JPRS-UES-87-004

22 MAY 1987

USSR Report

EARTH SCIENCES

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SPECIAL NOTICE

Effective 1 June 1987 JPRS reports will have a new cover design and color, and some reports will have a different title and format. Some of the color changes may be implemented earlier if existing supplies of stock are depleted.

The new cover colors will be as follows:

CHINA.....aqua
EAST EUROPE.....gold
SOVIET UNION.....salmon
EAST ASIA.....yellow
NEAR EAST & SOUTH ASIA...blue
LATIN AMERICA.....pink
WEST EUROPE.....ivory
AFRICA (SUB-SAHARA).....tan
SCIENCE & TECHNOLOGY.....gray
WORLDWIDES.....pewter

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USSR reports will become SOVIET UNION reports.

The USSR REPORT: NATIONAL ECONOMY will be titled SOVIET UNION/ECONOMIC AFFAIRS (UEA).

The USSR REPORT: POLITICAL AND SOCIOLOGICAL AFFAIRS will be titled SOVIET UNION/POLITICAL AFFAIRS (UPA).

The following Soviet journals will be added to those which are already issued in separate series:

EKO: ECONOMICS & ORGANIZATION OF INDUSTRIAL PRODUCTION (UEO)
THE WORKING CLASS & THE CONTEMPORARY WORLD (UWC)
PEOPLES OF ASIA & AFRICA (UAA)
MILITARY HISTORY JOURNAL (UMJ)
FOREIGN MILITARY REVIEW (UFM)
AVIATION & COSMONAUTICS (UAC)
SOCIOLOGICAL STUDIES (USS)

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USSR REPORT

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CONTENTS

WEATHER-SERVICE VESSEL 'VIKTOR BUYNITSKIY'

Moscow SOVETSKAYA ROSSIYA 17 Jan 87 p 2

[Article by S. Baranova]

[Text] A new weather scientific research vessel, the "Viktor Buynitskiy", has arrived in Murmansk, its port of registry. It is named for an eminent Soviet hydrographer and oceanologist who took part in many expeditions.

The ship is one of a new series of combined vessesl which are being built to order for the Soviet Union at shipyards in the Finnish city of Turku, and which will operate as part of the fleet of the Murmansk Hydrometeorological Service.

"We have long needed a vessel capable of performing two functions at once," said P. V. Vlasenko, head of the Murmansk Territorial Administration for Hydrometeorology and Monitoring of the Natural Environment. "It can perform planned scientific research work for studying the world's oceans, monitor pollution of coastal waters and, if necessary, deliver cargo to remote meteorological stations, which is extremely important, particularly right before winter comes to the Arctic region."

The vessel has everything necessary on board: research laboratories, a meteorological complex for gathering information, a bathysonde, computer technology, self-propelled barges, and winch mechanisms.

FTD/SNAP
/12955
CSO: 1865/314

AN-30M CLOUD-SEEDING AIRPLANE IN INTERNATIONAL EXHIBITION

Moscow VOZDUSHNYY TRANSPORT 6 Dec 86 p 4

[Article by A. Pyrkov]

[Text] The AN-30 airplane is well known to aviators. The AN-30M, a modification of this aircraft, has now appeared in aviation enterprises of our country. At an international exhibition, "Kontrol' Zagryazneniya-86" (pollution monitoring-86), many visitors have been attracted to a mock-up of this airplane from the Antonov design bureau. The airplane is intended for weather-modification flights; the letter "M" in its model number stands for 'meteorological protection'. This airplane carries everything needed to 'wring' snow or rain out of clouds or, on the other hand, to stop them.

V. Sokolovskiy, deputy chairman of the USSR State Committee on Hydrometeorology and Monitoring of the Natural Environment, noted that this new aircraft is very effective. Containers with reagents, a control panel for firing meteorological cartridges, convenient observation blisters -- all of these things help the crew to work efficiently. An AN-30M provided good weather for the Goodwill Games in Moscow. The airplane has been tested also in agriculture, and it has begun to be used for purifying the atmosphere over industrial enterprises.

The exhibition "Kontrol Zagryazneniya-86" covers many technologies. Instruments, installations and other equipment for measuring and monitoring industrial emissions into the atmosphere and effluents into bodies of water are being shown by 120 firms, enterprises and organizations of 16 countries. Stationary and mobile units for monitoring pollution of the air, water, soil and vegetation in cities and industrial areas can be seen here. The Federal Republic of Germany's "Biotronik" firm, for example, is showing mobile laboratories for monitoring of agricultural products, and for inspecting facilities of the oil and gas industries.

These laboratories also can be transported by helicopters. Such experiments have been conducted in Tyumen Oblast.

At the exhibition, scientists and specialists have broad opportunities for discussing a whole range of problems of environmental protection and of examining possibilities for solving them.

FTD/SNAP
/12955
CSO: 1865/314

REGIONAL WEATHER SATELLITE DATA PROCESSING CENTER OPENS IN TASHKENT

Moscow PRAVDA 7 Jan 87 p 6

[Article by V. Artemenko and Yu. Chernogayev, correspondents]

[Excerpt] A regional center for receiving and processing of data from satellites has been created in Tashkent. Meteorological information from "Meteor" satellites is processed and used widely for weather forecasting.

Photographs are received here four times a day, which makes it possible to keep track of the dynamic development of atmospheric processes. The pictures are sent to an analytical laboratory, where specialists overlay them with a meridian grid to prepare weather maps. Copies of the maps are sent to weather services in Afghanistan, India, Iraq, Iran, Pakistan, Sri Lanka -- to 15 countries in all.

The Tashkent center receives information on the weather over an area from the Indian Ocean to the Arctic Circle, and from Central Europe to East Siberia. The zone served by the Tashkent center takes in massive mountain ranges of Asia where there are no weather stations. Therefore it is understandable how important the satellite information is for this area.

FTD/SNAP
/12955
CSO: 1865/188

'BARS-1M' METEOROLOGICAL COMPLEX CARRIED ON IL-18 AIRPLANE

Leningrad LENINSKOYE ZNAMYA 24 Nov 86 p 4

[Article by Aleksandr Ruvinskiy]

[Excerpt] A report was received from meteorologists that a front of nimbus clouds was approaching the Chernobyl area. This meant that rain could be expected. The report was taken as a warning signal. An IL-18 airplane flew to meet the clouds. It circled near them. Other airplanes then took off and headed for the cloud front.

The rain never fell on Chernobyl.

"It poured down long before reaching there, on an area that was safe in terms of radiation," explained Aleksandr Litinetskiy, an associate of the Central Aerological Observatory in the city of Dolgoprudnyy. As head of a group of a flight research center, he has a direct relationship to the IL-18 airplane in this mission. No, he was not a member of the crew, but he directed the development of new apparatus installed on board this airplane.

"What we put on the airplane was the BARS-1M -- a computerized meteorological complex", Aleksandr continued. "It is needed for measuring and analyzing meteorological and navigational information directly in the air. Wind-movement characteristics, pressure, temperature and humidity, for example -- the BARS is capable of evaluating all of these."

During those anxious days in and around Chernobyl, the BARS correctly determined the so-called wind field, providing information on the path that the rain clouds were following. After receiving the necessary information, special airplanes equipped with special devices made the rain fall where it would do less harm.

The BARS-1M has predecessors and counterparts, of course. Similar apparatus has been used for a long time for scientific and applied purposes. But this other apparatus obviously falls short of modern requirements, particularly as regards to speed and accuracy.

There are no pointers of antiquated recorders in the BARS-1M equipment set. All of it represents the latest word in technology, including alphanumeric

indicators, communications equipment interfaced with a numerical printer and a magnetic-recording complex, and computer software. There are no intermediate data; real numbers in a real-time scale appear on a display and in printouts. Wind velocity? Right away. Air temperature and humidity? No problem. Such information is obtained in seconds, with minimal error. And there is no need to return to the airfield; everything is done right away, in the air.

FTD/SNAP
/12955
CSO: 1865/314

AWARD RECIPIENTS FOR RADIOMETEOROLOGICAL INSTRUMENTS (caption)

Leningrad LENINGRADSKAYA PRAVDA 9 Dec 86 p 1

[Abstract] Photographs are given of eight Leningrad residents who were awarded the 1986 USSR State Prize. They include five scientists who were honored for development of methods and equipment for radiometeorological tracking of clouds, precipitation and dangerous weather phenomena, and for introduction of this technology into the weather service. The five are: Doctor of Technical Sciences Vladimir Danilovich Stepanenko, deputy director of the Main Geophysical Observatory imeni Voyeykov; Candidate of Physical-Mathematical Sciences Georgiy Borisovich Brylev, head of a laboratory of this observatory; and candidates of technical sciences Samuil Isaakovich Vaksenburg, Nikolay Vladimirovich Gornostayev, and Grigoriy Fedorovich Shevela.

FTD/SNAP
/12955
CSO: 1865/314

UDC 551.579:06I(I-87)

CURRENT STATUS OF WORLD WEATHER SERVICE

Obninsk GIDROMETEOROLOGIYA: SERIYA "METEOROLOGIYA", SOVREMENNOYE SOSTOYANIYA VSEMIRNOY SLUZHBY POGODY in Russian No 7, 1986 pp 1-36

[Article by L. S. Dubrovina, All-Union Scientific Research Institute for Hydrometeorological Information-World Data Center]

[Abstract] The general structure of the World Weather Service and United Nations Environmental Program are briefly discussed and progress made over the past decade in automation of weather observation is noted. The current status of the World Weather Service, the major program of the World Meteorological Organization, is described, emphasizing the need for international cooperation among meterologists. The basic operational elements of the World Weather Service include the global observation system, global data processing system and global communications system, each of which is described. Improvement in both ground-based and satellite techniques has significantly increased the frequency of weather observations and their spatial resolution, causing complications in the operation of communications and forecasting equipment. Satellites now collect information from observation platforms such as buoys, ships at sea and automatic weather stations. The World Climatic Program, approved by the Eighth WMO Congress, calls for the development of data retrieval information systems, including data centers to store data files, with information to be available on the volume, reliability and recording format of the data stored there. References 31: 16 Russian, 15 Western.

6508/12955
CSO: 1865/213

UDC 551.585(100.2)

NEW METHOD OF ESTIMATING CONTINENTALITY OF CLIMATE ON GLOBAL SCALE

Moscow VESTNIK MOSKOVSKOGO UNIVERSITETA, SERIYA 5: GEOGRAFIYA in Russian
No 1, Jan-Feb 86 (manuscript received 28 Feb 86) pp 64-72

[Article by B. V. Poltaraus]

[Abstract] Two equations are derived which are recommended for estimating the continentality of climate. This article suggests an improvement in one of these equations to allow determination of the continentality of climate for the entire earth. Previous methods defined continentality essentially as the ratio of the sum of 3 local climate characteristics, reflecting the continental and oceanic influence at a given location, to a certain planetary sum of such components for the same latitude, expressed in percent. The improvement suggested in this article is based on consideration of the idea of "purely oceanic" and "purely continental" climatic influences. The final equation, considering the annual and daily amplitude of air temperature, relative humidity and amplitude of variations in dew point, was used to calculate continentality for a number of points in different climatic zones with different types of climates. It was found to be quite sensitive and universal, applicable to a wide variety of climate types and zones, providing a quantitative characteristic of climate, the degree of participation of continental influences and their origin. References: 17 Russian.

6508/12955
CSO: 1865/197

UDC 56.074:56:581:551.583.7(470.21)

QUANTITATIVE PALEOCLIMATIC RECONSTRUCTIONS IN KHIBINY MOUNTAINS AS ANALOGS OF FUTURE CLIMATE (METHODS, RESULTS)

Moscow VESTNIK MOSKOVSKOGO UNIVERSITETA, SERIYA 5: GEOGRAFIYA in Russian
No 1, Jan-Feb 86 (manuscript received 15 Mar 86) pp 84-88

[Article by T. V. Vashchalova and V. A. Klimanov]

[Abstract] The special Laboratory for Study of Avalanches and Mudflows, Geography Department, Moscow State University, has studied fluctuations during the Holocene for the purpose of preparing long-term predictions of avalanche activity in the Khibiny Mountains. The proposed approach is based on a statistical method of retrieving quantitative paleoclimate characteristics using spore and pollen data. The article discusses the results of large-scale paleoclimatic retrieval including determination of the amplitudes of temperature and precipitation fluctuations in the Khibiny Mountains during the Middle and Late Holocene with estimates of these characteristics for individual time periods. The quantitative paleoclimatic retrieval was based on spore and pollen analysis of 2 peat bogs and 2 lake deposit cores. The

basic climatic characteristics of the river valley mouths in the Khibiny Mountains were found to have changed within limits of -1 to +4°C (annual temperature), -50 to +100 mm (annual precipitation) over the past 5 to 7 millenia. Two large contrasting climatic epochs were found over the past 2000 years: a small climatic optimum and a brief period of glaciation, both of which can be considered possible analogs of future climatic situations. The major methodological result of this article is the conclusion that the quantitative climatic retrieval method used can be applied to mountain regions, particularly small areas of low mountains where forests are present. Figures 2; references: 14 Russian.

6508/12955
CSO: 1865/197

ULTRAVIOLET LIDAR FOR PHYTOPLANKTON STUDIES

Minsk SOVETSKAYA BELORUSSIYA, 16 Dec 86 p 4

[Text] An ultraviolet laser beam that is invisible to the eye was 'shot' at water from a height. A half-meter section of the water in the place where the beam struck began to glow instantly. It was phytoplankton -- single-cell water plants which contain chlorophyll -- reacting to the beam.

The new instrument is a lidar which specialists of Yerevan State University developed. In collaboration with scientists of the USSR Academy of Sciences' Institute of Limnology, these specialists have completed testing of the lidar and a new method of remote probing on Lake Sevan.

Professor V. Arutyunyan, director of the institute, told a TASS correspondent: "This device makes it possible to obtain an objective picture of the distribution of fields of phytoplankton, which is the chief indicator of the biological productivity of bodies of water. Moreover, the lidar reacts sensitively to the presence of organic substances in the water."

The instrument can be used in geology and also in agriculture, for forecasting harvest yields.

FTD/SNAP
/12955
CSO: 1865/152

FINDINGS FROM RECENT STUDY OF WATER FROM MEDITERRANEAN IN THE ATLANTIC

LENINSKOYE ZNAMYA 11 Nov 86 p 4

[Article by A. Tsyganov]

[Text] Did the Atlantic Ocean swallow up the legendary Atlantis? Science still does not know. But the Atlantic constantly 'swallows' large portions of the Mediterranean Sea. Water passes through the narrow Strait of Gibralter and replenishes the ocean's supply. It does not mix with the water mass of the Atlantic immediately, however, Not even the planet's second largest ocean is capable of quickly 'digesting' millions of cubic meters of warm water whose chemical composition and density are different. This water takes the shape of enormous lenses, which drift for months and even years at depths of several hundred meters, gradually dissolving.

The interesting phenomenon was discovered recently, and it has not received a lot of study by scientists as yet. One such lens was found, by coincidence over the exact place where the myth says sunken Atlantis is supposed to lie. An expedition of the USSR Academy of Sciences' Institute of Oceanology imeni Shirshov discovered this formation in the summer of this year. It was the first time that the researchers had encountered such a strongly pronounced abnormality of hydrophysical and hydrochemical characteristics of ocean water, which forced them to revise some of their scientific data.

The boundaries of the lens were thus very precisely defined. The difference in temperature between the water it contained and the surrounding water was 4 degrees. Moreover, this underwater 'flying saucer' was found to rotate at a constant angular velocity, like a solid. These features correspond to those of young formations which have just been formed. However, the lens was discovered approximately 3,000 kilometers from the Strait of Gibralter, unusually far from its place of origin. It would have taken it two years to travel this distance, according to minimal estimates. This means that processes of exchange between this lens and the water surrounding it must be taking place differently than theory describes them. It is also interesting that this formation is much larger than ones which scientists encountered previously.

But the main interest which this unusual phenomenon has for oceanologists is the possibility of discovering laws that govern the life and movement of waters in the ocean's depths, and of understanding how sea currents are formed.

Soviet research ships frequently explore parts of the Atlantic, which contains many mysteries. The purpose of the large-scale experiment called "Mezopoligon" is to study the dynamics of processes in the ocean and to ascertain their role in the formation of water and atmospheric conditions.

The oceanologists conducted observations for more than four months. They zigzagged eight times across an area of water coverning thousands of square kilometers, set down dozens of buoys, made a large number of reference measurements, and conducted numerous scientific experiments.

A fuller knowledge of the structure of the ocean and of relationships among its elements will help to determine more precisely its role in the formation of atmospheric phenomena, to construct a model of interaction between those two 'rulers of the weather,' and consequently to move closer to realizing all meteorologists' dream of reliable long-term weather forecasts.

FTD/SNAP
/12955
CSO: 1865/314

FINDINGS OF SUBMARINE STUDIES FROM RESEARCH SHIPS 'KELDYSH', 'VITYAZ'

Moscow IZVESTIYA 23 Jan 87 p 1

[Article by L. Kapelyushnyy]

[Text] The "Akademik Mstislav Keldysh" and "Vityaz", scientific research vessels of the USSR Academy of Sciences' Institute of Oceanology, have returned to their native shores from the Pacific Ocean and the East Atlantic, respectively. Scientists interviewed by the newspaper "Kaliningradskaya pravda" reported great successes in discovering new secrets of the ocean's depths.

