winds—to facilitate the approach of ships to the shore—were installed at Molodezhnaya Station between Dec. 1981 and Feb. 1982 by the 26th Soviet Antarctic Expedition, and were first put to use on Mar. 5, 1982. Data on type of equipment and its performance are discussed and tabulated.

44-3077
Ice breaks and speckles in the frozen limelight.
Grant, I., *New scientist,* July 1, 1989, 123(1671), p.73.
Laboratory techniques, Lasers, Ice accretion, Ice strength, Velocity measurement, Offshore structures, Ship icing, Wind tunnels, Reflectivity.

44-3078
Glaciers today—sea tomorrow.
Sharp, M., *Geographical magazine,* Oct. 1989, 61(10), p.28-31.
Glacier oscillation, Glacier melting, Climatic factors, Glacier mass balance, Sea level, Water temperature, Glaciology.
Despite their solid and durable appearance, glaciers are highly sensitive to atmospheric conditions. How are they responding to the dramatic changes induced by "the greenhouse effect"? The author assesses the present situation and considers future possibilities.

44-3079
Winter's cruel fairyland of ice.
Phillips, D., *Canadian geographic,* Feb.-Mar. 1990, 110(1), p.14-16.
Ice storms, Meteorological factors, Precipitation (meteorology), Glaze.

44-3080
Observational manoeuvres. *Geographical magazine,* Feb. 1990, 62(2), p.42-46.
Expeditions, Polar regions, Geological surveys, Ecology, Research projects, Arctic landscapes, Canada — Northwest Territories—Ellesmere Island.

44-3081
Ice Island field station—new features of Canadian Polar Margin.
Hobson, G., *American Geophysical Union. Transactions,* Sep. 12, 1989, 70(37), p.833, 838-839, 25 refs.
Ice islands, Physical properties, Oceanographic surveys, Marine geology, Floating structures, Icebergs, Research projects, Arctic Ocean.

44-3082
Device for removal of solid impurities from liquid nitrogen.
Brownridge, J D., *Cryogenics,* Jan 1989, 29(1), p 70-71, 2 refs.
Instruments, Laboratory techniques, Ice crystals, Cryogenics, Ice electrical properties, Low temperature research, Liquids, Electromagnetic properties, Materials.

44-3083
Test of Newton's inverse-square law in the Greenland ice cap.
Ander, M.E, et al, *Physical review letters,* Feb. 27, 1989, 62(9), p.985-988, 10 refs.
Gravity anomalies, Glacier ice, Boreholes, Measurement, Ice sheets, Geophysical surveys, Ice density, Subglacial observations, Greenland.

44-3084
Transit-Doppler measurements of the Filchner Ice Shelf motion in 1984. [Transit-Dopplermessungen 1984 zur Geschwindigkeitsbestimmung des Filchner Schelfeises],
Ellmer, W., et al, *Allgemeine Vermessungsnachrichten,* 1987, No.11/12, p.399-410, In German with English summary. 7 refs.
Hinze, H., Seeber, G., Welsch, W.
Glacier flow, Flow rate, Ice shelves, Radar echoes, Remote sensing, Antarctica—Filchner Ice Shelf.
During summer 1983/84 satellite (Doppler) observations were performed on the Filchner Ice Shelf in order to determine ice motion parameters. Observations were carried out in translocation techniques with a reference station on a nunatak (Belgrano II Station). Reduction of Doppler observations is done with the GEODOP V program Special emphasis is given to the problem of grouping the individual observations Objective, methods, and results of this campaign are presented and discussed. Results from the 1984 season investigation agree with those from repeated observations in other years. An outlook to the forthcoming use of GPS for ice motion determination is given. (Auth mod.)

44-3085
Frost heaving of saturated soil under constant confining stress. [Ittei kosoku oryoku moto ni okeru howa tsuchi no tojo tokusei],
Ryokai, K., et al, *Shimizu kensetsu kenkyujo ho (Shimizu Construction Institute. Reports),* Oct. 1980, No.33, p.27-36, In Japanese. 11 refs.
Goto, S., Akagawa, S.
Soil freezing, Frost heave, Saturation, Soil strength, Frozen ground expansion, Soil water migration, Analysis (mathematics).

44-3086
Experimental study of uniaxial compressive strength of frozen sand.
Takashi, T., et al, *Doboku gakkai ronbun hokokushu (Japan Society of Civil Engineers. Proceedings),* Oct. 1980, No.302, p.79-88, In Japanese. 17 refs.
Ohrai, T., Yamamoto, H., Okamoto, J.
Frozen ground strength, Soil freezing, Sands, Frozen ground compression.

44-3087
Rheology in soil engineering. Part 5. Rheology of frozen ground. [Dos itsu kogaku ni okeru reoroji 5. *Todo no reoroji*],
Kinoshita, S., et al, *Tsuchi to kiso (Soil and foundation),* Feb. 1981, 29(2), p.83-90, In Japanese. 18 refs.
Ryokai, K.
Soil freezing, Frozen ground mechanics, Frozen ground strength, Rheology, Analysis (mathematics).

44-3088
Experimental study of uniaxial compressive strength of homogeneously frozen clay.
Takashi, T., et al, *Doboku gakkai ronbun hokokushu (Japan Society of Civil Engineers. Proceedings),* Nov. 1981, No.315, p.83-93, In Japanese. 17 refs.
For a shorter English version see 38-2667.
Ohrai, T., Yamamoto, H., Okamoto, J.
Soil freezing, Frozen ground strength, Frozen ground compression, Clays.

44-3089
Thermal conductivity of frozen soils.
Yoneyama, K., et al, Japan Symposium on Thermophysical Properties, 2nd, 1981, [1981], p.109-112, In Japanese with English summary. 3 refs.
Ishizaki, T., Takahashi, Y., Watanabe, O.
Frozen ground thermodynamics, Thermal conductivity, Frozen ground physics.

44-3090
Review and findings of laboratory tests on the mechanical properties of artificially frozen soils.
Akagawa S., et al, *Shimizu technical research bulletin*. Mar. 1982, No.1, p.7-17, 22 refs.
Goto, S., Ryokai, K.
Soil freezing, Frozen ground mechanics, Artificial freezing.

44-3091
Relation between frost heave and specimen length.
Akagawa, S., International Conference on Permafrost, 4th, Fairbanks, Alaska, July 18-22, 1983, Tokyo, Research Institute of Shimizu Construction Co., [1983], 6p., 5 refs. This paper did not appear in the proceedings or final proceedings of this conference for which see 38-1099 through 38-1375 and 39-2121 through 39-2181.
Ice lenses, Frost heave, Frozen ground mechanics, Soil freezing.

44-3092
Effects of salinity on strength and creep behavior of artificially frozen soils.
Ogata, N., et al, *Denryoku chuo kenkyujo hokoku (Central Institute of Electric Power. Report)*, Feb. 1983, No.382041, 27p., In Japanese with English summary. 16 refs.
Kataoka, T., Yasuda, M.
Soil freezing, Soil creep, Frozen ground strength, Salinity, Saline soils, Artificial freezing.

44-3093
Local ice segregation and water migration in frozen soil under constant temperature gradient.
Takashi, T., et al, Doshitsu kogaku kenkyu happyokai (Soil Engineering Seminar, 18th), June 1983, p.735-738, In Japanese. 4 refs.
Ohrai, T., Yamamoto, H., Okamoto, J., Izuta, H.
Soil freezing, Soil water migration, Frozen ground mechanics, Ice lenses, Frozen ground strength.

44-3094
Unfrozen water contents of undisturbed and remolded Alaskan silt.
Tice, A.R., et al, *Cold regions science and technology*, Dec. 1989, 17(2), MP 2683, p.103-111, 13 refs.
Black, P.B., Berg, R.L.
Frozen ground, Unfrozen water content, Soil composition, Soil analysis, Frozen ground thermodynamics, Nuclear magnetic resonance, Saturation, Temperature effects, Soil water.
Unfrozen water content as a function of temperature was measured in the laboratory using pulsed nuclear magnetic resonance (PNMR) for 16 undisturbed frozen cores acquired from the Northwest Alaska Pipeline Company Chilled Gas Test Facility. The cores were then remolded and brought to their original densities and water contents, and unfrozen water content as a function of temperature was again measured over three warming and cooling cycles. It was found that differences in unfrozen water contents between the undisturbed warming and cooling curves depended upon relative degree of saturation and its effect on soil structure. Only slight changes occurred during the three warming curves of the remolded soil, indicating minor freezing and thawing consequences on the soil structure.

44-3095
Austdalsbreen, Norway: expected reaction to a 40 m increase in water level in the lake into which the glacier calves.
Hooke, R.L., et al. *Cold regions science and technology*, Dec. 1989, 17(2), p.113-126, 24 refs.
Laumann, T., Kennett, M.I.
Glacial lakes, Glacier melting, Water level, Subglacial observations, Glacier mass balance, Calving, Glacier flow, Glaciology, Topographic features, Sliding, Norway—Austdalsbreen Glacier.

44-3096
Elasticity of natural types of polycrystalline ice.
Sinha, N.K., *Cold regions science and technology*, Dec. 1989, 17(2), p.127-135, 21 refs.
Ice elasticity, Ice crystals, Ice crystal structure, Ice microstructure, Elastic properties, Analysis (mathematics), Ice loads, Temperature effects.

44-3097
Dynamic simulations of iceberg-seabed interactions.
Bass, D.W., et al, *Cold regions science and technology*, Dec. 1989, 17(2), MP 2684, p.137-151, 8 refs.
Lever, J.H.
Icebergs, Ocean bottom, Ice scoring, Computerized simulation, Ice solid interface, Floating ice, Hydrodynamics, Surface structure, Physical properties, Computer applications, Models.
A six degrees of freedom model of iceberg-seabed interaction is described. Predictions from the modelling are compared to observations obtained from the DIGS series of experiments on grounding and scouring icebergs on the Labrador Shelf.

44-3098
Effect of fluid flow on the development of preferred orientations in sea ice: laboratory experiments.
Stander, E., et al, *Cold regions science and technology*, Dec. 1989, 17(2), p.153-161, 15 refs.
Michel, B.
Sea ice, Ice structure, Fluid flow, Ice crystal growth, Ice water interface, Orientation, Salinity, Ice formation, Low temperature tests, Physical properties.

44-3099
Soil freezing by a step temperature drop in the open system under overburden pressure.
Horiguchi, K., et al, *Cold regions science and technology*, Dec. 1989, 17(2), p.163-171, 20 refs.
Akagawa, S.
Soil freezing, Soil structure, Frost heave, Frost action, Interstitial ice, Frost penetration, Frost action, Heat transfer, Freezing rate, Soil mechanics, Temperature gradients.

44-3100
Dynamic response of narrow structures to ice crushing.
Kärnä, T., et al, *Cold regions science and technology*, Dec. 1989, 17(2), p.173-187, 30 refs.
Turunen, R.
Offshore structures, Vibration, Floating ice, Ice loads, Structural analysis, Ice breakup, Ice edge, Ice solid interface, Dynamic loads, Velocity measurement, Models.

44-3101
Strength of soils and rocks at low temperatures.
Sellmann, P.V., *Cold regions science and technology*, Dec. 1989, 17(2), MP 2685, p.189-190, 7 refs.
Frozen rock strength, Frozen ground strength, Temperature effects, Frozen ground thermodynamics, Compressive properties, Temperature variations.

44-3102
Models for the orientation of hydrometeors.
McCormick, G.C., *IEEE transactions on antennas and propagation*, Oct 1989, 37(10), p.1301-1309, 15 refs.
Precipitation (meteorology), Orientation, Scattering, Radar echoes, Particles, Meteorological data.

44-3103
Thermal conductivity, heat capacity and diffusivity of rubbers from 60 to 300 K.
Bhowmick, T., et al, *Cryogenics*, Feb. 1990, 30(2), p.116-121, 19 refs.
Pattanayak, S.
Rubber, Thermal conductivity, Low temperature tests, Temperature measurement, Phase transformations, Polymers, Thermal properties, Molecular structure, Cryogenics.

44-3104
Test apparatus for measurement of heat capacity of cryogenic materials from 77 to 300 K.
Pattanayak, S., et al, *Cryogenics*, Feb. 1990, 30(2), p.122-126, 21 refs.
Bhowmick, T.
Polymers, Test equipment, Temperature measurement, Heat capacity, Low temperature tests, Cryogenics, Materials, Laboratory techniques, Rubber.

44-3105
Fracture energy and fatigue strength of unreinforced concrete beams at normal and low temperatures.
Ohlsson, U., et al, *Engineering fracture mechanics*, 1990, 35(1-2-3), p.195-203, 14 refs.
Daerga, P.A., Elfgren, L.
Concrete strength, Cracking (fracturing), Low temperature tests, Compressive properties, Freeze thaw cycles, Interstitial ice, Crack propagation, Temperature effects, Concrete freezing.

44-3106
Evolution of fracture behaviour of saturated concrete in the low temperature range.
Maturana, P., et al, *Engineering fracture mechanics*, 1990, 35(4-5), p.827-834, 9 refs.
Planas, J., Elices, M.
Concrete strength, Cracking (fracturing), Low temperature tests, Brittleness, Tensile properties, Mechanical tests, Moisture.

44-3107
Effect of ice density on the trajectory of ice pieces along a vessel's hull.
Hardiman, K.C., et al, *National Research Council, Canada. Institute for Marine Dynamics. Contractor report*, Apr 1989, CR-1989-12, 58p. + append., 5 refs.
Ritch, R., Abdelnour, R.
Ice navigation, Ships, Ice solid interface, Ice models, Ice density, Propellers, Ice loads.

44-3108
Extremal analysis of flexural strength of ice and crack size distribution.
Lal, M., *National Research Council, Canada. Institute for Marine Dynamics. Contractor report*, Mar. 1989, CR-1989-04, 106p., 13 refs.
Ice cover strength, Ice cracks, Flexural strength, Ice models, Ice mechanics, Mathematical models.

44-3109
Ice-structure interaction testing: a bibliography.
Lau, M., *National Research Council, Canada. Institute for Marine Dynamics. Contractor report*, Apr. 1989, CR-1989-11, 62p., 422 refs.
Ice loads, Offshore structures, Ice models, Bridges, Hydraulic structures, Test covers, Ice solid interface, Bibliographies.

44-3110
Arctic research: a focus of international cooperation.
Report of the U.S. Arctic Research Commission to the President and the Congress of the United States of America for the period 1 October 1988-30 September 1989.
U.S. Arctic Research Commission, Washington, D.C., Jan. 31, 1990, 40p., Refs. passim.
International cooperation, Research projects, Polar regions, Environmental protection, Legislation.

44-3111
Global commons—the Arctic in world affairs.
Young, O.R., *Technology review*, Feb.-Mar. 1990, 93(2), p.52-61, For another version see 44-1287.
Economic development, Polar regions.

44-3112
Determination of the equilibrium shape of the bodies formed during the solidification of filtration flow.
Kornev, K.G., et al, *Journal of applied mathematics and mechanics*, Mar 1990, 52(6), p.773-778, Translated from Prikladnaia matematika i mekhanika. 14 refs.
Chugunov, V.A.
Seepage, Fluid flow, Solids, Geocryology, Analysis (mathematics), Subgrade soils, Frozen rocks, Heat flux.

44-3113
Oxygen demand in ice covered lakes as it pertains to winter aeration.
Ellis, C.R., et al, *Water resources bulletin*, Dec. 1989, 25(6), p.1169-1176, 44 refs.
Stefan, H.G.
Frozen lakes, Aeration, Oxygen, Water chemistry, Limnology, Ice cover effect, Ecology, Subglacial observations, Bottom sediment, Temperature effects, Water temperature.

44-3114
Hydrologic effects of climate change in the Delaware River basin.
McCabe, G.J., Jr., et al, *Water resources bulletin*, Dec 1989, 25(6), p.1231-1242, 39 refs.
Ayers, M.A.
River basins, Climatic changes, Runoff, Soil water, Water balance, Hydrology, Precipitation (meteorology), Seasonal variations, Snow accumulation, Temperature effects, United States—Delaware River.

44-3115
Amorphization of cubic ice by ultraviolet radiation.
Kouchi, A., et al, *Nature*, Mar 8, 1990, 344(6262), p.134-135, 26 refs.
Kuroda, T.
Cubic ice, Amorphous ice, Ultraviolet radiation.

44-3116
Annual measurement of sea-ice thickness using an upward-looking sonar.
Hudson, R., *Nature*, Mar. 8, 1990, 344(6262), p.135-137, 10 refs.
Sea ice, Ice cover thickness, Ice acoustics, Ice bottom surface, Beaufort Sea.

44-3117
Transient model of visco-icy layer caused by solid indentation on ice.
Shih, L.Y., *National Research Council, Canada. Institute for Marine Dynamics. Institute report*, Aug. 1989, IR-1989-03, p.299-309, 11 refs.
Ice cover strength, Ice breaking, Impact strength, Ice models, Viscosity, Analysis (mathematics), Penetration tests.

44-3118
Ice capable research vessels.
Colbourne, D.B., *National Research Council, Canada. Institute for Marine Dynamics. Laboratory memorandum*, Sep. 1989, LM-1989-23, 5p.
Oceanographic ships, Ice navigation.
Present and future requirements for ice capable research vessels are discussed. International trends in construction and utiliza-

tion are reviewed. Research in the Arctic and Antarctic is briefly compared.

44-3119
State-of-the-art review of wave propagation in floating ice sheets.
Arunachalam, V.M., et al, *National Research Council, Canada. Institute for Marine Dynamics. Laboratory report,* June 1989, LR-1989-02, 20p., 42 refs.
Williams, F.M., Muggeridge, D.B.
Ocean waves, Ice water interface, Ice cover effect, Wave propagation, Ice edge, Ice floes, Analysis (mathematics).

44-3120
Approximate determination of the principal characteristics of icebreakers and ice-strengthened ships.
Titov, I.A., et al, *National Research Council, Canada. Institute for Marine Dynamics Contractor report,* May 1989, CR-1989-13, 11+p., Translated from Sudostroenie, Jan. 1989, No.1, p.3-5. 9 refs. Includes Russian original.
Simonov, IU.A.
Icebreakers, Ice navigation.

44-3121
Suspended percussion devices for breaking frozen ground. [Navesnye udarnye ustroĭstva dlia razrushenila merzlykh gruntov],
Ivanov, R.A., et al, Novosibirsk, Akademiia nauk SSSR. Sibirskoe otdelenie. Institut gornogo dela, 1988, 142p., In Russian. 104 refs
Fedulov, A.I.
Frozen ground strength, Excavation, Earthwork, Construction equipment, Hammers, Analysis (mathematics).

44-3122
Crystal growth in deformed polycrystalline ice during stress relaxation.
Mizuno, Y., *Low temperature science (Teion kagaku). Series A Physical sciences,* 1989, No.48, p.1-12, In Japanese with English summary. 7 refs.
Ice crystal growth, Ice crystal structure, Ice relaxation, Recrystallization, Ice creep, Relaxation (mechanics), Compressive properties, Strains.

44-3123
Thermal conductivity of snow and snow/metal mixtures.
Murakami, S., et al, *Low temperature science (Teion kagaku). Series A Physical sciences,* 1989, No.48, p.13-25, In Japanese with English summary. 19 refs.
Maeno, N.
Snow thermal properties, Thermal conductivity, Metals, Particles, Snow density, Snow impurities, Porosity, Temperature effects.

44-3124
Measurements of dielectric properties of frozen soils.
Araki, T., et al, *Low temperature science (Teion kagaku). Series A Physical sciences,* 1989, No.48, p.27-40, In Japanese with English summary. 9 refs.
Maeno, N.
Frozen ground physics, Dielectric properties, Soil water, Ground ice, Unfrozen water content, Temperature effects.

44-3125
Estimation of the distribution and total amount of water equivalent of snow on the running area of mudflow generated by the volcanic eruption of Mt. Tokachi, Hokkaido on 24 May, 1926.
Yamada, T., et al, *Low temperature science (Teion kagaku). Series A Physical sciences,* 1989, No.48, p.41-49, In Japanese with English summary. 4 refs.
Tachibana, Y.
Snow water equivalent, Runoff, Mudflows, Snowmelt, Snow cover distribution, Mountains, Distribution, Damage, Air temperature, Snow accumulation, Volcanoes.

44-3126
Effect of the equatorial Pacific Ocean on interannual variability in the Okhotsk Sea ice.
Tachibana, Y., et al, *Low temperature science (Teion kagaku). Series A Physical sciences,* 1989, No.48, p.71-77, In Japanese with English summary. 30 refs.
Wakahama, G.
Sea ice distribution, Radar, Sea water, Water temperature, Drift, Wind factors, Variations, Ice mechanics, Okhotsk Sea.

44-3127
Measurements of an atmospheric boundary layer around the air-sea-ice observation tower: 1987 winter experiments.
Aota, M., et al, *Low temperature science (Teion kagaku). Series A Physical sciences,* 1989, No.48, p.79-89, In Japanese with English summary. 8 refs.
Shirasawa, K., Takatsuka, T.
Ice edge, Boundary layer, Atmospheric circulation, Drift, Ice conditions, Heat transfer, Measuring instruments, Wind velocity, Air temperature, Anemometers, Towers.

44-3128
Measurements in the boundary layer under landfast ice in the southeast Hudson Bay II. Observations of momentum flux and turbulence intensity.
Shirasawa, K., et al, *Low temperature science (Teion kagaku). Series A Physical sciences,* 1989, No 48, p.90-102, In Japanese with English summary. 8 refs.
Ingram, R.G.
Fast ice, Turbulent boundary layer, Ice cover effect, Subglacial observations, Ocean currents, Turbulence, Measuring instruments, Velocity, Water temperature, Salinity.

44-3129
Attempt to interpret sea-ice features from the MOS-1 passive microwave data.
Ono, N., *Low temperature science (Teion kagaku) Series A Physical sciences,* 1989, No.48, p.103-109, In Japanese with English summary. 2 refs.
Sea ice, Ice conditions, Ice edge, Polynyas, Microwaves, Remote sensing, Radiometry, Measuring instruments, Analysis (mathematics), Okhotsk Sea.

44-3130
Estimations of the water equivalent and depth of snow cover using a beam sensor.
Akitaya, E., *Low temperature science (Teion kagaku). Series A Physical sciences,* 1989, No.48, p.111-115, In Japanese. 4 refs.
Snow water equivalent, Snow depth, Measuring instruments, Analysis (mathematics).

44-3131
Relationship between confined pressure of a sample and ice intrusion temperature.
Horiguchi, K., *Low temperature science (Teion kagaku). Series A Physical sciences,* 1989, No.48, p.117-120, In Japanese. 3 refs.
Ice temperature, Ice pressure, Grain size, Analysis (mathematics).

44-3132
Proceedings.
Arctic Technology Workshop, Hanover, NH, June 20-23, 1989, *U.S. Army Cold Regions Research and Engineering Laboratory,* Dec. 1989, SR 89-39, 475p., ADB-141 754, Refs. passim. For individual papers see 44-3133 through 44-3163.
Richter-Menge, J.A., ed, Tucker, W.B., ed, Kleinerman, M.M., ed.
Submarines, Ice navigation, Ice mechanics, Military operation, Ice physics, Meetings, Military equipment, Underwater acoustics, Polar regions, Sea ice distribution.
The Arctic Technology Workshop was held from 20-23 June 1989 at the U.S. Army Cold Regions Research and Engineering Laboratory (CRREL) in Hanover, NH. This workshop follows the three previously held Ice Penetration Technology Workshops in its intent to provide a forum for sharing and discussing recent efforts in the area of naval operations in the Arctic. Papers were presented on the following general topics: Arctic Ocean Acoustics; Atmospheric Phenomena; Ice Features, Statistics and Models; Mechanical Behavior of Ice; Through-Ice and High-Latitude Communications; Surface and Air Platforms; Submarine Operations; and Weapons Systems.

44-3133
Arctic ocean acoustics in CEAREX.
Baggeroer, A.B., *U.S. Army Cold Regions Research and Engineering Laboratory. Special report,* Dec. 1989, SR 89-39, Arctic Technology Workshop, Hanover, NH, June 20-23, 1989. Proceedings. Edited by J. Richter-Menge, W.B. Tucker III and M.M. Kleinerman, p.2-3. ADB-141 754.
Underwater acoustics, Subglacial observations, Ice cover effect, Acoustic scattering, Sound transmission, Drift stations, Pack ice, Noise (sound).

44-3134
Ambient noise studies in the Canadian and Eurasian basins and the Greenland Sea.
Bourke, R.H., et al, *U.S. Army Cold Regions Research and Engineering Laboratory Special report,* Dec 1989, SR 89-39, Arctic Technology Workshop, Hanover, NH, June 20-23, 1989 Proceedings Edited by J. Richter-Menge, W.B. Tucker III and M.M. Kleinerman, p.4-6. ADB-141 754.
Poffenberger, D.L., Newman, M.Z.
Underwater acoustics, Ice cover effect, Noise (sound), Ice mechanics, Drift stations, Seasonal variation.

44-3135
High frequency acoustical properties of saline ice.
Jezek, K.C., et al, *U.S. Army Cold Regions Research and Engineering Laboratory. Special report,* Dec. 1989, SR 89-39, MP 2686, Arctic Technology Workshop Hanover, NH, June 20-23, 1989. Proceedings. Edited by J. Richter-Menge, W.B. Tucker III and M.M. Kleinerman, p.9-23, ADB-141 754, 15 refs.
Stanton, T.K., Gow, A.J.
Ice acoustics, Sea ice, Echo sounding, Ice cover effect, Ice bottom surface, Attenuation, Ice structure, Acoustic measurement, Dendritic ice, Slush, Frazil ice, Experimentation, Ice growth, Salt ice, Reflection.
Sonar echo amplitude data have been collected at kilohertz carrier frequencies from the underside of different sea ice types. Histograms of normal incidence echo amplitudes were formed from over 90 samples of each ice type. Experiments were conducted on saline ice grown in an outdoor pond under relatively controlled conditions at CRREL and on the sea ice cover in the Fram Strait. Analysis shows marked variations (about a factor of 5) in the magnitude of the coherent reflection coefficients as congelation ice at the bottom of an ice sheet evolves from a growing dendritic interface to an ablating, thermally altered interface. Larger differences (about a factor 10) are observed between growing congelation ice and slush ice, used to simulate frazil. Transmission measurements through thin ice indicate that important attenuation processes are associated with basal dendritic structure resulting in a high attenuation regime (5 dB/cm at 200 kHz) in roughly the bottom 10 cm of growing sea ice and low attenuation regime (0.1 dB/cm) consisting of the overlying ice. These results indicate that important variations in acoustic regime exist in areas where different ice types are intermingled.

44-3136
Future airborne systems in northern latitudes.
Bailey, D.B., *U.S. Army Cold Regions Research and Engineering Laboratory. Special report,* Dec. 1989, SR 89-39, Arctic Technology Workshop, Hanover, NH, June 20-23, 1989. Proceedings. Edited by J. Richter-Menge, W.B. Tucker III and M.M. Kleinerman, p.26-52, ADB-141 754, 4 refs.
Airplanes, Aircraft icing, Airborne equipment, Temperature effects, Wind factors, Polar regions, Climatic factors, Turbulence.

44-3137
LAMPS MK III environmental capabilities.
Vollmer, M., *U.S. Army Cold Regions Research and Engineering Laboratory. Special report,* Dec. 1989, SR 89-39, Arctic Technology Workshop, Hanover, NH, June 20-23, 1989. Proceedings. Edited by J. Richter-Menge, W.B. Tucker III and M.M. Kleinerman, p.53-55. ADB-141 754.
Military transportation, Ship icing, Helicopters, Aircraft icing, Ice prevention, Ice removal, Sands, Countermeasures.

44-3138
Cold weather operational features of the V-22 tiltrotor aircraft.
Meanor, R.W., *U.S. Army Cold Regions Research and Engineering Laboratory. Special report,* Dec. 1989, SR 89-39, Arctic Technology Workshop, Hanover, NH, June 20-23, 1989. Proceedings. Edited by J. Richter-Menge, W.B. Tucker III and M.M. Kleinerman, p.56-84, ADB-141 754, 9 refs.
Aircraft icing, Countermeasures, Logistics, Cold weather operation, Aircraft landing areas, Ice accretion, Snow accumulation, Ice removal, Snow removal, Navigation, Helicopters, Climatic factors, Ice prevention.

44-3139
Use of the mechanical properties of ice in the development of predictive models.
Richter-Menge, J.A., et al, *U.S. Army Cold Regions Research and Engineering Laboratory. Special report,* Dec. 1989, SR 89-39, MP 2687, Arctic Technology Workshop, Hanover, NH, June 20-23, 1989. Proceedings. Edited by J. Richter-Menge, W.B. Tucker III and M.M. Kleinerman, p.87-99, ADB-141 754, 23 refs.
Cole, D.M., Tucker, W.B.
Ice mechanics, Drift, Ice navigation, Military operation, Ice physics, Ice crystal structure, Grain size, Sea ice, Ice forecasting, Mathematical models, Tests.

The approach to developing mechanistically-based predictive models discussed in this paper is by no means trivial. Ideally, a stepwise approach should be taken. This would first involve the determination of the micromechanical processes involved in the deformation of ice. We would begin by studying these processes in a relatively simple material, freshwater, equiaxed ice, and progress to the most complicated ice type, aligned, columnar sea ice. Once the phenomena of deformation were well understood over the range of loading and environmental conditions, the attention would focus towards the development of a mathematical, mechanistically-based model of the ice behavior. The model would require input about the loading scenario (e.g. surfacing submarine sail, ship travelling through the ice sheet, convergence of ice sheets), the appropriate environmental conditions, and the corresponding physical properties of the ice. The predictive model would first be verified using scale-model test results and, once the accuracy of the model was proven, application would be extended to field conditions. The capabilities of the model to predict loads in the field would be evaluated by comparison of the predicted to actual stress measurements determined during field experiments.

44-3140
Ice penetrating arctic oceanographic buoy (AOB).
Selsor, H.D., *U.S. Army Cold Regions Research and Engineering Laboratory. Special report*, Dec. 1989, SR 89-39, Arctic Technology Workshop, Hanover, NH, June 20-23, 1989. Proceedings. Edited by J. Richter-Menge, W.B. Tucker III and M.M. Kleinerman, p.101-103. ADB-141 754.
Ice strength, Penetration, Ice cover effect, Measuring instruments, Oceanography, Buoyancy.

44-3141
Vertical lifting and penetration of floating ice sheets with cylindrical indentors.
Sodhi, D.S., et al, *U.S. Army Cold Regions Research and Engineering Laboratory. Special report*, Dec. 1989, SR 89-39, MP 2688, Arctic Technology Workshop, Hanover, NH, June 20-23, 1989. Proceedings. Edited by J. Richter-Menge, W.B. Tucker III and M.M. Kleinerman, p.104. ADB-141 754.
McGilvary, W.R., Lever, J.H.
Floating ice, Ice models, Ice breakup, Penetration, Ice sheets, Ice cover thickness, Flexural strength, Ice deformation, Tests, Buoyancy.
Floating model ice sheets were lifted vertically and penetrated with cylindrical indentors of different shapes (flat, truncated-conical and conical) and diameters (76 mm, 152 mm and 305 mm) and in different ambient temperatures (0, 10, 20 F). The experimental results show that there is no effect of indentor shape or size on the ice penetration forces. From dimensional analysis, a relationship is obtained for maximum ice penetration force in terms of the specific weight of water, the ice thickness and the upward flexural strength.

44-3142
Analysis and forecasting at the Naval Polar Oceanography Center.
Hinsman, D.E., *U.S. Army Cold Regions Research and Engineering Laboratory. Special report*, Dec. 1989, SR 89-39, Arctic Technology Workshop, Hanover, NH, June 20-23, 1989. Proceedings. Edited by J. Richter-Menge, W.B. Tucker III and M.M. Kleinerman, p.112-120, ADB-141 754, 6 refs.
Oceanographic surveys, Military equipment, Remote sensing, Ice forecasting, Sea ice distribution, Ice mechanics, Meteorological data, Organizations, Statistical analysis, Microwaves, Computer applications.

44-3143
Remote sensing of sea ice.
Hawkins, J.D., *U.S. Army Cold Regions Research and Engineering Laboratory. Special report*, Dec. 1989, SR 89-39, Arctic Technology Workshop, Hanover, NH, June 20-23, 1989. Proceedings. Edited by J. Richter-Menge, W.B. Tucker III and M.M. Kleinerman, p.121-124. ADB-141 754.
Sea ice distribution, Remote sensing, Ice structure, Microwaves, Infrared mapping, Radiometry, Mapping, Ice edge.

44-3144
Recent progress in Navy sea ice forecast modeling.
Preller, R.H., *U.S. Army Cold Regions Research and Engineering Laboratory. Special report*, Dec. 1989, SR 89-39, Arctic Technology Workshop, Hanover, NH, June 20-23, 1989. Proceedings. Edited by J. Richter-Menge, W.B. Tucker III and M.M. Kleinerman, p.125-139. ADB-141 754, 10 refs.
Ice models, Ice forecasting, Sea ice distribution, Drift, Ice cover thickness, Ice conditions, Ice mechanics, Ice edge.

44-3145
Use of the distribution of ice thickness to select a cost-effective ice penetrator.
Thomas, F.V., et al, *U.S. Army Cold Regions Research and Engineering Laboratory. Special report*, Dec. 1989, SR 89-39, Arctic Technology Workshop, Hanover, NH, June 20-23, 1989. Proceedings. Edited by J. Richter-Menge, W.B. Tucker III and M.M. Kleinerman, p.141-149. ADB-141 754, 2 refs.
Woodfin, R.L.
Ice cover thickness, Penetration, Sea ice, Acoustic measurement, Submarines, Analysis (mathematics), Cost analysis.

44-3146
Arctic USW torpedo G&C program.
Ingram, R.D., *U.S. Army Cold Regions Research and Engineering Laboratory. Special report*, Dec. 1989, SR 89-39, Arctic Technology Workshop, Hanover, NH, June 20-23, 1989. Proceedings. Edited by J. Richter-Menge, W.B. Tucker III and M.M. Kleinerman, p.152-153. ADB-141 754.
Underwater acoustics, Ice cover effect, Sound transmission, Acoustic measurement, Experimentation.

44-3147
Weapon frequency arctic acoustic scattering.
Bishop, G.C., *U.S. Army Cold Regions Research and Engineering Laboratory. Special report*, Dec. 1989, SR 89-39, Arctic Technology Workshop, Hanover, NH, June 20-23, 1989. Proceedings. Edited by J. Richter-Menge, W.B. Tucker III and M.M. Kleinerman, p.156-185, ADB-141 754, Refs. p.183-185.
Acoustic scattering, Military operation, Ice bottom surface, Sound transmission, Detection, Pack ice, Surface roughness, Mathematical models.

44-3148
Ice penetrator development program.
Ferrario, M.T., *U.S. Army Cold Regions Research and Engineering Laboratory. Special report*, Dec. 1989, SR 89-39, Arctic Technology Workshop, Hanover, NH, June 20-23, 1989. Proceedings. Edited by J. Richter-Menge, W.B. Tucker III and M.M. Kleinerman, p.186-222. ADB-141 754.
Submarines, Penetration, Ice cover thickness, Military operation, Impact strength, Hydrodynamics, Design, Models, Tests.

44-3149
Rapid thermal ice penetration system.
Andersen, J.K., *U.S. Army Cold Regions Research and Engineering Laboratory. Special report*, Dec. 1989, SR 89-39, Arctic Technology Workshop, Hanover, NH, June 20-23, 1989. Proceedings. Edited by J. Richter-Menge, W.B. Tucker III and M.M. Kleinerman, p.224-242, ADB-141 754, 2 refs.
Ice cover thickness, Penetration, Military equipment, Submarines, Ice melting, Heat transfer, Subglacial navigation, Military operation, Tests.

44-3150
Arctic Submarine Experimental Pool.
Oblinger, L.P., *U.S. Army Cold Regions Research and Engineering Laboratory. Special report*, Dec. 1989, SR 89-39, Arctic Technology Workshop, Hanover, NH, June 20-23, 1989. Proceedings. Edited by J. Richter-Menge, W.B. Tucker III and M.M. Kleinerman, p.244-248. ADB-141 754.
Submarines, Subglacial navigation, Ice cover effect, Impact strength, Laboratories, Concrete structures.

44-3151
Proposed tactical investigation of a model arctic submarine.
Richardson, C., *U.S. Army Cold Regions Research and Engineering Laboratory. Special report*, Dec. 1989, SR 89-39, Arctic Technology Workshop, Hanover, NH, June 20-23, 1989. Proceedings. Edited by J. Richter-Menge, W.B. Tucker III and M.M. Kleinerman, p.249-259. ADB-141 754.
Submarines, Military equipment, Ice conditions, Models, Ice cover thickness, Ice breaking, Design.

44-3152
Electromagnetic noise collection and processing buoy, "Arctic Research Buoy".
Scarzello, J.F., et al, *U.S. Army Cold Regions Research and Engineering Laboratory. Special report*, Dec. 1989, SR 89-39, Arctic Technology Workshop, Hanover, NH, June 20-23, 1989. Proceedings. Edited by J. Richter-Menge, W.B. Tucker III and M.M. Kleinerman, p.260-265. ADB-141 754.
Lenko, D.S., Durante, G.G.
Military operation, Electromagnetic properties, Magnetic resonance, Noise (sound), Electric fields, Polar regions, Atmospheric physics, Drift stations, Computer applications, Maintenance.

44-3153
Polar lows.
Fett, R.W., *U.S. Army Cold Regions Research and Engineering Laboratory. Special report*, Dec. 1989, SR 89-39, Arctic Technology Workshop, Hanover, NH, June 20-23, 1989. Proceedings. Edited by J. Richter-Menge, W.B. Tucker III and M.M. Kleinerman, p.267-272, ADB-141 754, 1 ref.
Storms, Wind velocity, Icebreakers, Remote sensing, Forecasting, Detection.

44-3154
Environment of wintertime leads and polynyas.
Andreas, E.L., *U.S. Army Cold Regions Research and Engineering Laboratory. Special report*, Dec. 1989, SR 89-39, MP 2689, Arctic Technology Workshop, Hanover, NH, June 20-23, 1989. Proceedings. Edited by J. Richter-Menge, W.B. Tucker III and M.M. Kleinerman, p.273-288, ADB-141 754, 15 refs.
Polynyas, Heat transfer, Moisture transfer, Air water interactions, Pack ice, Convection, Heat flux, Airplanes, Navigation, Temperature effects, Humidity.
Wintertime leads and polynyas are terrific sources of heat and moisture. Described here are some of the environmental effects of these large heat and moisture fluxes. For example, the air near the water surface is supersaturated; the resulting fog can limit visibility, rime ice forms prolifically on any downwind structure, and for large leads and polynyas, massive plumes of condensate particles can alter the radiation budget of the downwind surface. Convectively driven turbulence fostered by the large fluxes enhances the vertical mixing. For large open water areas, the convection may be intense enough to jostle low-flying aircraft.

44-3155
Electro-expulsive system for ice removal.
Haslim, L., et al, *U.S. Army Cold Regions Research and Engineering Laboratory. Special report*, Dec. 1989, SR 89-39, Arctic Technology Workshop, Hanover, NH, June 20-23, 1989. Proceedings. Edited by J. Richter-Menge, W.B. Tucker III and M.M. Kleinerman, p.292-302. ADB-141 754.
Embry, G.D.
Ice prevention, Ice removal, Aircraft icing, Ice cover thickness, Protective coatings, Ship icing, Countermeasures.

44-3156
Arctic/cold weather surface ship program.
Kover, D.J., *U.S. Army Cold Regions Research and Engineering Laboratory. Special report*, Dec. 1989, SR 89-39, Arctic Technology Workshop, Hanover, NH, June 20-23, 1989. Proceedings. Edited by J. Richter-Menge, W.B. Tucker III and M.M. Kleinerman, p.303-313. ADB-141 754.
Ship icing, Ice removal, Military equipment, Climatic factors, Protective coatings, Ice prevention, Equipment, Maintenance.

44-3157
Hull forms for U.S. Navy surface ship ice transit.
Milano, V.R., *U.S. Army Cold Regions Research and Engineering Laboratory. Special report*, Dec. 1989, SR 89-39, Arctic Technology Workshop, Hanover, NH, June 20-23, 1989. Proceedings. Edited by J. Richter-Menge, W.B. Tucker III and M.M. Kleinerman, p.314-370. ADB-141 754, 22 refs.
Icebreakers, Ice navigation, Ice cover thickness, Ice breaking, Military equipment, Design, Amphibious vehicles, Ice conditions.

44-3158
Landing Craft, Air Cushion (LCAC) arctic design initiative.
Ehrhardt, J.P., *U.S. Army Cold Regions Research and Engineering Laboratory. Special report*, Dec. 1989, SR 89-39, Arctic Technology Workshop, Hanover, NH, June 20-23, 1989. Proceedings. Edited by J. Richter-Menge, W.B. Tucker III and M.M. Kleinerman, p.371-391. ADB-141 754.
Air cushion vehicles, Ice cover effect, Cold weather operation, Military equipment, Amphibious vehicles, Ice prevention, Research projects, Design, Equipment, Ice mechanics, Ice conditions.

44-3159
Sea ice thickness measurement using a down-sized airborne electromagnetic-sounding system.
Kovacs, A., et al, *U.S. Army Cold Regions Research and Engineering Laboratory. Special report*, Dec. 1989, SR 89-39, MP 2693, Arctic Technology Workshop, Hanover, NH, June 20-23, 1989. Proceedings. Edited by J. Richter-Menge, W.B. Tucker III and M.M. Kleinerman, p.394-424, ADB-141 754, 24 refs.
Holladay, J.S.
Ice cover thickness, Sea ice, Measuring instruments, Electromagnetic prospecting, Sounding, Ice strength, Pressure ridges, Snow depth, Airborne equipment, Sea water, Ice floes.

Recent developments to improve electromagnetic induction-measurement technology and to down size the related helicopter towed antenna assembly for use in airborne measurement of sea ice thickness are discussed as are the results from arctic field testing. The findings indicate that with further system improvement the day of routine sea ice thickness profiling from an airborne platform is close at hand as is the apparent capability to determine the conductivity of the sea ice from which an assessment of sea ice strength may be made

**44-3160**
**Ice strength estimates from submarine topsounder data.**
DiMarco R., et al, *U.S. Army Cold Regions Research and Engineering Laboratory. Special report,* Dec. 1989, SR 89-39, MP 2691, Arctic Technology Workshop, Hanover, NH, June 20-23, 1989. Proceedings. Edited by J. Richter-Menge, W. B. Tucker III and M.M. Kleinerman, p.425-426. ADB-141 754.
Dugan, J., Martin, W., Tucker, W.B.
Ice strength, Acoustic measurement, Submarines, Sounding, Underwater acoustics, Ice cove. thickness, Experimentation, Accuracy, Flexural strength.

**44-3161**
**Review of parametric ice thickness measurement sonar testing at Resolute Bay, Canada—1987.**
Wallerstedt, R., *U.S. Army Cold Regions Research and Engineering Laboratory Special report,* Dec 1989, SR 89-39, Arctic Technology Workshop, Hanover, NH, June 20-23, 1989. Proceedings. Edited by J Richter-Menge, W B. Tucker III and M.M. Kleinerman, p.427-450 ADB-141 754.
Ice cover thickness, Acoustic measurement, Sea ice, Submarines, Backscattering, Ice mechanics, Subglacial observations, Tests, Snow cover effect, Slush.

**44-3162**
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Paleoclimatology, Glacial deposits, Glacier formation, Algae, Stratigraphy, Antarctica—Ross Sea.
New diatom and silicoflagellate zonations are the basis of a micropaleontological study of DSDP Ross Sea Sites 272 and 273. Micropaleontological and sedimentological evidence from these two sites indicate open-marine conditions in the Ross Sea throughout the early and middle Miocene. Sedimentation was dominated by rapidly calving outlet glaciers dumping sediment into the Ross Sea at extremely high rates (>157 m/my - >450 m/my). Ice flow was dominantly from continental East Antarctica. In the late Miocene fluctuating sea surface temperatures produced alternating cycles of thick ice and open-water conditions which is recorded both in the sediments of DVDP Site 11 and DSDP Sites 272 and 273 as fluctuating IRD concentrations, sporadic bedding and occasional biogenic blooms. The age of sediment above the regional unconformity is Brunhes at Site 272 and predominantly Gilbert to Gauss at Site 273. The first pebble-sized IRD observed at the continental rise DSDP Site 274 indicates extensive ice shelves formed sometime after 10.0 m.y.B.P. (Auth. mod.)

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**Oxygen 18 and helium as tracers of ice shelf water and water/ice interaction in the Weddell Sea.**
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Ice water interface, Ice shelves, Ice melting, Isotope analysis, Antarctica—Weddell Sea, Antarctica—Filchner Ice Shelf.
The O-18 and He-4 signals imprinted on the water circulating under the Filchner/Ronne Ice Shelf (Ice Shelf Water, or ISW)

due to melting of glacial ice at the base of the ice shelf are traced across the sill separating the Filchner Depression from the Weddell Sea. Low delta O-18 values are correlated with high He-4 concentrations in the ISW found in the Filchner Depression. The fraction of glacial meltwater contained in the ISW found in the Filchner Depression is estimated to be about 6 to 7 per mill. The O-18 and helium isotope data from the overflowing shelf water component observed on the continental slope confirm the hypothesis that ISW contributes significantly to the Weddell Sea Bottom Water (WSBW). On the basis of a multiparameter water mass analysis it is discussed which fraction of the WSBW originates from ISW and which other shelf waters potentially could contribute to WSBW (Auth. mod.)

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Ice navigation, Research projects, Sea ice
A review of four German Antarctic expeditions (GANOVEX I-IV) is given for the period from 1979 to 1988. The logistic concept comprises mobile fieldwork supported by helicopters. A ship is normally used as a floating base but there are also two summer stations on-shore. One of them, the Gondwana Station, is only about 10 km from the new Italian Terra Nova Station. The scientific investigations carried out so far concern three important subjects: the reconstruction of the Gondwana supercontinent especially the reconstruction between Antarctica and Australia/Tasmania/New Zealand, the tectonic processes at the mobile Pacific margin of Antarctica/Gondwana in the Paleozoic, and the relation of the Ross Sea Rift and the adjacent block-faulted range of the Transantarctic Mountains. (Auth.)

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Terra Nova Bay: a geographic overview.
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Glaciers, Sea ice, Antarctica—Terra Nova Bay.
A brief account is given of the main geographical features of the Terra Nova Bay area The Transantarctic Mountains are crossed by outlet glaciers coming from the East-Antarctic Ice Sheet or by valley glaciers descending from local névés. The coasts and the bathymetry bear evidence of glacial erosion. Climate, life forms and permanent stations of the area are briefly described. (Auth)

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Geomorphological map of the Northern Foothills near the Italian station (Terra Nova Bay, Antarctica).
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Glaciers, Sea ice, Maps, Glacial deposits, Periglacial processes, Weathering, Antarctica—Terra Nova Bay.
A detailed colour geomorphological map at the scale of 1.20,000 is presented Landforms and deposits mapped include those related to glaciers, cryogenic activity, wind and sea action, weathering and geological structure. They have been represented with distinct colors referred to the geomorphic processes which they originated from Lithologic and structural features are also supplied. A pattern conditioned by the geological structure and glacial history can be outlined. Several zones parallel to the coast can be singled out A first, lower belt is characterized by coastal landforms, strongly conditioned by salt weathering and showing organogenous features A second belt can be recognized up to about 450 m, corresponding to the area covered by ice during the last glaciation A discontinuous sheet of glacial sediment is present, it is locally ice-cored and widely affected by ice-wedge polygons. Large areas of debris covered glaciers are also present. A third belt develops higher than 450 m, up to the maximum height in the surveyed area Large bedrock outcrops with a thin and highly discontinuous cover of glacial sediments occur in this belt. Rock surfaces are strongly oxidized, show frequent cavernous weathering, and locally, pseudo-karren features. Although major landforms are controlled by the structural trend and by glacial erosion, the periglacial processes appear as the most active for the evolution of subaerial landforms (Auth. mod)

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Microbiology, Ecosystems, Algae, Polar regions, Ice sheets, Sea ice, Deserts.
This review focuses on aspects of microbial ecology considered to be somewhat unusual and distinctive to the antarctic region Advances in the study of microbial ecosystems of the land, freshwater, and sea (excluding the oceanic phytoplankton) are discussed here with reference mainly to bacteria, cyanobacteria, microalgae, yeasts, and microfungi. However, as with all natural systems, there is an overlap of habitats, strategies, and populations which contributes to the dynamics and resilience of the antarctic ecosystem.

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Sea ice distribution, Periodic variations, Solar activity, Correlation, Wind factors, Ice forecasting, Time factor, Canada—Newfoundland.

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Three new samplers were developed for detailed analysis of the three-dimensional characteristics of frazil ice deposits beneath an ice cover. These samplers obtain *in-situ* bulk, hollow core and flat plate samples of the deposits through 200-mm-diameter access holes The samples provide information on a deposit's internal structure, stratigraphy and sedimentology, geometry and physical properties, and lateral and vertical variabilities of each When used as part of a comprehensive field program, the data provide information required for interpreting mechanisms of frazil transport and deposition, and for analyzing the dynamic interaction of frazil deposits with winter river processes.

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Permafrost thickness, Permafrost structure, Geophysical surveys, Permafrost depth, Antarctica—Seymour Island.
Four sites on a flat terrain with Tertiary sediments at Seymour I were sounded for permafrost depths with vertical electrical soundings (VES). two on the Meseta at 200 m a.s.l., one on the Submeseta 50-60 m a s.l. and one near the shore line at Larsen. Such VES soundings are compared with previous magnetotelluric (MT) soundings. for the compared area, on the Meseta, there is perfect coupling of both types of data. There are three permafrost conditions in the Meseta which are a result of temperature and salinity the upper one, 80 m thick, an intermediate brine layer, 8.0 m thick, and a lower permafrost, not icebounded, 44 m thick. Permafrost thickness decreases from 127.5 m on the Meseta at 200 m a.s l. down to 44 m on the Submeseta at 55 m a.s l. and down to Larsen sea shore with 28 m. This is considered as a response of sea level withdrawal during the last thousands of years because of isostatic rebound of the island due to glacial unloading. (Auth.)

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Snow water equivalent, Radar, Runoff forecasting, Snow accumulation, Microwaves, Snow depth, Measuring instruments, Tests.

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Petroleum industry, Environmental impact, Ecology, Environmental protection, Industrial development, Natural gas, Crude oil, Tundra, Meetings.

44-3327
Operation Deep Freeze 89/90 end of season report.
U.S. Naval Support Force Antarctica, 1990, var. p.
Research projects, Expeditions, Sea ice, Logistics, Antarctica.
This report describes the military support provided to the National Science Foundation in conjunction with the U.S. Antarctic Program from Aug. 1989 to Mar. 1990. This included providing fundamental life support requirements of food and medical services to McMurdo residents and the logistic pipeline for resupply of McMurdo, South Pole, and Byrd Stations, plus support of Scott Base, the nearby New Zealand camp Inherent with the support requirements is the objective of safe operations. A chronological summary of significant events during the operating period is given. The various organizations, units and commands participating in Operation DEEP FREEZE 89/90 are listed, and their activities are described in sufficient detail to provide guidance for following years

44-3328
Large-scale geomorphologic-glaciological mapping of the arid high-polar Borgmassivet, New Schwabenland, Antarctica. [Geomorphologisch-glaziologische Detailkartierung des arid-hochpolaren Borgmassivet, Neuschwabenland, Antarktica],
Brunk, K., *Berichte zur Polarforschung,* 1989, No.66, 102p., In German with English summary. Refs. p.85-102.
Glacial erosion, Climatic changes, Weathering, Geomorphology, Maps, Antarctica—Borg Massif.
The Borg Massif is an intensively glaciated mountainous region in the east antarctic dry snow zone, situated where several plateaus and nunataks intersect the slope of the inland ice sheet. The local climate is strongly influenced by the glacial climate of the surrounding inland ice areas. At the present low annual mean temperatures (below -25C), the cold, inert glacier masses are frozen to the ground, thus preventing any appreciable glacial erosion. The existing landforms of glacial erosion were principally created during the Oligocene and Miocene periods when the Borg Massif was covered by warm or warmbased glaciers Sculpturing of the plateau and nunatak flanks and the deepening of mostly tectonically controlled valleys came to an end when the ice masses froze to the ground, probably no later than during the Pliocene era The Borg Massif, in contrast to other antarctic mountainous regions, shows no traces of former particularly high marginal trimlines. Details of the climatic, erosional, and chemical weathering processes are discussed. Also given are selection and construction information of the 1:50,000 scale chart found in the back pocket of the book The chart depicts the geomorphology and glaciology of the area extending from 72 deg 28 min S to 72 deg 40 min S between 4 deg 3 min W and 3 deg 9 min W. (Auth. mod.)

44-3329
Environmental conditions on the Norwegian continental shelf Barents Sea.
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Rescue operations, Offshore drilling, Cold weather survival, Ice conditions, Rescue equipment, Safety, Offshore structures, Petroleum industry.

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Aircraft icing, Ice detection, Remote sensing, Microwaves, Radiometry, Ice formation indicators

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Power line icing, Electrical insulation, Snow electrical properties, Transmission lines.

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44-3341
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44-3342
Last glaciation of Marvin Peninsula, northern Ellesmere Island, High Arctic, Canada.
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Extraterrestrial ice, Ice surface, Albedo, Photometry, Spaceborne photography, Reflectivity, Photointerpretation.

44-3345
Albedo dichotomy of Rhea: Hapke analysis of Voyager photometry.
Verbiscer, A.J., et al, *Icarus,* Dec. 1989, 82(2), p.336-353, 32 refs.
Veverka, J.
Extraterrestrial ice, Ice surface, Photometry, Albedo, Surface roughness, Brightness, Light scattering, Statistical analysis.

44-3346
Prediction of vessel icing for near-freezing sea temperatures.
Overland, J.E., *Weather and forecasting,* Mar. 1990, 5(1), p.62-77, 28 refs.
Ship icing, Ice forecasting, Icing rate, Ice accretion, Ice models, Surface structure, Wind factors, Water temperature.

44-3347
Jacket structures in the arctic and subarctic seas.
Kimura, T , et al, *Nippon Steel technical report,* Jan 1988, No 36, p.1-6, 6 refs.
Offshore structures, Covering, Design, Protection, Ice pressure, Steel structures, Mechanical tests, Structural analysis.

44-3348
Ice-forming activity of ultrasmall particles on silver iodide.
Gorbunov, B.Z., et al, *Colloid journal of the USSR,* May-June 1989, 51(3), p.495-498, For Russian orginal see 44-2569. 9 refs.
Kakutkina, N.A., Kutsenogii, K.P.
Aerosols, Silver iodide, Ice crystal growth, Particles, Supercooled fog, Nucleation, Water vapor.

44-3349
Multiyear trends in snowpack ion accumulation and loss, northern Michigan.
Stottlemyer, R., et al, *Water resources research,* Apr. 1990, 26(4), p.721-737, 34 refs.
Rutkowski, D.
Snow cover, Chemical composition, Ion density (concentration), Runoff, Snow accumulation, Precipitation (meteorology), Seasonal variations, Streams, Watersheds, Snow water equivalent, United States—Michigan.

44-3350
Comparison of *in situ* and satellite-derived reflectances of Forbindels Glacier, Greenland.
Hall, D.K., et al, *International journal of remote sensing,* Mar. 1990, 11(3), p.493-504, 27 refs.
Bindschadler, R.A., Foster, J.L., Chang, A.T.C., Siddalingaiah, H.
Glacier surfaces, Snow surface, Reflectivity, Ice spectroscopy, Spaceborne photography, LANDSAT, Snow optics, Surface properties, Glacier surveys, Correlation, Glacier mass balance, Greenland—Forbindels Glacier.

44-3351
Surface expressions of eddies within the ice pack.
Shuchman, R A , et al, *International journal of remote sensing,* Jan. 1990, 11(1), p.3-4, 1 ref
Sutherland, L.L., Johannessen, O.M.
Pack ice, Ocean currents, Floating ice, Oblique photography, Air water interaction.

44-3352
Satellite sensor estimates of northern hemisphere snow volume.
Chang, A.T.C., et al, *International journal of remote sensing,* Jan. 1990, 11(1), p.167-171, 18 refs.
Foster, J.L., Hall, D.K.
Volume, Snow cover distribution, Seasonal variations, Radiometry, Spaceborne photography, Snow density, Snow cover structure, Scattering, Climatic change, Microwaves.

44-3353
Report for the period 1 July 1988 to 31 Mar. 1989 (but reporting the full antarctic field season).
British Antarctic Survey, Cambridge, Natural Environment Research Council, 102p., Publ. p.88-93.
Research projects, Glaciology.
General remarks are made concerning staff changes, finance and activities in various divisions at BAS stations; personnel awards are announced, distinguished visitors, and British and international meetings attended are listed. Logistic and operational activities are reviewed, including ship and air operations. A science strategy plan is provided; 5 principal and 2 minor "Science Themes" provide a framework for 14 research programs. They are reviewed in detail and consist of the following: pattern and change in the physical environment of Antarctica, geological evolution of West Antarctica, dynamics of antarctic terrestrial and freshwater ecosystems; structure and dynamics of the southern ocean ecosystem; physics of solar-terrestrial phenomena from Antarctica; humans in isolated polar communities, and antarctic geographic information and mapping. Included are lists of 1988 publications, and staff at various locations, divisions and aboard ships.

44-3354
Analysis of corrosion data to develop operational and engineering criteria for arctic structures—Vol.1 and 2.
Brown, T.G., et al, *Transport Canada. Report,* Apr. 1989, TP 9681E, 203p. + Appends., 37 refs.
Laskow, V.
Ships, Corrosion, Steel structures, Countermeasures, Icebreakers, Structural analysis, Welding, Surface properties, Statistical analysis, Chemical properties, Mechanical tests, Design criteria, Ocean environments.

44-3355
Prospects for measuring path-averaged turbulent heat fluxes using scintillation at three wavelengths.
Andreas, E.L., MP 2696, Symposium on Turbulence and Diffusion, 9th, Roskilde, Denmark, Apr. 30-May 3, 1990. Preprint volume, Boston, American Meteorological Society, [1990], p.74-77, 13 refs.
Heat flux, Atmospheric attenuation, Scintillation, Turbulence, Air temperature, Humidity, Propagation, Analysis (mathematics).

44-3356
Expected sea-level rise from climatic warming in the Antarctic.
Budd, W F , Greenhouse Planning for climate change, edited by G.I Pearman, Melbourne, Australia, CSIRO, 1988, p.74-82, 35 refs.
DLC QC912.3.G735 1988
Ice sheets, Mass balance, Ice creep, Air temperature, Antarctica.
The antarctic ice sheet is considered to be close to a steady state in mass balance with a net accumulation of about 2000 cu km/y, over the area of of about 13.6 million sq km, being approximately balanced by ice flow and calving of a similar amount. The uncertainties in the balance estimates exceed 20% which in absolute terms is larger than the volume of water involved in the current rate of sea-level rise. The major effects of global warming in the Antarctic which can affect future sea-level changes are possible increases in precipitation, which have a negative impact, and basal melt of the ice shelves, which could ultimately give rise to faster flow of the grounded ice, which would give a positive impact to sea-level rise. Numerical modelling of ice-sheet flow indicates that increased sliding speeds up to an order of magnitude above present rates could then lead to a reduction

in the volume of ground ice. The effect on sea level could reach up to 0.3 m in the first century and about 1 m by 500 years. The new steady state would be reached only after some 5000 years with a total increase to sea level of about 4.5 m. These changes, although serious and possibly irreversible, are sufficiently slow to be monitored and the impacts managed. (Auth.)

44-3357
Pigment data of sea ice cores collected from fast ice area near Syowa Station, Antarctica, from Mar. 1983 to Jan. 1984 (JARE-24).
Watanabe, K., et al, *Japanese Antarctic Research Expedition. JARE data reports,* Mar. 1990, No.157, 88p., 5 refs.
Satoh, H., Takahashi, E., Kanda, H.
Sea ice, Ice composition, Cryobiology, Algae, Antarctica—Showa Station.
Ice cores collected near Showa Station from Mar. 1983 to Jan. 1984 are analyzed in the evaluation of microalgae activity in sea ice. Two cores were sampled at each site of collection. Tables are presented summarizing the data from each of two cores and show average data for each part.

44-3358
150 MHz coherent radar system.
Moore, R.K., et al, IEEE National Radar Conference, Dallas, TX, Mar. 29-30, 1989. Proceedings, New York, Institute of Electrical and Electronics Engineers, 1989, p.42-47.
Raju, G., Xin, W., Davis, C., Demarest, K.R., Rummer, D.I.
DLC TK6573.I24a
Radar echoes, Ice cover, Data processing, Antarctica—West Antarctica.
A 150-MHz coherent radar has been developed for sounding the antarctic ice cap, but it may have other applications. The radar has a peak power of 20W, but has a chirp gain of 26 and coherent processing gain from 256 to 64,000 depending on control settings and application. The low time-bandwidth product was needed for the chirp to allow operation from the surface of the ice with a minimum range of only 250 m. The radar was tested successfully in both surface and airborne modes in West Antarctica during Dec. 1987.

44-3359
Navigation in the ice of the Arctic. (Sudokhodstvo vo l'dakh Arktiki),
Ankalnen, A.I., Moscow, Transport, 1990, 247p., In Russian. 26 refs.
Ice navigation, Icebreakers, Economic development, Marine transportation, Ports.

44-3360
Construction in water: manual. (Stroitel'stvo v vodnoĭ srede: spravochnik),
Godes, E.G., et al, Leningrad, Strolizdat, 1989, 527p. (Pertinent p.97-110, 439-448), In Russian. 20 refs. 2nd edition revised and enlarged. For 1st edition see 39-3508.
Narbut, R.M.
Hydraulic structures, Construction, Ice loads, Manuals, Cold weather construction, Cold weather operation.

44-3361
Characterization of hydrocarbon gas within the stratigraphic interval of gas-hydrate stability on the North Slope of Alaska, U.S.A.
Collett, T.S., et al, *Applied geochemistry,* Apr.-June 1990, 5(3), p.279-287, 27 refs.
Kvenvolden, K.A., Magoon, L.B.
Natural gas, Hydrates, Permafrost thermal properties, Well logging, Permafrost structure, Hydrocarbons, Gas inclusions, United States—Alaska—North Slope.

44-3362
Some cryogenic weathering features of gold-quartz veins and the formation of gold haloes, Baikal rift zone, U.S.S.R.
Taisaev, T.T., *Applied geochemistry,* Apr.-June 1990, 5(3), p.297-302, 14 refs.
Gold, Permafrost weathering, Cryogenic soils, Placer mining, USSR—Baykal Mountains.

44-3363
Prediction of mineral solubilities in natural waters: a chemical equilibrium model for the Na-K-Ca-Mg-Cl-SO4-H2O system at temperatures below 25 C.
Spencer, R.J., et al, *Geochimica et cosmochimica acta,* Mar. 1990, 54(3), p.575-590, 36 refs.
Möller, N., Weare, J.H.
Brines, Freezing points, Solid phases, Solubility, Solutions, Water chemistry, Low temperature research, Salinity, Supercooling, Minerals.

44-3364
Melting behavior of fluid inclusions in laboratory-grown halite crystals in the systems NaCl-H2O, NaCl-KCl-H2O, NaCl-MgCl2-H2O, and NaCl-CaCl2-H2O.
Davis, D.W., et al, *Geochimica et cosmochimica acta,* Mar. 1990, 54(3), p.591-601, 26 refs.
Lowenstein, T.K., Spencer, R.J.
Crystals, Brines, Solid phases, Freezing points, Melting points, Minerals, Temperature effects, Chemical analysis, Solutions.

44-3365
System NaCl-CaCl2-H2O: I. the ice liquidus at 1 atm total pressure.
Oakes, C.S., et al, *Geochimica et cosmochimica acta,* Mar. 1990, 54(3), p.603-610, 29 refs.
Bodnar, R.J., Simonson, J.M.
Brines, Liquid phases, Freezing points, Ice formation, Solutions, Salinity, Chemical composition, Temperature gradients, Geochemistry.

44-3366
Liquid-absent aqueous fluid inclusions and phase equilibria in the system CaCl2-NaCl-H2O.
Schiffries, C.M., *Geochimica et cosmochimica acta,* Mar. 1990, 54(3), p.611-619, 32 refs.
Minerals, Brines, Solid phases, Melting points, Ice formation, Hydrothermal processes, Spectroscopy, Chemical analysis, Temperature gradients, Phase transformations, Geologic processes.

44-3367
Phase transformations of water in hardened cement paste—a low-temperature DSC investigation.
Beddoe, R.E., et al, *Cement and concrete research,* Mar. 1990, 20(2), p.236-242, 11 refs.
Setzer, M.J.
Concrete freezing, Temperature measurement, Cements, Physical properties, Phase transformations, Thermodynamic properties, Water structure, Porous materials.

44-3368
Equipment and systems that help control snow. *Better roads,* Nov. 1989, 59(11), p.41-42,45.
Snow removal, Equipment, Cold weather operation, Design.

44-3369
Snow-winging tips. *Better roads,* Nov. 1989, 59(11), p.44.
Snow removal, Equipment, Design.

44-3370
Change in explosive waves with freezing of the ground.
Liakhov, G.M., et al, *Combustion, explosion, and shock waves,* Nov. 1989, 25(3), p.352-357, Translated from Fizika goreniia i vzryva. 12 refs.
Luchko, I.A., Plaksiĭ, V.A., Remez, N.S.
Explosion effects, Frozen ground compression, Wave propagation, Analysis (mathematics), Porosity, Physical properties.

44-3371
Sea control in the Arctic: a Soviet perspective.
Egan, D.M., et al, Newport, RI, U.S. Naval War College, Apr. 20, 1987, 48p., ADA-184 793, 81 refs.
Soviet strategy presented as conversation between two fictitious Soviet military planners but data on capabilities are factual.
Orr, D.W.
Ice navigation, Icebreakers, Military operation, Military transportation, Marine transportation, Logistics.

44-3372
Studies of cubic ice crystals. Final report.
Finnegan, W.G., et al, Reno, University of Nevada, Atmospheric Sciences Center, Desert Research Institute, Dec. 11, 1989, 71p., ADA-216 574, Refs. p.66-71.
Pitter, R.L.
Ice crystal structure, Ice crystal growth.

44-3373
Error sensitivity model for Doppler positioning using transit satellites.
McMillan, J.C., *Canada. Defence Research Establishment, Ottawa. Report,* Aug. 1989, DREO-1015, 132p., ADA-216 724, With French summary. 4 refs.
Navigation, Spacecraft, Data processing, Mathematical models.

44-3374
Studies of sea ice thickness and characteristics from an arctic submarine cruise. Phase 3. Progress report Oct. 1, 1988 - June 30, 1989.
Science Applications International Corporation Polar Oceans Associates, Cambridge, England, Sep. 4, 1989, 34p. + appends., ADA-216 738, Refs. passim. Two papers by P. Wadhams, et al, included as Appendix 4, for which see 44-3375 and 44-3376.
Sea ice, Ice cover thickness, Ice bottom surface, Ice surface, Subglacial navigation, Subglacial observations, Airborne radar, Submarines.

44-3375
Processes determining the bottom topography of multiyear arctic sea ice.
Wadhams, P., et al, Studies of sea ice thickness and characteristics from an arctic submarine cruise. Phase 3, Cambridge, England, SAIC Polar Oceans Associates, Sep. 4, 1989, 5p., ADA-216 738, Included in Appendix 4. 11 refs.
Martin, S.
Sea ice, Ice bottom surface, Ice cover thickness, Subglacial observations, Acoustic measurements, Submarines.

44-3376
Concurrent remote sensing of arctic sea ice from submarine and aircraft.
Wadhams, P., et al, MP 2697, Studies of sea ice thickness and characteristics from an arctic submarine cruise. Phase 3, Cambridge, England, SAIC Polar Oceans Associates, Sep. 4, 1989, 20p., ADA-216 738, Included in Appendix 4. 6 refs.
Comiso, J.C., Cowan, A.M., Crawford, J., Jackson, G., Krabill, W.B., Kutz, R., Sear, C.B., Swift, R.N., Tucker, W.B.
Sea ice, Ice bottom surface, Ice cover thickness, Ice surface, Remote sensing, Subglacial observations, Airborne radar.

44-3377
Acoustic mode coherence in the Arctic Ocean.
Polcari, J.J., Cambridge, Massachusetts Institute of Technology, May 1986, 297p., ADA-216 942, Ph.D. thesis. 85 refs.
Underwater acoustics, Ice acoustics, Sound transmission, Sound waves, Ice cover effect, Analysis (mathematics), Arctic Ocean.

44-3378
Observational evaluation of snow cover effects on the generation and modification of mesoscale circulations.
Cramer, J., *U.S. Air Force Institute of Technology, Wright-Patterson AFB, OH. Report,* 1988, AFIT/CI/CIA-88-200, 143p., ADA-217 437, M.S. thesis. 54 refs.
Snow cover effect, Atmospheric circulation, Snow air interface, Wind factors, Air flow, Aerial surveys.

44-3379
Adverse weather operations during the Canadian Atlantic Storms Program.
MacPherson, J.I., et al, *North Atlantic Treaty Organization. Advisory Group for Aerospace Research and Development. AGARD conference proceedings,* 1989, No.470, Flight in adverse environmental condition, p.12/1-12/13, ADA-217 606, 10 refs.
Isaac, G.A.
Aircraft icing, Wind factors, Cloud physics, Snowstorms.

44-3380
NASA's program on icing research and technology.
Reinmann, J.J., et al, *North Atlantic Treaty Organization. Advisory Group for Aerospace Research and Development. AGARD conference proceedings,* 1989, No.470, Flight in adverse environmental condition, p.22/1-22/31, ADA-217 606, 47 refs. For another version see 44-0992.
Shaw, R.J., Ranaudo, R.J.
Aircraft icing, Wind tunnels, Ice prevention, Computer simulation, Ice formation, Ice detection, Ice accretion, Safety.

44-3381
Ice induced aerodynamic performance degradation of rotorcraft: an overview.
Korkan, K.D., et al, *North Atlantic Treaty Organization. Advisory Group for Aerospace Research and Development. AGARD conference proceedings,* 1989, No.470, Flight in adverse environmental condition, p.23/1-23/34, ADA-217 606, 83 refs.
Britton, R.K.
Helicopters, Aircraft icing, Safety, Ice accretion, Cold weather performance.

44-3382
Flight and wind tunnel investigation of aerodynamic effects of aircraft ground deicing/anti-icing fluids.
Runyan, L.J., et al, *North Atlantic Treaty Organization Advisory Group for Aerospace Research and Development 4GARD conference proceedings*, 1989. No.470, Flight in adverse environmental condition, p.24/1-24/11, ADA-217 606, 6 refs.
Zierten, T.A., Hill, E.G.
Aircraft icing, Chemical ice prevention, Safety, Wind tunnels, Cold weather performance.

44-3383
Airfields on antarctic glacier ice.
Mellor, M., et al, *U.S. Army Cold Regions Research and Engineering Laboratory*, Dec. 1989, CR 89-21, 97p., ADA-217 638, 42 refs.
Swithinbank, C.
Ice runways, Glacier ice, Glacier surfaces, Glacier ablation, Antarctica.
The physical characteristics of blue ice ablation areas in Antarctica are described and some representative ablation rates are given. The possibilities for using blue-ice areas as airfields are outlined and exploratory surveys are mentioned. Site details are given for icefields at Mount Howe, Mill Glacier, Patriot Hills, Rosser Ridge, Mount Lechner, S1 near Casey station, and on the Ross Ice Shelf near McMurdo station. The surface roughness of blue ice is discussed, microrelief surveys are presented for Mount Howe and Patriot Hills, and spectral analyses are used to develop relations between bump height and wavelength. U.S. military specifications for the roughness limits of various types of runways are summarized and graphical comparisons are made with the roughness analyses for Mount Howe and Patriot Hills. Special machines for smoothing ice runways are discussed and design specifications are developed. Some notes on ground facilities and ground transport are included. Appendices give discussions of weather patterns in the Transantarctic Mountains and methodology for making spectral analyses of surface roughness. It is concluded that glacier-ice airfields for conventional transport aircraft can be developed at low cost in Antarctica. Recommendations for further work are offered.

44-3384
Effect of global warming on arctic coastal and offshore engineering.
Gerwick, B.C., Jr., *Journal of cold regions engineering*, Mar. 1990, 4(1), p.1-5, 2 refs.
Polar regions, Ocean environments, Climatic changes, Sea level, Engineering, Shore erosion, Sea ice, Air temperature, Ocean waves, Construction.

44-3385
Cold regions engineering: climatic warming concerns for Alaska.
Esch, D.C., et al, *Journal of cold regions engineering*, Mar. 1990, 4(1), p.6-14, 8 refs.
Osterkamp, T.E.
Climatic changes, Air temperature, Permafrost transformation, Ground thawing, Engineering, Permafrost mass transfer, Frozen ground temperature, Climatology, Temperature effects, Periodic variations, United States—Alaska.

44-3386
Consequences of climatic change for hydrology in permafrost zones.
Woo, M.K., *Journal of cold regions engineering*, Mar. 1990, 4(1), p.15-20, 12 refs.
Climatic changes, Permafrost hydrology, Ground thawing, Water balance, Glacier ablation, Snow accumulation, Climatology, Air temperature.

44-3387
Effects of elevated temperatures and rising sea level on Arctic coast.
Barnes, P.W., *Journal of cold regions engineering*, Mar. 1990, 4(1), p.21-28, 27 refs.
Climatic changes, Sea level, Shore erosion, Fast ice, Sea ice distribution, Ocean waves, Water temperature, Sediment transport, Geomorphology, Beaufort Sea.

44-3388
Potential responses of permafrost to climatic change.
Smith, M., *Journal of cold regions engineering*, Mar. 1990, 4(1), p.29-37, 24 refs.
Climatic changes, Permafrost transformation, Ground thawing, Air temperature, Ground temperature, Thermal regime, Frozen ground, Climatic factors.

44-3389
Thermal regime of permafrost in Alaska and predicted global warming.
Osterkamp, T.E., et al, *Journal of cold regions engineering*, Mar. 1990, 4(1), p.38-42, 10 refs.
Lachenbruch, A.H.
Climatic changes, Permafrost transformation, Thermal regime, Ground thawing, Ground temperature, Air temperature, Climatology, United States—Alaska.

44-3390
Climatic change and permafrost: record from surficial deposits.
Carter, L.D., *Journal of cold regions engineering*, Mar. 1990, 4(1), p.43-53, 33 refs.
Climatic changes, Permafrost dating, Permafrost forecasting, Surface structure, Landforms, Ground ice, Periodic variations, Glaciation, Geomorphology.

44-3391
Greenhouse warming: consequences for Arctic climate.
Etkin, D., *Journal of cold regions engineering*, Mar. 1990, 4(1), p.54-66, 12 refs.
Climatic changes, Gases, Atmospheric composition, Polar regions, Models, Carbon dioxide, Snow ice interface, Air temperature, Climatology.

44-3392
Effect of climatic warming on pile creep in permafrost.
Nixon, J.F., *Journal of cold regions engineering*, Mar. 1990, 4(1), p.67-73, 4 refs.
Climatic changes, Piles, Permafrost beneath structures, Ground thawing, Foundations, Creep, Ground temperature, Geothermal thawing, Settlement (structural), Simulation.

44-3393
Evidence of recent changes in global snow and ice cover.
Barry, R.G., *GeoJournal*, Feb. 1990, 20(2), p.121-127, 48 refs.
Snow cover distribution, Sea ice distribution, Ice cover, Periodic variations, Climatic factors, Climatic changes, Land ice, Permafrost distribution, Air temperature, Climatology.

44-3394
Signal-processing algorithm for the extraction of thin freshwater-ice thickness from short pulse radar data.
Riek, L., et al, *IEEE transactions on geoscience and remote sensing*, Jan. 1990, 28(1), MP 2698, p.137-145, 18 refs.
Crane, R.K., O'Neill, K.
Ice cover thickness, Measurement, Radar echoes, Mathematical models, Data processing, Scattering, River ice, Lake ice, Accuracy, Layers, Surface roughness, Electromagnetic waves.

44-3395
Review of beach nourishment from ice transport of shoreface materials, Beaufort Sea, Alaska.
Reimnitz, E., et al, *Journal of coastal research*, Spring 1990, 6(2), p.439-469, Refs. p.467-469
Barnes, P.W., Harper, J.R.
Shoreline modification, Sediment transport, Fast ice, Ice pileup, Beaches, Littoral zone, Shore erosion, Ice push, Ice scoring, Landforms, Gravel, Beaufort Sea.

44-3396
Geologic influences on fluvial hydrology and bedload transport in small mountainous watersheds, northern New Mexico, U.S.A.
Kelson, K.I., et al, *Earth surface processes and landforms*, Dec. 1989, 14(8), p.671-690, 48 refs.
Wells, S.G.
Watersheds, Stream flow, Runoff, Snowmelt, Sediment transport, Lithology, Rock properties, Surface structure, Mountains, Hydrology, Geologic processes.

44-3397
Enhanced boulder weathering under late-lying snowpatches.
Ballantyne, C.K., et al, *Earth surface processes and landforms*, Dec. 1989, 14(8), p.745-750, 14 refs.
Black, N.M., Finlay, D.P.
Nivation, Rocks, Weathering, Hardness tests, Meltwater, Mechanical tests, Rock properties, Surface properties, Climatic factors.

44-3398
Multisensor approach to sea ice classification for the validation of DMSP-SSM/I passive microwave derived sea ice products.
Steffen, K., et al, *Photogrammetric engineering and remote sensing*, Jan. 1990, 56(1), p.75-82, 14 refs.
Schweiger, A.J.
Sea ice distribution, Spaceborne photography, Radiometry, Data processing, Microwaves, Resolution, Ice edge, Ice conditions, Classifications, LANDSAT, Correlation.

44-3399
Inexpensive polarimetric FM radar and polarimetric signatures of artificial sea ice.
Gogineni, S.P., et al, IEEE National Radar Conference, Dallas, TX, Mar. 29-30, 1989. Proceedings, New York, Institute of Electrical and Electronics Engineers, 1989, p.188-191, 4 refs.
Bredow, J.W., Moore, R.K.
Artificial ice, Radar echoes, Scattering, Electronic equipment, Sea ice, Design, Electromagnetic waves.

44-3400
Synthesis and X-ray diffraction analysis of AgI-CuBr solid solutions for ice nucleation.
Sivanesan, S., et al, *Journal of materials science letters*, Mar. 1990, 9(3), p.263-265, 8 refs.
Gobinathan, R.
Solutions, Heterogeneous nucleation, Ice crystal growth, Silver iodide, Latticed structures, Molecular structure, X ray analysis, Chemical composition.

44-3401
Distribution of snow cover in Honshu with due consideration of satellite imagery.
Muramatsu, I., et al, *Seppyo*, Mar. 1990, 52(1), p.1-11, In Japanese with English summary. 8 refs.
Sato, S., Umebayashi, T., Takeda, T., Kato, A.
Snow cover distribution, Spaceborne photography, Japan—Honshu.

44-3402
On an improved equation for estimating the daily snowmelt water from snowpack.
Akatsu, K., et al, *Seppyo*, Mar 1990, 52(1), p.13-23, In Japanese with English summary. 10 refs.
Suto, H., Masatsuka, A.
Snowmelt, Runoff forecasting, Mathematical models, Snow melting, Snow water equivalent

44-3403
Depth of newly fallen snow measured by snow depth sensor.
Muramatsu, I., et al, *Seppyo*, Mar 1990, 52(1), p.25-28, In Japanese. 2 refs.
Sato, S.
Snow depth, Precipitation gages, Snow samplers, Snowfall.

44-3404
Influences of deforestation on snowmelt runoff.
Shimizu, T., *Seppyo*, Mar. 1990, 52(1), p.29-34, In Japanese. 11 refs.
Snowmelt, Runoff, Vegetation factors.

44-3405
Sea ice climatic atlas: Volume 2, Arctic East.
U.S. Naval Oceanography Command Detachment, Asheville, NC, NAVAIR 50-1C-541, June 1986, 147p.
Sea ice distribution, Ice conditions, Ice edge, Maps, Charts, Statistical analysis, Computer programs, Climatology, Arctic Ocean.

44-3406
Sea ice climatic atlas: Volume 3, Arctic West.
U.S. Naval Oceanography Command Detachment, Asheville, NC, NAVAIR 50-1C-542, June 1986, 147p.
Sea ice distribution, Ice edge, Ice conditions, Maps, Charts, Climatology, Statistical analysis, Computer programs, Arctic Ocean.

44-3407
Arctic marine transportation program, 1979 to 1986. Technical summary.
Zahn, P.B., et al, *U.S. Maritime Administration. Report*, Aug. 1988, MA-RD-840-88021, Var.p., PB89-190995, 63 refs.
DeBord, F.W., Minnick, P.V.
Ice navigation, Marine transportation, Icebreakers.

44-3408
Tensile reinforcement of road embankments on polygonal ground using geosynthetics. Final report.
Kinney, T.C., *Alaska. Department of Transportation and Public Facilities. Report*, Mar. 1986, FHWA-AK-RD-87-27, 53p., PB89-232482, 9 refs.
Permafrost beneath roads, Embankments, Construction materials, Road maintenance, Roadbeds, Trafficability.

44-3409
Sea transport in ice-covered waters.
Varsta, P., Espoo, Finland, Helsinki University of Technology, 1988, 22p., PB89-128854, 15 refs. Presented at the International Conference on Technology for Polar Areas, Trondheim, June 15-17, 1988. For other papers from same conference see 43-610 through 43-661.
Ice navigation, Marine transportation.

44-3410
Synopsis of analytic solutions for the temperature distribution in a river downstream from a dam or reservoir.
Gosink, J.P., *Water resources research*, June 1986, 22(6), p.979-983, ADA-171 414, 22 refs.
River flow, River ice, Water temperature, Analysis (mathematics), Temperature distribution, Temperature effects, Dams, Heat transfer.

44-3411
General overview of the surface of Mars, pt.3: lowlands, polar caps, large-scale fossilized activities of water and mud. [Das relief des Mars' Versuch einer zusammenfassenden Übersicht. Teil III (Tiefländer, Polkappen, fossile grossflächige Wasser-/Schlammaktivitäten)].
Jöns, H.P., *Geologische Rundschau*, Feb. 1990, 79(1), p.131-164, In German with English, French and Russian summaries. 25 refs.
Mars (planet), Polygonal topography, Mudflows, Extraterrestrial ice, Landforms, Ground water, Geologic processes, Frozen ground mechanics.

44-3412
Sticky snow: stopping the damage. [La neige collante: halte aux dégâts].
Admirat, P., et al, *Recherche*, Jan. 1990, No.217, p.96-99, In French. 8 refs.
Billot, P., Lapeyre, J.L., Esposito, O.
Power lines, Snow loads, Damage, Snow mechanics, Cables (ropes), Structural analysis, Metamorphism (snow), Weather forecasting, Countermeasures

44-3413
Effect of low temperature on the flexural behaviour of polypropylene mesh reinforced fibre cement composite.
Currie, B., et al, *International journal of cement composites and lightweight concrete*, Aug. 1989, 11(3), p.149-152, 7 refs.
Gardiner, T.
Cement admixtures, Polymers, Flexural strength, Low temperature tests, Brittleness, Loading, Physical properties, Phase transformations, Molecular structure

44-3414
Avalanche risk estimate—a model for complete simulation of snow cover evolution. [Prévision du risque d'avalanches-un modèle pour simuler intégralement l'évolution du manteau neigeux].
Brun, E., et al, *Neige et avalanches*, Apr. 1990, No.51, p.17-20, In French.
David, P., Dudul, M.
Snow cover stability, Avalanche forecasting, Avalanche modeling, Snow air interface, Simulation, Snow accumulation, Snow composition, Altitude.

44-3415
Multipurpose sled of the mountain rescue patrol. [Traineau polyvalent gendarmerie de secours].
Emin, R., *Neige et avalanches*, Apr. 1990, No.51, p.25-26, In French
Rescue equipment, Sleds, Materials, Mountains, Snow vehicles.

44-3416
Century old record of lead-210 fallout on the Greenland ice sheet.
Nijampurkar, V.N., et al, *Tellus*, Feb. 1990, 42B(1), p.29-38, 28 refs.
Clausen, H.B.
Fallout, Radioactive age determination, Ice cores, Ice dating, Geochronology, Ice sheets, Oxygen isotopes, Atmospheric composition, Chemical analysis, Greenland.

44-3417
Structural strength of frozen soils during thawing.
Vodolazkin, V.M., et al, *Soil mechanics and foundation engineering*, Mar. 1990, 26(5), p.207-209, Translated from Osnovaniia, fundamenty i mekhanika gruntov. 4 refs.
Sorokin, V.A., Fedoseev, IU.G.
Frozen ground strength, Ground thawing, Soil tests, Interstitial ice, Mechanical tests, Frozen ground mechanics, Soil compaction.

44-3418
Determination of a Z-R relationship for snowfall using a radar and high sensitivity snow gauges.
Fujiyoshi, Y., et al, *Journal of applied meteorology*, Feb. 1990, 29(2), p.147-152, 19 refs.
Snowfall, Snow accumulation, Radar echoes, Velocity measurement, Precipitation gages, Snow depth, Snow density, Reflectivity, Accuracy, Weather forecasting, Precipitation (meteorology).

44-3419
Mass-dimensional relationships for ice particles and the influence of riming on snowfall rates.
Mitchell, D.L., et al, *Journal of applied meteorology*, Feb. 1990, 29(2), p.153-163, 20 refs.
Zhang, R., Pitter, R.L.
Snow crystal structure, Snowfall, Ice crystal growth, Snow cover structure, Ice accretion, Microstructure, Precipitation (meteorology), Sampling.

44-3420
Albedo decay of prairie snows.
Baker, D.G., et al, *Journal of applied meteorology*, Feb. 1990, 29(2), p.179-187, 22 refs.
Ruschy, D.L., Wall, D.B.
Snow cover stability, Albedo, Periodic variations, Attenuation, Snow accumulation, Climatology, Temperature variations, Solar radiation.

44-3421
Ice saturation at the tropopause observed from the ER-2 aircraft.
Murphy, D.M., et al, *Geophysical research letters*, Mar. 1990, 17(4), p.353-356, 15 refs.
Stratosphere, Ice nuclei, Cloud physics, Clouds (meteorology), Water vapor, Radiation absorption.

44-3422
Measurement of the condensation nuclei profile to 31 km in the Arctic in January 1989 and comparisons with antarctic measurements.
Hofmann, D.J., *Geophysical research letters*, Mar. 1990, 17(4), p.357-360, 18 refs.
Cloud physics, Condensation nuclei, Atmospheric composition, Ice nuclei, Layers, Correlation.
The first measurement of the condensation nuclei (CN) profile in the Arctic during winter was made to 31 km on Jan 30, 1989 from Kiruna, Sweden (68N). Enhanced levels of CN were observed in the coldest regions above 18 km suggesting homogeneous or ion nucleation of CN as observed previously in Antarctica. A CN layer reaching a concentration of about 40 cu cm was observed between 22.5 and 26 km. Comparisons with data obtained in Antarctica in 1987 and 1988 indicate that this layer is similar to those observed at the same altitude in Antarctica under similar solar illumination conditions. The latter are believed to be of photochemical origin as suggested by measurements before and after stratospheric sunrise. This CN layer may thus serve as a measure of the amount of time an air parcel has spent in sunlight, an important parameter during the early stages of spring ozone depletion. (Auth.)

44-3423
Aerosol nucleation in the winter arctic and antarctic stratospheres.
Hamill, P., et al, *Geophysical research letters*, Mar. 1990, 17(4), p.417-420, 17 refs.
Toon, O.B., Turco, R.P.
Stratosphere, Aerosols, Homogeneous nucleation, Clouds (meteorology), Chemical analysis, Particles.
The formation rate of sulfuric acid-water aerosol particles as a function of altitude for the conditions of the winter arctic and antarctic stratospheres was calculated. The theoretical results indicate that sulfate particle formation can occur in the polar winter stratosphere. Conditions for new particle formation are increasingly favorable as the altitude increases between 20 and 30 km because of the decrease in surface area of pre-existing particles and increasing sulfuric acid vapor supply. The theoretical predictions are consistent with observations of a high altitude CN layer over Antarctica in the spring. Available vapor pressure data indicate that ternary system particles composed of sulfuric acid, nitric acid and water are not thermodynamically stable under winter stratospheric conditions. (Auth.)

44-3424
Vapor pressures of supercooled HNO3/H2O solutions.
Hanson, D.R., *Geophysical research letters*, Mar. 1990, 17(4), p.421-423, 17 refs.
Solutions, Vapor pressure, Supercooled clouds, Stratosphere, Cloud droplets, Condensation nuclei, Chemical composition.

44-3425
Incorporation of stratospheric acids into water ice.
Elliott, S., et al, *Geophysical research letters*, Mar 1990, 17(4), p.425-428, 25 refs.
Turco, R.P., Toon, O.B., Hamill, P.
Ice crystal growth, Chemical properties, Ice composition, Stratosphere, Impurities, Clouds (meteorology), Atmospheric composition, Absorption, Liquid phases

44-3426
Condensation of HNO3 on falling ice particles: mechanism for denitrification of the polar stratosphere.
Wofsy, S.C., et al, *Geophysical research letters*, Mar. 1990, 17(4), p.449-452, 27 refs.
Stratosphere, Chemical properties, Condensation nuclei, Hail, Atmospheric composition, Cloud physics, Particle size distribution, Coatings.
Ice particles created in polar stratospheric cooling events are predicted to descend into Type I PSCs and accrete a coating of nitric acid trihydrate (NAT) that inhibits evaporation. Coated particles efficiently strip HNO3 from the atmosphere, providing a mechanism for denitrification without significant dehydration. Coatings that disintegrate may release large particles of NAT that influence subsequent particle growth. (Auth.)

44-3427
Proceedings.
Conference of the Comité Arctique International, 6th, Fairbanks, AK, May 13-15, 1985, Leiden, Netherlands, E.J. Brill, 1989, 637p., Refs. passim. For selected papers see 44-3428 through 44-3433.
Rey, L., ed, Alexander, V., ed.
DLC QH84.1.C65 1985
Sea ice distribution, Oceanographic surveys, Ecosystems, Marine biology, Ocean environments, Biogeography, Underwater acoustics, Spaceborne photography, Remote sensing.

44-3428
Current perspectives on the role of ice margins and polynyas in high latitude ecosystems.
Niebauer, H.J., et al, Conference of the Comité Arctique International, 6th, Fairbanks, AK, May 13-15, 1985. Proceedings. Edited by L. Rey and V. Alexander, Leiden, Netherlands, E.J. Brill, 1989, p.121-144, 58 refs.
Alexander, V.
DLC QH84.1.C65 1985
Ice edge, Polynyas, Ecosystems, Marine biology, Ocean environments, Biomass.
Amidst the permanent polar ice, biological productivity is low, but in the region of seasonally varying ice biological activity increases dramatically. In the ocean at the ice edge, both in the marginal ice zone and probably also in polynyas, frontal systems with gradients in water density due mostly to melting ice play a large role in initiating spring phytoplankton blooms. This early spring primary production has major trophic implications. In this paper the concentration is on the biophysical interactions in the ice-edge zone, with emphasis on the lower trophic levels. Three regions are considered: the western Arctic, primarily the Bering Sea, the North Atlantic, and the southern ocean surrounding Antarctica. (Auth. mod.)

44-3429
Ecological features of the Barents Sea.
Loeng, H., Conference of the Comité Arctique International, 6th, Fairbanks, AK, May 13-15, 1985. Proceedings. Edited by L. Rey and V. Alexander, Leiden, Netherlands, E.J. Brill, 1989, p.327-365, 99 refs.
DLC QH84.1.C65 1985
Sea ice distribution, Ocean currents, Marine biology, Ecosystems, Ocean environments, Biomass, Biogeography, Oceanographic surveys, Barents Sea.

44-3430
Northern Svalbard waters.
Strömberg, J.O., Conference of the Comité Arctique International, 6th, Fairbanks, AK, May 13-15, 1985. Proceedings. Edited by L. Rey and V. Alexander, Leiden, Netherlands, E.J. Brill, 1989, p.402-426, 54 refs.
DLC QH84.1.C65 1985
Sea ice distribution, Ice edge, Marine biology, Ecosystems, Ice cover effect, Oceanographic surveys, Ocean environments, Biomass, Biogeography, Norway—Svalbard.

44-3431
Oceanographical variations in the Iceland Sea and their impact on biological conditions: a brief review.
Stefánsson, U., et al, Conference of the Comité Arctique International, 6th, Fairbanks, AK, May 13-15, 1985. Proceedings. Edited by L. Rey and V. Alexander, Leiden, Netherlands, E.J. Brill, 1989, p.427-455, 33 refs.
Jakobsson, J.
DLC QH84.1.C65 1985
Sea ice distribution, Marine biology, Ecosystems, Ice cover effect, Oceanographic surveys, Biogeography, Biomass, Ocean environments, Iceland Sea.

44-3432
Marine biological assessment in the Arctic using remote sensing.
Gower, J.F.R., et al, Conference of the Comité Arctique International, 6th, Fairbanks, AK, May 13-15, 1985. Proceedings. Edited by L. Rey and V. Alexander, Leiden, Netherlands, E.J. Brill, 1989, p.490-509, 20 refs.
Borstad, G.A.
DLC QH84.1.C65 1985
Sea ice distribution, Marine biology, Remote sensing, Biogeography, Spaceborne photography, Aerial surveys, Temperature measurement.

44-3433
Satellite-borne remote sensing and large-scale programs for the arctic seas in the 1990s.
Weeks, W.F., et al, MP 2699, Conference of the Comité Arctique International, 6th, Fairbanks, AK, May 13-15, 1985. Proceedings. Edited by L. Rey and V. Alexander, Leiden, Netherlands, E.J. Brill, 1989, p.510-530, 31 refs
Baker, D.J.
DLC QH84 .C65 1985
Sea ice distribution, Remote sensing, Spaceborne photography, Ice surveys, Marine biology, Ice conditions, Ice edge, Research projects.
The following paper describes several broad scientific and engineering problems related to geophysical aspects of the environment of the arctic seas, the application of satellite-based remote sensing systems in such studies, descriptions of proposed experiments, and finally approaches that could lead to the inclusion of more biological science in these physical science programs

44-3434
Fundamental characteristics of AC flashover on contaminated insulators covered with ice.
Sato, M., et al, *Japanese journal of applied physics*, May 1989, 28(5), p.889-896, 19 refs.
Saito, H., Kaga, A., Akagami, H.
Electrical insulation, Electrical resistivity, Electric charge Ice formation Ice salinity Defects, Glaze, Hoarfrost, Impurities, Transmission lines, Chemical composition, Sediments.

44-3435
On radiative effects of the anthropogenic aerosol components of the arctic haze and snow in a surface-atmosphere coupled model.
Blanchet, J.P., et al, International Radiation Symposium. Perugia, Italy, Aug. 1984. Proceedings, edited by G. Fiocco, Hampton, VA, A. DEEPAK, c1984, p.269-272, 20 refs.
List, R
DLC QC912.3 I57 1984
Aerosols, Solar radiation, Haze, Snow, Models.

44-3436
Relation of sliding displacement with snow: Kunimi landslide area in Toyama Prefecture.
Shuzui, H., et al, *Tsuchi to kiso (Soil mechanics and foundation engineering)*, May 1988, 36(5), p.13-18, In Japanese with English summary. 5 refs.
Ishibashi, N.
Landslides, Snow melting, Snow cover effect, Slope stability, Thaw weakening.

44-3437
Effectiveness of frost heave prevention methods in road pavements in high mountainous areas.
Fukuda, M., et al, *Tsuchi to kiso (Soil mechanics and foundation engineering)*, Aug. 1988, 36(8), p.25-30, In Japanese 16 refs
Ogawa, S., Kamei, T.
Road icing, Road maintenance, Frost heave, Ice prevention, Frost protection, Pavements.

44-3438
Frost depths of roads in Tohoku area.
Yanagisawa, E., et al, *Tsuchi to kiso (Soil mechanics and foundation engineering)*, Mar. 1989, 37(3), p.35-39, In Japanese. 9 refs.
Ishida, H., Yao, Y.J.
Road icing, Frost penetration, Analysis (mathematics).

44-3439
Snow disasters in the Tohoku district.
Ito, T., *Tsuchi to kiso (Soil mechanics and foundation engineering)*, Mar 1989, 37(3), p.52-56, In Japanese. 4 refs.
Snow depth, Snowstorms, Snowfall, Japan.

44-3440
Influence of freezing-thawing on undrained shear characteristics of sand.
Ogawa, S., et al, *Tsuchi to kiso (Soil mechanics and foundation engineering)*, Apr. 1989, 37(4), p.49-54, In Japanese with English summary. 8 refs.
Kamei, T., Matsuura, S.
Sands, Soil freezing, Freeze thaw cycles, Frozen ground strength, Soil strength, Frozen ground mechanics, Shear strength.

44-3441
On the frost-heave prevention for volcanic cohesive soil of low water content with quicklime.
Ishida, H., *Tsuchi to kiso (Soil mechanics and foundation engineering)*, Aug. 1989, 37(8), p.15-20, In Japanese with English summary 9 refs.
Soil freezing, Volcanic ash Frost heave, Frost protection.

44-3442
Frost damage to roads in Hokkaido with special reference to slope, tunnel and gutter.
Suzuki, T., et al, *Tsuchi to kiso (Soil mechanics and foundation engineering)*, Sep. 1989, 37(9), p.65-70, In Japanese. 17 refs.
Negishi, M.
Road icing, Frost action, Frost heave, Freeze thaw cycles, Japan—Hokkaido.

44-3443
Investigation of thermal screening of individual soldiers in cold regions. Final report.
Murrell, D.F., Seattle, WA, U.S. Army Cold Regions Test Center, Jan. 1990, 12p. + appends., USATECOM PROJ No.7-CO-R89-ATO-001, 1 ref.
Clothing, Thermal properties, Cold weather performance, Detection, Infrared photography, Countermeasures, Temperature measurements, Military research, Reflectivity, Materials, Surface properties.

44-3444
Space and airborne technology applications to antarctic operations.
Thomson, R.B., ed, Christchurch, Department of Scientific and Industrial Research, Antarctic Division. 1989, 159p., Refs. passim. For selected papers see A-41953 through A-41955, A-41959, A-41961, C-41963 through C-41965, F-41957, F-41958, I-41956, I-41960, I-41962 or 44-3445 through 44-3447.
SCAR Working Group on Logistics Symposium, Hobart, Australia, Sep. 1-2, 1988.
Spacecraft, Logistics, Cold weather operation, Telecommunication, Ice navigation, Sea ice distribution, Mapping, Data processing.
This publication contains a collection of papers presented at the Symposium, held in Hobart Sep. 1-2, 1988, which was convened to provide antarctic operators with information on new space and airborne technology applicable to remote sensing programs and improvements to telecommunications. The 13 full papers are arranged in five categories: state-of-the-art antarctic applications, operations, transport, station operations and communications, and operational mapping. Within the categories, the topics covered, among others, are remote sensing techniques, discrimination of sea ice types and conditions, satellite systems' efficiency, use of spaceborne technology in meteorology, and mapping of Antarctica.

44-3445
Support of antarctic operations of the Federal Republic of Germany by the aid of remote sensing techniques.
Kohnen, H., Space and airborne technology applications to antarctic operations. Edited by R.B. Thomson, Christchurch, Department of Scientific and Industrial Research, Antarctic Division, 1989, p.24-26.
Crevasse detection, Cold weather operation, Remote sensing, Ice navigation.
The Federal Republic of Germany conducts research expeditions in the Antarctic and has annually to resupply its stations in the Weddell Sea. During the summer, over-snow traverses carry out scientific investigations on ice shelves and the inland ice. Shipping in the Weddell Sea, even during the summer, encounters heavy pack ice conditions. The expeditions on the ice are endangered by crevasses and crevassed areas. This article outlines the techniques applied by the Federal Republic of Germany expeditions to reduce the risks as well as to facilitate the operations. (Auth.)

44-3446
Identification and discrimination of antarctic sea ice types from NOAA AVHRR imagery.
Allison, I., et al, Space and airborne technology applications to antarctic operations. Edited by R.B. Thomson, Christchurch, Department of Scientific and Industrial Research, Antarctic Division, 1989, p.38-61, 22 refs.
Chechet, R.
Sea ice, Spaceborne photography.
Recent shipboard and drifting buoy observations within the sea ice zone of East Antarctica have shown that much of the pack ice is highly mobile and that, although the overall ice concentration is high, much of this consists of young and thin types. With suitable enhancement the intent and distribution of some thin ice types can be identified on meteorological satellite imagery. NOAA 9 AVHRR imagery, collected by JARE at Showa in Oct. 1985, is used to investigate new ice in front of the Amery Ice Shelf and in large leads between flow assemblages in Prydz Bay Different multichannel indices are tested for best discrimination between open water and the different young ice categories in Antarctica. Profiles of these indices show the change in sea ice along lines between a small polynya in front of the Amery Ice Shelf and typical snow covered sea ice in the center of Prydz Bay Similar profiles are presented for another region of the same image (round 50 deg north of Enderby Land) where the satellite data can be compared with observations made from MV *Nella Dan* which was in this region at the same time. Discrimination of features on the antarctic continent from AVHRR data is also briefly discussed (Auth. mod.)

44-3447
Comparison of ship-observed sea ice conditions with NOAA AVHRR imagery in the Casey region, Antarctica.
Allison, I., et al, Space and airborne technology applications to antarctic operations. Edited by R.B. Thomson, Christchurch, Department of Scientific and Industrial Research, Antarctic Division, 1989, p.62-79, 12 refs.
Tildesley, P., Vrana, A., Wilson, J.
Sea ice distribution, Spaceborne photography, Data processing.
Australian operations will be covered by a proposed AVHRR reception facility on the antarctic continent, the use of this imagery for logistic purposes requires the efficient transmission of interpreted or enhanced data to the ships in real time. In this paper, ice conditions are compared as observed on board MV *Icebird* between the ice edge and the antarctic coast, and between 108E and 117E and between the ice edge and the coast in late Oct. (1987) with ice conditions interpreted from multichannel AVHRR imagery. An experimental program of relaying the AVHRR data collected in Hobart of *Icebird* via a 2400 baud INMARSAT link is described, and suggestions are made for improvements to the data processing to better discriminate between cloud and different categories of ice in the relayed data. (Auth. mod.)

44-3448
Glaciological data collected by the 29th Japanese Antarctic Research Expedition in 1988-1989.
Watanabe, O., et al, *Japanese Antarctic Research Expedition. JARE data reports*, Mar. 1990, No.156, 77p., Refs. passim.
Furukawa, T., Fujita, S
Snow accumulation, Traverses, Snow hardness, Antarctica Mizuho Station, Antarctica Asuka Station.
Data collected during oversnow traverses, conducted by JARE-29 1987 1989, by Showa and Asuka parties, with major activities along route IM from Mizuho Station to Advance Camp, are discussed and presented on tables They concern the position and elevation of stations, surface meteorology, net snow accumulation along traverse routes on Mizuho Plateau and at Asuka Station, surface slope measurements, and the hardness of the surface snow cover A map indicating the routes of JARE-29 in 1988-1989 in east Queen Maud Land is included.

44-3449
Ice tech '84.
International Conference on Icebreaking and Related Technologies, 3rd, Calgary, Canada, May 1984, [Calgary], Society of Naval Architects and Marine Engineers, [1984], var.p., Refs. passim. For individual papers see 44-3450 through 44-3463.
Ice breaking, Icebreakers, Offshore structures, Ships, Ice conditions, Ice loads, Ice solid interface, Meetings, Ice strength, Ice cover thickness, Velocity, Models.

44-3450
Eleven months in the installation of an arctic mobile drilling structure.
Johansson, B.M., et al, International Conference on Icebreaking and Related Technologies, 3rd, Calgary, Canada, May 1984. Proceedings, [Calgary], Society of Naval Architects and Marine Engineers, [1984], p.A/1-A/19, 4 refs.
Stubbs, J.T., Janson, W.
Offshore structures, Drilling, Caissons, Ice conditions, Hydraulic structures, Cold weather construction, Design, Computer applications, Beaufort Sea.

44-3451
Arctic tanker bow forms and evaluation of full scale propulsive performance in ice.
Takekuma, K., et al, International Conference on Icebreaking and Related Technologies, 3rd, Calgary, Canada, May 1984. Proceedings, [Calgary], Society of Naval Architects and Marine Engineers, [1984], p.B/1-B/12, 9 refs.
Kawaguchi, N., Glen, I.F.
Ice navigation, Tanker ships, Marine transportation, Ice loads, Ice breaking, Cold weather operation, Design, Statistical analysis, Ice physics

44-3452
Hull girder minimum section modulus of large merchant ice breakers.
Huther, M., et al, International Conference on Icebreaking and Related Technologies, 3rd, Calgary, Canada, May 1984. Proceedings, [Calgary], Society of Naval Architects and Marine Engineers, [1984], p.C/1-C/8, 20 refs
Beghin, D., Mogensen, O.
Icebreakers, Ice navigation, Ice loads, Ice deformation, Ice cover thickness, Stresses, Ships, Marine transportation, Ocean waves, Loads (forces), Ice pressure.

44-3453
Prediction of structural damage, penetration and cargo spillage due to ship collisions with icebergs.
Aldwinckle, D.S., et al, International Conference on Icebreaking and Related Technologies, 3rd, Calgary, Canada, May 1984. Proceedings, (Calgary), Society of Naval Architects and Marine Engineers, (1984), p.D/1-D/14, 26 refs.
Lewis, K.J.
Ice solid interface, Ships, Icebergs, Ice conditions, Impact strength, Ice loads, Models, Damage, Velocity, Forecasting.

44-3454
Ship-ice floe collision analysis considering the elastic deflection of hull girder.
Matsuishi, M., et al, International Conference on Icebreaking and Related Technologies, 3rd, Calgary, Canada, May 1984. Proceedings, (Calgary), Society of Naval Architects and Marine Engineers, (1984), p.E/1-E/13, 9 refs.
Ikeda, J.I., Kawakami, H., Hirago, M.
Ice solid interface, Ice floes, Ships, Elastic properties, Icebreakers, Ice loads, Impact strength, Analysis (mathematics), Velocity, Structural analysis.

44-3455
BAFFIN—a dynamic ship/ice interaction model.
Daley, C.G., International Conference on Icebreaking and Related Technologies, 3rd, Calgary, Canada, May 1984. Proceedings, (Calgary), Society of Naval Architects and Marine Engineers, (1984), p.F/1-F/8, 6 refs.
Ice solid interface, Ice strength, Ships, Ice friction, Ice loads, Mathematical models, Computer programs, Velocity, Stresses, Time factor, Dynamic loads.

44-3456
Multi-modal ice-management system.
Aker, C.M., International Conference on Icebreaking and Related Technologies, 3rd, Calgary, Canada, May 1984. Proceedings, (Calgary), Society of Naval Architects and Marine Engineers, (1984), p.G/1-G/16, 13 refs.
Ice navigation, Offshore structures, Ice mechanics, Ice friction, Ice physics, Ice conditions, Icebreakers, Drift age, Countermeasures.

44-3457
Risk analysis methodology for mobile offshore units operating in ice-infested waters
Nessim, M.A., et al, International Conference on Icebreaking and Related Technologies 3rd Calgary, Canada, May 1984 Proceedings, (Calgary), Society of Naval Architects and Marine Engineers, (1984), p.H/1-H/12, 18 refs.
Murray, A., Maes, M.A., Jordaan, I.J.
Ice conditions, Floating structures, Offshore structures, Ice loads, Ice solid interface, Impact strength, Ice pressure, Countermeasures, Safety, Ocean environments, Analysis (mathematics), Icebergs.

44-3458
Experience with a new type of model ice.
Enkvist, E., International Conference on Icebreaking and Related Technologies, 3rd, Calgary, Canada, May 1984. Proceedings, (Calgary), Society of Naval Architects and Marine Engineers, (1984), p.J/1-J/15, 10 refs.
Ice models, Offshore structures, Ice control, Ice mechanics, Flexural strength, Sea ice distribution, Ships, Tests, Ice friction, Ice salinity, Compressive properties, Models.

44-3459
System development for measurement of full scale ship ice impact forces.
Ghoneim, G.A.M., et al, International Conference on Icebreaking and Related Technologies, 3rd, Calgary, Canada, May 1984. Proceedings, (Calgary), Society of Naval Architects and Marine Engineers, (1984), p.K/1-K/15, 7 refs.
Edgecombe, M.H., Grinstead, J.
Ice loads, Icebreakers, Impact strength, Ice conditions, Shear strain, Shear stress, Measuring instruments, Models, Design, Tests.

44-3460
Estimation of icebreaking resistance by ship motion simulation.
Ishibashi, Y., International Conference on Icebreaking and Related Technologies, 3rd, Calgary, Canada, May 1984. Proceedings, (Calgary), Society of Naval Architects and Marine Engineers, (1984), p.L/1-L/10, 7 refs.
Ice strength, Ice breaking, Icebreakers, Ice conditions, Loads (forces), Ice pressure, Hydrodynamics, Velocity, Ice deformation, Analysis (mathematics), Ice navigation.

44-3461
Continuous motion of a ship in ridged ice.
Tunik, A.L., International Conference on Icebreaking and Related Technologies, 3rd, Calgary, Canada, May 1984. Proceedings, (Calgary), Society of Naval Architects and Marine Engineers, (1984), p.M/1-M/9, 37 refs.
Icebreakers, Ice navigation, Ice cover thickness, Pressure ridges, Ice solid interface, Mechanical properties, Ice loads, Velocity, Ice structure, Ice pressure, Analysis (mathematics).

44-3462
Use of ice cutters to provide mobility in ice for arctic offshore drilling structures.
Slocum, R.W., International Conference on Icebreaking and Related Technologies, 3rd, Calgary, Canada, May 1984. Proceedings, (Calgary), Society of Naval Architects and Marine Engineers, (1984), p.N/1-N/9, 4 refs.
Ice cutting, Ice navigation, Offshore structures, Offshore drilling, Floating structures, Mechanical properties, Caissons, Artificial islands, Ice conditions, Design.

44-3463
Potential for combining structural steel and concrete in arctic structures.
Maddock, W.J., et al, International Conference on Icebreaking and Related Technologies, 3rd, Calgary, Canada, May 1984 Proceedings, (Calgary), Society of Naval Architects and Marine Engineers, (1984), p.O/1-O/9, 14 refs.
Bruce, J.C.
Construction materials, Ice loads, Concrete structures, Steel structures, Floating structures, Caissons, Damage, Ice conditions, Design, Stress strain diagrams.

44-3464
Ice tech '90.
International Conference on Ships and Marine Systems in Cold Regions, 4th, Calgary, Canada, March 1990. (Calgary), Society of Naval Architects and Marine Engineers, (1990), var.p., Refs. passim.
For individual papers see 44-3465 through 44-3488.
Icebreakers, Ice breaking, Ships, Ice conditions, Ice loads, Ice solid interface, Ice navigation, Offshore structures, Meetings, Impact strength, Design, Marine transportation.

44-3465
Physical modelling of a first year ridge ramming event.
Comfort, G., et al, International Conference on Icebreaking and Related Technologies, 4th, Calgary, Canada, March 1990. Proceedings, (Calgary), Society of Naval Architects and Marine Engineers, (1990), p.A/1-A/24, 10 refs.
Keinonen, A.J., Spencer, D., Peirce, T.
Ice breaking, Pressure ridges, Ice friction, Ice strength, Ice physics, Models, Tests, Flexural strength, Ice cover thickness, Velocity

44-3466
Effect of ice friction on the resistance of two 1:30 scale models.
Williams, F.M., et al, International Conference on Ice breaking and Related Technologies, 4th, Calgary, Canada, March 1990. Proceedings, (Calgary), Society of Naval Architects and Marine Engineers, (1990), p.B/1-B/7, 13 refs.
Baker, D.N., Nishizaki, R.
Ships, Ice friction, Ice models, Ice strength, Ice solid interface, Ice cover thickness, Flexural strength, Models, Tests, Strength, Velocity.

44-3467
Development of ice model tests into a reliable tool for icebreaking ship design.
Sonninen, H., et al, International Conference on Icebreaking and Related Technologies, 4th, Calgary, Canada, March 1990. Proceedings, (Calgary), Society of Naval Architects and Marine Engineers, (1990), p.C/1-C/11, 14 refs.
Nortala-Hoikkanen, A.
Ice models, Icebreakers, Ice conditions, Flexural strength, Ice friction, Ice pressure, Design, Tests, Ice solid interface, Ice loads, Ice strength.

44-3468
Recent developments in model experiment techniques for large icebreakers.
Molyneux, D., et al, International Conference on Ice breaking and Related Technologies, 4th, Calgary, Canada, March 1990 Proceedings, (Calgary), Society of Naval Architects and Marine Engineers, (1990), p.E/1-E/11, 13 refs.
Reynolds, A.
Icebreakers, Models, Ice friction, Flexural strength, Ice navigation, Design, Tests, Water waves, Velocity.

44-3469
Results from the full scale testing of the new icebreaker *Oden*.
Liljestrom, G., et al, International Conference on Icebreaking and Related Technologies, 4th, Calgary, Canada, March 1990. Proceedings, (Calgary), Society of Naval Architects and Marine Engineers, (1990), p.F/1-F/9, 4 refs.
Backman, A., Fitzpatrick, J., Edgecombe, M.H.
Icebreakers, Ice loads, Shear stress, Strain tests, Design, Tests, Strain measuring instruments.

44-3470
Operational requirements and experience of the Baltic escort icebreaker class "Otso".
Lindroos, H., International Conference on Icebreaking and Related Technologies, 4th, Calgary, Canada, March 1990. Proceedings, (Calgary), Society of Naval Architects and Marine Engineers, (1990), p.G/1-G/10, 15 refs.
Icebreakers, Ice conditions, Ice breaking, Ice navigation, Design, Tests.

44-3471
Full-scale experiences with *Thyssen/Waas* icebreakers.
Varges, G.R., International Conference on Icebreaking and Related Technologies, 4th, Calgary, Canada, March 1990. Proceedings, (Calgary), Society of Naval Architects and Marine Engineers, (1990), p.H/1-H/14, 10 refs.
Icebreakers, Ice breaking, Ice navigation, Ice conditions, Tests, Models.

44-3472
Summary of Beaufort Sea icebreaker performance.
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Browne, R.P., Revill, C.R., Bayly, I.M.
Icebreakers, Ice breaking, Design, Ice conditions, Ice navigation, Ice strength, Ice cover thickness, Velocity

44-3473
Review of the experience gained as a result of the ice class upgrading of M.V. *Arctic*.
Luce, M.P., International Conference on Icebreaking and Related Technologies, 4th, Calgary, Canada, March 1990. Proceedings, (Calgary), Society of Naval Architects and Marine Engineers, (1990), p.K/1-K/9, 12 refs.
Icebreakers, Design, Ice navigation, Ice breaking, Ice strength, Ice cover thickness, Ice conditions, Structural analysis.

44-3474
Experience gained from the design and construction of the icebreaker *Oden*.
Liljestrom, G.C., et al, International Conference on Icebreaking and Related Technologies, 4th, Calgary, Canada, March 1990. Proceedings, (Calgary), Society of Naval Architects and Marine Engineers, (1990), p.L/1-L/10, 4 refs.
Renborg, B.G.
Icebreakers, Design, Ice breaking, Models, Tests, Structural analysis.

44-3475
New research vessel with icebreaking capability for the U.S. Antarctic Program.
Kennedy, H., et al, International Conference on Icebreaking and Related Technologies, 4th, Calgary, Canada, March 1990. Proceedings, (Calgary), Society of Naval Architects and Marine Engineers, (1990), p.M/1-M/8, 3 refs.
Voelker, R.P., Forhan, T
Icebreakers, Ship icing, Ice breaking, Design, Research projects.
A research vessel with icebreaking capability is being procured on behalf of the Division of Polar Programs, U.S. National Science Foundation to support the U.S. Antarctic Program. This paper provides a brief background on U.S. Antarctic marine science activities and the requirements for a more capable research vessel. The identified need is for a vessel with excellent open water performance, both steaming and on station, with substantial marine research versatility, and with three foot level ice breaking capability. The paper describes the mission profile of the planned vessel, environmental conditions, operational requirements, science support requirements, and special requirements determined to be essential for efficient support of the U.S. Antarctic Program. (Auth.)

44-3476
Probabilistic analysis of summer impact loads on arctic offshore structures.
Tunik, A.L., et al, International Conference on Icebreaking and Related Technologies, 4th, Calgary, Canada, March 1990. Proceedings, (Calgary), Society of Naval Architects and Marine Engineers, (1990), p.N/1-N/10, 40 refs.
Wright, B.D.
Offshore structures, Ice loads, Ice cover thickness, Ice floes, Ice conditions, Impact strength, Velocity, Ice solid interface.

44-3477
Design method for icebreaker hull loads due to level icebreaking.
St. John, J.W., et al, International Conference on Icebreaking and Related Technologies, 4th, Calgary, Canada, March 1990. Proceedings, (Calgary), Society of Naval Architects and Marine Engineers, (1990), p.O/1-O/14, 15 refs.
Minnick, P.V.
Ice loads, Icebreakers, Ice breaking, Loads (forces), Ice solid interface, Impact strength, Design, Ice pressure, Statistical analysis.

44-3478
Modeling of ice class shafting systems.
Cowper, D.N.B., et al, International Conference on Icebreaking and Related Technologies, 4th, Calgary, Canada, March 1990. Proceedings, (Calgary), Society of Naval Architects and Marine Engineers, (1990), p.P/1-P/22, 26 refs.
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Icebreakers, Ice loads, Ice breaking, Shafts (excavations), Models.

44-3479
Propulsion machinery concepts for icebreaking ships.
Schmid, H., International Conference on Icebreaking and Related Technologies, 4th, Calgary, Canada, March 1990. Proceedings, (Calgary), Society of Naval Architects and Marine Engineers, (1990), p.Q/1-Q/23, 8 refs.
Icebreakers, Ice breaking, Structural analysis, Ice navigation, Engines, Design.

44-3480
Ice conditions along Alaskan marine transportation routes.
Voelker, R.P., et al, International Conference on Icebreaking and Related Technologies, 4th, Calgary, Canada, March 1990. Proceedings, (Calgary), Society of Naval Architects and Marine Engineers, (1990), p.R/1-R/8, 8 refs.
Sedold, F.
Ice conditions, Ice navigation, Marine transportation, Ice pressure, Ice edge, Ice cover thickness, Drift, Measuring instruments.

44-3481
Arctic corrosion and its effects on the strength of icebreakers.
Brown, T.G., et al, International Conference on Icebreaking and Related Technologies, 4th, Calgary, Canada, March 1990. Proceedings, (Calgary), Society of Naval Architects and Marine Engineers, (1990), p.S/1-S/11, 11 refs.
Laskow, V., Lingnau, D.G., Gore, N.R.
Icebreakers, Corrosion, Steel structures, Stresses, Ice navigation, Ice loads, Brittleness, Strength, Impact strength.

44-3482
Overview and summary of the proposed revisions to the Canadian Arctic Shipping Pollution Prevention Regulations.
McCallum, J.S., International Conference on Icebreaking and Related Technologies, 4th, Calgary, Canada, March 1990. Proceedings, (Calgary), Society of Naval Architects and Marine Engineers, (1990), p.U/1-U/8, 4 refs.
Ice navigation, Icebreakers, Water pollution, Ice solid interface, Marine transportation, Ice conditions, Ice loads, Countermeasures, Research projects, Ships, Damage.

44-3483
Revised navigation control system for CASPPR based on ice regimes.
Lapp, D.J., et al, International Conference on Icebreaking and Related Technologies, 4th, Calgary, Canada, March 1990. Proceedings, (Calgary), Society of Naval Architects and Marine Engineers, (1990), p.V/1-V/15, 29 refs.
Lowings, M.G., Luce, M.P.
Ice navigation, Ice conditions, Marine transportation, Ice loads, Ice solid interface, Ice cover thickness, Ice control, Water pollution, Strength, Ships, Impact strength, Damage, Structural analysis.

44-3484
Ice load criteria for arctic vessels.
Churcher, A.C., et al, International Conference on Icebreaking and Related Technologies, 4th, Calgary, Canada, March 1990. Proceedings, (Calgary), Society of Naval Architects and Marine Engineers, (1990), p.W/1-W/32, Refs. p.W/29-W/32.
Blanchet, D., Johansson, B.M.
Ice loads, Icebreakers, Ships, Ice cover thickness, Models, Structural analysis, Safety, Damage.

44-3485
Strength requirements in the proposed CASPPR.
Daley, C.G., International Conference on Icebreaking and Related Technologies, 4th, Calgary, Canada, March 1990. Proceedings, (Calgary), Society of Naval Architects and Marine Engineers, (1990), p.X/1-X/13, 23 refs.
Icebreakers, Ice loads, Ice conditions, Structural analysis, Bearing strength, Shear strength, Analysis (mathematics), Damage, Countermeasures, Ice pressure, Design, Flexural strength.

44-3486
Materials aspects for arctic vessels.
Tomin, M.J., International Conference on Icebreaking and Related Technologies, 4th, Calgary, Canada, March 1990. Proceedings, (Calgary), Society of Naval Architects and Marine Engineers, (1990), p.Y/1-Y/10, 14 refs.
Ice navigation, Steel structures, Ships, Icebreakers, Fracturing, Ice loads, Bearing strength, Cracks, Safety, Design, Temperature effects.

44-3487
Subdivision and stability for arctic vessels.
Kendrick, A., International Conference on Icebreaking and Related Technologies, 4th, Calgary, Canada, March 1990. Proceedings, (Calgary), Society of Naval Architects and Marine Engineers, (1990), p.Z/1-Z/16, 10 refs.
Ice navigation, Ships, Structural analysis, Ice loads, Bearing strength, Stability, Icebreakers, Water pollution, Damage, Design.

44-3488
Design criteria for rudders, steering gears, nozzles and rudder ice knives for arctic vessels.
Browne, R.P., International Conference on Icebreaking and Related Technologies, 4th, Calgary, Canada, March 1990. Proceedings, (Calgary), Society of Naval Architects and Marine Engineers, (1990), p.AA/1-AA/9, 14 refs.
Ice navigation, Icebreakers, Ships, Ice cutting, Ice conditions, Ice loads, Structural analysis, Damage, Design criteria, Safety.

44-3489
All-Union Scientific and Technical Seminar, 10th, Moscow, July 4-6, 1989. Using new geophysical methods to solve engineering geological and hydrogeological problems. Summaries. (Ispol'zovanie novykh geofizicheskikh metodov dlia resheniia inzhenerno-geologicheskikh i gidrogeologicheskikh zadach. Tezisy dokladov).
Vsesoiuznyi nauchno-tekhnicheskii seminar, 10th, Moscow, July 4-6, 1989. Moscow, 1989. 272p. (Pertinent p.124-129, 191-206, 237-239). In Russian.
Chubarov, V.N., ed.
Engineering geology, Hydrogeology, Geophysical surveys, Geocryology, Frozen ground, Meetings, Avalanches.

44-3490
Problems of ground-water formation in cryolithozone: peculiarities of exploration and water reserves evaluation. (Problemy formirovaniia mestorozhdenii podzemnykh vod v kriolitozone, osobennosti ikh razvedki i otsenki zapasov).
Grodzenskii, V.D., Aktual'nye problemy gidrogeologii (Actual problems of hydrogeology), Moscow, 1989, p.92-103, In Russian with English summary. Presented at the 28th Session of the International Geological Congress, Washington, D.C., July 1989.
Subpermafrost ground water, Permafrost hydrology, Water supply.

44-3491
Formation and breakup of ice cover: in streams and water bodies of Kazakhstan. (Formirovanie i razrushenie ledianogo pokrova na vodotokakh i vodoemakh Kazakhstana).
Bellinson, M.M., Alma-Ata, Nauka, 1989, 216p., In Russian. 121 refs.
Ice formation, Ice breakup, Ice conditions, Ice cover, River ice, Lake ice, Ice forecasting, Ice models, Mathematical models, USSR—Kazakhstan.

44-3492
Classification and diagnostics of cryogenic soils in Yakutia. (Klassifikatsiia i diagnostika merzlotnykh pochv IAkutii).
Elovskaia, L.G., Yakutsk, IAkutskii filial SO AN SSSR, 1987, 172p., In Russian. Refs. p.164-172.
Cryogenic soils, Soil classification, Soil surveys, Tundra, Permafrost, USSR—Yakutia.

44-3493
Borehole shaft stability during deep drilling of ice cover. (Obespechenie ustoichivosti stvola skvazhiny pri glubokom burenii v lednikovykh pokrovakh).
Pashkevich, V.M., et al, *Antarktika, doklady komissii*, 1989, No.28, p.39-50, In Russian with English summary. 8 refs.
Chistiakov, V.K.
Boreholes, Drilling, Ice sheets, Shaft sinking, Stresses, Rheology.
The method of controlling the hole wall stability by filling the hole with special drilling mud of regulated density is presented on the basis of ice cover drilling experience. It is recommended to calculate the drilling mud density with the help of formulae obtained from a mathematical model of the borehole shaft contraction under rock pressure. This model takes into account ice stress, its rheological properties, and the time factor (Auth.)

44-3494
Core drilling with semi-automatic borehole tools on hoist cable. (Nekotorye osobennosti protsessa kolonkovogo bureniia skvazhin polusamonosnymi snariadami na gruzonesushchem kabele).
Vasil'ev, N.I., *Antarktika: doklady komissii*, 1989, No.28, p.51-58, In Russian with English summary. 3 refs.
Boreholes, Drilling, Ice drills, Ice cores, Antarctica—Vostok Station.
Borehole drilling by semi-automatic tools on hoist cable is the most effective method to study ice sediments in polar cap structure and composition. The factors determining the drilling process efficiency are the following: run length, descent-hoist operations rate, borehole tool servicing time on the surface, and mechanical drilling rate. The functional dependence between total time of drilling of borehole with a given depth, and factors determining the drilling process, are considered. The most important factor in drilling efficiency is the descent-hoist operations rate, and one of the ways for increasing this rate is the drilling of step boreholes. Two-step borehole drilling is examined, and a coefficient of hole steps depth optimal relationship is analytically obtained. The influence of various factors on the total time of deep hole drilling at Vostok Station is practically demonstrated. (Auth.)

44-3495
Volume relaxation of ice core from Vostok Station borehole. (Relaksatsionnoe rasshirenie ledianogo kerna iz burovoi skvazhiny na st. Vostok).
Lipenkov, V.IA., et al, *Antarktika, doklady komissii*, 1989, No.28, p.59-72, In Russian with English summary. 19 refs.
Salamatin, A.N.
Bubbles, Ice cores, Ice composition, Ice relaxation, Antarctica—Vostok Station.
Studies of ice core volume expansion from the 2083 m deep borehole drilled at Vostok Station single out 3 modes of ice relaxation (A, B, C). A-mode expansion occurs in a 2-phase system consisting of ice and air bubbles (at depth between 105 and 500 m), ice porosity increases due to volume expansion of pre-existing bubbles. C-mode expansion occurs in polar ice containing air in the form of clathrate inclusions (1250-2083 m), expansion resulting from dissociation of air hydrate and secondary air bubbles appearance (cavity). B-mode expansion is observed in a 3-phase system consisting of ice, air bubbles and crystalline hydrate inclusions (500-1250 m), ice porosity increases due to volume expansions of pre-existing bubbles and secondary bubble appearance. It has been found that air hydrate in ice under normal atmospheric pressure is more stable at lower temperatures. Rheological equation for numerical descriptions of the A-mode compression expansion of ice has been used to estimate conditions needed to ensure stability of air bubbles in the ice core after recovery. (Auth. mod.)

44-3496
Effects of rheology parameters, and heat and boundary conditions at glacier's bottom, on calculation results of stationary ice cover flow. (Chislenno e issledovanie vliianiia reologicheskikh parametrov, teplovykh uslovii i granichnykh uslovii na dne ledника na rezul'taty raschetov statsionarnogo techeniia pokrovnykh lednikov).
Larina, T.B., *Antarktika, doklady komissii*, 1989, No.28, p.73-79, In Russian with English summary. 5 refs.
Rheology, Glacier beds, Mathematical models.
The problem of ice motion along the flow line from ice separation is investigated, considering that the glacier surface and boundary conditions are determined and that the glacier's bed is horizontal. As bottom conditions and rheology parameters are not known from the experiment, assumptions, which do not exceed the number of experiments, are made and compared to calculation results. Two variants of bed conditions are considered. The effects of horizontal velocity component on the bed

and geothermal flow on calculation results are studied. The deductions made on the basis of calculation results can be applied to cover glaciers (Auth. mod.)

44-3497
**Formation characteristics of different types of atmospheric precipitation. [Osobennosti obrazovaniia atmosfernykh osadkov razlichnykh tipov v Antarktide],**
Aver'ianov, V.G., *Antarktika; doklady komissii,* 1989, No.28, p.80-91, In Russian with English summary. Refs. p.89-91.
Ice crystal growth, Meteorological factors, Precipitation (meteorology), Antarctica—Vostok Station.
The relationship between ice crystal growth and air temperature and humidity is discussed. Plate-shaped crystals are found to form under negative air temperatures typical of polar areas, though when temperatures drop below -35C, columnar ice crystals dominate the precipitation. Plate crystals dominate the precipitation of cyclonic type. "Ice needles" forming due to condensation (sublimation), and their contribution to the total sum of precipitation on Antarctica, have been estimated. Methods of measuring time on ice surface at Vostok Station are discussed. Micro-meteorological conditions at the surface are shown to control the change of the processes of condensation and evaporation. In 1982, condensation at Vostok Station was found to be stronger than evaporation. (Auth. mod.)

44-3498
**Iceberg outflow and glaciation mass balance on King George I. [Aisbergovyi stok i balans massy oledeneniia o-va King-Dzhordzh (Vaterloo), IUzhnye Shetlandskie ostrova],**
Govorukha, L.S., *Antarktika; doklady komissii,* 1989, No.28, p.92-96, In Russian with English summary. 11 refs.
Glacier mass balance, Icebergs, Rheology, Antarctica—King George Island.
The quantitative estimate is made of iceberg discharge of glaciers at King George I in present-day climatic conditions, based on geodetic measurements of movement velocity of ice surface layers at Little Ice Cap. Traces of its recent shrinkage are evident, proving that iceberg discharge accounts for the glaciation regime at King George I. Theodolite goniometrical observations show that near ice front domes zones move seaward at rates not higher than 10 m/year. The rate of outlet glaciers is of an order higher (50-60 to 100 cm/day). Comparisons show that domes and outlet glaciers mechanically discharge about 1 cu km/year. The comparison of net snow accumulation volumes, the values of surface melting and evaporation as well as iceberg outflow proves their algebraic sum to be near zero. (Auth. mod.)

44-3499
**SeaRISE: a multidisciplinary research initiative to predict rapid changes in global sea level caused by collapse of marine ice sheets.**
Bindschadler, R.A., ed, *U.S. National Aeronautics and Space Administration. NASA conference publication,* May 1990, NASA-CP-3075, 55p., 11 refs. Proceedings of a workshop held in College Park, MD, Jan. 23-25, 1990.
Climatic changes, Ice shelves, Sea level.
This document reports the results of a workshop held to discuss the role of the polar ice sheets in global climate change. The participants agreed that the most important aspect of the ice sheets' involvement in climate change is the potential of marine ice sheets to cause a rapid change in global sea level. To address this concern, a research initiative is called for that considers the full complexity of the coupled atmosphere-ocean-cryosphere lithosphere system. The initiative, which is described in this report, is called SeaRISE (Sea-level Response to Ice Sheet Evolution), and has the goal of predicting the contribution of marine ice sheets to rapid changes in global sea level in the next decade to few centuries. To attain this goal, a coordinated program of multidisciplinary investigations must be launched with the linked objectives of understanding the coupled state, internal dynamics, interactions, and history of this environmental system. (Auth. mod.)

44-3500
**Confluence zone of the intense katabatic winds at Terra Nova Bay, Antarctica, as derived from airborne sastrugi surveys and mesoscale numerical modeling.**
Bromwich, D.H., et al, *Journal of geophysical research,* Apr. 20, 1990, 95(D5), p.5495-5509, Refs. p.5508-5509.
Parish, T.R., Zorman, C.A.
Sastrugi, Aerial surveys, Wind (meteorology), Antarctica—Terra Nova Bay.
The surface wind field inland of the intense coastal katabatic wind regime at Terra Nova Bay has been studied both observationally and numerically. Airborne surveys of wind-induced features on the snow surface have been used to construct the time-averaged winter surface airflow pattern. The surface motion field has also been simulated by a mesoscale primitive equation model using terrain slopes with a horizontal resolution of 32 km. Both methods of analysis demonstrate that the intense katabatic airstream at Terra Nova Bay is forced by converging air currents in the continental interior. The broadscale confluence zone becomes organized into two regions within about 180 km of the coast. The primary route for katabatic mass transport into the Terra Nova Bay area is Reeves Glacier valley, but an important secondary source is provided by airflow down David Glacier. The confluence zone feeding into David Glacier valley stretches over 100 km into the interior and is forced by the broadscale terrain configuration of the ice sheet. Airborne surveys of sastrugi orientations are a highly successful method for establishing the detailed pattern of surface airflow. However, a systematic examination of sastrugi dimensions suggests that such work could also be carried out using SPOT-type satellite observations, which is a more cost-effective approach than aircraft surveying. (Auth. mod.)

44-3501
**Glacial-interglacial CO2 change: the iron hypothesis.**
Martin, J.H., *Paleoceanography,* Feb. 1990, 5(1), p.1-13, Refs. p.10-13.
Ice composition, Biomass, Ice edge.
Several explanations for the 200 to 280 ppm glacial/interglacial change in atmospheric CO2 concentrations deal with variations in southern ocean phytoplankton productivity and the related use or nonuse of major plant nutrients. An hypothesis is presented herein in which arguments are made that new productivity in today's southern ocean is limited by iron deficiency, and hence the phytoplankton are unable to take advantage of the excess surface nitrate/phosphate that, if used, could result in increased total southern ocean new production. As a consequence of Fe-limited new productivity, Holocene interglacial CO2 levels (preindustrial) are as high as they were during the last interglacial (about 280 ppm). In contrast, atmospheric dust Fe supplies were 50 times higher during the last glacial maximum (LGM). Because of this Fe enrichment, phytoplankton growth may have been greatly enhanced, larger amounts of upwelled nutrients may have been used, and the resulting stimulation of new productivity may have contributed to the LGM drawdown of atmospheric CO2 to levels of less than 200 ppm. Background information and arguments in support of this hypothesis are presented. (Auth.)

44-3502
**Nearshore Great Lakes ice cover.**
Bolsenga, S.J., *Cold regions science and technology,* May 1988, 15(2), p.99-105, 15 refs.
Lake ice, Ice cover thickness, Ice conditions, Ice surveys, Ice growth, Great Lakes.

44-3503
**On the spatial frequency of linear ice scours on the seabed.**
Gaskill, H., et al, *Cold regions science and technology,* May 1988, 15(2), p.107-130, 34 refs.
Lewis, C.F.M.
Ice scoring, Ocean bottom, Pipelines, Bottom topography, Ice bottom surface, Icebergs, Mathematical models, Statistical analysis.

44-3504
**Formation process and direction distribution of snow cornices.**
Kobayashi, D., et al, *Cold regions science and technology,* May 1988, 15(2), p.131-136, 4 refs.
Ishikawa, N., Nishio, F.
Snow cornices, Blowing snow, Wind factors, Topographic effects.

44-3505
**Avalanche accident at Vassdalen, Norway, 5 March 1986.**
Lied, K., *Cold regions science and technology,* May 1988, 15(2), p.137-150, 7 refs.
Avalanches, Accidents, Avalanche formation, Avalanche tracks, Snow cover stability, Norway

44-3506
**Modelling the thermal regime of a lake during the winter season.**
Sahlberg, J., *Cold regions science and technology,* May 1988, 15(2), p.151-159, 13 refs.
Lakes, Thermal regime, Lake ice, Mathematical models, Ice cover effect, Ice conditions, Ice water interface.

44-3507
**Influence of freezing mode on frost heave characteristics.**
Konrad, J.M., *Cold regions science and technology,* May 1988, 15(2), p.161-175, 23 refs.
Soil freezing, Frost heave, Ice lenses, Artificial freezing, Underground pipelines, Frost penetration.

44-3508
**Factors affecting the prediction of wave-induced iceberg motion.**
Lever, J.H., et al, *Cold regions science and technology,* May 1988, 15(2), p.177-190, 15 refs.
Attwood, D., Sen, D.
Ocean waves, Icebergs, Ice mechanics, Ice models, Mathematical models, Ice loads, Offshore structures

44-3509
**Permafrost temperatures in the Arctic National Wildlife Refuge.**
Osterkamp, T.E., *Cold regions science and technology,* May 1988, 15(2), p.191-193, 4 refs.
Permafrost thermal properties, Frozen ground temperature, Soil temperature, Thermal regime, United States—Alaska—Arctic National Wildlife Refuge.

44-3510
**Time-domain reflectometry and electrical conductance measurements during seasonal soil frost.**
Hayhoe, H.N., et al, *Cold regions science and technology,* May 1988, 15(2), p.195-200, 14 refs.
Balchin, D.
Soil freezing, Unfrozen water content, Frost penetration, Soil temperature, Electrical measurement, Runoff forecasting.

44-3511
**Some characteristics of falling snow.**
Mellor, M., et al, *Cold regions science and technology,* May 1988, 15(2), MP, p.201-206, 7 refs.
Mellor, A.
Snowfall, Snow accumulation, Snow density, Snowflakes, Snow optics, Visibility.
Data for snow accumulation rate, density and visibility for Hanover, NH in 1982-1984 are compared with data for Antarctica in 1966

44-3512
**Constraints on the preservation of diamict facies (melt-out tills) at the margins of stagnant glaciers.**
Paul, M.A., et al, *Quaternary science reviews,* 1990, 9(1), p.51-69, 102 refs.
Eyles, N.
Glacial deposits, Glacier melting, Glacier ice.

44-3513
**Winter offshore/onshore wind differences in southeastern Hudson Bay, Canada.**
Larouche, P., *Arctic,* Mar. 1990, 43(1), p.55-59, With French summary. 20 refs.
Wind velocity, Ice cover effect, Topographic effects, Ice air interface, Canada—Hudson Bay.

44-3514
**Plan for snow fences on multilane highways. [Tashase-doro ni okeru bosetsusaku no keikaku],**
Fujita, H., et al, *Hokkaido kaihatsukyoku gijutsu kenkyu happyokai ronbunshu (Hokkaido Development Bureau Technical Research Meeting Proceedings),* 1986, No.30, p.91-96, In Japanese.
Kurahashi, Y., Yamaguchi, M., Nagaoka, Y., Takeuchi, M.
Snow fences, Road maintenance.

44-3515
**Survey of freezing depth throughout Hokkaido. [Zendo no tokeitsu fukasa no ikkosatsu],**
Saito, T., et al, *Hokkaido kaihatsukyoku gijutsu kenkyu happyokai ronbunshu (Hokkaido Development Bureau Technical Research Meeting Proceedings),* 1986, No 30, p.123-128, In Japanese. 5 refs.
Kumagai, S., Sato, S., Mizushima, T.
Road icing, Frost penetration, Analysis (mathematics), Japan—Hokkaido

44-3516
**Experiment on improving frost heave test methods. [Tojo shiken hoho no kairyo ni kansuru jikken],**
Mizushima, T., et al, *Hokkaido kaihatsukyoku gijutsu kenkyu happyokai ronbunshu (Hokkaido Development Bureau Technical Research Meeting. Proceedings),* 1986, No 30, p.129-134, In Japanese. 7 refs.
Kumagai, S., Sato, S., Saito, S.
Frost heave, Soil freezing, Frost resistance, Tests.

44-3517
**Report on measurement of riverbed waves during snowmelt runoff. [Yusetsu shussui toki ni okeru kasho nami sokutei hokoku],**
Nakayama, H., et al, *Hokkaido kaihatsukyoku gijutsu kenkyu happyokai ronbunshu (Hokkaido Development Bureau Technical Research Meeting. Proceedings),* 1986, No.30, p.423-428, In Japanese.
Kubota, Y., Momiji, K.
Snowmelt, Runoff, Water waves, River flow, Flood forecasting, Bottom topography

44-3518
**Simulation of groundwater considering snowmelt. [Yusetsusui o koryo shita chikasui shimyureshon],**
Watanabe, K., et al, *Hokkaido kaihatsukyoku gijutsu kenkyu happyokai ronbunshu (Hokkaido Development Bureau Technical Research Meeting. Proceedings),* 1986, No.30, p.501-506, In Japanese. 9 refs.
Segawa, A.
Snowmelt, Ground water, Mathematical models.

44-3519
**Snow pressure in design of fiberglass-reinforced-plastic fences at Wakkanai Airport. [Wakkanai kuko ni okeru setsuatsu o koryo shita F.R.P. fensu no sekkei ni tsuite],**
Imabayashi, H., et al, *Hokkaido kaihatsukyoku gijutsu kenkyu happyokai ronbunshu (Hokkaido Development Bureau Technical Research Meeting. Proceedings),* 1986, No 30, p.1189-1194, In Japanese
Ishijima, T., Nakamura, M.
Runways, Snow loads, Snow fences

44-3520
Tests on rotary snow removal machinery. [Rotari josetsu kikai ni kansuru chosa shiken],
Nakayama, K., et al, *Hokkaido kaihatsukyoku gijutsu kenkyu happyokai ronbunshu (Hokkaido Development Bureau Technical Research Meeting. Proceedings),* 1986, No.30, p.1251-1268, In Japanese. 4 refs.
Nakamura, N.
Snow removal, Equipment, Tests.

44-3521
Tests on snow removal truck. [Josetsu torakku ni kansuru chosa shiken],
Nakajima, J., et al, *Hokkaido kaihatsukyoku gijutsu kenkyu happyokai ronbunshu (Hokkaido Development Bureau Technical Research Meeting. Proceedings),* 1986, No.30, p.1283-1288, In Japanese.
Saito, T.
Snow removal, Motor vehicles, Tests.