From a "Pisces" craft which dove 48 times to depths as great as 2,000 meters, scientists of the "Mstislav Keldysh" were able to view a world previously unknown. They were rewarded with the discovery of animals of a type that was unknown to science. In color photographs, they appear as small reddish orange tubes tinged with yellow, green and blue, and having sinuous arms like those of starfish.

Another important finding was unusually shaped accumulations of polymetallic ores which resemble fantastic towers as tall as a multistory building. These 'skyscrapers' cover large territories of the ocean's depths, which is of interest for marine geology.

Geological research also was in the program of the "Vityaz", from which studies were made of mountain ranges, volcanoes and rocks at deep levels. With the aid of the submersible craft "Argus", the scientists took a core sample from an unprecedented depth, using a drilling device on the craft. This experiment was truly unique.

Material which the expeditions gathered is now being studied at the Institute of Oceanology, with the hope of revealing still more surprises.

FTD/SNAP
/12955
CSO: 1865/314

RESEARCH SHIP 'ZUBOV' TAKES PART IN ANTARCTIC EXPEDITION

Leningrad LENINGRADSKAYA PRAVDA 24 Dec 86 p 4

[Article by A. Kozlovskiy]

[Text] The scientific research vessel 'Professor Zubov' sailed from Leningrad today. It will conduct research in south polar waters and take part in transport operations of the 32nd Soviet Antarctic Expedition.

Scientists will carry out hydrologic, hydrochemical and aerometeorological studies and will also study the relief of the ocean bottom in an area to the northwest of Lazarev Sea.

In a few days, the last ship of the 32nd Antarctic Expedition, the tanker 'BAM', will sail from the Far Eastern port of Nakhodka. Once every two years this tanker makes stops at oil storage bases located at the Bellingshausen, Molodezhnaya and Mirnyy stations and fills tanks there with various fuels -- for diesel electric stations, gasoline for airplanes and auto vehicles, kerosene for helicopters, and fuel for tractors.

FTD/SNAP
/12955
CSO: 1865/221

RESEARCH VESSEL 'STRAKHOV' TO WORK IN GULF OF MEXICO

Vilnius SOVETSKAYA LITYA 13 Jan 86 p 2

[Text] The 'Akademik Nikolay Strakhov', a scientific research vessel of the USSR Academy of Sciences' Geology Institute, has set out from the seaport of Kaliningrad on a cruise.

"The main part of our work will be done in the Gulf of Mexico," related Doctor of Geological-Mineralogical Sciences V. I. Kononov, head of the expedition. "This area of the Central Atlantic was selected for a reason; it is the best-suited to the expedition's task of studying the heat field of the earth. Like the search for new sources of energy, this topic is very important, one of both scientific and economic significance. The waters of the gulf and their hydrochemical properties will be studied at the same time.

"This expedition of the Geology Institute will be the first to work in collaboration with scientists of Mexico and Spain. The vessel's port of registry is Kaliningrad."

FTD/SNAP
/12955
CSO: 1865/221

GEOLOGICAL, BIOLOGICAL STUDIES FROM SHIP 'KELDYSH'

Moscow SOTSIALISTICHESKAYA INDUSTRIYA 24 Dec 86 p 2

[Text] Kaliningrad -- An expedition on board the research ship 'Akademik Mstislav Keldysh' has obtained a great wealth of scientific material.

The ship docked in its port of registry yesterday, following a long cruise in the Atlantic, Indian and Pacific oceans.

"Unique data on processes of ore formation which take place on the ocean floor were obtained during this cruise," said A. Lisitsyn, corresponding member of the USSR Academy of Sciences and head of the expedition. "Numerous samples and specimens were taken from hot metal-bearing eruptions with the aid of manned submersible craft. Substantial additions were made also to the collection of mysterious tube-shaped animals recently discovered by biologists. These creatures live at great depths, near such sources of ore. Concentrations of them indicate places where metal-bearing material has erupted, for purposes of prospecting; however, the creatures themselves are of tremendous interest to science.

"The system of submarine ridges extending for 72,000 kilometers cannot be investigated closely even in the course of a long cruise, of course. The expedition therefore confined itself just to certain areas."

FTD/SNAP
/12955
CSO: 1865/188

WORK ON HARNESSING OCEAN ENERGY RESOURCES AT PACIFIC OCEANOLOGY INSTITUTE

Moscow IZVESTIYA 4 Feb 87 p 1

[Article by Yu. Balakirev, (Vladivostok)]

[Excerpts] Specialists of the Slavyanka Ship Repair Plant are working on an unusual order. An experimental prototype of a miniature power station which converts the energy of sea waves into electric power is being built here. The outer shell of this station, which is 8 meters long, is now ready. This pioneer power plant was developed at the Pacific Oceanology Institute (TOI) of the USSR Academy of Sciences' Far East Research Center (DVNTS).

"Only models of the wave-driven power plant have been tested at sea," said Candidate of Technical Sciences V. Sichkarev, the unit's developer. "They demonstrated efficiency and good survivability in a rough sea. I'm not about to predict how long the time for trials of the test prototype will be. Only the station's shell is available as yet. As for what goes inside it, here we have encountered delays. Effective financing for the project still is only a dream..."

Another promising innovation of TOI's ocean power engineering laboratory also is awaiting its day. Candidate of Technical Sciences A. Ilin, head of this laboratory, has proposed original technical solutions for an Arctic thermal power station. His approach was to develop modules with capacities of 3,500 kilowatts, which are simple in design and require minimal maintenance.

"We decided to do the designing and plans ourselves, in collaboration with the Far East Polytechnical Institute," said A. Ilin. "We shall first develop an experimental model of the station; the necessary components and the basin of an island maritime station are available for this purpose. A test prototype will appear next winter, we think. The first industrial power plant will be built by 2000. Provided, of course, that the project receives the resources and attention it needs."

Utilization of unconventional and renewable sources of energy is essential for the advancement of civilization. Our country possesses unique ocean energy resources, particularly in the Far East. Nature is able to provide inexhaustible energy in the form of waves, tides, currents, and the wind.

They have only to be utilized competently. What progress has science made to date?

"During the last 5-year plan, we studied and evaluated the energy resources of the ocean," reported Doctor of Physical-Mathematical Sciences, Professor V. Akulichev, chief scientific secretary of DVNTS and head of the project "Energetika". "Our ideas concerning these resources could be called fairly complete. Advanced methods for converting various types of energy have been identified and developed, as well as new technical solutions which are protected by certificates of invention. But the practical outcome of this work depends on the participation of a number of ministries, and on the coordinating role of the State Committee for Science and Technology."

TOI is the chief institute in charge of "Energetika", which is a section of the large-scale nationwide program "Mirovoy Okean" (World Ocean). This institute's specialized laboratory is currently our country's only academy scientific organization which is studying these timely questions of utilization of renewable energy sources.

The USSR ministries of power and electrification, and power machine building nevertheless are in no hurry to 'harness' the ocean. The time has come to make utilization of the ocean's energy a working proposition, however.

FTD/SNAP
/12955
CSO: 1865/221

SYMPOSIUM ON COMPREHENSIVE ENVIRONMENT-MONITORING METHODS

Moscow SOTSIALISTICHESKAYA INDUSTRIYA 23 Nov 86 p 1

[Excerpt] An international symposium, "Comprehensive Methods for Monitoring the Quality of the Natural Environment", will open tomorrow in Moscow. A. Ovchinnikov, corresponding member of the USSR Academy of Sciences and chairman of the symposium's organizing committee, told about the tasks of the upcoming forum, at the request of our correspondent:

"The main task is defined by the symposium's title: comprehensive methods and approaches are what is now needed for evaluating the condition of the environment objectively. Specialists in our country and abroad who are studying harmful effects of human activity on forests, bodies of water, the atmosphere, and soil (so-called anthropogenic abnormalities) have amassed a wealth of experience and developed original monitoring methods and equipment. The symposium should help to publicize them on a broad scale.

"Systems analysis of the quality of the environment has begun to advance. Academician K. Kondratyev laid the scientific groundwork for this. Too few people know about the latest achievements of laser probing, and of space monitoring of the earth's surface. Diagnosis with the aid of biological objects is yielding interesting results. Living sensing devices are becoming more and more numerous. Marine plants, mollusks and plankton remove harmful impurities from sea water. And mosses have been found to react sensitively to air pollution. Changes occur in their cells, and their genetic apparatus readjusts. Scientists are observing such mutations closely, and a special direction has even appeared. It is apparent that time has come to combine the most advanced methods of monitoring into a single diagnostic system and to develop mobile laboratories with diverse instrumentation.

"The effectiveness of researcy by biologists, medical personnel and botanists depends directly upon progress in the field of chemical physics. [At the symposium] we wish to acquaint ecologists with a new scientific direction -- electronics of organic materials. A variety of sensing devices based on organic semiconductors will raise monitoring to a new level and make it more accurate and adaptable. After all, these devices possess the unique property of sharply altering their characteristics in response to the presence of even microscopic doses of certain substances. Polymers send out electric signals which are then fed easily into a computer and processed. And it is possible in principle to synthesize polymers that will detect any impurities in the air."

FTD/SNAP
/12955
CSO: 1865/314

OIL-SPILL CLEANUP DRILL INVOLVES HELICOPTER WITH EXPERIMENTAL GEAR

Moscow VODNYY TRANSPORT 20 Nov 86 p 3

[Excerpt] A helicopter hovered at an altitude of about 30 meters near an offshore drilling rig, the "Shelf-2". A vessel of the "Neftegaz" type could be seen below the helicopter. A door of the helicopter opened, and a man appeared. With little hesitation, he was lowered quickly by a cable to the vessel's deck. Thus began a comprehensive training exercise, "LARN", which was organized jointly by the Caspian Shipping Line and cooperating organizations.

A special marine unit of the shipping line's expeditionary detachment for emergency, rescue and underwater technical work (EO ASPTR) has been in existence for seven years. Based in Baku, this unit is called upon to deal with accidental oil spills on the sea.

Questions of interaction with other agencies and services, primarily aviation, are receiving special attention in the unit. A number of techniques have been tried out in joint training and other exercises: a pier belonging to the EO ASPTR has been made available for landings by MI-8 helicopters, and methods have been learned for delivering equipment and personnel of the unit to the after-decks of vessels of the "Neftegaz" type (design V-92) at sea, and for towing equipment with large dimensions from the detachment's base to the place of an oil spill, using outside slings. An example of such equipment is an emergency system weighing 2 tons which is used to pump petroleum products out of tankers.

The use of mechanical means of cleaning up oil spills is not always possible in operations of the "LARN" program. A situation may develop in which chemicals called dispensers must be used. Aircraft can accomplish this considerably faster than ships. During the "LARN" exercises, an MI-8 helicopter demonstrated the capabilities of sprinkling apparatus carried on an outside sling. This apparatus, which has a capacity of 1,965 liters, was developed at the Krasnodar affiliate of the State Scientific Research Institute of Civil Aviation.

At a speed of 180 kilometers, the helicopter and its sprinklers apply a swath of dispersing agent 20-22 meters wide. MI-8 helicopters can be used economically for this operation up to 50 kilometers from the shore.

It is regrettable that only test prototypes of this sprinkling apparatus exist. The problem is that enterprises of neither the Ministry of Civil Aviation nor the Ministry of the Merchant Fleet want the job of producing it, although similar apparatus is broadly employed in the USA, Sweden and other countries.

Also in Krasnodar there is another relatively simple development which we need very much: a pivoting slip ring for automatically detaching a load from an outside sling at its lower end. But this development also has not progressed beyond the experimental-prototype stage. Helicopters still drop their loads and outside slings together.

In collaboration with the Azerbaijan Civil Aviation Administration, we are now working on the problem of delivering large items of oil-spill cleanup equipment to other basins on board heavy cargo airplanes.

(A photograph is given showing the helicopter flying with a load on a sling).

FTD/SNAP
/12955
CSO: 1865/314

WELDING INSTITUTE CREATES LAB FOR BUILDING OFFSHORE PLATFORMS

Moscow IZVESTIYA 7 Dec 86 p 2

[Article by S. Tsikora, correspondnet, Kiev]

[Excerpt] Giant steel platforms will be installed firmly on the bed of the Caspian Sea next year. From these platforms, oil and gas can be extracted in water 100, 200 and even 250 meters deep instead of 30-40 meters, as was formerly the case. The platforms will be the first all-welded structures made from domestic materials. They are being put into series production at a plant in Baku.

Reaching out to such great depths offshore and developing fundamentally new equipment for this purpose required the united efforts of many agencies. Of particular interest is an unusual form of cooperation which is now being practiced by the USSR Ministry of the Gas Industry (Mingazprom), the Ukrainian Academy of Sciences' Institute of Electric Welding imeni Paton, and the Baku Metal Structures Plant.

V. Bernadskiy, scientific secretary of the electric-welding institute, and V. Novikov, head of a department of the institute, told our correspondent about the features of this new kind of cooperation:

"The platforms, which engineers call deep-water offshore foundations, are structures with huge dimensions. They have to operate in the most incredible conditions and withstand everything: sea salt which corrodes metal, violent storms, moving ice in northern latitudes... The platforms must therefore meet extremely high requirements, particularly as regards their materials. Technological solutions that are new in principle are needed; they must be compatible with new welding processes, and industry must be equipped with this new technology.

"We know how to accomplish this task in theory. But how do we do it in practice?

"Our version is as follows. A special industry laboratory of USSR Mingazprom is being created at the electric-welding institute. This laboratory will conduct the necessary research and experimental work at the institute. For the purpose of putting results of this work into practice quickly at

a specific production facility, a number of the laboratory's associates will be based permanently at the plant in Baku where the offshore platforms are built.

"The electric-welding institute has substantial experience with creating and operating industry laboratories under its own roof. There are now seven such laboratories here. The offshore-foundations laboratory will be the eighth."

FTD/SNAP
/12955
CSO: 1865/314

USES OF AIRBORNE LASER 'CHAYKA-1' FOR PROBING WATER, LAND SURFACES

Moscow SOTSIALISTICHESKAYA INDUSTRIYA 11 Dec 86 p 4

[Article by V. Lagovskiy]

[Abstract] The lenghty article reports on applications of the first airborne laser unit, "Chayka-1". It records comments of Doctor of Physical-Mathematical Sciences Dmitriy Vasilyevich Vlasov, who talked about what can be learned from laser probing of water and land surfaces, and about studies by the USSR Academy of Sciences' Institute of General Physics (IOFAN) which established the kinds of information that can be obtained. The "Chayka-1" unit reportedly is installed on an AN-30 airplane marked with the number 30060. Its initial testing has been completed, and a "Chayka-2" unit is expected next.

The article reports that tests of the laser at night in the vicinity of Tashkent caused a stir in that city. Laser beams shot from the airplane onto fields caused bright green flashes. According to Vlasov, the equipment was being used here to test laser probing as a means of monitoring the condition of cotton crops. Candidate of Physical-Mathematical Sciences D. Mirkamilov of the Tashkent Polytechnical Institute is quoted regarding experiments in which his institute took part with the developers of "Chayka-1". He said that in the Fergana valley, the laser probing revealed an infection of cotton plants at a very early stage, and it was also helpful in measuring the height of plants.

While IOFAN has just begun to ascertain the kinds of information that laser probing of plants can provide, more has been learned about laser light's interaction with water surfaces, according to Vlasov. But even here successes outside the laboratory are said to be fairly recent. It is recalled that at first researchers had difficulty understanding why the reflection of laser light from the ocean surface was highly erratic. A breakthrough reportedly was provided by IOFAN scientists' study of a phenomenon observed by cosmonaut L. Demin from space over the Mozambique Strait. He was able to see clearly strips of seabottom sand dunes, although the depth of the strait is 1,800 meters. IOFAN scientists hypothesized that smooth waves on the ocean surface act like giant lenses. They amplify sunlight many times, which penetrates to the seabottom and is concentrated in very narrow spots. The hypothesis further explains that when observed from space, these

illuminated spots on the bottom are magnified by the ocean 'lens' so that small ripples of sand measuring millimeters across appear as expanses of sand dunes. According to Vlasov, this finding helped to understand a peculiarity of laser probing of water surfaces. It was assumed that even small waves make a big difference on the intensity of reflected signals on oscilloscopes.

Recent experiments reportedly have confirmed this. Allowances for wave activity were made in the laser apparatus. It is said that now a computer analyzes the amplitude of flashes and is able to determine not only the composition of impurities in water, but also their concentration. With oil, it is claimed that the laser unit can tell the type of oil and also whether it spilled from a passing tanker or whether it seeped from a nearby offshore well. V. Gridin, head of a laboratory of the Moscow Institute of Petroleum and Gas, is quoted regarding the potential of laser probing as a means of prospecting offshore oil deposits. He said joint experiments have convinced him that such prospects are realistic.

In conclusion, the article quotes corresponding member of the USSR Academy of Sciences F. Bunkin, director of the work on laser probing. He observed that whereas formerly lasers could be used only for probing the atmosphere, now they can be used to study the surface of land and the ocean. He said he thinks lasers eventually will help to view things on Earth more clearly from space, for example, to study the ocean layer by layer.