44-3522
Investigative report on observation characteristics of radar rain and snow gages (Part 2). [Reda usetsu ryokei no kansoku tokusei ni kansuru chosa hokoku (2)],
Takahashi, T., et al, *Hokkaido kaihatsukyoku gijutsu kenkyu happyokai koen gaiyoshu (Hokkaido Development Bureau Technical Research Meeting. Lecture summaries),* 1988, 32(1), p.5-10, In Japanese. 2 refs.
Sagae, H., Mizushima, T.
Precipitation gages, Snowfall, Radar echoes

44-3523
Tests on rotary snow removal machinery. Final report. [Rotari josetsu kikai ni kansuru chosa shiken], *Hokkaido kaihatsukyoku gijutsu kenkyu happyokai koen gaiyoshu (Hokkaido Development Bureau Technical Research Meeting. Lecture summaries),* 1988, 32(1), p.167-186, In Japanese.
Snow removal, Equipment, Tests.

44-3524
Tests on wind and snow control and obstructions to visibility; wind tunnel experiments on snow fences on National Highway 241 in the Sokotai area. [Bofu, bosetsu oyobi shitei shogai ni kansuru chosa shiken; ippan kokudo 241 go Sokotai chiku sessaku ni kansuru fudo jikken],
Takabe, N., et al, *Hokkaido kaihatsukyoku gijutsu kenkyu happyokai koen gaiyoshu (Hokkaido Development Bureau Technical Research Meeting. Lecture summaries),* 1988, 32(1), p.189-194, In Japanese.
Nakano, T., Omura, K.
Snow fences, Road maintenance, Visibility, Wind tunnels.

44-3525
Tests on improving the efficiency of snow removal devices on snow removal trucks. [Josetsu torakku no josetsu sochi no koritsuka ni kansuru chosa shiken],
Nakajima, J., et al, *Hokkaido kaihatsukyoku gijutsu kenkyu happyokai koen gaiyoshu (Hokkaido Development Bureau Technical Research Meeting. Lecture summaries),* 1988, 32(1), p.195-200, In Japanese.
Ushiki, S., Tukagata, K.
Snow removal, Motor vehicles, Equipment, Tests.

44-3526
Performance tests on 100-PS-model small-scale snowplows. [Kogata josetsusha (100 PS) no seino shiken],
Sasaki, C., et al, *Hokkaido kaihatsukyoku gijutsu kenkyu happyokai koen gaiyoshu (Hokkaido Development Bureau Technical Research Meeting. Lecture summaries),* 1988, 32(1), p.201-206, In Japanese.
Kawakami, S., Horikawa, R.
Snow removal, Motor vehicles, Equipment.

44-3527
Surface energy balance, parameterizations of boundary-layer heights and the application of resistance laws near an antarctic ice shelf front.
Heinemann, G., et al, *Boundary-layer meteorology,* Apr. 1990, 51(1-2), p.123-158, 69 refs.
Rose, L.
Surface energy, Turbulent boundary layer, Ice shelves, Atmospheric pressure, Polynyas, Air flow, Radiation balance, Sea ice, Snow surface, Surface temperature.
A study of the surface energy balance with turbulent fluxes obtained by the Monin Obukhov similarity theory and a comparison with results for resistance laws are presented for the strong baroclinic conditions in the vicinity of the Filchner/-Ronne Ice Shelf front. The data are taken from a field experiment in the antarctic summer season 1983/84. For the first time in the coastal antarctic region, this data set comprises synchronous energy balance measurements over the polynya and the ice shelf together with soundings of the boundary layer, yielding vertical profiles of the wind velocity and temperature over the ice shelf, at the ice shelf front and over the polynya. Over the ice shelf, the radiation balance is the largest component of the energy fluxes and is mainly compensated by the subsurface energy flux and the turbulent heat flux in the daily mean. Over the polynya, turbulent fluxes of sensible and latent heat lead to large energy losses of the water surface in the nighttime and in situations of very low air temperatures. Different parameterizations for boundary-layer height are compared using tethered sonde and energy balance measurements. With the height of the inversion base over the polynya and the height of the critical bulk Richardson number over the ice shelf, external parameters for the application of resistance laws were determined. The comparison of turbulent surface fluxes obtained by the energy balance measurements and by the resistance laws shows good agreement for the convective conditions over the polynya. For the stably stratified boundary layer over the ice shelf with small amounts of turbulent heat flux, the deviation is large for the case of a cold air outflow with a superposed inertial oscillation. (Auth.)

44-3528
Observations on organic mounds on the North Shore of the Gulf of St. Lawrence, Québec. [Observations sur les buttes organiques de la Côte-Nord du Golfe du Saint-Laurent, Québec],
Dionne, J.C., et al, *Géographie physique et quaternaire,* 1988, 42(3), p.289-301, In French with English and German summaries. 37 refs.
Gerardin, V.
Pit and mound topography, Organic soils, Frost action, Soil structure, Shores, Peat, Geologic processes, Mosses, Canada—Quebec—Gulf of St. Lawrence.

44-3529
Periglacial bibliography for Québec, 1969-1989, including glacial topics from 1960-1989. [Bibliographie du périglaciaire du Québec, 1969-1989, incluant le glaciel pour la période 1960-1989],
Dionne, J.C., *Géographie physique et quaternaire,* 1989, 43(2), p.233-243, In French. 12 refs.
Bibliographies, Periglacial processes, Geomorphology, Canada—Quebec.

44-3530
Middle Wisconsinan climate fluctuations recorded in central Alaskan loess.
Begét, J., *Géographie physique et quaternaire,* 1990, 44(1), p.3-13, With French and German summaries. 25 refs.
Loess, Paleoclimatology, Magnetic properties, Permafrost dating, Radioactive age determination, Wind factors, Carbon dioxide, Climatic changes.

44-3531
Ice-push bedrock and its syngenetic till at Pont-Rouge, Québec. [Substrat glaciotectonisé et till syngénétique à Pont-Rouge, Québec],
Schroeder, J., et al, *Géographie physique et quaternaire,* 1990, 44(1), p.33-42, In French with English and German summaries. 16 refs.
Beaupré, M., Cloutier, M.
Glacier beds, Stratification, Glacial erosion, Ice push, Rocks, Stratigraphy, Glaciation, Substrates, Pit and mound topography, Glacier flow, Canada—Quebec.

44-3532
Fiord to deep sea sediment transfers along the northeastern Canadian continental margin: models and data.
Andrews, J.T., *Géographie physique et quaternaire,* 1990, 44(1), p.55-70, With French and German summaries. 84 refs.
Sediment transport, Glacier flow, Calving, Land ice, Littoral zone, Ice shelves, Glacier oscillation, Stratigraphy, Glacial erosion, Bottom sediment, Canada—Baffin Island.

44-3533
Coastal sedimentation along glacial outwash plain shorelines in northwest Spitsbergen. [Sédimentation littorale en bordure de plaines d'épandage fluvioglaciaire au Spitsberg nord-occidental],
Héquette, A., et al, *Géographie physique et quaternaire,* 1990, 44(1), p.77-88, In French with English and German summaries. 34 refs.
Ruz, M.-H.
Shoreline modification, Glacial deposits, Sediment transport, Outwash, River flow, Beaches, Littoral zone, Norway—Spitsbergen.

44-3534
Fluvial outbursts and cryokarstic processes on Mars and in Siberia. [Vallées de débâcle et processus cryokarstiques sur Mars et en Sibérie],
Costard, F., *Géographie physique et quaternaire,* 1990, 44(1), p.97-104, In French with English summary. 47 refs.
Ground ice, Permafrost transformation, Fluid flow, Mars, Temperature effects, Landforms, Cryogenic structures, Extraterrestrial ice, Geocryology, U.S.S.R.—Siberia.

44-3535
Comments on the prediction of ice crystal size distribution in a continuous crystallizer.
Shirai, Y., et al, *Chemical engineering science,* 1990, 45(4), p.1147-1148, For article being commented upon see 41-1348. 4 refs.
Ice crystal growth, Heat transfer, Solutions, Particle size distribution.

44-3536
On the mechanisms of the ice accretion on h.v. conductors.
Teisseyre, Y., et al, *Cold regions science and technology,* Apr. 1990, 18(1), p.1-8, 11 refs.
Farzaneh, M.
Ice accretion, Electric fields, Dendritic ice, Drops (liquids), Electric equipment, Electric charge, Electrical resistivity, Ice deformation, Surface structure, Electromagnetic properties, Polarization (charge separation).

44-3537
Deep penetration of permafrost through saturated ground.
Kelly, R.J., et al, *Cold regions science and technology,* Apr. 1990, 18(1), p.9-27, 17 refs.
Morland, L.W., Boulton, G.S.
Soil freezing, Subpermafrost ground water, Permafrost depth, Ice water interface, Analysis (mathematics), Permafrost structure, Phase transformations, Glacial geology, Frozen ground thermodynamics.

44-3538
Crack nucleation due to elastic anisotropy in polycrystalline ice.
Shyam Sunder, S., et al, *Cold regions science and technology,* Apr. 1990, 18(1), p.29-47, 27 refs.
Wu, M.S.
Ice cracks, Ice crystal structure, Crack propagation, Ice elasticity, Ice microstructure, Ice models, Nucleation, Grain size, Tensile properties.

44-3539
Unfrozen water as a function of void ratio in a clayey silt.
Konrad, J.M., *Cold regions science and technology,* Apr. 1990, 18(1), p.49-55, 11 refs.
Soil freezing, Unfrozen water content, Water transport, Clay soils, Porosity, Thaw consolidation, Adsorption, Soil tests.

44-3540
Transport of water due to a temperature gradient in unsaturated frozen clay.
Nakano, Y., et al, *Cold regions science and technology,* Apr. 1990, 18(1), MP 2701, p.57-75, 20 refs.
Tice, A.R.
Soil freezing, Water transport, Unfrozen water content, Temperature gradients, Soil temperature, Soil tests, Clays, Analysis (mathematics), Seepage.
The net flux of water in a fine-grained soil column is given. Under this assumption a new experimental method was introduced to determine certain soil properties.

44-3541
Development of an underwater frazil-ice detector.
Daly, S.F., et al, *Cold regions science and technology,* Apr. 1990, 18(1), MP 2702, p.77-82, 7 refs.
Rand, J.H.
Ice detection, Frazil ice, Underwater ice, Water intakes, Measuring instruments, Water flow, Flow measurement, Electrical resistivity, Hydraulic structures, Design, Flow rate, Remote sensing.
A new underwater frazil-ice detector developed at USACRREL is described. The detector can operate remotely and independently. It can automatically start de-icing procedures and alert operators to the presence of frazil. The detector operates by measuring the flow rate through a small intake screen upon which frazil ice can accumulate. The intake screen is, in effect, a miniature trash rack that will freeze up much sooner than the actual trash rack. The detector was tested in the laboratory and in the field with good results, it is economical, and is built largely with off-the-shelf items.

44-3542
Friction loss through a uniform snow layer.
Yen, Y.C., *Cold regions science and technology,* Apr. 1990, 18(1), MP 2703, p.83-90, 9 refs.
Snow permeability, Air flow, Mass flow, Snow density, Internal friction, Snow thermal properties, Vapor pressure, Air snow interface, Snow structure, Fluid flow, Heat loss.
An experimental study covering a mass flow rate of air ranging from .00162 to .0675 kg/sq m/m and for snow density varying from 377 to 472 kg/cu m has been conducted. Pressure drops of 1.176 to 281.1 N/sq m were recorded. A plot of friction factor f (sub p) and Re (sub p) (defined analogously as the friction factor f and the classical Reynolds number Re for fluid flow through conduits) showed a good representation of all the experimental data.

44-3543
**Sea ice thickness versus impulse radar time-of-flight data.**
Kovacs, A., et al, *Cold regions science and technology,* Apr 1990, 18(1), MP 2704, p 91-98, 1 ref
Morey, R.M.
Sea ice, Ice cover thickness, Radar echoes, Snow depth, Measurement, Snow cover, Ice electrical properties, Dielectric properties, Electromagnetic waves, Ice floes, Reflectivity.
Two second-year sea ice floes were probed using "impulse" radar sounding and direct drilling methods The resulting two-way time-of-flight of the impulse radar EM wavelet, traveling from the surface to the ice "bottom" and back to the surface, was compared with snow and ice thickness data obtained from a drill hole From this comparison, simple relationships are presented that provide an estimate of the thickness of sea ice, between about 1 and 8 m thick, with or without a snow cover The data revealed that the apparent dielectric constant of the sea ice decreased with increasing ice thickness, from a value of about 7 for ice 1 m thick, to about 3 5 for ice 6 m thick

44-3544
**Proceedings of the NIPR Symposium on Polar Meteorology and Glaciology, No.3.**
Kawaguchi, S., ed, Tokyo, National Institute of Polar Research, 1990, 114p., For individual papers see 44-3545 through 44-3549 or F-42007 through F-42009, I-42004 through I-42006, I-42010 and I-42011
NIPR Symposium on Polar Meteorology and Glaciology, 11th, Tokyo, July 12-13, 1988
Meetings, Meteorological data, Snow, Ice cores
This is a collection of papers presented at the 11th Symposium on Polar Meteorology and Glaciology held on July 12-13, 1988, in Tokyo It consists of 10 full length papers and 16 abstracts; the former include studies on ozone, stratospheric temperature, clouds and particle precipitation, components and annual fluctuation of snow and ice cover, radiation, and atmospheric heat and water budgets, as part of the research programs of the Antarctic Climate Research, 1987-1991, the East Queen Maud Land Glaciological Project, 1982-1986, and the Middle Atmosphere Program, 1982-1985.

44-3545
**Organic components of antarctic snow and ice. Part 1. Volatile fatty acids in snow drift.**
Ohta, K., et al, NIPR Symposium on Polar Meteorology and Glaciology, Proceedings. No 3, Tokyo, National Institute of Polar Research, 1990, p.36-42, 21 refs
Nishio, F., Osada, K.
Snow composition, Snow impurities, Snowdrifts, Antarctica—Mizuho Plateau.
Snow drift samples collected on Mizuho Plateau were analyzed for volatile fatty acids including formic, acetic, propionic and butyric acids. Formic (2 3-11.7 ppb) and acetic (11 4-59.8 ppb) acids were detected as major components. Their concentrations were far lower than those reported in rain and snow samples from urban, rural and remote areas However, the concentrations were higher than those of formic and acetic acid concentrations reported in the ice core sample collected from the coast of East Antarctica The concentrations of volatile fatty acids in snow drift samples showed a marked seasonal variation, i e., low levels in winter and high levels in summer, correlating with solar radiation Based on this seasonal variation, it is concluded that these volatile fatty acids were produced by photochemical oxidation of atmospheric hydrocarbons The contribution of these volatile fatty acids to the acidity of *snow drift is small* (Auth )

44-3546
**Transport rates of Na+, Cl-, NO3- and SO42- by drifting snow at Mizuho Station, Antarctica.**
Osada, K., et al, NIPR Symposium on Polar Meteorology and Glaciology, Proceedings No 3, Tokyo, National Institute of Polar Research, 1990, p.43-50, 22 refs.
Higuchi, K.
Snow cover distribution, Snowdrifts, Snow composition, Ice composition, Wind factors, Antarctica—Mizuho Station.
Transport rates of Na+, Cl-, NO3 and SO42- by drifting snow are estimated to evaluate the contribution to material transport processes at Mizuho Station Daily transport rates of Na+ and Cl- in winter are about 3 times the transport rates in summer daily transport rates of NO3- and SO42- in winter are two thirds of those in summer Transport rates of chemical constituents by ice flow are also estimated to compare with those by drifting snow, the latter comprise between 9% and 18% of the amount transported by the former Differences in NO3- and SO42- concentrations (in microgram/l) between ice core (56 and 51) and snow drift in summer (315 and 199, respectively) suggest that deposition of the snow layer in summer does not occur at altitudes from 2000 m to 3000 m in the katabatic wind region. The amount of sulfate transport by drifting snow toward the coastal region below 2000 m altitude is three orders smaller than that through the entire antarctic atmosphere. (Auth mod )

44-3547
**Measurements of total gas content of an ice core from Mizuho Station, Antarctica.**
Kameda, T., et al, NIPR Symposium on Polar Meteorology and Glaciology, Proceedings. No 3, Tokyo, National Institute of Polar Research, 1990, p 51-57, 24 refs.
Nakawo, M , Nagoshi, M , Mae, S
Ice cores, Bubbles, Ice cover thickness, Antarctica—Mizuho Station.
Total gas content of an ice core 700 m long, drilled at Mizuho Station, has been measured by two methods the "melting method", in which entrapped gas in an ice sample was collected in a gas burette by melting the sample in liquid, and the "dry extraction method", which was also employed to measure gas contents for small samples The gas was introduced into an evacuated container by crushing a sample It was found that the total gas content of the Mizuho core increased almost linearly with decrease of depth, from 600 to 180 m below the surface Above 180 m, however, total gas content was much larger than in the lower part of the ice core This probably indicates that the ice sheet thickness has decreased since the gas was incorporated into the ice matrix located at about 180 m depth. (Auth.)

44-3548
**Some comments on the recent studies of interannual fluctuations of Northern Hemisphere snow and ice cover and climate.**
Tsuchiya, I., NIPR Symposium on Polar Meteorology and Glaciology, Proceedings No 3, Tokyo, National Institute of Polar Research, 1990, p.89-94, 24 refs
Snow cover stability, Climatic changes, Surface temperature, Polar regions.

44-3549
**Measurements of falling attitudes of snowflakes using two video cameras.**
Muramoto, K , et al, NIPR Symposium on Polar Meteorology and Glaciology, Proceedings. No.3, Tokyo, National Institute of Polar Research, 1990, p 95-99, 4 refs.
Shiina, T., Endoh, T., Konishi, H , Kitano, K.
Snowflakes, Snowfall, Velocity, Recording instruments.

44-3550
**Acoustic properties of icy soils and ice.** [Akusticheskie svoĭstva l'distykh gruntov i l'da],
Zykov, IU.D., et al, Moscow, Nauka, 1989, 133p , In Russian with English summary. 130 refs.
Chervinskaia, O.P.
Frozen ground strength, Ground ice, Cryogenic textures, Ice acoustics, Acoustic measurement, Frozen ground mechanics, Frozen ground physics, Elastic waves, Engineering geology, Analysis (mathematics)

44-3551
**All-Union Congress of Soil Scientists, 8th, Novosibirsk, Aug. 14-18, 1989. Summaries. Book 1.** [Tezisy dokladov. Kniga 1],
Vsesoiuznyĭ s"ezd pochvovedov, 8th, Novosibirsk, Aug. 14-18, 1989, Novosibirsk, 1989, 299p. (Pertinent p 119-123), In Russian
Kovalev, R.V., ed.
Soil freezing, Frozen ground thermodynamics, Frozen ground physics, Soil water migration, Seasonal variations, Meetings, Ground ice.

44-3552
**All-Union Congress of Soil Scientists, 8th, Novosibirsk, Aug. 14-18, 1989. Summaries. Book 6.** [Tezisy dokladov Kniga 6],
Vsesoiuznyĭ s"ezd pochvovedov, 8th, Novosibirsk, Aug. 14-18, 1989, Novosibirsk, 1989, 290p., In Russian. For selected papers see 44-3553 through 44-3560.
Kovalev, R.V., ed.
Cryogenic soils, Soil freezing, Frozen ground, Permafrost distribution, Soil formation, Soil microbiology, Meetings.

44-3553
**Structure of the reclaimable soil layer in the northern and eastern regions of the USSR.** [Osobennosti stroeniia meliorirуemoĭ tolshchi severnykh i vostochnykh raĭonov SSSR],
Uglanov, I N , Vsesoiuznyĭ s"ezd pochvovedov, 8th, Novosibirsk, Aug 14-18, 1989 Tezisy dokladov Kniga 6 (All-Union Congress of Soil Scientists, 8th, Novosibirsk, Aug. 14-18, 1989. Summaries. Book 6). Edited by R.V. Kovalev, Novosibirsk, 1989, p.48-51, In Russian.
Cryogenic soils, Permafrost preservation, Land reclamation, USSR.

44-3554
**Interaction of the cryosphere and biosphere during soil and soil cover formation.** [Vzaimovliianie kriosfery i biosfery pri formirovanii pochv i pochvennogo pokrova],
Makeev, O.V., Vsesoiuznyĭ s"ezd pochvovedov, 8th, Novosibirsk, Aug. 14-18, 1989. Tezisy dokladov. Kniga 6 (All-Union Congress of Soil Scientists, 8th, Novosibirsk, Aug. 14-18, 1989 Summaries. Book 6). Edited by R.V. Kovalev, Novosibirsk, 1989, p.242-252, In Russian.
Cryogenic soils, Soil formation, Soil classification.

44-3555
**Cryogenesis and fertility of frozen soils in northeastern USSR *with the soils of Yakutia as an example.*** [Kriogenez i plodorodie merzlotnykh pochv severo-vostoka SSSR na primere pochv Iakutii],
Elovskaia, L.G., Vsesoiuznyĭ s"ezd pochvovedov, 8th, Novosibirsk, Aug. 14-18, 1989. Tezisy dokladov Kniga 6 (All-Union Congress of Soil Scientists, 8th, Novosibirsk, Aug. 14-18, 1989. Summaries Book 6). Edited by R.V. Kovalev, Novosibirsk, 1989, p.253-257, In Russian.
Cryogenic soils, Soil formation, Soil classification, Frozen ground chemistry, USSR—Yakutia

44-3556
**Geography of soils in the permafrost region.** [Geografiia pochv merzlotnoĭ oblasti],
Sokolov, I.A., et al, Vsesoiuznyĭ s"ezd pochvovedov, 8th, Novosibirsk, Aug. 14-18, 1989 Tezisy dokladov. Kniga 6 (All-Union Congress of Soil Scientists, 8th, Novosibirsk, Aug. 14-18, 1989. Summaries. Book 6). Edited by R.V. Kovalev, Novosibirsk, 1989, p 258-263, In Russian
Bystriakov, G.M., Naumov, E.M., Volkovintser, V.I., Ignatenko, I V , Koniushkov, D E
Cryogenic soils, Permafrost distribution, Soil formation, Soil classification

44-3557
**Physical chemical processes in soil cryogenesis.** [Fiziko-khimicheskie protsessy pri pochvennom kriogeneze],
Voronin, A.D., et al, Vsesoiuznyĭ s"ezd pochvovedov, 8th, Novosibirsk, Aug. 14-18, 1989. Tezisy dokladov. Kniga 6 (All-Union Congress of Soil Scientists, 8th, Novosibirsk, Aug. 14-18, 1989 Summaries. Book 6). Edited by R.V. Kovalev, Novosibirsk, 1989, p.264-268, In Russian.
Savel'eva, E.M., Ostroumov, V.E.
Cryogenic soils, Soil freezing, Soil formation, Frozen ground chemistry, Frozen ground physics.

44-3558
**Permafrost, soils and microorganisms.** [Vechnaia merzlota, pochvy i mikroorganizmy],
Zviagintsev, D.G., et al, Vsesoiuznyĭ s"ezd pochvovedov, 8th, Novosibirsk, Aug. 14-18, 1989 Tezisy dokladov Kniga 6 (All-Union Congress of Soil Scientists, 8th, Novosibirsk, Aug 14-18, 1989 Summaries. Book 6). Edited by R V Kovalev, Novosibirsk, 1989, p.269-273, In Russian.
Khlebnikova, G.M., Glichinskiĭ, D.A , Fedorov-Davydov, D G , Chaĭkovskaia, N R
Cryogenic soils, Permafrost, Soil microbiology, Soil formation, Cryobiology.

44-3559
**Paleocryogenesis, soil evolution, and structure of soil cover.** [Paleokriogenez, evoliutsiia pochv i struktura pochvennogo pokrova],
Velichko, A.A., et al, Vsesoiuznyĭ s"ezd pochvovedov, 8th, Novosibirsk, Aug. 14-18, 1989. Tezisy dokladov. Kniga 6 (All-Union Congress of Soil Scientists, 8th, Novosibirsk, Aug. 14-18, 1989. Summaries. Book 6). Edited by R.V. Kovalev, Novosibirsk, 1989, p.274-280, In Russian.
Morozova, T.D., Nechaev, V.P., Porozhniakova, O M., Tsatskin, A.I.
Cryogenic soils, Soil formation, Paleoclimatology, Geocryology.

44-3560
**Paleocryogenesis and soils of the Russian plain.** [Paleokriogenez i pochvy russkoĭ ravniny],
Makeev, A.O., et al, Vsesoiuznyĭ s"ezd pochvovedov, 8th, Novosibirsk, Aug. 14-18, 1989 Tezisy dokladov Kniga 6 (All-Union Congress of Soil Scientists, 8th, Novosibirsk, Aug 14-18, 1989 Summaries Book 6) Edited by R V Kovalev, Novosibirsk, 1989, p.281-287, In Russian
Dubrovina, I.V., Kulinskaia, E.V., IAkusheva, T.E.
Cryogenic soils, Plains, Soil formation, Paleoclimatology.

44-3561
Peculiarities of the thin gold grain size distribution in the cryogenic zone of gold ore bodies and their secondary haloes and dissemination fluxes. (Osobennosti raspredeleniia krupnosti tonkogo zolota v kriogennoĭ zone okisleniia zolotorudnykh tel i ikh vtorichnykh oreolakh i potokakh rasseianiia),
Talsaev, T T, et al, *Akademiia nauk SSSR Doklady*, Jan. 1990, 310(3), p.699-703, In Russian. 10 refs.
Prokopchuk, S.I.
Gold, Frozen ground chemistry, Cryogenic soils, Minerals, Grain size, Exploration, Geochemistry, Geocryology

44-3562
Study on road construction for the 21st century in snow and cold regions. (Sekisetsu kanreichi ni okeru 21 seiki no doru kozo ni kansuru kenkyu), *Hokkaido kaihatsukyoku gijutsu kenkyu happyokai koen gaiyoshu (Hokkaido Development Bureau Technical Research Meeting. Lecture summaries)*, 1988, 32(2), p.5-34, In Japanese.
Highway planning, Economic development, Snow cover distribution, Snow cover effect, Construction, Japan—Hokkaido.

44-3563
Freezing index and freezing depth in rock of road tunnels. (Doru tonneru ni okeru toketsu shisu to ganban toketsu fukasa),
Ishizuka, T, et al, *Hokkaido kaihatsukyoku gijutsu kenkyu happyokai koen gaiyoshu (Hokkaido Development Bureau Technical Research Meeting. Lecture summaries)*, 1988, 32(2), p.43-48, In Japanese. 2 refs.
Negishi, M., Kikuchi, M.
Tunnels, Freezing indexes, Frost penetration.

44-3564
On-site studies to select methods of pavement repair. (Hoso shuzen koho sentei no tame no genchi kaitai chosa ni tsuite),
Yamazaki, A., et al, *Hokkaido kaihatsukyoku gijutsu kenkyu happyokai koen gaiyoshu (Hokkaido Development Bureau Technical Research Meeting. Lecture summaries)*, 1988, 32(2), p.57-62, In Japanese. 10 refs.
Sugioka, H., Mizushima, T.
Road icing, Road maintenance, Pavements.

44-3565
Countermeasures against frost heave on national highways. (Kokudo no tojo taisaku ni tsuite),
Saito, T., et al, *Hokkaido kaihatsukyoku gijutsu kenkyu happyokai koen gaiyoshu (Hokkaido Development Bureau Technical Research Meeting. Lecture summaries)*, 1988, 32(2), p.63-68, In Japanese. 3 refs.
Sugioka, H., Mizushima, T.
Road icing, Frost heave, Road maintenance, Frost protection, Countermeasures.

44-3566
Test results of horizontal loads on suspended fence anchors. (Chosaku anka no suihei saika shiken kekka ni tsuite),
Kanno, M., et al, *Hokkaido kaihatsukyoku gijutsu kenkyu happyokai koen gaiyoshu (Hokkaido Development Bureau Technical Research Meeting. Lecture summaries)*, 1988, 32(2), p.91-96, In Japanese. 4 refs.
Kurokawa, K., Tanaka, M.
Avalanche engineering, Snow fences, Anchors, Snow loads, Road maintenance.

44-3567
Performance of nonmetal tire chains in Hokkaido. (Hokkaido ni okeru hikinzoku taiya chen no seino tsuite),
Sato, H, et al, *Hokkaido kaihatsukyoku gijutsu kenkyu happyokai koen gaiyoshu (Hokkaido Development Bureau Technical Research Meeting. Lecture summaries)*, 1988, 32(2), p.97-102, In Japanese. 1 ref.
Hattori, K., Kadoyama, Y.
Tires, Road icing, Skid resistance, Traction.

44-3568
Snow melting agents in Hokkaido. (Hokkaido ni okeru yusetsuzai ni tsuite),
Ninagawa, K., et al, *Hokkaido kaihatsukyoku gijutsu kenkyu happyokai koen gaiyoshu (Hokkaido Development Bureau Technical Research Meeting. Lecture summaries)*, 1988, 32(2), p.103-108, In Japanese. 3 refs.
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Profiles of wind speed, temperature and turbulent fluxes of heat and momentum in the lowest 32 m have been measured at a station on an antarctic ice shelf. During the antarctic winter the surface layer often shows strong static stability, with temperature gradients as large as 1 K per m in the lowest few metres. The surface inversion is destroyed during periods of high wind speed but the wind profile shows significant deviation from the expected logarithmic form under such conditions Measurements of stress at 5 m indicate that the roughness length of the snow surface is about .0001 m. At 5 m height, the variations of the dimensionless wind shear and potential temperature gradient agree with previously determined forms of the Monin-Obukhov similarity functions. Above 5 m, the behaviour of dimensionless wind shear and potential temperature gradient is only qualitatively similar and surface-layer similarity theory does not provide a good description of the profiles. Turbulence length scales have been deduced from vertical velocity power spectra. Under near-neutral conditions, the ratio of turbulence length scale to measurement height is observed to decrease with increasing height of measurement This observation is consistent with the variation of turbulence length scale with height implied by the measurements of dimensionless wind shear It is suggested that the stability of the overlying atmosphere restricts the depth of the turbulent boundary layer and hence the length scales of turbulence within this layer Increasing stability causes a decrease of turbulence length scales at all levels. The ratios of turbulence kinetic energy to stress and temperature variance to heat flux are examined. Measurements are somewhat scattered, but the distribution of values varies little with height or stability The form of the distribution suggests that large-scale motions, possibly internal gravity waves, may be playing an important role in boundary-layer processes. (Auth. mod.)

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Algae, Classifications, Structural analysis, Ice cover, Growth, Plant ecology, Sampling, Statistical analysis, Pack ice, Land ice, Canada—Gulf of St. Lawrence.

44-3702
Fracture and breakup of river ice cover.
Beltaos, S., *Canadian journal of civil engineering*, Apr. 1990, 17(2), p.173-183, With French summary. 29 refs.
River ice, Ice breakup, Ice cracks, Crack propagation, Ice cover, Ice deformation, Ice jams, Flood forecasting, Ice mechanics, Water pressure, Cracking (fracturing).

44-3703
Effect of concrete specifications and inspection practices on freeze-thaw resistance: a field study.
Ward, M.A., et al, *Canadian journal of civil engineering*, Apr. 1990, 17(2), p.271-276, With French summary. 7 refs.
Langan, B.W.
Concrete durability, Specifications, Seasonal freeze thaw, Air entrainment, Tests, Concrete strength, Compressive strength.

44-3704
Effectiveness of using igdanite A-6 to crush permafrost and hard rock. [Effektivnost' primeneniia igdanita A-6 dlia drobleniia mnogoletnemerzlykh i skal'nykh porod].
Samoilov, V.I., et al, Issledovanie vzryvnogo metoda drobleniia gornykh porod s primeneniem prostelshikh VV (Study on the explosive method of crushing rock by using the simplest explosives), Moscow, 1988, p.22-29, In Russian. 2 refs.
Egupov, A.A., Evmenova, E.M., Starshinov, A.V.
Explosives, Blasting, Mining, Permafrost, Frozen ground strength, Frozen rock strength.

44-3705
Effect of hydrologic forest reclamation on change in hydrometeorological conditions of swamps. [Vliianie gidrolesomelioratsii na izmenenie gidrometeorologicheskikh uslovii bolot].
Orlov, E.D., Prirodnye resursy Karelii, ikh ispol'zovanie i okhrana (Natural resources of Karelia, their use and protection), Petrozavodsk, 1988, p.44-59, In Russian.
Land reclamation, Swamps, Permafrost hydrology, Snow depth, Snow water equivalent, Peat, USSR Karelia.

44-3706
Engineering geological mapping [Inzhenerno-geologicheskoe kartirovanie].
Gruzdov, A.V., ed, Moscow, Nauka, 1989, 118p, In Russian Refs. passim For selected articles see 44-3707 through 44-3709.
Vasil'chuk, IU.K., ed.
Engineering geology, Mapping, Permafrost distribution, Soil classification, Soil surveys, Geological surveys, Permafrost structure.

44-3707
Contents and methods for compiling engineering geological maps of permafrost peat. [O soderzhanii i metodike sostavleniia inzhenerno-geologicheskoi karty mnogoletnemerzlykh torfianykh massivov].
Kashpeniuk, P.I., et al, Inzhenerno-geologicheskoe kartirovanie (Engineering geological mapping). Edited by A.V. Gruzdov and IU.K. Vasil'chuk, Moscow, Nauka, 1989, p.83-89, In Russian. 6 refs.
Trofimov, V.T.
Engineering geology, Peat, Soil mapping, Permafrost distribution, Permafrost structure, Soil classification.

44-3708
Problems of medium-scale mapping of the ice content and cryogenic types of frozen layers in the lower reaches of the Kolyma River. [Voprosy srednemasshtabnogo kartografirovaniia l'distosti i kriogeneticheskikh tipov merzlykh tolshch v nizov'iakh r Kolymy].
Vasil'chuk, IU.K., et al, Inzhenerno-geologicheskoe kartirovanie (Engineering geological mapping). Edited by A.V. Gruzdov and IU.K. Vasil'chuk, Moscow, Nauka, 1989, p.89-96, In Russian. 15 refs.
Leibman, M.O., Bochkarev, N.IU., Burakova, N.O., Iz"iurova, N.F.
Soil mapping, Cryogenic soils, Permafrost distribution, Permafrost structure, Ground ice, Ice volume, Engineering geology, Soil profiles, USSR Kolyma River

44-3709
Principles of structural geomorphological mapping between the Kolyma and Indigirka rivers to evaluate the engineering geological conditions. [Printsipy strukturno-geomorfologicheskogo kartirovaniia Kolymo-Indigirskogo mezhdurech'ia dlia otsenki inzhenerno-geologicheskikh uslovii].
Kostenko, N.P., et al, Inzhenerno-geologicheskoe kartirovanie (Engineering geological mapping). Edited by A.V. Gruzdov and IU.K. Vasil'chuk, Moscow, Nauka, 1989, p.96-103, In Russian
Tsap, IU.A.
Engineering geology, Soil mapping, Permafrost distribution, Frozen ground strength, Geomorphology, Geological maps, USSR—Kolyma River, USSR—Indigirka River.

44-3710
Soil electrical resistivity on King George Island, Antarctica. [Resistividad eléctrica del suelo en isla Rey Jorge, Antártica].
Iribarren B., M., et al, *Santiago de Chile. Instituto antártico chileno. Serie científica*, 1990, No.40, p.95-100, In Spanish with English summary. 5 refs.
Carranza C., J.
Electrical resistivity, Sounding, Cryogenic soils, Antarctica—King George Island.
A brief description is given of the vertical electric sounding method used in measuring soil resistivity on King George I in Jan. 1985 Tabulated results are presented, a scheme of the electrode configuration in electrical conductivity measurements is included.

44-3711
Microbial ecosystems of Antarctica.
Vincent, W.F., Cambridge, England, Cambridge University Press, 1988, 304p, Refs. p.265-290. For previous entry in Antarctic Bibliography see 17B-39514.
Microbiology, Marine biology, Ecosystems, Cryobiology, Ecology, Cold weather survival, Soil microbiology, Ice cover effect, Snow cover effect.

44-3712
Climate of Moscow for the last 30 years. [Klimat Moskvy za poslednie 30 let].
Petrosyants, M.A., ed, Moscow, Izdatel'stvo Moskovskogo universiteta, 1989, 94p., In Russian. 41 refs.
Climate, Meteorological data, Urban planning, Weather observations, Precipitation (meteorology), Air temperature, Radiation balance, USSR—Moscow.

44-3713
BEPERS-88—sea ice remote sensing with synthetic aperture radar in the Baltic Sea.
Leppäranta, M., et al, *American Geophysical Union Transactions*, July 11, 1989, 70(28), p.698-699,708-709, 14 refs.
Thompson, T.
Ice surveys, Sea ice distribution, Airborne radar, Radar photography, Ice conditions, Ice surface, Surface roughness, Classifications, Microwaves, Baltic Sea

44-3714
View through ice: are unusual airborne radar backscatter features from the surface of the Malaspina Glacier, Alaska, expressions of subglacial morphology.
Molnia, B.F., et al, *American Geophysical Union. Transactions*, July 11, 1989, 70(28), p.701,710, 2 refs.
Jones, J.E.
Glacier surfaces, Airborne radar, Radar photography, Subglacial observations, Geomorphology, Side looking radar, Backscattering, Glacier beds, Surface properties, United States—Alaska—Malaspina Glacier.

44-3715
Crevasse deformation and examples from Ice Stream B, Antarctica.
Vornberger, P.L., et al, *Journal of glaciology*, 1990, 36(122), p.3-10, 17 refs.
Whillans, I.M.
Crevasses, Glacier flow, Ice deformation, Glacier surfaces, Ice models, Ice mechanics, Shear stress, Velocity, Glaciology, Antarctica—Ice Stream B.
Crevasses, once formed, are subject to rotation and bending according to the velocity field through which they travel. Because of this, crevasse shapes can be used to infer something about the velocity field of a glacier. This is done using a model in which each crevasse opens perpendicularly to the principal extensional strain-rate, when that strain-rate exceeds some specified critical value, and is then deformed according to the same velocity gradients that formed the crevasse. This model describes how crevasses are formed, translated, rotated, bent, and lengthened. Velocity fields are sought for which calculations produce crevasses approximating those found in three example areas on Ice Stream B. The first example is the hook-shaped crevasses that occur just outside the chaotic shear zone at the ice-stream margin. They are used to infer a rate of lateral shearing, and side drag. The second example, a pattern of splaying crevasses, is satisfactorily simulated by a model with side drag stress varying linearly across the ice stream. This confirms that this region is restrained almost entirely by side drag. The third example is transverse crevasses and their change in orientation, but many different velocity fields can produce the observed pattern. Of these three examples, the shapes of hook-shaped marginal crevasses and splaying crevasses can provide useful information whereas transverse crevasses are less helpful. (Auth.)

44-3716
Dominion Range ice core, Queen Maud Mountains, Antarctica—general site and core characteristics with implications.
Mayewski, P.A., et al, *Journal of glaciology*, 1990, 36(122), MP 2707, p.11-16, 17 refs.
Twickler, M.S., Lyons, W.B., Spencer, M.H., Meese, D.A., Gow, A.J., Grootes, P.M., Sowers, T., Watson, M.S., Saltzman, E.
Ice cores, Drill core analysis, Glacier ice, Ice composition, Ice sampling, Ice cover thickness, Isotope analysis, Ice crystal structure, Climatic change, Ice temperature, Antarctica—Queen Maud Mountains.
The Transantarctic Mountains of East Antarctica provide a new milieu for retrieval of ice-core records. Here are reported the initial findings from the first of these records, the Dominion Range ice core record. Sites such as the Dominion Range are valuable for the recovery of records detailing climate change, volcanic activity, and changes in the chemistry of the atmosphere. The unique geographic location of this site and a relatively low accumulation rate combine to provide a relatively long record of change for this potentially sensitive climatic region. As such, information concerning the site and general core characteristics are presented, including ice surface, ice thickness, bore-hole temperature, mean annual net accumulation, crystal size, crystal fabric, oxygen-isotope composition, and examples of ice chemistry and isotopic composition of trapped gases. (Auth.)

44-3717
Determination of the surface and bed topography in central Greenland.
Hodge, S.M., et al, *Journal of glaciology*, 1990, 36(122), p.17-30, 23 refs.
Wright, D.L., Bradley, J.A., Jacobel, R.W., Skou, N., Vaughn, B.
Glacier surfaces, Glacier thickness, Aerial surveys, Sounding, Ice sheets, Topographic features, Ice bottom surface, Height finding, Glacier beds, Data processing, Topographic surveys, Greenland.

44-3718
Icequakes on Ekström Ice Shelf near Atka Bay, Antarctica.
Von der Osten-Woldenburg, H., *Journal of glaciology*, 1990, 36(122), p.31-36, 7 refs.
Icequakes, Glacier ice, Seismic surveys, Ice breaking, Seismology, Ice solid interface, Wave propagation, Ice shelves, Tensile properties, Tides, Antarctica—Ekström Ice Shelf.
Two seismic arrays recorded in an 11 month field experiment in 1985 the seismicity of Ekström Ice Shelf in the area of an ice rumple and an inlet, situated respectively about 10 km northwest and 7km north of the German antarctic station Georg von Neumayer. Most of the focal depths of the icequakes considered until now are in the range 5-9 m, the ice-rumple area shows extremely high seismic activity. Tensile fracture is the most frequent fault mechanism, although there are a few shear-fracture events. The ice rumple's seismicity provides information on the dynamics of the ice shelf in this area. A comparison of this time-dependent seismicity with tides suggests that most of this seismicity is induced by tides. The most active period of this seismicity starts at the beginning of low tide and ends at low tide. The location of the epicentres of icequakes recorded at the time and the digital recording on tapes of the seismicity without interruption for 396 h shows a jerky vertical movement of the ice shelf in response to tides; this can be interpreted as a kind of "grater effect", especially at the southern ice-rock boundary of the ice rumple. The seismicity in the inlet is much less and tensile fracture seems to be the only fault mechanism. (Auth. mod.)

44-3719
Relationship between the development of depth hoar and avalanche release in the Tian Shan Mountains, China.
Ma, W F, et al, *Journal of glaciology*, 1990, 36(122), p.37-40, 4 refs.
Hu, R.
Depth hoar, Avalanche triggering, Snow cover structure, Avalanche mechanics, Snow cover stability, Temperature gradients, Precipitation (meteorology), Snow composition, Mountains, China—Tian Shan Mountains.

44-3720
On the numerical solution of Stefan problems in temperate ice.
Hutter, K., et al, *Journal of glaciology*, 1990, 36(122), p.41-48, 12 refs.
Zryd, A., Röthlisberger, H.
Stefan problem, Slush, Freezing rate, Analysis (mathematics), Ice water interface, Phase transformations, Freezing points, Glacial hydrology, Water content, Ice temperature.

44-3721
Thermal response of a small ice cap to climatic forcing.
Hanson, B., *Journal of glaciology*, 1990, 36(122), p.49-56, 22 refs.
Glacier heat balance, Climatic factors, Glacier flow, Glacier melting, Ice models, Ice sheets, Glacier beds, Thermal conductivity, Ice temperature, Periodic variations, Climatology, Glacier mass balance, Canada—Baffin Island—Barnes Ice Cap.

44-3722
Avalanche weather forecasting at the Northwest Avalanche Center, Seattle, Washington, U.S.A.
Ferguson, S.A., et al, *Journal of glaciology* 1990, 36(122), p.57-66, 10 refs.
Moore M B, Marriott, R T, Speers-Hayes, P.
Avalanche forecasting, Weather forecasting, Mountains, Climatic factors, Meteorological data, Microclimatology, Precipitation (meteorology).

44-3723
Subglacial water pressures and the shape of subglacial conduits.
Hooke, R.L., et al, *Journal of glaciology*, 1990, 36(122), p.67-71, 16 refs.
Laumann, T., Kohler, J.
Subglacial drainage, Glacier melting, Water pressure, Water flow, Surface structure, Glacier surfaces, Glacial hydrology, Subglacial observations, Periodic variations, Hydraulic structures.

44-3724
Observations on the drainage of an ice-dammed lake in West Greenland.
Russell, A.J., et al, *Journal of glaciology*, 1990, 36(122), p.72-74, 5 refs.
Aitken, J.F., De Jong, C.
Icebound lakes, Ice dams, Subglacial drainage, Shoreline modification, Glacial lakes, Ice tunnels, Moraines, Dislocations (materials), Sediment transport, Greenland—Söndre Strömfjord.

44-3725
Remote-sensing studies of Kvitöyjökulen, an ice cap on Kvitöya, north-east Svalbard.
Bamber J.L., et al, *Journal of glaciology*, 1990, 36(122), p.75-81, 27 refs.
Dowdeswell, J.A.
Ice sheets, Glacier surfaces, Radio echo soundings, Topographic features, Aerial surveys, Remote sensing, Glacier beds, Height finding, Ice electrical properties, LANDSAT, Snow impurities, Glacier melting, Suspended sediments, Norway—Svalbard.

44-3726
Jakobshavns Isbrae, West Greenland: seasonal variations in velocity—or lack thereof.
Echelmeyer, K., et al, *Journal of glaciology*, 1990, 36(122), p.82-88, 29 refs.
Harrison, W.D.
Glacier flow, Glacier melting, Seasonal variations, Velocity measurement, Basal sliding, Surface drainage, Seasonal ablation, Glacial hydrology, Upwelling, Greenland.

44-3727
Configuration of the drainage system of Midtdalsbreen, Norway, as indicated by dye-tracing experiments.
Willis, I.C., et al, *Journal of glaciology*, 1990, 36(122), p.89-101, 43 refs.
Sharp, M.J., Richards, K.S.
Subglacial drainage, Glacier flow, Water flow, Dispersions, Water pressure, Velocity measurement, Glacial hydrology, Basal sliding, Cavitation, Norway.

44-3728
*In-situ* tensile tests of snow-pack layers.
Jamieson, J.B., et al, *Journal of glaciology*, 1990, 36(122), p.102-106, 11 refs.
Johnston, C.D.
Snow cover structure, Snow strength, Test equipment, Mechanical tests, Microstructure, Snow crystal structure, Layers, Snow plasticity, Tensile properties.

44-3729
Notch-strengthening effect in fresh-water ice.
Nixon, W.A., et al, *Journal of glaciology*, 1990, 36(122), p.107-111, 13 refs.
Schulson, E.M.
Ice crystals, Tensile strength, Ice strength, Grain size, Mechanical tests, Crack propagation.

44-3730
Digital low-frequency, surface-profiling ice-radar system.
Wright, D.L., et al, *Journal of glaciology*, 1990, 36(122), p.112-121, 20 refs.
Hodge, S.M., Bradley, J.A., Grover, T.P., Jacobel, R.W.
Electronic equipment, Radar echoes, Ice surface, Profiles, Low frequencies, Design, Electromagnetic waves, Topographic features, Glacier surfaces, Glacier thickness, Reflectivity, Measuring instruments, Ice surveys, Antarctica—Ice Stream B.
A new short-pulse digital profiling radar system that operates at lower frequencies than most ice radars used in polar regions to date has been designed and built by the U.S. Geological Survey. The transmitter is an avalanche transistor pulser which drives a resistively loaded dipole transmitting antenna. A similar, but separate antenna is connected to the receiver. The receiver has adjustable sensitivity time control (STC) of as much as 60 dB to compensate for attenuation and geometric spreading factors. A fiber-optic cable is used to transmit both control signals and data. The data-acquisition and display system incorporates very high-speed digitizing and signal averaging, real-time profile display, and data storage on standard computer nine-track magnetic tape. The system was successfully used on Ice Stream B in West Antarctica at center frequencies of 1, 2, 4, 8, and 12.5 MHz. Bottom-return signal-to-noise ratios of more than 40 dB were obtained at 2 MHz through 800 m of ice. Convoluted internal surfaces not related to present bottom topography were resolved within the ice streams and anomalous strong reflections or "bright spots" were identified near the base of the ice. At present, there is no satisfactory glaciological explanation for either of these observations. (Auth.)

44-3731
Unusual jökulhlaup involving potholes on Black Rapids Glacier, Alaska Range, Alaska, U.S.A.
Sturm, M., et al, *Journal of glaciology*, 1990, 36(122), MP 2708, p.125-126, 3 refs.
Cosgrove, D.M.
Glacier surfaces, Subglacial drainage, Surface drainage, Water flow, Glacial lakes, Surface structure, Hydraulic structures, United States—Alaska.

44-3732
Modelling of flexural-gravitational waves in continuous ice cover.
Kozin, V.M., New York, Engineering Consulting and Translation Center (ECTC), [1989], 4p., T-822-08, Translated from "Theory and strength of an icebreaking ship", Gor'kii. Politekhnicheskii institut, 1982. 4 refs.
Ice cover strength, Ice models, Ice mechanics, Flexural strength, Ice deformation, Wave propagation, Water waves, Mathematical models, Ice water interface

44-3733
On the feasibility of modelling the bending-gravitational waves in continuous ice cover.
Levshchanov, L.P., New York, Engineering Consulting and Translation Center (ECTC), [1989], 5p., T-868-12, Translated from "Designing the means of extending navigation", Gor'kii. Politekhnicheskii institut, 1986. 8 refs.
Ice cover strength, Ice models, Ice mechanics, Flexural strength, Ice deformation, Mathematical models, Ice water interface, Water waves, Wave propagation.

44-3734
Resistance of snow to motion of an icebreaker
Gramuzov, E.M., New York, Engineering Consulting and Translation Center (ECTC), [1989], 9p., T-868-08, Translated from Designing the means of extending navigation", Gor'kii. Politekhnicheskii institut, 1986. 8 refs.
Snow strength, Ice breaking, Icebreakers, Mathematical models, Snow cover effect, Ice navigation, Metal snow friction.

44-3735
On a frequency analysis of ice impacts.
Javanainen, M., New York, Engineering Consulting and Translation Center (ECTC), [1989], 8p., T-880-02, Translated from "Proceedings of the Soviet-Finnish Seminar on the Ice Strength of Ships, Leningrad, 1988" 6 refs.
Ice breaking, Ice navigation, Ice cover strength, Impact strength, Analysis (mathematics), Ships, Ice loads.

44-3736
Simulation of oil slick transport in Great Lakes connecting channels: theory and model formulation.
Shen, H.T., et al, *U.S. Army Cold Regions Research and Engineering Laboratory*, Feb 1990, CR 90-01 29p., ADA-222 446, 54 refs.
Yapa, P.D., Petroski, M.E.
Oil spills, Computerized simulation, River flow, Mathematical models, Ice cover effect, Lake effects, Environmental impact, Channels (waterways), Great Lakes.
The growing concern over the impacts of oil spills on aquatic environments has led to the development of many computer models for simulating the transport and spreading of oil slicks in surface water. Almost all of these models were developed for coastal environments. In this study, two computer models, named as ROSS and LROSS, were developed for simulating oil slick transport in rivers and lakes, respectively. The oil slick transformation processes considered in these models include advection, spreading, evaporation and dissolution. These models can be used for slicks of any shape originated from instantaneous or continuous spills in rivers and lakes with or without ice covers. Although the study was originated by U.S. Army Corps of Engineers, Detroit District in relation to the Great Lakes limited navigation season extension study, these models can be used for any river and lake.

44-3737
Alaska index: streamflow, lake levels, and water-quality records to September 30, 1988.
Still, P.J., et al, *U.S. Geological Survey. Open-file report*, 1989, No.89-269, 189p.
Cosby, J.M.
Stream flow, Water chemistry, Rivers, Lakes, Surface waters, Water temperature, Hydrology, United States—Alaska.

44-3738
US global ice core research program West Antarctica and beyond.
Grootes, P.M., et al, MP 2709, U.S. National Science Foundation, Ice Core Working Group, Dec 1989, 32p
Gow, A.J.
Climatic changes, Research projects, Ice cores, Drill core analysis, Paleoclimatology, Paleoecology, Greenland, Antarctica.
The Ice Core Working Group, sponsored by the U.S. National Science Foundation, recommends that the NSF fund ice core research for the 1990s in Greenland and West Antarctica, to study climatic changes back to 125,000 years ago.

44-3739
Some observations of sea ice in the vicinity of Lützow-Holm Bay, Antarctica.
Yoshida, Y., et al, *Antarctic record*, Mar. 1990, 34(1), p.8-14, 12 refs.
Moriwaki, K
Sea ice distribution, Ice navigation, Fast ice, Antarctica—Lützow-Holm Bay.
Sea ice investigations were conducted in the Lützow-Holm Bay region in 1981 in conjunction with field work of submarine geomorphology. The investigation comprised observations on the ground and from the air, and simplified analysis of NOAA satellite images. Measurements were made of ice thickness in time sequence near Showa Station and along 500 km long traverse routes during nearly maximum thickness of first-year ice. The brief report presented here may be useful for future studies of sea ice conditions near Showa Station (Auth. mod.)

44-3740
Meteorological observations at Syowa Station in 1987 by the 28th Japanese Antarctic Research Expedition.
Kaneto, S., et al, *Antarctic record*, Mar. 1990, 34(1), p.15-45, In Japanese with English summary. 9 refs.
Sugawara, H., Ogihara, H., Yamamoto, A
Meteorological data, Snowstorms, Polar regions, Antarctica—Showa Station.
Results of meteorological observations carried out at Showa Station Feb. 1, 1987, to Jan. 31, 1988, are as follows: monthly mean temperatures of all seasons except winter were higher than normal, and monthly mean wind speeds were high, especially in Nov. when the strongest wind was recorded. Fourteen blizzards occurred, none from mid-June to mid-Sep.; tropospheric temperature was above normal; stratospheric temperature was lower than normal, especially from Oct. to Nov., when the difference reached 10 C. The polar night jet stream ended in Dec., while normally changing in Nov. Total ozone was depressed extraordinarily, reaching 153 m atm-cm on Oct. 5. (Auth. mod.)

44-3741
Report on meteorological research observations by the 29th Japanese Antarctic Research Expedition in 1988.
Wada, M., et al, *Antarctic record*, Mar. 1990, 34(1), p.46-75, In Japanese with English summary. 7 refs.
Aoki, S., Aoki, T., Seko, K.
Sea ice, Ice crystals, Meteorological data.
Meteorological investigations of interannual variations of antarctic atmosphere, carried out by JARE-29 in 1988, included observations of cloud and precipitation using vertical pointing meteorological radar; dual-wave microwave radiometer and NOAA satellite data, monitoring of atmospheric minor constituents, and radiation measurements. Two unmanned stations were built, and observations of sea ice and ice sheet structure were carried out. (Auth. mod.)

44-3742
China-Japan collaborative research program on antarctic biology at Great Wall Station on King George Island, South Shetland Islands in the summer of 1988/89.
Watanabe, K., et al, *Antarctic record*, Mar. 1990, 34(1), p.94-101, In Japanese with English summary. 1 ref.
Inoue, M., Ohyama, Y.
Sea ice, Algae, Antarctica—Great Wall Station.
Field observations and biological sample collection were carried out in the vicinity of the Great Wall Station from mid-Nov 1988 to early Mar. 1989. The areas surveyed included the Fildes and Burton peninsulas and Nelson I. Taxonomic analysis of lichen specimens revealed 199 taxa of 64 genera from the area. Marine biological observations were made at 5 locations in the coastal area off Great Wall Station, and ice algae and phytoplankton specimens were collected.

44-3743
Temporal variability of primary production and energy flow in arctic sea ice area (PREFLA Project).
Fukuchi, M., et al, *Antarctic record*, Mar. 1990, 34(1), p.102-112, 14 refs.
Naito, Y., Hoshiai, T.
Ice cover effect, Sea ice, Algae, Biomass, Research projects.
A three-year program (1988-1990) is described which aims to clarify the temporal variations of primary production and its downward flux, as well as to evaluate the role of zooplankton in energy flow. The northern Bering Sea and the Chukchi Sea were selected to compare the ice-associated biological process in the antarctic coastal areas, the program cooperates with the U.S. program Inner Shelf Transfer and Recycling (ISHTAR). Three field observations were carried out in 1988 and two in 1989. (Auth. mod.)

44-3744
Hydraulic model of overland flow on grass covered slopes.
Adrian, D.D., et al, MP 2710, International Conference for Centennial of Manning's Formula and Kuichling's Rational Formula, Charlottesville, VA, May 22-26, 1989. Proceedings. Channel flow and catchment runoff. Edited by B.C. Yen, American Society of Civil Engineers, 1989, p.569-578, 14 refs.
Martel, C.J.
Slopes, Water flow, Surface drainage, Water treatment, Grasses, Waste treatment, Laminar flow, Analysis (mathematics), Slope orientation, Models, Flow rate, Hydraulics, Surface properties.
The overland flow system involves applying wastewater to the upper elevation of a carefully prepared grassed slope. The wastewater flows down the surface of the slope through the grass, it is collected at the bottom of the slope and may be discharged to a stream or, perhaps, to a rapid infiltration site. While flowing down the slope, some loss in volume occurs due to evapotranspiration and infiltration, although these losses are usually small due to the short length of slope employed and the impervious nature of soils which favor this method of treatment. The hydraulics of shallow flow down wide grassed channels has received some attention when the flow regime is turbulent. The U.S. Environmental Protection Agency sponsored Storm Management Model uses the Manning equation to describe shallow overland flow, but this approach is suspect when the flow occurs in the laminar regime. Experimental measurements by the Corps of Engineers show that overland flow occurs in the laminar regime with the Reynolds number less than 226 based on depth of flow, which may be no more than 0.01 m, and less than 20 based on grass diameter, taken as 0.001 m. A model of the hydraulic behavior of wastewater as it flows down the slope of an overland flow system is developed

44-3745
Performance of an omni-directional wheel on snow and ice.
Blaisdell, G.S., *U.S. Army Cold Regions Research and Engineering Laboratory*, Feb. 1989, MP 2711, 21p. + appends., Prepared for Naval Coastal Systems Center, Panama city, FL. 7 refs.
Vehicle wheels, Cold weather performance, Traction, Aircraft landing areas, Tires, Design, Rubber ice friction, Vehicles.
A brief study was performed to investigate the suitability of service vehicles equipped with a unique omni-directional wheel operating aboard aircraft carriers in northern latitudes, where ice and snow on the flight deck is not uncommon. This study addressed the comparative performance of the omni-directional wheel, a bias-ply highway tire as used on current Navy MD-3 aircraft tow vehicles, a typical non-pneumatic forklift truck tire, and an automotive radial-ply all-season tire. The tires were tested for driving traction levels on prepared ice, hard-packed snow, and fresh shallow snow. In general, the omni-directional wheel showed superior performance to the forklift truck tire and the bias-ply highway tire. The radial all-season tire, however outperforms the omni-directional wheel in traction on slippery surfaces. The omni-directional wheel was found to be well-behaved during traction testing and shows promise for operation on winter surfaces. Recommendations are provided that might further improve omni-directional wheel performance on snow and ice.

44-3746
New approach for sizing rapid infiltration systems (discussion and closure).
Reed, S.C., et al, *Journal of environmental engineering*, 1989, 115(4), MP 2712, p.879-882, 3 refs. For article being discussed see 42-2246.
Crites, R.W., Zirschky, J., Martel, J
Seepage, Soil water, Water treatment, Design, Waste treatment, Municipal engineering, Permeability.

44-3747
Analytical methods for detecting military-unique compounds.
Jenkins, T.F., et al, *Army environmental sciences*, 1989, 7(3), MP 2713, p.13-14.
Walsh, M.E.
Environmental tests, Soil pollution, Explosives, Chemical analysis, Test equipment, Molecular structure, Laboratory techniques, Chemical properties.

44-3748
Inclusion of sensible heating in convective parameterization applied to lake-effect snow.
Ellenton, G.E., et al, *Monthly weather review*, May 1979, 107(5), p.551-565, 28 refs.
Danard, M.B.
Lake effects, Snowfall, Air flow, Convection, Heat flux, Snowstorms, Mathematical models, Air water interactions, Precipitation (meteorology), Atmospheric pressure, Boundary layer, Snow accumulation.

44-3749
Analysis of melting in the presence of natural convection in the melt region.
Sparrow, E.M., et al, *Journal of heat transfer*, Nov. 1977, Vol.99, p.520-526, 9 refs.
Patankar, S.V., Ramadhyani, S.
Melting, Phase transformations, Convection, Liquid phases, Analysis (mathematics), Liquid solid interfaces, Heat transfer, Temperature variations, Layers.

44-3750
Sludge dewatering by natural freeze-thaw.
Martel, C.J., MP 2714, Solid/liquid separation: waste management and productivity enhancement. Edited by H.S. Muralidhara, Columbus, Battelle Press, 1990, p.116-122, 9 refs.
Sludges Waste treatment, Freeze drying, Freeze thaw tests, Moisture transfer, Design, Water treatment, Drainage, Capillarity, Freezing.
Sludges are easily separated into solid and liquid fractions by freezing and thawing. Water and wastewater treatment plants in cold climate areas can take advantage of this process by freezing and thawing sludge during the winter and summer seasons in a new unit operation called a sludge freezing bed. The purpose of this study was to measure the dewaterability of freeze-thaw conditioned sludges and measure how well they drain at various depths. Typical water treatment, anaerobically digested and aerobically digested sludges were tested. The main conclusion of this study was that up to 2.0 m of these sludges could be applied to a freezing bed.

44-3751
Is the antarctic ice sheet disintegrating.
Kamb, B., *Engineering and science*, Spring 1990, 53(3), p.4-13.
Ice sheets, Glacier surges, Stream flow, Flow rate, Ice deformation, Antarctica—West Antarctica.
During two field seasons of borehole work carried out on Ice Stream B in a project sponsored by the National Science Foundation, the stability of the West Antarctic ice sheet was studied. Features of its great ice streams are described and the mechanism of ice stream motion is discussed. Three explanations for antarctic ice stream rapid motion are proposed: super-plasticity of the ice near the base of the stream; glacier surging; and the subglacial-till-deformation theory. All 3 are described and their models are shown. It is concluded that, at present, the antarctic ice sheet is not disintegrating.

44-3752
Investigation of the LIZ-3 Dew Line Station water supply lake.
Kovacs, A., *U.S. Army Cold Regions Research and Engineering Laboratory*, Apr. 1990, SR 90-11, 10p., ADA-222 469, 6 refs.
Water supply, Frozen lakes, Lake water, Lake ice, Radar photography, Subsurface drainage, Subpermafrost groundwater, Permafrost beneath lakes, United States—Alaska—North Slope.
The level of a lake supplying water to the LIZ-3 Dew Line Station, near the Chukchi Sea coast of Alaska, had fallen about a quarter of a meter. This lowering reduced the availability of water to the station during the winter and raised concern that the lake may continue to drain. A radar subsurface sounding survey of the lake was made in May 1984 to determine if the lake contained a deep area from which potable water could be drawn from under the ice during the winter. No acceptable deep areas were found. Recommendations are provided for preventing further drainage of the lake and for deepening a portion of the lake. A possible solution for making the sour water remaining under the winter lake ice acceptable for consumption is also presented.

44-3753
Ice effects on hydraulics and fish habitat.
Ashton, G.D., *U.S. Army Cold Regions Research and Engineering Laboratory*, Apr. 1990, SR 90-08, 24p., ADA-222 457, 5 refs.
River ice, Ice cover effect, River flow, Hydraulics, Analysis (mathematics), Ice conditions, United States—Nebraska—Platte River.
The effects of an ice cover on the flow depths and velocities beneath the ice are analyzed. Data from gauging records for the Platte River in Nebraska are analyzed using this context. A procedure to use the results for habitat simulations during winter periods is suggested. The effects of partial coverage by a stationary ice cover and the effects of coverage of ice on multiple channel flow distributions are analyzed.

44-3754
Salmon River ice jam control studies: interim report.
Axelson, K.D., et al, *U.S. Army Cold Regions Research and Engineering Laboratory*, Apr. 1990, SR 90-06, 8p., ADA-222 665, 9 refs.
Foltyn, E.P., Zabilansky, L.J., Lever, J.H., Perham, R.E., Gooch, G.E.
Ice jams, River ice, Ice control, Frazil ice, Flood control, Ice booms, United States—Idaho—Salmon River.
The city of Salmon, ID has been affected by flooding resulting from an ice jam on the Salmon River. This ice jam, known as the Deadwater jam, is composed of frazil ice. Environmental and economic constraints require an innovative approach to the control of the frazil ice in this situation. An Ice Control Structure (ICS) should provide enough control of both production and transport of frazil ice to prevent the Deadwater jam from reaching Salmon. Past investigations have indicated that a temporary ICS, or a combination of temporary and permanent structures, might be successful at Salmon. This interim report documents the progress of a study intended to obtain the information necessary to design an ICS upstream from Salmon.

44-3755
Surface changes in well casing pipe exposed to high concentrations of organics in aqueous solution.
Taylor, S., et al, *U.S. Army Cold Regions Research and Engineering Laboratory*, Mar. 1990, SR 90-07, 14p., ADA-222 447, 12 refs.
Parker, L.
Well casings, Ground water, Soil pollution, Water pollution, Wastes, Scanning electron microscopy, Corrosion, Pipes (tubes), Surface properties.
This preliminary study was undertaken to assess how the surface structural characteristics of four common well casing materials polyvinyl chloride (PVC), Teflon (polytetrafluoroethylene PTFE), stainless steel 304 (SS304) and stainless steel 316 (SS316) are affected by exposure to an aqueous solution containing tetrachloroethylene, toluene, *p*-dichlorobenzene and *o*-dichlorobenzene in concentrations near their solubility. Casing samples that had been exposed to a test solution for 1 week, 1 month and 6 months were examined with a scanning electron microscope (SEM) and compared with control samples placed in well water for an equivalent time period. Pieces of casing that had not been placed in any aqueous solution were also examined and are assumed to be representative of the initial structure of the casing's surface. These organics are of concern at hazardous waste sites, where they often occur in ground water. The observations indicate that the surface characteristics of PVC, SS316 and SS304 did not change when exposed to the organic aqueous solution. The surface variability and lack of distinguishing features at high magnification made it difficult to tell if the PTFE surface had changed. However, no obvious changes (swelling, pitting etc.) were seen.

44-3756
X-ray photography method for experimental studies of the frozen fringe characteristics of freezing soil.
Akagawa, S., *U.S Army Cold Regions Research and Engineering Laboratory*, Feb 1990, SR 90-05, 69p., ADA-222 448, 15 refs.
Soil freezing, Frost heave, X ray analysis, Ice lenses, Ground ice, Temperature measurement.
The objectives of this report are to demonstrate a useful method for observing frost heave in freezing soil and to evaluate the method for the study of frozen fringe characteristics. X-ray photography of lead spheres containing thermocouples was tested in conjunction with frost heave tests. By applying image-processing techniques for determining the coordinates of the spheres, it is possible to obtain precise temperature profiles and determine the deformation in freezing soil. Strain and strain rate data calculated from the coordinates of the lead spheres and the temperature profiles show when, where and how much deformation (heaving and consolidation) has taken place in the freezing soil. The temperature and strain field around the frozen fringe were also observed. However, the method of determining the frozen fringe location from the location of the warmest ice lens was found to be questionable, because the active heaving zone was found to be located between the warmest visible ice lens and the 0 C isotherm. This was especially true during transient heaving, which occurs while the 0 C isotherm penetrates into the unfrozen soil. For studying the precise deformation characteristics of the frozen fringe, further precise analysis of the X-ray photo's intensity profile will be needed to convert it to a strain profile. The accuracy and spacing of the temperature sensors do not seem to be adequate for temperature measurements in the frozen fringe, and there is a need for measurement methods that are more accurate than conventional temperature sensors.

44-3757
Development of an analytical method for the determination of explosive residues in soil. Part 3. Collaborative test results and final performance evaluation.
Bauer, C.F., et al, *U.S Army Cold Regions Research and Engineering Laboratory*, May 1989, CR 89-09, 89p., ADA-213 000, 23 refs.
Jenkins, T.F., Koza, S.M., Schumacher, P.W., Miyares, P.H., Walsh, M.E.
Soil pollution, Explosives, Chemical analysis, Soil tests, Soil chemistry, Statistical analysis.
A collaborative test of a method for the determination of nitroaromatic and nitramine explosives in soil was conducted at eight laboratories. The method involves extraction of a 2.00-g portion of soil with 10.0 mL of acetonitrile in a sonic bath, dilution of 5.00 mL of soil extract with 5.00 mL of aqueous CaCl2 filtration and determination by RP-HPLC-UV at 254 nm. Certified reporting limits (CRLs) and method detection limits (MDLs) were obtained for HMX, RDX, TNT and ten other analytes. Values ranged from 0.07 to 2.15 microgram/g for the CRLs and from 0.03 to 1.27 microgram/g for the MDLs. The analytes (HMX, RDX, TNB, DNB, tetryl, TNT and 2,4-DNT) were measured in eight field-contaminated soils and eight spiked standard matrix soils. Both sets of eight consisted of four individual samples in duplicate. Concentrations ranged from the limits of detection to nearly 1000 microgram/g. The results were evaluated by means of analysis of variance and regression analysis with and without the inclusion of data identified as outliers. The results indicate that collaborators have nearly equivalent performance on spiked samples, and that for field-contaminated soil the variability of extraction recoveries contributes to imprecision. Analyte recoveries were good, except for tetryl: 95-97% for HMX, RDX, TNT and DNT (similar to recoveries from aqueous samples), 92-93% for DNB and TNB, and 70% for tetryl.

44-3758
Man and nature in the North: harmony of contrasts. (Chelovek i priroda Severa. garmoniia protivopolozhnostei).
Zimov, S.A., *Akademiia nauk SSSR. Vestnik*, 1990, No.2, p.118-132, In Russian. 12 refs.
Tundra, Environmental protection, Environmental impact, Human factors, Ecosystems, Economic development.

44-3759
Wheeled versus tracked vehicle snow mobility test program.
Green, C.E., et al, MP 2715, International Society for Terrain Vehicle Systems, Joint U.S.A.-Canada meeting, Victoria, British Columbia, Apr., 1989, International Society for Terrain Vehicle Systems, 1989, 19p.
Grimes, K., Blaisdell, G.L.
Vehicle wheels, Vehicles, Cold weather performance, Snow cover effect, Tests, Tracked vehicles, Tires, Traction, Military research, Snow density.
The U.S Army Cold Regions Research and Engineering Laboratory (CRREL) and the U.S. Army Engineer Waterways Experiment Station conducted snow mobility tests in Houghton, MI, during the period Jan. through Mar., 1988. These tests were part of the first phase of a two year snow mobility program. Wheeled and tracked vehicles were tested to (1) develop fundamental mobility relations between vehicle characteristics and snow properties, (2) to validate specific snow relations in CRREL's snow mobility model, and (3) to modify the model as necessary to improve its prediction accuracy and adapt it for use in the NATO Reference Mobility Model, Condensed Army Mobility Model, and the Army Mobility Model.

44-3760
Nondestructive evaluation of moisture migration in insulation material under prolonged exposure to water.
Ayorinde, O.A., MP 2716, Defense Conference on Nondestructive Testing, 38th, San Antonio, TX, Oct. 31-Nov. 2, 1989. Proceedings, 1989, p.111-121, 3 refs.
Thermal insulation, Moisture detection, Absorption, Tests, Materials, Moisture transfer, Vapor barriers, Water content, Gamma irradiation, Measuring instruments, Test equipment.
Nondestructive measurement and analysis of moisture absorption and migration in polyurethane insulation material subjected to a prolonged water exposure were performed using a dual-energy gamma-ray device. The parameters influencing moisture absorption by a given type of insulation were found to include (a) the insulation density, (b) the insulation thickness, (c) the presence of a vapor barrier or jacket, (d) the type of insulation jacket and (e) the time of exposure to moisture. With time, the variation of any of these factors would cause a change in moisture gradient across the insulation thickness. For this investigation, the effects of the insulation thickness, exposure time to moisture and the presence of a vapor jacket were evaluated and quantified for polyurethane insulation. Also, a preliminary test was performed with a frozen polystyrene beadboard to evaluate the measurement accuracy by the gamma-ray method in determining nondestructively the insulation moisture content and profile.

44-3761
Influence of ground water monitoring well casings on metals and organic compounds in well water.
Hewitt, A.D., et al, MP 2717, HAZTECH International '89, Fourth Annual Exhibition and Conference, Cincinnati, OH, Sep. 12-14, 1989. Proceedings. Hazardous waste and hazardous materials management, 1989, 9p., 14 refs.
Parker, L.V., Jenkins, T.F., Reynolds, C.M., Lang, K.T., Stutz, M.H.
Ground water, Environmental tests, Well casings, Water pollution, Chemical analysis, Wells, Water chemistry, Leaching, Standards, Corrosion, Steels.
The purpose of these studies was to compare PVC, PTFE, SS 304 and SS 316 well casings for monitoring metals and organic compounds in well water. Review of the literature revealed that these commonly used well casing materials had not been studied concurrently. These studies used well casings manufactured specifically for ground water monitoring and water obtained from a 76-m-deep domestic well in Weathersfield, VT. No attempt was made to maintain dissolved oxygen, carbon dioxide, temperature, pH or redox potential levels representative of ground water, and this undoubtedly had an effect on analyte speciation. Because of these factors, the static laboratory conditions, and exposure of freshly cut surfaces on the well casings, the results will not quantitatively predict what might occur under field conditions. Nevertheless, since spiked analytes varied relative to the control by more than 10% after only 8 hours of exposure, and leaching experiments showed analyte concentrations greater than 5% of the present EPA drinking water quality standards, it is the authors' opinion that there is a basis for concern, especially for shallow wells with a slow recharge.

44-3762
Evaluation of the Caterpillar Challenger tractor for use in Antarctica.
Blaisdell, G.L., et al. *U.S. Army Cold Regions Research and Engineering Laboratory*, Feb. 1989, MP 2718, 12p. + figs., Prepared for Division of Polar Programs, National Science Foundation.
Liston, R.A
Tractors, Cold weather performance, Mechanical tests, Tracked vehicles, Traction, Snow compaction, Logistics, Surface properties.
The newly marketed Caterpillar agriculture tractor, called the Challenger 65, was evaluated in snow covered terrain to determine its potential as a prime mover for operations in Antarctica. Three vehicle configurations were tested: with the standard belt, with the standard belt carrying studs, and with a specially constructed wide track to improve flotation. Rolling resistance and drawbar pull were measured on ice, hard packed snow and in deep, relatively soft snow. General handling and ride were evaluated qualitatively. It was found that the tractor is rugged, well constructed, is easy to operate and has the normal ride quality associated with vehicles having short wheelbases. The results of the evaluation are very encouraging and led to the conclusion that the machine should receive serious consideration for application in the Antarctic for transport problems that may soon appear that involve the use of sled trains.

44-3763
Reconnaissance geology and exploration geochemistry of King Cove, Alaska Peninsula.
DuBois, G.D., et al. *U.S. Geological Survey. Open-file report*, 1989, No.89-350, 23p., 12 refs.
Wilson, F.H., Detterman, R.L., Hopkins, R.T. Jr
Rocks, Geochemistry, Chemical analysis, Stratigraphy, Geologic structures, Geologic processes, Sampling, Spectroscopy, Exploration, Hydrothermal processes, Geological surveys, United States—Alaska—King Cove.

44-3764
Thermal maturity and organic geochemistry of the Kandik basin region, east-central Alaska.
Underwood, M.B., et al. *U.S. Geological Survey Open-file report*, 1989, No.89-353, 41p., 48 refs.
Laughland, M.M., Wiley, T.J., Howell, D.G.
Rocks, Geologic structures, Stratigraphy, Chemical analysis, Geochemistry, Geothermal processes, Stratification, Rock properties, Hydrocarbons, Reflectance, United States—Alaska—Kandik River.

44-3765
Ice effect on erosion and sedimentation on the Ontario shores of James Bay, Canada.
Martini, I.P., *Zeitschrift fur geomorphologie*, Mar. 1981, 25(1), p.1-16, With German and French summaries. 30 refs.
Shore erosion, Sea ice, Sediment transport, Ice structure, Coastal topographic features, Fast ice, Shoreline modification, Ice scoring, Ice cover thickness, Ice breakup, Sea ice distribution, Canada, Ontario—James Bay.

44-3766
Nonlinear problems in the study of water movement in frozen soils.
Nakano, Y., MP 2719, Army Conference on Applied Mathematics and Computing, 6th. Transactions, U.S. Department of Defense, 1989, p.383-393, ARO Report 89-1, 14 refs.
Frozen ground mechanics, Water transport, Water content, Analysis (mathematics), Unfrozen water content, Mass balance, Water vapor, Phase transformations, Temperature gradients.

44-3767
Chemically breaking the bond between ice and road surfaces.
Trost, S.E., et al, University of Minnesota. Department of Civil Engineering and Materials Science. Report TOC No.18, Jan. 1987, 21p., PB90-179995, 7 refs. For another version see 41-2068.
Heng, F.J., Cussler, E.L.
Ice removal, Road icing, Ice adhesion, Salting, Chemical analysis, Solutions, Ice melting, Ice solid interface, Freezing points, Surface properties, Mass transfer.

44-3768
Grain-size, heavy-mineral, and geochemical analyses of sediments from the Chukchi Sea, Alaska.
Luepke, G., et al, *U.S. Geological Survey bulletin*, 1989, No.1896, 12p., 14 refs.
Escowitz, E.C
Ocean bottom, Bottom sediment, Minerals, Chemical analysis, Mineralogy, Geological surveys, Gravel, Grain size, Placer mining, United States—Alaska—Chukchi Sea.

44-3769
Icebreaker midbody resistance—phase 2, beam variation.
Baker, D., et al, *Transport Canada. Report*, Jan 1990, TP 10161E, 176p., With French summary. 6 refs.
Mulder, C.
Icebreakers, Simulation, Mechanical tests, Performance, Ice loads, Models, Ice mechanics, Structural analysis, Metal ice friction, Design criteria.

44-3770
Abrasion of concrete by ice in arctic sea structures.
Huovinen, S., *Technical Research Centre of Finland. Publications*, Mar. 1990, No.62, 110p. + appends., 77 refs. For another version see 44-3340.
Offshore structures, Sea ice, Ice loads, Concrete durability, Abrasion, Frost resistance, Surface properties, Aggregates, Freeze thaw cycles, Mechanical tests, Concrete strength, Damage, Compressive strength

44-3771
Experimental results on frost as a first wall shielding concept for inertial confinement fusion. Final report.
Neely, H.H., et al, *Energy Technology Engineering Center. Report*, Mar. 1, 1990, ETEC 89-4, 100p., 1 ref.
Hoffman, N.J., Murray, K.A.
Frost protection, Walls, Hoarfrost, Radiation absorption, Ice crystal growth, Ablation, Dendritic ice, Ice crystal structure, Temperature effects, Computerized simulation, Water vapor.

44-3772
Effects of the West Dock Causeway on nearshore oceanographic processes in the vicinity of Prudhoe Bay, Alaska.
Hale, D.A., et al, U.S. National Oceanic and Atmospheric Administration. Ocean Assessments Division. Special report, 1989, 50p., 28 refs.
Hameedi, M.J., Hachmeister, L.E., Stringer, W.J
Offshore structures, Shores, Hydrography, Ocean currents, Topographic effects, Petroleum industry, Wind factors, Environmental impact, Salinity, United States—Alaska—Prudhoe Bay.

44-3773
Ice thickness data—winter 1986-1987. Ottawa, Environment Canada, Atmospheric Environment Service, Climatology and Applications, 1990, 59p., In English and French.
Ice cover thickness, Meteorological data, Sea ice, River ice, Seasonal variations, Freezeup, Ice breakup, Measurement, Snow depth, Canada.

44-3774
Influence of casing materials on trace-level chemicals in well water.
Parker, L.V., et al, *Ground water monitoring review*, Spring 1990, 10(2), MP 2720, 11p., 26 refs.
Hewitt, A.D., Jenkins, T.F.
Well casings, Ground water, Water pollution, Soil pollution, Water chemistry, Chemical analysis.
Four well casing materials—polyvinyl chloride (PVC), polytetrafluoroethylene (PTFE), and stainless steel 304 (SS 304) and 316 (SS 316)—were examined to determine their suitability for monitoring inorganic and organic constituents in well water. The inorganic study used a factorial design to test the effect of concentration of mixed metals (arsenic, chromium, lead, and cadmium), pH, and organic carbon. The well casings were also tested for sorption/desorption of 10 organic substances.

44-3775
On the experimental determination of the spectral reflection properties of the snow cover in the solar wavelength region 400-1000 nm. (Zur experimentellen Ermittlung des spektralen Reflexionsverhaltens der Schneedecke im Spektralbereich 400 bis 1000 nm).
Günther, T., *Zeitschrift für meteorologie*, 1990, 40(1), p.50-54, In German with English summary. 11 refs.
Snow optics, Snow cover structure, Reflectivity, Sunlight, Albedo, Snow morphology, Surface structure

44-3776
Satellite and geographic information system estimates of Colorado River Basin snowpack.
Ferris, J.S., et al, *Photogrammetric engineering and remote sensing*, Nov 1989, 55(11), p.1629-1635, 17 refs.
Congalton, R.G.
Snow depth, Spaceborne photography, Data processing, Runoff forecasting, Snow water equivalent, Stream flow, Radiometry, Snowmelt, United States—Colorado River Basin

44-3777
Classification of merged AVHRR and SMMR arctic data with neural networks.
Key, J.R., et al, *Photogrammetric engineering and remote sensing*, Sep. 1989, 55(9), p.1331-1338, 35 refs
Maslanik, J.A., Schweiger, A.J.
Spaceborne photography, Radiometry, Data processing, Sensor mapping, Landforms, Classifications, Remote sensing, Polar regions, Sea ice, Barents Sea

44-3778
Seismic exploration on a floating ice sheet.
Rendleman, C.A., et al, *Geophysics*, Apr. 1990, 55(4), p.402-409, 5 refs.
Levin, F.K.
Floating ice, Seismic reflection, Ice acoustics, Computerized simulation, Wave propagation, Attenuation, Ice cover thickness, Acoustic measurement

44-3779
Deep subpermafrost thermal regime in the Mackenzie Delta basin, northern Canada—analysis from petroleum bottom-hole temperature data.
Majorowicz, J.A., et al, *Geophysics*, Mar. 1990, 55(3), p.362-371, 35 refs.
Jones, F.W., Judge, A.S.
Permafrost bases, Thermal regime, Temperature measurement, Permafrost depth, Permafrost heat transfer, Boreholes, Heat flux, Canada—Mackenzie Delta.

44-3780
Two-dimensional mapping of sea-ice keels with airborne electromagnetics.
Liu, G., et al, *Geophysics*, Feb. 1990, 55(2), p.239-248, 20 refs.
Becker, A.
Ice bottom surface, Sensor mapping, Aerial surveys, Ice cover thickness, Floating ice, Ice electrical properties, Electromagnetic properties, Topographic features, Mathematical models.

44-3781
Breaking through the Arctic.
West, R.M., *U.S. Naval Institute. Proceedings*, Jan. 1990, 116(1), p.57-60.
Icebreakers, Expeditions, Marine transportation.

44-3782
Plane truth about snow removal. *American city & country*, Apr. 1990, 105(4), p.52-56.
Runways, Snow removal, Equipment, Environmental protection, Winter maintenance.

44-3783
Natural convection melting of a frozen porous medium.
Cheilaiah, S., et al, *International journal of heat and mass transfer*, May 1990, 33(5), p.887-899, With French, German and Russian summaries. 33 refs.
Viskanta, R.
Porous materials, Ice melting, Convection, Phase transformations, Thermodynamics, Artificial melting, Ground thawing.

44-3784
Effect of ice nucleators on snow making and spray freezing.
Liao, J.C., et al, *Industrial & engineering chemistry research*, Mar 1990, 29(3), p.361-366, 13 refs
Ng, K.C.
Spray freezing, Cloud droplets, Heterogeneous nucleation, Snow manufacturing, Air water interactions, Snow composition.

44-3785
Random choice method for the Stefan problem.
Sod, G.A., *Computers & mathematics with applications*, 1990, 19(8-9), p.1-9, 15 refs.
Stefan problem, Analysis (mathematics), Boundary value problem.

44-3786
Moving an ice mountain.
Kollé, J.J., *Mechanical engineering*, Feb 1990, 112(2), p.48-53, 1 ref.
Iceberg towing, Tests, Ice drills, Hydraulic jets, Vehicles.

44-3787
Contribution to the theory of melting.
Carmesin, H.O., *Physical review B*, Mar. 1, 1990, 41(7), p.4349-4357, 21 refs.
Melting, Theory, Phase transformations, Analysis (mathematics), Particles, Thermodynamics.

44-3788
Technology transfer.
Eaton, R., *American Public Works Association. Reporter*, May 1990, 57(5), MP 2721, p.25
Road maintenance, Education, Municipal engineering.

44-3789
Technology transfer. *American Public Works Association. Reporter*, July 1989, 56(7), p.42.
Sludges, Freeze drying, Design, Subsurface structures, Waste treatment, Cold weather operation.

44-3790
Remote sensing in Antarctica and the southern ocean: applications and developments.
Maslanik, J.A., et al. *Antarctic science*, June 1990, 2(2), p.105-121, Refs. p.118-121.
Barry, R.G.
Sensor mapping, Remote sensing, Climatology, Sea ice.
Remote sensing provides the means to study features and processes that are not easily accessible or amenable to direct observations. In polar regions, and Antarctica in particular, studies of ice shelf processes, changes in the sea-ice cover, and ice-ocean-atmosphere investigations must rely in large part on measurements from aircraft and satellites. The polar regions present a unique set of problems that complicate applications and limit the usefulness of certain sensors; new instruments planned for launch in the 1990s will help resolve many of these difficulties. Examples of remote sensing applications for the study of the continent, drifting ice, ocean, and atmosphere demonstrate ways that existing data as well as new observations can be used to aid polar research. (Auth.)

44-3791
Estimation of neutral lipid levels in antarctic sea ice microalgae by nile red fluorescence.
Priscu, J.C., et al. *Antarctic science*, June 1990, 2(2), p.149-155, 23 refs.
Priscu, L.R., Palmisano, A.C., Sullivan, C.W.
Algae, Sea ice, Microbiology.
The fluorescent neutral lipid stain, nile red, was used to examine cell-specific neutral lipid levels in natural assemblages of antarctic sea ice microalgae. Neutral lipid:chlorophyll, neutral lipid:particulate carbon (PC) and neutral lipid:particulate nitrogen (PN) ratios were highest in communities dominated by *Nitzschia* spp. and *Navicula glacei* van Heurck. The lowest specific neutral lipid content was estimated in the congelation ice samples dominated by the diatom *Amphiprora* spp. and in surface assemblages dominated by *Phaeocystis pouchetii* Hariot and the dinoflagellate *Gymnodinium* sp. Scatter plots of neutral lipid on PC and PN, which included data from all assemblages, showed that assemblages dominated by *P. pouchetii* and *Amphiprora* spp. clustered near the origin reflecting their relatively lower specific neutral lipid levels, compared with assemblages dominated by *N. glacei* and *Nitzschia* spp. Cellular PC:PN was significantly ($P<0.001$) lower in microalgae inhabiting surface melt pools or tide cracks compared to those associated with congelation or platelet ice. (Auth.)

44-3792
Remote water-temperature measurement.
Daly, S., *U.S. Army Corps of Engineers. Engineer technical letter*, Aug. 24, 1989, No.1110-1-146, MP 2722, 6p.
Water temperature, Temperature measurement, Measuring instruments, Design, Telemetering equipment, River flow, Remote sensing.
This article provides descriptive information on establishing a remote water temperature measurement station. The data can be recorded with a data logger on site or transmitted via a data collection platform (DCP) to a Geostationary Operational Environmental Satellite (GOES).

44-3793
Methods to reduce ice accumulation on miter gate recess walls.
Rand, J.H., et al. *U.S. Army Corps of Engineers. Engineer technical letter*, Aug. 24, 1989, No.1110-2-320, MP 2723, 6p.
Hanamoto, B.
Locks (waterways), Walls, Ice prevention, Electric heating, Water flow, Tests, Design, Electric equipment.
This article provides information on methods to reduce or eliminate ice accumulation on miter gate recess walls. With reduced ice accumulation, the miter gates can be completely recessed, thus preventing possible structural damage to the miter gates by lock traffic.

44-3794
Reduced winter leakage in gates with J-seals.
Rand, H. et al. *U.S. Army Corps of Engineers. Engineer technical letter*, Aug. 24, 1989, No.1110-2-319, MP 2724, 3p.
Hanamoto, B.
Spillways, Leakage, Ice prevention, Electric heating, Water flow, Design, Cold weather operation.
This article provides information regarding reduced winter leakage of spillway gate seals, leading to reduced ice interference with gate operation, by means of installing heat tapes in bottom-channel J-seals on spillway gates.

44-3795
Snow particle size spectra in lake effect snows.
Braham, R.R. Jr. *Journal of applied meteorology*, Mar. 1990, 29(3), p.200-207, 22 refs.
Snowfall, Snow crystals, Particle size distribution, Probes, Lake effects, Spectra, Particles, Measurement.

44-3796
Synthesis of AgI-AgCl-CuI solid solutions for ice nucleation studies.
Sivanesan, S., et al. *Crystal research and technology*, Feb. 1990, 25(2), p.129-133, 17 refs.
Gobinathan, R.
Admixtures, Nucleation, Solutions, Ice formation, Latticed structures, X ray analysis, Chemical properties, Silver iodide.

44-3797
Fast implicit finite-difference method for the analysis of phase change problems.
Voller, V.R., *Numerical heat transfer—part B*, 1990, 17(2), p.155-169, 15 refs.
Phase transformations, Enthalpy, Analysis (mathematics), Computer applications, Thermal properties.

44-3798
Analysis of the composite ice wall.
Corder, P.R., et al, Offshore and Arctic Operations Symposium 1990. Edited by R.G. Urquhart, A. Ertas and D. Hui, New York, American Society of Mechanical Engineers, 1990, p.21-39, PD-Vol.29, Presented at the 13th Annual Energy-Sources Technology Conference and Exhibition, New Orleans, LA, Jan. 14-18, 1990. 7 refs.
Wang, C.Y.
Offshore structures, Walls, Covering, Ice loads, Protection, Design, Concrete strength, Steel structures, Engineering, Structural analysis.

44-3799
Elastic visco-plastic modelling of a frozen sand using equivalent time.
Yin, J.H., et al, Offshore and Arctic Operations Symposium 1990. Edited by R.G. Urquhart, A. Ertas and D. Hui, New York, American Society of Mechanical Engineers, 1990, p.133-139, PD-Vol.29, Presented at the 13th Annual Energy-Sources Technology Conference and Exhibition, New Orleans, LA, Jan. 14-18, 1990. 6 refs.
Domaschuk, L., Graham, J.
Frozen ground mechanics, Creep, Mechanical tests, Mathematical models, Deformation, Plasticity, Viscoelasticity, Mechanical properties.

44-3800
Acute toxicity of petroleum hydrocarbons to the arctic littoral mysid *Mysis oculata* (fabricius).
Riebell, P.N., et al, Arctic and Marine Oilspill Program Technical Seminar, 12th, Calgary, Alberta, June 7-9, 1989. Proceedings, Ottawa, Environment Canada, Technology Development and Technical Services Branch, 1989, p.161-185, 58 refs.
Percy, J.A.
Animals, Water pollution, Crude oil, Environmental impact, Environmental tests, Oil spills, Ocean environments, Chemical analysis, Hydrocarbons.

44-3801
Oil pollution problem in the Baltic marine environment.
Hirvi, J.P., et al, Arctic and Marine Oilspill Program Technical Seminar, 12th, Calgary, Alberta, June 7-9, 1989. Proceedings, Ottawa, Environment Canada, Technology Development and Technical Services Branch, 1989, p.307-327, 21 refs.
Rytkönen, J., Hakala, R.
Ocean environments, Oil spills, Water pollution, Sea water, Oil recovery, Countermeasures, Water chemistry, Baltic Sea.

44-3802
Origin of natural gas hydrates on the North Slope of Alaska.
Collett, T.S., et al, *Geologic studies in Alaska by the U.S Geological Survey, 1988. Edited by J.H. Dover and J.P. Galloway. U.S. Geological Survey bulletin*, 1989, No.1903, p.3-9, 22 refs.
Bird, K.J., Kvenvolden, K.A., Magoon, L.B.
Natural gas, Hydrates, Geological surveys, Origin, Models, Permafrost depth, Clathrates, Subsurface structures, Geochemistry, United States—Alaska.

44-3803
Biological instrumentation for underice studies in the Arctic.
Herman, A.W., Canada. Divisions of Fisheries and Oceans. Science Review 1987, Dartmouth, Minister of Supply and Services, 1988, p.49-53, 3 refs.
Algae, Ice bottom surface, Growth, Measuring instruments, Sampling, Fast ice, Ecosystems, Subsurface investigations.

44-3804
Distribution of chlorinated hydrocarbon pesticides and PCBs in the Arctic Ocean.
Hargrave, B.T., et al, *Canada technical report of Fisheries and Aquatic Sciences*, Apr. 1989, No.1644, 224p., With French and Inuktitut summaries. 44 refs.
Vass, W.P., Erickson, P.E., Fowler, B.R.
Ocean environments, Pollution, Environmental tests, Environmental impact, Sampling, Air pollution, Water pollution, Hydrocarbons, Chemical analysis, Arctic Ocean.

44-3805
Seasonal runoff forecast for Kangerluarsunnguaq near Nuuk/Godthåb, West Greenland.
Braithwaite, R.J., *Grönlands Geologiske Undersøgelse. Open file series*, Mar. 1990, No.90(3), 17p., With Danish summary. 12 refs.
Electric power, Runoff forecasting, Water supply, Glacier melting, Glacial hydrology, Site surveys, Correlation, Greenland—Kangerluarsuunguaq.

44-3806
Activities of the Alaska District Water Resources Divison, U.S. Geological Survey, 1990.
Snyder, E.F., comp, *U.S. Geological Survey. Open-file report*, 1990, No.90-157, 21p., 41 refs.
Water supply, Research projects, Hydrology, Water balance, Ground water, Water pollution, United States—Alaska.

44-3807
Permafrost and terrain research and monitoring: Norman Wells pipeline—volume II: research and monitoring results—1983-1988.
MacInnes, K.L., et al, *Canada. Northern Affairs Program. Environmental studies*, Apr. 1990, No.64, 204p., With French summary. Refs. p.153-167.
Burgess, M.M., Harry, D.G., Baker, T.H.W.
Discontinuous permafrost, Underground pipelines, Environmental impact, Research projects, Soil temperature, Permafrost preservation, Slope stability, Ground thawing, Canada—Northwest Territories—Norman Wells.

44-3808
Sea Ice Properties and Processes; Proceedings of the W.F. Weeks Sea Ice Symposium.
Ackley, S.F., ed, *U.S. Army Cold Regions Research and Engineering Laboratory*, Feb. 1990, M 90-01, 299p., ADA-221 723, Refs. passim. For individual papers see 44-3809 through 44-3857 or B-42106, F-42103 through F-42105, F-42107 through F-42113, and I-42114.
Weeks, W.F., ed, W.F. Weeks Sea Ice Symposium: Sea Ice Properties and Processes, San Francisco, CA, Dec. 1988.
Sea ice distribution, Ice physics, Ice deformation, Ice conditions, Climatic factors, Ice mechanics, Meetings.
The W.F. Weeks Sea Ice Symposium held in San Francisco, Dec. 1988 includes 34 papers and abstracts written by about 150 authors. Studies of sea ice properties carried out in the Arctic and Antarctic were reported.

44-3809
Internal structure, composition and properties of brackish ice from the Bay of Bothnia.
Weeks, W.F., et al, *U.S. Army Cold Regions Research and Engineering Laboratory. Monograph*, Feb. 1990, M 90-01, MP 2725, Sea Ice Properties and Processes, Proceedings of the W.F. Weeks Sea Ice Symposium, San Francisco, CA, Dec. 1988, Edited by S.F. Ackley and W.F. Weeks, p.5-15, ADA-221 723, 23 refs.
Gow, A.J., Kosloff, P., Digby-Argus, S.A.
Sea ice, Ice physics, Ice structure, Ice composition, Remote sensing, Radar echoes, Fast ice, Remote sensing, Pack ice, Ice strength, Ice temperature, Snow ice interface, Ice salinity, Tensile properties, Baltic Sea—Bothnia, Bay.
Field observations made during the Mar 1988 BEPERS (Bothnian Experiment in Preparation for ERS-1) remote sensing experiment allow limited characterization of the temperature, salinity, structure and physical property profiles of the different types of brackish ice that forms in the Bay of Bothnia. During the sampling period, undeformed fast ice thicknesses varied from 40 to 60 cm in the bay to the east of Umea, Sweden, with somewhat thicker ice occurring in the northernmost, nearly fresh, portions of the bay. Ice salinities were generally less than 1 per mil and the ice temperatures were usually higher than -3.5 C. Although most of the ice examined was simple columnar congelation ice, a variety of c-axis fabrics were observed, including random, vertical and horizontal (random and aligned) orientations. There was no obvious pattern to the geographic arrangement of these fabrics. Brine volume profiles are used to estimate representative ice property profiles. Comparisons are made between the properties of ice from the Bay of Bothnia and those of more typical sea ice from the Arctic Ocean at similar ice thicknesses. A variety of structural factors contributing to specific areas of higher radar return in the bay are also discussed.

44-3810
**Snow cover effects on antarctic sea ice thickness.**
Ackley, S.F., et al, *U.S. Army Cold Regions Research and Engineering Laboratory. Monograph,* Feb. 19[illegible]0, M 90-01, MP 2726, Sea Ice Properties and Pro[illegible]s; Proceedings of the W F Weeks Sea Ice Sym[illegible]m, San Francisco, CA, Dec 1988 Edited by S.F. Ackley and W.F Weeks, p.1[illegible]-21, ADA-221 723, 12 ref
L[illegible]nge, M.A., Wadhams, P.
Sea ice distribution, Ice cover thickness, Snow cover effect, Pack ice, Ice density, Loads (forces), Snow depth, Surface properties, Models, Antarctica—Weddell Sea.
In model simulations of seasonal pack ice growth in both polar regions (e.g., Maykut and Untersteiner 1971, Semtner 1976, Hibler 1979), the snow cover is treated essentially as an insulating layer that inhibits ice growth because of its lower conductivity than pack ice In the Winter Weddell Sea Project-86, on the cruise of the West German vessel *Polarstern,* several factors were found that negate this behavior predicted by the models. Relatively thin sea ice (40-60 cm) forms initially in Antarctica during the ice edge advance. Surface roughness features act as snow fences and, under the action of relatively high winds (40 knots in frequent storms), the snow cover is shifted around over periods of hours to a few days. Wind-blown snowdrifts [illegible] to 1 m or greater thicknesses in a few hours. Snow of this depth can easily depress the existing ice cover surface below sea level, and flooding of the snow cover followed by sub-freezing temperatures leads to a superimposed snow-ice layer on the top surface. The remaining snow cover is redistributed in the next storm within a few days to continue the process. Two sets of measurements showed the general nature of the process The first set, a series of 4000 ice thickness measurements, showed about 1.5% of the holes drilled had the ice surface at or below sea level at the time of the measurement, sometimes accompanied by slush pools on the surface Sea ice cores analyzed for oxygen isotopes independently confirmed that the top 10-20 cm of the intact cores was derived from seawater-flooded snow in several cases. It was estimated that the snow cover increases mean sea ice thickness in Antarctica by 20-30% (10-20 cm) over model predictions by this flooding-infiltration-refreezing ice growth mechanism (Auth.)

44-3811
**Development and physical properties of sea ice in the Weddell Sea, Antarctica.**
Lange, M.A., *U.S. Army Cold Regions Research and Engineering Laboratory. Monograph,* Feb. 1990, M 90-01, Sea Ice Properties and Processes, Proceedings of the W F Weeks Sea Ice Symposium, San Francisco, CA, Dec 1988 Edited by S F Ackley and W.F. Weeks, p.22-28, ADA-221 723, 10 refs.
Sea ice distribution, Ice physics, Ice composition, Ice structure, Ice conditions, Ice formation, Seasonal variations, Ice edge, Remote sensing Antarctica—Weddell Sea.
Sea ice is a major element in the coupled ocean-atmospheric regime of the polar regions It strongly alters energy-, mass- and momentum-fluxes between the ocean and atmosphere in a complex, multiply coupled manner. Sea ice also affects global climate because of its important role in the overall albedo of the earth Its growth and decay influences the heat and salt budget of the ocean over a region far exceeding the polar oceans. Additionally, sea ice provides a unique habitat for a variety of specially adapted organisms, which are of prime importance for *the marine ecosystem of the polar oceans Despite these facts,* investigations into the properties of antarctic sea ice have so far been essentially limited to remote sensing observations and investigations at a few coastal wintering-over stations. This is primarily due to the relative inaccessibility of the closed pack during winter and other logistic difficulties Only since the advent of modern, ice-going research vessels has it become possible to conduct detailed studies of the sea ice regime of Antarctica and the Arctic throughout the year. Over the last 6 years, an extensive field/laboratory program, was carried out with the German research icebreaker, *Polarstern* addressing the development and physical properties of antarctic sea ice In the course of 5 expeditions, ice of the central, eastern and southeastern parts of the Weddell Sea was sampled, both during austral summers and during winter. A brief account of major achievements of this program is given, without attempting to completely cover all the aspects of the work, some of which are described in companion papers of this report and some in other publications. (Auth.)

44-3812
**Quantification of sea-ice textures through automated *digital image analysis.***
Eicken, H., et al, *U.S. Army Cold Regions Research and Engineering Laboratory Monograph,* Feb 1990, M 90-01, MP 2727, Sea Ice Properties and Processes, Proceedings of the W F Weeks Sea Ice Symposium, San Francisco, CA, Dec 1988. Edited by S.F. Ackley and W F Weeks, p.28-32, ADA-221 723, 3 refs.
Lange, M.A , Ackley, S.F
Sea ice, Ice physics, Ice crystal structure, Ice formation, Meteorological factors, Oceanography, Grain size, Photography, Computer applications, Antarctica—Weddell Sea.
The physical and biological properties of sea ice are governed to a large extent by its texture. The texture of a sea-ice cover, on the other hand, is controlled by the meteorological and oceanographic conditions under which growth took place Textural analysis can thus provide insight into the formation and development of sea ice, and at the same time it represents the central link between the evolution and the properties of an ice cover Studies of sea-ice thin sections taken from the Weddell Sea have generally relied on subjective, qualitative evaluations of texture Aside from c-axis distributions determined with a Rigsby stage, textural characteristics such as grain size or shape are usually not evaluated because the procedure is time-consuming [illegible] determination of c-axis distribution) or even impossible The complex texture of sea ice—with intertwining grains of diverse shapes, numerous inclusions of brine and gases between and within grains, and sub-grain boundaries often defies common notions of "grains" "grain size," etc The introduction of automatic texture analysis might be helpful in overcoming the difficulties outlined above. The method allows classification of textures, permitting direct comparison between large numbers of samples, which is difficult or impossible to achieve through qualitative examination Automatic *texture analysis also overcomes personal bias inherent in* conventional methods by collecting and considering all the information (i.e., all gray values) available for one thin section (Auth.)

44-3813
**Chemical and structural properties of sea ice in the southern Beaufort Sea.**
Meese, D.A., *U.S. Army Cold Regions Research and Engineering Laboratory. Monograph,* Feb. 1990, M 90-01, MP 2728, Sea Ice Properties and Processes, Proceedings of the W F Weeks Sea Ice Symposium, San Francisco, CA, Dec 1988 Edited by S F Ackley and W.F. Weeks, p.32-35, ADA-221 723, 11 refs
Sea ice, Ice structure, Ice composition, Ice cores, Chemical analysis, Ice salinity, Sea water.
Detailed chemical and structural profiles were determined for 10 first-year and 10 multiyear ice cores collected in the southern Beaufort Sea during Apr and May 1986 and 1987 Concentrations of Cl, Br and $SO_4$ were determined with a Dionex ion chromatograph using standard techniques An eluent of 1.125 mM sodium bicarbonate and 3.5 mM of sodium carbonate was used Concentrations of Na, Ca, K and Mg were determined by atomic absorption spectrophotometry using standard techniques (Perkin-Elmer 1976) Nutrient analyses ($PO_4$, $SiO_4$, $NO_3$, $NO_2$ and $NH_4$) were conducted following the techniques of Gilbert and Loder (1977) on the 1986 samples and those of Whitledge et al (1981) on the 1987 samples Chlorophyll *a* analyses were conducted using the techniques of Strickland and Parsons (1972) Detailed descriptions of the analysis and blank studies can be found in Meese (1988). The objectives of the study included determination of what, if any, chemical and/or physical trends exist in sea ice in the southern Beaufort Sea and to determine the extent of chemical fractionation in the ice

44-3814
**Nutrient concentrations in antarctic pack ice during the austral winter.**
Garrison, D.L., et al, *U.S Army Cold Regions Research and Engineering Laboratory Monograph,* Feb. 1990, M 90-01, Sea Ice Properties and Processes, Proceedings of the W.F. Weeks Sea Ice Symposium, San Francisco, CA, Dec. 1988 Edited by S.F. Ackley and W F Weeks, p.35-40 ADA-221 723, 18 refs
Close, A.R., Gordon, L.I.
Pack ice, Sea ice, Ice composition, Meltwater, Brines, Sea water, Salinity, Marine biology, Ice salinity, Chemical analysis, Ice floes, Seasonal variations.
Nutrient concentrations in sea ice are often measured as a bulk parameter on melted samples However, for biological studies it is necessary to reflect the actual *in-situ* concentrations within brine inclusions In previous studies the ice has been considerable problems in determining the relative importance of physical vs biological effects in controlling nutrient concentrations in ice. During the Antarctic Marine Ecosystem Research in the Ice Edge Zone (AMERIEZ) winter cruise of 1988, salinity, nutrients (nitrate+nitrite, nitrite silicic acid, phosphate, and ammonia) and other physical and biological parameters in sea ice were measured Salinities in ice ranged from about 2 in some melted core sections to 104 per mill in brine from the surface layer of ice Nutrient concentrations in newly forming ice were close to the levels predicted from seawater nutrient/salinity ratios In older ice, nitrate, phosphate, and silicate also tended to agree with the seawater nutrient salinity ratios Brine samples from the surface layer of ice floes showed considerable variability and were depleted in nutrients relative to values predicted from salinity. Ammonia and nitrite showed a poor relationship with salinity and the levels were markedly elevated in melted ice samples of first and multiyear ice Nutrient concentrations were uncorrelated with biological parameters such as chlorophyll *a*, POC and PON The poor relationship between ammonia, nitrite and salinity in bulk samples and the considerable variability in nutrient/salinity ratios in concentrated brine make interpreting nutrient measurements in ice problematic. (Auth.)

44-3815
**Vertical results of the Cox and Weeks sea ice salinity prediction model.**
Cox, G F N, *U S Army Cold Regions Research and Engineering Laboratory Monograph,* Feb 1990, M 90-01, Sea Ice Properties and Processes, Proceedings of the W.F. Weeks Sea Ice Symposium, San Francisco, CA, Dec. 1988. Edited by S.F. Ackley and W.F. Weeks, p.40, ADA-221 723, Abstract only.
Ice salinity, Ice temperature, Sea ice, Mathematical models, Forecasting, Temperature distribution

44-3816
**Theoretical estimates of light reflection and transmission by spatially inhomogeneous and temporally varying ice covers.**
Perovich, D.K., *U.S. Army Cold Regions Research and Engineering Laboratory. Monograph,* Feb. 1990, M 90-01, MP 2729, Sea Ice Properties and Processes, Proceedings of the W F Weeks Sea Ice Symposium, San Francisco, CA, Dec. 1988. Edited by S.F. Ackley and W.F. Weeks, p.45-49, ADA-221 723, 11 refs.
Ice spectroscopy, Ice optics, Light transmission, Reflection, Wave propagation, Absorption, Ice thermal properties, Remote sensing, Geophysical surveys, Thermodynamics, Ice compositior Ice cover thickness, Models, Snow depth.
The reflection, absorption, and transmission of light at visible and near-infrared wavelengths is important for a number of geophysical problems Light reflection is an important parameter in remote sensing studies, absorption is significant to ice thermodynamics, and transmission strongly influences biological activity in and under the ice The focus on this paper is on the spectral (wavelength region 400-1000 nm) reflection and transmission of light by spatially inhomogeneous sea ice covers investigated using a two-stream, multilayer radiative transfer model. The model is computationally simple and utilizes available experimental data on the optical properties of sea ice The ice cover is characterized as a layered medium composed of selections from nine distinct snow and ice types Two cases are presented illustrating values of spectral albedo, transmittance, and transmitted PAR (photosynthetically active radiation) for a uniform ice cover as it melts and for a spatially inhomogeneous ice cover The importance of ice thickness and surface conditions on the spectral reflected and transmitted radiation fields is demonstrated

44-3817
**Scattering and absorption of light by sea ice.**
Buckley, R.G., et al, *U.S. Army Cold Regions Research and Engineering Laboratory Monograph,* Feb. 1990, M 90-01, Sea Ice Properties and Processes, *Proceedings of the* W.F. Weeks Sea Ice Symposium, San Francisco, CA, Dec. 1988. Edited by S F. Ackley and W.F. Weeks, p.49-52, ADA-221 723, 9 refs.
Trodahl, H.J.
Ice optics, Light scattering, Absorption, Sea ice, Ice crystal structure, Transmission, Backscattering, Brines, Seasonal variations, Ultraviolet radiation, Marine biology, Antarctica—McMurdo Sound.
The anisotropic and inhomogeneous optical characteristics of antarctic sea ice have been studied by measuring the pattern of radiation emerging from the ice surfaces near a light source placed on the surface It is demonstrated that anisotropic scattering in the bulk of the ice imposes a characteristic angular dependence on the transmitted radiance The magnitude of the transmitted radiance is found to depend, among other things, on the brine volume of the surface layer, and to decrease with the spring warming. It is observed that the ice is particularly transparent during the early spring which coincides with the period of reduced atmospheric ozone With the resulting high UV radiance this is potentially damaging for life within and under the ice (Auth.)

44-3818
**Beam scattering measurements in young sea ice.**
Voss, K.J., et al, *U.S. Army Cold Regions Research and Engineering Laboratory. Monograph,* Feb 1990, M 90-01, Sea Ice Properties and Processes, Proceedings of the W.F Weeks Sea Ice Symposium, San Francisco, CA, Dec. 1988. Edited by S F. Ackley and W.F. Weeks, p.53-57, ADA-221 723, 5 refs.
Schoonmaker, J.S., Gilbert, G.D.
Ice optics, Light scattering, Sea ice, Albedo, Lasers, Ice crystal structure, Experimentation, Refraction, Temperature effects, Ice cover thickness.

44-3819
**Electrical, physical and microwave properties of snow-covered floating ice.**
Garrity, C. *U.S. Army Cold Regions Research and Engineering Laboratory. Monograph,* Feb 1990, M 90-01, Sea Ice Properties and Processes; Proceedings of the W.F. Weeks Sea Ice Symposium, San Francisco, CA, Dec 1988 Edited by S.F Ackley and W.F. Weeks, p.57-61. ADA-221 723, 17 refs.
Floating ice, Ice physics, Snow cover effect, Microwaves, Ice electrical properties, Sea ice, Ice salinity, Snow stratigraphy, Solar radiation, Wind factors, Ice temperature.

44-3820
Some observations of established snow cover on saline ice and their relevance to microwave remote sensing.
Lohanick, A W , *U S Army Cold Regions Research and Engineering Laboratory Monograph,* Feb. 1990, M 90-01, Sea Ice Properties and Processes; Proceedings of the W F Weeks Sea Ice Symposium, San Francisco, CA, Dec 1988 Edited by S.F Ackley and W.F Weeks, p.61-67, ADA-221 723, 7 refs.
Ice salinity, Remote sensing, Microwaves, Snow cover effect, Snow cover structure, Radiometry, Brightness, Temperature variations.

44-3821
Acoustical and morphological properties of undeformed sea ice: laboratory and field results.
Jezek, K C , et al, *U S Army Cold Regions Research and Engineering Laboratory Monograph,* Feb. 1990, M 90-01, MP 2730, Sea Ice Properties and Processes, Proceedings of the W.F Weeks Sea Ice Symposium, San Francisco, CA, Dec. 1988 Edited by S F Ackley and W F Weeks, p.67-75, ADA-221 723, 9 refs.
Stanton, T.K., Gow, A.J., Lange, M.A.
Sea ice, Ice acoustics, Ice structure, Ice growth, Reflection, Ice salinity, Ice crystal structure, Lake ice.
Sonar echo amplitude data have been collected at carrier frequencies of 188 and 120 kHz from the underside of different sea ice types Histograms of normal incidence echo amplitudes were formed from over 90 samples of each ice type Experiments were conducted on saline ice grown in an outdoor pond under relatively controlled conditions at CRREL and on the sea ice cover in the Fram Strait Analysis shows marked variations (about a factor of 5) in the magnitude of the coherent reflection coefficients as congelation ice at the bottom of an ice sheet evolves from a growing dendritic interface to an ablating, thermally altered interface. Larger differences (about a factor of 10) are observed between growing congelation ice and slush ice, used to simulate frazil. These results indicate that important variations in acoustic regime exist in areas where different ice types are intermingled.

44-3822
Acoustics of arctic ice floes: modeling, simulation, and signal processing.
Pomalaza-Raez, C.A., et al, *U.S. Army Cold Regions Research and Engineering Laboratory Monograph,* Feb. 1990, M 90-01, Sea Ice Properties and Processes; Proceedings of the W.F. Weeks Sea Ice Symposium, San Francisco, CA, Dec 1988. Edited by S.F. Ackley and W.F. Weeks, p.75-78, ADA-221 723, 7 refs.
Shanan, S.S., Shen, H.H.
Ice acoustics, Ice floes, Noise (sound), Interfaces, Subglacial observations, Acoustic measurement, Simulation.

44-3823
Comparison of the compressive strength of antarctic frazil ice and laboratory-grown columnar ice.
Richter-Menge, J.A., et al, *U.S. Army Cold Regions Research and Engineering Laboratory Monograph,* Feb. 1990, M 90-01, MP 2731, Sea Ice Properties and Processes; Proceedings of the W F Weeks Sea Ice Symposium, San Francisco, CA, Dec. 1988. Edited by S.F. Ackley and W.F. Weeks, p.79-84, ADA-221 723, 14 refs.
Ackley, S.F , Lange, M.A
Frazil ice, Ice strength, Compressive properties, Sea ice, Strain tests, Ice crystal structure, Grain size, Tests, Ice microstructure Stresses, Antarctica—Weddell Sea.
Unconfined, uniaxial compression tests were performed on frazil sea ice samples collected in the Weddell Sea. The tests were done at a constant strain rate of 1/100 1/s and at temperatures of -3, -5 and -10 C. Data from the frazil ice tests were compared to results from tests done under the same conditions on transversely isotropic, columnar saline ice. The approximate grain sizes of the frazil and columnar ice were 1 and 10 mm, respectively. The results of this work indicate that the frazil ice generally has a higher strength than columnar ice loaded in the plane of the sheet. Tests done by other researchers on freshwater, equiaxed polycrystalline ice have also shown the compressive strength to vary inversely with grain size. Application of this relationship to the sea ice tested indicates that the results from these freshwater ice tests at a strain rate of 1/100 1/s cannot be directly extended to explain the variation in compressive strength between the frazil and columnar sea ice It is speculated that this may be due to 1) the influence that the increased ductility of sea ice has on the relationship between strength and grain size at 1/100 1/s, 2) that another microstructural parameter (e.g., the thickness of the ice between brine inclusions) may be the controlling factor in determining sea ice strength, or 3) that the dominant mechanisms driving deformation vary with each ice type. (Auth.)

44-3824
Sea ice: a habitat for the foraminifer *Neogloboquadrina pachyderma?.*
Dieckmann, G., et al, *U.S. Army Cold Regions Research and Engineering Laboratory Monograph,* Feb. 1990, M 90-01, MP 2732, Sea Ice Properties and Processes; Proceedings of the W F Weeks Sea Ice Symposium, San Francisco, CA, Dec. 1988. Edited by S.F Ackley and W.F. Weeks, p.86-92, ADA-221 723, 22 refs.
Spindler, M., Lange, M.A., Ackley, S.F., Eicken, H
Sea ice, Marine biology, Microbiology, Ice growth, Ecology, Biomass, Bacteria, Ice composition, Sea water, Pack ice, Ice cover thickness, Ice cores, Antarctica—Weddell Sea.
A report is given on a large-scale survey of the Weddell Sea pack ice and water column carried out during the Winter Weddell Sea Project 1986 (WWSP '86) from midwinter to austral spring It was concluded that the incorporation of *Neogloboquadrina pachyderma* into sea ice is related to ice formation processes, and that their incorporation into the ice is not necessarily accidental but may indicate an overwintering strategy These observations can have implications for the use of *N pachyderma* as a marker for water masses, since foraminifers growing in the ice may have a different isotopic configuration from those living in seawater only. (Auth. mod.)

44-3825
Microorganisms concentrated by frazil ice: evidence from laboratory experiments and field measurements.
Garrison, D.L., et al, *U.S. Army Cold Regions Research and Engineering Laboratory Monograph,* Feb 1990, M 90-01, Sea Ice Properties and Processes, Proceedings of the W F Weeks Sea Ice Symposium, San Francisco, CA, Dec 1988 Edited by S.F. Ackley and W F Weeks, p.92-96, ADA-221 723, 20 refs.
Close, A.R., Reimnitz, E.
Frazil ice, Microbiology, Sea ice, Marine biology, Algae, Experimentation, Sea water, Chlorophylls, Distribution, Ice cover thickness.

44-3826
Suspended-matter scavenging by rising frazil ice.
Reimnitz, E., et al, *U.S. Army Cold Regions Research and Engineering Laboratory. Monograph,* Feb. 1990, M 90-01, Sea Ice Properties and Processes; Proceedings of the W.F. Weeks Sea Ice Symposium, San Francisco, CA, Dec. 1988. Edited by S F Ackley and W.F. Weeks, p.97-100, ADA-221 723, 10 refs.
Kempema, E.W., Weber, W.S., Clayton, J.R., Payne, J.R.
Frazil ice, Ice composition, Microbiology, Plankton, Suspended sediments, Ice solid interface, Ice adhesion, Marine biology, Experimentation, Ice growth.

44-3827
Wave-induced sediment enrichment in coastal ice covers.
Shen, H.T., et al, *U.S. Army Cold Regions Research and Engineering Laboratory. Monograph,* Feb. 1990, M 90-01, Sea Ice Properties and Processes; Proceedings of the W F. Weeks Sea Ice Symposium, San Francisco, CA, Dec. 1988. Edited by S.F. Ackley and W.F. Weeks, p.100-102, ADA-221 723, 6 refs.
Ackermann, N.L.
Sea ice, Suspended sediments, Ice composition, Water waves, Ice cover, Impurities, Sea water, Distribution, Analysis (mathematics), Experimentation.

44-3828
Sediment in Eurasian arctic sea ice.
Wollenburg, I , et al, *U.S. Army Cold Regions Research and Engineering Laboratory. Monograph,* Feb. 1990, M 90-01, Sea Ice Properties and Processes, Proceedings of the W.F. Weeks Sea Ice Symposium, San Francisco, CA, Dec. 1988. Edited by S.F. Ackley and W.F. Weeks, p.102-106, ADA-221 723, 22 refs.
Pfirman, S.L., Lange, M.A.
Sea ice, Suspended sediment , Ice composition, Ice cores, Particle size distribution, Distribution, Snow composition, Grain size.

44-3829
Source, characteristics, and significance of sediment pellets formed on the sea ice of the arctic basin.
Barnes, P W , et al, *U S Army Cold Regions Research and Engineering Laboratory Monograph,* Feb 1990, M 90-01, Sea Ice Properties and Processes, Proceedings of the W F Weeks Sea Ice Symposium, San Francisco, CA, Dec 1988 Edited by S.F Ackley and W F Weeks, p.106-108, ADA-221 723, refs.
Kempema, E.W., Reimnitz, E.
Sea ice, Suspended sediments, Ice formation, Sediment transport, Experimentation, Freeze thaw cycles, Sea water.

44-3830
Sediment transport by ice gouging: application of model experiments to the arctic continental shelf.
Barnes, P W , et al, *U.S. Army Cold Regions Research and Engineering Laboratory. Monograph,* Feb. 1990, M 90-01, Sea Ice Properties and Processes, Proceedings of the W F Weeks Sea Ice Symposium, San Francisco, CA, Dec. 1988 Edited by S.F. Ackley and W.F. Weeks, p.109-111, ADA-221 723, 5 refs.
Hunter, R.E., Lee, A., Reimnitz, E., Weber, W S.
Sediment transport, Ice scoring, Bottom topography, Ocean bottom, Ice floes, Drift, Bottom sediment, Experimentation, Ice mechanics.

44-3831
Movements of fine-grained sediment particles in freshwater- and seawater-slush ice slurries during freezing front advances.
Clayton, J.R , Jr., et al, *U.S. Army Cold Regions Research and Engineering Laboratory. Monograph,* Feb. 1990, M 90-01, Sea Ice Properties and Processes, Proceedings of the W.F. Weeks Sea Ice Symposium, San Francisco, CA, Dec. 1988 Edited by S.F. Ackley and W F. Weeks, p.111-114, ADA-221 723, 5 refs.
Reimnitz, E., Payne, J.R., Kempema, E.W.
Sediment transport, Sea ice, Particle size distribution, Freezing, Suspended sediments, Slush, Experimentation, Sea water freezing.

44-3832
Salt-water anchor ice formation: observations from the Alaskan Beaufort Sea and flume experiments.
Kempema, E.W., et al, *U.S. Army Cold Regions Research and Engineering Laboratory. Monograph,* Feb. 1990, M 90-01, Sea Ice Properties and Processes, Proceedings of the W.F. Weeks Sea Ice Symposium, San Francisco, CA, Dec. 1988. Edited by S.F. Ackley and W F. Weeks, p.114-116, ADA-221 723, 5 refs.
Reimnitz, E., Barnes, P.W.
Ice formation, Bottom ice, Storms, Ice structure, Sediments, Ice mechanics, Seasonal variations, Sea water, Frazil ice.

44-3833
Lidar detection of leads in arctic sea ice.
Schnell, R.C., et al, *U.S. Army Cold Regions Research and Engineering Laboratory Monograph,* Feb. 1990, M 90-01, MP 2733, Sea Ice Properties and Processes, Proceedings of the W F Weeks Sea Ice Symposium, San Francisco, CA, Dec 1988 Edited by S.F. Ackley and W.F. Weeks, p.119-123, ADA-221 723, 19 refs.
Barry, R G , Miles, M W , Andreas, E.L., Radke, L.F , Brock, C.A., McCormick, M.P., Moore, J.L.
Sea ice, Streams, Remote sensing, Ice structure, Marine meteorology, Radiation balance, Lidar, Models, Heat transfer, Moisture transfer, Seasonal variations, Backscattering, Detection.
Remote sensing using an airborne infrared lidar has shown an unexpected capability to detect open leads (linear openings) in arctic sea ice and their associated meteorology in winter. It is shown that vertical profiles of backscattered radiation demonstrate strong returns from hydrometeor plumes originating from leads having a surface water temperature near -1 8 C Recently refrozen leads are also distinguishable by the lidar backscatter from adjacent thicker, older sea ice. Wide leads release enough energy to create buoyant plumes which penetrate the arctic boundary layer inversion, transporting heat and moisture into the troposphere These results show that the role of the Arctic as a global heat sink may need to be re-evaluated, and that lead plumes have a significant effect on the radiation budget.

44-3834
Review of the oceanography and micrometeorology of arctic leads and polynyas.
Smith, S D., *U.S. Army Cold Regions Research and Engineering Laboratory. Monograph,* Feb. 1990, M 90-01, Sea Ice Properties and Processes; Proceedings of the W F Weeks Sea Ice Symposium, San Francisco, CA, Dec. 1988. Edited by S.F. Ackley and W.F. Weeks, p.123-126, ADA-221 723, 28 refs.
Polynyas, Sea ice, Streams, Brines, Climatic factors, Heat balance, Ice mechanics, Oceanography, Microclimatology, Marine biology, Latent heat, Ice formation, Wind factors.

44-3835
Wind-generated polynyas off the coasts of the Bering Sea Islands.
Kozo, T.L., et al, *U.S. Army Cold Regions Research and Engineering Laboratory Monograph,* Feb 1990, M 90-01, MP 2734, Sea Ice Properties and Processes, Proceedings of the W.F. Weeks Sea Ice Symposium, San Francisco, CA, Dec. 1988 Edited by S.F. Ackley and W.F. Weeks, p.126-132, ADA-221 723, 15 refs.
Farmer, L.D., Welsh, J.P.
Polynyas, Wind factors, Sea ice, Ice mechanics, Latent heat, Climatic factors, Distribution, Drift, Bering Sea.

The relationship of winds derived from mesoscale meteorological networks to polynya sizes and orientations was investigated Defense Meteorological Satellite Program imagery was merged with atmospheric pressure network data from the Bering Sea for Mar 1988 During the month, wind systems drove sea ice southward, creating and maintaining polynyas south of St Lawrence, St Matthew, and Numivak Islands. Existing land stations, the deployment of a moored pressure buoy south of the ice edge, and a new automated weather station on St Matthew Island have allowed the "creation" of meso-networks that surround these lee-shore polynyas. This analysis (rather than synoptic) has shown that polynya lengths and orientations can be simply related to the mesonet computed geostrophic winds The typical time lag between the onset of a geostrophic wind and the appearance of "windsock" type tracking of the polynyas is 24 hours.

44-3836
**Recent measurements of sea ice topography in the eastern Arctic.**
Krabill, W.B., et al, *U.S Army Cold Regions Research and Engineering Laboratory. Monograph,* Feb. 1990, M 90-01, MP 2735, Sea Ice Properties and Processes; Proceedings of the W.F. Weeks Sea Ice Symposium, San Francisco, CA, Dec 1988 Edited by S.F. Ackley and W.F. Weeks, p.132-136, ADA-221 723, 8 refs.
Swift, R.N., Tucker, W.B.
Sea ice, Topography, Ice surface, Remote sensing, Lidar, Surface roughness, Pressure ridges, Photography.
During a multinational remote sensing experiment in May 1987, the NASA Airborne Oceanographic Lidar (AOL) was used to collect profiles of the sea ice surface topography in the eastern Arctic. A Global Positioning System (GPS) receiver was used to provide aircraft positioning to an accuracy of about 50 m The AOL is a pulsed laser that provides a profile free of phase shift discontinuities common to continuous wave lasers. Similar to other laser data, however, the aircraft altitude variation requires removal from the profile prior to calculation of the ice surface roughness statistics. As with previous data, there remains an uncertainty as to the freeboard level of the ice after the aircraft motion has been removed, thus small-scale roughness statistics are considered unreliable However, statistics of pressure ridges can be generated with confidence. The statistical results of ridges from this data set, consisting mainly of ridge height and frequency distributions, compare well wit previous results obtained from this area of the Arctic. Consistent with previous findings, the AOL data indicate that while the regional mean ridge heights from the area north of Greenland are similar to those reported for other parts of the Arctic, the average kilometer contains substantially more ridges than have been observed in other Arctic locations.

44-3837
**Processes determining the bottom topography of multiyear arctic sea ice.**
Wadhams, P., et al, *U.S. Army Cold Regions Research and Engineering Laboratory. Monograph,* Feb. 1990, M 90-01, Sea Ice Properties and Processes; Proceedings of the W.F. Weeks Sea Ice Symposium, San Francisco, CA, Dec. 1988. Edited by S.F Ackley and W.F. Weeks, p.136-141, ADA-221 723, 12 refs.
Martin, S.
Ice bottom surface, Topography Sea ice, Side looking radar, Acoustic measurement, Surface roughness, Sea ice, Climatic factors, Hummocks, Pressure ridges, Ice melting, Freezing, Models.

44-3838
**Fractal description of ice keel small-scale surface roughness.**
Bishop, G C , et al, *U S Army Cold Regions Research and Engineering Laboratory Monograph,* Feb 1990, M 90-01, Sea Ice Properties and Processes; Proceedings of the W.F. Weeks Sea Ice Symposium, San Francisco, CA, Dec. 1988. Edited by S.F. Ackley and W F Weeks, p 141-145, ADA-221 723, 9 refs
Chellis, S.E.
Ice bottom surface, Acoustic measurement, Surface roughness, Topography, Analysis (mathematics), Accuracy.

44-3839
**Small-scale under-ice morphology study in the high Arctic.**
Connors, D.N., et al, *U.S. Army Cold Regions Research and Engineering Laboratory. Monograph,* Feb. 1990, M 90-01, Sea Ice Properties and Processes, Proceedings of the W.F Weeks Sea Ice Symposium, San Francisco, CA, Dec 1988 Edited by S.F Ackley and W.F. Weeks, p 145-151, ADA-221 723, 9 refs.
Levine, E.R., Shell, R.R.
Ice bottom surface, Ice structure, Ice floes, Pressure ridges, Surface roughness, Ice surface, Ice acoustics, Ice optics, Topography.

44-3840
**Simulation of the ice ridging process.**
Hopkins, M.A., et al, *U.S. Army Cold Regions Research and Engineering Laboratory. Monograph,* Feb 1990, M 90-01, Sea Ice Properties and Processes, Proceedings of the W.F. Weeks Sea Ice Symposium, San Francisco, CA, Dec. 1988. Edited by S.F. Ackley and W.F. Weeks, p.152-156, ADA-221 723, 10 refs.
Hibler, W.D., III.
Pressure ridges, Ice deformation, Sea ice, Rheology, Ice cover thickness, Ice growth, Heat loss, Simulation, Models.

44-3841
**Periodicities and keel spacings in the under-ice draft distribution.**
Key J.R., et al, *U.S. Army Cold Regions Research and Engineering Laboratory. Monograph,* Feb 1990, M 90-01, Sea Ice Properties and Processes, Proceedings of the W.F. Weeks Sea Ice Symposium, San Francisco, CA, Dec. 1988. Edited by S.F. Ackley and W.F. Weeks, p.156-160, ADA-221 723, 10 refs
McLaren, A.S.
Ice bottom surface, Bottom topography, Acoustic measurement, Spectra, Distribution, Models.

44-3842
**Mountain barrier effects on ice island drift in a coastal ice zone.**
Lu, M., et al, *U.S. Army Cold Regions Research and Engineering Laboratory Monograph,* Feb 1990, M 90-01, Sea Ice Properties and Processes, Proceedings of the W.F. Weeks Sea Ice Symposium, San Francisco, CA, Dec. 1988. Edited by S.F. Ackley and W.F. Weeks, p.163-168, ADA-221 723, 8 refs.
Sackinger, W M.
Icebergs, Ice islands, Drift, Wind factors, Mountains, Ice mechanics, Topographic effects, Wind direction, Wind velocity.

44-3843
**Analysis of sea ice drift in a coastal zone.**
Smith, P.A., *U.S. Army Cold Regions Research and Engineering Laboratory. Monograph,* Feb. 1990, M 90-01, Sea Ice Properties and Processes; Proceedings of the W.F. Weeks Sea Ice Symposium, San Francisco, CA, Dec. 1988. Edited by S F. Ackley and W.F. Weeks, p.168-172, ADA-221 723, 12 refs
Drift, Sea ice, Wind factors, Ice physics, Coastal topographic features, Ice mechanics, Velocity, Stresses

44-3844
**Variations in antarctic sea ice.**
Breitenberger, E., et al, *U.S. Army Cold Regions Research and Engineering Laboratory. Monograph,* Feb. 1990, M 90-01, Sea Ice Properties and Processes, Proceedings of the W.F. Weeks Sea Ice Symposium, San Francisco, CA, Dec. 1988. Edited by S.F Ackley and W.F. Weeks, p.173-177, ADA-221 723, 9 refs.
Wendler, G.
Sea ice distribution, Ice edge, Ice melting, Pack ice, Seasonal variations, Polynyas.
Antarctic sea ice data from the Navy-NOAA (National Oceanic and Atmospheric Administration) Joint Ice Center for the period 1973-1984 were analyzed. Temporal and spatial variations in the ice edge position and areal coverage of the ice pack were examined The results show significant interannual variation in these parameters In general, the ice pack receded dramatically from 1973-1977 From 1978 on this trend was reversed For the 1973-1984 period, small negative trends in ice extent and area were found These trends were not statistically significant. Short-term variations in the ice cover provide insights into the mechanisms of ice dynamics By examining the anomalies in areal coverage and ice edge position, advective processes are seen to greatly affect the evolution of the ice pack Anomalies in ice area seem to display interannual persistence in some sectors. (Auth.)

44-3845
**Time-lapse motion study of the "Odden" during 1978-1987 as observed with the Nimbus-7 scanning multichannel microwave radiometer.**
Gloersen, P., *U.S. Army Cold Regions Research and Engineering Laboratory Monograph,* Feb. 1990, M 90-01, Sea Ice Properties and Processes, Proceedings of the W F Weeks Sea Ice Symposium, San Francisco, CA, Dec. 1988. Edited by S.F. Ackley and W.F. Weeks, p.177-179, ADA 221 723, 3 refs
Sea ice distribution, Remote sensing, Radiometry, Microwaves, Ice conditions, Greenland Sea.

44-3846
**SMMR observations of the sea ice regime in the Ross Sea, 1979-1985.**
Jacobs, S., et al, *U.S. Army Cold Regions Research and Engineering Laboratory Monograph,* Feb. 1990, M 90-01, Sea Ice Properties and Processes, Proceedings of the W F. Weeks Sea Ice Symposium, San Francisco, CA, Dec. 1988. Edited by S.F Ackley and W.F. Weeks, p.179-181. ADA-221 723.
Comiso, J.C.
Sea ice distribution, Remote sensing, Microwaves, Radiometry, Wind factors, Ocean currents, Bottom topography, Meteorological factors, Ice formation, Sea water, Salinity, Seasonal variations, Antarctica—Ross Sea.
Sea ice concentrations derived from the Nimbus-7 Scanning Multichannel Microwave Radiometer (SMMR) can be related to atmospheric forcing and to sea floor topography via the ocean circulation In the Ross Sea, ice concentrations are lower year-round over the continental shelf than above the adjacent deep ocean. The lowest concentrations appear on the west-central shelf, where persistent SSW winds move sea ice away from the coastline The increased rate of ice formation in the greater expanse of open water in this sector results in the highest-salinity shelf water to be found in the Antarctic There is a little monthly or interannual variability in the average 86% ice concentration over the shelf during the 7- to 8-month winter period when that region is south of the marginal ice zone. There is considerable variability during the remainder of the year, with early opening of the large Ross Polynya followed by insolation and heating of the ocean surface layer and later ice formation in autumn. In terms of ice cover, this ocean heat storage resulted in a spring-summer-autumn cycle about six weeks longer in 1979-80 than in 1984-85. (Auth.)

44-3847
**Variability of sea ice concentration in the Canada Basin and associated atmospheric forcings: 1979-1984.**
Maslanik, J.A., et al, *U.S. Army Cold Regions Research and Engineering Laboratory. Monograph,* Feb 1990, M 90-01, Sea Ice Properties and Processes; Proceedings of the W F Weeks Sea Ice Symposium, San Francisco, CA, Dec. 1988. Edited by S.F. Ackley and W.F. Weeks, p.181-184, ADA-221 723, 10 refs.
Barry, R.G.
Sea ice distribution, Ice conditions, Remote sensing, Radiometry, Ice growth, Meteorological factors, Microwaves, Albedo, Ice floes, Heat flux

44-3848
**Reversals of the Beaufort Gyre sea ice circulation and effects on ice concentration in the Canada Basin.**
Serreze, M.C., et al, *U.S. Army Cold Regions Research and Engineering Laboratory. Monograph,* Feb. 1990, M 90-01, Sea Ice Properties and Processes; Proceedings of the W.F. Weeks Sea Ice Symposium, San Francisco, CA, Dec. 1988. Edited by S.F. Ackley and W.F. Weeks, p.185-188, ADA-221 723, 14 refs.
Barry, R.G., McLaren, A.S.
Sea ice distribution, Drift, Ice mechanics, Meteorological factors, Atmospheric pressure, Wind factors, Ocean currents, Velocity, Beaufort Sea.

44-3849
**NASA sea ice validation program for the DMSP SSM/I.**
Cavalieri, D.J., et al, *U.S. Army Cold Regions Research and Engineering Laboratory Monograph,* Feb. 1990, M 90-01, Sea Ice Properties and Processes, Proceedings of the W.F. Weeks Sea Ice Symposium, San Francisco, CA, Dec 1988 Edited by S.F. Ackley and W.F Weeks, p.197-203, ADA-221 723, 6 refs.
Sea ice distribution, Ice conditions, Remote sensing, Microwaves, LANDSAT, Airplanes, Accuracy, Arctic Ocean, Antarctica—Weddell Sea.
The NASA Ocean Data System at the Jet Propulsion Laboratory in Pasadena, CA, was assigned the task of developing software to process and map the geophysical parameters, while the National Snow and Ice Data Center in Boulder, CO, will assume the long-term responsibilities of processing and archiving these data. Because the determination of the accuracy of the ice parameters is critical to the development of a scientifically useful data set, a key component of NASA's program is the validation of the derived ice parameters in the Arctic and Antarctic. This paper briefly outlines the program to validate the sea ice parameters derived from an algorithm described by Cavalieri et al. (1984) and Gloersen and Cavalieri (1986) and presents some of the early results of the validation effort NASA's progress in processing and archiving the SSM/I data is discussed by C Morris elsewhere in this volume In the next section, the specific validation objectives are given and the general approach is discussed Some preliminary results from satellite intercomparisons and from aircraft underflights are given in the third section, and finally, a tentative assessment is presented in the last section. (Auth. mod.)

44-3850
NASA SSM/I data processing and archiving of sea ice products.
Morris, C S , *U S Army Cold Regions Research and Engineering Laboratory Monograph*, Feb 1990, M 90-01, Sea Ice Properties and Processes, Proceedings of the W F Weeks Sea Ice Symposium, San Francisco, CA, Dec 1988 Edited by S F Ackley and W.F. Weeks, p.203-205, ADA-221 723, 2 refs.
Sea ice distribution, Remote sensing, Data processing, Microwaves, Radiometry, Ice conditions, Brightness, Temperature distribution

44-3851
Validation of the SSM/I and AES/YORK algorithms for sea ice parameters.
Bjerkelund, C.A., et al, *U.S Army Cold Regions Research and Engineering Laboratory Monograph*, Feb. 1990, M 90-01, Sea Ice Properties and Processes, Proceedings of the W F Weeks Sea Ice Symposium, San Francisco, CA, Dec 1988. Edited by S F. Ackley and W.F. Weeks, p.206-208, ADA-221 723, 2 refs
Ramseier, R.O., Rubinstein, I.G.
Sea ice distribution, Ice conditions, Remote sensing, Microwaves, Radiometry, Statistical analysis, Wind factors, Accuracy.

44-3852
Remote sensing of ocean surface winds with the special sensor microwave/imager (SSM/I).
Goodberlet, M.A., et al, *U.S. Army Cold Regions Research and Engineering Laboratory Monograph*, Feb. 1990, M 90-01, Sea Ice Properties and Processes; Proceedings of the W F Weeks Sea Ice Symposium, San Francisco, CA, Dec. 1988 Edited by S.F Ackley and W F. Weeks, p.209-213, ADA-221 723, 10 refs.
Swift, C.T.
Wind velocity, Remote sensing, Microwaves, Marine meteorology, Oceans, Accuracy.

44-3853
Global snow varintions derived from SMMR: preliminary results.
Chang, A.T.C., et al, *U.S. Army Cold Regions Research and Engineering Laboratory. Monograph*, Feb. 1990, M 90-01, Sea Ice Properties and Processes; Proceedings of the W.F. Weeks Sea Ice Symposium, San Francisco, CA, Dec. 1988. Edited by S.F. Ackley and W.F. Weeks, p.213-217, ADA-221 723, 7 refs.
Chiu, L.S.
Snow cover distribution, Volume, Remote sensing, Radiometry, Microwaves, Snow depth, Climatic factors, Seasonal variations.

44-3854
Antarctic ice sheet brightness temperature variations.
Jezek, K.C., et al, *U.S. Army Cold Regions Research and Engineering Laboratory. Monograph*, Feb. 1990, M 90-01, MP 2736, Sea Ice Properties and Processes, Proceedings of the W F Weeks Sea Ice Symposium, San Francisco, CA, Dec 1988 Edited by S.F. Ackley and W.F. Weeks, p.217-223, ADA-221 723, 11 refs.
Cavalieri, D.J., Hogan, A.W.
Ice sheets, Geophysical surveys, Microwaves, Radiometry, Remote sensing, Ice temperature, Ice surface, Brightness, Polarization (waves), Ice electrical properties, Air temperature.
In this paper the possibility of extracting geophysical information about the great ice sheets from passive microwave data is explored This work was stimulated by calculations done by Zwally (1977) who showed that typical snow grain sizes at the surface of the ice sheet measurably influence the microwave emissivity of the near surface. This result led to speculation that ice-sheet-wide accumulation rates could be estimated by using empirical relations between grain size and accumulation rate but little quantitative progress has been made towards that goal using single channel radiometer data alone Data from the Scanning Multichannel Microwave Radiometer are now in a convenient format for analysis, prompting us to perform a qualitative analysis of the 18- and 37-GHz vertically and horizontally polarized data in the context of Zwally's earlier work. An additional premise of the investigation is that this analysis can be simplified by hypothesizing that large-scale glaciologic regimes have characteristic surfaces controlled by local environmental conditions In turn, characteristic surface properties contribute to unique microwave signatures. To test whether a segmentation of the SMMR data set into particular glacial regimes could be used to identify differences between the physical properties of each regime, mean monthly brightness temperatures were examined at 18- and 37-GHz for both horizontal and vertical polarizations over five areas. Measurable differences were found between brightness temperature trends for the different areas that were attributed, in part, to fluctuations in the large scale surface temperature field of the ice sheet. (Auth.)