FTD/SNAP
/12955
CSO: 1865/152

SUCCESSES IN PREDICTING TSUNAMIS PROMPT IDEA OF NATIONAL SERVICE

Moscow SOTSIALISTICHESKAYA INDUSTRIYA 20 Nov 86 p 4

[Article by S. Korepanov]

[Abstract] The article records comments of academician V. I. Ilichev, chairman of the presidium of the USSR Academy of Sciences' Far East Research Center, regarding the possibility of creating a state service for prediction of tsunamis. He said that studies done by the Far East Research Center's Institute of Marine Geology and Geophysics have revealed indicators according to which it is possible to determine the force of waves spawned by earth quakes with a certain probability, when correlated with signals of seismic stations. Ilichev said that tsunamis in the ocean can be detected by instruments for recording the level of the sea and movement of currents, and other factors. Scientists of the Far East Research Center reportedly have been working on methods of such measurements and their experimental verification for a number of years. Also, the center's Institute of Volcanology has been working on prediction of earthquakes. As a result of the work of the center's scientists in collaboration with other research institutions of the country, Ilichev claimed that the scientific principles and technical requirements for an automated system for prediction of tsunamis have been worked out. He said that the technical basis for such a system already exists, but the question of its organizational structure still must be resolved. Necessary facilities for it belong to many different agencies. For example, seismic stations belong to the USSR Academy of Sciences, many of the personnel and much of the financing must be provided by the USSR Ministry of Geology, while data transmission is governed by the USSR State Committee on Hydrometeorology and Monitoring of the Natural Environment.

FTD/SNAP
/12955
CSO: 1865/314

UNDERWATER ROBOT 'FRED' (caption)

Moscow VECHERNYAYA MOSKVA 6 Jan 87

[Abstract] A photograph is given showing an underwater robot called 'FRED', which was developed at the Moscow Higher Technical School imeni Bauman. The four-wheeled robot vehicle is one of the exhibits at an exhibition of the scientific-technical creativity of Moscow young people which is in the "USSR Standards" pavilion at the USSR Exhibition of National Economic Achievements.

FTD/SNAP
/12955
CSO: 1865/188

UDC 551.242.2+552.3(265/266)

TECTONICS OF THE CAROLINE OCEANIC STEP (SOUTHWESTERN PACIFIC OCEAN)

Moscow GEOTEKTONIKA in Russian No 6, Nov-Dec 86
(manuscript received 1 Oct 85) pp 40-54

[Article by Yu. M. Pushcharovskiy and Yu. N. Raznitsin, Geology Institute, USSR Academy of Sciences]

[Abstract] A discussion of the Southwestern Pacific, which the authors call the Caroline Oceanic Step, is presented. The tectonics and history of development of the region are described. The step, located between the Caroline Islands on the north and the Melanesian island arc trenches to the south, was formed by subsidence of the Eastern Marianas Abyssal Plate in the Late Eocene and Early Oligocene. The structure and material composition of Mussau Ridge are discussed on the basis of data collected during the ninth cruise of the research vessel "Akademik Mstislav Keldysh." Figures 6: references 34: 10 Russian, 24 Western.

6508/12955
CSO: 1865/182

UDC 551.24:551.21(261)

TECTONICS AND MAGMATISM OF WALVIS RIDGE AND DISCOVERY RISE (ATLANTIC OCEAN)

Moscow GEOTEKTONIKA in Russian, No 6, Nov-Dec 86
(manuscript received 13 May 85) pp 55-68

[Article by B. P. Zolotarev and B. N. Kotenev, Geology Institute, USSR Academy of Sciences; All-Union Scientific Research Institute of Fishing and Oceanography]

[Abstract] A detailed study is presented of two structures: Walvis Ridge and Discovery Rise. The discussion is based on additional data collected on the relief of these upthrusts by one of the authors in 1979-1980 aboard the research vessel "Professor Mesyatsev" and studies of rock specimens dredged from the area. Published materials from previous studies of the

geological structure and geophysics of the ridge and the composition of volcanic rock in the area are also considered. These two formations are the two largest aseismic elevations in the eastern South Atlantic. Both structures have a typical oceanic crust with a thickness of 20 to 25-30 km. Subalkaline and alkaline rocks are predominant in the geological structure. Mantle hot spots have altered the geological structure of the upthrusts. Figures 10; references 26: 7 Russian, 19 Western.

6508/12955
CSO: 1865/182

UDC 550.422

CONCENTRATION COEFFICIENTS OF ELEMENTS IN FERROMANGANESE NODULES RELATIVE TO OCEAN SEDIMENTS

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 291, No 2, Nov 86 (manuscript received 8 May 86) pp 451-453

[Article by G. N. Baturin, Oceanology Institute imeni P. P. Shirshov, USSR Academy of Sciences, Moscow]

[Abstract] A first attempt is made to present the full picture of accumulation of elements in abyssal ferromanganese nodules relative to ocean sediments based on original data and data from the literature obtained mostly in the past 5 to 6 years. Manganese in the nodules is associated with Ni, Cu, Zn, Mo, Cd, Tl, whereas iron is associated with Co, V. P, Pb, Zr, Ta, Nb, Sb, As, Bi, U and Th. References 15: 14 Russian, 1 Western.

6508/12955
CSO: 1865/189

UDC 551.782.13.2+561.26

STRATIGRAPHY AND DIATOMS OF NEOGENE DEPOSITS OF GREATER KURIL ARC AND THEIR CORRELATION WITH ABYSSAL NORTHWEST PACIFIC SEDIMENTS

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 291, No 2, Nov 86 (manuscript received 12 Nov 85) pp 437-440

[Article by K. A. Ushko and L. M. Dolmatova, All-Union Scientific Research Institute of Foreign Geology, Moscow: "Kamchatgeologiya" Geological Production Association Petropavlovsk-Kamchatskiy]

[Abstract] A study was made of the stratigraphy and diatoms of the Greater Kuril Arc based on 12 volcanogenic-sedimentary zone cross sections to provide detailed local stratigraphic diagrams and correlate them with zonal ocean sediment systems. The studies for the first time allowed stratigraphic differentiation of deposits of the Upper Miocene and Pliocene of the Great

Kuril Arc into diatom zones with known suite ages. The stratigraphic position of the Rybakovskaya, Alekhinskaya, Kamuyskaya, Parusnaya and Golovninskaya suites was determined. A direct correlation was drawn among sections of volcanogenic-sedimentary deposits in the Greater Kuril Arc and deep drilling studies in the North Pacific. Specifics of the similarity and differences of composition of diatom zones of island arc cross sections and deep ocean boreholes were revealed. References 8: 3 Russian, 5 Western.

6508/12955
CSO: 1865/189

UDC 551.501

STATISTICAL STRUCTURE OF TEMPERATURE FIELD OVER SOUTH PACIFIC OCEAN

Leningrad VESTNIK LENINGRADSKOGO UNIVERSITETA, SERIYA 7: GEOLOGIYA, GEOGRAFIYA in Russian No 4, Dec 86 (manuscript received 10 Jul 86) pp 106-109

[Article by V. A. Vasilyev, L. V. Vasilyeva and A. V. Kondratyev]

[Abstract] An attempt is made, using the South Pacific Ocean as an example, to study the vertical statistical structure of the January temperature field based on daily satellite radiometer soundings of the atmosphere over a period of 5 years for 15 isobaric surfaces above the Pacific. The behavior of the calculated quantitative characteristics is studied in several latitude zones. It is found that in an area with a sparse network of aerologic stations, such as the South Pacific, the statistical structure of the temperature field can be analyzed using satellite radiometric sounding data. The quantitative and qualitative agreement of the data from such aerologic stations and satellites is good. References: 5 Russian.

6508/12955
CSO: 1865/196

UDC 550.831(551.46)

GEOPHYSICAL-GEOMORPHOLOGICAL STATISTICAL REGIONALIZATION OF NORTH ATLANTIC

Leningrad VESTNIK LENINGRADSKOGO UNIVERSITETA, SERIYA 7: GEOLOGIYA, GEOGRAFIYA in Russian No 4, Dec 86 (manuscript received 5 May 86) pp 93-97

[Article by V. S. Mironov and V. G. Mishenkov]

[Abstract] A study was made of a statistical method used as the basis for establishing of mutual correlation among measured ocean depths and gravity anomalies. The relationships are used to regionalize the North Atlantic Ocean. The method is implemented as a computer program written in PL-1. The results are presented without analysis of the geological factors governing the regionalization of the area. Figures 3; references 8: 7 Russian, 1 Western.

6508/12955
CSO: 1865/196

UDC 551.46

SYNOPTIC VARIABILITY OF FRONTAL ZONES AND SEGMENTS IN OYASHIO SYSTEM

Leningrad VESTNIK LENINGRADSKOGO UNIVERSITETA, SERIYA 7: GEOLOGIYA, GEOGRAFIYA in Russian No 4, Dec 86 (manuscript received 10 Mar 86) pp 71-81

[Article by D. K. Staritsyn and V. R. Fuks]

[Abstract] The variability of frontal zones and interfaces in the Southern Kuril region was studied on the basis of experimental measurement of temperature fields with an IR radiometer on an IL-14 aircraft. Fourteen aircraft studies were made at 100-200 m altitude during the summer and fall of 1983 and 1984. The variability of the position and internal structure of 3 frontal zones are discussed. The zones are found to be quite variable and dynamic, passing through phases of frontal formation, steady maintenance and relaxation. Complex space-time variability of temperature is also observed. A relationship is found between phases of temperature fronts and the type of atmospheric circulation. The frontal formation zone almost always corresponds to anticyclonic circulation, with north winds predominating. Cyclical atmospheric circulation with predominantly southerly winds results in relaxation of fronts. Figures 3; references 8: 7 Russian, 1 Western.

6508/12955
CSO: 1865/196

UDC 553.98:551.351.2

FIRST ALL-UNION CONFERENCE ON 'JOINT UTILIZATION OF OIL AND GAS RESOURCES OF USSR CONTINENTAL SHELF'

Moscow IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY: GEOLOGIYA I RAZVEDKA in Russian No 1, Jan 87, pp 128-129

[Article by Ye. I. Koltunov and G. Ye. Ryabukhin; Mineralogy Institute imeni I. M. Gubkin]

[Abstract] A scientific conference was held at the Mineralogy Institute on 24-26 June 1986. It was devoted to problems relating to marine oil and gas resources. Some 46 educational institutions participated in the conference, which was broken down into 13 sections on problems of geology of the USSR continental shelf, geophysical prospecting methods, drilling of off-shore oil and gas wells production and transportation of marine hydrocarbons, technical means of assimilating oil and gas resources on the continental shelf of the USSR, economics and planning of utilization of marine oil and gas deposits, environmental protection, safety and applicable law, training and retraining of engineers for off-shore oil work. Some 500 reports were presented. Most common were reports on the geology of the seas and oceans. Many reports reflected the concept of global plate tectonics. The section on economics dealt with methods of estimating the economic

effectiveness of new technology for continental shelf oil and gas deposits. Reports were also heard on the current status and prospects for development of technology for off-shore oil and gas drilling, problems of planning and creation of marine oil and gas structures in areas which do or do not freeze, and the technology of manufacture and calculation of the strength of such structures. Particular attention was given to personnel training problems. The conference defined the main scientific trends for university research work in 1986-1990. They are not mentioned in this report.

6508/12955
CSO: 1865/217

UDC 551.54+551.5

INFLUENCE OF GAS EXCHANGE BETWEEN OCEAN AND ATMOSPHERE ON FORMATION OF ATMOSPHERIC PRESSURE FIELD

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 291, No 5, Dec 86 (manuscript received 25 Dec 85) pp 1231-1234

[Article by I. P. Semiletov, Pacific Ocean Oceanology Institute, Far Eastern Scientific Center, USSR Academy of Sciences, Vladivostok]

[Abstract] The purpose of this work is to demonstrate the possibility that gas exchange between the atmosphere and the ocean may influence the formation of the atmospheric pressure field. A model of the boundary diffusion layer is used, assuming gas exchange by molecular diffusion through a thin laminar film separating the fully mixed layers of the atmosphere and the ocean. The study indicates that in addition to energy exchange in the form of heat and moisture, which determines the formation of the terrestrial climate, we must also consider gas exchange in areas of intensive vertical water movement, which may influence the formation of centers of action in the atmosphere by creating local and regional conditions. References 15: 6 Russian, 9 Western.

6508/12955
CSO: 1865/219

UDC 551.242.5(261)

TECTONICS OF SEDIMENTARY COVER AND BASEMENT OF LABRADOR SEA

Moscow BYULLETEN MOSKOVSKOGO OBSHCHESTVA ISPYTATELEY PRIRODY: OTDEL GEOLOGICHESKIY in Russian Vol 62, No 1, Jan-Feb 87 (manuscript received 19 Apr 83) pp 25-36

[Article by K. A. Klitin, Geology Institute, USSR Academy of Sciences, Moscow]

[Abstract] Data obtained by drilling are used to describe the cross section of the sedimentary cover in the Labrador Sea between Labrador and Greenland. The acoustic basement and its surface structure are then described. The consolidated oceanic crust in the area was created before the beginning of the formation of the present sedimentary cover by spreading or by physical and mineralogical processes leading to thinning and transformation of the continental crust to an oceanic crust and the appearance of plateau basalts. The rift valley of the central Labrador upthrust probably developed in connection with relatively recent spreading. The Newfoundland oceanic basin was laid down simultaneously with the process of formation of the oceanic crust. Processes creating the consolidated oceanic crust were also manifested as intensive down-warping, leading to the formation of a deep-water basin which began to be filled with sedimentary deposits in the Paleocene and in places the Cretaceous. The Labrador deep-water basin was almost completely filled with sediment by the Late Miocene. Sediment accumulation occurred here under shallow conditions during the Pliocene. During the Quaternary, probably the Late Quaternary, new down-warping occurred, creating the present-day deep-water trench of the Labrador Sea and the surrounding continental and island slopes. Figures 2; references 21: 5 Russian, 16 Western.

6508/12955
CSO: 1865/220

UDC 551.24

STRUCTURE OF MIOCENE-QUATERNARY DEPOSITS OF KOMANDORSKIY AND ALEUTIAN TRENCHES AND SHIRSHOV RIDGE

Moscow BYULLETEN MOSKOVSKOGO OBSHCHESTVA ISPYTATELEY PRIRODY: OTDEL GEOLOGICHESKIY in Russian Vol 62, No 1, Jan-Feb 87 (manuscript received 9 Oct 84) pp 41-47

[Article by V. N. Moskalenko, Southern Division, Oceanology Institute, USSR Academy of Sciences, Gelendzhik]

[Abstract] In 1982, the author's institute undertook an integrated geophysical study of the crust in the Bering Sea during the 29th cruise of the research vessel "Dmitriy Mendeleyev." A significant volume of reflected wave seismic studies was undertaken in the deep Aleutian and Komandorskiy

trenches and over Shirshov Ridge to support a detailed study of the structure of the upper sedimentary cover with high resolution down to a depth of 2.5-3.0 km beneath the sea floor. High-frequency seismic wave sources such as a 20 kJ electric spark radiator and pneumatic sources with chamber volumes of up to 3 liters were used. The Miocene and Quaternary deposit sequences in the two basins are quite similar, indicating that sediment accumulated in this region under deep-water conditions in the Late Quaternary. The deposits on Shirshov Ridge were found to consist of turbidites, as in the adjacent trenches. Sediments in all three areas thus were formed simultaneously. Figures 5; references 5: 1 Russian, 4 Western.

6508/12955
CSO: 1865/220

UDC 551.468.1(479.223)

WAVE ENERGY FLOW ALONG SHORELINE OF BLACK SEA COAST OF ADJARIA

Moscow VESTNIK MOSKOVSKOGO UNIVERSITETA, SERIYA 5: GEOGRAFIYA in Russian
No 1, Jan-Feb 87 (manuscript received 23 May 86) pp 40-43

[Article by G. A. Safyanov and K. G. Sokol]

[Abstract] The energy method for studying the displacement of sediment along a shoreline is widely used, but requires some standardization of approaches to obtain comparible results. This article outlines an approach for graphic representation of the results and their interpretation allowing comparison for the coastlines of different seas. The method is based on separation of waves into classes by wave height, frequency and direction, and division of the coastline into elementary linear sectors. Results of observation of the height, period and direction of waves along the coast of Adjaria for 1983-1984 were processed. It was found that in this area, where the beach consists of pebbles rather than sand, only 5 to 7% of the energy of the current along the coast is utilized in the transport of sediment. This and the unsatisfactory accuracy of recording of wave directions dictate further development of the method for its application to such areas. Figure 1; references: 8 Russian.

6508/12955
CSO: 1865/197

UDC 556.556.2(575.2)

NUMERICAL MODELING OF CURRENTS IN ISSYK-KUL LAKE

Moscow VESTNIK MOSKOVSKOGO UNIVERSITETA, SERIYA 5: GEOGRAFIYA in Russian
No 1, Jan-Feb 87 (manuscript received 27 May 86) pp 43-48

[Article by B. V. Arkhipov and V. I. Revyakin]

[Abstract] Three-dimensional evolutionary models are promising for modeling of hydrodynamic processes in lakes. This article applies such a model to currents in Lake Issyk-Kul. The purpose of the mathematical modeling was to estimate the significance of windstorms in the formation of the circulation and the dome of cold water and to determine the influence of thermal stratification on the currents and the evolution of current and temperature fields with changing wind conditions. It was found that wind currents in combination with Coriolis force redistribute the field of water density in such a way that the density gradients maintain the horizontal cyclonic circulation caused by the wind but prevent vertical circulation due to the direct effect of the wind and at some stage begin to suppress purely wind-driven vertical circulation. Figures 3; references 12: 10 Russian, 2 Western.

6508/12955
CSO: 1865/197

UDC 550.4:549:551.84

FERROMANGANESE IRON-MANGANESE FORMATIONS IN 'ZOLUSHKA' CAVE

Moscow DOKLADY AKADEMII NAUK SSSR in Russian, Vol 292, No 2, Jan 87
(manuscript received 15 Oct 85) pp 451-454

[Article by S. N. Volkov, B. I. Smirnov and E. A. Yanchuk, "Zapadukrgeologiya" Geological Production Association, Lvov]

[Abstract] The "Zolushka" cave is located in the Darabano-Mamalyzhsk upthrust in the Prut River Valley in gypsoanhydrites, and was filled with water until less than 30 years ago, when intensive pumping of water dried the Karst cavities in the 1950's. Formations in the cave contain up to 50% iron in red layers, up to 50% manganese in black layers, plus Ni, Co, Cu, Zn and Mo, primarily in the manganese-rich layers. The alternation of layers of different colors in the sediments in this cave indicates that the primarily terrigenous component was deposited first, iron and manganese arriving in dissolved form. Iron was deposited first, followed by manganese.
Figures 2; references 9: 7 Russian, 2 Western.

6508/12955
CSO: 1865/214

UDC 546.26

BEHAVIOR OF ORGANIC MATTER IN AREA OF MIXING OF WATERS FROM AMAZON RIVER AND OCEAN

Moscow DOKLADY AKADEMII NAUK SSSR in Russian, Vol 292, No 2, Jan 87 (manuscript received 10 Oct 85) pp 459-463

[Article by V. Ye. Artemyev and G. I. Shapiro, Oceanology Institute imeni P. P. Shirshov, USSR Academy of Sciences, Moscow]

[Abstract] A study was made of the specifics of transformation of dissolved and suspended organic matter in waters of the Atlantic Ocean in the vicinity of the mouth of the Amazon River as a function of salinity. In site observations were compared with the results of parallel experiments involving mixing of river and ocean waters collected during the 9th cruise of the research vessel "Professor Shtokman" in March-April, 1983. This work demonstrated the nonconservative nature of the behavior of dissolved organic matter in the area of mixing of the water of the Amazon River and the ocean. A model was developed to estimate the losses of organic matter in these waters. As salinity increases, the form of organic matter is converted from dissolved to suspended and back primarily as a result of physicochemical processes such as flocculation and adsorption-desorption. Figures 3; references 8: 5 Russian, 3 Western.

6508/12955
CSO: 1865/214

MATHEMATICAL-CARTOGRAPHIC MODELING OF ECONOMIC UTILIZATION OF ATLANTIC OCEAN

Novosibirsk GEOGRAFIYA I PRIRODNYYE RESURSY in Russian No 4, Oct-Dec 86 (manuscript received 4 Mar 85) pp 113-121

[Article by Ye. A. Sigolayeva and V. S. Tikunov, Moscow State University]

[Abstract] An economic regionalization of the Atlantic Ocean is attempted, based on published data on the economic utilization of the ocean. The economic utilization of a water area is determined by coastal population, location of production facilities and ports, degree of utilization of mineral and power resources, intensity of fishing and marine transport. The maps presented in this article are limited to the following characteristics: distance from the shoreline, accessibility of an area to coastal populations, distribution of biomass in the ocean, density of shipping, level of pollution by oil film, and location of oil- and gas-bearing basins. Maps of each of these characteristics are presented, plus a composite map illustrating the overall economic utilization of the ocean. Figures 4; references 20: 19 Russian, 1 Western.

6508/12955
CSO: 1865/216

UDC 553.98.061.3:551.242.2(265.7+267.7)

PETROLEUM AND GAS FORMATION IN BASINS OF INDOPACIFICA

Novosibirsk TIKHOOKEANSKAYA GEOLOGIYA in Russian No 6, Nov-Dec 86
(manuscript received 27 Dec 84) pp 46-52

[Article by O. K. Bazhenova, Yu. G. Zorina and R. D. Rodnikova, Moscow State University; All-Union Scientific Research Institute of Foreign Geology, Moscow]

[Abstract] The conditions for petroleum and gas formation in the sedimentary basins in the region of merging of the Pacific Ocean, Eurasian and Indo-Australian blocks of the earth's crust are examined. The genetic nature, history of development, geothermal regime, composition and thickness of the component strata, katagenetic history, composition and quantity of buried organic matter, extent and configuration of the basins are related to their position relative to the most important tectonic elements of the region and determine the conditions and scales of petroleum and gas formation, as indicated by a full-page map accompanying the text which shows the position of 40 such basins. These basins can be divided into three groups. The first group includes basins located in the rear part of island arcs turned toward the continent, including abyssal basins of marginal seas, with the majority of basins of this type situated in the marginal sea. The second group includes interarc (between the outer and inner arcs) narrow downwarps of different extent, traps which receive products of destruction of the island arc zone, including volcanic. The third group includes frontal basins, structurally corresponding to downwarps separated by transverse rises into a number of sedimentation basins. Eocene deposits are predominantly gas bearing; Oligocene deposits contain pools of petroleum and condensate; Miocene deposits constitute the main commercial horizon for petroleum, gas and condensate; Pliocene and Pleistocene deposits contain gas and an insignificant quantity of petroleum. Figures 1; references 13: 11 Russian, 2 Western.

5303/12955
CSO: 1865/225

UDC 551.465

TWO-LAYER MODEL OF CIRCULATION IN WORLD OCEAN WITH DETAILED DESCRIPTION OF SEASONAL EVOLUTION OF UPPER QUASIHOMOGENEOUS LAYER

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 291, No 3, Nov 86 (manuscript received 9 Jul 85) pp 699-703

[Article by B. A. Kagan, V. A. Ryabchenko and S. A. Fokin, Leningrad Branch, Oceanology Institute imeni P. P. Shirshov, USSR Academy of Sciences]

[Abstract] Although the upper quasihomogeneous layer (UQL) has a decisive role in the formation of climate and general circulation of the ocean, there has never been any successful effort to incorporate the UQL in a global model. Without awaiting a solution of the problem of parameterization of mixing beyond the limits of the UQL, but at the same time taking into account the interaction between the UQL and the deep layer, the article outlines a two-layer model of circulation in the world ocean. The ocean is divided into two layers, UQL and deep layer, in each of which the temperature T_i is assumed to be invariable in depth and subject to determination, together with the vertically averaged velocity component u_i, level disturbance ζ and thicknesses of the UQL and deep layer. The pertinent equations for the model are derived under these and other simplifying assumptions. Examples of computations are given. The computed and observed mean annual discharges of the main ocean currents are in rather good agreement. For example, the results of computations of the mean annual discharges of the Antarctic Circular Current, Gulf Stream and Kuroshio are 160, 52 and 74 Sv, whereas the corresponding experimental data are 130, more than 100 and 80-90 Sv respectively. The correspondence between the computed and observed seasonal variations of mean zonal temperature of the UQL is highly satisfactory, over the greater part of the world ocean not exceeding 1°C. There is a qualitative similarity between the computed and observed seasonal variations of the mean zonal thicknesses of the UQL. Figures 1; references 14: 5 Russian, 9 Western.

5303/12955
CSO: 1865/173

UDC 534.87+551.436.26:534

REMOTE ACOUSTIC SOUNDING OF FERROMANGANESE NODULES

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 291, No 3, Nov 86
(manuscript received 18 Jul 85) pp 697-699

[Article by Yu. Yu. Zhitkovskiy, A. Yu. Zakhlestin, A. I. Zotov, V. I. Kayevitser, G. M. Petrov and A. V. Sknarya, Oceanology Institute imeni P. P. Shirshov, USSR Academy of Sciences; Radio Engineering and Electronics Institute, USSR Academy of Sciences, Moscow]

[Abstract] The characteristics of sound scattering in the abyssal ocean in regions of Fe-Mn nodule concentrations in the Pacific Ocean were studied in the summer of 1983. The objective was determination of the possibilities of using remote acoustic methods in the exploration of Fe-Mn nodule deposits. The instrument complex used included a side-looking sonar developed by the Oceanology Institute and a unit for shaping and preprocessing of a linear-frequency-modulated signal developed at the Radio Engineering and Electronics Institute. The relatively weak sound absorption in the water in the sonar frequency range (6-7 KHz) made it possible to tow the radiating and receiving antennas near the ocean surface at a shallow depth, in contrast to the method involving towing of a sonar on a long cable directly near the bottom. The rate of towing was 4-5 knots. This made it possible to sound a zone with a width of 11 km where the ocean depth is about 4 km. A reliable bottom image was obtained in a zone with a width of 7.5 km with a signal source power of about 300 W. The findings were compared with samples recovered from the ocean floor with an "Okean-0.25" dredge. It was found that all stations with a high content of Fe-Mn nodules (more than 15 kg/m^2) correspond to zones of strong scattering; stations with a density less than 10 kg/m^2 correspond to zones of moderate scattering, etc. The remote sounding (back-scattered signal) provides data on several parameters characterizing the Fe-Mn nodule deposits: density, size distribution of nodules, percentage of floor covered by nodules and distance between individual nodules. Figures 2: references: 5 Russian.

5303/12955
CSO: 1865/173

CRUISES OF SCIENTIFIC RESEARCH SHIPS (JANUARY-JUNE 1986)

Moscow ZEMLYA I VSELENNAYA in Russian, No 6, Nov-Dec 86 p 4

[Article by A. A. Goncharenko]

[Abstract] Exploration of the world ocean continued during the first half of 1986 under a number of national and international programs. The "Professor Shtokman" (Oceanology Institute, USSR Academy of Sciences) worked under the UNESCO International Geological Correlations Program. In the tropical Indian Ocean a study was made of bottom relief and sediments, ancient shorelines and morpholithodynamic processes on the continental margins and near islands. The research area was near Mahe Island and the Farquhar Islands and the northwestern coast of Madagascar. The "Akademik Mstislav Keldysh" (Oceanology Institute), also operating in the Indian Ocean, made a study of acoustic fields in the ocean and their relationship to oceanological characteristics, information needed for developing an acoustic method for exploration for minerals on the ocean floor. Two ships of the Oceanological Institute, the "Vityaz" and the "Dmitriy Mendeleyev," made cruises in the eastern part of the Pacific Ocean. A study was made of the synoptic variability of hydrophysical fields, internal waves, fronts and the fine structure of waters in the California Current region. Specialists of the Thermophysics and Electrophysics Institute, Estonian Academy of Sciences, aboard the "Arnold Veymer," participated in an international experiment for study of spottiness in the Baltic Sea (1 of 12 research ships from 6 countries of the Baltic region doing studies of spots of sea pollution). The collected data will make it possible to evaluate the temporal and spatial variability of hydrophysical and chemical-biological fields and ecosystems in the Baltic Sea. The "Akademik Vernadskiy" and the "Mikhail Lomonosov" (Marine Hydrophysics Institute, Ukrainian Academy of Sciences) carried out research in the Atlantic under the "Razrezy" ("Sections") program. The new ship "Akademik Oparin" (Pacific Ocean Institute of Bioorganic Chemistry, Far Eastern Scientific Center) made its first cruise (Caribbean Sea, Red Sea, Indian Ocean) for chemical and biochemical studies of marine organisms in tropical regions. A search was made for new sources of physiologically active compounds which might be used in medicines and reagents. The "Akademik Aleksandr Vinogradov," operating in the northwestern Pacific Ocean, continued research under the WESTPAC program, determining the age and composition of the basement rocks underlying the sedimentary stratum, as well as relief, geophysical fields and sedimentary deposits. The "Akademik Kurchatov" (Oceanology Institute) studied marine fauna in the Scotia Sea and along the coast of Namibia. Figures 1.

5303/12955
CSO: 1865/163

UDC 549.283:552.321.6(267.3)

NATIVE GOLD IN SERPENTINIZED PERIDOTITES OF OWEN FAULT (INDIAN OCEAN)

Kiev DOKLADY AKADEMII NAUK UKRAINSKOY SSR, SERIYA B: GEOLOGICHESKIYE, KHIMICHESKIYE I BIOLOGICHESKIYE NAUKI in Russian No 10, Oct 86 (manuscript received 6 Jan 86) pp 16-20

[Article by V. V. Slipchenko, V. V. Demyanenko, A. V. Andreyev and A. K. Cheburkin, Mineral Geochemistry and Physics Institute, Ukrainian Academy of Sciences, Kiev]

[Abstract] The lower part of Owen Fault (12°35'N, 58°14'E, depth 4,000-5,700 m) was dredged on the 19th cruise of the research ship "Akademik V Vernadskiy." Fragments and chips of peridotites, serpentinized to different degrees, weighing about 500 kg, were brought to the surface. Native gold, pyrite and galenite were discovered in the heavy nonelectromagnetic fraction of one of the samples. The native gold was represented by xenomorphic segregations. Twenty gold grains were detected; these measured 0.02-0.1, but most commonly, 0.05 mm. The color was goldish yellow, but in some cases the grains were covered by reddish films of iron hydroxides. The samples of native gold and accompanying minerals were studied using a scanning electron microscope and an x-ray spectrometer. The native gold from the fault ultrabasites has a constant admixture of silver in the range 10-20%. Similar formations have been reported from the Indian and Atlantic Oceans. The different analyses which were made suggest a hydrothermal genesis of the native gold from the serpentinized periodotites. The finding of native gold in the carbonatized serpentinites affords additional evidence that the processes of hydrothermal transformation of oceanic and continental ultrabasites are essentially the same, indicative of a possible single deep source of the hydrotherms, associated with degassing of the mantle. Figures 3; references: 10 Russian.

5303/12955
CSO: 1865/170

UDC (550.834:551.78+551.88)(265.3-14)

STRUCTURE AND EVOLUTION OF SEDIMENTARY COVER OF SAKHALIN MARGIN OF SOUTH OKHOTSK BASIN

Novosibirsk TIKHOOKEANSKAYA GEOLOGIYA in Russian, No 4, Jul-Aug 86 (manuscript received 19 Mar 85) pp 3-14

[Article by V. V. Kudelkin, V. O. Savitskiy, T. I. Karpey and V. P. Boldyreva, Institute of Marine Geology and Geophysics, Far Eastern Scientific Center, USSR Academy of Sciences, Novoaleksandrovsk; Dalmorneftegazgeofizrazvedka Trust, Sakhalingeologiya Geological Production Association, Yuzhno-Sakhalinsk]

[Abstract] The Cenozoic history of the underwater margins of Southeastern Sakhalin has been reconstructed on the basis of a generalization of all available Russian and Japanese research. The authors successively examine the geomorphology, general structural conditions, seismostratigraphy of the sedimentary layers, seismofacies analysis and history of sedimentation, in each section supplying maps or diagrams of the particular aspect of the reconstruction. The exploited materials included data from a dense network of common depth point method profiles, rock samples raised from the floor by dredging, and correlations with the geology of the island and drilling data. It is shown that five regional unconformities divide the sedimentary complex of the ocean margins into five systems which can be dated roughly as follows: Late Oligocene-Early Miocene, Early-Middle Miocene, Middle-Late Miocene, Late Miocene-Pliocene and Pleistocene. Up to the Upper Miocene sedimentation was concentrated in a system of intra-arc troughs controlled by the horst-graben basement structure. This was followed by formation of an open sea basin, interrupted by short-period regressions. The type of sedimentation, transgressive or regressive, was essentially dependent on two key factors -- orogenic activity of Southeastern Sakhalin and eustasy. Figures 6; references 18: 13 Russian, 5 Western.

5303/12955
CSO: 1865/120

UDC 551.241

RELATIONSHIP BETWEEN ASTHENOSPHERE AND CRUSTAL STRUCTURES OF PACIFIC OCEAN MARGINS

Novosibirsk TIKHOOKEANSKAYA GEOLOGIYA in Russian No 4, Jul-Aug 86 (manuscript received 28 Feb 85) pp 15-22

[Article by A. G. Rodnikov, Interdepartmental Geophysical Committee, USSR Academy of Sciences, Moscow]

[Abstract] The relationships between the deep and surface structure of island arcs, marginal seas and folded structures of active margins of the

Pacific Ocean are examined. The asthenosphere, identified with a region of partial melting, is most fully expressed. The thickest, most fully expressed asthenosphere is associated with tectonically active regions. The anomalous mantle is directly adjacent to the crust within the interarc basins of the island arcs which are characterized by outpourings of recent tholeiitic basalts. Within the abyssal basins the asthenosphere lies at a depth between 30 and 60-100 km; the age of the tholeiites ranges from Miocene to Paleogene (even Late Cretaceous). There are distinct differences in heat flow distribution. Heat flow is higher in tectonically active regions such as island arcs, marginal seas and recent folded mountain structures, but reduced in the abyssal basins adjoining them and on adjacent continental shields. Endogenous processes in the transition zone in turn govern processes in the upper mantle (especially the asthenosphere). Asthenosphere formation in the transition zone is responsible for a decrease in the density of matter, resulting in an increase in volume. The excess volume results in uplifting and dilatation of the lithosphere, giving rise to abyssal basins of marginal seas and island arcs. Tholeiites pour out along fractures. Intensive mineralization accompanies the processes transpiring in the uplifting zones. Tectonic processes in some basins are accompanied by hydrothermal activity with deposition of zinc, copper and iron sulfides. Minerals may well be found in ancient paleorift structures of transition zones. Figures 4; references 33: 12 Russian, 21 Western.