44-3855
Airborne sea ice thickness sounding.
Kovacs, A., et al, *U.S. Army Cold Regions Research and Engineering Laboratory Monograph*, Feb. 1990, M 90-01, MP 2737, Sea Ice Properties and Processes, Proceedings of the W.F. Weeks Sea Ice Symposium, San Francisco, CA, Dec. 1988. Edited by S F Ackley and W F Weeks, p.225-229, ADA-221 723, 7 refs.
Holladay, J.S.
Ice cover thickness, Sea ice, Airborne equipment, Electromagnetic prospecting, Sounding, Remote sensing, Radar echoes, Boreholes, Snow depth, Ice floes, Pressure ridges.
Results from the use of airborne electromagnetic induction technology for profiling sea ice thickness are presented. The airborne sea ice thickness soundings indicated that the thickness could be estimated but the resolution decreased as the ice became rough However, it was found that the average ice thickness estimated by airborne electromagnetic sounding for a given flight track was in reasonable agreement with the average ice thickness determined by direct drill hole measurement Examples of the ice thickness profiles obtained by airborne sounding and direct drill hole sounding are presented and compared. Future development of the airborne system is discussed.

44-3856
On the relationship between ice thickness and 33.6-GHz brightness temperature observed for first-season sea ice.
Eppler, D , et al, *U S. Army Cold Regions Research and Engineering Lsboratory Monograph*, Feb. 1990, M 90-01, Sea Ice Properties and Processes, Proceedings of the W F Weeks Sea Ice Symposium, San Francisco CA, Dec 1988 Edited by S.F. Ackley and W.F. Weeks, p.229-232, ADA-221 723, 4 refs.
Farmer, L.D., Lohanick, A.W.
Ice cover thickness, Remote sensing, Sea ice, Microwaves, Radiometry, Snow ice interface, Brightness, Ice temperature, Ice formation, Ice structure.

44-3857
Airborne passive microwave observations of arctic sea ice.
Comiso, J.C., et al, *U.S. Army Cold Regions Research and Engineering Laboratory. Monograph*, Feb. 1990, M 90-01, Sea Ice Properties and Processes, Proceedings of the W.F. Weeks Sea Ice Symposium, San Francisco, CA, Dec. 1988. Edited by S.F. Ackley and W.F Weeks, p.233-235, ADA-221 723, 1 ref.
Kutz, R., Dod, T., Crawford, J.
Sea ice distribution, Remote sensing, Microwaves, Radiometry, Ice conditions, Temperature variations, Brightness, Ice surveys.

44-3858
Cavitating fluid sea ice model.
Flato, G M , et al, *U S. Army Cold Regions Research and Engineering Laboratory Monograph*, Feb. 1990, M 90-01, MP 2738, Sea Ice Properties and Processes; Proceedings of the W.F. Weeks Sea Ice Symposium, San Francisco, CA, Dec. 1988. Edited by S F Ackley and W F Weeks, p.239-242, ADA-221 723, 3 refs.
Hibler, W.D., III.
Ice models, Sea ice, Cavitation, Oceans, Climatic changes, Ice cover effect, Rheology, Sea water, Ice cover thickness, Fluid dynamics, Ice mechanics.
The motivation for the present work is the development of a sea ice rheology parameterization that retains most of the essential physics of large-scale drift, yet is conceptually simple and computationally fast enough to be useful for long-term climate studies The approach is to reformulate the velocity correction method of Nikiforov et al (1967) and Parkinson and Washington (1979) and obtain the so-called cavitating fluid rheology The rationale is that pack ice can be viewed as a two-phase medium (in two dimensions), one phase being ice and the other open water. The open water phase is considered to have no strength and so convergence will reduce the area of open water. The ice phase has some strength and so convergence is restricted if no open water is present Divergence, on the other hand, is unhindered and causes open water to be created. In the model discussed here, the ice pack is assumed to have no shear strength which, although counterintuitive, has certain advantages first, the model is much simpler, and second, a more robust (and realistic) circulation of the ice is maintained for wind fields averaged over periods of days or weeks. By incorporating the cavitating fluid rheology into a complete dynamic-thermodynamic sea ice model and performing several three year simulations of the arctic sea ice cover, the effect of various parameters and time step lengths can be evaluated Comparison with the more complete viscous-plastic model of Hibler (1979), which includes shear strength, yields insight into the effects of this simplified parameterization.

44-3859
Importance of a simulation of the annual cycle and interannual variations of ice cover in the Arctic.
Fleming, G H , *U.S. Army Cold Regions Research and Engineering Laboratory. Monograph*, Feb 1990, M 90-01, Sea Ice Properties and Processes, Proceedings of the W.F. Weeks Sea Ice Symposium, San Francisco, CA, Dec. 1988. Edited by S.F. Ackley and W.F. Weeks, p.243-247, ADA-221 723, 9 refs.
Sea ice distribution, Ice mechanics, Ice conditions, Ice water interface, Mathematical models, Seasonal variations, Rheology, Thermodynamics, Statistical analysis.

44-3860
On modeling the baroclinic adjustment of the Arctic Ocean.
Hibler, W.D., III, *U.S. Army Cold Regions Research and Engineering Laboratory. Monograph*, Feb. 1990, M 90-01, MP 2739, Sea Ice Properties and Processes; Proceedings of the W F Weeks Sea Ice Symposium, San Francisco, CA, Dec 1988 Edited by S F Ackley and W.F. Weeks, p.247-250, ADA-221 723, 3 refs.
Ocean currents, Ice mechanics, Drift, Bottom topography, Mathematical models, Wind factors, Salinity, Water temperature, Pressure.

44-3861
Full sea ice model forced with GCM atmosphere: alleviation of a systematic thickness bias through a modified strength parameterization.
Loewe, P , *U S Army Cold Regions Research and Engineering Laboratory. Monograph*, Feb. 1990, M 90-01, Sea Ice Properties and Processes, Proceedings of the W.F. Weeks Sea Ice Symposium, San Francisco, CA, Dec. 1988. Edited by S.F. Ackley and W F. Weeks, p.251-255, ADA-221 723, 8 refs.
Ice models, Sea ice, Ice mechanics, Ice cover thickness, Drift, Wind factors, Climatic factors, Thermodynamics, Analysis (mathematics).

44-3862
Warming effect of meridional sea ice transport on climate.
Ledley, T.S., *U.S. Army Cold Regions Research and Engineering Laboratory. Monograph*, Feb. 1990, M 90-01, Sea Ice Properties and Processes, Proceedings of the W F Weeks Sea Ice Symposium, San Francisco, CA, Dec 1988. Edited by S.F Ackley and W.F. Weeks, p.256-258, ADA-221 723, 4 refs.
Ice mechanics, Climatic changes, Sea ice, Ice cover thickness, Heat flux, Polar regions, Temperature variations, Streams.
Sea ice is an important factor in controlling the exchange of energy between the ocean and atmosphere in the polar regions and has an important impact on climate. A coupled energy balance climate-sea ice model is used here to examine the effect of sea ice transport on the ocean-atmosphere energy exchange and atmospheric temperature. The model results show that the transport of sea ice thins the pack ice in the central Arctic and around Antarctica This thinning produces a larger lead fraction within the ice pack and a longer period of ice-free conditions, which results in warmer conditions near the poles. (Auth.)

44-3863
Preliminary testing of a sea ice model for the Greenland Sea.
Preller, R.H., et al, *U.S. Army Cold Regions Research and Engineering Laboratory Monograph*, Feb 1990, M 90-01, Sea Ice Properties and Processes; Proceedings of the W.F Weeks Sea Ice Symposium, San Francisco, CA, Dec 1988 Edited by S F Ackley and W F Weeks, p.259-277, ADA-221 723, 28 refs.
Cheng, A., Posey, P.G.
Sea ice distribution, Ice models, Ice forecasting, Drift, Meteorological factors, Ice water interface, Ice cover thickness, Mathematical models, Thermodynamics, Ice mechanics, Ocean currents, Bottom topography, Greenland Sea.

44-3864
Interaction of an ocean eddy with a marginal ice zone ocean front.
[illegible] D C , IV, et al, *U.S. Army Cold Regions Research and Engineering Laboratory Monograph*, Feb. 1990, M 90-01, Sea Ice Properties and Processes; Proceedings of the W F Weeks Sea Ice Symposium, San Francisco, CA, Dec 1988 Edited by S.F. Ackley and W.F Weeks, p.278-281, ADA-221 723, 7 refs.
Bird, A.A., Budgell, W.P.
Ice edge, Ocean currents, Turbulent flow, Ice water interface, Remote sensing, Ice conditions, Models, Wind factors.

44-3865
Using the free-drift force balance to estimate drag coefficients and ice thickness.
McPhee, M.G., *U.S. Army Cold Regions Research and Engineering Laboratory. Monograph,* Feb. 1990, M 90-01, Sea Ice Properties and Processes, Proceedings of the W.F. Weeks Sea Ice Symposium, San Francisco, CA, Dec. 1988. Edited by S.F. Ackley and W.F. Weeks, p.281-284, ADA-221 723, 8 refs.
Ice mechanics, Ice cover thickness, Sea ice, Drift, Ice volume, Wind velocity, Water flow, Stresses, Design, Analysis (mathematics).

44-3866
Attempt to measure deep saline outflow through Barrow Canyon.
Roach, A T , et al, *U S Army Cold Regions Research and Engineering Laboratory Monograph,* Feb. 1990, M 90-01, Sea Ice Properties and Processes; Proceedings of the W.F. Weeks Sea Ice Symposium, San Francisco, CA, Dec. 1988 Edited by S.F. Ackley and W.F. Weeks, p.287-290, ADA-221 723, 7 refs.
Aagaard, K.
Sea water, Water flow, Ice formation, Sea ice, Salinity, Ocean currents, Freezing points, Moorings, Wind factors, Pressure.

44-3867
Oceanic heat flux in the Fram Strait measured by a drifting buoy.
Perovich, D.K., et al, *U.S Army Cold Regions Research and Engineering Laboratory. Monograph,* Feb. 1990, M 90-01, MP 2740, Sea Ice Properties and Processes; Proceedings of the W.F. Weeks Sea Ice Symposium, San Francisco, CA, Dec 1988 Edited by S F Ackley and W F Weeks, p.291-296, ADA-221 723, 14 refs.
Tucker, W.B., Krishfield, R.A.
Ice temperature, Sea ice distribution, Heat flux, Ice melting, Sea water, Drift stations, Ice edge, Ice cover effect, Ice cover thickness, Heat transfer, Thermistors, Water temperature, Latent heat.
Two thermistor strings were installed through the ice to measure ice temperatures and determine oceanic heat fluxes as the Arctic Environmental Drifting Buoy drifted from the Arctic Basin into the Greenland Sea Ice temperature data between Dec 14, 1987 and Jan 2, 1988 were retrieved During this period the AEDB progressed from approximately 81N 4'E to 77N 5'W This constituted the most rapid displacement of the entire drift, coinciding with the entry of the floe into the marginal ice zone of Fram Strait. Once in the MIZ, water temperatures increased, most notably at a depth of 16 m, where values changed from -1 8 C to more than 2 C Bottom ablation rates of 34 mm/day were observed between 21 and 28 Dec. During this excursion into warmer water, the oceanic heat flux increased by a factor of 18, from 7W/sq m to 128W/sq m.

44-3868
Introduction to Lanzhou Institute of Glaciology and Geocryology, Academia Sinica.
Lanzhou Institute of Glaciology and Geocryology, Lanzhou, China, [1988], 17p., In English with 1 chart, 3 personnel tables and 2 sketch maps in Chinese.
Organizations, Research projects, Glaciology, Geocryology, China.

44-3869
Mathematical model of temperature changes in concrete pavements.
Adkins, D.F., et al, *Journal of transportation engineering,* June 1990, 116(3), p 349-358, 6 refs.
Merkley, G.P
Concrete pavements, Concrete freezing, Mathematical models, Freeze thaw cycles, Temperature variations.

44-3870
Distinction between ice-pushed and ice-lifted landforms on lacustrine and marine coasts.
Gilbert, R., *Earth surface processes and landforms,* Feb. 1990, 15(1), p.15-24, 33 refs.
Ice push, Shores, Ice rafting, Ice pileup, Coastal topographic features, Shoreline modification, Ice cover effect.

44-3871
Rate of bedrock weathering by frost action: field measurements and a predictive model.
Matsuoka, N., *Earth surface processes and landforms,* Feb. 1990, 15(1), p.73-90, 36 refs.
Frost weathering, Frost shattering, Frozen rock strength, Mathematical models, Rock mechanics, Freeze thaw cycles, Frost action, Rock properties.

44-3872
Potential impact of the Northern Hemisphere Quaternary ice sheets on the frequencies of the astroclimatic orbital parameters.
Dehant, V., et al, *Journal of geophysical research,* May 20, 1990, 95(D6), p.7573-7578, 29 refs.
Loutre, M.-F., Berger, A.
Ice sheets, Ice volume, Periodic variations, Paleoclimatology, Sea level, Gravity, Mathematical models, Orientation.

44-3873
Cloud cover analysis with arctic advanced very high resolution radiometer data. 2. Classification with spectral and textural measures.
Key, J.R., *Journal of geophysical research,* May 20, 1990, 95D(6), p.7661-7675, 43 refs.
Clouds (meteorology), Classifications, Data processing, Spaceborne photography, Radiometry, Sea ice distribution, Snow cover, Remote sensing, Surface properties.

44-3874
Prediction model for snowmelt, snow surface temperature and freezing depth using a heat balance method.
Kondo, J., et al, *Journal of applied meteorology,* May 1990, 29(5), p.375-384, 20 refs.
Yamazaki, T.
Snowmelt, Snow surface temperature, Heat balance, Runoff forecasting, Freezing points, Snow cover structure, Snow water content, Solar radiation, Thermal conductivity.

44-3875
Lagrangian modeling of the ice process: a first-echo case.
Knight, C.A., et al, *Journal of applied meteorology,* May 1990, 29(5), p.418-428, 16 refs.
Precipitation (meteorology), Clouds (meteorology), Ice formation, Ice nuclei, Models, Wind factors, Particles, Temperature effects, Radar echoes.

44-3876
Effect of residual stress on the cold-resistance and endurance of welded joints.
Larionov, V.P , et al, *Strength of materials* Mar 1990, 21(7). p.891-896, Translated from Problemy prochnosti. 10 refs.
Petushkov, V.G., Yakovlev, G.P.
Steel structures, Joints (junctions), Brittleness, Low temperature research, Shear stress, Tensile strength, Crack propagation, Analysis (mathematics), Welding

44-3877
Recharge-discharge function of wetlands near Juneau, Alaska: part 1. Hydrogeological investigations.
Siegel, D.I., *Ground water,* July-Aug. 1988, 26(4), p.427-434, 42 refs.
Swamps, Hydrologic cycle, Ground water, Water flow, Muskeg, Hydrogeology, Water table, Soil water migration, Flow measurement.

44-3878
Recharge-discharge function of wetlands near Juneau, Alaska: part 2. Geochemical investigations.
Siegel, D.I., *Ground water,* Sep.-Oct. 1988, , p.580-586, 30 refs.
Swamps, Hydrologic cycle, Ground water, Surface waters, Chemical composition, Geochemistry, Solutions, Chemical analysis, Metals.

44-3879
Diffusivity of a glacial-outwash aquifer by the flood-wave-response technique.
Reynolds, R.J , *Ground water,* May-June 1987, 25(3), p.290-299, 12 refs.
Ground water, Glacial deposits, Soil water migration, Diffusion, Stream flow, Flooding, Outwash, Flow measurement.

44-3880
Deformation and failure of steel VNS25 at low temperatures taking account of the form of stressed state and stress concentrations.
Koval'chuk, B.I., et al, *Strength of materials,* Jan 1989, 21(1), p.56-59, Translated from Problemy prochnosti. 3 refs.
Rudenko, V.N., Khvatan, A.M., Belous, A.A.
Steels, Deformation, Low temperature tests, Ultimate strength, Mechanical properties, Cryogenics.

44-3881
Introduction to the glaciers in China. (Zhongguo bingchuan gailun),
Shi, Y.F , ed, Beijing, Kexue chubanshe (Science Publishing House), 1989, 231p. + photographs + maps, In Chinese. Refs. p.221-229. For selected chapters see 44-3882 through 44-3892.
Huang, M.H., ed, Ren, B.H., ed.
Mountain glaciers, Glacier surveys, Glaciology, Snow line, China.

44-3882
Geomorphologic and climatic conditions of existence of alpine glaciers and elevation of snow line in West China.
Shi, Y F , et al, Zhongguo bingchuan gailun (Introduction to the glaciers in China). Edited by Y F Shi, M.H. Huang, and B.H. Ren, Beijing, Kexue chubanshe (Science Publishing House), 1989, p 11 28 In Chinese.
Bai, C.Y.
Mountain glaciers, Glacier formation, Snow line, Glacier surveys, Geomorphology, Climatic factors, China

44-3883
Radiation and heat balances on alpine glaciers in China.
Bai, C.Y., Zhongguo bingchuan gailun (Introduction to the glaciers in China). Edited by Y.F. Shi, M.H Huang, and B.H. Ren, Beijing, Kexue chubanshe (Science Publishing House), 1989, p 29-54, In Chinese.
Mountain glaciers, Glacier heat balance, Radiation balance, Glacier surveys, Glacier surfaces, Analysis (mathematics), Solar radiation, China.

44-3884
Ice formations of glaciers in China.
Xie, Z C., et al, Zhongguo bingchuan gailun (Introduction to the glaciers in China). Edited by Y.F. Shi, M.H. Huang, and B.H. Ren, Beijing, Kexue chubanshe (Science Publishing House), 1989, p.55-68, In Chinese.
Huang, M H.
Mountain glaciers, Glacier formation, Glacier ice, Glacier surveys, Ice formation, China.

44-3885
Mass balance of glaciers in China.
Xie, Z.C., et al, Zhongguo bingchuan gailun (Introduction to the glaciers in China). Edited by Y.F. Shi, M.H. Huang, and B.H. Ren, Beijing, Kexue chubanshe (Science Publishing House), 1989, p.69-87, In Chinese.
Zhang, J.H.
Glacier mass balance, Mountain glaciers, Glacier surveys, Analysis (mathematics), China.

44-3886
Flow of glaciers in China.
Huang, M.H., Zhongguo bingchuan gailun (Introduction to the glaciers in China). Edited by Y F Shi, M.H. Huang, and B.H. Ren, Beijing, Kexue chubanshe (Science Publishing House), 1989, p 88-104, In Chinese.
Mountain glaciers, Glacier flow, Glacier surveys, Analysis (mathematics), China.

44-3887
Temperature of glaciers in China.
Huang, M.H., Zhongguo bingchuan gailun (Introduction to the glaciers in China). Edited by Y.F. Shi, M H. Huang, and B.H Ren, Beijing, Kexue chubanshe (Science Publishing House), 1989, p 105-121, In Chinese.
Mountain glaciers, Glacier ice, Ice temperature, Glacier surveys, Analysis (Mathematics), China

44-3888
Geochemistry of glaciers in China.
Wang, P., Zhongguo bingchuan gailun (Introduction to the glaciers in China). Edited by Y.F. Shi, M.H. Huang, and B.H. Ren, Beijing, Kexue chubanshe (Science Publishing House), 1989, p.122-137, In Chinese.
Mountain glaciers, Glacier ice, Ice composition, Snow composition, Glacier surveys, Geochemistry, Chemical analysis, China.

44-3889
Types and regional distribution of glaciers in China.
Shi, Y.F., et al, Zhongguo bingchuan gailun (Introduction to the glaciers in China) Edited by Y F Shi, M H Huang, and B H Ren, Beijing, Kexue chubanshe (Science Publishing House), 1989, p.138-170, In Chinese.
Ren, B.H
Mountain glaciers, Glaciology, Glacier surveys, Classifications, Topography, China.

44-3890
Recent fluctuation of glaciers in China.
Ren, B.H , Zhongguo bingchuan gailun (Introduction to the glaciers in China) Edited by Y F Shi, M H Huang, and B H Ren, Beijing, Kexue chubanshe (Science Publishing House), 1989, p.171-186, In Chinese.
Mountain glaciers, Glacier oscillation, Glacier surveys, China.

44-3891
**Runoff from glacier melting water in China and its nourishment to rivers.**
Yang, Z.N , Zhongguo bingchuan gailun (Introduction to the glaciers in China) Edited by Y F Shi, M H Huang, and B.H Ren, Beijing, Kexue chubanshe (Science Publishing House), 1989, p.187-204, In Chinese.
Glacier melting, Meltwater, Runoff, River flow, Water supply, Glacial rivers, Glacier surveys, Analysis (mathematics), China.

44-3892
**Glacial debris flow and glacial lake outburst flood in China.**
Deng, Y X., Zhongguo bingchuan gailun (Introduction to the glaciers in China). Edited by Y.F. Shi, M.H. Huang, and B.H. Ren, Beijing, Kexue chubanshe (Science Publishing House), 1989, p.205-220, In Chinese
Glacier melting, Glacial lakes, Lake bursts, Mudflows, Mountain glaciers, Meltwater, Avalanche formation, China.

44-3893
**Dynamics of ammonium oxidizer activity and nitrous-oxide (N2O) within and beneath antarctic sea ice.**
Priscu, J.C., et al, *Marine ecology progress series,* Apr. 1990, 62(1-2), p.37-46, Refs. p 45-46.
Downes, M.T., Priscu, L.R., Palmisano, A.C., Sullivan, C.W.
Bacteria, Chemical analysis, Sea ice, Polar regions, Antarctica—McMurdo Sound, Antarctica—Ross Ice Shelf.
Nitrapyrin, an inhibitor of NH4+ oxidizing bacteria, was used to estimate the activity of NH4+ oxidizing bacteria in the bottom 1 to 15 cm of annual sea ice and in the water column at various locations in McMurdo Sound and along the Ross Ice Shelf (RIS). Nitrapyrin significan ly inhibited dark C-14 HCO3- uptake in virtual all sea-ice samples, indicating the presence of NH4+ oxidizing bacteria Inorganic carbon fixation by sea ice NH4+ oxidizers was only a small fraction of that fixed by sea-ice photoautotrophs, both on an hourly and annual basis Despite their relative lack of importance to inorganic carbon fixation, NH4+ oxidizing bacteria may have an important role in the N dynamics within the biogenic layer of annual sea ice, both in terms of NH4+ utilization and eventual NO3- production Inorganic carbon fixation in the water column beneath sea ice was generally not inhibited significantly by nitrapyrin NH4+ oxidizer activity was also no. detectable in deep water flowing beneath (southward) or from under (northward) the RIS N2O (a by-product of NH4+ oxidation) levels in pelagic samples were always near 100% of saturation with respect to the air above the sea surface, corroborating the low levels of NH4+ oxidizer activity found in the water column (Auth )

44-3894
**Runway sites for heavy wheeled aircraft in East Antarctica.**
Budd, W.F., et al, Melbourne, University, Meteorology Department, May 1990, 95p. + 25 folded maps in separate loose-leaf binder, 11 refs.
Russell-Head, D.S.
Ice runways, Site surveys, Aircraft landing areas, Ice (construction material), Snow (construction material), Snow compaction, Trafficability, Meteorological factors, Meteorological data, Antarctica—East Antarctica.
This report describes sites in East Antarctica that are being or could be developed to provide hard-surface runways for use by heavy wheeled transport aircraft. The coastal zone between 63E (Mawson Station) and 111E (Casey Station) is the main area considered. Comment is also made on sites outside this region both near the coast and in the antarctic interior. As runways can be made from rock, blue ice, or compacted snow, the type of runway and construction methods vary according to the site situation Site data, including construction constraints and meteorological factors, are given for six specific sites—Mawson area (blue ice), Larsemann Hills (compressed snow), Davis (rock and sea ice), Bunger Hills (rock and fast sea-ice), Casey (compressed snow), and Dumont d'Urville (rock) Maps, aerial photographs, site photographs and tabulated meteorological data are provided An assessment is made of the relative merits of the various sites and of the advantages of establishing a network. (Auth )

44-3895
**Phagotrophy and fecal pellet production by an athecate dinoflagellate in antarctic sea ice.**
Buck, K.R., et al, *Marine ecology progress series,* Feb. 8, 1990, 60(1-2), p.75-84, Refs. p.83-84.
Bolt, P.A., Garrison, D L.
Sea ice, Microbiology, Algae, Antarctica Weddell Sea.
A phagotrophic athecate dinoflagellate was found in sea ice and the underlying water-column of the Weddell Sea ice edge during the austral autumn of 1986. This organism lacked a sulcus, a cingulum and flagella but possessed a dinokont nucleus, a cytostome and amphiesmal vesicles The single large food vacuole contained a variety of protistan prey but was predominantly composed of the pennate diatom *Nitzschia cylindrus* The fecal pellet produced upon the egestion of his vacuole was membrane bound Of the fecal pellet volume 15% was identifiable protoplasm, mostly *N cylindrus* Carbon per pellet averaged 97 pg. Release of the fecal pellet into the underlying water column upon melting of the ice may account for a significant proportion of the particulate organic carbon available to metazoan grazers at the ice edge Flux of material out of the euphotic zone via this fecal pellet may be significant. (Auth. mod.)

44-3896
**Observations of winter polynyas and fractures using NOAA AVHRR TIR images and Nimbus-7 SMMR sea ice concentration charts.**
Dey, B., et al, *Remote sensing of environment,* Nov. 1989, 30(2), p.141-149, 31 refs.
Feldman, U.
Sea ice distribution, Spaceborne photography, Polynyas, Charts, Wind factors, Ice cracks, Correlation, Infrared photography

44-3897
**Method for measuring snow depth using fine-resolution radars.**
Lei, G , et al, *Remote sensing of environment,* Nov. 1989, 30(2), p.151-158, 8 refs.
Moore, R.K., Gogineni, S.P.
Snow depth, Airborne radar, Measurement, Radar echoes, Ice surface, Sea ice, Backscattering, Attenuation, Analysis (mathematics).

44-3898
**Deterioration of concrete in cold sea waters.**
Moukwa, M., *Cement and concrete research,* May 1990, 20(3), p.439-446, 7 refs.
Concrete durability, Decomposition, Sea water, Tides, Temperature effects, Freeze thaw tests, Concrete admixtures, Cracking (fracturing).

44-3899
**Effect of the parameters of testing systems on the temperature distribution in te objects under low-temperature thermostatic control.**
Ostapenko, L S , *Strength of materials,* Jan 1990, 21(5), p.649-654, Translated from Problemy prochnosti. 8 refs.
Low temperature tests, Temperature control, Laboratory techniques, Mechanical tests, Thermal conductivity, Thermostats, Accuracy, Analysis (mathematics), Low temperature research

44-3900
**Effect of low temperatures on the damping properties of polymer coatings of glue composites "Sprut".**
Yakovlev, A.P., et al, *Strength of materials,* Jan. 1990, 21(5), p 681-684, Translated from Problemy prochnosti. 2 refs.
Diatchenko, S.V.
Coatings, Steels, Decomposition, Low temperature tests, Temperature effects, Polymers, Vibrations, Stability.

44-3901
**Radar backscatter measurements over saline ice.**
Gogineni, S., et al, *International journal of remote sensing,* Apr. 1990, 11(4), MP 2741, p.603-615, 16 refs.
Moore, R.K., Wang, Q., Gow, A.J., Onstott, R.G.
Artificial ice, Sea ice, Measurement, Radar echoes, Backscattering, Ice surface, Antennas, Ice growth, Snow cover effect, Surface effect, Wave propagation.
During the 1984 and 1985 winter seasons, radar backscatter measurements were performed on artificial sea ice at the U S Army Cold Regions Research and Engineering Laboratory (CRREL) at Hanover, NH. Radar data were collected at selected frequencies in the 4-17 GHz region for incidence angles from 0 to 60 deg with like and cross polarizations These measurements were performed on smooth, rough, bare and snow-covered saline ice and open water Backscattering from ice increased with its thickness until the ice was about 1 cm thick and then decreased gradually with further growth Rough ice and snow covered ice gave similar returns at 13 6 GHz, but the scattering coefficients of snow-covered ice were lower than that of rough ice at 9 6 GHz Depolarized scattering from smooth, thin ice and water were much lower than from rough ice and snow-covered ice.

44-3902
**Freezing nucleation rates of dilute solution droplets measured between -30 and -40 C in laboratory simulations of natural clouds.**
DeMott, P.J., et al, *Journal of the atmospheric sciences,* May 1, 1990, 47(9), p.1056-1064, 17 refs.
Rogers, D.C.
Cloud droplets, Freezing, Homogeneous nucleation, Simulation, Cloud chambers, Supercooling, Temperature effects, Low temperature research, Clouds (meteorology).

44-3903
**Helices of antifreeze.**
Pain, R H , *Nature,* May 19, 1988, 333(6170), p.207-208, 5 refs.
Antifreezes, Freezing, Molecular structure, Latticed structures, Orientation, Animals.

44-3904
**Airborne discrimination between ice and water: application to the laser measurement of chlorophyll-in-water in a marginal ice zone.**
Hoge, F.E., et al, *Remote sensing of environment,* Oct. 1989, 30(1), p.67-76, 27 refs.
Wright, C.W., Swift, R.N., Yungel, J.K.
Sea ice, Ice edge, Aerial surveys, Chlorophylls, Lasers, Detection, Sea water, Upwelling, Ice melting, Greenland Sea.

44-3905
**Operational use of profiler data and satellite imagery to evaluate the NMC numerical models in predicting heavy snow.**
Beckman, S.K., *Weather and forecasting,* June 1990, 5(2), p.259-277, 15 refs.
Snowstorms, Weather forecasting, Radar photography, Wind factors, Spaceborne photography, Meteorological data, Precipitation (meteorology), Atmospheric circulation.

44-3906
**Topographically induced convective snowbands over the Baltic Sea and their precipitation distribution.**
Andersson, T , et al, *Weather and forecasting,* June 1990, 5(2), p.299-312, 23 refs.
Nilsson, S.
Clouds (meteorology), Snowfall, Convection, Topographic effects, Snow accumulation, Measurement, Weather forecasting, Precipitation (meteorology), Baltic Sea.

44-3907
**Fully automated system for simultaneous measurement of thermal conductivity and heat capacity from 4 to 300 K.**
Kwok, R S., et al, *Review of scientific instruments,* Feb. 1990, 61(2), p.809-813, 12 refs
Brown, S.E.
Temperature measurement, Thermal conductivity, Heat capacity, Laboratory techniques, Solids, Cryogenics, Low temperature research, Thermodynamics.

44-3908
**Problems of modern hydrology. [Problemy sovremennoĭ gidrologii].**
Shiklomanov, I.A., ed, Leningrad, Gidrometeoizdat, 1989, 327p , In Russian. Refs. passim. For selected articles see 44-3909 through 44-3913.
Hydrology, Snow cover, Ice cover, River ice.

44-3909
**Problems of technical refitting for hydrological observation systems. [Problemy tekhnicheskogo pereosnashcheniia sistemy gidrologicheskikh nabliudeniĭ].**
Klein, G S , et al, Problemy sovremennoi gidrologii (Problems of modern hydrology). Edited by I.A. Shiklomanov, Leningrad, Gidrometeoizdat, 1989, p 58-73 (Pertinent p.67-68), In Russian 6 refs.
Nezhikhovskiĭ, B.R., Solov'ev, N.IA , Chel'tsov, A.V., IUfit, G.A.
Ice cover thickness, Thickness gages, Radar.

44-3910
**Using aerial gamma surveys of snow cover to forecast spring flood runoff. [Ispol'zovanie aviatsionnykh gamma-s emok snezhnogo pokrova v prognozakh stoka vesennego polovod'ia].**
Vershinina, L K., Problemy sovremennoi gidrologii (Problems of modern hydrology). Edited by I.A. Shiklomanov, Leningrad, Gidrometeoizdat, 1989, p.82-96, In Russian. 7 refs.
Snow cover distribution, Snow water equivalent, Runoff forecasting, Snow surveys, Gamma irradiation, Aerial surveys, Flood forecasting, Analysis (mathematics).

44-3911
**Hydrology of rivers in permafrost regions: a new division of land hydrology. [Gidrologiia rek kriolitozony —novyĭ razdel gidrologii sushi].**
Sokolov, B.L., Problemy sovremennoi gidrologii (Problems of modern hydrology). Edited by I.A. Shiklomanov, Leningrad, Gidrometeoizdat, 1989, p.195-205, In Russian. 20 refs.
Permafrost hydrology, Permafrost beneath rivers, River flow, Ground water.

44-3912
Hydrophysical studies of soils and snow cover. [Gidrofizicheskie issledovaniia pochv i snezhnogo pokrova],
Kaliuzhnyi, I.L., et al, Problemy sovremennoi gidrologii (Problems of modern hydrology). Edited by I.A. Shiklomanov, Leningrad, Gidrometeoizdat, 1989, p.205-220, In Russian. 25 refs.
Lavrov, S.A., Pavlova, K.K., Shutov, V.A.
Soil freezing, Soil water migration, Snow cover effect, Snow hydrology, Analysis (mathematics), Heat transfer, Moisture transfer.

44-3913
Ice jams on rivers: methods of study, calculation and forecasting. [Zatory i zazhory l'da na rekakh—metody izucheniia, rascheta i prognoza],
Buzin, V.A., et al, Problemy sovremennoi gidrologii (Problems of modern hydrology) Edited by I.A. Shiklomanov, Leningrad, Gidrometeoizdat, 1989, p.220-231, In Russian. 16 refs.
Bolotnikov, G.I., Filippov, A.M.
Ice jams, River ice, Ice forecasting, River flow, Models, Analysis (mathematics)

44-3914
Historical climatic records in ice cores from the surface layer of Wilkes Land, Antarctica.
Qin, D.H., et al, *Science in China. Series B,* Apr. 1990, 33(4), p.460-466, 7 refs.
Wang, W.T.
Climatic changes, Ice cores, Ice dating, Oxygen isotopes, Antarctica—Wilkes Land.
Following an investigation into the stratigraphical features of ice cores from two typical shallow boreholes in Wilkes Land, one inland and another near the margin, and analyzing delta O-18 and the gross beta radioactivity in the cores, as well as analyzing the power spectra of delta O-18, some important assessments are presented on the climatic information of the past several decades there, such as the annual mean temperature and precipitation. It is suggested that there is a period of 11 years with n which the climate changed cyclically in East Antarctica (Auth. mod.)

44-3915
Antifreeze admixtures for cold weather concreting. Preliminary test results.
Korhonen, C.J., et al, MP 2742, 1990, 8p., 10 refs.
Presented at the American Concrete Institute Spring Convention, Toronto, Canada, Mar. 18-23, 1990.
Cortez, E.R.
Concrete admixtures, Winter concreting, Antifreezes, Concrete freezing, Concrete strength.
Winter concreting practices in the United States are geared toward assuring that fresh concrete never freezes Foreign literature points out that chemical admixtures can be used to depress the freezing point of water while permitting the cement to hydrate Information about various chemical admixtures, based on an extensive literature survey and the results from an ongoing laboratory test program, is presented At 20, -5 and -10C, an aqueous solution of sodium nitrite/calcium nitrite and a solution of sodium nitrite potassium carbonate performed well in strength tests.

44-3916
Arctic Petroleum Review, Summer 1988, Vol. 11, No. 1(issue 28).
Canadian Petroleum Association, Calgary, 1988, 8p.
Cold weather operation, Petroleum industry

44-3917
Arctic Petroleum Review, Winter 1988-89, Vol.11, No.2(issue 29).
Canadian Petroleum Association, Calgary 1989, 8p
Cold weather operation, Petroleum industry

44-3918
Arctic Petroleum Review, Summer 1989, Vol.12, No.1(issue 30).
Arctic Petroleum Association, Calgary, 1989, 8p.
Cold weather operation, Petroleum industry

44-3919
Arctic Petroleum Review, Winter 1990, Vol 12, No.2(issue 31).
Canadian Petroleum Association, Calgary, 1990, 8p
Cold weather operation, Petroleum industry.

44-3920
Climatic engineering.
Coveney, D.B., *Institute of Environmental Sciences. Journal,* Jan.-Feb. 1990, 33(1), p.70-79, 2 refs.
Low temperature research Equipment, Temperature effects Ice formation Engineering Climatic factors, Simulation, Test equipment, Low temperature tests

44-3921
Pluto.
Binzel, R.P., *Scientific American,* June 1990, 262(6), p.50-58, 4 refs
Extraterrestrial ice, Planetary environments, Light transmission, Ice formation.

44-3922
Salting-out solvent extraction for preconcentration of neutral organic solutes from water.
Leggett, D.C., et al, *Analytical chemistry,* July 1, 1990, 62(13), MP 2743, p.1355-1356, 9 refs.
Jenkins, T.F., Miyares, P.H.
Water chemistry, Laboratory techniques, Chemical analysis, Chemical composition, Solubility, Chemistry.
It appears there has been very little exploitation of salting out with water-miscible solvents for extraction of organic solutes from water. Although this technique is known to many chemists, we found no specific literature references to salting-out of organic compounds as a prelude to their determination in water, save one recent abstract. This technique has, however, been used for a number of years for extraction of metal-chelates into organic solvents prior to atomic absorption, high-performance liquid chromatography, polarographic, or colorimetric analysis. So, although we freely acknowledge that the technique itself is not new, we do feel that its potential applications in organic trace analysis of water have not been properly appreciated or utilized We describe here just one of many possible examples, which has found considerable utility in our laboratory

44-3923
Field assessment of fisheries habitat-enhancement structures in Bingo Brook, Vermont, after the Spring 1989 ice run.
Calkins, D.J., et al, MP 2744, International Association of Hydrological Sciences Congress, 23th. Ottawa, Ontario, Aug. 22, 1989. Proceedings, [1989], 12p., 4 refs.
Gatto, L.W., Brockett, B.E.
Hydraulic structures, Stream flow, Ice breakup, Ice cover effect, Stability, Ice conditions, Ecosystems, Rocks.
Fisheries habitat-enhancement structures, such as flow deflectors, check dams, large boulders placed in-stream and woody-materials structures that diversify stream habitats, have not been evaluated to see if they can withstand river ice forces during ice runs and ice jams. This paper assesses the first winter performance of such structures placed in Bingo Brook, a small stream in the Green Mountain National Forest, Vermont Photographs, field observations and ice thickness measurements were taken throughout the winter. The primary objective was to observe 1988-89 ice conditions and ice cover breakup at the structures to determine their survivability during an ice run and jam, and to identify improvements in their design for projects being constructed in the summer and fall of 1989.

44-3924
Ski friction and thermal response.
Warren, G.C., et al, MP 2745, International Snow Science Workshop, Whistler, British Columbia, 1989, [1989], p.223-225, 2 refs.
Colbeck, S.C.
Skis, Wood ice friction, Temperature measurement, Meltwater, Sliding, Thermal properties

44-3925
Simulation of district heating systems for piping design.
Phetteplace, G., MP 2746, International Symposium on District Heat Simulation, Reykjavik, Iceland, Apr. 13-16, 1989, [1989], 27p., 12 refs.
Heating, Cost analysis, Heat pipes, Design criteria, Simulation, Analysis (mathematics), Heat loss, Pipes (tubes).
This paper describes the initial development of a non-proprietary comprehensive design model for sizing distribution piping This model considers all major costs incurred in the construction and operation of a distribution system over its useful lifetime. The effects of annual variations in load are considered where they will have an impact on the operational costs. Realistic methods for meeting variations in load, such as combined temperature and flow modulation, can be used. Results from a sample calculation are compared to results of a criteria-based design The criteria-based design is shown to have a life cycle cost which exceeds that of the optimal design by 16% In addition, the capital costs of the criteria-based design are shown to be 30% greater.

44-3926
Optimal sizing of district heating pipes.
Phetteplace, G., MP 2747, American Society of Heating, Refrigerating and Air-Conditioning Engineers Winter Meeting, Chicago, IL, Jan. 1989, American Society of Heating, Refrigerating and Air-Conditioning, 25p., 11 refs.
Heating, Heat pipes, Cost analysis, Design criteria, Analysis (mathematics), Heat loss, Models, Pipes (tubes).
Existing design methods for district heating systems rely largely on criteria known only to result in functional designs which may be far from optimal This paper develops a rational design method which achieves a design yielding the lowest life cycle cost for the assumptions made All major costs are considered, and the formulation provides great flexibility for including factors such as escalation of energy costs. In establishing the operating costs for the system, any type of annual load profile and operational strategy may be considered. The method developed is used to obtain an optimal design of a typical district heating main. This design is compared to a design resulting from the application of well established criteria. The criteria-based design is shown to have a life cycle cost which exceeds that of the optimal design by 16% The capital costs are 30% greater for the criteria-based design.

44-3927
Regional climatic trends in northern New England.
Haugen, R.K., et al, *New England—St. Lawrence Valley Geographical Society Proceedings,* 1988, Vol.18, MP 2748, p.64-71, 8 refs.
Fulk, M.A.
Air temperature, Statistical analysis, Meteorological data, Climatic changes, Temperature variations, Periodic variations, Climatology, Precipitation (meteorology).
The unusually dry and warm summer of 1988 has heightened interest in the subject of climatic change. Six inland stations in Maine, New Hampshire, and Vermont, with temperature and precipitation records of nearly 100 years, are analyzed The database is the NOAA-Oak Ridge National Laboratory US Historical Climatology Network Seasonal and annual air temperature and precipitation patterns are compared among the six stations Five out of six stations exhibit a gradual warming over their periods of record, but no regional precipitation trends can be identified.

44-3928
Similarity solutions for granular avalanches of finite mass with variable bed friction.
Nohguchi, Y., et al, *Continuum mechanics and thermodynamics,* 1989, Vol.1, p.239-265, 6 refs.
Hutter, K., Savage, S.B.
Avalanche modeling, Avalanche mechanics, Sliding, Mathematical models, Slope processes, Internal friction.

44-3929
Winter chaos—can we buy our way out of it.
Hunt, R.D., et al, *Institution of Civil Engineers Proceedings,* Apr. 1988, 84(Pt 1), p.429-434
Roads, Trafficability, Winter maintenance, Weather forecasting, Countermeasures, Transportation.

44-3930
Parametric analysis of self-freezing in an initially wet porous medium.
Fey, Y.C., et al, *International journal of heat and fluid flow,* June 1988, 9(2), p.147-155, 7 refs.
Boles, M.A.
Freeze drying, Porous materials, Heat transfer, Mass transfer, Analysis (mathematics), Sublimation, Vapor transfer, Vacuum freezing.

44-3931
Hydraulic erosion resistance of thawing soil.
Van Klaveren, R.W., et al, *American Society of Agricultural Engineers. Paper,* 1987, 87-2602, 29p., For presentation at the 1987 Winter Meeting, American Society of Agricultural Engineers, Chicago, IL, Dec. 15-18, 1987. 18 refs.
McCool, D.K.
Soil erosion, Water erosion, Ground thawing, Shear stress, Soil strength, Artificial freezing, Runoff forecasting, Sedimentation, Water flow.

44-3932
Laboratory experiments on frost shattering of rocks.
Matsuoka, N., *University of Tsukuba. Institute of Geoscience. Science reports,* Jan. 25,1988, 9A, p.1-36, 58 refs.
Frozen rocks, Frost shattering, Freeze thaw tests, Moisture transfer, Porosity, Water content, Rock properties, Weathering.

44-3933
Thawing soil strength measurements for predicting vehicle performance.
Shoop, S.A., MP 2749, International Society of Terrain Vehicle Systems, North American Meeting, Victoria, British Columbia, Apr., 1989. Proceedings, [1989], 18p., 7 refs.
Soil tests, Vehicles, Performance, Soil strength, Traction, Ground thawing, Shear properties, Soil water, Accuracy.
The CRREL Instrumented Vehicle (CIV), and shear annulus, direct shear and triaxial compression test devices were used to measure the strength of thawed and thawing soil. These strength values can be used in simple traction models to predict the tractive performance of vehicles. Strength was evaluated in terms of the parameters c and phi based on the Mohr-Coulomb failure criterion. It is proposed here that an instrumented vehicle is best suited for terrain characterization for mobility studies because the conditions created by a tire slipping on a soil surface are exactly duplicated The c and phi values from the shear annulus were found to overpredict traction because of the low normal stress applied by the annulus and the curved nature of the failure envelope. Of all the tests, the direct shear test yields the highest phi value. This was most likely because the test was run at a slow deformation rate, under drained conditions The triaxial test results were the most similar to those from the vehicle All test methods show phi increasing with soil moisture up to plastic limit of the soil and then decreasing. Phi as measured with the vehicle was also found to be strongly influenced by the thaw depth.

44-3934
Marine controls on modern sedimentation on the antarctic continental shelf.
Jacobs, S.S., *Marine geology*, Jan. 1989, 85(2/4), Modern glacimarine environments: glacial and marine controls of modern lithofacies and biofacies. Edited by R.D. Powell and A. Elverhöi, p.121-153, Refs. p.149-153.
Sediment transport, Bottom sediment, Marine deposits, Glacial deposits, Ice water interface, Glacier tongues, Ice shelves, Sedimentation, Ocean currents
Time series (greater than 1 yr) current measurements in the Ross and Weddell seas have revealed moderate to strong currents that are seasonally variable, vertically coherent and dominated by the diurnal tide and longer term events. Few long-term current measurements exist in the shelf and slope bottom boundary layers that are most important to sediment deposition and erosion. Icebergs may frequent certain routes, e.g., in association with currents and fronts near the edge of the continental shelf and are capable of scouring and resuspending sediments down to shelf-break depths. Sea ice plays a role in shelf sedimentation by rafting eolian and bottom debris away from the nearshore regions. In addition, generally offshore winds produce numerous leads and polynyas along the coastline and within the sea-ice fields. Higher biological productivity in these polynyas may be linked to higher local sedimentation rates. Biogenic marine sediments apparently comprise a major percentage of the regionally variable modern shelf deposits, despite the impressive glacial setting and polar environment. (Auth. mod.)

44-3935
Biogenic sedimentation in McMurdo Sound, Antarctica.
Dunbar, R.B., et al, *Marine geology*, Jan. 1989, 85(2/4), Modern glacimarine environments: glacial and marine controls of modern lithofacies and biofacies. Edited by R.D. Powell and A. Elverhöi, p.155-179, Refs. p.176-179.
Leventer, A.R., Stockton, W.L.
Bottom sediment, Marine deposits, Ice water interface, Marine biology, Sedimentation, Ice shelves, Ocean currents, Biomass, Antarctica—McMurdo Sound.
Surface sediments from eastern McMurdo Sound and fjord basins of the Victoria Land Coast are enriched in organic carbon and opal. At depths below 600 m, opal contents commonly exceed 30%; organic carbon contents average 1.5% and are as high as 3.5%. Opal and organic carbon are supplied by local production within and below sea ice and by advection from open water areas of the southwestern Ross Sea. The distribution of organic carbon and opal at the sea floor is consistent with cyclonic (clockwise) water circulation in McMurdo Sound. Advective transport from the Ross Sea supplies biogenic sediment to eastern and northern McMurdo Sound, the southwestern shelf is bathed by waters derived in part from beneath the Ross Ice Shelf which transport very little allochthonous carbon. The supply of biogenic debris in southwestern McMurdo Sound is further curtailed by sea-ice conditions, e.g. more prevalent multi-year sea ice which reduces photosynthesis, and the absence of summer basal melting and ice breakout which restricts the flux of sea ice and open-water production to the sea floor. Consistent with this hypothesis, organic carbon fluxes measured via sediment trapping beneath fast ice are one to two orders of magnitude higher in eastern versus western McMurdo Sound. Pronounced cross-sound gradients in shallow water benthic biomass and species diversity have previously been attributed to east-west variations in productivity. Our surface sediment data suggest that similar or even more dramatic contrasts in benthic community structure may exist in the deeper water areas of McMurdo Sound. The accumulation rate of organic carbon in the deep basins of McMurdo Sound averages 45 milligrams of carbon per square meter per day, more than an order of magnitude higher than the world average organic carbon flux to continental margins, and equivalent to accumulation rates observed in many anoxic settings. If similar patterns of biogenic sedimentation exist on many other parts of the shelf, the antarctic continental margin is an important sink for sedimentary organic carbon, as has been previously suggested for the silica system. (Auth. mod.)

44-3936
High-resolution seismic-reflection interpretations of some sediment deposits, antarctic continental margin: focus on the western Ross Sea.
Karl, H.A., *Marine geology*, Jan. 1989, 85(2/4), Modern glacimarine environments: glacial and marine controls of modern lithofacies and biofacies. Edited by R.D. Powell and A. Elverhöi, p.205-223, 24 refs.
Bottom sediment, Marine deposits, Glacial deposits, Seismic reflection, Seismic surveys, Oceanographic surveys, Bottom topography, Antarctica—Ross Sea.
High-resolution seismic-reflection data have been used to interpret the history of marine sediment accumulations around Antarctica. Reconnaissance analysis of 1-, 3.5-, and 12-kHz data collected by the U.S. Geological Survey in the western Ross Sea has led to the identification of eight echo-character facies and six microtopographic facies in the sediment deposits that overlie the Ross Sea unconformity. Three depositional facies regions have been identified on the continental shelf. Evidence of glacial processes and products is uncommon in regions 1 and 2, but is abundant in region 3. McMurdo Sound, region 1, is characterized by a monospecific set of acoustic facies. This unique assemblage probably represents turbidity current deposition in the western part of the basin. Most of the seafloor in region 2, from about latitude 77S to 75S, is deeper than 600 m below sealevel. The microtopographic facies and echo-character facies observed on the lower slopes and basin floor there reflect the thin deposits of pelagic sediments that have accumulated in the low-energy conditions that are typical of deep-water environments. In shallower water near the boundary with region 3, the signature of the acoustic facies is different from that in deeper water and probably indicates higher energy conditions or, perhaps, ice-related processes. Thick deposits of tills emplaced by lodgement during the most recent advance of the West Antarctic Ice Sheet are common from latitude 75S to the northern boundary of the study area just south of Coulman Island (region 3). The signature of microtopographic facies in this region reflects the relief of the base of the grounded ice sheet prior to decoupling from the seafloor. Current winnowing and scour of shallow parts of the seafloor inhibits sediment deposition and maintains the irregular, hummocky relief that characterizes much of the region. Seafloor relief of this type in other polar areas could indicate the former presence of grounded ice. (Auth. mod.)

44-3937
Glaciomarine sedimentation in epicontinental seas exemplified by the northern Barents Sea.
Elverhöi, A., et al, *Marine geology*, Jan. 1989, 85(2/4), Modern glacimarine environments: glacial and marine controls of modern lithofacies and biofacies. Edited by R.D. Powell and A. Elverhöi, p.225-250, Refs. p.248-250.
Pfirman, S.L., Solheim, A., Larssen, B.
Bottom sediment, Marine deposits, Glacial deposits, Sedimentation, Glacier surges, Ice rafting, Barents Sea.

44-3938
Glacigenic sediments on a passive continental margin as exemplified by the Barents Sea.
Vorren, T.O., et al, *Marine geology*, Jan. 1989, 85(2/4), Modern glacimarine environments: glacial and marine controls of modern lithofacies and biofacies. Edited by R.D. Powell and A. Elverhöi, p.251-272, 35 refs.
Lebesbye, E., Andreassen, K., Larsen, K.B.
Bottom sediment, Marine deposits, Glacial deposits, Seismic surveys, Marine geology, Glacial geology, Barents Sea.

44-3939
Comparison of models of glacial sedimentation along the eastern Canadian margin.
Josenhans, H.W., et al, *Marine geology*, Jan. 1989, 85(2/4), Modern glacimarine environments: glacial and marine controls of modern lithofacies and biofacies. Edited by R.D. Powell and A. Elverhöi, p.273-300, 34 refs.
Feder, G.B.J.
Bottom sediment, Marine deposits, Glacial deposits, Sedimentation, Marine geology, Glacial geology, Geomorphology, Geochronology, Geological surveys.

44-3940
On the deposition of sediment within glacier-influenced fjords: oceanographic controls.
Syvitski, J.P.M., *Marine geology*, Jan. 1989, 85(2/4), Modern glacimarine environments: glacial and marine controls of modern lithofacies and biofacies. Edited by R.D. Powell and A. Elverhöi, p.301-329, 61 refs.
Bottom sediment, Sediment transport, Glacial deposits, Marine deposits, Ice water interface, Coastal topographic features, Mathematical models.

44-3941
Macrofauna of Canadian arctic fjords.
Dale, J.E., et al, *Marine geology*, Jan. 1989, 85(2/4), Modern glacimarine environments: glacial and marine controls of modern lithofacies and biofacies. Edited by R.D. Powell and A. Elverhöi, p.331-358, Refs. p.356-358.
Aitken, A.E., Gilbert, R., Risk, M.J.
Bottom sediment, Glacial deposits, Marine deposits, Marine biology, Coastal topographic features.

44-3942
Glacimarine sedimentary processes, facies and morphology of the south-southeast Alaska shelf and fjords.
Powell, R.D., et al, *Marine geology*, Jan. 1989, 85(2/4), Modern glacimarine environments: glacial and marine controls of modern lithofacies and biofacies. Edited by R.D. Powell and A. Elverhöi, p.359-390, Refs. p.385-390.
Molnia, B.F.
Marine deposits, Glacial deposits, Bottom sediment, Geological surveys, Geomorphology, Geochronology, Glacial geology, Marine geology, Coastal topographic features.

44-3943
Seismic reflection characteristics of glacial and glacimarine sediment in the Gulf of Alaska and adjacent fjords.
Carlson, P.R., *Marine geology*, Jan. 1989, 85(2/4), Modern glacimarine environments: glacial and marine controls of modern lithofacies and biofacies. Edited by R.D. Powell and A. Elverhöi, p.391-416, Refs. p.412-416.
Bottom sediment, Glacial deposits, Marine deposits, Coastal topographic features, Seismic surveys, Geological surveys, Geomorphology, Geochronology, United States—Alaska—Gulf of Alaska.

44-3944
Alluvial dike dam with a heat-waterproof screen and non-freezing drainage. (Namyvnaia ograzhdaiushchaia damba s teplogidroizoliatsionnym ekranom i nezamerzaiushchim drenazhem).
Kuznetsov, G.I., et al, *Izvestiia vysshikh uchebnykh zavedenii. Stroitel'stvo i arkhitektura*, Apr. 1990, No.4, p.64-73, In Russian. 5 refs.
Raspopova, R.Kh.
Embankments, Earth dams, Thermal insulation, Drainage, Waterproofing, Thermal regime, Frost protection, Analysis (mathematics).

44-3945
Heterogeneous reactions on model polar stratospheric cloud surfaces: reaction of N2O5 on ice and nitric acid trihydrate.
Quinlan, M.A., et al, *Journal of physical chemistry*, Apr. 19,1990, 94(8), p.3255-3260, 33 refs.
Reihs, C.M., Golden, D.M., Tolbert, M.A.
Ice composition, Cloud physics, Chemical properties, Gases, Ice surface, Hydrates, Chemical analysis, Ice air interface, Low temperature tests, Surface properties.

44-3946
HCl/H2O solid-phase vapor pressures and HCl solubility in ice.
Hanson, D.R., et al, *Journal of physical chemistry*, May 31,1990, 94(11), p.4700-4705, 35 refs.
Mauersberger, K.
Ice composition, Chemical properties, Solubility, Gases, Hydrates, Crystal growth, Vapor pressure, Solid phases, Ice air interface, Low temperature tests.

44-3947
Star Vue interactive assistance.
McAvoy, J.G., *Transport Canada. Publication*, Mar. 1990, No.TP10406E, 26p. + appns., With French summaries. 2 refs.
Sea ice, Classifications, Radar photography, Data processing, Computer programs, Ice navigation, Ice conditions, Airborne radar.

44-3948
Method for controlling stationary frost heaving.
Akagawa, S., *Shimizu technical research bulletin*, Mar. 1990, No.9, p.1-8, 8 refs.
Frost heave, Soil freezing, Soil tests, Countermeasures, Ice lenses, Frozen ground thermodynamics, Freezing rate, Boundary layer.

44-3949
Applications of ISES for snow, ice, and sea state.
Chang, A.T.C., et al, Earth Sciences Requirements for the Information Sciences Experiment System, Williamsburg, VA, May 1-4, 1989. Proceedings. Edited by D.E. Bowker, S.J. Katzberg and R.G. Wilson, NASA, 1990, p.189-196. NASA conference publication 3072.
Delnore, V.E.
Spacecraft, Remote sensing, Snow cover, Ice cover, Sensor mapping, Climatology, Wind factors.

44-3950
Double torsion test applied to fine grained and freshwater columnar ice and sea ice.
Parsons, B.L., et al, *Canada National Research Council. Institute for Marine Dynamics. Laboratory report*, Aug. 1988, No.AVR-01, 12p., 26 refs.
Snellen, J.B., Muggeridge, D.B.
Ice strength, Ice cracks, Crack propagation, Mechanical tests, Sea ice, Brittleness, Mechanical properties.

44-3951
Friction at the base of a glacier.
Schweizer, J., *Zurich. Eidgenossischen Technischen Hochschule. Versuchsanstalt fur Wasserbau, Hydrologie und Glaziologie. Mitteilungen*, 1989, No.101, 181p., With German summary. Refs. p.171-176.
Glacier friction, Glacier flow, Basal sliding, Glacier beds, Sediment transport, Mathematical models, Water pressure, Shear stress.

44-3934
Marine controls on modern sedimentation on the antarctic continental shelf
Jacobs, S.S., *Marine geology*, Jan. 1989, 85(2/4), Modern glacimarine environments glacial and marine controls of modern lithofacies and biofacies Edited by R.D. Powell and A. Elverhöi, p 121-153. Refs. p.149-153.
Sediment transport, Bottom sediment, Marine deposits, Glacial deposits, Ice water interface Glacier tongues, Ice shelves, Sedimentation, Ocean currents
Time series (greater than 1 yr) current measurements in the Ross and Weddell seas have revealed moderate to strong currents that are seasonally variable, vertically coherent and dominated by the diurnal tide and longer term events. Few long-term current measurements exist in the shelf and slope bottom boundary layers that are most important to sediment deposition and erosion Icebergs may frequent certain routes, e g , in association with currents and fronts near the edge of the continental shelf and are capable of scouring and resuspending sediments down to shelf-break depths Sea ice plays a role in shelf sedimentation by rafting eolian and bottom debris awa, from the nearshore regions In addition, generally offshore winds produce numerous leads and polynyas along the coastline and within the sea-ice fields Higher biological productivity in these polynyas may be linked to higher local sedimentation rates Biogenic marine sediments apparently comprise a major percentage of the regionally variable modern shelf deposits, despite the impressive glacial setting and polar environment. (Auth. mod )

44-3935
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Leventer, A.R., Stockton, W.L.
Bottom sediment, Marine deposits, Ice water interface, Marine biology, Sedimentation, Ice shelves, Ocean currents, Biomass, Antarctica—McMurdo Sound.
Surface sediments from eastern McMurdo Sound and fjord basins of the Victoria Land Coast are enriched in organic carbon and opal. At depths below 600 m, opal contents commonly exceed 30%, organic carbon contents average 1.5% and are as high as 3 5% Opal and organic carbon are supplied by local production within and below sea ice and by advection from open water areas of the southwestern Ross Sea. The distribution of organic carbon and opal at the sea floor is consistent with cyclonic (clockwise) water circulation in McMurdo Sound Advective transport from the Ross Sea supplies biogenic sediment to eastern and northern McMurdo Sound, the southwestern shelf is bathed by waters derived in part from beneath the Ross Ice Shelf which transport very little allochthonous carbon. The supply of biogenic debris in southwestern McMurdo Sound is further curtailed by sea-ice conditions e g more prevalent multi-year sea ice which reduces photosynthesis, and the absence of summer basal melting and ice breakout which restricts the flux of sea ice and open-water production to the sea floor. Consistent with this hypothesis, organic carbon fluxes measured via sediment trapping beneath fast ice are one to two orders of magnitude higher in eastern versus western McMurdo Sound Pronounced cross-sound gradients in shallow water benthic biomass and species diversity have previously been attributed to east-west variations in productivity Our surface sediment data suggest that similar or even more dramatic contrasts in benthic community structure may exist in the deeper water areas of McMurdo Sound The accumulation rate of organic carbon in the deep basins of McMurdo Sound averages 45 milligrams of carbon per square meter per day more than an order of magnitude higher than the world average organic carbon flux to continental margins, and equivalent to accumulation rates observed in many anoxic settings. If similar patterns of biogenic sedimentation exist on many other parts of the shelf, the antarctic continental margin is an important sink for sedimentary organic carbon, as has been previously suggested for the silica system. (Auth. mod )

44-3936
High-resolution seismic-reflection interpretations of some sediment deposits, antarctic continental margin: focus on the western Ross Sea.
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Bottom sediment, Marine deposits, Glacial deposits, Seismic reflection, Seismic surveys, Oceanographic surveys, Bottom topography, Antarctica—Ross Sea.
High-resolution seismic-reflection data have been used to interpret the history of marine sediment accumulations around Antarctica Reconnaissance analysis of 1-, 3 5-, and 12-kHz data collected by the U S Geological Survey in the western Ross Sea has led to the identification of eight echo-character facies and six microtopographic facies in the sediment deposits that overlie the Ross Sea unconformity Three depositional facies regions have been identified on the continental shelf Evidence of glacial processes and products is uncommon in regions 1 and 2, but is abundant in region 3 McMurdo Sound, region 1, is characterized by a monospecific set of acoustic facies This unique assemblage probably represents turbidity current deposition in the western part of the basin. Most of the seafloor in region 2 from about latitude 77S to 75S, is deeper than 600 m below sealevel The microtopographic facies and echo-character facies observed on the lower slopes and basin floor there reflect the thin deposits of pelagic sediments that have accumulated in the low-energy conditions that are typical of deep-water environments In shallower water near the boundary with region 3, the signature of the acoustic facies is different from that in deeper water and probably indicates higher energy conditions or, perhaps, ice-related processes Thick deposits of tills emplaced by lodgement during the most recent advance of the West Antarctic Ice Sheet are common from latitude 75S to the northern boundary of the study area just south of Coulman Island (region 3) The signature of microtopographic facies in this region reflects the relief of the base of the grounded ice sheet prior to decoupling from the seafloor. Current winnowing and scour of shallow parts of the seafloor inhibits sediment deposition and maintains the irregular, hummocky relief that characterizes much of the region Seafloor relief of this type in other polar areas could indicate the former presence of grounded ice (Auth. mod )

44-3937
Glaciomarine sedimentation in epicontinental seas exemplified by the northern Barents Sea.
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Pfirman, S.L., Solheim, A., Larssen, B.B.
Bottom sediment, Marine deposits, Glacial deposits, Sedimentation, Glacier surges, Ice rafting, Barents Sea.

44-3938
Glacigenic sediments on a passive continental margin as exemplified by the Barents Sea.
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Bottom sediment, Marine deposits, Glacial deposits, Seismic surveys, Marine geology, Glacial geology, Barents Sea.

44-3939
Comparison of models of glacial sedimentation along the eastern Canadian margin.
Josenhans, H.W., et al, *Marine geology*, Jan. 1989, 85(2 4), Modern glacimarine environments. glacial and marine controls of modern lithofacies and biofacies. Edited by R.D. Powell and A. Elverhöi, p.273-300, 34 refs.
Feder, G.B J.
Bottom sediment, Marine deposits, Glacial deposits. Sedimentation, Marine geology, Glacial geology, Geomorphology, Geochronology, Geological surveys.

44-3940
On the deposition of sediment within glacier-influenced fjords: oceanographic controls.
Syvitski, J P M., *Marine geology*, Jan 1989, 85(2/4), Modern glacimarine environments. glacial and marine controls of modern lithofacies and biofacies. Edited by R.D. Powell and A. Elverhöi, p.301-329, 61 refs.
Bottom sediment, Sediment transport, Glacial deposits, Marine deposits, Ice water interface, Coastal topographic features, Mathematical models.

44-3941
Macrofauna of Canadian arctic fjords.
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Aitken, A.E., Gilbert, R., Risk, M.J.
Bottom sediment, Glacial deposits, Marine deposits, Marine biology, Coastal topographic features

44-3942
Glacimarine sedimentary processes, facies and morphology of the south-southeast Alaska shelf and fjords.
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Molnia, B.F.
Marine deposits, Glacial deposits, Bottom sediment, Geological surveys, Geomorphology, Geochronology, Glacial geology, Marine geology, Coastal topographic features.

44-3943
Seismic reflection characteristics of glacial and glacimarine sediment in the Gulf of Alaska and adjacent fjords.
Carlson, P.R., *Marine geology*, Jan. 1989, 85(2/4), Modern glacimarine environments: glacial and marine controls of modern lithofacies and biofacies. Edited by R D. Powell and A. Elverhöi, p.391-416, Refs p.412-416
Bottom sediment, Glacial deposits, Marine deposits, Coastal topographic features, Seismic surveys, Geological surveys, Geomorphology, Geochronology. United States—Alaska—Gulf of Alaska

44-3944
Alluvial dike dam with a heat-waterproof screen and non-freezing drainage. [Namyvnaia ograzhdaiushchaia damba s teplogidroizoliatsionnym ekranom i nezamerzaiushchim drenazhem],
Kuznetsov, G.I., et al, *Izvestiia vysshikh uchebnykh zavedenii. Stroitel stvo i arkhitektura*, Apr. 1990, No.4, p.64-73, In Russian. 5 refs.
Raspopova, R.Kh.
Embankments, Earth dams, Thermal insulation, Drainage, Waterproofing, Thermal regime, Frost protection, Analysis (mathematics).

44-3945
Heterogeneous reactions on model polar stratospheric cloud surfaces: reaction of N2O5 on ice and nitric acid trihydrate.
Quinlan, M.A., et al, *Journal of physical chemistry*, Apr. 19,1990, 94(8), p.3255-3260, 33 refs.
Reihs, C.M., Golden, D M., Tolbert, M A
Ice composition, Cloud physics, Chemical properties, Gases, Ice surface, Hydrates, Chemical analysis, Ice air interface, Low temperature tests, Surface properties.

44-3946
HCl/H2O solid-phase vapor pressures and HCl solubility in ice.
Hanson, D R., et al, *Journal of physical chemistry*. May 31,1990, 94(11), p.4700-4705, 35 refs.
Mauersberger, K.
Ice composition, Chemical properties, Solubility, Gases, Hydrates, Crystal growth, Vapor pressure, Solid phases, Ice air interface, Low temperature tests.

44-3947
Star Vue interactive assistance.
McAvoy, J G , *Transport Canada. Publication*, Mar 1990, No.TP10406E, 26p. + appns., With French summaries. 2 refs.
Sea ice, Classifications, Radar photography, Data processing, Computer programs, Ice navigation, Ice conditions, Airborne radar

44-3948
Method for controlling stationary frost heaving.
Akagawa, S., *Shimizu technical research bulletin*. Mar. 1990, No.9, p.1-8, 8 refs.
Frost heave, Soil freezing, Soil tests, Countermeasures, Ice lenses, Frozen ground thermodynamics, Freezing rate, Boundary layer.

44-3949
Applications of ISES for snow, ice, and sea state.
Chang, A.T C., et al, Earth Sciences Requirements for the Information Sciences Experiment System, Williamsburg, VA, May 1-4, 1989. Proceedings. Edited by D.E. Bowker, S.J. Katzberg and R.G. Wilson, NASA, 1990, p.189-196. NASA conference publication 3072.
Delnore, V.E.
Spacecraft, Remote sensing, Snow cover, Ice cover, Sensor mapping, Climatology, Wind factors.

44-3950
Double torsion test applied to fine grained and freshwater columnar ice and sea ice.
Parsons, B.L., et al, *Canada. National Research Council. Institute for Marine Dynamics. Laboratory report*, Aug. 1988, No.AVR-01, 12p., 26 refs.
Snellen, J.B , Muggeridge, D.B.
Ice strength, Ice cracks, Crack propagation, Mechanical tests, Sea ice, Brittleness, Mechanical properties.

44-3951
Friction at the base of a glacier.
Schweizer, J., *Zurich. Eidgenossischen Technischen Hochschule. Versuchsanstalt fur Wasserbau, Hydrologie und Glaziologie. Mitteilungen*, 1989, No.101, 181p., With German summary. Refs. p.171-176.
Glacier friction, Glacier flow, Basal sliding, Glacier beds, Sediment transport, Mathematical models, Water pressure, Shear stress.

44-3978
Large-scale physical oceanography of polar oceans.
Carmack, E.C., Polar oceanography. Part A: physical science Edited by W O Smith, Jr , San Diego, Academic Press, 1990. p 171-222, Refs p 211-222
Oceanography. Ocean currents, Water temperature, Salinity, Sea ice distribution, Ice water interface, Oceans, Ocean bottom.
A review is presented of large-scale circulation patterns and water mass distributions in the Arctic Ocean, and in the southern ocean south of the Antarctic Convergence, in a comparison of the two polar regions.

44-3979
Mesoscale phenomena in the polar oceans.
Muench, R.D , Polar oceanography Part A physical science. Edited by W.O. Smith, Jr., San Diego, Academic Press, 1990, p.223-285, Refs. p.280-285.
Oceanography, Ocean currents, Water temperature, Salinity, Polynyas, Ice edge, Oceans.
The summarized description and discussion of oceanic mesoscale processes, as observed in the polar regions, are presented. The mesoscale phenomena in this study are divided into fronts and eddies; their lateral property fluxes are also considered. The two different physical mechanisms resulting in the formation of latent-heat and sensible-heat polynyas are described.

44-3980
Small-scale processes.
McPhee, M.G., Polar oceanography Part A: physical science Edited by W O Smith, Jr., San Diego, Academic Press, 1990, p.287-334, Refs. p.331-334.
Air water interactions, Ice air interface, Ice water interface, Turbulent boundary layer, Sea ice, Ice mechanics, Ice physics, Analysis (mathematics), Antarctica—Weddell Sea.
A discussion of the oceanic processes affecting air-sea-ice interaction is divided into the following areas of interest: fundamental physics; turbulent exchange; measurements from under-ice boundary layer drag coefficients and under-ice roughness, heat and mass flux at the ice/ocean interface; and internal wave drag. A table with representative estimates of undersurface roughness length for the Weddell Sea and several arctic seas is presented.

44-3981
Models and their applications to polar oceanography.
Häkkinen, S., Polar oceanography. Part A. physical science. Edited by W.O Smith, Jr., San Diego, Academic Press, 1990, p.335-384, Refs. p.381-384.
Ice models, Sea ice distribution, Ice water interface, Thermodynamics, Ice cover effect, Ocean currents, Mathematical models.
The ice models, ocean models, and coupled ice-ocean models reviewed in this chapter show the complexity of the dynamic and thermodynamic processes in ice and in polar oceans. An interesting feature of the models, i.e. the importance of convection in the areas of seasonal ice cover, as for example around Antarctica, is pointed out.

44-3982
Simulation of runoff and nitrate transport from mixed basins in Sweden.
Brandt, M . *Nordic hydrology* 1990, 21(1), p 13-34, 25 refs.
Runoff, River basins, Water pollution, Water balance, Models, Snowmelt, Precipitation (meteorology), Air pollution, Sweden.

44-3983
Estimating the variance of airborne snow water equivalent estimates using computer simulation techniques.
Carroll, S.S., et al, *Nordic hydrology*, 1990, 21(1), p.35-46, 8 refs.
Carroll, T.R.
Snow cover, Snow water equivalent, Measurement, Gamma irradiation, Computerized simulation, Aerial surveys, Soil water, Forest canopy, Accuracy.