5303/12955
CSO: 1865/120

UDC 551.781.43/5:551.24:553.078(571.65/66+100)

LATE PALEOGENE STAGE IN DEVELOPMENT OF KORYAKSKOYE HIGHLAND AND SOME OTHER REGIONS OF PACIFIC OCEAN ZONE

Novosibirsk TIKHOOKEANSKAYA GEOLOGIYA in Russian No 4, Jul-Aug 86 (manuscript received 21 Jan 83) pp 49-57

[Article by A. I. Pozdeyev, Kamchatgeologiya Geological Production Association, Petropavlovsk-Kamchatskiy]

[Abstract] Despite the extensive literature available on the geological structure, magmatism and tectonics of the Koryakskoye Highland, much has remained unclear with respect to its geological history. The highland has usually been regarded as a region characterized by a crust of the transitional type, now passing through a stage of orogenic development. Such a conclusion has been based on the presence of a melanocratic basement, an insignificant role of intracrustal granitoid magmatism and corresponding metallogenetic associations and the widespread development of active recent movements. There has been too little attention given to the fact that here there are several blocks of the earth's crust, both continental and oceanic, differing sharply in structure, development and metallogeny. These blocks are separated by deep faults. These blocks are zones having their own geological and ore formations. Figures 1 and 2 are a structural-formation diagram and

a paleogeographic diagram of the plateau in the Late Paleogene. These figures serve as a basis for a new description and interpretation of the Late Paleogene (second half of Eocene-Oligocene) development of the highland, a period with its own well-expressed tectonic movements, magmatism and ore formation. These processes had the character of tectonomagmatic activation with which cassiterite-silicate, gold-silver, mercury and other ore formations can be associated. A comparative analysis of this stage in this region is made with other parts of the Pacific Ocean and the Mediterranean Sea. It is concluded that tectonomagmatic activation was a widespread phenomenon in the Late Paleogene. Figures 2: reference 49: 38 Russian, 11 Western.

5303/12955
CSO: 1865/120

UDC 551.462(265)

STRUCTURAL POSITION OF NECKER RIDGE (CENTRAL PART OF PACIFIC OCEAN)

Novosibirsk TIKHOOKEANSKAYA GEOLOGIYA in Russian No 4, Jul-Aug 86 (manuscript received 20 Jun 84) pp 104-107

[Article by A. A. Andreyev and A. S. Svarichevskiy, Marine Geology and Geophysics Institute, Far Eastern Scientific Center, USSR Academy of Sciences, Novoaleksandrovsk]

[Abstract] Necker Ridge in the central Pacific Ocean was studied in 1982 by scientists on the scientific research ships "Pegas" and "Morskoy Geofizik" during several intersections of the ridge. Data were collected on bottom relief and geophysical fields in relation to the tectonic nature of the ridge. The Necker mountain system can be defined as an independent structural-morphological unit. The Necker Ridge, a part of this system, is a narrow mountain structure extending in an azimuth 35-40°. It extends for a distance of 500 km and its width at the base is 30-40 km. The ridge rises as much as 3,000 m above the surrounding plains. The most uplifted sectors in the southwest are slightly flattened. Toward the Hawaiian Ridge the Necker Ridge drops down and assumes crestlike configurations, and near Necker Island its elevation does not exceed 500 m. The slopes of the ridge are even and up to 20° in steepness. The adjacent ridges are arranged almost symmetrically on both sides of the ridge. These ridges are subparallel to the Necker Ridge and have an azimuth of 15-20°. All the ridges are virtually without a sedimentary cover or it is extremely thin. The magnetic field in the studied area owes its existence to the volcanic masses of the ridges and indicates their definite uniformity, as is also confirmed by the configuration of the ridges, which exhibit no signs of transverse dissection. The origin of the ridge can be attributed to a superposed process caused by fracturing of an already quite mature oceanic crust and there is no relationship to the formation of the oceanic crust in the spreading zone and it is not a continuation of the transform faults in the eastern part of the Pacific Ocean. Figures 4; references 8: 2 Russian, 6 Western.

5303/12955
CSO: 1865/120

UDC 553.323(267)

FERROMANGANESE NODULES OF ANTARCTIC SECTOR IN PACIFIC OCEAN

Novosibirsk TIKHOOKEANSKAYA GEOLOGIYA in Russian No 5, Sep-Oct 86
(manuscript received 8 May 85) pp 23-28

[Article by G. N. Baturin, V. N. Lukashin and A. Ya. Shevchenko, Oceanology Institute, USSR Academy of Sciences, Moscow]

[Abstract] The Antarctic sector of the Pacific Ocean is one of the regions of massive occurrence of Fe-Mn nodules. A study of such nodules was made using material from the 30th cruise of the "Dmitriy Mendeleyev" (November 1982-March 1983). The samples were dredged from the floor on a meridional run across the southwestern part of the Antarctic Basin. The productivity of nodules was from 8 to 15 kg/m^2. For all nodules the surrounding sediments were siliceous diatomaceous oozes with an SiO_2 content of 60% or more. The nodules were predominantly rounded in configuration, with a smooth or bumpy surface and with a diameter of 3-6 cm. The nodules had nuclei of varying size, pebbles or fragments of weathered rocks, most frequently ob basic composition. Structure of the ore matter was studied using a scan-ing ning microscope; chemical composition was determined by the atomic absorption method. At magnifications of 800-3,000 it was found that the ore matter has an extremely great diversity of structures and textures: colloform, granular, globular, concentrically layered. Remnants of organisms are present in individual sectors, primarily in the outer part, giving biogeneous textures. These nodules differ from those of the Pacific and Indian Oceans due to some impoverishment with manganese, copper, cobalt, zinc, vanadium and molybdenum, but are similar with respect to calcium, aluminum, titanium and strontium. The nodules are closest in composition to those of the Australian-Antarctic Basin. A table gives the chemical compositions (18 elements) in comparison with the corresponding averages for the world ocean. Figures 3; references 20: 13 Russian, 7 Western.

5303/12955
CSO: 1865/183

UDC 551.462:551.35

RESULTS OF DREDGING OF SOME SEAMOUNTS ON THE JAPANESE MARGINAL OCEANIC RAMPART

Novosibirsk TIKHOOKEANSKAYA GEOLOGIYA in Russian No 5, Sep-Oct 86
(manuscript received 23 Jul 84) pp 35-42

[Article by B. I. Vasilyev, Pacific Ocean Oceanological Institute, Far Eastern Scientific Center, USSR Academy of Sciences, Vladivostok]

[Abstract] During the 11th and 15th cruises of the "Kallisto" a study was made of five seamounts on the Japanese marginal oceanic rampart (these are

plotted on a map, Fig. 1 in the text; Table 1 lists them by name, coordinates, depth, height, width at base, slope steepness). The conical configuration of these seamounts is evidence of their volcanic origin. Continuous seismic profiling data indicate then these features have no sedimentary cover (Table 2 describes the dredged material recovered in each of the seamount areas). The seamounts themselves are described and the dredged materials are analyzed in detail. All the seamounts were clearly volcanoes which erupted for the most part basaltic lavas, less frequently andesitic lavas, and their pyroclastic material. The outpourings of these lavas occurred primarily under subaerial conditions, as indicated by the bubbly textures of the rocks, reddish-brown color and abundance of psephytic unsorted pyroclastic products, including volcanic bombs and lapilli. Fragments of "exotic" rocks are found, especially in the form of inclusions in tuffs and tuff breccias. Their presence makes it possible to postulate that sialic rocks, including intrusive and magmatic rocks, are part of the basement on which the volcanoes sit. Also highly significant is the surface nature of the volcanic eruptions and their relatively recent subsidence to a depth of 3-4 km, as is indicated by the freshness of the volcanites. The evidence suggests that shallow waters or even surface conditions prevailed in this region in the Early Cenozoic, with intensive subsidence beginning only in the Middle Miocene. Figure 1; references 9: 5 Russian, 4 Western.

5303/12955
CSO: 1865/183

SOVIET-JAPANESE SYMPOSIUM ON GEOLOGY AND GEOPHYSICS OF EAST ASIA SEA FLOOR

Novosibirsk TIKHOOKEANSKAYA GEOLOGIYA In Russian No 5, Sep-Oct 86, pp 122-125

[Article by I. K. Tuyezov]

[Abstract] The Fifth Soviet-Japanese Symposium on Geology and Geophysics of the Floor of East Asia Marginal Seas was held at Khabarovsk during the period 8-15 October 1985 under the sponsorship of the Institute of Tectonics and Geophysics, Far Eastern Scientific Center, and the Interdepartmental Geophysical Committee, USSR Academy of Sciences. The symposium was attended by 50 scientists, including 13 Japanese, with the presentation of 35 reports, 14 of them by Japanese specialists. The reports and accompanying discussions reflected sharply contrasting interpretations concerning the geological history of this region, sometimes reflecting diametrically opposite points of view. The following were among the subjects considered [each report is accompanied by a brief summary]: formation of East Asia marginal seas; spreading of the Sea of Japan and rotational movements of the Japanese Islands, as revealed by paleomagnetic data; gravity anomalies in West Pacific Ocean abyssal trenches; features of the Okinawa trough in the East China Sea; formation of abyssal trenches and basins, rifts, intermontane depressions and other depressions as a result of downwarping of the earth's mantle; validity of continental drifts; metamorphic rocks of the folded basement of marginal seas; characteristics of the Yap fault; structure and formation of the Philippine Sea; tectonic regionalization of the Philippine Sea floor;

granites of western Pacific Ocean and adjacent parts of Asia; Cenozoic volcanism of Japan, Northeast China and Eastern Korea; volcanism of Early-Middle Miocene' tectonic processes in the Late Mesozoic in Northeast Asia, including the Sea of Okhotsk; heat flow in the Pacific Ocean and structure of the asthensophere in the northwestern sector of the Asiatic-Pacific Ocean active region. Soviet-Japanese monographs will present the results of work along these lines; they will appear in 1987-1990.

5303/12955
CSO: 1865/183

UDC 551.465.11(264)

PREDICTION OF SYNOPTIC MOVEMENTS IN POLYMODE REGION USING BAROCLINIC MODEL

Moscow OKEANOLOGIYA in Russian Vol 26, No 5, Sep-Oct 86
(manuscript received 12 Jun 85) pp 725-731

[Article by V. M. Kamenkovich, V. D. Larichev, B. V. Kharkov, Yu. M. Grachev and T. B. Tsybaneva, Oceanology Institute imeni P. P. Shirshov, USSR Academy of Sciences, Moscow]

[Abstract] In an earlier study (OKEANOLOGIYA, Vol 21, No 6, pp 949-959, 1981) V. M. Kamenkovich, et al. proposed a numerical baroclinic model for local prediction of synoptic movements in the open ocean based on quasigeostrophic equations. This model is now applied using POLYMODE data. Computations were made for a square region with sides measuring 288 km whose center was at a point with the coordinates 29°N, 70°W corresponding to the center of the Soviet POLYMODE buoy test range. The horizontal resolution in the model (number of points of intersection) was 33 x 33; the time interval was 3 hours. A collocation variant of the model was used with expansion of the sought-for fields in eigenfunctions of a vertical operator. The period covered was 20 April-20 May 1978. The results were compared with predictions made using a barotropic model and two other variants of a baroclinic model. An analysis of computed synoptic charts and prediction errors for the upper three horizons (100, 400, 700 m) revealed that a prediction for a time up to 1 month using a baroclinic model with filtering has no significant advantages in comparison with a barotropic forecast. (The quality of all variants for the 1,400-m horizon was considerably poorer.) The effectiveness of a baroclinic prediction is essentially dependent on the choice of observation horizons, a fact which must be taken into account in planning observations. However, the data presented show that a baroclinic prediction for a period of about three weeks gives good results. Figures 3; references 25: 21 Russian, 4 Western.

5303/12955
CSO: 1865/129

UDC 551.465.43

STUDY OF EVOLUTION OF GULF STREAM CYCLINIC EDDY

Moscow OKEANOLOGIYA in Russian Vol 26, No 5, Sep-Oct 86
(manuscript received 30 Jul 84, after revision 3 Jan 85) pp 732-737

[Article by V. A. Bubnov, A. B. Zubin, L. V. Moskalenko and A. S. Osadchiy, Atlantic Division, Oceanology Institute imeni P. P. Shirshov, USSR Academy of Sciences, Kaliningrad; Southern Division, Oceanology Institute imeni P. P. Shirshov, USSR Academy of Sciences, Gelendzhik]

[Abstract] Three hydrological surveys under the "Razrezy" program were carried out during the period January-March 1984 in the Gulf Stream by the "Vityaz" and the "Akademik Kurchatov." At the time of the first survey (1-17 January) the area was characterized by a powerful cyclonic formation with two cores of reduced temperature and salinity. The eddy was oriented from NE to SW and measured 150 x 600 km. The eddy at that time was of an intermediate age. By the beginning of the second survey (16 January-10 February) there had been a considerable restructuring in the neighborhood of the cyclonic eddy, but also in the Gulf Stream as a whole. By the time of the third survey (16 February-8 March) the synoptic situation had changed considerably. The cyclonic eddy had adquired a regular circular form and a size characteristic for classical Gulf Stream rings, had been displaced southward and had a diameter of about 200 km. The velocity of orbital motion had increased to 70-80 cm/s at the surface and to 40-50 cm/s at 500 m. In general, after some weakening between the first and second surveys, during the third survey the eddy again intensified. The two-core cyclonic movement had split into two daughter eddies and had entered into contact with the Gulf Stream, at the same time turning clockwise by almost 90°. The larger of the eddies, after this contact, departed from the Gulf Stream, whereas the smaller merged with it, forming a meander. Figures 4; references: 4 Russian.

5303/12955
CSO: 1865/129

UDC 551.46.09

ROLE OF ANOMALOUS CURRENTS IN FORMATION OF OCEAN SURFACE TEMPERATURE FIELD

Moscow OKEANOLOGIYA in Russian Vol 26, No 5, Sep-Oct 86
(manuscript received 21 Feb 85, after revision 4 Dec 85) pp 738-742

[Article by L. I. Piterbarg, Oceanology Institute imeni P. P. Shirshov, USSR Academy of Sciences, Moscow]

[Abstract] A number of earlier studies have provided evidence of the presence of a cause-and-effect relationship between the formation and evolution of anomalies of ocean surface temperature and anomalies of the character

of drift currents. The author has now formulated a theoretical approach to study of the mechanisms of the effect of anomalous currents on the field of ocean surface temperature as a whole, its annual variation and anomalies, on the basis of rigorously derived equations for the statistical moments of the temperature field in a randomly inhomogeneous medium. Equations are derived for the mean field and the correlation function of temperature fluctuations in the upper layer of the ocean is found without invoking hypotheses concerning the proportionality of the turbulent flows to the mean gradients. It is shown that the rigorous derivation of the equation for mean temperature presented here for the case of short-correlated velocity and source fields leads to the appearance of an additional source in addition to the "traditional" diffusion term. The proposed "short correlation" is postulated as a necessary condition for the "traditional" closure of the equation for mean temperature. The drift currents serve not only as a factor responsible for forming the field of anomalous ocean surface temperature, but also as a dissipating factor, which can be expressed in analytical form. The dependence of "lateral" heat exchange on scale of the anomaly must be taken into account in predicting the lifetime of the forming anomaly. References 12: 5 Russian, 7 Western.

5303/12955
CSO: 1865/129

UDC 551.465.11

ERRORS IN RETRIEVING HYDROLOGICAL FIELDS AND FIELDS OF THEIR DIFFERENTIAL CHARACTERISTICS BY METHOD OF APPROXIMATION BY ORTHOGONAL FUNCTIONS

Moscow OKEANOLOGIYA in Russian Vol 26, No 5, Sep-Oct 86
(manuscript received 17 May 84, after revision 10 Sep 84) pp 743-750

[Article by O. P. Nikitin and Yu. Ya. Elken, Oceanology Institute imeni P. P. Shirshov, USSR Academy of Sciences, Moscow; Thermophysics and Electrophysics Institute, Estonian Academy of Sciences, Tallin]

[Abstract] The problem of positioning measurement points for retrieving two-dimensional hydro- and meteorological fields and the fields of their differential characteristics has usually been solved by the optimal interpolation method. However, there are difficulties and limitations in application of this method. Accordingly, it is proposed that the problem be solved within the framework of a method involving approximation by orthogonal functions, as proposed by C. E. Wallington. An in-depth discussion of this method for retrieving the two-dimensional fields of a sought-for scalar parameter and its linear differential characteristics is presented. Expressions are derived which can be used in evaluating the quality of the approximation and also in planning the distribution of measurement points. Criteria are proposed on the basis of which all configurations of measurement points can be classified as favorable, unfavorable or inapplicable (these criteria and terms are carefully defined) with respect to the retrieval on their basis of a particular characteristic of the measured parameter.

The method is illustrated by a specific example. Figures 2; references 7: 5 Russian, 2 Western.

5303/12955
CSO: 1865/129

UDC 551.463.2

DETERMINATION OF PARAMETERS OF FISH IN SOUND-SCATTERING LAYERS AND THEIR BEHAVIOR DURING MIGRATIONS FROM SPECTRA OF SCATTERED ACOUSTIC SIGNALS

Moscow OKEANOLOGIYA in Russian Vol 26, No 5, Sep-Oct 86
(manuscript received 21 Feb 85) pp 751-762

[Article by V. A. Mozgovoy, Oceanology Institute imeni P. P. Shirshov, USSR Academy of Sciences, Moscow]

[Abstract] Increasing attention is being given to determination of the parameters of scattering organisms and their identification and clarification of the behavior of organisms during migrations. A method has been developed for determining the resonance frequencies of fish swimbladders in sound-scattering layers from the ratio of the spectrum of the acoustic signal scattered by the sound-scattering layer to the spectrum of the sounding signal. The initial data were collected in the northeastern part of the tropical Pacific during the 6th cruise of the "Akademik Mstislav Keldysh" using the tonal-pulse method. Important conclusions could be drawn concerning the behavior of such fish during migrations. The fish evidently had neutral buoyancy at the nighttime depth near midnight and at the daytime depth. The "pumping up" of the bladder in surface, oxygen-rich waters prior to morning descent affords the fish a double advantage: the oxygen reserve enables them to spend the day deep in waters with a deficit of dissolved oxygen and it facilitates the migration process because the bladder is already partially or completely prepared for ensuring neutral buoyancy at the daytime depth. It was possible to determine the resonance frequencies of swimbladders, compute the volumes of swimbladders and estimate the lengths of fish and their concentrations. Three size groups of resonance scatterers were defined. There was a decrease in the resonance frequencies of scatterers directly prior to morning descent of the sound-scattering layer caused by swimbladder inflation. One group of fish carried out the morning migration in a "constant volume" regime, whereas another carried out this migration in a "constant mass" regime. Figures 5; references 15: 6 Russian, 9 Western.

5303/12955
CSO: 1865/129

UDC 551.464

HYDROCHEMICAL STRUCTURE OF GULF STREAM FRONTAL ZONE WATERS

Moscow OKEANOLOGIYA in Russian Vol 26, No 5, Sep-Oct 86
(manuscript received 27 Jun 84, after revision 14 Oct 85) pp 768-772

[Article by A. M. Chernyakova, S. G. Poyarkov, S. O. Borodkin and Ye. A. Akhmetyeva, Oceanology Institute imeni P. P. Shirshov, USSR Academy of Sciences, Moscow]

[Abstract] During the period 1 January-5 March 1984, under the "Razrezy" program, studies of the hydrochemical structure of waters in the energy-active zone of the Gulf Stream system were made on the fifth cruise of the "Vityaz." The studied area fell at the coordinates 36-40°N and 60-64°W, where a quasistationary Gulf Stream meander is situated. Three test range surveys were made (1-8 January -- 39 stations; 18-27 January -- 40 stations; 17 February-5 March -- 70 stations). Distance between stations did not exceed 30 miles. Sea water samples were taken from 18 standard horizons (0-2,000 m). Measurements were made of oxygen dissolved in sea water, content of phosphates, nitrates and silicic acid. The studies made it possible to clarify the main patterns of vertical distribution of chemical elements. The following types of hydrochemical structure were defined: Sargasso Sea, Gulf Stream proper, eddy formations and slope waters. The topography of the extrema of hydrochemical parameters and the degree of development of the quasihomogeneous surface layer served as the principal criteria for defining these structures. Despite the constant interaction of waters in this dynamically active zone, these structures are genetically clearly distinguishable, primarily on the basis of the depth of the extrema of properties and the degree of development of the surface layer, but also on the basis of the oxygen content and content of biogenous elements. A distinguishing feature for the considered structures is that the absolute concentrations of chemical characteristics in the extremal layers are virtually identical for all structures. It is clear that hydrochemical parameters can be used successfully as reliable identifiers of different types of waters, often being more representative than hydrological parameters in such dynamically complex regions as the Gulf Stream frontal zone. Figures 3; references: 4 Russian.

5303/12955
CSO: 1865/129

UDC 551.464.6

POTASSIUM-CHLORINITY RATIO IN WHITE SEA WATERS

Moscow OKEANOLOGIYA in Russian Vol 26, No 5, Sep-Oct 86
(manuscript received 23 Jul 84) pp 773-778

[Article by N. I. Popov, A. F. Akimova and V. A. Pchelin, Oceanology Institute imeni P. P. Shirshov, USSR Academy of Sciences, Moscow]

[Abstract] The idea has developed (based on chemical analyses of White Sea waters) that with respect to the relative composition of the main ions these waters differ substantially from ocean and sea water. This is particularly true of potassium. White Sea waters have been assigned a potassium-chlorinity ratio averaging 0.01668, almost 20% below the mean oceanic value 0.0206, and such an unusual anomaly is unknown elsewhere. It has been postulated that this phenomenon is evidence of a low quantity of potassium in continental waters flowing into the White Sea (a statement still found in the literature). However, the degree of freshening observed in the White Sea indicates that the quantity of potassium salts in this runoff cannot be responsible for such a considerable anomaly of the potassium-chlorinity ratio. Accordingly, quantitative determinations of potassium were made by the highly precise tetraphenyl-boron method. Water chlorinity was determined at the same time by the argentometric method. The resulting potassium-chlorinity ratios (0.0194-0.0212) considerably exceed the determinations made in 1875 and 1939 and average 0.0205 for the sea, which is close to the value now accepted for the ocean. In the waters of the Dvina runoff current the relative K concentration is somewhat lower than in the Barents Sea waters at the entrance into the White Sea, evidence of the partial removal of potassium from ocean water in the zone of its mixing with river water. Figure 1; references 15: 9 Russian, 6 Western.

5303/12955
CSO: 1865/129

UDC 551.464.7

HYDROCHEMICAL RESEARCH IN RIISER-LARSEN SEA, SEA OF COSMONAUTS AND SEA OF COOPERATION

Moscow OKEANOLOGIYA in Russian Vol 26, No 5, Sep-Oct 86 (article submitted 11 Jan 85, after revision 12 May 85) p 785

[Article by Yu. A. Mikhaylovskiy and T. V. Mikhaltseva, All-Union Scientific Research Institute of Marine Fishing and Oceanography]

[Abstract] Research in the Indian Ocean Sector of the Antarctic Ocean (Riiser-Larsen Sea, Sea of Cosmonauts and Sea of Cooperation) was carried out in January-March 1984 on the "Akademik Knipovich." About 200 stations were occupied on meridional runs to a depth of 1,200 m or to the bottom in

in shallow areas. The most northerly stations were at 59°30'-60°00'S and the most southerly at the edge of the drifting ice. The distribution of hydrochemical characteristics was studied: dissolved oxygen, phosphates, nitrates, nitrites and silicon, as well as the first data on organic phosphorus. Organic sulfur was analyzed by the Giles method with 0.2 g of ammonium persulfate. The absolute content of O_2 at the surface in the Riiser-Larsen Sea and in the Sea of Cosmonauts varied from 7.2 to 8.8 ml/liter (saturation 89-112%). At the surface of the Sea of Cooperation the absolute content was 8.05 ml/liter (100% saturation was not observed). A region with reduced absolute and relative O_2 content at a depth of 100 m (4.1-6.0 ml/liter and 60-70%) in the southeastern part of the Sea of Cosmonauts corresponds to a divergence zone extending along the continental slope, where there is an oxygen minimum at 145-200 m. The greatest depth of the oxygen minimum (500-700 m) is observed in the southwestern part of the Sea of Cosmonauts as a result of receipt of waters of the Antarctic Coastal Current. In the Sea of Cooperation the spatial distribution of the oxygen minimum agrees well with the characteristics of water advection in the region. (Specific data are also given on the distribution of silicon, phosphorus, nitrates and nitrites.) References 3: 2 Russian, 1 Western.

5303/12955
CSO: 1865/129

UDC 551.462.543

NEW DATA ON BOTTOM RELIEF IN CAPE VERDE BASIN

Moscow OKEANOLOGIYA in Russian Vol 26, No 5, Sep-Oct 86
(manuscript received 31 Jul 84) pp 786-790

[Article by Yu. D. Yevsyukov, Southern Division, Oceanology Institute imeni P. P. Shirshov, USSR Academy of Sciences, Gelendzhik]

[Abstract] There has been only limited study of the Cape Verde Basin. Echo sounding or continuous seismic profiling profiles are often tens and hundreds of kilometers apart. In early December 1983, on the 31st cruise of the "Dmitriy Mendeleyev," geological and geophysical research was carried out in a test range in the basin in the neighborhood of regions where similar work had been done earlier. The work was done in a rectangular system of runs with a length of 54-81 miles with distances between runs of 2.5-21.5 miles. About 40 satellite determinations were made during the survey. The collected data were used in compiling a geomorphological map of the test range. It was found that the central part of the basin has complex and diversified bottom relief of the block type. Among the conspicuous features is a major depression of sublatitudinal strike whose formation was apparently caused by the existence of a deep fault (it has an even bottom with a width of 6.5-8.5 miles and a depth of 6,090 m). A seamount with a depth over its peak of 4,387 m was discovered during the survey, in external appearance resembling an underwater volcano. The central part of the test range is a blocklike rise with an elevation from 300 to 850 m,

its uppermost part being complicated by ridges with an elevation of 150-300 m. Fewer data were collected on a blocklike rise in the southern part of the test range. The studied area has a predominance of short morphostructures of a NW-SE strike; such ridges are characteristic for almost the entire area of the test range. At a distance 180-200 km to the north of the test range the strike of morphostructures is quite different. The change in strike of large ridges in a relatively short distance is an important fact which must be taken into account in clarifying the history of development of one of the large basins of the Atlantic. The described structures are evidently an eastward continuation of the Cape Verde fault zone. The filling of negative relief forms by sediments has a local character which is reflected in subhorizontal surfaces situated at different hypsometric levels. Figure 1; references: 10 Russian.

5303/12955
CSO: 1865/129

UDC 551.462.62(261)

HILLY RELIEF IN NORTHERN PART OF ATLANTIC OCEAN TROPICAL ZONE

Moscow OKEANOLOGIYA in Russian Vol 26, No 5, Sep-Oct 86
(manuscript received 29 Jun 84, after revision 15 Jan 85) pp 791-798

[Article by M. V. Rudenko, Atlantic Division, Oceanology Institute imeni P. P. Shirshov, USSR Academy of Sciences, Moscow]

[Abstract] The hilly bottom relief of the North Atlantic Ocean was studied using depth data along about 10,000 km of runs in the North Atlantic Ocean. This provided more than 5,000 determinations of slope and made it possible to compute vertical and horizontal dissection and other morphometric indices. The studied area was from 15 to 26°N and from 52 to 62°W. In the east, within the Canaries and Cape Verde Basins, the zone of abyssal hills occupies a broad zone 10-12° in longitude. In the direction of the Mid-Atlantic Ridge the hill zone has a distinct boundary set off by a conspicuous tectonic scarp. In the direction of the continent its boundary is less clear. This zone of abyssal hills is represented by ridges and hills closer to the Mid-Atlantic Ridge and undergoes transformation into a ridge-block morphology which alternates with valley forms near its edges. These differences in the nature of abyssal hills to the west and east of the rift valley are probably associated with the peculiarities of formation of ridge structure. The relief of the Atlantic Ocean floor constitutes a unified genetic series. The nature of the relief is somewhat modified due to: general subsidence of the floor in the process of formation of the lithosphere, as a result of which pre-existing valleys were deepened, emphasizing the position of ridges and ranges; closer to the periphery of the zones of abyssal hills the relief is smoothed by sediments so that the relief of abyssal hills in these sectors persists only in basement morphology, not at the present-day surface. Figure 4; references 7: 6 Russian, 1 Western.

5303/12955
CSO: 1865/129

UDC 551.417+551.468:627.8

EXPERIENCE IN STATISTICAL STUDY OF CORRELATION BETWEEN WAVE-TIDE FIELD AND SPECIFICS OF TRANSVERSE SHORE ZONE PROFILE

Moscow OKEANOLOGIYA in Russian Vol 26, No 5, Sep-Oct 86
(manuscript received 9 Jul 84, after revision 16 Jan 85) pp 806-812

[Article by A. O. Selivanov and L. V. Anzimirov, Moscow State University imeni M. V. Lomonosov; Moscow Mining Institute]

[Abstract] The configuration of the coastal zone transverse profile is a highly important indicator of the influence of both tides and waves on the coast. Accordingly, a study was made of the problem of statistical study of the influence exerted on it by wave and tidal factors, as well as the morphological characteristics of the underwater shore slope. This study involved examination of the different types of shores existing in Onega Bay. A correlation was found between the width of tidal flats and the newly proposed index of relative deformation of the transverse profile of a tidal coastal zone with alongshore and transverse components of the coastal flow of wave energy, tide height and slopes of the underwater shore slope. Differences in morphological types of shores in the bay are defined relative to the intensity of influence of the principal energy and other factors involved in coastal zone reformation. The soundness of a morphological classification of shores was confirmed (four types of shores were examined: abrasional-accumulative bay and leveled shores; level abrasional shores; tidal shores; glaciotectonic shores slightly modified by sea and smoothing exarational and glacioaccumulative shores). The derived multiple regression equations can be used in predicting trends in reformation of individual sectors of shores with a change in the tide and wave regime. Figures 2; references 24: 22 Russian, 2 Western.

5303/12955
CSO: 1865/129

UDC 551.465:481.55(269.4)

FEATURES OF COMPOSITION AND DISTRIBUTION OF PHYTOPLANKTON IN DIFFERENT MODIFICATIONS OF ANTARCTIC WATERS IN NEIGHBORHOOD OF BOUVET ISLAND

Moscow OKEANOLOGIYA in Russian Vol 26, No 5, Sep-Oct 86
(manuscript received 5 Jun 84, after revision 18 Dec 84) pp 815-820

[Article by S. N. Semenova and P. P. Fedulov, Atlantic Division, Scientific Research Institute of Fishing and Oceanography, Kaliningrad]

[Abstract] There has been relatively little research on the composition and distribution of phytoplankton in the eastern sector of the Atlantic portion of antarctic seas. The gap has been partially filled by an oceanological survey carried out in June 1982. Fifty-eight stations were occupied

and phytoplankton carried out in June 1982. Fifty-eight stations were occupied and phytoplankton samples were taken with bathometers from the horizons 0, 10, 25, 50 and 100 m. A total of 305 samples were taken. In the test range in the neighborhood of Bouvet Island the principal hydrological feature is a frontal zone which separates the warm waters of the Antarctic Circumpolar Current and the cold waters originating from the Weddell Sea. This frontal zone separates waters of different origin and significantly different oceanographic characteristics both in the surface layers and in depth. In the water phytoplankton there were 136 species and intraspecies taxons. Most of the species were diatoms. The differences in plankton distribution in the different modifications of antarctic waters were determined. The most intensive development of diatoms was in the waters of the Antarctic Circumpolar Current, whereas an increased presence of Peridinium, Flagellata and coccolithophorids was observed in waters of the Weddell Sea. Differences in the composition and quantity of phytoplankton in the waters of the Weddell Sea and in waters of the Antarctic Circumpolar Current are attributable to inhomogeneity of the hydrogical structure and different seasonal state of phytocenes in different latitude zones. Figures 5; references 12: 8 Russian, 4 Western.

5303/12955
CSO: 1865/129

UDC 551.466.2

USE OF STRING WAVE RECORDER FOR MEASURING WAVE PARAMETERS FROM DRIFTING SHIP

Moscow OKEANOLOGIYA in Russian Vol 26, No 5, Sep-Oct 86
(manuscript received 27 Jan 84) pp 831-837

[Article by A. G. Voronovich, A. D. Rozenberg and P. V. Sakov, Oceanology Institute imeni P. P. Shirshov, USSR Academy of Sciences]

[Abstract] During the 6th cruise of the "Akademik Mstislav Keldysh" in 1983 a series of measurements was carried out in the open ocean for determining the possibility of using a string wave recorder for measuring the parameters of waves from a drifting ship when there was compensation for the vessel's rolling and pitching. This necessitated determination of the correlation between the spectrum of waves and the spectrum of the vessel's movements. The apparatus used consisted of two independent parts: a string wave recorder and a system for measuring acceleration a(t) at the point of string attachment. The a(t) parameter is measured by a special high-response barometric accelerometer for registering the vertical component of the acceleration a(t). The accelerometer included a glass measuring tube placed in a water-filled vessel and connected to a tank. The change in the height of the water column in the tube, measured by electrodes, is linearly related to the change in local acceleration a caused by pitching and rolling. The experiments were carried out in the presence of wind waves (wind speed up to 8 m/s), superposed on a swell wave (maximum height up

to 6 m). It was found that when there are moderate waves the use of a string wave recorder is quite reliable for measuring the spectrum of surface rises in a broad frequency range from 1 to $2F_m$; at higher frequencies the ship's rolling and pitching exerts no influence on sensor readings. For this reason in some cases when measuring the high-frequency part of the wave spectrum it is possible to dispense with the accelerometer, using alternative methods for correcting readings of the string sensor. Figures 5; references: 3 Russian.