44-3984
Comparative model tests in ice of a Canadian Coast Guard R-class icebreaker.
Tatinclaux, J.C., et al, MP 2751, Society of Naval Architects and Marine Engineers, 1989, p.1/1-1/18, 8 refs For presentation at the Annual Meeting of the Society of Naval Architects and Marine Engineers, New York, N.Y., Nov. 15-18, 1989.
Alekseyev, IU N , Enkvist, E . Kitagawa, H., Narita, S., Schwarz, J., Takekuma, K., Williams, F.M.
Icebreakers, Models, Mechanical tests Metal ice friction, Performance, Propellers, Ice mechanics, Correlation, Accuracy

44-3985
Detection of coarse sediment movement using radio transmitters.
Chacho, E.F., Jr , et al, MP 2752, 23rd Congress of the International Association for Hydraulic Research, Ottawa, Canada, Aug. 21-25, 1989. Proceedings, [1989], p.367-373(B), 7 refs.
Burrows, R.L., Emmett, W.W.
River flow, Sediment transport, Telemetering equipment, Rocks, Detection, Radio waves, Glacial rivers.

44-3986
Enhanced diesel fuel low temperature operability—additive developments.
Brown, G.I., et al, *Erdöl & Kohle, Erdgas, Petrochemie*, May 1990, 43(5), p.196-204, With German summary. 14 refs.
Gaskill, G.P.
Fuels, Fuel additives, Viscosity, Temperature effects, Cold weather performance, Crystal growth, Diesel engines, Low temperature research, Chemical properties.

44-3987
Three functions that model empirically measured unfrozen water content data and predict relative hydraulic conductivity.
Black, P.B., *U.S. Army Cold Regions Research and Engineering Laboratory*, May 1990, CR 90-05, 7p., ADA-223 875, 22 refs.
Soil freezing, Unfrozen water content, Soil water migration, Mathematical models, Frozen ground
Empirically determined data on changes in unfrozen water content, occurring as result of changes in the state of ice and water in soil, are discussed with reference to the changes in soil-water retention data for ice-free soil. The similarity between the two types of data is developed. The Brooks and Corey, van Genuchten and Gardner equations are then shown to be applicable to describing unfrozen water content data. These three functions are then used in the model of Mualem, and the relative hydraulic conductivity of frozen soil is predicted.

44-3988
Thermal infrared survey of winter trails in the Ft. Wainwright Training Area, Alaska.
Collins, C.M., et al, *U S Army Cold Regions Research and Engineering Laboratory*, May 1990, SR 90-17, 16p., ADB-145 746, 6 refs.
Haugen, R.K.
Road icing, Military operation, Naleds, Infrared photography, Ice roads, Terrain identification, Snow roads, Infrared reconnaissance, Permafrost beneath roads, United States—Alaska—Fort Wainwright.
A thermal infrared imaging system was mounted on an Army UH 1H helicopter and used to conduct a series of survey flights over the winter trail network of the Ft. Wainwright Training Area during November 1986. The training area is south of the Tanana River from Fairbanks and consists of 2600 sq. km. of nearly flat land underlain by discontinuous permafrost. A network of trails has been developed over the years to allow access to the training area during the winter for unit training and large-scale military maneuvers. The purpose of the survey flights was to try to identify areas along the trails where groundwater comes to the surface as springs, seeps and stream overflows. During the winter these outflow areas can be a source of extensive ground icings as the water repeatedly seeps to the surface and freezes. These areas frequently remain unfrozen below a thin ice cover well into the winter, and vehicles have become stuck when they broke through the thin ice. On the thermal IR imagery, overflow or icing areas were easily discernible as brighter (warmer) areas against the darker (colder) snow-covered terrain. Even at night, details of the snow-covered trails, airfields and different vegetation types could be ascertained in the thermal IR image, due to slight differences in thermal properties. Information acquired during this study was supplied to the Ft. Wainwright Directorate of Plans, Training, and Mobilization and was used to reroute trails around the overflow and icing areas, allowing unimpeded winter access into the training area.

44-3989
Geological, soil and vegetation characteristics of the areas of gas condensate fields in the northern Tyumen' region. Review. [Kharakteristika geologicheskikh i pochvenno-rastitel'nykh osobennostei territorii gazokondensatnykh mestorozhdenii severa Tiumenskoi oblasti. Obzornaia informatsiia],
Masalkin, S.D., et al, Moscow, VNIIPKtekhorgneftegazstroi, 1989, 49p., In Russian. 29 refs.
Shishov, V.N., ed.
Natural gas, Permafrost distribution, Cryogenic soils, Vegetation patterns, Petroleum industry, Tundra, Environmental protection, USSR—Tyumen'.

44-3990
Problems of the technology and organization of environmental protection during the construction of oil and gas industry facilities in the arctic regions. Review. [Voprosy obosnovaniia tekhnologii i organizatsii prirodookhrannykh rabot pri stroitel'stve ob"ektov neftianoi i gazovoi promyshlennosti v Arkticheskikh raionakh. Obzornaia informatsiia],
Shishov, V.N., et al, Moscow, VNIIPKtekhorgneftegazstroi, 1990, Var.p., In Russian. In 3 parts published separately. Part 1, 27 refs.; Part 2, 130 refs.; Part 3, 6 refs.
Mazur, I.I., ed.
Petroleum industry, Environmental protection, Permafrost preservation, Environmental impact, Tundra, Gas pipelines, Permafrost distribution, Permafrost beneath structures.

44-3991
Comparison of four volatile organic compounds in frozen and unfrozen silt.
Taylor, S., et al, *U.S. Army Cold Regions Research and Engineering Laboratory*, Apr. 1990, SR 90-13, 9p. ADA-224 009.
Schumacher, P.W., Perry, L.B.
Soil freezing, Soil pollution, Soil chemistry, Waste treatment.
The effect of freezing on the distribution and movement of four volatile organic compounds was studied in a silty soil. Eight polycarbonate test tubes were filled with spiked saturated soil. The soil was frozen half way up in four of the tubes, the other four were controls and were not frozen. It was found that freezing a water-saturated silt spiked with chloroform, benzene, toluene, or tetrachloroethylene did not move the organics ahead of the freezing front, but rather that freezing retarded the volatilization of each organic in the frozen soil relative to the unfrozen soil.

44-3992
Some *Nitzschia* and related diatom species from fast ice samples in the Arctic and Antarctic.
Medlin, L.K., et al, *Polar biology*, June 1990, 10(6), p.451-479, Refs. p.478-479.
Hasle, G.R.
Fast ice, Algae, Polar regions.
Some *Nitzschia* and closely related species have been examined in the light and electron microscopes from fast ice samples in the Arctic and Antarctic. *Nitzschia neofrigida*, forming arborescent colonies, and *Nitzschia promare*, forming loose ribbon colonies, are described as new species, both probably included in the distribution of other similar species. A new combination, *Auricula compacta*, represents the first report of this genus from ice samples. Colony formation is reported for the first time in *Nitzschia arctica* and *Nitzschia taeniiformis*. No bipolar species were found, and several reports of arctic species in antarctic ice samples have been refuted. (Auth.)

44-3993
Proceedings of the 46th annual Eastern Snow Conference, Quebec City, Quebec, June 8 and 9, 1989.
Eastern Snow Conference, 1989, 307p., Refs. passim.
For individual papers see 44-3994 through 44-4032.
Lewis, J.E., ed.
Snow cover structure, Snow cover stability, Snow surface, Snow optics, Snow accumulation, Runoff forecasting, Remote sensing, River ice, Meetings, Sampling, Snow surveys.

44-3994
Studies of snow chemistry in the Scottish Highlands.
Davies, T.D., et al, *Eastern Snow Conference. Proceedings*, 1989, 46th, p.1-13, 34 refs.
Tranter, M.
Snow cover, Chemical properties, Streams, Meltwater, Chemical composition, Snow impurities, Chemical analysis, Ion density (concentration), Scotland.

44-3995
Chemical studies of snow in Japan.
Suzuki, K., *Eastern Snow Conference. Proceedings*, 1989, 46th, p.14-26, 3 refs.
Snow accumulation, Wind factors, Sampling, Snow composition, Chemical properties, Meltwater, Chemical analysis, Runoff, Japan—Sapporo.

44-3996
Influence of summertime precipitation events on meltwater production in the Karakoram, northern Pakistan.
Wake, C.P., *Eastern Snow Conference. Proceedings*, 1989, 46th, p.28-35, 13 refs.
Watersheds, Surface drainage, Meltwater, Precipitation (meteorology), Runoff forecasting, Climatic factors, Glacier melting, Pakistan—Karakoram Range.

44-3997
Spring melting at an Alpine site: the influence of mineral dust. (Fonte printanière sur un site Alpin influence des poussières minerales),
Delmas, V., *Eastern Snow Conference Proceedings*, 1989, 46th, p.36-44, In French 12 refs
Snow cover, Snowmelt, Chemical properties, Dust, Snow impurities, Sampling, Artificial melting, Chemical analysis

44-3998
Temporal variations in solute concentrations of meltwater and forest floor leachate at a forested site in the Adirondacks, New York.
Peters, N.E., et al, *Eastern Snow Conference. Proceedings*, 1989, 46th, p.45-56, 26 refs.
Driscoll, C.T.
Meltwater, Forest soils, Leaching, Chemical composition, Streams, Chemical analysis, Snow hydrology, Sampling, Ion density (concentration).

44-3999
Initiation of premature breakup of river ice cover: existing methodologies and approaches to integral analysis.
Abdel-Zaher, A.K., et al, *Eastern Snow Conference. Proceedings*, 1989, 46th, p.59-73, 25 refs.
Davar, K.S., Dawe, J.L.
River ice, Ice breakup, Forecasting, Ice models, Hydrodynamics, Ice cracks, Crack propagation, Ice strength.

44-4000
High frequency dynamic response of the Canadian east coast seasonal sea ice zone.
Nazarenko, D.M., *Eastern Snow Conference. Proceedings*, 1989, 46th, p 74-81. 8 refs
Sea ice distribution, Seasonal variations, Sensor mapping, Radiometry, Brightness, Remote sensing, Microwaves, Canada—Baffin Bay.

44-4001
Comparison of measurements of snowfall by radar using an S-band and an X-band transmitter.
Giguere, A., *Eastern Snow Conference. Proceedings*, 1989. 46th, p.82-98. 13 refs
Snowfall, Radar echoes, Snow accumulation, Wave propagation, Measurement, Correlation, Precipitation (meteorology), Attenuation.

44-4002
Origin and peculiarities of columnar type crystals in the atmosphere.
Podzimek, J., *Eastern Snow Conference. Proceedings*, 1989, 46th, p.99-108. 19 refs.
Ice crystal structure, Classifications, Ice models, Ice crystal growth, Temperature effects, Orientation, Liquid phases.

44-4003
Snow-surface temperature analysis.
Bates, R.E., et al, *Eastern Snow Conference Proceedings*, 1989, 46th, MP 2753, p.109-116, 4 refs.
Gerard, S.
Snow surface temperature, Snow air interface, Temperature measurement, Measuring instruments, Correlation, Temperature variations, Accuracy.
This paper gives a detailed analysis of near snow-surface temperature measurements gathered at the U.S. Army Cold Regions Research and Engineering Laboratory (CRREL) in Hanover, NH, and at a National Guard facility located at Hollis, ME. These data provided simultaneous hourly or half-hourly surface temperatures for intercomparison of the instrumentation noted above during three winters of field experiments.

44-4004
Differences between air and snow surface temperatures during evaporation.
Bernier, P.Y., et al, *Eastern Snow Conference. Proceedings*, 1989, 46th, p.117-120, 6 refs.
Edwards, G.C.
Snow surface temperature, Snow evaporation, Air temperature, Temperature measurement, Snow cover effect, Accuracy, Snow air interface, Heat transfer.

44-4005
Darcy permeability of fine-grained compact snow.
Sommerfeld, R.A., et al, *Eastern Snow Conference. Proceedings*, 1989, 46th, p.121-128, 19 refs.
Rocchio, J.E.
Snow permeability, Measurement, Snow density, Grain size, Snow composition.

44-4006
Vector analysis of ice petrographic data.
Fernck, M.G., et al, *Eastern Snow Conference. Proceedings*, 1989, 46th, MP 2754, p 129-141, 13 refs.
Claffey, K.J., Richter-Menge, J.A.
Ice crystal structure, Orientation, Analysis (mathematics), Ice crystal optics
In this paper a quantitative analysis of uniaxial crystal orientation data is developed Though the method is general, we focus on the application of the analysis to ice fabrics. The crystal orientation data are represented as points on the surface of a unit sphere. An orthogonal least-squares error measure is used to develop equations that define the closest plane and line through the data while retaining all coordinate directions as independent variables. For comparison, a parallel development is presented of the standard dependent variable least-squares determination of the best plane The orthogonal error measure quantifies the goodness-of-fit to the data of all approximate representations. Finally, a technique is developed to generalize from the standard Schmidt net presentation of data in the xy-plane to a presentation in any of the three planes defined by the Cartesian coordinate system

44-4007
Ice breakup of the Nashwaak River, New Brunswick.
Prowse, T.D., et al, *Eastern Snow Conference Proceedings*, 1989, 46th, p.142-155, With French summary. 17 refs.
Beltaos, S., Burrel, B.C., Tang, P., Dublin, J.
River ice, Ice jams, Ice breakup, Flooding, Climatic factors, Ice cover strength, Ice mechanics, Flood forecasting, Canada

44-4008
Influence of snowcover on the growth of antarctic fast ice.
Crocker, G.B., *Eastern Snow Conference. Proceedings*, 1989, 46th, p.156-164, 10 refs.
Fast ice, Snow cover effect, Ice growth, Snow cover structure, Models, Thermodynamic properties, Periodic variations, Antarctica—McMurdo Sound.
The physical properties of snowcover on antarctic landfast sea ice have been observed to be highly variable spatially, temporally, and stratigraphically. This range of conditions is considerably greater than on arctic sea ice, it is not adequately represented by the simple homogeneous approximations used in most thermodynamic ice growth models, which have been developed largely on the basis of observations made in arctic regions. In this paper, measurements of the properties of the snowcover on the fast ice in McMurdo Sound are discussed along with their effects on ice growth. A simple thermodynamic model is described which can be used to simulate these effects over a wide range of ice, snowcover, and atmospheric conditions. (Auth.)

44-4009
Does snow have ion chromatographic properties.
Hewitt, A.D., et al, *Eastern Snow Conference. Proceedings*, 1989, 46th, MP 2755, p.165-171, 9 refs.
Cragin, J.H., Colbeck, S.C.
Snow composition, Chemical properties, Ion diffusion, Snow crystals, Meltwater, Adsorption, Ice water interface, Chemical analysis.
In this study we investigate whether or not grains of metamorphosed snow (ice crystals) can act as a chromatographic column selectively adsorbing and retaining inorganic ions. The chromatographic process has been proposed as a potential mechanism to explain the preferential elution of inorganic ions observed in water from melting snowpacks. Experiments were conducted using a 1.5 cm diameter by 30 cm long Pyrex glass column filled with frozen droplets and natural snow grains. Deionized water and solutions containing known dilute concentrations of sulfate, nitrate and chloride were then slowly allowed to flow down through the column and the eluant was collected in 1 mL aliquots An experiment specifically designed to detect chromatographic effects showed all three species appeared at the bottom of the column simultaneously, indicating that ice surfaces exhibit no preferential affinity for these anions.

44-4010
Snow and ground thermal regimes in a subarctic woodland.
Desrochers, D.T., *Eastern Snow Conference. Proceedings*, 1989, 46th, p.172-183, 12 refs.
Snow cover effect, Forest soils, Soil temperature, Snow temperature, Thermal regime, Subarctic landscapes, Ice solid interface, Temperature variations.

44-4011
Water chemistry of the ultra-oligotrophic lake of New-Quebec Crater. (Chimie des eaux ultra-oligotrophes du Lac du Cratere du Nouveau-Québec),
Ouellet, M., et al, *Eastern Snow Conference. Proceedings*, 1989, 46th, p.184-195, In French with English summary 22 refs
Limnology, Lake water, Water chemistry, Lacustrine deposits, Geologic structures, Water pollution, Impurities, Ion diffusion, Canada.

44-4012
Recent discoveries of snow algae in upstate New York and Quebec Province and preliminary reports on related snow chemistry.
Hoham, R.W., et al, *Eastern Snow Conference. Proceedings*, 1989, 46th, p.196-200, 18 refs.
Yatsko, C.F., Germain, L., Jones, H.G.
Algae, Growth, Snow cover, Snow composition, Chemical properties, Nutrient cycle, Ecosystems, Microbiology.

44-4013
Application of aerosol physics to snow research.
Hogan, A.W., *Eastern Snow Conference Proceedings*, 1989, 46th, MP 2756, p.201-207, 6 refs.
Snowflakes, Snow crystal structure, Snowfall, Statistical analysis, Aerosols, Snow optics, Precipitation (meteorology), Particles, Visibility, Classifications.
Operational winter meteorology deals with problems that depend on the area, volume or number of snowflakes in the air. The irregular shape of typical aggregated snowflakes requires special techniques for calculation of area, volume or number from mass precipitation data. Atmospheric aerosols, paint pigments, and other fine particles have very irregular shapes but are several orders of magnitude smaller than snowflakes. The statistical techniques developed to describe these fine particles can be applied to snowflakes to estimate the visibility, rate of surface coverage and other area- or volume-dependent operational parameters. It appears that these techniques can be broadly applied to generalization of the physical properties of airborne snow.

44-4014
Assessment of NWS surface-measured snow water equivalent data based on remotely-sensed data in the Northern Plains.
Schmidlin, T.W., *Eastern Snow Conference. Proceedings*, 1989, 46th, p.208-212, 4 refs.
Snow water equivalent, Aerial surveys, Gamma irradiation, Snow surveys, Snow hydrology, Climatology, Measurement, Correlation.

44-4015
Snowmelt runoff studies in upper Yamuna basin.
Parsad, R.S., et al, *Eastern Snow Conference. Proceedings*, 1989, 46th, p.213-218, 2 refs.
Singh, A.
Snowmelt, Stream flow, Runoff forecasting, Flow measurement, River basins, Measuring instruments, Snow hydrology, India—Yamuna River.

44-4016
Chemistry of snow pack accumulation and melt in a deciduous forest.
Robertson, E., et al, *Eastern Snow Conference. Proceedings*, 1989, 46th, p.219-222.
Barry, P.J.
Snow composition, Snow cover, Chemical properties, Variations, Forest land, Runoff, Snow water equivalent, Snowmelt, Ion diffusion.

44-4017
Litter decomposition beneath deep snow in temperate climates.
Taylor, B.R., *Eastern Snow Conference. Proceedings*, 1989, 46th, p.223-227, 19 refs.
Forest ecosystems, Vegetation, Decomposition, Snow cover effect, Temperature effects, Nutrient cycle, Subsurface investigations.

44-4018
Variability of snowcover as a factor in forest decline.
Auclair, A.N.D., *Eastern Snow Conference. Proceedings*, 1989, 46th, p.228-231, 9 refs.
Snow cover stability, Forest ecosystems, Growth, Snow cover effect, Frost penetration, Plants (botany), Freeze thaw cycles, Soil freezing.

44-4019
Tree morphology as an estimator of average snow depth.
Wooldridge, G.L., et al, *Eastern Snow Conference. Proceedings*, 1989, 46th, p.232-236, 8 refs.
Sommerfeld, R.A., Musselman, R.C.
Trees (plants), Snow line, Snow depth, Snow cover effect, Damage, Growth, Forecasting.

44-4020
Failure modes observed during river ice breakup.
Prowse, T.D., et al, *Eastern Snow Conference. Proceedings*, 1989, 46th, p.237-241, 4 refs.
Demuth, M.N.
River ice, Ice breakup, Ice cover strength, Dynamic loads, Ice mechanics, Ice deformation, Loads (forces)

44-4021
Hydraulically actuated test frame for the field determination of ice flexural properties.
Demuth, M.N., et al, *Eastern Snow Conference. Proceedings*, 1989, 46th, p.242-246, 8 refs.
Prowse, T.D.
Ice cover strength, Flexural strength, Mechanical tests, Brittleness, Ice mechanics, Ice deformation.

44-4022
Optical effects in falling snow.
Hutt, D.L., *Eastern Snow Conference. Proceedings*, 1989, 46th, p.247-251, 5 refs.
Snow optics, Wave propagation, Transmissivity, Snow crystal structure, Attenuation, Light scattering, Electrical measurement, Precipitation (meteorology).

44-4023
Alternate use of two different emitters in radar observation of mixed precipitation. [Utilisation alternée de deux emitteurs differents dans l'observation par radar de precipitations mixtes].
Giguere, A., *Eastern Snow Conference. Proceedings,* 1989, 46th, p.252-256, In French. 8 refs.
Snowfall, Radar echoes, Wave propagation, Transmissivity, Accuracy, Precipitation (meteorology).

44-4024
Simulation of the effects of frost on the performance of roads subjected to salt deicing. [Simulation des effets du gel sur le comportement des chaussées aux sels déglacants].
Padilla, F., et al, *Eastern Snow Conference. Proceedings,* 1989, 46th, p.257-261, In French. 7 refs.
Villeneuve, J.P.
Roads, Cold weather performance, Road icing, Soil freezing, Models, Frost penetration, Temperature effects.

44-4025
Snowpack water losses during melt in a deciduous forest: a comparison of lysimetric and snow course estimates.
Buttle, J., et al, *Eastern Snow Conference. Proceedings,* 1989, 46th, p.267-271, 6 refs.
Sami, K.
Snowmelt, Forest land, Snow surveys, Meltwater, Measurement Snow hydrology, Sampling, Accuracy, Snow courses.

44-4026
Analysis of snow albedo as estimated by Landsat-5 Thematic Mapper. [Analyse de l'albedo de la neige estime par le Thematic Mapper de Landsat-5].
Bernier, M., et al, *Eastern Snow Conference. Proceedings,* 1989, 46th, p.272-276, In French. 8 refs.
Granberg, H., Royer, A., Fortin, J.P.
Snow surface, Albedo, Spaceborne photography, Sensor mapping, Snow hydrology, LANDSAT, Attenuation.

44-4027
Major ion chemistry of the pre-melt snowpack, Turkey Lake watershed, 1980-1988.
Semkin, R G., et al, *Eastern Snow Conference. Proceedings,* 1989, 46th, p.277-281, 7 refs.
Jeffries, D.S., Neureuther, R., Seymour, M.D.
Snow cover, Chemical composition, Watersheds, Snow impurities, Ion density (concentration), Sampling, Air pollution

44-4028
Chemical migration in snowpack.
Murphey, B.B., et al, *Eastern Snow Conference. Proceedings,* 1989, 46th, MP 2757, p.282-286, 8 refs.
Wolfe, D., Hogan, A.W.
Snow cover, Snow composition, Chemical properties, Snow impurities, Migration, Sampling, Precipitation (meteorology), Pollution
It is inviting to use snowpack sampling as a technique to collect precipitation specimens, and to evaluate chemical precipitation theories or source-receptor pollution transport models with the results of specimen analysis. Such snowpack sampling would allow a posteriori collection of representative samples for analysis, rather than requiring multi-point multi-time collections by several observers, through a long precipitation period. An experiment has been initiated to investigate chemical behavior in snowpack

44-4029
Review of microwave remote sensing of snow.
Heacock, T., et al, *Eastern Snow Conference. Proceedings,* 1989, 46th, p.287-290, 13 refs.
Lewis, J.
Microwaves, Snow cover structure, Remote sensing, Wave propagation, Scattering, Snow water equivalent, Vegetation factors

44-4030
Buried snowbank ice in the central and northern Yukon Territory.
Pollard, W.H., *Eastern Snow Conference. Proceedings,* 1989, 46th, p.292-297, 9 refs.
Ground ice, Ice surveys, Subsurface structures, Snow cover, Stratigraphy, Discontinuous permafrost, Ice structure, Canada.

44-4031
Sub-ice springmelt water circulation in a small lake.
Roberge, J., et al, *Eastern Snow Conference. Proceedings,* 1989, 46th, p.298-302.
Jones, G.
Lakes, Subglacial observations, Water flow, Meltwater, Limnology, Water temperature, Layers.

44-4032
Field stations in arctic and subarctic Canada.
Adams, P., *Eastern Snow Conference. Proceedings,* 1989, 46th, p.303-305, 5 refs.
Stations, Research projects, Climatology, Glaciology.

44-4033
Diagnostic for denitrification in the winter polar stratospheres.
Fahey, D.W., et al, *Nature,* June 21, 1990, 345(6277), p.698-702, 42 refs.
Solomon, S., Kawa, S.R., Loewenstein, M., Podolske, J.R., Strahan, S.E., Chan, K.R.
Stratosphere, Atmospheric composition, Seasonal variations.
A striking negative correlation between *in situ* measurements of reactive nitrogen (NOy) and nitrous oxide (N2O) has been observed throughout the lower polar stratospheres. This correlation has been extensively used to quantify the extent of denitrification in high-latitude air parcels. (Denitrification in the atmosphere is defined as the permanent removal of reactive nitrogen.) The removal of NOy from the antarctic winter stratosphere maintains high concentrations of reactive chlorine, thereby priming the atmosphere for catalytic ozone destruction. The pairwise correlation of the NOy and N2O data from the Southern and Northern Hemispheres is presented Both datasets show a linear correlation region, defined as a reference state, and regions of denitrification, where the correlation breaks down. Using two-dimensional photochemical model simulations of the atmosphere, there is a similar linear correlation between NOy and N2O, thereby establishing a theoretical framework for the reference state. This general approach, which can be extended to other pairs of molecules, should prove to be powerful in further comparisons of aircraft data with numerical models. (Auth.)

44-4034
Could arctic ice be thinning.
McLaren, A.S., et al, *Nature,* June 28, 1990, 345(6278), p.762, 21 refs.
Barry, R.G., Bourke, R.H.
Sea ice, Ice cover thickness, Arctic Ocean.

44-4035
Evidence for thinning of the arctic ice cover north of Greenland.
Wadhams, P., *Nature,* June 28, 1990, 345(6278), p.795-797, 14 refs.
Sea ice, Ice cover thickness, Arctic Ocean.

44-4036
Depletion of H2O2 in a Greenland ice core: implications for oxidation of volcanic SO2.
Laj, P., et al, *Nature,* July 5, 1990, 346(6279), p.45-48, 31 refs.
Drummey, S.M., Spencer, M.J., Palais, J.M., Sigurdsson, H.
Ice cores, Ice composition, Atmospheric composition, Greenland.

44-4037
Consumption of atmospheric methane by tundra soils.
Whalen, S.C., et al, *Nature,* July 12, 1990, 346(6280), p.160-162, 34 refs.
Reeburgh, W.S.
Tundra, Soil chemistry, Water table, Atmospheric composition.

44-4038
Recent increase in nitrate concentration of antarctic snow.
Mayewski, P.A., et al, *Nature,* July 19, 1990, 346(6281), p.258-260, 20 refs.
Legrand, M.R.
Snow composition, Atmospheric composition, Clouds (meteorology), Antarctica—Vostok Station, Antarctica—Dome C.
Polar ice cores provide a unique record of global climate change. In particular, their records of nitrate concentration can yield new insight into the atmospheric nitrogen cycle, but first it is necessary to understand the processes controlling the spatial distribution of nitrate at the ice-sheet surface, and to define any trends in its temporal distribution Trends are reported in the nitrate time series deduced from low-accumulation sites such as Dome C and Vostok Station. These trends must be treated with caution because of the possibility of post-depositional alteration But the increases in the concentration of the spring maximum in nitrate that occur in the South Pole record for the past few years deserve careful consideration, as they may be a result of denitrification of polar stratospheric clouds in the lower stratosphere and may hence be connected in some way with the antarctic ozone 'hole'. (Auth.)

44-4039
Polar ice ablation rates measured using *in situ* cosmogenic C-14.
Lal, D., et al, *Nature,* July 26, 1990, 346(6282), p.350-352, 14 refs.
Jull, A.J.T., Donohue, D.J., Burtner, D., Nishiizumi, K.
Ice sheets, Ablation, Carbon isotopes, Antarctica—Allan Hills.
Reported here is the detection of an unambiguous signal of *in situ* cosmogenic C-14 in ice samples from two ablation sites in the Antarctic. The C-14 is produced mainly by nuclear spallations of oxygen in ice. The observed concentration of C-14 in ablation ice samples is 1000-3000 atom per g ice three orders of magnitude higher than expected from the amount of trapped atmospheric CO2 in this ice. The *in situ* C-14 has a unique signature, about 60% exists as CO-14 and the remainder as CO2-14. This result is consistent with that expected from studies of artificially produced C-11 in solid targets. The C-14 concentration decreases with depth as expected for *in situ* production. The calculated model ablation rates are 5.8 and 7.6 cm/yr at two sites from the Allan Hills main ice field, in agreement with rates determined by the stake method. The C-14 age of accumulation ice based on trapped (atmospheric) CO2 would be an underestimate of the true age, if a correction is not made for *in situ* produced CO2-14 This can be done easily because the C-14 activities of both the CO and CO2 phases, as well as the trapped CO2 concentration, can be measured. (Auth. mod.)

44-4040
Proceedings.
International Radiation Symposium, Lille, France, 1988, Hampton, VA, A. DEEPAK Publishing, 1989, 653p., For selected papers see 44-4041 through 44-4045 and I-42205 through I-42209.
Lenoble, J., ed, Geleyn, J.F., ed.
Meetings, Radiation, Polar regions.
During IRS 88, 200 scientific papers were presented to 250 participants, either in sessions or by posters. The objective of this Symposium is to provide a forum to review the state of the art in the field of atmospheric radiation, arranged by four major topic groups. Topic 1 concerns the interactions between clouds and radiation, topic 2, climate and radiation, topic 3, basic radiative processes, spectroscopic problems, and the middle atmosphere; topic 4 is devoted to remote sensing of atmospheric constituents. A few of the papers consider radiation problems in polar environments and atmospheres.

44-4041
"Cloudless" ice crystal precipitation in the polar regions.
Curry, J.A., et al, International Radiation Symposium, Lille, France, Aug. 1988. Proceedings. Edited by J. Lenoble and J.F. Geleyn, Hampton, VA, A. DEEPAK Publishing, 1989, p.80-83, 15 refs.
Meyer, F.G., Ebert, E.E.
DLC QC912.3.I57 1988
Ice crystals, Precipitation (meteorology), Polar regions.
Small ice crystals, in the presence of otherwise clear air, have been observed in the lower troposphere of polar regions. Due to difficulties in observing these ice crystals particularly during the polar clouds, this condensate has not been included in cloud climatologies. Evidence for widespread occurrence of this phenomenon in polar regions is summarized. It is suggested that this condensate may present a substantial perturbation to the polar radiation budget. Some comparisons are made with this phenomenon as experienced in arctic and antarctic conditions. (Auth. mod.)

44-4042
Analysis of polar clouds from AVHRR multispectral radiances using pattern recognition.
Ebert, E.E., International Radiation Symposium, Lille, France, Aug. 1988. Proceedings. Edited by J. Lenoble and J.F. Geleyn, Hampton, VA, A. DEEPAK Publishing, 1989, p.184-187, 6 refs.
DLC QC912.3.I57 1988
Infrared radiation, Cloud physics, Ice surface, Radiometry.
The radiometry of IR surfaces and cloud cover categories is analyzed from satellite data. A good potential is demonstrated for the various patterns by knowing a cloud type, some characteristics of its micro-physical properties may be inferred to calculate short- and long-wave fluxes at the surface. Conditions in both polar regions are considered. (Auth. mod.)

44-4043
Longwave radiation budget at the surface from satellite data: development and validation.
Gupta, S.K., et al, International Radiation Symposium, Lille, France, Aug. 1988. Proceedings. Edited by J. Lenoble and J.F. Geleyn, Hampton, VA, A DEEPAK Publishing, 1989, p.291-294, 8 refs.
Wilber, A C., Darnell, W L., Suttles, J T
DLC QC912.3.I57 1988
Solar radiation, Radiation balance.
A technique was developed for determining monthly average downward and net longwave fluxes at the surface over the entire globe on a 5 deg equal-area grid. Downward longwave flux was computed using parameterized equations developed from detailed radiative transfer computations. Meteorological data used for flux computation were obtained from the Tiros Operational Vertical Sounder (TOVS) system flown aboard NOAA's operational Sun-synchronous satellites The technique was demonstrated by computing monthly-average downward and net fluxes for the month of Feb., 1982 The antarctic regions are included on the charts depicting these radiation distributions. (Auth. mod.)

44-4044
Surface radiation budget components measured over arctic sea ice.
Bauer, P., et al, International Radiation Symposium, Lille, France, Aug. 1988. Proceedings. Edited by J. Lenoble and J F Geleyn, Hampton, VA, A DEEPAK Publishing, 1989, p 295-297, 3 refs
Hennings, D., Raschke, E.
DLC QC912.3.I57 1988
Radiation balance, Sea ice, Measurement.

44-4045
Influence of ice microphysics on microwave radiation transfer through an evolving rain cloud.
Smith, E.A., et al, International Radiation Symposium, Lille, France, Aug. 1988. Proceedings. Edited by J Lenoble and J.F. Geleyn, Hampton, VA, A. DEEPAK Publishing, 1989, p.627-630, 5 refs.
Mugnai, A
DLC QC912.3 I57 1988
Microwaves, Ice microstructure, Brightness, Clouds (meteorology), Precipitation (meteorology).

44-4046
Lichen growth rates for the northwest coast of Spitsbergen, Svalbard.
Werner, A., *Arctic and alpine research*, May 1990, 22(2), p 129-140, 43 refs.
Lichens, Growth, Age determination, Classifications, Time factor, Arctic landscapes, Climatic factors, Plants (botany), Lithology, Norway—Svalbard.

44-4047
Geochemistry of subglacial calcites: implications for the hydrology of the basal water film.
Sharp, M., et al, *Arctic and alpine research*, May 1990, 22(2), p.141-152, 32 refs.
Tison, J.L., Fierens, G.
Subglacial drainage, Water films, Meltwater, Glacial deposits, Freezing, Chemical composition, Minerals, Isotope analysis, Glacial hydrology, Geochemistry, Glacier beds, Switzerland—Glacier de Tsanfleuron.

44-4048
Comparison of melt energy computations and ablatometer measurements on melting ice and snow.
Munro, D.S., *Arctic and alpine research*, May 1990, 22(2), p 153-162, 30 refs
Glacier ablation, Ice melting, Snow melting, Surface energy, Measurement, Measuring instruments, Accuracy, Meltwater, Diurnal variations

44-4049
Hydrological regime of lakes in the Mackenzie Delta, Northwest Territories, Canada.
Bigras, S.C., *Arctic and alpine research*, May 1990, 22(2), p.163-174, 27 refs
Lake water, Deltas, Water level, Flooding, Ice breakup, Hydrologic cycle, Evaporation, Water balance, Water flow, Canada—Northwest Territories—Mackenzie River Delta

44-4050
Ground-penetrating radar study of active layer thicknesses in areas of moist sedge and wet sedge tundra near Bethel, Alaska, U.S.A.
Doolittle, J.A., et al, *Arctic and alpine research*, May 1990, 22(2), p.175-182, 30 refs.
Hardisky, M.A., Gross, M.F.
Active layer, Radar echoes, Soil profiles, Subsurface investigations, Thaw depth, Soil analysis, Swamps, Tundra, United States—Alaska—Bethel.

44-4051
Plant and soil groups in the alpine grasslands of the Vanoise Massif, French Alps.
Gensac, P., *Arctic and alpine research*, May 1990, 22(2), p 195-201, 19 refs.
Alpine landscapes, Vegetation patterns, Plant ecology, Site surveys, Soil classification, Plants (botany), Vegetation factors, Ecosystems, France—Alps.

44-4052
Antarctic sector of the Pacific.
Glasby, G.P., ed, *Elsevier oceanography series*, 1990, Vol.51, 396p., Refs. p.325-380. For individual papers see 44-4053 through 44-4055 and A-12211, A-42221, B-42218 through B-42220, E-42215 through E-42217, F-42214, I-42212 and J-42213.
DLC GC461.A59
Meteorological factors, Sea ice, Glacial deposits, South Pacific Ocean.
To illustrate how the Pacific Ocean is transformed in its southernmost part especially south of the Antarctic Convergence, the first chapters of this book deal with its climate, hydrology and ice, pointing out also that the influence of the cold hub of the Southern Hemisphere, acting through the air and waters it chills, extends to the climate and oceanic processes far to the north. The remaining 7 chapters consider the geological, biological, environmental and economic aspects of the antarctic and subantarctic regions, aiming to show the scientific achievements, as well as some of the problems, relevant to this increasingly important part of the world.

44-4053
Meteorology.
Mullan, A.B., et al, *Elsevier oceanography series*, 1990, Vol.51, Antarctic sector of the Pacific, edited by G.P. Glasby, p.21-54.
Hickman, J.S.
DLC GC461.A59
Sea ice, Ice air interface, Meteorological data, South Pacific Ocean.
Meteorology at increasingly higher latitude bands over the southern ocean, from a hemispheric point of view, is described. Weather systems are examined, and the complications of sea ice and the effect of the antarctic continent are considered. Some relationships between fluctuations in sea ice and cyclone activity on very short and very long time-scales have been found. Antarctica has a marked effect on the large-scale atmospheric circulation over the ocean, also, its asymmetry about the Pole produces a corresponding asymmetry in ocean temperatures at high latitudes. Current research efforts are reviewed briefly in the concluding section of this chapter.

44-4054
Ice.
Keys, J.R., *Elsevier oceanography series*, 1990, Vol.51, Antarctic sector of the Pacific, edited by G.P Glasby, p.95-123.
DLC GC461.A59
Ice shelves, Sea ice distribution, Icebergs, Ice navigation, Ice water interface, South Pacific Ocean, Antarctica—Ross Ice Shelf.
The significance and characteristics of antarctic ice in the Pacific sector are discussed with emphasis on ice shelves, icebergs and sea ice. It is found that the distribution and characteristics of diverse ice forms in the area are complex and very significant in environmental and human terms. It is suggested that the distribution, volume, production and decay of icebergs need to be better known to help refine estimates of the mass balance of the ice sheet, iceberg production rates and to quantify the iceberg hazards.

44-4055
Sediments.
Anderson, J.B., *Elsevier oceanography series*, 1990, Vol.51, Antarctic sector of the Pacific, edited by G.P. Glasby, p.187-206.
DLC GC461.A59
Glacial geology, Glacial deposits, Sediments, South Pacific Ocean.
Sediment types, distribution patterns, and processes which regulate sedimentation on the seafloor of the antarctic sector of the Pacific are described, based on sediment cores and samples, bottom photographs, and nephelometer profiles acquired during cruises of the United States vessels, as well as on published sediment descriptions and maps of Russian and French scientists.

44-4056
Clay mineralogy of ungleyed cryohydromorphic soils.
Gradusov, B.P., et al, *Soviet soil science*, 1990, 22(2), p.80-87, Translated from Pochvovedenie, 1989, No.6, p.81-88. 11 refs.
Sokolov, I.A.
Clay minerals, Cryogenic soils, Mineralogy, Soil profiles, Soil formation, Soil composition.

44-4057
Water permeability of frozen soils under tree stands in the forest-steppe zone.
Rybakova, N.A., *Soviet soil science*, 1990, 22(2), p.106-112, Translated from Pochvovedenie, 1989, No.8, p.116-122. 12 refs.
Frozen ground, Permeability, Soil water migration, Forest strips, Soil freezing, Ground thawing, Steppes.

44-4058
Multiband imaging systems.
McKim, H.L., et al, *U.S. Army Cold Regions Research and Engineering Laboratory*, May 1990, SR 90-15, 10p. ADA-223 969.
Merry, C.J., LaPotin, N.T.
Terrain identification, Remote sensing, Spacecraft, Military operation, Spaceborne photography, Aerial surveys, Data processing, Photointerpretation.
Digital data from satellite systems can provide timely and detailed terrain information for battlefield intelligence. Multiband imaging systems that can acquire simultaneous remotely sensed data for the same ground locality throughout the electromagnetic spectrum are available for analysis using conventional photo interpretation techniques or more sophisticated digital image processing methods. This report describes existing and future multiband imaging systems with the emphasis on how a terrain analyst would use these data to prepare thematic overlays.

44-4059
Use of soft grade asphalts in airfields and highway pavements in cold regions.
Janoo, V.C., *U.S. Army Cold Regions Research and Engineering Laboratory*, May 1990, SR 90-12, 47p., ADA-224 072, 54 refs.
Pavements, Bituminous concretes, Cracking (fracturing), Frost resistance, Fatigue (materials), Bearing strength, Freezing indexes.
Soft grades of asphalt cement are being used for controlling low temperature cracking in some parts of the northern regions of the United States and in Canada. The U.S. Army Corps of Engineers (COE) specified softer asphalts for use in cold regions (ETL 1110-3-369) dated Nov 1976; at present, the COE uses the penetration viscosity number (PVN) as a measure of the temperature susceptibility of the asphalt. A minimum PVN of -0.5 is specified for moderately cold areas and -0.2 in regions where the design freezing index is greater than 39900 C-hr. Field studies have been conducted that clearly show the benefits of using softer grades of asphalt for minimizing low temperature cracking in cold regions, however, field studies relating rutting to asphalt type are rare. A major concern is whether or not pavements constructed with softer grades of asphalt are more susceptible to rutting during the hot summer months. A field study was conducted by CRREL to gather information on the use of soft grades of asphalt (AC 2.5, AC 5 and AC 10) and their associated pavement performance. An attempt was made to compare the COE specifications with State DOT specifications for these soft grades of asphalt. The influence of the asphalts studied, and the preliminary results of this field program, are presented in this report. For the longer term objectives of this study, new or reconstructed pavements in various parts of the country will be monitored for both low temperature cracking and rutting.

44-4060
Case study of potential causes of frost heave.
Henry, K.S., *U.S. Army Cold Regions Research and Engineering Laboratory*, May 1990, SR 90-09, 35p., ADA-224 071, 17 refs.
Frost heave, Pavements, Soil freezing, Runways, Frost protection, Frost penetration, Subgrade soils.
Frost action beneath pavements can lead to several problems, including thaw weakening, which causes cracking and subsequent pumping of fine soil particles onto the surface, as well as hazardous conditions caused by differential heaving. This study examined data and frost-susceptible soil collected during the winter of 1985-86 at Ravalli County Airport, Hamilton, MT, to determine possible causes of frost heave. Variables analyzed were depth to water table, depth of frost penetration, maximum frost heave, and soil moisture tension and soil temperature with depth. Analysis of the field data revealed the possibility that hydraulic conductivity of subgrade soils and rates of heat loss in the soil may be limiting frost heave rates. Soil density and depth to water table may also be factors affecting amounts of frost heave. Furthermore the base course "gravel" used at the airport contained considerable amounts of fines and did heave somewhat in laboratory tests. Recommendations for design changes to reduce frost heave at Ravalli County Airport were made.

44-4061
Arctic research: advances and prospects.
Conference of Arctic and Nordic Countries on Coordination of Research in the Arctic, Leningrad, U.S.S.R., Dec. 1988. Proceedings-Pt 1 and Pt 2. Moscow, Nauka, 1990, 366p + 445p, Refs passim. For selected papers see 44-4062 through 44-4118.
Kotliakov, V.M., ed, Sokolov, V.E., ed.
International cooperation, Research projects, Environmental protection, Ocean environments, Natural resources, Pollution, Ecology, Geologic processes, Geologic structures, Sedimentation, Atmospheric composition, Meetings.

44-4062
Arctic research and its role in the solution of global problems.
Israel, IU.A., et al, Conference of Arctic and Nordic Countries on Coordination of Research in the Arctic, Leningrad, U.S.S.R., 1988. Proceedings. Pt.1. Arctic research: advances and prospects. Edited by V.M. Kotliakov and V.E. Sokolov, Moscow, Nauka, 1990, p.24-31, 14 refs.
International cooperation, Research projects, History, Polar regions, Sea ice, Polar atmospheres.

44-4063
Geophysical activities in Greenland of the Danish Meteorological Institute.
Lassen, K., Conference of Arctic and Nordic Countries on Coordination of Research in the Arctic, Leningrad, U.S.S.R., 1988. Proceedings. Pt 1. Arctic research: advances and prospects. Edited by V.M. Kotliakov and V.E. Sokolov, Moscow, Nauka, 1990, p 32-40, 3 refs.
Geophysical surveys, Atmospheric composition, Geomagnetism, Meteorological data, International cooperation, Greenland.

44-4064
Dynamics of spatial and temporal variations of electromagnetic processes in the Arctic (wave phenomena).
Troitskaia, V.A., Conference of Arctic and Nordic Countries on Coordination of Research in the Arctic, Leningrad, U.S.S.R., 1988. Proceedings. Pt.1 Arctic research: advances and prospects. Edited by V.M. Kotliakov and V.E. Sokolov, Moscow, Nauka, 1990, p.40-43, 12 refs.
Geomagnetism, Atmospheric composition, Wave propagation, Geophysical surveys, Polar regions, Solar radiation.

44-4065
Study of geophysical processes in the polar cusp is a key problem of solar-terrestrial relation investigation in the Arctic.
Raspopov, O.M., Conference of Arctic and Nordic Countries on Coordination of Research in the Arctic, Leningrad, U.S.S.R., 1988. Proceedings. Pt.1. Arctic research: advances and prospects. Edited by V.M. Kotliakov and V.E. Sokolov, Moscow, Nauka, 1990, p.44-47, 4 refs.
Geomagnetism, Atmospheric disturbances, Atmospheric composition, Solar radiation, Research projects, Electromagnetic properties, Polar regions.

44-4066
Aurora-related studies in Finland 1988.
Sucksdorff, C., Conference of Arctic and Nordic Countries on Coordination of Research in the Arctic, Leningrad, U.S.S.R., 1988. Proceedings. Pt.1. Arctic research advances and prospects. Edited by V.M. Kotliakov and V.E. Sokolov, Moscow, Nauka, 1990, p.47-52.
Geomagnetism, Solar radiation, Atmospheric composition, Geophysical surveys, Electromagnetic properties, Magnetometers.

44-4067
Studying large-scale ocean-atmosphere interaction in the Earth's polar regions.
Alekseev, G.V., et al, Conference of Arctic and Nordic Countries on Coordination of Research in the Arctic, Leningrad, U.S.S.R., 1988. Proceedings. Pt.1. Arctic research: advances and prospects. Edited by V.M. Kotliakov and V.E. Sokolov, Moscow, Nauka, 1990, p.53-63, 19 refs.
Air water interactions, Polar atmospheres, Climatic factors, Heat transfer, Polar regions, Oceanographic surveys.

44-4068
Studies of sea-air interaction in the North-European Basin.
Alekseev, G.V., et al, Conference of Arctic and Nordic Countries on Coordination of Research in the Arctic, Leningrad, U.S.S.R., 1988. Proceedings. Pt.1. Arctic research: advances and prospects. Edited by V.M. Kotliakov and V.E. Sokolov, Moscow, Nauka, 1990, p.63-75, 24 refs.
Air water interactions, Climatic factors, Ocean currents, Polar atmospheres, Sea ice, Water temperature.

44-4069
Numerical modelling of the Arctic Ocean water dynamics.
Doronin, N.IU., et al, Conference of Arctic and Nordic Countries on Coordination of Research in the Arctic, Leningrad, U.S.S.R., 1988. Proceedings. Pt.1. Arctic research: advances and prospects. Edited by V.M. Kotliakov and V.E. Sokolov, Moscow, Nauka, 1990, p.76-85, 12 refs.
Proshutinskii, A.IU.
Ocean currents, Sea ice, Sea level, Mathematical models, Hydrodynamics, Oceanography, Arctic Ocean.

44-4070
Numerical modelling of large-scale circulation in the North-European Basin.
Semenov, G.A., Conference of Arctic and Nordic Countries on Coordination of Research in the Arctic, Leningrad, U.S.S.R., 1988. Proceedings. Pt.1 Arctic research: advances and prospects. Edited by V.M. Kotliakov and V.E. Sokolov, Moscow, Nauka, 1990, p.85-87, 2 refs.
Ocean currents, Climatic factors, Heat transfer, Polar regions.

44-4071
Thermohaline structure, water circulation and deep winter convection in the Greenland Sea stationary gyre.
Alekseev, G.V., et al, Conference of Arctic and Nordic Countries on Coordination of Research in the Arctic, Leningrad, U.S.S.R., 1988. Proceedings. Pt.1 Arctic research: advances and prospects. Edited by V.M. Kotliakov and V.E. Sokolov, Moscow, Nauka, 1990, p.87-88, 3 refs.
Bogorodskii, P.V., Nagurnyi, A.P.
Ocean currents, Water temperature, Convection, Hydrodynamics, Salinity, Greenland Sea.

44-4072
Studying the mechanism of formation of shallow sea water circulation in the Arctic Ocean.
Kulakov, M.IU., et al, Conference of Arctic and Nordic Countries on Coordination of Research in the Arctic, Leningrad, U.S.S.R., 1988. Proceedings. Pt.1. Arctic research: advances and prospects. Edited by V.M. Kotliakov and V.E. Sokolov, Moscow, Nauka, 1990, p.89-90.
Pavlov, V.K.
Ocean currents, Velocity measurement, Mathematical models, Hydrodynamics, Chukchi Sea.

44-4073
Arctic Sea ice and its variability.
Barry, R.G., Conference of Arctic and Nordic Countries on Coordination of Research in the Arctic, Leningrad, U.S.S.R., 1988. Proceedings. Pt.1. Arctic research advances and prospects. Edited by V.M. Kotliakov and V.E. Sokolov, Moscow, Nauka, 1990, p.91-101, 38 refs.
Sea ice distribution, Seasonal variations, Ice cover thickness, Drift, Climatology, Arctic Ocean.

44-4074
Urgent problems in studying sea ice in the Arctic Ocean.
Buzuev, A.IA., et al, Conference of Arctic and Nordic Countries on Coordination of Research in the Arctic, Leningrad, U.S.S.R., 1988. Proceedings. Pt.1. Arctic research: advances and prospects. Edited by V.M. Kotliakov and V.F. Sokolov, Moscow, Nauka, 1990, p.101-106, 11 refs.
Gudkovich, Z.M.
Sea ice distribution, Ice conditions, Seasonal variations, Oceanography, Arctic Ocean.

44-4075
Sea ice off the Icelandic coasts.
Jakobsson, T., Conference of Arctic and Nordic Countries on Coordination of Research in the Arctic, Leningrad, U.S.S.R., 1988. Proceedings. Pt.1 Arctic research: advances and prospects. Edited by V.M. Kotliakov and V.E. Sokolov, Moscow, Nauka, 1990, p.106-110.
Sea ice distribution, Ice conditions, Research projects, Wind factors, Iceland.

44-4076
TAIS system and scientific and operational support of navigation.
Kapustin, A.N., et al, Conference of Arctic and Nordic Countries on Coordination of Research in the Arctic, Leningrad, U.S.S.R., 1988. Proceedings. Pt.1. Arctic research: advances and prospects. Edited by V.M. Kotliakov and V.E. Sokolov, Moscow, Nauka, 1990, p.110-113.
Sea ice, Ice conditions, Meteorological data, Data processing, Navigation, Spaceborne photography, Arctic Ocean.

44-4077
Long-term trends in studies of engineering constructions and ice interaction process.
Likhomanov, V.A., et al, Conference of Arctic and Nordic Countries on Coordination of Research in the Arctic, Leningrad, U.S.S.R., 1988. Proceedings. Pt.1 Arctic research: advances and prospects. Edited by V.M. Kotliakov and V.E. Sokolov, Moscow, Nauka, 1990, p.114-119, 10 refs.
Ilchuk, A.N., Faddeev, O.V.
Ships, Construction, Ice strength, Ice solid interface, Engineering, Ice mechanics.

44-4078
Impact of ice on petroleum exploration in the Barents Sea.
Løset, S., et al, Conference of Arctic and Nordic Countries on Coordination of Research in the Arctic, Leningrad, U.S.S.R., 1988. Proceedings. Pt.1. Arctic research: advances and prospects. Edited by V.M. Kotliakov and V.E. Sokolov, Moscow, Nauka, 1990, p.119-128, 11 refs.
Carstens, T., McClimans, T.
Crude oil, Exploration, Sea ice distribution, Ice conditions, Oceanography, Offshore structures, Barents Sea.

44-4079
Sea ice deformations in the proximity of coasts.
Eiingsson B., Conference of Arctic and Nordic Countries on Coordination of Research in the Arctic, Leningrad, U.S.S.R., 1988. Proceedings. Pt.1. Arctic research advances and prospects. Edited by V.M. Kotliakov and V.E. Sokolov, Moscow, Nauka, 1990, p.129-137, 4 refs.
Sea ice, Ice deformation, Ice strength, Ice mechanics, Fast ice, Analysis (mathematics).

44-4080
Possible use of deuterium and oxygen-18 to identify sea masses and to trace the origin and drifting of sea ice (preliminary study).
Árnason, B., Conference of Arctic and Nordic Countries on Coordination of Research in the Arctic, Leningrad, U.S.S.R., 1988. Proceedings. Pt.1. Arctic research. advances and prospects. Edited by V.M. Kotliakov and V.E. Sokolov, Moscow, Nauka, 1990, p.137-147, 8 refs.
Sea water, Chemical composition, Sea ice distribution, Ocean currents, Drift, Isotopes.

44-4081
Arctic Ocean sea ice massifs.
Smirnov, V.I., Conference of Arctic and Nordic Countries on Coordination of Research in the Arctic, Leningrad, U.S.S.R., 1988. Proceedings. Pt.1. Arctic research: advances and prospects. Edited by V.M. Kotliakov and V.E. Sokolov, Moscow, Nauka, 1990, p.147-149.
Sea ice distribution, Ice conditions, Ice navigation, Arctic Ocean.

44-4082
Simulation of ice movement in the Arctic Basin over long-term periods.
Appel', I.L., et al, Conference of Arctic and Nordic Countries on Coordination of Research in the Arctic, Leningrad, U.S.S.R., 1988. Proceedings. Pt.1. Arctic research: advances and prospects. Edited by V.M. Kotliakov and V.E. Sokolov, Moscow, Nauka, 1990, p.149-150, 1 ref.
Sea ice distribution, Drift, Simulation, Meteorological data, Arctic Ocean.

44-4083
Influence of wave processes and instabilities under sea ice cover on formation of pools of open water.
Korobeinikov, V.P., et al, Conference of Arctic and Nordic Countries on Coordination of Research in the Arctic, Leningrad, U.S.S.R., 1988. Proceedings. Pt.1. Arctic research: advances and prospects. Edited by V.M. Kotliakov and V.E. Sokolov, Moscow, Nauka, 1990, p.151-152, 4 refs.
Marchenko, A.V., Sibgatullin, N.R.
Sea ice, Ocean waves, Wave propagation, Ice cover effect, Elastic waves, Analysis (mathematics), Ice cracks.

44-4084
Arctic climate and its variations. aspects of international cooperation.
Voskresenskii, A.I., et al, Conference of Arctic and Nordic Countries on Coordination of Research in the Arctic, Leningrad, U.S.S.R., 1988. Proceedings. Pt.1. Arctic research advances and prospects. Edited by V.M. Kotliakov and V.E. Sokolov, Moscow, Nauka, 1990, p.153-163, 14 refs.
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Sea water, Isotope analysis, Evaporation, Ice cover effect, Chemical composition, Oxygen isotopes, Paleoclimatology.
Sea water samples from an assortment of climatic zones including the Arctic and Antarctic are subjected to isotope analysis, with the object of discovering regional peculiarities in the meteoric water line. An exceptional deviation in the relation between oxygen and deuterium isotopes in arctic water is discovered and ascribed to inhibition by the arctic ice cover of the formation of that surface layer whose evaporation produces the common source of meteoric water

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Sea water, Surface temperature, Polynyas, Spaceborne photography, Temperature measurement, Water temperature, Infrared photography, Detection, Data processing, Antarctica—Weddell Sea.
Sea surface temperatures (SSTs) in antarctic polynyas are observed with NOSS-7 imagery The study demonstrates the possibility of separating open water areas from clouds and ice with Advanced Very High Resolution Radiometer (AVHRR) channels 1, 3, 4 and 5 accurately enough for surface-temperature retrievals Measurements from subsequent overpasses at different viewing angles agree with each other within the theoretically derived error bounds of 0 5 to 1 deg K. It is shown that even the cold antarctic atmosphere requires a correction to the 11 micrometer satellite measurements to obtain adequate SST measurements (Auth.)

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**Drumlins, subglacial meltwater floods, and ocean responses.**
Shaw, J., *Geology,* Sep. 1989, 17(9), p 853-856, 27 refs.
Subglacial drainage, Meltwater, Glacial erosion, Sea level, Climatic factors, Water erosion, Glacial hydrology, Landforms, Climatology.

44-4144
**Drumlins, subglacial meltwater floods, and ocean responses—comment and reply.**
Kehew, A.E., et al, *Geology,* May 1990, 18(5), p 479-480, For article being commented on see 44-4143. 16 refs.
Lord, M.L., Shaw, J.
Glacial lakes, Lake bursts, Subglacial drainage, Meltwater, Floods, Climatic factors Glacial hydrology, Sea level, Glacial erosion.

44-4145
**Radar reflectivity of Titan.**
Muhleman, D.O., et al, *Science,* May 25, 1990, 248(4958), p.975-980, 23 refs.
Grossman, A.W , Butler, B J , Slade, M A
Extraterrestrial ice, Hydrocarbons, Radar echoes, Reflectivity, Wave propagation, Cryogenic structures, Dielectric properties, Surface roughness, Data processing, Thermodynamic properties.

44-4146
**Atmospheric barometer measures arctic sea surface height.**
Smith, T.E., *Sea technology,* Feb. 1990, 31(2), p.43-46
Barometers, Sea level, Height finding, Accuracy, Subglacial observations, Atmospheric pressure, Hydrography, Electric power, Oceanography

44-4147
**Pressuremeter creep testing in ice: calibration and test procedures.**
Kjartanson, B.H., et al, *Geotechnical testing journal,* Mar. 1990, 13(1), p.3-9, 12 refs.
Shields, D.H., Domaschuk, L.
Ice creep, Ice pressure, Mechanical tests, Measuring instruments, Laboratory techniques, Temperature effects, Rheology

44-4148
**Proceedings.**
Symposium on Ice and Climate, Seattle, WA, Aug. 21-25, 1989, *Annals of glaciology,* 1990, Vol 14, 377p , Refs passim For individual papers see 44-4149 through 44-4219 or F-42239 through F-42242, F-42245 through F-42249, F-42251, F-42254 through F-42258, F-42260, F-42261, F-42263, I-42243, I-42244, I-42250. I-42253, I-42259, and I-42262.
Climatic changes, Paleoclimatology, Glaciation, Sea ice, Mountain glaciers, Ice sheets, Ice cores, Meetings
Of the 145 papers presented at the Symposium, 26 are pertinent to Antarctica and deal with land and sea ice age, temperature, mass balance, chemistry, distribution, models, formation and decay, and the relationship between variations in ice and glacial and interglacial climates.

44-4149
**Multiple steady states in ice-water-till systems.**
Alley, R.B., *Annals of glaciology,* 1990, Vol.14, Symposium on Ice and Climate, Seattle, WA, Aug 21-25 1989. Proceedings, p.1-5, 12 refs.
Glacier flow, Glacier beds, Basal sliding, Glacier ice Ice water interface, Glacial hydrology, Ice models, Mathematical models, Antarctica—West Antarctica.
An ice sheet with fixed boundary conditions may have two steady configurations, as shown by a new one-dimensional model including the physics and continuity of ice, water, and deforming subglacial till. In one steady state, a steep surface slope causes rapid internal ice shearing but forces basal water through subglacial aquifers, suppressing basal velocity, in the other steady state, a gentle surface slope causes only slow ice shearing but allows water to lubricate the ice-bed interface and cause rapid basal velocities. Small climatic forcing may cause large ice-sheet response during a switch between steady states. Ice Stream B, West Antarctica is the ice mass on which a variety of simulations has been run (Auth.)

44-4150
**Recent warming in central Greenland?.**
Alley, R.B., et al, *Annals of glaciology,* 1990, Vol.14, Symposium on Ice and Climate, Seattle, WA, Aug. 21-25, 1989. Proceedings, p.6-8, 6 refs.
Koci, B.
Climatic changes, Ice temperature, Drill core analysis, Ice sheets, Greenland.

44-4151
**Lidar-derived particle concentrations in plumes from arctic leads.**
Andreas, E.L , et al, *Annals of glaciology,* 1990, Vol.14, MP 2758, Symposium on Ice and Climate, Seattle, WA, Aug. 21-25, 1989. Proceedings, p.9-12, 24 refs.
Miles, M.W., Barry, R.G., Schnell, R.C.
Ice openings, Cloud droplets, Air water interactions, Lidar, Aerosols, Polynyas, Analysis (mathematics), Humidity.
With an airborne lidar, massive plumes of condensate particles rising from wintertime leads in the Arctic Ocean have been observed. Some of these plumes reached an altitude of 4 km; some extended over 200 km down-wind from their surface source Here we invert the lidar equation and use lidar backscatter data to infer particle concentrations within two such plumes Assuming that the plumes consist of supercooled water droplets of radius 5 micron, typical concentrations of 300,000-600,000 droplets/cu m just above the lead is estimated. Concentrations within the plumes can still be as high as 10,000 droplets/cu m at an altitude of 3 km and 200 km downwind from some leads Had it been assumed that the plume particles are ice spheres of radius 40 microns, concentrations would be just 100 times less than these.

44-4152
**Age of Crary Ice Rise, Antarctica, determined from temperature-depth profiles.**
Bindschadler, R.A., et al, *Annals of glaciology,* 1990 Vol 14, Symposium on Ice and Climate, Seattle, WA, Aug. 21-25, 1989. Proceedings, p.13-16, 17 refs.
Roberts, E.P., Iken, A.
Ice shelves, Ice dating, Glacier thickness, Ice temperature, Geochronology, Ice cover thickness, Antarctica —Crary Ice Rise, Antarctica—Ross Ice Shelf.
Temperature-depth measurements from two sites on Crary Ice Rise are analyzed to deduce the time the ice first grounded at each location. At the thicker site (480 m), the best estimate of the time since grounding is 1100 years At the shallower site (369 m) the grounding is more recent, 580 years ago, and there is evidence that basal cooling was delayed for 450 years while water at the base was freezing. This analysis leads to the conclusion that Crary Ice Pise was formed by at least two separate grounding events and is not a remnant of a more extensive grounded ice sheet which occupied the present position of the Ross Ice Shelf. (Auth)

44-4153
**Simplified three-dimensional ice-sheet model including ice shelves.**
Böhmer, W.J., et al, *Annals of glaciology,* 1990, Vol.14, Symposium on Ice and Climate, Seattle, WA, Aug. 21-25, 1989. Proceedings, p.17-19, 8 refs.
Herterich, K.
Ice sheets, Ice shelves, Ice models, Paleoclimatology, Glacier oscillation, Mathematical models.
A simplified numerical three-dimensional ice-sheet/ice-shelf model with a coarse horizontal resolution (100 km), designed for simulations of ice-volume changes on ice-age time scales (100,000 years and longer), is presented. The ice-sheet part uses the shallow-ice approximation to determine the flow, and includes a three-dimensional temperature calculation The ice shelf is described in a quasi-stationary way Ice-shelf thickness depends only on the thicknesses at the grounding line and the distances to the grounding line. The effect of the transition zone between ice sheet and ice shelf (assuming a width $< < 100$ km) is parameterized in terms of the ice thicknesses defined on the coarse grid. The ice sheets of Antarctica were used in developing the model. (Auth. mod.)

44-4154
**Increased ablation at the margin of the Greenland ice sheet under a greenhouse-effect climate.**
Braithwaite, R.J., et al, *Annals of glaciology,* 1990, Vol.14, Symposium on Ice and Climate, Seattle, WA, Aug. 21-25, 1989. Proceedings, p.20-22, 11 refs
Olesen, O.B.
Ice sheets, Glacier ablation, Climatic changes, Ice models, Mathematical models, Ice edge, Climatic factors, Greenland.

44-4155
Modelling global ice and climate changes through the ice ages.
Budd, W.F., et al, *Annals of glaciology*, 1990, Vol 14, Symposium on Ice and Climate, Seattle, WA, Aug. 21-25, 1989. Proceedings, p.23-27, 24 refs.
Rayner, P.
Ice models, Climatic changes, Paleoclimatology, Ice sheets, Ice cover, Snow cover, Heat balance, Radiation balance.
A global energy balance model has been developed which includes an interactive mixed layer ocean sea ice, and snow and ice cover on the land A full annual cycle is included and the model provides a close simulation to the variation of surface temperature through the year over land and over ocean as a function of latitude The present annual variations of sea ice and snow on the ground are also well simulated The model has been used for a wide range of sensitivity tests which include variations of the solar constant, surface albedos, and the effects of feed back, or absence of feed-back, in the response of the snow and ice cover An examination is made of the impacts of the orbital changes alone, as well as with the feed-back from the large ice sheets (Auth mod)

44-4156
Air-ice-ocean feedback mecharisms and ice oscillation on millennial time scales.
Chu, P C, *Annals of glaciology*, 1990, Vol.14, Symposium on Ice and Climate, Seattle, WA, Aug. 21-25, 1989. Proceedings, p.28-31, 9 refs.
Air water interactions, Ice air interface, Ice water interface, Climatic changes, Mathematical models, Ice cover effect, Ice cover thickness, Sea ice distribution, Oscillations.

44-4157
Atmosphere's response to the ice sheets of the last glacial maximum.
Cook, K H., *Annals of glaciology*, 1990, Vol.14, Symposium on Ice and Climate, Seattle, WA, Aug. 21-25, 1989. Proceedings, p.32-38, 16 refs.
Ice sheets, Ice air interface, Paleoclimatology, Atmospheric circulation, Mathematical models, Climatic changes, Ice age theory, Marine atmospheres.

44-4158
Modeling onset of glaciation.
Crowley, T J, et al, *Annals of glaciology*, 1990, Vol.14, Symposium on Ice and Climate, Seattle, WA, Aug 21-25, 1989. Proceedings, p.39-42, 34 refs.
North, G.R.
Paleoclimatology, Climatic changes, Models, Glaciation, Ice age theory, Glacier formation, Antarctica—South Pole.
Numerous studies have shown that climate has varied between ice-free and glaciated states, with transitions often marked by abrupt steps. Summarized are some modeling studies that have attempted to explain elements of the long-term trend and discuss a particular model for abrupt transitions that involves instabilities due to albedo discontinuities at the snow/ice edge Glaciation in both polar regions is considered. (Auth. mod)

44-4159
Sensitivity of the thickness of arctic sea ice to the optical properties of clouds.
Curry, J.A., et al, *Annals of glaciology*, 1990. Vol 14, Symposium on Ice and Climate, Seattle, WA, Aug 21-25, 1989 Proceedings, p 43-46, 21 refs
Ebert, E.E.
Ice cover thickness, Cloud cover, Cloud physics, Sea ice, Air pollution, Radiation balance, Ice air interface, Optical properties.

44-4160
Paleoclimatic model of the mid-Pleistocene climate transition.
Deblonde, G., et al, *Annals of glaciology*, 1990, Vol.14, Symposium on Ice and Climate, Seattle, WA, Aug. 21-25, 1989. Proceedings, p.47-50, 23 refs.
Peltier, W.R.
Paleoclimatology, Pleistocene, Climatic change, Mathematical models, Ice age theory, Ice sheets.

44-4161
Recent deposition of Pb-210 on the Greenland ice sheet: variations in space and time.
Dibb, J.E., *Annals of glaciology*, 1990, Vol 14, Symposium on Ice and Climate, Seattle, WA, Aug 21-25, 1989. Proceedings, p.51-54, 27 refs.
Glacier ice, Fallout, Impurities, Isotope analysis, Air pollution, Ice sheets, Ice composition, Greenland.

44-4162
Two-dimensional coupled atmosphere ice-sheet-continent model designed for paleoclimatic simulations.
Esch, M.B., et al, *Annals of glaciology*, 1990, Vol.14, Symposium on Ice and Climate, Seattle, WA, Aug. 21-25, 1989 Proceedings, p.55-57, 16 refs.
Herterich, K.
Ice sheets, Paleoclimatology, Ice models, Glacier thickness, Mathematical models, Ice age theory.

44-4163
Climatic effects on glacier distribution across the southern Coast Mountains, B.C., Canada.
Evans, I.S., *Annals of glaciology*, 1990, Vol.14, Symposium on Ice and Climate, Seattle, WA, Aug. 21-25, 1989. Proceedings, p.58-64, 23 refs.
Mountain glaciers, Alpine glaciation, Glacier surveys, Climatic factors, Glacier mass balance, Canada—British Columbia.

44-4164
Zonally-averaged stable-isotope model coupled to a regional variable-elevation stable-isotope model.
Fisher, D.A., *Annals of glaciology*, 1990, Vol.14, Symposium on Ice and Climate, Seattle, WA, Aug. 21-25, 1989. Proceedings, p.65-71, 27 refs.
Isotope analysis, Oxygen isotopes, Precipitation (meteorology), Mathematical models, Impurities, Ice cover, Ice composition, Antarctica—Vostok Station.
A global model is presented that simulates zonal averages of stable isotopes delta(O-18), delta(D) and precipitation rates at sea level. The model is empirical and uses as input zonal averages of evaporation, meridional water-vapor flux, air temperature, sea temperature, wind speed, relative humidity, sea-ice cover, and supersaturation in clouds as a function of temperature The global model provides input to high-latitude regional solutions that are found integrating up assumed vapor trajectories, which need not be at sea level Zonal moisture contributions for high-elevation sites are found to be different between Northern Hemisphere (Crête, Greenland) and Southern Hemisphere (Vostok, East Antarctica) with the southern high-latitude cold oceans making a larger relative contribution. (Auth. mod.)

44-4165
On a simple sea-ice dynamics model for climate studies.
Flato, G.M., et al, *Annals of glaciology*, 1990, Vol.14, Symposium on Ice and Climate, Seattle, WA, Aug. 21-25, 1989. Proceedings, p.72-77, 8 refs.
Hibler, W.D., III.
Sea ice distribution, Ice models, Ice cover thickness, Ice air interface, Mathematical models, Drift, Ocean currents, Atmospheric circulation, Air water interactions.

44-4166
Parameterization of the annual surface temperature and mass balance of Antarctica.
Fortuin, J.P.F., et al, *Annals of glaciology*, 1990, Vol.14, Symposium on Ice and Climate, Seattle, WA, Aug. 21-25, 1989. Proceedings, p.78-84, 8 refs
Oerlemans, J.
Glacier mass balance, Surface temperature, Ice air interface, Mathematical models, Ice sheets, Ice shelves, Air temperature, Ice temperature.
Analysis of the annual surface temperature and mass balance was performed for the entire antarctic ice cap as well as for three separate regions ice shelves (elevation less than 200 m), the interior (elevation above 1500 m), and the escarpment region in between. It was found that temperature can be parameterized very well in terms of elevation and latitude An estimate is made of the annual horizontal and vertical advective velocities in the free atmosphere above the interior, based on regression results and a physical analysis of the precipitation processes in this region A temperature sensitivity analysis was performed for the current mass-balance distribution. For a 1 K rise in surface temperature, the regression estimates of the increase in accumulation on the grounded ice sheet is equivalent to a rate of sea-level lowering of 0.2 mm/a. This is about 30% less than estimates based on the current mass balance perturbated by the increase in saturation vapor pressure of the free atmosphere. (Auth mod)

44-4167
6000-year climate records in an ice core from the Höghetta ice dome in northern Spitsbergen.
Fujii, Y, et al, *Annals of glaciology*, 1990, Vol.14, Symposium on Ice and Climate, Seattle, WA, Aug. 21-25, 1989. Proceedings, p.85-89, 10 refs.
Paleoclimatology, Ice cores, Drill core analysis, Climatic changes, Glacier oscillation, Norway—Spitsbergen.

44-4168
520-year temperature record of a 100 m core from the Ronne Ice Shelf, Antarctica.
Graf, W., et al, *Annals of glaciology*, 1990, Vol 14, Symposium on Ice and Climate, Seattle, WA, Aug. 21-25, 1989. Proceedings, p.90-93, 10 refs.
Reinwarth, O., Moser, H.
Ice shelves, Climatic changes, Ice cores, Isotope analysis, Ice temperature, Paleoclimatology, Antarctica—Ronne Ice Shelf.
Evidence for climatic changes during the last 520 years was inferred from C 18 content of a 100 m ice core from the Ronne Ice Shelf The core was stratigraphically dated using seasonal variations of O-18 content. Corrected delta O-18 values show a large scatter from year-to-year due to the local variability. The smoothed isotopic record displays variations in different time scales, which are caused most probably by climatological induced temperature variations. The gradient of O-18 content with the 10 m firn temperature of 1 15 per mill/K found in the middle part of the Filchner-Ronne Ice Shelf was used to transfer the O-18 series to a temperature record. (Auth. mod.)

44-4169
1400 year oxygen isotope history from the Ross Sea area, Antarctica.
Grootes, P M., et al, *Annals of glaciology*, 1990, Vol 14, Symposium on Ice and Climate, Seattle, WA, Aug. 21-25, 1989. Proceedings, p.94-98, 14 refs.
Stuiver, M., Saling, T.L., Mayewski, P.A., Spencer, M.J., Alley, R.B., Jenssen, D
Ice cores, Paleoclimatology, Oxygen isotopes, Isotope analysis, Climatic changes, Antarctica—Ross Ice Shelf.
Four ice cores from the Ross Sea drainage show patterns of delta O-18 variations on a time scale of decades to centuries over the last 1400 years without change in the long-term average delta O-18 Century scale delta O-18 fluctuations in the two cores drilled in the Ross Ice Shelf at Station J-9 are highly correlated The long isotope record (>30,000 a) of the 1978 J-9 core thus represents local conditions over at least 100 m and on time scales of 100 years and longer Regional correlations between the J-9 delta O-18 records, and those from Ridge BC and the Dominion Range, are barely significant or absent The failure to find clear regional isotope trends related to climate fluctuations may reflect the finding that between 1957 and 1982 the area was in the transition zone between areas with opposite temperature trends, and showed little or no temperature change The fact that the records nevertheless show significant delta O-18 fluctuations highlights the need to base regional climate reconstructions on a regional suite of ice-core records. (Auth. mod.)

44-4170
Glacier and permafrost signals of 20th-century warming.
Haeberli, W., *Annals of glaciology*, 1990, Vol.14, Symposium on Ice and Climate, Seattle, WA, Aug. 21-25, 1989 Proceedings, p.99-101, 30 refs.
Mountain glaciers, Climatic changes, Glacier melting, Permafrost thermal properties, Glacier oscillation.

44-4171
Long-term glacier mass-balance investigations in Svalbard, 1950-88.
Hagen, J.O., et al, *Annals of glaciology*, 1990, Vol.14, Symposium on Ice and Climate, Seattle, WA, Aug 21-25, 1989 Proceedings, p.102-106, 12 refs.
Liestöl, O.
Glacier mass balance, Climatic changes, Glacier oscillation, Glacier surveys, Norway—Svalbard.

44-4172
Geostatistics in glaciology: implications of a study of Scharffenbergbotnen, Dronning Maud Land, East Antarctica.
Herzfeld, U.C., et al, *Annals of glaciology*, 1990, Vol 14, Symposium on Ice and Climate, Seattle, WA, Aug 21-25, 1989 Proceedings, p.107-110, 6 refs.
Holmlund, P.
Glacier beds, Glacier thickness, Subglacial observations, Radio echo soundings, Glacier surveys, Bottom topography, Statistical analysis, Antarctica—Queen Maud Land.
Geostatistical methods are applied in the analysis of radio-echo data from Scharffenbergbotnen, Dronning Maud Land, in order to allow the following investigations detailed and reliable cartography of subglacial bed topography and ice thickness, comparison of recent ice flow patterns and ice flow during earlier glacial maxima, and mass balance studies in relation to climatic changes (Auth)

44-4173
Paleogeographic significance of middle Pleistocene glaciomarine deposits on Baldwin Peninsula, northwest Alaska.
Huston, M M., et al, *Annals of glaciology*, 1990, Vol 14, Symposium on Ice and Climate, Seattle, WA, Aug 21-25, 1989 Proceedings, p.111-114 13 refs.
Brigham-Grette, J., Hopkins, D.M.
Pleistocene, Glacial deposits, Marine deposits, Glaciation, Moraines, Geochronology, Sea level, United States—Alaska—Baldwin Peninsula.

44-4174
Antarctic ice sheet during the last glacial-interglacial cycle: a three-dimensional experiment.
Huybrechts, P, *Annals of glaciology*, 1990, Vol.14 Symposium on Ice and Climate, Seattle, WA, Aug. 21-25, 1989. Proceedings, p.115-119, 24 refs.
Ice sheets, Paleoclimatology, Glacier oscillation, Ice age theory, Pleistocene, Climatic changes, Sea level, Glaciation, Models.
A complete three-dimensional thermo-mechanical ice-sheet model for the entire antarctic ice sheet, including an ice shelf, grounding line-dynamics and isostatic bed adjustment, is employed to simulate the response of the ice sheet during the last glacial-interglacial cycle with respect to changing environmental conditions. Model calculations started at 160 ka B.P. In line with glacial geological evidence, the most pronounced fluctuations are found in the West Antarctica ice sheet and appear to be essentially controlled by changes in eustatic sea level. Grounding occurs more readily in the Weddell Sea than in the

Ross Sea, and, due to the long time scales involved, the ice sheet does not reach its full glacial extent until 16 ka B P The concomitant disintegration of the West Antarctica ice sheet is triggered by a rise in sea level and takes around 6000 years to complete The ice sheet then halt close to the present state and no collapse takes place This Holocene deglaciation appears to have added 6-8 million cu km of ice to the world oceans, corresponding with an antarctic contribution to worldwide sea level of 12-15 m (Auth mod)

44-4175
**Feedback mechanism among decadal oscillations in Northern Hemisphere atmospheric circulation, sea ice, and ocean circulation**
Ikeda, M., *Annals of glaciology*, 1990, Vol 14, Symposium on Ice and Climate, Seattle, WA, Aug. 21-25, 1989. Proceedings, p 120-123 14 refs
Atmospheric circulation, Ocean currents, Sea ice distribution, Ice air interface, Climatic changes, Air water interactions, Models

44-4176
**Apparent one-year lag relationship of heavy snow years between Eurasia and North America.**
Iwasaki, T., *Annals of glaciology*, 1990, Vol.14, Symposium on Ice and Climate, Seattle, WA, Aug 21-25, 1989 Proceedings, p 124-126, 7 refs
Snow cover distribution, Seasonal variations, Snowfall, Climatic factors, Meteoroiogical data, Remote sensing.

44-4177
**Antarctic and southern ocean sea-ice and climate trends.**
Jacka, T H., *Annals of glaciology*, 1990, Vol.14, Symposium on Ice and Climate, Seattle, WA, Aug 21-25, 1989. Proceedings, p 127-130, 25 refs
Sea ice distribution, Ice edge, Climatic changes, Ice air interface, Air temperature, Data processing, Statistical analysis, Meteorological data
A computer-based climate monitoring project is described Data sets include monthly and annual mean surface temperatures and pressures for occupied stations in Antarctica, the southern ocean and South Pacific Ocean, and monthly antarctic sea-ice extent at each 10 deg of longitude Simple statistical analyses of the data sets reveal a mean warming of about 0 15C/10a since the mid 1950s for antarctic coastal stations and of about 0 04C/10a since the mid 1940s for the ocean stations The sea-ice record from 1973 to 1988 reveals that the average northern ice limit has decreased at about 0 23 deg lat /10a Despite apparently compatible long-term trends of temperature and sea-ice extent, annual fluctuations of temperature and ice extent are highly variable and are not well correlated (Auth )

44-4178
**Thinning of the ice sheet estimated from total gas content of ice cores in Mizuho Plateau, East Antarctica.**
Kameda, T., et al, *Annals of glaciology*, 1990, Vol.14, Symposium on Ice and Climate, Seattle, WA, Aug. 21-25, 1989. Proceedings, p.131-135, 27 refs
Nakawo, M , Mae, S , Watanabe, O., Naruse, R
Ice sheets, Glacier thickness, Ice cores, Paleoclimatology, Drill core analysis, Glacier oscillation, Climatic changes, Antarctica—Mizuho Plateau
A linear relation between total gas content in ice and the elevation of ice formation was obtained from 7 shallow ice cores in Mizuho Plateau The derived relation was applied to the vertical profile of total gas content in a 700 m long ice core A general trend of gradual increase in total gas content was observed from 600 to 200 m in depth After eliminating the effect of down-slope flow of ice around Mizuho Station it was estimated that the thickness of the ice sheet decreased by about 350 m at maximum during the last 2000 years This tendency also appears in the delta O-18 profile of the same ice core (Auth mod.)

44-4179
**Glacier fluctuations and climate in the Cordillera Blanca, Peru.**
Kaser, G., et al, *Annals of glaciology*, 1990, Vol 14, Symposium on Ice and Climate, Seattle, WA, Aug 21-25, 1989 Proceedings, p 136-140, 14 refs
Ames, A., Zamora, M.
Mountain glaciers, Glacier oscillation, Glacial meteorology, Glacier mass balance, Climatic changes, Glacier surveys, Peru

44-4180
**Meridional sea-ice transport and its impact on climate.**
Ledley, T S , *Annals of glaciology*, 1990, Vol 14, Symposium on Ice and Climate, Seattle, WA, Aug 21-25, 1989. Proceedings, p 141-143, 11 refs.
Sea ice distribution, Ice cover thickness, Ice air interface, Air temperature, Ice openings, Drift, Ice edge, Air water interactions, Models.

44-4181
**Impact of Milankovitch solar radiation variations on sea-ice and air temperature in a coupled energy-balance climate-sea-ice model.**
Ledley, T S., *Annals of glaciology*, 1990, Vol 14, Symposium on Ice and Climate, Seattle, WA, Aug. 21-25, 1989 Proceedings, p.144-147, 10 refs.
Solar radiation, Ice cover thickness, Air temperature, Ice age theory, Ice air interface, Paleoclimatology, Models, Air water interactions.

44-4182
**Glaciers and climate in Svalbard: statistical analysis and reconstruction of the Bröggerbreen mass balance for the last 77 years.**
Lefauconnier, B., et al, *Annals of glaciology*, 1990, Vol 14, Symposium on Ice and Climate, Seattle, WA, Aug. 21-25, 1989. Proceedings, p 148-152, 14 refs.
Hagen, J.O.
Glacial meteorology, Glacier mass balance, Climatic changes, Glacier oscillation, Glacier surveys, Statistical analysis, Norway—Svalbard.

44-4183
**Diurnal patterns of the bi-directional reflectance of fresh-water ice.**
Leshkevich, G.A., et al, *Annals of glaciology*, 1990, Vol 14, Symposium on Ice and Climate, Seattle, WA, Aug. 21-25, 1989. Proceedings, p.153-157, 16 refs.
Deering, D W , Eck, T.F , Ahmad, S P
Ice optics, Diurnal variations, Reflectivity, Albedo, Slush, Lake ice, Remote sensing

44-4184
**Satellite altimetry, semivariograms, and seasonal elevation changes in the ablation zone of West Greenland.**
Lingle, C.S., et al, *Annals of glaciology*, 1990, Vol.14, Symposium on Ice and Climate, Seattle, WA, Aug. 21-25, 1989 Proceedings, p.158-163, 20 refs.
Brenner, A.C , Zwally, H.J.
Ice sheets, Height finding, Glacier surfaces, Spaceborne photography, Remote sensing, Glacier surveys, Glacier oscillation, Analysis (mathematics), Greenland

44-4185
**Quantitative approximation of mountain glacial climates.**
Locke, W W., III, *Annals of glaciology*, 1990, Vol.14, Symposium on Ice and Climate, Seattle, WA, Aug. 21-25, 1989. Proceedings, p.164-167, 16 refs
Mountain glaciers, Paleoclimatology, Statistical analysis, Glacier mass balance, Climatic factors, Glacier oscillation

44-4186
**Climatic change in a high-altitude alpine area suggested by the isotopic composition of cold basal glacier ice.**
Lorrain, R , et al, *Annals of glaciology*, 1990, Vol 14, Symposium on Ice and Climate, Seattle, WA, Aug. 21-25, 1989 Proceedings, p 168-171, 20 refs.
Haeberli, W
Mountain glaciers, Isotope analysis, Climatic changes, Paleoclimatology, Glacier ice, Ice sampling, Switzerland Alps.

44-4187
**Late Wisconsin advance and retreat pattern in the Miami sublobe, Laurentide ice sheet.**
Lowell, T V , et al, *Annals of glaciology*, 1990, Vol 14, Symposium on Ice and Climate, Seattle, WA, Aug 21-25, 1989 Proceedings, p 172-175, 14 refs
Stuckenrath, R
Paleoclimatology, Ice sheets, Glacier oscillation, Glaciation, Quaternary deposits, Radioactive age determination, Stratigraphy.

44-4188
**Northern Hemisphere volcanic chemistry record (1869-1984) and climatic implications using a South Greenland ice core.**
Lyons, W B , et al, *Annals of glaciology*, 1990, Vol.14, Symposium on Ice and Climate, Seattle, WA, Aug. 21-25, 1989. Proceedings, p.176-182, 38 refs.
Mayewski, P A , Spencer, M J , Twickler M S Gracdel, T E
Ice cores, Volcanic ash, Climatic changes, Impurities, Air pollution, Chemical analysis, Greenland.

44-4189
**Effects of glaciation on methane-hydrate stability.**
MacAyeal, D.R., et al, *Annals of glaciology*, 1990, Vol 14, Symposium on Ice and Climate, Seattle, WA, Aug. 21-25, 1989. Proceedings, p.183-185, 10 refs.
Lindstrom, D.R.
Glaciation, Paleoclimatology, Atmospheric composition, Hydrates, Gases, Bottom sediment, Ice sheets, Climatic changes, Mathematical models.

44-4190
**Glaciochemical survey of the Summit region, Greenland.**
Mayewski, P.A., et al, *Annals of glaciology*, 1990, Vol 14, Symposium on Ice and Climate, Seattle, WA, Aug 21-25, 1989 Proceedings, p 186-190, 13 refs
Spencer, M.J., Twickler, M.S , Whitlow, S
Snow composition, Ice composition, Glacier ice, Chemical analysis, Ice cores, Atmospheric composition, Snow impurities, Greenland.

44-4191
**Air temperature and precipitation at Wolverine Glacier, Alaska; glacier growth in a warmer, wetter climate.**
Mayo, L R , et al, *Annals of glaciology*, 1990, Vol.14, Symposium on Ice and Climate, Seattle, WA, Aug 21-25, 1989. Proceedings, p.191-194, 14 refs
March, R S
Air temperature, Precipitation (meteorology), Climatic changes, Glacier mass balance, Glacier oscillation, Glacier alimentation, United States - Alaska—Wolverine Glacier

44-4192
**Chemical evidence in polar ice cores from dielectric profiling.**
Moore, J C , et al, *Annals of glaciology*, 1990, Vol.14, Symposium on Ice and Climate, Seattle, WA, Aug. 21-25, 1989. Proceedings, p.195-198, 27 refs
Paren, J.G , Mulvaney, R.
Ice cores, Ice electrical properties, Ice composition, Dielectric properties, Chemical analysis, Mathematical models, Impurities, Antarctica—Dolleman Island.
The dielectric stratigraphy of a 130 m ice core from Dolleman I , Antarctic Peninsula shows large variations in the dielectric relaxation process and in conductivity A comparison with the chemical stratigraphy of the core demonstrates the decisive role played by both acids and salts in determining the electrical behavior of natural ice The dielectric response is sensitive both to the type of impurity and to its distribution within the ice fabric The evidence supports other observations of the localization of sulphuric acid at three-grain boundaries in contrast, the salt impurity appears to be largely incorporated into the ice lattice The overriding importance of the dielectric profiling technique is that it is the only profiling tool so far developed that is sensitive to the presence of salt in polar ice cores (Auth )

44-4193
**Little Ice Age (neoglacial) paleoenvironmental conditions at Siple Station, Antarctica.**
Mosley-Thompson, E , et al, *Annals of glaciology*, 1990, Vol 14, Symposium on Ice and Climate, Seattle, WA, Aug 21-25, 1989. Proceedings, p.199-204, 34 refs
Thompson, L G., Grootes, P M., Gundestrup, N S
Ice cores, Climatic changes, Paleoclimatology, Meteorological data, Isotope analysis, Dust, Antarctica—Siple Station.
The 550-yr records of delta O-18 and dust concentrations from Siple Station suggest warmer and less dust atmospheric conditions from 1600 to 1830 A D which encompasses much of the Northern Hemisphere Little Ice Age (LIA) Dust and delta O-18 data from Amundsen-Scott Station indicate that the opposite conditions were prevalent there during the LIA Meteorological data from 1945-85 show that the LIA temperature opposition between Amundsen-Scott and Siple, inferred from delta O 18 is consistent with the present spatial distribution of surface temperature There is some observational evidence suggesting that under present conditions stronger zonal westerlies produce a temperature pattern similar to that of the LIA These regional differences demonstrate that a suite of spatially distributed, high resolution ice-core records will be necessary to characterize the LIA in Antarctica (Auth )

44-4194
**Climatic information from the Chongce Ice Cap, West Kunlun, China.**
Nakawo, M., et al, *Annals of glaciology*, 1990, Vol 14, Symposium on Ice and Climate, Seattle, WA, Aug. 21-25, 1989. Proceedings, p 205-207, 14 refs
Ageta, Y., Han, J.K.
Mountain glaciers, Ice composition, Climatic changes, Impurities, Chemical analysis, China—Kunlun Mountains.

44-4195
**Interpreting the field evidence of past ice sheets: structural stability and genericity.**
Nye, J.F., *Annals of glaciology*, 1990, Vol.14, Symposium on Ice and Climate, Seattle, WA, Aug 21-25, 1989 Proceedings, p 208-210, 5 refs
Ice sheets, Glacier oscillation, Glacier flow Mathematical models, Glacial geology

44-4196
**Investigating climate change by digital analysis of blue ice extent on satellite images of Antarctica.**
Orheim, O., et al, *Annals of glaciology*, 1990, Vol 14, Symposium on Ice and Climate, Seattle, WA, Aug 21-25, 1989 Proceedings, p.211-215, 12 refs
Lucchitta, B.
Climatic changes, Glacier surfaces, Snow cover distribution, Spaceborne photography, Remote sensing, Ice sheets, Data processing, Glacier surveys.
Landsat-5 Thematic Mapper (TM) and SPOT data collected 2 years apart from an identical area of Queen Maud Land have been analyzed to detect variations in surface features that may signal climatic change, and to establish a technique that readily identifies such changes It is found that selective principal component analysis on band ratios of near-IR, green, highlights changes in blue ice areas It is suggested that it generally takes longer to increase a blue ice area than to decrease it, and that blue ice extent is most sensitive to changes in accumulation rate The investigated blue ice area shows a decrease in extent over the 2 yr period caused by incursion of snow that probably resulted from an increase in accumulation rate Comparison of 2 TM images collected 18 days apart shows that transitory snow drifts have little effect on blue ice extent (Auth mod)

44-4197
**Identification of some global volcanic horizons by major element analysis of fine ash in antarctic ice.**
Palais, J.M, et al, *Annals of glaciology*, 1990, Vol.14, Symposium on Ice and Climate, Seattle, WA, Aug. 21-25, 1989. Proceedings, p.216-220, 20 refs.
Kirchner, S., Delmas, R J
Ice cores, Volcanic ash, Ice dating, Chemical analysis, Ice composition, Antarctica—Amundsen-Scott Station.
Results of a study of the chemical composition of insoluble microparticles filtered from 5 intervals of a core from the South Pole are reported These 5 intervals were identified as being due to volcanic fallout, on the basis of electrical conductivity and sulfuric acid measurements The major element composition of tiny (<5 microns) glass shards found in these layers was determined and compared with analyses of volcanic ash from known eruptions or from volcanic sources suspected of having produced the fallout Glass shards from volcanic eruptions of both local (Antarctic and subantarctic) and of global (Indonesian/South American) importance have been identified in this study (Auth mod)

44-4198
**Search for the Little Ice Age in southern ocean sea-ice.**
Parkinson, C L., *Annals of glaciology*, 1990, Vol 14, Symposium on Ice and Climate, Seattle, WA, Aug 21-25, 1989. Proceedings, p 221-225, 19 refs
Sea ice distribution, Climatic changes, Ice edge, Paleoclimatology, History.
Records from the expeditions of Cook, Bellingshausen Wilkes, and Ross in the late 18th and early 19th centuries have been examined for the information they provide on locations of sea ice edge during the Little Ice Age When these locations are compared with satellite derived ice edge locations in the mid 1970s, there is a suggestion of particularly heavy ice covers in the eastern Weddell Sea in Dec. 1772, in the Amundsen Sea in Mar 1839 and in a portion of the western Weddell Sea in Jan 1820 Many of the observations from the 4 expeditions indicate sea ice edge locations that lie within the range of ice edge locations at the same time of year in the mid 1970s, and a few of the observations suggest a less extensive ice cover than in the 1970s (Auth mod)

44-4199
**Impact of the Siberian high and Aleutian low on the sea-ice cover of the Sea of Okhotsk.**
Parkinson, C.L., *Annals of glaciology*, 1990, Vol.14, Symposium on Ice and Climate, Seattle, WA, Aug. 21-25, 1989. Proceedings, p.226-229, 10 refs
Sea ice distribution, Atmospheric pressure, Ice air interface, Statistical analysis, Okhotsk Sea.

44-4200
**Climate and the initiation of maritime ice sheets.**
Payne, A., et al, *Annals of glaciology*, 1990, Vol 14, Symposium on Ice and Climate, Seattle, WA, Aug 21-25, 1989. Proceedings, p.232-237, 14 refs.
Sugden, D.
Ice sheets, Glacier thickness, Paleoclimatology, Ice air interface, Glaciation, Glacier formation, Mathematical models, Scotland.

44-4201
**Modeling mass-balance changes during a glaciation cycle.**
Pelto, M S., et al, *Annals of glaciology*, 1990, Vol.14, Symposium on Ice and Climate, Seattle, WA, Aug. 21-25, 1989. Proceedings, p 238-241, 25 refs.
Higgins, S.M., Hughes, T.J., Fastook, J.L.
Glacier mass balance, Paleoclimatology, Glaciation, Climatic factors, Models
Identification of present day climate settings and alpine glacier-balance gradients indicates that the balance gradient of alpine glaciers is primarily determined by climatic conditions Determination of balance gradients for specific climatic settings on present-day ice sheets provides an analog for determining the mass balance on paleo and future ice sheets. (Auth)

44-4202
**Treatment of shortwave radiation and open water in large-scale models of sea-ice decay.**
Perovich, D.K, et al, *Annals of glaciology* 1990, Vol 14, MP 2759, Symposium on Ice and Climate, Seattle, WA, Aug 21-25, 1989 Proceedings, p.242-246, 12 refs.
Maykut, G.A.
Sea ice distribution, Ice melting, Solar radiation, Mathematical models, Ice water interface, Ice cover thickness, Ice air interface, Ice models, Ice edge
Sea ice covering the polar oceans is only a thin veneer whose areal extent can undergo large and rapid variations in response to relatively small changes in thermal forcing Positive feedback between variations in ice extent and global albedo has the potential to amplify small changes in climate Particularly difficult to model is the summer decay and retreat of the ice pack which is strongly influenced by shortwave radiation entering the upper ocean through leads Most models assume that all of this energy is expended in lateral melting at floe edges In reality, only a portion of shortwave radiation contributes directly to lateral melting, with the remainder going to bottom ablation and warming of the water This partitioning of shortwave radiation affects not only the magnitude, but also the character of the predicted ice decay, reducing the change in ice concentration and enhancing the thinning of the ice and the storage of heat in the water In this paper an analytical model is presented which includes many of these processes and is stable regardless of time step, making it suitable for use in climate simulations

44-4203
**Asynchronous coupling of ice-sheet and atmospheric forcing models.**
Pollard, D., et al, *Annals of glaciology*, 1990. Vol 14, Symposium on Ice and Climate, Seattle, WA, Aug 21-25, 1989 Proceedings, p.247-251, 19 refs
Muszynski, I., Schneider, S.H., Thompson, S.L
Ice sheets, Paleoclimatology, Mathematical models, Ice age theory, Glacier thickness, Glacier oscillation, Ice air interface.

44-4204
**Arctic Ocean multi-year ice balance, 1979-82.**
Rothrock, D A, et al, *Annals of glaciology*, 1990, Vol 14, Symposium on Ice and Climate, Seattle, WA, Aug 21-25, 1989. Proceedings, p.252-255, 10 refs.
Thomas, D.R.
Sea ice distribution, Mass balance, Ice conditions, Ice cover, Remote sensing, Data processing, Mathematical models.

44-4205
**Seasonal variation of oxygen isotopic composition of firn cores in the antarctic ice sheet.**
Satow, K, et al, *Annals of glaciology*, 1990, Vol 14, Symposium on Ice and Climate, Seattle, WA, Aug 21-25, 1989 Proceedings, p.256-260, 15 refs.
Watanabe, O
Ice cores, Isotope analysis, Ice sheets, Seasonal variations, Climatic changes, Oxygen isotopes, Antarctica—Mizuho Plateau.
Two 30 m cores from 2 different spots on Mizuho Plateau were analyzed Marked seasonal variations periodically appear in oxygen isotope records of the cores One core with no trace of snow melting had a complete record showing a change of annual net snow accumulations from 1920 through 1980. A variation of annual net accumulation has some relation with that of the annual maximum value of delta O-18 and annual amplitude of the delta O-18 change in an annual snow layer Power spectral analyses with respect to this variation indicate that there is a predominant periodicity of about five years. (Auth mod)

44-4206
**Glacier recession and lake shrinkage indicating a climatic warming and drying trend in Central Asia.**
Shi, Y.F., et al, *Annals of glaciology*, 1990, Vol.14, Symposium on Ice and Climate, Seattle, WA, Aug 21-25, 1989 Proceedings, p.261-265, 17 refs.
Ren, J.W
Mountain glaciers, Glacier melting, Climatic changes, Lakes, Glacier mass balance, Paleoclimatology

44-4207
**Simple parameterization of ice leads in a general circulation model, and the sensitivity of climate to change in antarctic ice concentration.**
Simmonds, I, et al, *Annals of glaciology* 1990, Vol.14, Symposium on Ice and Climate, Seattle, WA, Aug 21-25, 1989 Proceedings, p 266-269, 14 refs
Budd, W.F.
Ice openings, Atmospheric circulation, Air water interactions, Ice air interface, Sea ice distribution, Models, Polynyas
An experiment designed to assess the sensitivity of the modelled climate to the imposition of a 50% concentration in the winter antarctic sea ice is described Significant warming of up to 6 C takes place in the vicinity of and above the antarctic sea ice and is associated with significant changes in the zonal wind structure Pressure reductions are simulated over the sea ice, being particularly marked in the Weddell Sea region, and an anomalous east-west aligned ridge is simulated at about 60S. Very large changes in the sensible heat flux are simulated near the coast of Antarctica (Auth mod)

44-4208
**Isotopic method of estimating conductive heat flux through antarctic first-year sea ice.**
Souchez, R, et al, *Annals of glaciology*, 1990, Vol 14, Symposium on Ice and Climate, Seattle, WA, Aug 21-25, 1989 Proceedings, p 270-272, 12 refs.
Tison, J.L., Jouzel, J.
Sea ice, Isotope analysis, Ice heat flux.
The deuterium concentration profile in a first-year antarctic sea-ice cover is used to deduce a growth-rate curve, applying a previously published model Time variations of the conductive heat flux throughout the growth period are then estimated from this growth-rate curve Results indicate that the isotopic determination of sea ice growth rate can be considered as an alternate method for determining the conductive heat flux through a young sea-ice cover However, there is need for a further test of the method by measuring *in situ* temperatures and growth rates during the formation of first-year sea ice, and by analyzing the isotopic composition of ice samples taken simultaneously along selected profiles during the growth period (Auth.)

44-4209
**Is ice-stream evolution revealed by satellite imagery.**
Stephenson, S N, et al, *Annals of glaciology*, 1990, Vol 14, Symposium on Ice and Climate, Seattle, WA, Aug. 21-25, 1989. Proceedings, p.273-277, 15 refs.
Bindschadler, R.A.
Ice sheets, Glacier flow, Spaceborne photography, Remote sensing, Glacier surfaces, Crevasses, Glacier surveys.
Ten Landsat Thematic Mapper images together show Ice Streams E, D and most of Ice Stream C on Siple Coast, West Antarctica The images are interpreted to reveal aspects of both spatial and temporal evolution of the ice streams Onset of ice-stream flow appears to occur at distributed sites within the ice-stream catchment, and apparent enhanced flow continues in channels until they ... forming the main ice stream. Most crevassing on these ice streams is associated with features of horizontal dimensions between 5 and 20 km It is suggested that these features are caused by bed structures which may be an important source of restraint to ice flow, similar to ice rumples on ice shelves A pattern of features near the grounding line of the now-stagnant Ice Stream C are interpreted as having formed because there was a period of reduced flux before the ice stream stopped (Auth.)

44-4210
**Effect of area distribution with altitude on glacier mass balance—a comparison of North and South Klawatti glaciers, Washington State, U.S.A.**
Tangborn, W.V., et al, *Annals of glaciology*, 1990, Vol.14, Symposium on Ice and Climate, Seattle, WA, Aug. 21-25, 1989. Proceedings, p.278-282, 10 refs.
Fountain, A.G., Sikonia, W.G.
Mountain glaciers, Glacier mass balance, Altitude, Glacier surveys, Analysis (mathematics).

44-4211
**Twentieth-century glacier change at Svartisen, Norway: the influence of climate, glacier geometry and glacier dynamics.**
Theakstone, W.H., *Annals of glaciology*, 1990, Vol 14, Symposium on Ice and Climate, Seattle, WA, Aug. 21-25, 1989. Proceedings, p 283-287, 10 refs.
Mountain glaciers, Glacier oscillation, Climatic changes, Glacier mass balance, Glacier surveys, Norway—Svartisen.

44-4212
**Glacial stage ice-core records from the subtropical Dunde Ice Cap, China.**
Thompson, L.G., et al, *Annals of glaciology*, 1990, Vol 14, Symposium on Ice and Climate, Seattle, WA, Aug. 21-25, 1989. Proceedings, p.288-297, 34 refs.
Mountain glaciers, Ice cores, Paleoclimatology, Climatic changes, China—Dunde Ice Cap.

44-4213
**Laboratory study of heat flux through coastal polynyas during frazil-ice production.**
Ushio, S., et al, *Annals of glaciology*, 1990, Vol.14, Symposium on Ice and Climate, Seattle, WA, Aug. 21-25, 1989. Proceedings, p.298-300, 5 refs.
Wakatsuchi, M.
Ice heat flux, Frazil ice, Polynyas, Sea water freezing, Laboratory techniques.

44-4214
**Review of Central Asian glaciochemical data.**
Wake, C.P., et al, *Annals of glaciology*, 1990, Vol 14, Symposium on Ice and Climate, Seattle, WA, Aug. 21-25, 1989 Proceedings, p.301-306, 25 refs.
Mayewski, P.A., Spencer, M.J.
Mountain glaciers, Ice composition, Snow composition, Chemical analysis, Glacier surveys, Glacier ice, Ice sampling, Climatic factors.

44-4215
Topographic and glaciological controls on Holocene ice-sheet margin dynamics, central West Greenland.
Warren, C.R., et al, *Annals of glaciology*, 1990, Vol.14, Symposium on Ice and Climate, Seattle, WA, Aug. 21-25, 1989. Proceedings, p.307-310, 19 refs.
Hulton, N.R.J.
Ice sheets, Topographic effects, Glacier flow, Glacier oscillation, Glacier beds, Paleoclimatology, Geochronology, Glacial deposits, Greenland.

44-4216
Energy budgets over various types of terrain in polar regions.
Weller, G., et al, *Annals of glaciology*, 1990, Vol 14, Symposium on Ice and Climate, Seattle, WA, Aug 21-25, 1989. Proceedings, p.311-314, 27 refs.
Wendler, G.
Polar atmospheres, Radiation balance, Heat balance, Climatic changes, Climatic factors.
This paper summarizes typical energy-balance data for a variety of polar terrain types, to aid in a better understanding of climate and climate change. Terrain types examined include rock surfaces, glaciers and large ice sheets including those of Antarctica. For each of these terrains energy-balance-related parameters, including albedo, surface roughness, and thermal diffusivity of the subsurface and their seasonal variations are considered. Components of the surface energy balance, and particularly the net radiation or radiation balance, are presented on a seasonal basis. Net radiation is shown to be a poor indicator of climate, if used as the sole parameter, contradicting earlier conclusions by some climatologists. (Auth. mod.)

44-4217
Estimating oceanic heat flux from sea-ice thickness and temperature data.
Wettlaufer, J.S., et al, *Annals of glaciology*, 1990, Vol.14, Symposium on Ice and Climate, Seattle, WA, Aug. 21-25, 1989. Proceedings, p.315-318, 16 refs.
Untersteiner, N., Colony, R.
Ice cover thickness, Sea ice, Ice heat flux, Ice water interface, Air water interactions, Ice air interface, Models.

44-4218
Neoglaciation in the southern Kenai Mountains, Alaska.
Wiles, G.C., et al, *Annals of glaciology*, 1990, Vol.14, Symposium on Ice and Climate, Seattle, WA, Aug. 21-25, 1989. Proceedings, p.319-322, 23 refs.
Calkin, P.E.
Alpine glaciation, Mountain glaciers, Glacier oscillation, Climatic changes, Paleoclimatology, Glacier surveys, United States—Alaska—Kenai Mountains.

44-4219
Climatic record from an ice margin area in East Antarctica.
Yao, T.D., et al, *Annals of glaciology*, 1990, Vol.14, Symposium on Ice and Climate, Seattle, WA, Aug. 21-25, 1989. Proceedings, p.323-327, 31 refs.
Petit, J.R., Jouzel, J., Lorius, C., Duval, P.
Ice cores, Ice sheets, Paleoclimatology, Isotope analysis, Glacier oscillation, Ice dating, Antarctica—Dumont d'Urville Station.
Deuterium content, microparticle concentration, ice crystal size and bubble concentration have been studied along an 82 m ice core drilled down to the bedrock in the ice-sheet margin in East Antarctica. The Last Glacial maximum (LGM) is distinctly marked by low deuterium content, high concentration of microparticles, small ice crystals and high bubble concentrations. This core covers a significant part of the Last Glacial Period with ice from a warmer period recovered around a depth of 60 m. (Auth.)

44-4220
Flow resistance under an ice cover. [Soprotivleniia potoku pod ledianym pokrovom],
Pavlov, S.IA., et al, Gidravlika sooruzhenii (Hydraulics of structures), Kalinin, Universitet, 1988, p.28-33, In Russian. 12 refs.
Khapaeva, A.K., Iankovskii, N.B.
River flow, Ice cover effect, Ice water interface, Water flow, Mathematical models.

44-4221
Forest fires and long-term variation in the chemical composition of atmospheric precipitation and snow cover. [Lesnye pozhary i mnogoletniaia izmenchivost' khimicheskogo sostava atmosfernykh osadkov i snezhnogo pokrova],
Ivanov, A.V., et al, *Gidrokhimicheskie materialy*, 1989, Vol.95, p.3-14, In Russian. 3 refs.
Kashin, N.P.
Forest fires, Snow cover, Snow composition, Snow impurities, Atmospheric composition, Precipitation (meteorology), Analysis (mathematics).

44-4222
Reaction of arctic ice to warming associated with an increase of carbon dioxide in the atmosphere. [Reaktsiia arkticheskikh l'dov na poteplenie, sviazannoe s rostom soderzhaniia uglekislogo gaza v atmosfere],
Zakharova, O.K., *Leningrad. Gosudarstvennyi gidrologicheskii institut Trudy*, 1989, Vol.347, p.57-64, In Russian. 4 refs.
Sea ice distribution, Ice cover thickness, Climatic changes, Carbon dioxide, Ice air interface, Mathematical models.

44-4223
Change in the albedo of land in the zone of seasonal snow cover variations under possible climate warming. [Izmenenie al'bedo sushi v zone sezonnykh variatsii snezhnogo pokrova pri vozmozhnom poteplenii klimata],
Balkova, I.M., *Leningrad. Gosudarstvennyi gidrologicheskii institut Trudy*, 1989, Vol.347, p.65-74, In Russian. 19 refs.
Snow cover distribution, Albedo, Climatic changes, Seasonal variations.

44-4224
Effect of vertical wind shear on the distribution of artificial crystallization in thick supercooled cloud layers. [Vliianie vertikal'nogo sdviga vetra na rasprostranenie iskusstvennoi kristallizatsii v moshchnykh pereokhlazhdennykh oblachnykh sloiakh],
Bakhanov, V.P., et al, *Kiev. Ukrainskii regional'nyi nauchno-issledovatel'skii institut. Trudy*, 1989, Vol 230, p 3-11, In Russian. 9 refs.
Volynets, L.M., Voronov, G.S., Kudriavtseva, S.K., Manzhara, A.A.
Artificial nucleation, Wind factors, Supercooled clouds, Cloud seeding.

44-4225
Effect of various impurities on the ice forming efficiency of silver iodide aerosols. [O vliianii razlichnykh primesei l'doobrazuiushchuiu effektivnost' aerozolei iodida serebra],
Bakhanova, R.A., et al, *Kiev. Ukrainskii regional'nyi nauchno-issledovatel'skii institut Trudy*, 1989 Vol.230, p.11-19, In Russian. 11 refs.
Kiselev, V.I., Kuku, E.I., Olei'nik, R.V.
Cloud seeding, Nucleating agents, Silver iodide

44-4226
Data on wind in clouds suitable for seeding to increase precipitation in winter. [Nekotorye dannye o vetre v oblakakh, prigodnykh dlia zaseva s tsel'iu uvelicheniia osadkov v zimnii period],
Vaisblat, I.B., et al, *Kiev. Ukrainskii regional'nyi nauchno-issledovatel'skii institut. Trudy*, 1989, Vol.230, p.19-25, In Russian. 7 refs.
Petrova, S.A.
Wind factors, Cloud seeding, Artificial precipitation.

44-4227
Errors in measuring the winter precipitation layer by data from the precipitation gage network. [Oshibki izmerenna sloia zimnikh osadkov po dannym osadkomernoi seti],
Vinogradova, A.A., et al, *Kiev. Ukrainskii regional'nyi nauchno-issledovatel'skii institut. Trudy*, 1989, Vol.230, p 25-31, In Russian. 3 refs.
Petrova, S.A., Sukhinskii, A.N.
Precipitation (meteorology), Statistical analysis, Precipitation gages, Snowfall

44-4228
Dissipation of supercooled stratiform clouds by pyrotechnics. [Rasseianie pereokhlazhdennykh oblakov sloistykh form pirotekhnicheskimi izdeliiami],
Voronov, G.S., *Kiev. Ukrainskii regional'nyi nauchno-issledovatel'skii institut. Trudy*, 1989, Vol 230, p.31-38, In Russian. 3 refs.
Supercooled clouds, Cloud dissipation, Cloud seeding, Smoke generators.

44-4229
Dependence of precipitation in the cold season near industrial complexes on various characteristics of clouds and the atmosphere. [O zavisimostiakh osadkov khlognogo polugodiia vblizi promyshlennogo kompleksa ot nekotorykh kharakteristik oblakov i atmosfery],
Galadzhii, N.M., et al, *Kiev. Ukrainskii regional'nyi nauchno-issledovatel'skii institut. Trudy*, 1989, Vol.230, p.38-46, In Russian. 3 refs.
Akimov, N.M.
Precipitation (meteorology), Human factors, Statistical analysis, Air temperature, Wind velocity, Cloud cover.

44-4230
Effect of large industrial cities on solid precipitation. [Osobennosti vliianiia krupnogo promyshlennogo goroda na tversye osadki],
Zabolotskaia, T.N., et al, *Kiev. Ukrainskii regional'nyi nauchno-issledovatel'skii institut. Trudy*, 1989, Vol.230, p.46-55, In Russian. 7 refs.
Muchnik, V.M.
Snowfall, Human factors, Precipitation (meteorology), Statistical analysis, Snow depth.

44-4231
Frequency of thunderstorms and hail near an industrial city. [Chastota obrazovaniia groz i grada vblizi promyshlennogo goroda],
Zabolotskaia, T.N., et al, *Kiev. Ukrainskii regional'nyi nauchno-issledovatel'skii institut. Trudy*, 1989, Vol.230, p.55-59, In Russian. 5 refs.
Muchnik, V.M.
Thunderstorms, Hail, Human factors, Statistical analysis.

44-4232
Microstructure and phase structure of convective clouds in the steppes of the Ukraine. [Mikrostruktura i fazovoe stroenie konvektivnykh oblakov stepnoi chasti Ukrainy],
Kornienko, E.E., *Kiev. Ukrainskii regional'nyi nauchno-issledovatel'skii institut. Trudy*, 1989, Vol.230, p.66-71, In Russian. 11 refs.
Cloud seeding, Cloud droplets, Cloud physics, Nucleating agents.

44-4233
Evaluating the effect of weather modification on cumulonimbus clouds for artificial increase of precipitation. [Otsenka effekta vozdeistviia na kuchevodozhdevye oblaka s tsel'iu iskusstvennogo uvelicheniia osadkov],
Kornienko, E.E., et al, *Kiev. Ukrainskii regional'nyi nauchno-issledovatel'skii institut. Trudy*, 1989, Vol 230, p.71-101, In Russian. 26 refs.
Smorodintseva, L.I., Umanskii, N.S., Shedemenko, I.P.
Artificial precipitation, Cloud seeding, Weather modification, Statistical analysis.

44-4234
Relation between the effect of artificial increase of winter precipitation and the parameters of seeded clouds. [Sviaz' effekta iskusstvennogo uvelicheniia zimnikh osadkov s parametrami zasechannykh oblakov],
Ramenskaia, A.P., et al, *Kiev. Ukrainskii regional'nyi nauchno-issledovatel'skii institut. Trudy*, 1989, Vol 230, p.134-138, In Russian. 2 refs.
Sin'ko, N.V.
Artificial precipitation, Cloud seeding, Winter, Statistical analysis.

44-4235
Model of sea ice and the upper ocean mixed layer off Labrador.
Yao, T., et al, *Journal of geophysical research*, July 15, 1990, 95(C7), p.11,603-11,612, 22 refs.
Ikeda, M.
Sea ice distribution, Ice models, Ice water interface, Ocean currents, Mathematical models, Ice edge, Ice heat flux, Water temperature, Salinity, Canada—Labrador.

44-4236
Multiyear sea ice in the Arctic: model- and satellite-derived.
Walsh, J.E., et al, *Journal of geophysical research*, July 15, 1990, 95(C7), p.11,613-11,628, 30 refs.
Zwally, H.J.
Sea ice distribution, Ice models, Spaceborne photography, Mathematical models, Remote sensing, Ice cover thickness.

44-4237
Reflection and transmission characteristics at the edge of shore fast sea ice.
Fox, C., et al, *Journal of geophysical research*, July 15, 1990, 95(C7), p.11,629-11,639, 44 refs.
Squire, V.A.
Fast ice, Ice edge, Ocean waves, Ice water interface, Sea ice, Ice models, Mathematical models, Wave propagation.

44-4238
Evolution of the southern ocean winter mixed layer and sea ice: open ocean deepwater formation and ventilation.
Martinson, D.G., *Journal of geophysical research*, July 15, 1990, 95(C7), p.11,641-11,654, 27 refs.
Sea ice, Ice water interface, Polynyas, Salinity, Mathematical models, Heat flux, Antarctica—Weddell Sea.
An analytical model has been developed to describe the nature of the winter ocean/sea ice interaction in the southern ocean.

to determine the principal processes responsible for maintaining stability in this marginally stable region, and to predict the response to changes in the external forcing and initial conditions. The model accurately describes the sparse winter observations and the general temporal evolution of the ice, mixed layer depth, and salinity for the period following the elimination of the seasonal pycnocline by rapid fall ice growth. The discussion is limited to the eastern Weddell Sea area, considered to be the least stable in the southern ocean (Auth. mod.)

44-4239
Southern ocean winter mixed layer.
Gordon, A.L., et al, *Journal of geophysical research*, July 15, 1990, 95(C7), p.11,655-11,672, 40 refs.
Huber, B.A.
Sea ice, Ice water interface, Oceanographic surveys, Heat flux, Salinity.
Austral winter 1986 observations from the *Polarstern* along the Greenwich meridian from the ice edge to the antarctic margin show the mixed layer beneath the winter sea ice cover to be significantly depressed in oxygen saturation. Incorporation of Weddell Deep Water (WDW) into the winter mixed layer, responsible for this undersaturation, also introduces heat and salinity into the surface layer which strongly influences the mixed layer, sea-air exchanges and sea ice formation processes. The air temperatures during the cruise are just sufficient to remove the WDW heat input in the presence of observed ice thickness and concentration. This suggests that the sea ice cover and WDW heat input into the mixed layer are in approximate balance by midwinter. As a consequence of circulation/topography interaction, the Maud Rise water column stands out as an anomaly relative to the surrounding region, with a significantly more saline and dense mixed layer. It is hypothesized that spin-up of the Weddell Gyre's barotropic circulation induced by an increase of the regional wind stress curl would enhance the probability of polynya development over Maud Rise. (Auth. mod.)

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Overview of the current NASA program on aircraft icing research.
Ranaudo, R.J., et al, *SAE transactions*, 1988, Vol.97(Sec.1), p.1977-1994, 17 refs.
Reehorst, A.L., Potapczuk, M.G.
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Structural dynamics of electro-impulse de-icing on the Lear Fan Kevlar composite leading edge.
Paramasivam, T., et al, *SAE transactions*, 1985. Vol.94(Sec.4), p.4.768-4.776.
Zumwalt, G.W.
Aircraft icing, Ice removal, Electric equipment, Materials, Mechanical tests, Ice adhesion.

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Gardner, N.J., *ACI materials journal*, Jan.-Feb. 1990, 87(1), p.68-78, 12 refs.
Concrete admixtures, Concrete curing, Concrete strength, Temperature effects, Mechanical tests, Water temperature, Mechanical properties.

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Perkins, F.M.
Soil freezing, Thermal conductivity, Measurement, Soil water migration, Heat transfer, Soil tests, Soil temperature.

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Experimental study of freeze-coating on a chilled axially moving wire.
Cheung, F.B., et al, *Experimental thermal and fluid science*, July 1990, 3(4), p.431-439, 23 refs.
Pellizzari, R.O., Cha, S.W.
Ice formation, Hydrodynamics, Glaze, Temperature effects, Coatings, Simulation.

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Fluid mechanics of solidification.
Huppert, H.E., *Journal of fluid mechanics*, Mar. 1990, Vol.212, p.209-240, 73 refs.
Liquid cooling, Phase transformations, Liquid solid interfaces, Fluid mechanics, Freezing, Temperature effects, Stefan problem, Crystal growth.

44-4246
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Rossi, A., *SAE transactions*, 1988, Vol.97(Sec.3), p.3.970-3.980, 21 refs.
Crude oil, Viscosity, Chemical composition, Cold weather performance, Manufacturing, Hydrocarbons, Admixtures, Chemical analysis.

44-4247
Use of dimethyl ether as a starting aid for methanol-fueled SI engines at low temperatures.
Kozole, K.H., et al, *SAE transactions*, 1988, Vol.97(Sec.3), p.3.1079-3.1097, 24 refs.
Wallace, J.S.
Engines, Cold weather performance, Fuels, Fuel additives, Hydrocarbons, Chemical properties.

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Enhancing low-temperature phase stability of a 50/50 methanol/hydrocarbon blend.
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Shah, D.O., Brinkman, N.D.
Fuels, Fuel additives, Cold weather performance, Temperature effects, Hydrocarbons, Chemical properties.

44-4249
Interpretation of hydrologic effects of climate change in the Sacramento-San Joaquin River Basin, California.
Lettenmaier, D.P., et al, Potential effects of global climate change on the United States. Appendix A. Water resources, Washington, D.C., U.S Environmental Protection Agency, May 1989, p.1/1-1/52, PB90-171968, 19 refs.
Gan, T.Y., Dawdy, D.R.
Climatic changes, River basins, Snowmelt, Hydrology, Runoff, Water supply, Models, United States—California.

44-4250
Effects of climate changes on the Laurentian Great Lakes levels.
Croley, T.E., II, et al, Potential effects of global climate change on the United States. Appendix A. Water resources, Washington D.C., U.S Environmental Protection Agency, May 1989, p.4/1-4/34, PB90-171968, 57 refs.
Hartmann, H.C.
Climatic changes, Lakes, Water level, Snowmelt, Ice cover effect, Runoff, Models, Great Lakes.

44-4251
Impact of global warming on Great Lakes ice cycles.
Assel, R.A., Potential effects of global climate change on the United States. Appendix A. Water resources, Washington, D.C., U.S. Environmental Protection Agency, May 1989, p.5/1-5/30, PB90-171968, 24 refs.
Climatic changes, Lake ice, Ice conditions, Ice cover, Ice models, Great Lakes.

44-4252
Study on the climate characteristics over King Sejong Station, Antarctica (1988-1989).
Lee, B.Y., et al, *Korean journal of polar research*, June 1990, 1(1), p.47-57, In Korean with English summary. 6 refs.
Kim, D.H., Kim, Y.
Snow accumulation, Meteorological charts, Antarctic—King Sejong Station.
Monthly summaries of meteorological data, collected from Feb. 1988 to Dec. 1989 at King Sejong Station, are presented, showing the following averages: pressure, 989.9 mb, air temperature, 1.5 C, wind speed, 8.0 m/s, with northerly direction; and relative humidity, 88%. The mean value of cloudiness was 6.7 octas; days of precipitation were 357, and of fogginess 229. It is suggested that this type of weather pattern is due the latitudinal and geographic position of the station, which is strongly influenced by the ocean. (Auth. mod.)

44-4253
Environment around King Sejong Station, King George Island, Antarctica in 1988/89.
Chang, S.K., et al, *Korean journal of polar research*, June 1990, 1(1), p.59-65, In Korean with English summary. 3 refs.
Kim, D.Y., Lee, B.Y., Chung, H.S.
Snow accumulation, Meteorological data, Ecology, Antarctica—King Sejong Station.
Meteorological data collected around King Sejong Station from Feb 1988 to Feb 1989 show the following: a mean temperature of -1.9 C, with a minimum of -19.9 C and a maximum of 10.4 C measured in late Aug. and mid Dec., respectively; a mean wind speed of 7.3 m/s, and gusts of 43.3 m/s recorded in late Dec. Raised beaches and moraine deposits developed in the vicinity of the station; a rookery of Gentoo and Chinstrap penguins, and several species of seabirds, were observed 2 km south of the station. At Potter Cove, growth of *Deschampsia antarctica* was found at the northern flat area, and several families of elephant seals were seen on the northern beach. Maxwell Bay and Marian Cove were frozen from early July to late Sep., when the sea ice broke and was carried away by strong winds. (Auth. mod.)

44-4254
Global change over the last climate cycle from the Vostok ice core record (Antarctica).
Jouzel, J., et al, *Quaternary international*, 1989. Vol.2, p.15-24, 89 refs.
Ice cores, Paleoclimatology, Climatic changes, Glacier oscillation, Antarctica—Vostok Station.
The recently obtained Vostok record provides detailed information over the last climatic cycle (160 ka). In comparison with current Holocene conditions, the Last Glacial Maximum (20 ka BP) is characterized by much colder conditions (up to 10 C) and reduced precipitation (x 1/2). A large increase of continental and marine aerosols is explained by a more vigorous large scale atmospheric circulation associated with changing continental deserts and shelves as well as changes in sea ice extent. The drastic climatic change occurring at the last glacial termination is correlated with a large increase of atmospheric CO2 (from about 200 to 270 ppmv). The isotopic temperature record from the Vostok ice core depicts two drastic glacial-interglacial terminations (around 15 and 140 ka BP) and a long glacial period (110-15 ka BP) which includes two interstadials. Full glacial stages are characterized by larger aerosol loadings. The CO2 record of global significance is well correlated with the isotope temperature profile, being high (270 ppmv) during interglacials and low (200 ppmv) during full glacial conditions. Spectral analysis of the Vostok temperature record supports the existence of a relationship between the Pleistocene climate and orbital forcing. On the other hand, the existence of a CO2-climate correlation suggests that CO2 changes have had an important climatic role in amplifying the relatively weak orbital forcing. (Auth.)

44-4255
Primary effluent as a heat source for heat pumps.
Phetteplace, G.E., et al, *ASHRAE technical data bulletin*, 1989, 5(6), MP 2760, p.12-17, 4 refs. For another version see 43-2160.
Ueda, H.T.
Heat transfer, Heat sources, Sewage treatment, Heat recovery, Water treatment, Waste treatment.
Water-source heat pumps have been installed in two waste treatment buildings at Ft. Greely, AK. These heat pumps use primary effluent as a source of heat. Intermediate loops circulating an ethylene glycol/water mixture are used to transfer heat from the effluent heat exchangers to the heat pump evaporators. In one case, heat exchange is accomplished via an embossed panel heat exchanger immersed directly in the effluent. In the other case, the effluent heat exchanger is a plate-and-frame unit.

44-4256
Analysis of ice formation with flow reversal for application to a water source heat pump.
Aceves-Saborio, S.M., et al, *ASHRAE technical data bulletin*, 1989, 5(6), p.27-35, 7 refs. For another version see 44-3030.
Reistad, G.M., Nakamura, H.
Heat transfer, Heat sources, Ice formation, Water flow, Defrosting, Mathematical models, Ice makers.

44-4257
Late Quaternary glacial and vegetative history of the Glacier National Park region, Montana.
Carrara, P.E., *U.S. Geological Survey. Bulletin*, 1989, No.1902, 64p., Refs. p.55-58.
Mountain glaciers, Glacier melting, Revegetation, Paleoclimatology, Quaternary deposits, Paleobotany, Glacier oscillation, Volcanic ash, Alpine glaciation, United States—Montana—Glacier National Park.

44-4258
Note on the improvement of TIROS operational vertical sounder temperature retrievals above the antarctic snow and ice fields.
Lutz, H.J., et al, *Journal of geophysical research*, July 20, 1990, 95(D8), p.11,747-11,754, 12 refs.
Smith, W.L., Raschke, E.
Radiance, Data processing, Sounding, Meteorological data.
The problem of retrieving temperature and moisture profiles in the antarctic regions using radiance observations from the TIROS operational vertical sounder (TOVS) is discussed. The high-resolution infrared sounder (HIRS) data are calibrated with the internal cold and warm blackbodies in order to alleviate apparent calibration discrepancies resulting from using space as a cold reference. Significant improvements of the simultaneous retrieval results have been achieved in using a climatological first guess and selected channels of HIRS as a result of this change in calibration procedure. The retrieval results of the orbit at Dec. 21, 1987 (2345 UT) are compared with radiosonde data and analyses of the European Center of Medium Range Weather Forecasts (ECMWF) of Dec. 22, 1987 (0000 UT). (Auth.)

44-4259
Ice-core record of atmospheric response to anthropogenic sulphate and nitrate.
Mayewski, P.A., et al, *Nature*, Aug. 9, 1990, 346(6284), p.554-556, 14 refs.
Lyons, W.B., Spencer, M.J., Twickler, M.S., Buck, C.F., Whitlow, S.
Ice cores, Atmospheric composition, Pollution, Greenland.

44-4260
National Weather Service gamma snow system physics and calibration.
Fritzsche, A.E., *U.S. National Oceanic and Atmospheric Administration. National Weather Service Report*, Dec 1987, NWS-8201, 37p., 5 refs
Snow surveys, Snow water equivalent, Gamma irradiation, Aerial surveys, Isotope analysis, Analysis (mathematics), Remote sensing.

44-4261
Evaluation of the collection, archiving and publication of daily snow data in the United States.
Robinson, D.A., *Physical geography*, Apr-June 1989, 10(2), p.120-130, 20 refs.
Snow surveys, Snow depth, Snow cover distribution, Meteorological data.

44-4262
Explosive waves in snow.
Liakhov, G.M., et al, *Combustion, explosion and shock waves*, July-Aug. 1989 (Pub. 1990), 25(4), p.493-499, Translated from Fizika goreniia i vzryva. 9 refs
Sabitskaia, V.I., Averchenko, A.M., Zakharov, S.D., Bakhrushina, L.G.
Detonation waves, Snow strength, Wave propagation, Snow compression, Explosion effects

44-4263
Mechanism of H+, Li+, Na+, Be+ and Mg2+ ion diffusion in ice-like structures. (Mekhanizm diffuzii ionov H+, Li+, Na+, Be2+ i Mg2+ v podobnykh strukturakh),
Pinchuk, V.M., et al, *Zhurnal neorganicheskoi khimii*, Dec. 1988, 33(12), p.2993-2996. In Russian. 13 refs.
Shevardina, L.B., Vladimirova, V.G.
Water structure, Molecular structure, Ion diffusion, Ice structure.

44-4264
Theoretical estimates of light reflection and transmission by spatially complex and temporally varying sea ice covers.
Perovich, D.K., *Journal of geophysical research*, June 15, 1990, 95(C6), MP 2761, p.9557-9567, 25 refs.
For another version see 44-3816.
Sea ice, Ice cover, Ice optics, Light transmission, Ice models, Mathematical models, Reflection, Ice surface, Ice cover thickness
The focus of this paper is on ice reflection and transmission of light by spatially inhomogeneous and temporally varying sea ice covers. This is investigated using a two-stream, multilayer radiative transfer model in the wavelength region from 400 to 1000 nm. The model is computationally simple and utilizes the available experimental data on the optical properties of sea ice. The ice cover is characterized as a layered medium composed of selections from nine distinct snow and ice types. Three case studies are presented illustrating values of spectral albedo, transmittance, and transmitted photosynthetically active radiation (PAR) for (1) a spatially inhomogeneous ice cover, (2) a uniform ice cover as it undergoes a melt cycle, and (3) a temporally changing spatially variable ice cover. Results indicate that small-scale horizontal variations in snow depth and ice thickness can cause light transmission to change over 3 orders of magnitude. Dramatic changes in light reflection and transmission are predicted in the early part of the melt season as the ice cover evolves from an opaque, snow-covered medium to translucent bare or ponded ice

44-4265
Development of an airborne sea ice thickness measurement system and field test results.
Kovacs, A., et al, *U.S. Army Cold Regions Research and Engineering Laboratory*, Dec. 1989, CR 89-19, 47p., ADA-224-867, 23 refs.
Holladay, J.S.
Sea ice, Ice cover thickness, Ice surveys, Aerial surveys, Radio echo soundings, Pressure ridges, Ice electrical properties
Recent efforts to improve airborne electromagnetic induction measurement technology and to downsize the related helicopter-towed antenna assembly from about 7.5 m long to about 3.5 m long for use in airborne measurement of sea ice thickness are discussed, as are the results from arctic field testing. Also examined are the system noise and drift problems encountered during arctic field evaluation, problems that adversely affected the quality of the sounding data. The sea ice sounding data indicate that it should be possible to determine thickness to within [illegible] for ice floes with moderate relief but that because of sounding footprint size and current model algorithm constraints, steep-sided pressure ridge keels cannot be well defined. The findings also indicate that routine sea ice thickness profiling from an airborne platform is close at hand with further system improvement, as is the apparent possibility to determine the conductivity of the sea ice, from which an assessment of sea ice strength can be made

44-4266
Optimization of hull form for future arctic tankers—phase 1. Summary report.
Luce, M.P., et al, *Transport Canada. Publication*, Sep. 1989, TP 10186E, 12p., With French summary.
Baker, D., Sneyd, A., Taylor, A.
Tanker ships, Design, Performance, Ice breaking, Design criteria.

44-4267
Earthwork construction.
Waidelich, W.C., *National Research Council. Transportation Research Board State of the art report*, 1990, No 8, Guide to earthwork construction. Edited by R.D. Holtz, p.25-48, 7 refs.
Earthwork, Cold weather construction, Soil texture, Soil temperature, Embankments.

44-4268
Environmental considerations.
McGuffey, V.C., et al, *National Research Council. Transportation Research Board State of the art report*, 1990, No.8, Guide to earthwork construction. Edited by R.D. Holtz, p.83-91, 7 refs.
Bellatty, T.A., Haas, W.M.
Earthwork, Environmental impact, Soil erosion, Frost action, Ground freezing, Environmental protection

44-4269
Classification of sea-ice images using a dual-polarized radar.
Orlando, J.R., et al, *IEEE journal of oceanic engineering*, July 1990, 15(3), p.228-237, 14 refs.
Mann, R., Haykin, S.
Sea ice, Radar echoes, Classifications, Data processing, Accuracy, Ice surface, Floating ice.

44-4270
Electron density distribution in ice Ih determined by single-crystal x-ray diffractometry.
Goto, A., et al, *Journal of chemical physics*, July 15, 1990, 93(2), p.1412-1417, 22 refs.
Hondoh, T., Mae, S.
X ray analysis, Ice crystal structure, Hydrogen bonds, Ice physics, X ray diffraction, Ice models, Lattice models.

44-4271
Snowmelt runoff modeling in a balsam fir forest with a variable source area simulator (VSAS2).
Prévost, M., et al, *Water resources research*, May 1990, 26(5), p.1067-1077, 30 refs.
Barry, R., Stein, J., Plamondon, A.P.
Snowmelt, Runoff, Forest soils, Models, Seepage, Runoff forecasting, Snow hydrology, Stream flow, Simulation.

44-4272
Generation and evolution of a water-condensate aerosol and prevention of icing of the air-intake lines of stationary gas turbines.
Bakhanov, V.P., et al, *Applied thermal sciences*, Sep.-Oct. 1988, 1(5), p.21-28, Translated from Promyshlennaia teplotekhnika. 8 refs.
Buykov, M.V., Yeshchenko, A.I., Manzhara, A.A.
Engines, Cold weather operation, Ice formation, Ice prevention, Aerosols, Gas pipelines, Mathematical models.

44-4273
Longest sub-freezing period in Newfoundland winters.
Schmidlin, T.W., *Climatological bulletin*, Dec. 1988, 22(3), p.35-42, With French summary. 7 refs.
Winter, Air temperature, Periodic variations, Freezing, Climatology, Meteorological data, Canada—Newfoundland.

44-4274
Spring and autumn freeze risk in Ontario.
Bootsma, A., et al, *Climatological bulletin*, Aug. 1989, 23(2), p.43-59, With French summary. 17 refs
Brown, D.M.
Air temperature, Frost forecasting, Seasonal variations, Meteorological data, Canada—Ontario.

44-4275
Seasonal snowfall totals in northern New England: recent trends and variability
Suchling, P.W., et al, *Climatological bulletin*, Aug. 1988, 22(2), p.14-25, With French summary. 20 refs.
Kunkel, M.B.
Snow accumulation, Seasonal variations, Meteorological data, Precipitation (meteorology), United States—New England.

44-4276
Leaky Rayleigh wave and Scholte wave at the interface between water and porous sea ice.
Weng, W., et al, *Acoustical Society of America. Journal*, June 1990, 87(6), p.2481-2488, 13 refs.
Yew, C.H.
Sea ice, Underwater acoustics, Sound transmission, Wave propagation, Ice water interface, Analysis (mathematics), Specular reflection, Sound waves.

44-4277
Role of methane clathrates in past and future climates.
MacDonald, G.J., *Climatic change*, June 1990, 16(3), p.247-281, Refs. p.278-281.
Clathrates, Gases, Carbon dioxide, Climatic changes, Paleoclimatology, Permafrost, Hydrocarbons, Stability.

44-4278
CO2 climate sensitivity and snow-sea-ice albedo parameterization in an atmospheric GCM coupled to a mixed-layer ocean model.
Meehl, G.A., et al, *Climatic change*, June 1990, 16(3), p.283-306, 23 refs.
Washington, W.M.
Albedo, Climatic changes, Ice cover effect, Air temperature, Carbon dioxide, Models, Soil water, Climatic factors, Sea ice distribution.

44-4279
Analysis of melting at the wall in laminar flow in a cylindrical channel.
Chun, M.H., et al, *International communications in heat and mass transfer*, July-Aug. 1990, 17(4), p.443-454, 5 refs.
Cho, S.J.
Ice melting, Convection, Laminar flow, Liquid solid interfaces, Temperature effects, Phase transformations, Mathematical models.

44-4280
Analysis of high-frequency multitone transmissions propagated in the marginal ice zone.
Catipovic, J.A., et al, *Acoustical Society of America Journal*, July 1990, 88(1), p.185-190, 9 refs.
Baggeroer, A.B.
Underwater acoustics, Sea ice, Sound transmission, Wave propagation, Acoustic measurement, Telecommunication, Subglacial observations, Data processing

44-4281
Class A prediction of arctic caisson performance discussion and reply.
Sladen, J.A., et al, *Géotechnique*, June 1990, 40(2), p.299-302, 4 refs. For article being discussed see 43-1469.
Hewitt, K.J., Hicks, M.A., Smith, I.M.
Caissons, Ice loads, Offshore structures, Performance, Forecasting, Measurement, Floating ice.

44-4282
Shipborne AVHRR-HRPT receiving and image processing system for polar research.
Vachoff, T., *International journal of remote sensing*, May 1990, 11(5), p.877-886, 15 refs.
Ice navigation, Spaceborne photography, Data processing, Sea ice, Radiometry, Icebreakers, Oceanography, Antennas.

44-4283
Monte Carlo study of melting of a model bulk ice, Han, K.K., Rolla, University of Missouri, 1989, 8[illegible] University Microfilms order No.DA9008379, Ph. thesis. 76 refs.
Ice melting, Ice crystal structure, Melting points, Statistical analysis, Ice models, Molecular structure, Phase transformations, Computerized simulation

44-4284
Simulation of hydraulics and thermal-ice regime in river networks.
Gunaratna, P.P., Potsdam, NY, Clarkson University, 1990, 274p., University Microfilms order No. DA9003533, Ph.D. thesis. 68 refs.
River ice, River flow, Computerized simulation, Hydraulics, Ice conditions, Ice models, Mathematical models, Ice cover thickness, Thermal regime.

44-4285
Dynamics and origin of saline soils on the Slims River Delta, Kluane National Park, Yukon Territory.
Harris, S.A., *Arctic*, June 1990, 43(2), p.159-175, With French summary. 67 refs.
Saline soils, Cryogenic soils, Soil surveys, Seasonal freeze thaw, Soil formation, Salinity, Permafrost, Canada—Yukon Territory

44-4260
National Weather Service gamma snow system physics and calibration.
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Earthwork, Cold weather construction, Soil texture, Soil temperature, Embankments.

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44-4272
Generation and evolution of a water-condensate aerosol and prevention of icing of the air-intake lines of stationary gas turbines.
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Engines, Cold weather operation, Ice formation, Ice prevention, Aerosols, Gas pipelines, Mathematical models.

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Longest sub-freezing period in Newfoundland winters.
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Winter, Air temperature, Periodic variations, Freezing, Climatology, Meteorological data, Canada—Newfoundland.

44-4274
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Air temperature, Frost forecasting, Seasonal variations, Meteorological data, Canada—Ontario.

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Snow accumulation, Seasonal variations, Meteorological data, Precipitation (meteorology), United States—New England.

44-4276
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Yew, C.H.
Sea ice, Underwater acoustics, Sound transmission, Wave propagation, Ice water interface, Analysis (mathematics), Specular reflection, Sound waves.

44-4277
Role of methane clathrates in past and future climates.
MacDonald, G.J., *Climatic change*, June 1990, 16(3), p.247-281, Refs. p.278-281.
Clathrates, Gases, Carbon dioxide, Climatic changes, Paleoclimatology, Permafrost, Hydrocarbons, Stability.

44-4278
CO2 climate sensitivity and snow-sea-ice albedo parameterization in an atmospheric GCM coupled to a mixed-layer ocean model.
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Albedo, Climatic changes, Ice cover effect, Air temperature, Carbon dioxide, Models, Soil water, Climatic factors, Sea ice distribution.

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Ice melting, Convection, Laminar flow, Liquid solid interfaces, Temperature effects, Phase transformations, Mathematical models.

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Analysis of high-frequency multitone transmissions propagated in the marginal ice zone.
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Underwater acoustics, Sea ice, Sound transmission, Wave propagation, Acoustic measurement, Telecommunication, Subglacial observations, Data processing.

44-4281
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Ice navigation, Spaceborne photography, Data processing, Sea ice, Radiometry, Icebreakers, Oceanography, Antennas.

44-4283
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Ice melting, Ice crystal structure, Melting points, Statistical analysis, Ice models, Molecular structure, Phase transformations, Computerized simulation.

44-4284
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44-4285
Dynamics and origin of saline soils on the Slims River Delta, Kluane National Park, Yukon Territory.
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Saline soils, Cryogenic soils, Soil surveys, Seasonal freeze thaw, Soil formation, Salinity, Permafrost, Canada—Yukon Territory.

44-4309
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Artificial freezing, Permafrost beneath structures, Bridges, Foundations, Soil freezing.

44-4310
Study on methods to preserve permafrost in bridge pier foundations on the Baykal-Amur railroad. (Issledovanie sposobov sokhraneniia vechnomerzlykh gruntov v osnovaniiakh ustoev mostov na BAMj,
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Permafrost beneath structures, Permafrost preservation, Bridges, Foundations.

44-4311
Study on the stability of culverts on the Baykal-Amur railroad. (Issledovanie ustoĭchivosti vodopropusknykh trub na BAMj,
Volkov, V.N., Lineĭnye sooruzheniia na vechnomerzlykh gruntakh (Linear structures on permafrost). Edited by I.A. Nekrasov, Moscow, Nauka, 1990, p.129-137, In Russian.
Culverts, Permafrost beneath structures, Soil stabilization

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Tupitsyn, V.S.
Frost mounds.

44-4313
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Minaĭlov, G.P., Lineĭnye sooruzheniia na vechnomerzlykh gruntakh (Linear structures on permafrost) Edited by I.A. Nekrasov, Moscow, Nauka, 1990, p.146-153, In Russian 8 refs.
Permafrost thermal properties, Permafrost beneath roads, Embankments, Thermal regime, Railroads.