5303/12955
CSO: 1865/129

UDC 551.46

CORRELATION BETWEEN REFRACTION OVER SEA AND NATURE OF RADAR REFLECTIONS FROM SEA SURFACE

Moscow OKEANOLOGIYA in Russian Vol 26, No 5, Sep-Oct 86
(manuscript received 30 Nov 84, after revision 25 Feb 85) pp 838-842

[Article by V. A. Genkin, S. P. Kalenichenko, V. M. Leonov and V. R. Loshakov, Leningrad Electrical Engineering Institute imeni Ulyanov (Lenin)

[Abstract] An effort was made to clarify information concerning the degree of refraction in the centimeter range of radio waves. This is necessary not only for ensuring a high accuracy in the measurement of coordinates and the choice of operating modes in radioengineering systems, but also for interpreting meteorological phenomena. The variability of refraction exerts an influence on the characteristics of radar reflections from the sea surface, which can be used in determining the parameters of the sea surface. In this process it is necessary to separate variations of reflections due to variability of the sea surface from variations caused by the variability of refraction. It was necessary to derive a more detailed dependence of the intensity of reflections on range and to ascertain the influence of refraction on this dependence. Data were collected using a radar operating in the 5-cm range with the antenna positioned 12 m above sea level in different test ranges and under different seasonal conditions. The dependence of the power of radar reflections P_M on range R was determined: $P_M = f(R)$. These range characteristics were determined from measurements made over the course of 72 days. These measurements revealed significant changes in the main parameters of the range characteristic (its shape and extent) as a function of range. The range characteristic extent was the maximum range where the reflected signal was equal to the threshold signal, comparable with the level of internal noise of the radar detector. This extent varied from 0.1 to 10 radio horizon ranges, computed for normal refraction. A three-level evaluation of the degree of refraction, based on the shape of the range characteristic of radar reflections, is proposed. Figure 1; references 4: 3 Russian, 1 Western.

5303/12955
CSO: 1865/129

UDC 551.46.08

MOVEMENT OF FREE-FALL PROFILER IN FLOW WITH VELOCITY SHEAR

Moscow OKEANOLOGIYA in Russian Vol 26, No 5, Sep-Oct 86
(manuscript received 16 Mar 84) pp 843-848

[Article by V. N. Nabatov and V. A. Razzhivin, Atlantic Division, Oceanology Institute imeni P. P. Shirshov, USSR Academy of Sciences, Kaliningrad]

[Abstract] A simple linear model describing the behavior of a free-fall profiler in a stationary current with velocity shear was described by P. J. Hendricks, et al. in DEEP-SEA RES., Vol 28, pp 1199-1215, 1981. Proceeding along these same lines, a method is proposed which makes it possible to eliminate a number of deficiencies which have made the use of free-fall profilers difficult. A simple equation is derived (which has been experimentally checked) for describing the horizontal motion of such a probe during its falling in a medium with a stationary current velocity shear. The problem was solved for a probe in the form of a cylinder with a great lengthening, a streamlined nose and a flat end section. A number of assumptions were made in deriving this equation (the flow of a fluid of uniform density is stationary with a horizontal velocity of a constant direction and a modulus dependent only on depth; the vertical velocity of falling of the probe considerably exceeds the maximum relative horizontal velocity of the flow; the probe axis is vertical). The law of temporal change of horizontal velocity of the body V(t) arising under the influence of a horizontal directed flow with the velocity U(z) is defined. Despite the assumptions made in its derivation, the proposed equation describes well the behavior of a free-fall probe in a flow with a vertically changing horizontal velocity. The equation can be used in field work for the purpose of correction of measurements of current velocity profiles. Figures 2; references 10: 2 Russian, 8 Western.

5303/12955
CSO: 1865/129

UDC 550.52

ULTRAVIOLET IRRADIATION AS METHOD FOR DESTRUCTION OF ORGANOMETALLIC COMPLEXES IN OCEAN SEDIMENTS

Moscow OKEANOLOGIYA in Russian Vol 26, No 5, Sep-Oct 86
(manuscript received 11 Mar 84, after revision 22 Oct 84) pp 849-851

[Article by L. L. Demina and A. N. Belyayeva, Oceanology Institute imeni P. P. Shirshov, USSR Academy of Sciences, Moscow]

[Abstract] As early as 1968 it had been demonstrated that organic matter dissolved in sea water can be decomposed by UV irradiation. The authors now propose a new approach for using UV for the destruction of organometallic

compounds in suspended matter. The method is best suited for analysis of the forms of presence of metals in oceanic suspended matter containing hundredths and thousandths of a percent of metals (dry weight), not requiring use of hydrogen peroxide and therefore reducing the risk of sample contamination during analysis. There are two variants of the method: UV irradiation of a dry sample and irradiation of the same sample in the form of a suspension in 25 ml of doubly distilled water. Irradiation is by a low-pressure mercury-quartz lamp (450 W). The degree of oxidation of organic matter is monitored on the basis of the decrease in the content of organic carbon in the suspension. The dependence of C_{org} content on irradiation time was determined. It was found that in the case of irradiation of a dry sample C_{org} oxidation transpires more rapidly and completely than in the irradiation of suspended matter. Virtually complete C_{org} oxidation sets in 12 hours after onset of irradiation. Application of the method is illustrated by experimental work with Indian Ocean waters, for which the content of organically bound forms was found for Cu, Mn, Zn, Co, Al and Pb. Figure 1; references 5: 4 Russian, 1 Western.

5303/12955
CSO: 1865/129

UDC 550.834

REGISTRY OF PRESSURE WAVES BY BOTTOM SEISMIC STATIONS

Moscow OKEANOLOGIYA in Russian Vol 26, No 5, Sep-Oct 86
(manuscript received 6 Feb 84, after revision 22 Nov 84) pp 852-855

[Article by G. N. Lunarskiy, Oceanology Institute imeni P. P. Shirshov, USSR Academy of Sciences, Moscow]

[Abstract] Work is continuing on reducing the noise level when receiving and registering extremely weak seismic oscillations when using sea floor seismographs. One of the problems has been vibration of instrument components, which lessens response due to noise background increase. Hydrophones have replaced seismic detectors because they make it possible to register pressure waves. They also react less to the mechanical vibration associated with operation of the tape-moving mechanism. However, hydrophones are negatively affected by bottom currents which give rise to a definite type of interference. When using a hydrophone for this purpose it is necessary to have a special amplifier with a high input resistance. A variant of the circuitry for a suitable hydrophone amplifier is described in detail. The microcircuit has a high input resistance and a low noise level. Provision is made for two registry channels ("rough" and highly sensitive), made possible due to use of an active divider at the amplifier output. The procedures for tuning and adjusting the amplifier are specified. The total amplification factor is 250-300 (frequency 20 Hz; equivalent input capacitance 15 nF; load resistance 250 ohm; range of amplified frequencies 2.2-300 Hz; input resistance 2.7 megohm; output resistance about 25 ohm; maximum input voltage 7.5 mV; dynamic range of amplifier about 75 db;

nonlinear distortions not more than 2%; supply voltage ±6.5 V; required power not greater than 35 mW. The amplifier performed well on several cruises of scientific research ships. Figures 2; references 11: 7 Russian, 4 Western.

5303/12955
CSO: 1865/129

UDC 551.465

'MEZOPOLIGON' EXPEDITION DESCRIBED

Moscow OKEANOLOGIYA in Russian Vol 26, No 5, Sep-Oct 86, pp 858-860

[Article by Yu. A. Ivanov, V. G. Kort, A. S. Monin, I. M. Ovchinnikov and I. F. Shadrin]

[Abstract] The "Mezopoligon" ("Mesoscale Test Range") expedition was carried out in March-July 1985 in the northern part of the tropical Atlantic. Emphasis was on study of the dynamics of mesoscale and synoptic eddies in the open ocean and processes of interaction between the atmosphere and the ocean. Three scientific research vessels participated in the expedition: "Akademik Mstislav Keldysh," "Akademik Kurchatov" and "Vityaz." There are three types of energy-carrying mesoscale disturbances (upper-layer eddies; eddies in the main thermocline (a lens with "outside water") and bottom eddies (generated by bottom relief irregularities)). The expedition stressed research on upper-layer mesoscale eddies as a manifestation of mesoscale nonuniformity in the field of synoptic disturbances. This research necessarily involved measurements of the flows of heat, moisture and momentum in the near-water layer of the atmosphere and in the surface layer of the ocean. Important hydrochemical determinations were also made (dissolved oxygen, silicic acid, nitrates, phosphates, pH and alkalinity). Special research of various kinds was also carried out. The expedition began with a hydrological survey in the North Trades Current at about 20°N, 37°W, an area where synoptic disturbances are always present but where weather is usually stable. A total of 169 hydrological stations were occupied in an area measuring 120 x 120 miles with a 10-mile interval to a depth of 1,500 m. The survey revealed that the eastern part of the test range was occupied by a synoptic anticyclonic eddy and the western part by a cyclonic eddy (a frontal zone passed through the center of the test range). In another stage in the work automatic buoys were placed at 76 stations in a test range measuring 80 x 80 miles, with a frontal zone occupying the center of the test range, the buoys separated by a distance of 10 miles. Currents and temperatures were measured at the 75- and 200-m horizons. Seven buoys were positioned at the center of the test range for studying internal waves. All the buoys were in place during the period 7 April-15 May. The four hydrological surveys made and buoy data provided much material for studying mesoscale variability. All data indicated that mesoscale nonuniformity is a characteristic phenomenon in the ocean. Two additional hydrological surveys were made to study an intrusion lens of "outside" (Mediterranean) water observed at horizons from 800 to 1,400 m. Figure 1.

5303/12955
CSO: 1865/129

UDC 554.46.07

FORTY-SECOND CRUISE OF SCIENTIFIC RESEARCH SHIP 'AKADEMIK KURCHATOV' (6 AUGUST-5 OCTOBER 1985)

Moscow OKEANOLOGIYA in Russian Vol 26, No 5, Sep-Oct 86, pp 860-864

[Article by R. V. Ozmidov]

[Abstract] The 42d cruise of the "Akademik Kurchatov" was dedicated to the "Mikrostruktura" ("Microstructure") project of the "World Ocean" Program for study of the fine structure of hydrophysical fields, mesoscale turbulence and mixing processes in specific regions of the ocean (zones of mixing of waters of different origin, frontal zones, regions with abrupt depth changes, zones with great gradients of hydrophysical fields and great spatial-temporal variability). The research areas selected were areas between Nordkapp and West Spitsbergen and to the northwest of Spitsbergen to the edge of the floating ice, and as a comparison, the zone of contact between Mediterranean and Atlantic waters to the west of the Strait of Gibraltar. The cruise began in Kaliningrad in August 1985. Hydrological work between Nordkapp and West Spitsbergen revealed a number of new details on the spatial and temporal variability of hydrological fields, such as variations in the position and characteristics of water masses of the currents there and the frontal zones between them. A number of eddy formations were detected in the region, including an anticyclonic eddy around Medvezhiy Island. Information was obtained on the zone of contact between the relatively warm waters of the West Spitsbergen Current and arctic waters, a zone characterized by numerous layers with temperature inversions with very great temperature and salinity gradients. It is postulated that bottom Atlantic water is formed in this region. At all stages in the work the characteristics of internal waves were determined, usually revealing a nonstationary nature of the process: as a storm develops there is a change not only in the amplitude of the internal waves, but also in their modal structure. The spectral structure of these internal waves was determined under different conditions for transpiring of the process. The spectral characteristics of surface waves were determined, as well as variability of their parameters with a change in meteorological characteristics in the test ranges. Measurements of microscale turbulence in the test ranges revealed that when wind waves are present the upper layer of the ocean is always agitated but in the main water layer turbulence is observed only in individual spots. In shallow-water areas the bottom water layer is also turbulent; this turbulence is characterized by variability and the presence of coherent eddy structures. The number of turbulent spots increases in frontal zones. In the upper layer turbulence in the zone of floating ice may be caused not only by wind waves, but also by local convective movements due to the melting of ice and movements of floes on swell waves. During special work in the neighborhood of Ampere and Josephine seamounts to the west of Gibralter important data were obtained on the nature of turbulence above and along the slopes of these formations. The cruise ended on 5 October 1985. Figures 3.

5303/12955
CSO: 1865/129

UDC 554.46.07

TENTH CRUISE OF 'VITYAZ' SCIENTIFIC RESEARCH SHIP (7 AUGUST-20 NOVEMBER 1985)

Moscow OKEANOLOGIYA in Russian Vol 26, No 5, Sep-Oct 86, pp 864-867

[Article by V. I. Voytov]

[Abstract] The 10th cruise of the "Vityaz" (7 August-20 November 1985) was carried out in the North Atlantic and the Mediterranean Sea, operating under a number of programs, including marine optics. When in the Gulf Stream Energy-Active Zone the expedition had the opportunity to observe 11 cyclones. Study of meteorological and actinometric characteristics made it possible to compute ocean surface heat exchange (mean value 162 W/m^2). The research revealed that heat reaches the ocean surface from both solar radiation (42%) and from the water layer (58%). From the ocean surface heat is lost into the atmosphere as a turbulent heat flow (13%) or in evaporation (87%). A hydrological survey was made with bathometers to a depth of 2,000 m at 81 stations, providing information on the principal hydrological structures situated within the limits of the test range. These were the waters of the Sargasso Sea and the continental slope, separated by the Gulf Stream, forming a meander between 38 and 40°N. The mean geostrophic discharge of the Gulf Stream was 39.6 sverdrup and its maximum velocity was 147 cm/s. South of the Gulf Stream, between 61 and 63°W, in the Sargasso Sea area, there was a cold eddy of a synoptic scale. The main purpose of the test range survey was a determination of water heat content and its variability. Hydrochemical and radiochemical determinations, hydrooptical measurements and biological studies were made. The hydrochemical data were quite consistent with the hydrological structures. Radiochemical research revealed that radon and radium are good indicators of water upwelling. The distribution of optical properties in these waters was determined. The slope waters were the least transparent, whereas Sargasso Sea waters were the most transparent. An optical survey was also carried out in the neighborhood of the Canaries Islands. It was found that everywhere in this region North Atlantic abyssal waters and antarctic bottom waters, interacting with North Atlantic bottom waters, are the most transparent waters in the ocean. Another test range was occupied in the eastern Mediterranean, where the radium-226 concentration was determined in the entire water layer. A study was made of the influence of bottom relief on the optical properties of surface water layers. Optical sounding over the Mid-Atlantic Ridge and near it revealed that the extinction index in the upper 200-m layer was greater specifically over the ridge. It was also found that an increase in the extinction index is associated with more intense biological productivity. The increase in bioproductivity is probably caused by eddies and circulations over ridges, giving rise to conditions for the upwelling of deep water rich in biogeneous elements. Radon and radium isotopes were found to be good tracers for cyclonic eddies and zones of upwelling of deep waters. High ratios of the fluorescence of chlorophyll to the fluorescence of dissolved organic matter are indicative of the biological youth of waters. A total of 174 stations were occupied on the expedition; the extent of the cruise was about 19,000 nautical miles. Figure 1.

5303/12955
CSO: 1865/129

UDC 574(265)/910.2

SECOND ECOLOGICAL EXPEDITION IN NORTHERN PART OF PACIFIC OCEAN (37th CRUISE OF SCIENTIFIC RESEARCH SHIP 'AKADEMIK KOROLEV,' 19 JUNE-22 SEPTEMBER 1984)

Moscow OKEANOLOGIYA in Russian Vol 26, No 5, Sep-Oct 86 pp 867-870

[Article by A. V. Tsyban]

[Abstract] The second ecological expedition to the northern part of the Pacific Ocean took place during the period 19 June-22 September 1984 aboard the scientific research ship "Akademik Korolev." The objective was joint research on the physical, biogeochemical, biological and microbiological processes in different geographical zones of the ocean (subarctic, temperate, subtropical and tropical) and clarification of the possibility of comprehensive global monitoring in special test ranges in the highly productive and vulnerable ecosystems in this region. The first stage of the cruise constituted the Second Soviet-American Expedition to the Bering Sea (79 scientists, 16 of whom were Americans). The work was done in four test ranges and on the runs joining them. The test ranges were situated in different water masses studied by Soviet scientists in 1981 during the first ecological expedition in this region. During the second part of the cruise research was carried out on runs in the Kuroshio Current and in the Philippine Sea, as well as at stations in the South China and Philippine Seas. Work in the Bering Sea was done during the transition period from spring to summer in three or four water masses (surface, shelf, intermediate, bottom). The high biological productivity of the Bering Sea was confirmed. For the first time there was a comprehensive study of biogeochemical cycles of toxic pollutants in the Bering Sea ecosystem and northwestern Pacific. Data were collected characterizing the occurrence and circulation of polycyclic aromatic hydrocarbons and heavy metals. The negative effects of anthropogenic activity were clearly manifested. It was found that in comparison with other regions of the world ocean destructive processes transpire at a rate which is 5 to 10 times slower, making the subarctic ecosystem particularly vulnerable. Extensive studies were made of the structural characteristics of neuston and plankton organisms. This expedition provided much material extremely useful for the further development of the theory of assimilation capacity of marine ecosystems which can serve as a basis for monitoring and predicting the state of biological resources in the world ocean. Figure 1; references: 3 Russian.