44-4314
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Solodovnikov, B.I., et al, Lineĭnye sooruzheniia na vechnomerzlykh gruntakh (Linear structures on permafrost). Edited by I.A. Nekrasov, Moscow, Nauka, 1990, p.153-157, In Russian.
Solodovnikov, A.B.
Permafrost beneath roads, Highway planning.

44-4315
Dynamics of permafrost under natural conditions and during destruction of ground covers in the Zeya region. (Dinamika kriolitozony v estestvennykh usloviiakh i pri unichtozhenii napochvennykh pokrovov v raĭone Zeĭskaj,
Zabolotnik, S.I., Lineĭnye sooruzheniia na vechnomerzlykh gruntakh (Linear structures on permafrost). Edited by I.A. Nekrasov, Moscow, Nauka, 1990, p.157-167, In Russian. 10 refs.
Permafrost preservation, Environmental impact, Snow cover effect, Vegetation factors.

44-4316
Maximum power of a self-regulating cooling device with a slightly inclined evaporator. (Predel'naia moshchnost' samoreguliruiushchegosia okhlazhdaiushchego ustroĭstva so slabonaklonnym isparitelem),
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Shirikhin, IU.N.
Artificial freezing, Permafrost preservation, Soil freezing, Permafrost beneath structures, Permafrost thermal properties, Analysis (mathematics).

44-4317
Influence of sea ice on coastal erosion in the Canadian Beaufort Sea. (L'influence de la glace de mer sur l'érosion littorale en mer de Beaufort canadienne),
Héquette, A., *Revue de géomorphologie dynamique*, 1989, 38(3), p.81-98, In French with English summary. 68 refs.
Sea ice, Shore erosion, Ice scoring, Beaufort Sea.

44-4318
Change in the ice regime of the lower Syrdar'ya due to runoff diversion. (Ob izmenenii ledovogo rezhima nizhnego techeniia Syrdar'i v sviazi s iz"iatiem stoka),
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River ice, Ice conditions, Runoff

44-4319
Contemporary Tien Shan glacier oscillations in climate diagnostics of recent years. (Sovremennye kolebaniia lednikov Tian'-Shania v diagnoze klimata poslednikh let),
Denisova, T.IA., et al, *Alma-Ata. Kazakhskiĭ regional'nyĭ nauchno-issledovatel'skiĭ gidrometeorologicheskiĭ institut. Trudy*, 1988, Vol.102, p.128-135, In Russian. 6 refs.
Makarevich, K.G., Chichasov, G.N.
Mountain glaciers, Glacier oscillation, Climatic changes, Analysis (mathematics).

44-4320
Calculating the ice regime of rivers and channels. (K raschetu ledovogo rezhima rek i kanalov),
Gal'perin, R.I., *Alma-Ata. Kazakhskiĭ regional'nyĭ nauchno-issledovatel'skiĭ gidrometeorologicheskiĭ institut. Trudy*, 1988, Vol.102, p.135-147, In Russian. 6 refs.
River ice, Ice conditions, Analysis (mathematics)

44-4321
Method of measuring nucleation activity of water. (Metod izmereniia nukleatsionnoĭ aktivnosti vody),
Bilková, E., et al, *Moscow. Tsentral'naia aerologicheskaia observatoriia. Trudy*, 1989, Vol.174, p.111-121, In Russian with English summary. 13 refs.
Dubrovský, M., Petera, V., Školoud, O.
Ice nuclei, Nucleation rate, Cloud droplets

44-4322
Snowfall forecasting meteorological service for motor vehicle transportation. (O meteorologicheskom obespechenii avtopredprnatiĭ prognozami snegopadov),
Kuprienko, V.G., et al, *Leningrad. Glavnaia geofizicheskaia observatoriia. Trudy*, 1989, Vol.528, p.33-37, In Russian. 6 refs.
Braginskaia, L.L.
Weather forecasting, Snowfall, Road maintenance.

44-4323
Evaluating the economic efficiency of road icing forecasts. (Ob otsenke ekonomicheskoĭ effektivnosti prognozov gololeda na dorogakh),
Braginskaia, L.L., et al, *Leningrad. Glavnaia geofizicheskaia observatoriia. Trudy*, 1989, Vol.528, p.38-43, In Russian. 7 refs.
Kuprienko, V.G.
Road icing, Ice forecasting, Economic analysis.

44-4324
Economic effect of hydrometeorological and ice information for arctic navigation. (Ekonomicheskiĭ effekt gidrometeorologicheskoĭ i ledovoĭ informatsii pri obespechenii sudokhodstva v Arktike),
Murzin, A.I., *Leningrad. Glavnaia geofizicheskaia observatoriia. Trudy*, 1989, Vol.528, p.75-81, In Russian.
Ice reporting, Ice navigation, Economic development.

44-4325
Decision-making aids for winter maintenance. (Systèmes d'aide à la décision pour la viabilité hivernale),
*Revue générale des routes et des aérodromes*, June 1990, No.675, p.17-23, In French with English summary.
Road maintenance, Winter maintenance, Snow removal, Ice reporting, Road icing.

44-4326
Winter in the Haut-Doubs region of France. (L'hiver dans le Haut-Doubs),
Vallet, R., *Revue générale des routes et des aérodromes*, June 1990, No.675, p.25-29, In French with English summary
Road maintenance, Snow removal, Winter maintenance.

44-4327
GFS 2000 icing detection system. (Détection de verglas système GFS 2000),
Marc, J.L., *Revue générale des routes et des aérodromes*, June 1990, No.675, p.30-33, In French
Road icing, Ice detection, Ice reporting, Road maintenance.

44-4328
Satellite ocean color studies of antarctic ice edges in summer and autumn.
Comiso, J.C., et al, *Journal of geophysical research*, June 15, 1990, 95(C6), p.9481-9496, Refs. p.9495-9496.
Maynard, N.G., Smith, W.O., Jr., Sullivan, C.W.
Ice edge, Spaceborne photography, Algae, Sea ice distribution, Antarctica—Weddell Sea.
Large areas of elevated phytoplankton pigment concentrations were observed using CZCS satellite data in the Weddell Sea marginal ice zone and adjacent regions during the austral summer-autumn transition. The study was made in conjunction with *in situ* observations of pigment levels and ice data derived from satellite passive microwave observations. Phytoplankton blooms, about 200 km wide and extending several hundred kilometers along the ice edge, were observed. A time series in Marguerite Bay also shows the persistence of a bloom for at least 12 days and significant effects on spatial distribution of the phytoplankton due to ocean and sea ice movement. An unusual pattern of sea ice formation in the Weddell Sea was also observed in a series of CZCS images near the Greenwich meridian. Turbulent oceanic and atmospheric forcings are suggested during the early stages of development of sea ice in the region, and may account for the low pigment concentrations observed adjacent to the area. This study shows that ice edge phytoplankton blooms are not simply a spring-summer feature but extend into the austral autumn, and that they may contribute significantly to regional productivity. (Auth. mod.)

44-4329
Influences of atmospheric half-yearly cycle on the sea ice extent in the Antarctic.
Enomoto, H., et al, *Journal of geophysical research*, June 15, 1990, 95(C6), p.9497-9511, Refs. p.9510-9511.
Ohmura, A.
Sea ice distribution, Ice edge, Meteorological factors
The relationship between sea ice and weather, one of the least known components of the climatic systems, could be an important factor for the climate of high latitudes. The annual cycle of the sea ice extent is characterized by an asymmetric development, with the sea ice area slowly advancing toward the equator in the winter and rapidly retreating in summer. In this study the seasonal asymmetric behavior of ice extent and the changes in sea ice concentration are shown to be linked to the atmospheric convergence line (ACL) around Antarctica. It is found that the relative positions of the ACL characterized by the half-year cycle exert a strong influence upon the mean movement of the sea ice. It is also observed from the investigations of the areal concentration of the sea ice that a decrease in ice concentration prior to the sea ice retreat is needed for a rapid retreat. (Auth.)

44-4330
Coupled sea ice-mixed layer-pycnocline model for the Weddell Sea.
Lemke, P., et al, *Journal of geophysical research*, June 15, 1990, 95(C6), p.9513-9525, 26 refs.
Owens, W.B., Hibler, W.D., III.
Ice models, Ice water interface, Sea ice distribution, Air water interactions, Paleoclimatology, Polynyas, Antarctica—Weddell Sea.
A dynamic-thermodynamic sea ice model is coupled to a one-dimensional model of the oceanic mixed layer and pycnocline and is applied to the Weddell Sea. This model prognostically determines the vertical oceanic heat flux from the mixed layer dynamics, in contrast to earlier sea ice modeling where the oceanic heat flux was prescribed. In addition to the standard simulation, polynya and paleoclimate experiments were performed to investigate the effects of sea ice dynamics. Furthermore, the mixed layer-pycnocline model is compared to the original Kraus-Turner approach. (Auth.)

44-4331
Sensitivity studies with a sea ice-mixed layer-pycnocline model in the Weddell Sea.
Owens, W.B., et al, *Journal of geophysical research*, June 15, 1990, 95(C6), p.9527-9538, 21 refs.
Lemke, P.
Sea ice, Ice models, Rheology, Ice water interface, Antarctica—Weddell Sea.
The sensitivity of a dynamic-thermodynamic sea ice model coupled to a one-dimensional mixed layer-pycnocline model to variations of dynamic and thermodynamic model parameters is investigated. Furthermore, the modifications of the model results due to the inclusion of a prognostic snow cover and the implementation of simplified sea ice rheologies are investigated. In these comparisons special emphasis is placed upon the ice-ocean boundary conditions (buoyancy fluxes) and the mixed layer properties. (Auth.)

44-4332
Coupled sea ice-mixed layer simulations for the southern ocean.
Stössel, A., et al, *Journal of geophysical research*, June 15, 1990, 95(C6), p.9539-9555, 30 refs.
Lemke, P., Owens, W.B
Ice models, Meteorological factors, Sea ice, Ice cover thickness, Ice water interface.
A coupled sea ice-mixed layer-pycnocline model for the Weddell Sea is extended to the entire sea ice area around the antarctic continent The monthly atmospheric forcing and the annual oceanic forcing are specified from climatology. Sensitivity runs were performed with a fixed mixed layer, without snow cover, with a different ice strength constant and a varying e-folding constant for the closing of leads, without dynamics, and without ocean currents. Since the atmospheric forcing fields although derived from large historical data sets, differ considerably depending on the analysis technique, alternative wind, temperature, and precipitation forcing has been applied Finally, the model has been forced with mean monthly winds supplemented by stochastic variations representing short-term variability. The model results are compared with analyses o satellite data as well as with single measurements and with simulation results from earlier models. (Auth )

44-4333
Upper ocean internal waves in the marginal ice zone of the northeastern Greenland Sea.
Eckert, E G., et al, *Journal of geophysical research*, June 15, 1990, 95(C6), p.9569-9574, 13 refs.
Foster, T.D.
Wave propagation, Ocean currents, Ice edge, Measurement.

44-4334
Salt fingering in subsea permafrost: some stability and energy considerations.
Gosink, J.P., et al, *Journal of geophysical research*, June 15, 1990, 95(C6), p.9575-9583, 41 refs.
Baker, G.C.
Subsea permafrost, Salt water, Brines.

44-4335
Dynamical evaluation of the surface circulation using remote sensing of drifting ice floes.
Larouche, P., et al, *Journal of geophysical research*, June 15, 1990, 95(C6), p.9755-9764, Refs p.9763-9764.
Dubois, J.M.M.
Ice floes, Drift, Remote sensing, Ocean currents.

44-4336
Late Quaternary glacial history of the South Orkney Plateau, Antarctica.
Herron, M.J., et al, *Quaternary research*, May 1990, 33(3), p.265-275, 25 refs.
Anderson, J.B.
Paleoclimatology, Glaciation, Ice cover thickness, Glacial deposits, Glacial erosion, Sea ice, South Orkney Islands.
Piston cores from the South Orkney Plateau penetrated overcompacted diamictons in water depths of up to 250 m. Detailed textural and petrological analyses of these diamictons indicate that they are basal tills. Seismic records from the plateau show a widespread surface of glacial erosion and provide additional evidence of an ice cap grounded to a depth of 250 m. Piston cores from the slope of the plateau penetrated diatomaceous muds resting directly on poorly sorted muds with very little to no biogenic material The sharp contact separating diatomaceous surface sediments from basal tills and sub-ice shelf deposits indicates that the ice cap and ice shelf retreated from the plateau rapidly Radiocarbon dates for diatomaceous muds from a glacial trough on the plateau indicate that the ice cap and ice shelf retreated from the plateau prior to 6000 to 7000 years ago The homogeneity of surficial diatomaceous sediments suggests that sea ice conditions over the plateau have not changed radically since that time. (Auth. mod.)

44-4337
Antarctica: past and future glaciations. [Antarktida: proshloe i budushchee oledeneniia],
Miagkov, S.M., Moscow, Izdatel'stvo Moskovskogo Universiteta, 1989, 159p., In Russian. Refs. p.157-159.
Ice cover, Glacier ice, Paleoclimatology, Ice age theory, Human factors.
Antarctic geography, its subglacial topography, the beginning and the principal stages of the continental glaciation and the formation of antarctic ice cover are discussed in ch 1-4 of this book Based on the review of factual data, and of the results of mathematical modeling, the beginning dates of cover glaciation are given as 40-50 m.y.a., the cause of its formation is attributed to sea level variations of the world ocean as well as to the topography of the continent. Examined in the 5th and last chapter are the causes of antarctic climate variations, including human factor effects on the climate, and consequently on future glaciations.

44-4338
Strength of materials and structures at low temperatures. Collection of scientific works. [Prochnost' materialov i konstruktsii pri nizkikh temperaturakh Sbornik nauchnykh trudov],
Strizhalo, V.A., ed Kiev Naukova dumka, 1990, 273p., In Russian Refs passim For individual papers see 44-4339 through 44-4396
Low temperature research Cryogenic structures, Steel structures, Strength Plasticity tests, Thermal stresses, Brittleness, Fracturing, Construction materials, Temperature effects.

44-4339
Effect of subzero treatment on the deformation of construction alloys and selection of safe stresses. [Vliianie glubokogo okhlazhdeniia na osobennosti deformirovaniia konstruktsionnykh splavov i vybor dopuskaemykh napriazhenii],
Pisarenko, G.S., et al, Prochnost' materialov i konstruktsii pri nizkikh temperaturakh. Sbornik nauchnykh trudov (Strength of materials and structures at low temperatures. Collection of scientific works). Edited by V.A. Strizhalo, Kiev, Naukova dumka, 1990, p.3-9, In Russian. 9 refs.
Strizhalo, V.A.
Cryogenic structures, Low temperature research, Strength, Loads (forces), Brittleness, Stresses, Cracking (fracturing), Cold weather performance.

44-4340
Cryogenic engineering (problems of development). [Kriogennaia tekhnika (problemy razvitiia)],
Filin, N.V., Prochnost' materialov i konstruktsii pri nizkikh temperaturakh Sbornik nauchnykh trudov (Strength of materials and structures at low temperatures. Collection of scientific works). Edited by V.A. Strizhalo, Kiev, Naukova dumka, 1990, p.10-16, In Russian. 6 refs.
Cryogenic structures, Engineering, Construction materials, Cracking (fracturing), Bearing strength, Experimentation, Countermeasures.

44-4341
Kinetics of fatigue crack growth in austenitic steel and nickel alloy at temperatures of 293, 93 and 11 K. [Kinetika rosta ustalostnykh treshchin v austenitnoi stali i nikelevom splave pri temperaturakh 293, 93 i 11 K],
Aleksenko, E.N., et al, Prochnost' materialov i konstruktsii pri nizkikh temperaturakh. Sbornik nauchnykh trudov (Strength of materials and structures at low temperatures. Collection of scientific works). Edited by V.A. Strizhalo, Kiev, Naukova dumka, 1990, p.16-21, In Russian. 12 refs.
Grinberg, N.M.
Low temperature tests, Fatigue (materials), Fracturing, Cryogenic structures, Steels, Thermal stresses, Atmospheric pressure, Countermeasures.

44-4342
Effect of preliminary deformation on the sensitivity of metastable austenitic steel to stress concentrations at cryogenic temperatures. [Vliianie predvaritel'noi deformatsii na chuvstvitel'nost' metastabil'noi austenitnoi stali k kontsentratsii napriazhenii pri kriogennykh temperaturakh],
Antropov, N.P., et al, Prochnost' materialov i konstruktsii pri nizkikh temperaturakh. Sbornik nauchnykh trudov (Strength of materials and structures at low temperatures Collection of scientific works). Edited by V.A. Strizhalo, Kiev, Naukova dumka, 1990, p.21-25, In Russian. 4 refs.
Krakhmalev, V.I., Manninen, A.I., Khoroshailov, V.G.
Cryogenic structures, Steel structures, Thermal stresses, Deformation, Low temperature tests, Loads (forces), Temperature effects, Experimentation.

44-4343
Regularity of creep and mechanical performance of heat-resistant polymers in the temperature range between 125 and 293 K. [Zakonomernosti polzuchesti i mekhanicheskaia rabotosposobnost' teplostoikikh polimerov v temperaturnom intervale 125-293 K],
Askadskii, A.A., et al, Prochnost' materialov i konstruktsii pri nizkikh temperaturakh Sbornik nauchnykh trudov (Strength of materials and structures at low temperatures. Collection of scientific works). Edited by V.A. Strizhalo, Kiev, Naukova dumka, 1990, p.25-28, In Russian. 6 refs.
Polymers, Low temperature research, Creep, Mechanical properties, Rheology, Temperature effects, Thermal stresses, Loads (forces).

44-4344
Test methods for crack-resistance of structural steels under dynamic load. [Metodika ispytanii na treshchinostoikost' stroitel'nykh stalei pri dinamicheskom nagruzhenii],
Basko, E.M., et al, Prochnost' materialov i konstruktsii pri nizkikh temperaturakh. Sbornik nauchnykh trudov (Strength of materials and structures at low temperatures. Collection of scientific works) Edited by V.A. Strizhalo, Kiev, Naukova dumka, 1990, p.28-32, In Russian 8 refs.
Gusev, V.K.
Low temperature tests, Fracturing, Dynamic loads, Steels, Ultimate strength, Construction materials, Fatigue (materials), Analysis (mathematics).

44-4345
Effect of heat treatment, chemical composition and anticorrosive coatings on the threshold of cold brittleness of structural steels. [Vliianie termicheskoi obrabotki, khimicheskogo sostava i antikorrozionnogo pokrytiia na porog khladnolomkosti konstruktsionnykh stalei],
Belkin, L.M., et al, Prochnost' materialov i konstruktsii pri nizkikh temperaturakh. Sbornik nauchnykh trudov (Strength of materials and structures at low temperatures. Collection of scientific works). Edited by V.A. Strizhalo, Kiev, Naukova dumka, 1990, p.33-38, In Russian. 2 refs.
Mis'ko, V.I., Volkov, I.B., Belkin, M.IA.
Low temperature tests Steels, Heating, Chemical composition, Protective coatings, Corrosion, Countermeasures, Viscosity, Temperature effects, Statistical analysis.

44-4346
Resistance of welded joints to crack propagation at low temperatures. [Soprotivliaemost' svarnykh soedinenii razvitiiu treshchin pri nizkikh temperaturakh],
Bondarovich, L.A., et al, Prochnost materialov i konstruktsii pri nizkikh temperaturakh. Sbornik nauchnykh trudov (Strength of materials and structures at low temperatures. Collection of scientific works). Edited by V.A. Strizhalo, Kiev, Naukova dumka, 1990, p.38-43, In Russian.
Podgornyi, A.S., Ostrovskii, A.V., Shirina, I.G.
Low temperature tests, Crack propagation, Welding, Joints (junctions), Strength, Temperature effects, Deformation, Countermeasures Loads (forces).

44-4347
Effect of ordered discreteness on the temperature dependence of strength characteristics of GTsK metals. [IAvlenie uporiadochennoi diskretnosti na temperaturnykh zavisimostiakh prochnostnykh kharakteristik GTsK-metallov],
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Steels, Low temperature tests, Fatigue (materials), Strength, Temperature effects, Meteorological factors.

44-4386
Elasticity tests under conditions of offset of the applied loads. [Metod ispytaniĭ na rastiazhenie v usloviiakh nesoosnosti prilozhenna nagruzki],
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Equipment, Low temperature tests, Loads (forces), Elastic properties, Mechanical properties, Metals, Deformation, Brittleness, Temperature effects.

44-4387
Effect of low temperatures on features of deformation diagrams of construction materials. [Vliianie nizkikh temperatur na kharakter diagramm deformirovaniia konstruktsionnykh materialov],
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Voĭtenko, A.F.
Construction materials, Steels, Low temperature tests, Elastic properties, Plasticity tests, Charts, Deformation, Analysis (mathematics).

44-4388
Determination of low-temperature strengthening of aluminum alloys. [Opredelenie nizkotemperaturnogo uprochnenna aliuminievykh splavov],
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Rusak, I.F., Skol'tsov, V.I
Metals, Low temperature tests, Physical properties, Plasticity tests, Alloys, Temperature effects, Statistical analysis, Analysis (mathematics)

44-4389
Limiting state of metals at cryogenic temperatures under impulse magnetic exposure. [Predel'noe sostoianie metallov pri kriogennykh temperaturakh v usloviiakh impul'snykh magnitnykh vozdeĭstviĭ],
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Vorob'ev, E.V., Arkovenko, G.I., Gorodnitskiĭ, A.M.
Low temperature research, Metals, Elastic properties, Steels, Magnetic surveys, Alloys, Thermal effects, Stresses, Construction materials.

44-4390
Low-cycle strength of materials and welded structures from high-durable steels at low climatic temperatures. [Malotsiklovaia prochnost' materialov i elementov svarnykh konstruktsiĭ iz vysokoprochnykh staleĭ pri nizkikh klimaticheskikh temperaturakh],
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Cold weather performance, Steels, Welding, Construction materials, Joints (junctions), Strength, Stresses, Deformation, Temperature effects, Experimentation.

44-4391
Effect of phase conversion on viscosity of metastable steel for cryogenic purposes. [Vliianie fazovykh prevrashcheniĭ na viazkost' metastabil'noĭ stali kriogennogo naznacheniia],
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Kolchin, G.G., Gvozdik, V.V., Krivtsov, IU.S.
Low temperature research, Steels, Viscosity, Deformation, Crack propagation, Strength, Plasticity tests, Countermeasures, Experimentation, Temperature effects.

44-4392
Fatigue resistance of steels and their welded joints with regard to mining and transportation industry in the Far North. [Soprotivlenie ustalosti staleĭ i ikh svarnykh soedineniĭ s uchetom ekspluatatsii gornodobyvaiushcheĭ i transportnoĭ tekhniki v raĭonakh Kraĭnego Severa],
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Steel structures, Cold weather performance, Fatigue (materials), Loads (forces), Joints (junctions), Cracking (fracturing), Mining, Transportation, Strength.

44-4393
Calculation of stress-strain state in a cylindrical pipe at low temperatures. [Raschet napriazhenno-deformirovannogo sostoianiia tsilindricheskoĭ truby pri nizkikh temperaturakh],
IUzevich, V.N., Prochnost' materialov i konstruktsiĭ pri nizkikh temperaturakh. Sbornik nauchnykh trudov (Strength of materials and structures at low temperatures. Collection of scientific works). Edited by V.A. Strizhalo, Kiev, Naukova dumka, 1990, p.253-257, In Russian. 5 refs.
Pipes (tubes), Low temperature research, Viscosity, Deformation, Stresses, Loads (forces), Plastic deformation, Analysis (mathematics), Experimentation.

44-4394
Evaluation of crack resistance of 10KhSND and 12GN2MFAIU steels, using physical parameters of viscosity. [Otsenka treshchinostoĭkosti staleĭ 10KhSND i 12GN2MFAIU s ispol'zovaniem fizicheskikh parametrov viazkosti],
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Fazliakhmetov, R.S.
Steels, Cold weather performance, Viscosity, Physical properties, Cracking (fracturing), Strength, Brittleness, Loads (forces), Fatigue (materials), Temperature effects, Statistical analysis.

44-4395
Cyclic durability of *Nb-Cu* in the temperature range of 293-4.2 K. [Tsiklicheskaia dolgovechnost' *Nb-Cu* v intervale temperatur 293-4.2 K],
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Metals, Strength, Welding, Low temperature tests, Deformation, Durability, Cables (ropes), Transmission lines, Fatigue (materials), Temperature effects.

44-4396
Applying explosion processes to structural steels for increasing resistance to brittle failure. [Primenenie obrabotki vzryvom dlia povysheniia soprotivleniia khrupkomu razrusheniiu konstruktsionnykh staleĭ],
IAkovleva, S P , et al, Prochnost' materialov i konstruktsiĭ pri nizkikh temperaturakh. Sbornik nauchnykh trudov (Strength of materials and structures at low temperatures Collection of scientific works) Edited by V A. Strizhalo, Kiev, Naukova dumka, 1990, p.264-269, In Russian. 9 refs.
Sleptsov, O.I., Sobolenko, T.M., Gavril'ev, I.N.
Steels, Explosion effects, Elastic properties, Strength, Deformation, Static loads, Temperature effects, Microstructure, Brittleness, Countermeasures.

44-4397
Soil series of the West Siberian platform. [Gruntovye tolshchi Zapadno-Sibirskoĭ plity],
Trofimov, V.T., ed, Moscow, Universitet, 1988, 127p., In Russian. 31 refs.
Cryogenic soils, Permafrost distribution, Soil surveys

44-4398
Studies, calculations and predictions of the ice and thermal regime of surface waters. [Issledovaniia, raschety i prognozy ledovogo i termicheskogo rezhima vod sushi],
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River ice, Ice jams, Ice conditions.

44-4399
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Bolotnikov, G.I, *Leningrad Gosudarstvennyĭ gidrologicheskiĭ institut Trudy,* 1989, Vol 345, p 3-17, In Russian. 16 refs.
River ice, Ice jams, Ice models, Ice conditions, Ice cover strength, Mathematical models

44-4400
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Kozitskiĭ, I.E., *Leningrad. Gosudarstvennyĭ gidrologicheskiĭ institut. Trudy,* 1989. Vol.345, p.17-28, In Russian. 19 refs.
River ice, Ice cover strength, Ice breakup, Analysis (mathematics).

44-4401
Critical review and ways to improve methods to calculate the highest ice jam water levels. [Kriticheskiĭ obzor i puti sovershenstvovaniia metodov rascheta naivysshikh zatornykh urovneĭ vody],
Buzin, V.A., *Leningrad. Gosudarstvennyĭ gidrologicheskiĭ institut. Trudy,* 1989, Vol.345, p 28-41, In Russian. 10 refs.
Ice jams, Water level, Analysis (mathematics), River flow, Flood forecasting.

44-4402
Effect of autumn and spring ice runoff on the maximum ice jam water level and rise. [K voprosu o vliianii osennego i vesennego stoka l'da na maksimal'nye zatornye urovni i pod"emy vody],
Alekseenko, R.IA., *Leningrad. Gosudarstvennyĭ gidrologicheskiĭ institut. Trudy,* 1989, Vol 345, p 41-45, In Russian. 8 refs.
Runoff, Ice jams, Water level.

44-4403
Calculation and analysis of the roughness coefficients of the bottom surface of ice jams according to data from studies on the northern Dvina River. [Raschet i analiz koeffitsientov sherokhovatosti nizhneĭ poverkhnosti zazhorno-zatornykh skoplenii l'da po dannym issledovanii na r. Severnoĭ Dvine],
Filippov, A.M., *Leningrad. Gosudarstvennyĭ gidrologicheskiĭ institut. Trudy,* 1989, Vol.345, p.46-54, In Russian. 6 refs.
Roughness coefficient, Ice jams, Ice bottom surface.

44-4404
Results of calculations of ice jams in the equilibrium state. [Rezul'taty rascheta zazherov v sostoianii ravnovesiia],
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Ice jams, Ice mechanics, Analysis (mathematics), River ice, River flow.

44-4405
Ice jams on the Daugava River in the region of the Vaikule na station. [Zatory l'da na reke Daugave v raione sta Vaĭkuliany],
Pastors, A.A., *Leningrad. Gosudarstvennyĭ gidrologicheskiĭ institut. Trudy,* 1989, Vol.345, p.63-74, In Russian.
Ice jams.

44-4406
Methods for forecasting maximum ice jam water levels on the Neva River. [Metodika prognoza maksimal'nykh zazhornykh urovneĭ vody reki Nevy],
Donchenko, R.V., et al, *Leningrad Gosudarstvennyĭ gidrologicheskiĭ institut. Trudy,* 1989, Vol.345, p.74-81, In Russian. 5 refs.
Shchegoleva, E.V.
Ice jams, Water level, Analysis (mathematics), Flood forecasting.

44-4407
Forecasting of water discharge for the upper Amur in the period of ice breakup. [Prognoz raskhodov vody verkhnego Amura v period vskrytiia],
Buzin, V.A., *Leningrad. Gosudarstvennyĭ gidrologicheskiĭ institut. Trudy*, 1989, Vol.345, p.81-86, In Russian. 3 refs.
Ice breakup, River flow, Analysis (mathematics), Flood forecasting, Water level.

44-4408
Improving the reliability and estimating the accuracy of ice condition forecasts based on statistical correlations. [Povyshenie nadezhnosti i otsenka tochnosti prognozov ledovkh iavleniĭ, osnovannykh na statisticheskikh zavisimostiakh],
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Buzin, V.A.
River ice, Ice conditions, Statistical analysis, Ice forecasting.

44-4409
Predicted effect of the Berezovka Hydroelectric Power Plant on the thermal and ice regime of bodies of water in the Kan-Achinsk Fuel and Energy Complex. [Ozhidaemoe vozdeĭstvie Berezovskoĭ GRES na termicheskiĭ i ledovyĭ rezhim vodnykh ob"ektov KATEKa],
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Surface waters, Ice conditions, Thermal pollution, Environmental impact, Thermal regime, Electric power.

44-4410
Improving the methods for calculating the water surface temperature of a reservoir from continental weather station data. [Usovershenstvovannaia metodika rascheta temperatury poverkhnosti vody vodoema po dannym kontinental'nykh meteostantsiĭ],
Vuglinskiĭ, V.S., *Leningrad. Gosudarstvennyĭ gidrologicheskiĭ institut. Trudy*, 1989, Vol.345, p.101-119, In Russian. 7 refs.
Reservoirs, Water temperature, Analysis (mathematics), Surface temperature, Meteorological data.

44-4411
Forecasting of changes in natural conditions of West Siberia. [Prognoz izmeneniia prirodnykh uslovii Zapadnoĭ Sibiri],
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Permafrost forecasting, Geocryology, Land development, Tundra, Environmental impact, Permafrost preservation.

44-4412
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Balchin, D.
Soil freezing, Frost heave, Measurement, Soil temperature, Unfrozen water content, Temperature gradients, Soil mechanics, Seasonal variations

44-4413
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Menzies, J., *Canadian journal of earth sciences*, May 1990, 27(5), p.684-693, With French summary. 49 refs.
Glacial deposits, Frozen ground mechanics, Sediment transport, Stratigraphy, Subglacial observations, Geocryology, Canada—Ontario.

44-4414
On the relationship between ice volume and sea level over the last glacial cycle.
Marshal, I.M., et al, *Climate dynamics*, Apr. 1990, 4(2), p.81-84, 10 refs.
Berger, A.
Ice age theory, Ice volume, Sea level, Periodic variations, Ice sheets.

44-4415
Non-linear climate oscillator controlled by biogeochemical cycling in the ocean: an alternative model of Quaternary ice age cycles.
Shaffer, G., *Climate dynamics*, Apr 1990, 4(2), p.127-143, Refs. p.141-143.
Ice age theory, Biomass, Geochemical cycles, Climatic changes, Oceans, Atmospheric composition, Air temperature, Tectonics, Nutrient cycle.

44-4416
Mass and number flux of ice crystals during Sierra snowfall.
Ahmed, S.A., Reno, University of Nevada, 1989, 86p., University Microfilms order No.1337941, M.S. thesis. 40 refs.
Cloud physics, Snow crystal growth, Snowstorms, Snowfall, Nucleation rate, Precipitation (meteorology), Cloud seeding.

44-4417
Ice sublimation under forced convection. Determination of the global coefficient of mass transfer. [Sublimation de la glace sous convection forcee. Determination du coefficient global de transfert de masse],
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Lambrinos, G.
Ice sublimation, Convection, Mass transfer, Phase transformations, Wind factors, Vapor diffusion.

44-4418
Autogenic and allogenic denudation in carbonate karst by the multiple basin method: an example from Svartisen, North Norway.
Lauritzen, S.E., *Earth surface processes and landforms*, Mar. 1990, 15(2), p.157-167, 27 refs.
Karst, Water erosion, Water chemistry, Solubility, Subpolar regions, Runoff, Hydrogeochemistry, Norway.

44-4419
Effect of frost-heave forces of soils on the bearing capacity of pyramidal piles.
Bakholdin, B.V., et al, *Soil mechanics and foundation engineering*, May 1990, 26(6), p.243-248, Translated from Osnovaniia, fundamenty i mekhanika gruntov. 4 refs.
Kolesnikov, L.I., Shikalovich, N.S.
Piles, Frost heave, Bearing strength, Foundations, Freeze thaw cycles, Bearing tests, Stabilization.

44-4420
Determination of design permafrost temperatures in termination zone of anchors used to strengthen underground pipelines.
Gokhman, M.R., et al, *Soil mechanics and foundation engineering*, May 1990, 26(6), p.252-257.
Fedorovich, D.I.
Underground pipelines, Design criteria, Analysis (mathematics), Cold weather construction.

44-4421
Comparative model tests in ice of a Canadian Coast Guard R-class icebreaker.
Tatinclaux, J.C., et al, *Society of Naval Architects and Marine Engineers Transactions*, 1989 (Pub. 1990), Vol.97, MP 2762, p.31-52, Includes discussion and authors' reply 12 refs For another version see 44-3984.
Alekseev, IU.N., Enkvist, E., Kitagawa, H., Narita, S., Schwarz, J., Takekuma, K., Williams, F.M.
Icebreakers, Metal ice friction, Ice navigation, Analysis (mathematics).
This paper presents the results of resistance and propulsion tests in level ice of a 1:20 scale model of the Canadian Coast Guard R-class icebreaker at two ice-hull friction coefficients, performed at several ice testing facilities in various countries under the aegis of the Committee on Performance of Ships in Ice-covered Waters of the International Towing Tank Conference (ITTC). There is good agreement overall among the test results obtained at the various facilities. The differences that do remain should be attributed to differences in experimental techniques and types of model ice used at the participating laboratories. An increase in hull roughness led to an increase in ice resistance as expected, but had no effect on the propeller characteristics. While the thrust coefficient in ice was nearly the same as in clear water, the torque coefficient and thrust deduction factor were much greater in level ice than in clear water and nearly constant. Full-scale ship performance predicted from the resistance test results of the rougher model and the propulsion characteristics in clear water was in good agreement overall with available field trial data. Predicted performance using the ice resistance of the rougher model and the model propeller characteristics in ice was usually below that observed at full scale. This would indicate that ice-propeller interaction is excessive during model propulsion tests, or that the effect of ice entrainment on propeller performance is greater at model scale than at full scale. Ice-propeller interaction remains a domain where further research is needed.

44-4422
Oden: Icebreaker technology for the year 2000.
Johansson, B.M., et al, *Society of Naval Architects and Marine Engineers. Transactions*, 1989 (Pub. 1990), Vol.97, p.53-83, Includes discussion and authors' reply. 21 refs.
Liljestrom, G.C.
Icebreakers, Ice navigation, Ice breaking, Diesel engines, Performance, Design.

44-4423
Numerical modelling of frost and thaw penetration.
Sheng, D.C., Luleå, Sweden, University of Technology, Feb 1990, 103p., Refs. p.95-103.
Ground thawing, Frost penetration, Mathematical models, Soil freezing, Frost heave, Thaw weakening, Frost forecasting.

44-4424
Nondestructive, three-dimensional density measurements of ice core samples by X ray computed tomography.
Kawamura, T., *Journal of geophysical research*, Aug. 10, 1990, 95(B8), p.12,407-12,412, 20 refs.
Ice cores, Ice density, X ray analysis, Analysis (mathematics), Bubbles, Ice structure.

44-4425
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International Conference on Port and Ocean Engineering under Arctic Conditions, 10th, Luleå, Sweden, June 12-16, 1989, Luleå, Sweden, University of Technology, 1989, p.1188-1611, Refs. passim. For selected papers see 44-4426 through 44-4447. For Vols. 1 & 2 see 43-3708 through 43-3813.
Axelsson, K.B.E., ed, Fransson, L.Å., ed.
Ice loads, Icebreakers, Sea ice, Ice navigation, Ice surveys, Bridges, Oil spills, Ice breaking, Offshore structures, Ship icing.

44-4426
Link across "Storebaelt": ice forces on the piers of the western bridge.
Tryde, P., International Conference on Port and Ocean Engineering under Arctic Conditions, 10th, Luleå, Sweden, June 12-16, 1989 Proceedings. POAC 89 Vol.3 Edited by K.B.E Axelsson and L.Å. Fransson, Luleå, Sweden, University of Technology, 1989, p.1202-1209, 5 refs.
Bridges, Piers, Ice loads, Sea ice, Ice pressure.

44-4427
Habbakuk project—building ships from ice.
Gold, L.W., International Conference on Port and Ocean Engineering under Arctic Conditions, 10th, Luleå, Sweden, June 12-16, 1989. Proceedings. POAC 89. Vol.3. Edited by K.B.E. Axelsson and L.Å. Fransson, Luleå, Sweden, University of Technology, 1989, p.1211-1228, 3 refs.
Ice (construction material), Ships, Artificial ice, Ice strength, Ice islands, Marine transportation.

44-4428
*Oden:* a state-of-the-art icebreaker.
Johansson, B.M., et al, International Conference on Port and Ocean Engineering under Arctic Conditions, 10th, Luleå, Sweden, June 12-16, 1989. Proceedings. POAC 89. Vol.3. Edited by K.B.E. Axelsson and L.Å. Fransson, Luleå, Sweden, University of Technology, 1989, p.1229-1265, 9 refs.
Liljeström, G.C.
Icebreakers. Ice breaking, Design, Performance, Diesel engines, Ice navigation, Pressure ridges.

44-4429
Recent ice sea field engineering activities in the Okhotsk Sea coast of Japan.
Oshima, M., International Conference on Port and Ocean Engineering under Arctic Conditions, 10th, Luleå, Sweden, June 12-16, 1989. Proceedings. POAC 89. Vol.3. Edited by K.B.E. Axelsson and L.Å. Fransson, Luleå, Sweden, University of Technology, 1989, p.1266-1280.
Sea ice, Research projects, Offshore structures, Towers, Ice surveys, Oceanographic surveys, Okhotsk Sea.

44-4430
Oil spills in arctic regions—environmental hazards and recovery techniques.
Sandkvist, J., International Conference on Port and Ocean Engineering under Arctic Conditions, 10th, Luleå, Sweden, June 12-16, 1989 Proceedings. POAC 89. Vol.3. Edited by K.B.E. Axelsson and L.Å. Fransson, Luleå, Sweden, University of Technology, 1989, p.1281-1296, 13 refs.
Oil spills, Oil recovery, Ice cover effect, Sea ice, Water pollution, Environmental impact, Countermeasures.

44-4431
Research on icebreaking process.
Varsta, P., International Conference on Port and Ocean Engineering under Arctic Conditions, 10th, Luleå, Sweden, June 12-16, 1989 Proceedings POAC 89. Vol.3. Edited by K.B.E. Axelsson and L.A. Fransson, Luleå, Sweden, University of Technology, 1989, p.1297-1317, 47 refs.
Ice breaking, Icebreakers, Ice navigation, Ice loads, Ice models.

44-4432
Internal structure, composition and properties of brackish ice from the Bay of Bothnia during the BEPERS-88 experiment.
Weeks, W.F., et al, MP 2763, International Conference on Port and Ocean Engineering under Arctic Conditions, 10th, Luleå, Sweden, June 12-16, 1989 Proceedings. POAC 89. Vol.3. Edited by K.B.E. Axelsson and L.A. Fransson, Luleå, Sweden, University of Technology, 1989, p.1318-1333, 21 refs.
Gow, A.J., Kosloff, P., Digby-Argus, S.A.
Sea ice, Salt ice, Ice salinity, Ice surveys, Remote sensing, Ice temperature, Ice structure, Bothnia, Bay.
Field observations made during the Mar 1988 BEPERS (Bothnian Experiment in Preparation for the ERS-1 satellite) remote sensing experiment allow limited characterizations of the temperature, salinity, structure and physical property profiles of the brackish ice that forms in the Bay of Bothnia. During the sampling period, undeformed fast ice thicknesses varied from 40 to 60 cm in the Bay to the east of Umeå, Sweden, with somewhat thicker ice occurring in the northernmost, nearly fresh, portions of the Bay. Ice salinities were generally less than 1 per mill and the ice temperatures were usually warmer than -3.5 C. Although most of the ice examined was simple congelation ice, a variety of c-axis fabrics were observed including random, vertical and horizontal (random and aligned) orientations. There was no obvious pattern to the geographic arrangement of these fabrics. Brine volume profiles are used to estimate representative ice property profiles. Comparisons are made between the properties of ice from the Bay of Bothnia and those of more typical sea ice from the Arctic Ocean at similar ice thicknesses. A variety of structural factors contributing to specific areas of high radar return in the Bay are also discussed.

44-4433
Coastal sea ice deformations.
Erlingsson, B., International Conference on Port and Ocean Engineering under Arctic Conditions, 10th, Luleå, Sweden, June 12-16, 1989. Proceedings. POAC 89 Vol.3. Edited by K.B.E. Axelsson and L.A. Fransson, Luleå, Sweden, University of Technology, 1989, p.1335-1347, 8 refs.
Sea ice, Ice deformation, Ice cover strength, Analysis (mathematics), Ice models, Shores, Topographic effects.

44-4434
Variation of ice properties in an ice area of 1 x 2 km in the Gulf of Bothnia, March 1988.
Fransson, L.Å., et al, International Conference on Port and Ocean Engineering under Arctic Conditions, 10th, Luleå, Sweden, June 12-16, 1989. Proceedings. POAC 89. Vol.3. Edited by K.B.E. Axelsson and L.A. Fransson, Luleå, Sweden, University of Technology, 1989, p.1348-1357, 8 refs.
Stehn, L., Åström, L., Håkansson, B., Omstedt, A.
Sea ice, Ice sampling, Ice surveys, Remote sensing, Bothnia, Bay.

44-4435
Sea ice concentration in the Bothnian Sea obtained from visual satellite data.
Håkansson, B., International Conference on Port and Ocean Engineering under Arctic Conditions, 10th, Luleå, Sweden, June 12-16, 1989. Proceedings. POAC 89. Vol.3. Edited by K.B.E. Axelsson and L.A. Fransson, Luleå, Sweden, University of Technology, 1989, p.1358-1369, 9 refs.
Sea ice distribution, Ice conditions, Spaceborne photography, Remote sensing, Ice surveys, Bothnia, Bay

44-4436
Airborne laser profiling of ice ridges in the Baltic Sea.
Lewis, J.E., et al, International Conference on Port and Ocean Engineering under Arctic Conditions, 10th, Luleå, Sweden, June 12-16, 1989 Proceedings. POAC 89. Vol.3. Edited by K.B.E. Axelsson and L.A. Fransson, Luleå, Sweden, University of Technology, 1989, p.1370-1379, 8 refs.
Leppäranta, M., Granberg, H.B.
Pressure ridges, Ice surveys, Lidar, Lasers, Sea ice, Remote sensing, Baltic Sea.

44-4437
Sensitivity test of coupling a sea ice model and an ocean model.
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Rasmussen, E.B.
Sea ice distribution, Ice models, Ice water interface, Mathematical models, Ocean currents, Heat flux.

44-4438
Studies in freezing of water and aqueous solutions.
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Nieman..., C.
Freezing, Phase transformations, Ice water interface, Ice formation.

44-4439
Ice force measurements on a bridge pier in a small river.
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Gagnon, J.G.
Bridges, Piers, Ice loads, River ice
Three V-shaped panels were installed on a bridge pier in a small river in Vermont, USA. Each panel was supported on four instrumented pins such that the ice force on each face of the V-shaped panel was measured by three load cells. During the ice run in Mar 1988, the ice forces were measured and recorded. Typical records and histograms of the measured ice forces are presented.

44-4440
First results of ice force measurements with TIP-panels at Norströmsgrund lighthouse.
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Jochmann, P., Hoffmann, L.
Ice loads, Offshore structures, Measuring instruments, Ice pressure.

44-4441
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Zakrzewski, W.P., Lozowski, E.P.
Ship icing, Sea spray, Ice accretion, Ice growth, Ice models, Mathematical models.

44-4442
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Lozowski, E.P., Horjen, I.
Ship icing, Sea spray, Ice forecasting, Icing rate, Ice models, Mathematical models.

44-4443
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Hammarström, L., Johansson, B.M.
Icebreakers, Ice loads, Ice breaking, Design.

44-4444
Investigations of the effect of the principal dimensions ratios and hull form on the ship's passability in ice.
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Ice navigation, Icebreakers, Ships, Analysis (mathematics).

44-4445
BEPERS-88, a sea ice remote sensing experiment in the Gulf of Bothnia.
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Leppäranta, M.
Ice surveys, Sea ice, Remote sensing, Ice reporting, Research projects, Bothnia, Bay.

44-4446
Experiences with the new Swedish icebreaker *Oden*.
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Icebreakers, Icebreaking, Ice navigation.

44-4447
Arctic operations in the western part of the Soviet Arctic.
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Ice navigation, Marine transportation, Logistics.

44-4448
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*Gordon, A.L., Oceanus,* Summer 1988, 31(2), p.39-46, 7 refs.
Sea ice, Polynyas, Ocean currents, Climate.
A descriptive account of the global role of the southern ocean in the climate system is presented. The physical atmospheric and oceanic processes and the position of Antarctica and its surrounding ocean in regard to climate are summarized. The southern ocean influences global climate because of the ability of cold polar waters to cross the Antarctic Circumpolar Current to mix with the warmer waters at the lower latitudes. Southern ocean upwelling in the region between the Antarctic Circumpolar Current and Antarctica and its effect on the ocean-temperature-salinity instability of stratification are discussed, as are the relationships of sea ice and polynyas, coastal latent heat polynyas, and open-ocean sensible heat polynyas as factors influencing global climate.

44-4449
Late Quaternary development of the Champlain Sea basin.
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Glaciation, Marine geology, Oceans, Glacier melting, Glacial deposits, Sedimentation, Quaternary deposits, Ice water interface, Fossils, Meltwater, Subglacial drainage, Sea level, Canada—Ontario—Champlain Sea.

44-4450
Champlain Sea: evolution of concepts, and bibliography.
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Glaciation, Oceans, Glacial lakes, Bibliographies, History, Marine geology, Geologic processes, Canada—Ontario—Champlain Sea.

44-4451
Basin, the ice, the Champlain Sea.
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Glaciation, Glacier melting, Glacial geology, Glacial lakes, Oceans, Glacier flow, Canada—Ontario—Champlain Sea.

44-4452
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Glacier melting, Oceans, Marine geology, Sea level, Glacial deposits, Glacial erosion, Quaternary deposits, Canada—Ontario—Champlain Sea.

44-4453
Ice-proximal deposits of the Champlain Sea at South Gloucester, near Ottawa, Canada.
Rust, B.R., *Geological Association of Canada. Special paper,* 1988, No.35, Late Quaternary development of the Champlain Sea basin. Edited by N.R. Gadd, p.37-45, With French summary. 20 refs.
Glacial deposits, Oceans, Glacier melting, Outwash, Subglacial drainage, Sediment transport, Stratigraphy, Canada—Ontario—Champlain Sea.

44-4454
Champlain Sea subwash fan at St. Lazare, Quebec.
Burbidge, G.H., et al, *Geological Association of Canada. Special paper,* 1988, No.35, Late Quaternary development of the Champlain Sea basin Edited by N.R. Gadd, p.47-61, With French summary. 39 refs.
Rust, B.R.
Glacial deposits, Glacier melting, Outwash, Marine geology, Oceans, Subglacial drainage, Meltwater, Stratigraphy, Canada—Quebec -St. Lazare.

44-4455
Glaciomarine fan deposition in the Champlain Sea.
Sharpe, D R., *Geological Association of Canada. Special paper,* 1988, No.35, Late Quaternary development of the Champlain Sea basin. Edited by N.R. Gadd, p 63-82, With French summary. Refs. p.80-82.
Glacial deposits, Glacier melting, Sedimentation, Oceans, Outwash, Ice water interface, Subglacial drainage, Meltwater, Canada—Ontario—Champlain Sea.

44-4456
Lithofacies relationships in a freshwater-marine transition of the Champlain Sea.
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Glacial deposits, Sedimentation, Glacial lakes, Oceans, Glacier melting, Stratification, Grounded ice, Canada—Ontario—Champlain Sea.

44-4457
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Glacial deposits, Glacier melting, Sedimentation, Oceans, Ice rafting, Ice water interface, Fossils, Canada—Quebec—Champlain Sea.

44-4458
Lake Agassiz and its contribution to flow through the Ottawa-St. Lawrence system.
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44-4459
Eurasian ice sheet formation and collapse resulting from natural atmospheric CO2 concentration variations.
Lindstrom, D.R., *Paleoceanography,* Apr. 1990, 5(2), p.207-227, 49 refs.
Glacier oscillation, Glacier formation, Ice age theory, Climatic factors, Carbon dioxide, Atmospheric composition, Glacier beds, Computerized simulation, Grounded ice.

44-4460
Vegetation of the Storbreen Gletschervorfeld, Jotunheimen, Norway III. Vegetation-environment relationships.
Whittaker, R J, *Journal of biogeography,* Sep. 1989, 16(5), p.413-433, 43 refs.
Site surveys, Vegetation patterns, Age determination, Plant ecology Frost action, Glacier ablation, Biogeography, Moraines, Norway.

44-4461
Calibration of piezocones for investigations in soft soils and demands for accuracy of the equipment.
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Eskilson, S., Larsson, R.
Soil profiles, Measuring instruments, Penetration tests, Design, Soil tests, Accuracy, Soil pressure.

44-4462
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Cler, G., Kedl, R.J.
Cooling systems, Ice (water storage), Performance, Air conditioning, Cost analysis, Diurnal variations.

44-4463
Method for testing the gliding quality of skis.
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Skis, Sliding, Friction, Velocity measurement, Ice solid interface.

44-4464
Friction between plastics and ice.
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Plastics ice friction, Skis, Sliding, Mechanical tests, Temperature effects.

44-4465
Detailed test plan: preproduction qualification (PPQ) test of aircrew clothing system, cold-weather.
Todd, W.E., *U.S. Army Test and Evaluation Command. Project,* July 1990, No.8-EI-495-ACS-002, 17p. + appends., 8 refs.
Clothing, Cold weather performance, Cold weather tests, Specifications, Research projects, Human factors, Aircraft.

44-4466
Arctic research of the United States, Vol.4.
U.S. Interagency Arctic Research Policy Committee, MP 2765, Washington, D.C., Spring 1990, 120p.
Brown, J., ed, Bowen, S., ed.
Research projects, Oceans, Oceanography, Environmental protection, Ecology, Climatology, Meetings, Natural resources, Atmospheric composition
The lead article in this issue reflects the importance of the Arctic Ocean and its marginal seas to U.S. national interests, including the fisheries industry, the oil and gas industries, defense, and the study of global climate change processes. This is followed by a brief description of research projects of the specific federal agencies involved in the Arctic Oceans Research Program

44-4467
Canadian Coast Guard icebreakers keeping Canada moving through winter ice. *Canadian shipping and marine engineering,* Nov. 1989, 60(2), p.16-18.
Icebreakers, Performance, Marine transportation, Canada—St. Lawrence, Gulf of.

44-4468
Radar surveying of the bottom surface of ice covers.
Arcone, S.A., et al, *Canadian journal of remote sensing,* Apr. 1990, 16(1), MP 2766, p.30-39, With French summary. 29 refs.
Calkins, D.J.
River ice, Radar echoes, Ice bottom surface, Ice cover thickness, Ice conditions, Subglacial observations, Ice solid interface, Scattering.

44-4469
Explosive waves in snow.
Liakhov, G.M., et al, *Combustion, explosion, and shock waves,* Jan. 1990, 25(4), p.493-499, Translated from Fizika goreniia i vzryva. 9 refs.
Explosion effects, Wave propagation, Shock waves, Snow cover effect, Snow plasticity, Snow compression.

44-4470
Heat transfer from a tube immersed in a fluidized bed with frosting.
Torikoshi, K., et al, *Heat transfer—Japanese research,* 1990, 19(1), p.73-91, Translated from Japanese Society of Mechanical Engineers Transactions. 7 refs
Kawabata, K., Yamashita, H.
Pipes (tubes), Heat transfer, Hoarfrost, Ice formation, Heat transfer coefficient, Air conditioning.

44-4471
Elasto-plastic fracture characterization of paving materials at low temperatures.
Mahboub, K., *Journal of testing and evaluation,* May 1990, 18(3), p.210-218, 29 refs.
Pavements, Admixtures, Cracking (fracturing), Low temperature tests, Crack propagation, Plastic properties.

44-4472
Cartographic modeling of snow avalanche path location within Glacier National Park, Montana.
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Mapping, Avalanche tracks, Avalanche modeling, Photogrammetric surveys, Computer applications, Vegetation patterns, Avalanche forecasting, United States—Montana.

44-4473
Internal waves under the arctic pack ice during the Arctic Internal Wave Experiment: the coherence structure.
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Sea ice, Gravity anomalies, Subglacial observations, Wave propagation, Ice cover effect, Analysis (mathematics), Pack ice, Beaufort Sea.

44-4474
Testing alternative parameterizations of lateral melting and upward basal heat flux in a thermodynamic sea ice model.
Harvey, L.D.D., *Journal of geophysical research,* May 15, 1990, 95(C5), p.7359-7365, 23 refs.
Sea ice, Ice melting, Ice models, Heat flux, Ice bottom surface, Sea ice distribution, Ice cover thickness, Water temperature.

44-4475
Effect of water depth on ice-proximal glaciolacustrine sedimentation: Salpausselkä I, southern Finland.
Fyfe, G.J., *Boreas,* June 1, 1990, 19(2), p.147-164, 88 refs.
Moraines, Sedimentation, Subglacial drainage, Lacustrine deposits, Glacial deposits, Glacial lakes, Water level, Finland.

44-4476
Proglacial glaciotectonic deformation and the origin of the Cromer Ridge push moraine complex, North Norfolk, England.
Hart, J.K., *Boreas,* June 1, 1990, 19(2), p.165-180, 54 refs.
Glacial erosion, Moraines, Ice push, Deformation, Stratigraphy, Glacial geology, Ice sheets, England—Norfolk.

44-4477
Sedimentology and depositional environments of the Lund Diamicton, southern Sweden.
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Lagerlund, E.
Glacial deposits, Stratigraphy, Periglacial processes, Sediment transport, Ice rafting, Glaciation, Sweden.

44-4478
Laboratory study of the efficiency with which aerosol particles are scavenged by snow flakes.
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Barth, U., Pruppacher, H.R.
Scavenging, Snowflakes, Snow crystals, Aerosols, Air flow, Air pollution.

44-4479
Ice jams on rivers. [O ledovykh zatorakh na rekakh],
Kostelianets, B.A., *Transportnoe stroitel'stvo,* May 1990, No.5, p.18-20, In Russian.
Ice jams, Velocity, River ice, Ice mechanics, Bridges, Damage, Countermeasures, Drift.

44-4480
Ice loads on harbor structures. [O ledovykh nagruzkakh na portovye sooruzheniia],
Smirnov, G.N., et al, *Transportnoe stroitel'stvo,* May 1990, No.5, p.27, In Russian. 2 refs.
Rogachko, S.I., Evdokimov, G.N.
Ice loads, Ports, Structures, Ice mechanics, Ice pressure, Sea ice, Drift, Hydraulic structures, Offshore structures, Ice strength, Tests.

44-4481
Ice loads on multi-pile supports. [Ledovye nagruzki na mnogostolbchatye opory],
Afanas'ev, V.P., *Transportnoe stroitel'stvo,* May 1990, No.5, p.28-29, In Russian. 8 refs.
Pile structures, Ice loads, Supports, Offshore structures, Ice mechanics, Ice pressure, Analysis (mathematics), Ice breakup, Ice cover thickness.

44-4482
Features of ballasting and straightening of railroad tracks. [Osobennosti zimnei ballastirovki i vypravki puti],
Lykov, V.G., et al, *Transportnoe stroitel'stvo,* Apr 1990, No.4, p.5-6, In Russian.
Terekhin, L.N., Sidun, V.P.
Railroad tracks, Cold weather construction, Antifreezes, Subgrades, Embankments, Frozen cargo, Construction materials, Freezing, Countermeasures, Climatic factors, Stabilization, USSR—Yamal Peninsula.

44-4483
Controlling the thermal regime of tunnels in severe climatic conditions. [Upravlenie teplovym rezhimom tonnelei v surovykh klimaticheskikh uslovniakh],
Gendler, S.G., et al, *Transportnoe stroitel'stvo,* Apr. 1990, No.4, p.18-22, In Russian. 6 refs.
Railroad tunnels, Thermal regime, Cold weather operation, Freeze thaw cycles, Microclimatology, Maintenance, Drainage, Temperature gradients, Thermal stresses, Countermeasures, Analysis (mathematics).

44-4484
Improving the thermal properties of lightweight concretes. [Uluchshenie teplotekhnicheskikh svoistv legkikh betonov],
Fedorov, V.A., *Transportnoe stroitel'stvo,* Apr. 1990, No.4, p.33-34, In Russian. 1 ref.
Lightweight concretes, Thermal properties, Concrete aggregates, Concrete strength, Clays, Wood.

44-4485
Variations of artificial illumination in the Far North. [Varianty iskusstvennogo osveshcheniia v usloviiakh Kraĭnego Severa],
Dubenskaia, V.F., et al, *Transportnoe stroitel'stvo* Apr. 1990, No.4, p.41-43, In Russian 4 refs
Vinogradova, G.V., Zakrevskaia, O.V.
Cold weather construction, Light effects, Illuminating, Winter, Climatic factors, USSR—Far North.

44-4486
Calving of Erebus Glacier tongue.
Robinson, W., et al, *Nature,* Aug. 16, 1990, 346(6285), p 615-616, 2 refs.
Haskell, T.G.
Ice breakup, Glacier tongues, Calving, Icebergs, Antarctica—Erebus, Mount.
A brief account is given of the Mar. 1, 1990 breakup of sea ice near the tongue of Erebus Glacier on Ross I. and the subsequent calving of the tongue into a 100 million tonne, 3.5 km long iceberg. The sea ice breakup is regarded as the primary cause of the calving, putting stress on a sharp bay at the narrow neck of the tongue. Heavy seas rolling out of the north finished the job. The period from 2020-2030 is the projected next calving occurrence of Erebus Glacier.

44-4487
Ice-pushed boulders on the shores of Gotland, Sweden.
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Rocks, Sea ice, Ice push, Littoral zone, Wind factors, Coastal topographic features, Sweden—Gotland.

44-4488
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McFadden, T., *Journal of cold regions engineering,* June 1990, 4(2), p 69-84, 8 refs.
Cold weather construction, Research projects, Design, Materials, Winter concreting, Houses, Cost analysis, Finland—Kilpisjärvi.

44-4489
Probabilistic evaluation of design iceberg collision.
McTaggart, K.A., et al, *Journal of cold regions engineering,* June 1990, 4(2), p.85-101, 21 refs.
Isaacson, M.
Icebergs, Offshore structures, Ice loads, Impact, Models, Analysis (mathematics), Water waves, Hydrodynamics.

44-4490
Geosynthetic reinforcement of paved road embankments on polygonal ground.
Kinney, T.C., et al, *Journal of cold regions engineering,* June 1990, 4(2), p.102-112, 12 refs.
Connor, B.
Thermokarst, Roads, Subgrade preparation, Construction, Materials, Mechanical tests, Deformation, Pavements, Embankments.

44-4491
Ecological and physiological investigations in continental antarctic cryptogams. I. Vegetation pattern and its relation to snow cover on a hill near Casey Station, Wilkes Land.
Kappen, L., et al, *Flora,* 1990, 184(3), p.209-220, 24 refs.
Meyer, M., Bölter, M.
Vegetation patterns, Snow cover effect, Plant ecology, Site surveys, Alimentation, Antarctica—Casey Station.
The vegetation of the summit region of a small ice-free hill in the inner part of the east-Antarctic Bailey Peninsula, Windmill Islands, was recorded by 105 relevés along various transects. It was analyzed by the Braun-Blanquet phytosociological method, by a divisive polythetic procedure and tested by an ordination analysis. An epipetric *Usnea sphacelata*- and a *Rinodina olivaceobrunnea*-moss turf community were described as distinct communities and additionally a transient community. The vegetation is highly dependent on the extension and duration of a shallow snow cover, because snow is the main water source for the poikilohydrous cryptogams. This was shown by recording regularly the changes of snow cover in 5 quadrats of the summit region. The photophilous, wind-exposed vegetation of this hill resembles ecologically that of high arctic and alpine regions. The dominance of *Neuropogon* species is characteristic of the Antarctic and also the Andine region; in equivalent arctic-alpine communities *Umbilicaria* species are the most prominent element. The epibryic and epigeic *R olivaceobrunnea*-moss turf community has no identical counterpart in the arctic and alpine region. (Auth.)

44-4492
Late Wisconsinan deglaciation of the area south of Dolphin and Union Strait, northern District of Mackenzie.
McMartin, I., et al, *Current research, part D, Geological Survey of Canada. Paper,* 1990, 90-1D, p.55-66, With French summary. 18 refs.
St-Onge, D.A.
Glaciation, Glacial erosion, Glacial deposits, Glacier flow, Moraines, Geologic structures, Canada—Northwest Territories.

44-4493
Were erratics moved by glaciers or icebergs to Prince Patrick Island, western Arctic Archipelago, Northwest Territories.
Hodgson, D.A., *Current research, Part D, Geological Survey of Canada. Paper,* 1990, 90-1D, p.67-70, With French summary. 10 refs.
Glacial deposits, Sediment transport, Ice rafting, Pleistocene, Canada—Prince Patrick Island.

44-4494
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Woo, M.K., et al, *Current research, Part D, Geological Survey of Canada. Paper,* 1990, 90-1D, p 85-93, With French summary. 11 refs.
Young, K.L., Edlund, S.A
Slope processes, Hydrologic cycle, Snowmelt, Runoff, Microclimatology, Suprapermafrost ground water Seepage, Vegetation factors, Canada Northwest Territories.

44-4495
Dislocation mobility for non-basal glide in ice measured by *in situ* X-ray topography.
Hondoh, T., et al, *Philosophical magazine A,* July 1990, 62(1), p.89-102, 17 refs.
Iwamatsu, H., Mae, S.
Ice surface, Sliding, Ice plasticity, X ray analysis, Ice physics, Dislocation (materials), Anisotropy.

44-4496
Method of determining the critical brittleness temperature of steel from the energy of crack initiation in the specimen.
Zvezdin, IU.I., et al, *Soviet materials science,* Mar 1990, 25(5), p.486-488, Translated from Fiziko-khimicheskaia mekhanika materialov 11 refs
Steels, Threshold temperatures, Cracking (fracturing), Brittleness, Temperature effects, Impact tests, Low temperature research, Tensile strength.

44-4497
Determination of critical brittleness temperatures in crack resistance testing.
Karzov, G.P., et al, *Soviet materials science,* Mar. 1990, 25(5), p.489-493, Translated from Fiziko-khimicheskaia mekhanika materialov. 26 refs.
Smirnov, V.I., Timofeev, B.T.
Steels, Cracking (fracturing), Brittleness, Threshold temperatures, Standards, Temperature effects, Mechanical tests, Low temperature research.

44-4498
Morphology of optically anisotropic agarose hydrogel prepared by directional freezing.
Yokoyama, F., et al, *Colloid & polymer science,* June 1990, 268(6), p.552-558, 15 refs.
Colloids, Freezing, Ice crystal growth, Orientation, Scanning electron microscopy, Anisotropy, Temperature gradients.

44-4499
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Heat transfer, Porous materials, Freezing, Melting, Fluid flow, Phase transformations, Convection, Artificial freezing, Ice melting, Permeability.

44-4500
Proceedings of the Symposium: Transport of Glacial Drift in Finland.
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Perttunen, M., ed.
Glacial geology, Glacial deposits, Sediment transport, Geochemistry, Finland.

44-4501
Transport distances of Finnish crystalline erratics during the Weichselian glaciation.
Donner, J., *Finland. Geological Survey. Special paper,* 1989, No.7, Proceedings of the Symposium: Transport of Glacial Drift in Finland, Lammi, Finland, Apr. 12-13, 1988. Edited by M. Perttunen, p.7-13, 35 refs.
Glacial geology, Glacial deposits, Sediment transport, Geochronology, Ice sheets, Glacier flow, Glaciation, Quaternary deposits, Finland, Estonia.

44-4502
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44-4508
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44-4509
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44-4510
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44-4516
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44-4518
Estimation of soil properties for environmental protection during construction of oil and gas systems (example of Middle Ob' region). (Vozmozhnosti ucheta prirodnykh osobennostei gruntov pri sooruzhenii ob"ektov neftegazovogo kompleksa v tseliakh okhrany prirody (na primere srednego Priob'ia),
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44-4519
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44-4521
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44-4523
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44-4524
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44-4526
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44-4527
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44-4528
Burial of industrial wastes from largest gas-condensate deposits in the Timano-Pechora, Volga-Ural and Caspian areas. [Zakhoronenie promstokov na krupneĭshikh gazokondensatnykh mestorozhdeniiakh Timano-Pechorskoĭ, Volgo-Ural'skoĭ i Prikaspiĭskoĭ provintsiĭ],
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44-4529
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44-4530
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44-4531
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44-4532
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Ice physics, Hydrates, Microstructure.

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Comiso, J.C., *Journal of geophysical research*, Aug. 15, 1990, 95(C8), p.13,411-13,422, 39 refs.
Sea ice, Sea ice distribution, Ice conditions, Classifications, Microwaves, Remote sensing, Radiometry, Seasonal variations, Ice forecasting, Ice cover effect, Accuracy, Arctic Ocean.

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Redistribution function applicable to a dynamic model of sea ice.
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Sea ice, Dynamic properties, Ice models, Ice pressure, Analysis (mathematics), Stress concentration, Ice cover thickness, Plastic deformation, Ice mechanics.

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Dynamic and thermodynamic sea ice model for subpolar regions.
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Sea ice, Ice models, Ice conditions, Ice pressure, Ice cover strength, Simulation, Dynamic properties, Thermodynamic properties, Subpolar regions, Drift.

44-4548
Comparison of periglacial landforms on the Vestfold Hills, East Antarctica, and on the Fildes Peninsula, West Antarctica.
Zhang, Q., *Antarctic research*, 1990, 2(1), p.1-9, In Chinese with English summary. 9 refs.
Patterned ground, Periglacial processes, Permafrost, Wind factors, Antarctica—Vestfold Hills, Antarctica—Fildes Peninsula.
From data collected during the last 20-30 yrs., the Fildes Peninsula and the Vestfold Hills are distinguished by two types of climate: the antarctic maritime climate, with mild low temperature, long summer, moisture and high precipitation, and the antarctic continental climate, which is characterized by extremely low temperature, short summer, low precipitation and violent winds. The low temperature, coupled with short periods of freeze-thaw activity and widespread dryness in regolith of the Vestfold Hills, limited the development of periglacial landforms in this region; mild low temperatures, coupled with long periods of freeze-thaw activity and humidity, show active periglacial processes at Fildes Peninsula. Expansion and contraction of sorted circles was measured Feb. 1981-Mar. 1985 at Vestfold Hills, and Feb. 1985-Feb. 1988 at Fildes Peninsula, showing the mean annual expansion rates to be 1.2-6.2 mm, and 5.1-32 mm, respectively. Expansion occurs in Feb.-Mar., contraction in Nov.-Jan. This shows that the development of sorted circles is active in summer and stable in winter. (Auth. mod.)

44-4549
Densification process within the near-surface layer of the antarctic ice sheet.
Qin, D.H., *Antarctic research*, 1990, 2(1), p.10-19, 23 refs.
Snow density, Ice density, Ice sintering, Ice crystal structure, Antarctica—Wilkes Land.
Study of ice cores from Wilkes Land show that the densification process within the near surface layer of the antarctic ice sheet is dominated by the environment and exhibits geographic zonality. Warm type densification takes place mainly on the periphery of the ice sheet, where the mean annual temperature is about -10 to -15 C. High temperature in summer and consequent melting and infiltration are the main factors influencing the densification process. Cold type densification occurs in the huge central region of Antarctica, where the mean annual temperature is below -25 C, with the maximum below 0 C in summer. In this region, ice sintering is a main cause for the densification. The alternate type densification occurs in the transition zone between the above two regions, where the mean annual temperature is -15 to -25 C and the highest temperature is 0 C in summer. Both melting and sintering are the main causes for alternate type densification. These three types of densification process differ greatly in macroscopic and microscopic characteristics. (Auth. mod.)

44-4550
Studies on the BHQ ice core from the Law Dome, Antarctica.
Huang, M., et al, *Antarctic research*, 1990, 2(1), p.20-26, 15 refs.
Li, J., Xie, Z.
Ice cores, Ice structure, Ice composition, Antarctica—Law Dome.
The structure of the ice core varies with depth. Its surface layer is firn, followed by an ice layer with a random fabric pattern (beginning at 28 m depth), then transformed to a small circle girdle pattern (beginning at 147 m depth) through a transition layer, finally to a single-maximum pattern (beginning at 191 m depth). The stratigraphic profile of the ice core is similar to that of other cores on the Law Dome. The ice was analyzed for trace elements using an instrumental neutron activation technique. No tendency towards a systematic increase or decrease in the element concentrations in the past 4000 years has been found. The mean concentrations of Na and Al over the past 4000 years are higher than those in the Vostok ice core by factors of 9 and 4, respectively. (Auth. mod.)

44-4551
Thermal and dynamical characteristics over the Great Wall Station during the austral summer of 1987-1988.
Bian, L., et al, *Antarctic research*, 1990, 2(1), p.73-81, In Chinese with English summary. 12 refs.
Lu, L., Jia, P.
Snow cover effect, Radiation absorption, Heat flux, Thermal regime, Meteorological data, Antarctica—Great Wall Station.
Boundary layer observations over the Great Wall Station, carried out during summer 1987-1988, show a marked daily variation in all components of the summer surface thermal balance in the area. The daily average net radiation value for snow-covered and snow-free land surfaces is positive. The inversion occurs under 2 m above snow-covered surfaces, which results in heat transmission from air to land and negative sensible heat flux; above snow-free surfaces the sensible heat flux is positive. Due to polar cyclonic activities all year round, the area around the Station is very moist and the land surface permanently wet, with the result that 75% of the net radiation is absorbed in the process of snow melting and moisture evaporation. The sensible heat flux, and the heat flux into the ground, are only 25% and 2% of the net radiation, respectively. It is concluded that the thermal regime over subantarctic regions differs greatly from that over the continent. (Auth. mod.)

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