5303/12955
CSO: 1865/129

UDC 551.465

GEOLOGICAL RESEARCH ON THIRTY-FIFTH CRUISE OF SCIENTIFIC RESEARCH SHIP 'DMITRIY MENDELEYEV' (4-27 JULY 1985)

Moscow OKEANOLOGIYA in Russian Vol 26, No 5, Sep-Oct 86 pp 870-872

[Article by G. N. Baturin and G. L. Kashintsev]

[Abstract] The program for the 35th cruise of the "Dmitriy Mendeleyev" was dedicated to collection of data under the "Ore Formation Project," with emphasis on study of occurrence of phosphorites on the Sea of Japan floor within Soviet territorial waters. An effort was made to clarify the geological bedding conditions, occurrence, composition and quality of phosphorites. The cruise lasted from 4 to 27 July 1985 with work concentrated in the northern part of the Yamato Rise (some work was also done on the continental slope near Vladivostok). The expedition consisted of 11 detachments, with most of the work being done by the geological detachments (geology, lithology, biostratigraphy, geochemistry, phosphorite formation). The extent of the expeditionary cruise was 2,329 miles (with echo sounding for 670 miles and continuous seismic profiling for 467 miles). Work was done at 101 stations, 87 of which were in the Yamato Rise region. A total of 574 samples of bottom sediments were taken. A specialized geological survey at 1:100,000 was made over an area of 3,000 km^2. Phosphorites were discovered at 14 stations (dense and unconsolidated massive formations of an irregular and flattened configuration, nodules, blocks, conglomerates, crusts, phosphatized rocks and bone detritus), with phosphorites constituting several percent of the total quantity of material. Two areas of possible future exploitation of phosphorite raw material were discovered (170 and 30 km^2 in area respectively). Paleoceanological reconstructions indicate that the phosphorites are associated with the shelf of a Late Miocene basin. The phosphorite formation process was evidently caused by the diagenesis of sediments enriched with organic matter and biogenous phosphorus. Many incidental geological discoveries were made. For example, a Paleozoic terrigenous stratum was found (phillites and meta-sandstones) within the folded basement; the decisive role in its formation was evidently played by the redeposition of volcanic material. Figure 1; references: 5 Russian.

5303/12955
CSO: 1865/129

UDC 550.42:551.35

MODERN CONCEPT CONCERNING TRANSPORT OF BOTTOM SEDIMENTS IN ABYSSAL REGIONS OF WORLD OCEAN

Moscow EKSPRESS-INFORMATSIYA. SERIYA: MORSKAYA GEOLOGIYA I GEOFIZIKA in Russian No 11, 1986, pp 1-7

[Article by A. A. Chistyakov and R. Ye. Krasovskaya, All-Union Scientific Research Institute of Foreign Geology; All-Union Scientific Research Institute of Economics of Raw Materials and Geological Prospecting Work]

[Abstract] American scientists, working under the High-Energy Benthic Boundary Layer Experiment from 1983 to 1986, made a comprehensive study of processes of movement of sediments in the bottom boundary layer in a test range off Nova Scotia at depths as great as 5,000 m. The detailed observations revealed that at depths of less than 4,000 m there are no traces of the effect of bottom currents. At depths of 4,000-4,500 m or more forms appear which are attributable to bottom currents. Maximum velocities (up to 74 cm/s) of bottom currents are attained at depths of 5,000 m, causing an increased concentration of suspended particles in the boundary layer. During these four years more than 2,500 stereoscopic photographs of the bottom were taken. The research demonstrated that at depths greater than 2,000-3,000 m there is a quite intensive transport and redeposition of surface sediments as a result of the presence of different kinds of bottom currents. Study of such currents is complicated by their variability in time and space, complexity of the circulations and appearance of countercurrents. The currents vary in width from several to tens and hundreds of kilometers and occupy different levels in the water mass. There are tidal, seasonal and nonuniform periodic velocity fluctuations up to 40 cm/s or more in the direction of the averaged current. Such bottom currents have an adequate velocity for erosion, transport and redeposition of sandy as well as silty-clayey sediments. Operating over a sufficiently long time, strong bottom currents can cause considerable erosion of sediments accumulated earlier or remove them completely, resulting in gaps in geological sections. Paleocurrents of this type probably played an important role in the formation of ferromanganese nodules.

5303/12955
CSO: 1865/236

ASSOCIATION CREATED FOR ADVANCEMENT OF SUPERDEEP DRILLING

Moscow SOTSIALISTICHESKAYA INDUSTRIYA 14 Dec 86 p 1

[Text] A session of an interagency scientific council of the USSR State Committee for Science and Technology completed its work yesterday in Yaroslavl. The session was devoted to problems of studying Earth's interior.

Taking part in the session were scientists of the USSR Ministry of Geology, the USSR Ministry of Higher and Specialized Secondary Education, the USSR Academy of Sciences, and other ministries and agencies.

Ye. Kozlovskiy, USSR minister of geology, commented on the session's results:

"Geology is an economic strategy, figuratively speaking. This means that it must know what mineral reserves the country possesses both for meeting present-day requirements and with the long-range outlook taken into consideration. At the same time, it is becoming more and more difficult to prospect deposits. The interbranch scientific-technical complex "Geos" has been created for the purpose of accelerating scientific-technical progress. It is an automated system for gathering and processing information obtained on four levels: in outer space, in the air, on the ground, and underground. Deep and superdeep drilling is one of the most important and effective means of investigation in this system.

"It is important to note that Soviet drilling technology has provided highly effective scientific research. This technology made it possible to reach a depth of 12,064 meters in the Kola borehole for the first time in the world, and to obtain the most complete set of scientific data on the structure of the Earth's crust in world practice. Further development of the system of deep and superdeep boreholes is planned, primarily in ore and oil-bearing regions of Siberia, the Urals, Tyumen Oblast, the Caspian Basin, and in the Ukraine and Central Asia.

"A great deal of work lies ahead. A research-and-production association, 'Nedra' (Earth's interior), has just been created. It is to be developed into an all-Union center for deep crystal research."

FTD/SNAP
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CSO: 1865/314

LARGE PROSPECTING PROGRAM "GEOS" CALLS FOR DRILLING, AEROSPACE STUDIES

Moscow: SOVETSKAYA ROSSIYA 6 Dec 86 p 4

[Article by P. Timofeyev]

[Excerpt] The USSR Ministry of Geology has begun work on carrying out a unique scientific-technical program called "Geos". Information about our country's natural resources will be gathered from four sources -- from satellites, from aerial-photography airplanes, from ground stations, and from sensors installed in so-called superdeep boreholes. The information will be processed together at a single automated center. Scientists hope that such comprehensive studies will make it possible in the near future to have a full picture of deposits of minerals that have not yet been discovered. We asked Anatoliy Ivanovich Krivtsov, head of the administration of scientific research organizations of the USSR Ministry of Geology, to tell about the new program:

"A central link in the new system will be provided by data from deep within the earth, gathered from the network of superdeep boreholes that is now being developed. Each of these boreholes will be from 7,000 to 15,000 meters deep. At the surface they are situated at different elevations above sea level. Thus the overall depth of the cross-section of the earth's surface that the network takes in will be nearly 60 kilometers. Information from boreholes that already have been sunk, including from the first one on the Kola Peninsula (at present it is 12,066 meters deep), is leading already to revisions of many scientific conceptions that for a long time were thought to be unshakable.

"One of the new superdeep boreholes will be sunk in Tyumen. Its main objective is to find new deposits of oil and gas. When the network of superdeep boreholes is completed, we will be able to install integrated seismic equipment in them. This will be very important for creating a system of early seismic detection.

FTD/SNAP
/12955
CSO: 1865/314

DISCOVERY ABOUT OIL FORMATION MAY AID SYNTHETIC FUEL PRODUCTION

Baku BAKINSKIY RABOCHIY in Russian 28 Dec 86 p 3

[Article by R. Akhmetov, correspondent]

[Excerpt] On 25 December, a scientific discovery of academicians A. A. Trofimuk and N. V. Cherskiy, Doctor of Geological and Mineralogical Sciences V. P. Tsarev, and Candidate of Chemical Sciences T. I. Soroka was recorded in the USSR State Committee on Inventions and Discoveries. This discovery broadens theoretical concepts of the transformation of organic substances into hydrocarbons.

It was thought that oil and gas formed from organic substances buried millions of years ago at a depth of more than 2 kilometers in rocks of the sedimentary sheath, and that the process of formation took place at certain pressures and at temperatures above 70-80 degrees Celsius. However, geologists occasionally found pools of liquid fuel at lessor depths and at lower temperatures. Proponents of this theory explained the occurrence of such deposits as the result of extrusion of petroleum from the Earth's mantle.

"Not all scientists agreed with this hypothesis, of course," said N. V. Cherskiy, who for 50 years has been doing research in the field of prospecting, surveying and extracting of hydrocarbon fuel materials. "We noted that the majority of oil and gas deposits are found at the edges of mountain ranges, where earthquakes often occur. As is known, earth tremors propagate longitudinal and transverse seismic waves that bear great energy. According to one hypothesis, their mechanical energy is transformed into chemical energy in the course of reactions in which thermal energy plays no part. Consequently, oil can form at lower temperatures than those 'prescribed' by theory."

To test this hypothesis, experimental investigations were performed at the Institute of Physical-Technical Problems of the North, which belongs to the Yakutsk affiliate of the USSR Academy of Sciences' Siberian Branch. Effects produced by seismotectonic processes on the transformation of organic minerals into hydrocarbons were studied. The specialists constructed a model of an underground stratum consisting of sand, clay, coal and scattered organic matter. All of this material was placed inside a vessesl, and the air was pumped out of it. It was then constantly subjected to the action

of elastic seismic waves for a prolonged period of time -- from several months to a year. In other words, the laboratory's associates simulated, at a very rapid pace, the natural process of oil creation, which takes millions of years. When the vessel was opened, elements of petroleum and combustible gases were found in it.

The Siberian scientists thus demonstrated that oil can form in the sedimentary sheath of the earth's crust even at a temperature of 20 degrees, and at lower pressures than had been thought.

Results of this scientific study make it possible to prospect hydrocarbon fuel materials more purposefully. Tectonic and seismic activity of earth's interior is becoming a new criterion for evaluating the prospects of finding oil and gas in regions.

The authors of the discovery think that it will become possible in the future to build plants for producing oil and natural gas from lignites, peat and other organic substances. Such a method of obtaining petroleum products may prove to be more profitable than making synthetic liquid fuel from bituminous coal.

FTD/SNAP
/12955
CSO: 1865/188

UDC 553.41(575.3)

NEW GOLD-BERTHIERITE TYPE OF MINERALIZATION IN CENTRAL TAJIKISTAN

Dushanbe DOKLADY AKADEMII NAUK TADZHIKSKOY SSR in Russian Vol 29, No 4, 1986 (manuscript received 8 Jan 86) pp 226-229

[Article by N. A. Blokhina, Geology Institute, Tajik Academy of Sciences]

[Abstract] A distinctive zone of mineralization in the Tajik SSR is described. It is characterized by the presence of a gold-berthierite complex in a band of northeasterly strike amidst sandy-shaly deposits associated with a system of subparallel dikes of granodiorite-porphyries and graniteaplites. The country rocks and the dikes intersecting them within the ore zone are serpentinized, silicified and pyritized. Three mineral associations can be discriminated in the primary ores: arsenopyrite-pyrite, pyrrhotine-chalcopyrite-sphalerite and sulfo salt-sulfide. Finely disperse gold is associated with the first of these associations, whereas visible gold is associated with the latter. A detailed study was made of the native gold-berthierite association, a new type of gold mineralization earlier unknown in Central Tajikistan. Its low-sulfide ores are of interest with respect to gold and possibly antimony. There is a direct geochemical relationship between the gold and the accompanying silver. The bismuth closely associated with the gold in the gold-sulfide deposits of the region was deposited later and is bound in sulfo salts. There is platinum and palladium in these sulfides, but due to their small quantities are only of geochemical interest. In exploration for deposits of the gold-berthierite type it is recommended that attention be given to the widespread occurrence of ore outcrops of tripuhyite in the oxidation zone. In the absence of primary mineralization this mineral may indicate the presence of berthierite in the ores. References 3: 2 Russian, 1 Western.

5303/12955
CSO: 1865/180

UDC 550.423:546.9

DISTRIBUTION OF PLATINOIDS, GOLD AND IRON GROUP ELEMENTS IN ROCKS OF OPHIOLITIC ASSOCIATION OF KAMCHATKA CAPE PENINSULA (EASTERN KAMCHATKA)

Novosibirsk TIKHOOKEANSKAYA GEOLOGIYA in Russian No 5, Sep-Oct 86 (manuscript received 25 Jun 85) pp 120-121

[Article by A. I. Kvasov, Tectonics and Geophysics Institute, Far Eastern Scientific Center, USSR Academy of Sciences, Khabarovsk]

[Abstract] Geological and geochemical information on the ophiolitic association of rocks on Kamchatka Cape Peninsula was given in an earlier article (A. F. Bekhtold, et al., DOKL. AN SSSR, Vol 281, No 2, 1985). The neutron activation method was used in determining rare earth elements in basalts, dolerites, gabbros and dolerites. Now data are given on the distribution of platinoids, gold and elements of the iron group in these rocks (Pt, Pd, Ir, Au and Ti, Cr, Ni, Co, Sc, Fe). The presence and content of iron group elements, platinoids and gold were first determined by the neutron activation method with irradiation of the samples by epithermal neutrons; then platinoids and gold were determined by the neutron activation method with irradiation by thermal neutrons after concentration of the elements in a nickel sulfide matte. A table gives the content (g/ton) of these elements in peridotites, dunites, dolerites and gabbros. There is a tendency for the accumulation of platinoids in dunites and to a lesser degree in peridotites. The mean contents of gold, iridium, platinum and palladium in the rocks of the basite-hyperbasite association are close to the contents of these same elements in the basite-hyperbasite complexes of the Ukrainian shield, lower than the contents in rocks in different associations in the Urals and considerably lower than in chondrites. Distinct correlations between Pt and Pd in peridotites and Pt and Ir in dolerites suggest the presence of accessory minerals in the rocks. References: 4 Russian.

5303/12955
CSO: 1865/183

UDC 553.411.078

SYSTEMATIZATION OF GOLD ORE DEPOSITS IN FAR EAST

Novosibirsk TIKHOOKEANSKAYA GEOLOGIYA in Russian No 5, Sep-Oct 86 (manuscript received 12 Feb 85) pp 95-99

[Article by L. V. Eyrish, Far Eastern Institute of Mineral Raw Materials]

[Abstract] The classification of gold ore deposits is difficult due to the diversity of the conditions under which they are formed. Deposits are usually grouped on the basis of mineralogical composition of the ores and country rock using such criteria as interrelationship of mineralization and magmatism, depth and mineral content. By contrast, the proposed systematization of gold ore deposits in the southern part of the Far East is

based on the relationship between productive mineralization and regional structural levels and its relationship to definite magma complexes, as well as the ore-magma zonality detected in a region. Morphology, mineral composition, country rock metamorphism and other factors are also taken into account. Within the limits of individual gold-bearing regions in the Far East there are deposits which differ in morphology, depth and age and which according to previous systematizations would have been assigned to different formations and groups of formations, giving no idea concerning the structural geology position of the mineralization. This is despite the fact that in each gold-bearing region there is a distinct association between the deposits and the intrusions to which they are paragenetically related and definite regional structural levels representing natural geological discontinuities between structural-formation complexes of different age. In the structures of the Mesozoic tectonomagmatic activation, for example, it was possible to discriminate three levels of gold mineralization: hypabyssal, subvolcanic and near-surface. The proposed systematization is presented in the form of two detailed tables. References: 23 Russian.

5303/12955
CSO: 1865/183

ASTRAKHAN GAS-CONDENSATE DEPOSIT: DISCOVERY, EXPLORATION AND FUTURE EXPLOITATION

Moscow KHIMIYA I ZHIZN in Russian No 7, Jul 86, pp 7-11

[Article by G. A. Gabrielyants, doctor of geological and mineralogical sciences: "Astrakhan Treasures"]

[Abstract] A major deposit has been discovered quite recently only 80 km from Astrakhan. There are many reasons for this recent discovery in such an accessible location. The first serious geophysical work was done during the period 1968-1973 and revealed possible petroleum and gas traps in the subsalt deposits, but initial drilling was unproductive, this attributable to drilling precisely in the wrong places. The first major strike was in August 1976: 400,000 cubic meters of gas per day, with each cubic meter of this gas yielding 220 cm^3 of light petroleum. After 1978 strikes were common and the Caspian Petroleum and Gas Province was defined. Unfortunately, the deposit is complex in structure and its products have a high hydrogen sulfide content. New equipment and new procedures had to be developed for its efficient exploitation. There was not one dry hole among the first 14 drilled by new procedures. Operating conditions are complicated by many physical and chemical factors, especially hydrate formation and possible deposition of sulfur on borehole walls. The gas is valuable not only as a fuel, but as an invaluable chemical raw material. It is a source of sulfur, organic sulfur compounds, light petroleum and aromatic hydrocarbons, ethane, propane and butane. Exploitation principles must therefore differ substantially from operation of purely gas deposits. The suggestion has been made that only 30-40% of the resources of this deposit be exploited,

but methods are being developed to ensure full use of stratum pressure. The considerable quantity of CO_2 in Astrakhan gas may be used in maintaining stratum pressure. Figure 1.

5303/12955
CSO: 1865/187

UDC 551.242.31+553.982/981(571.64)

PETROLEUM AND GAS CONTENT OF ENVELOPMENT STRUCTURES ON NORTHERN SAKHALIN

Novosibirsk TIKHOOKEANSKAYA GEOLOGIYA in Russian No 4, Jul-Aug 86 (manuscript received 18 Feb 85) pp 107-111

[Article by A. I. Gavrilov, I. K. Tuyezov and V. V. Kharakhinov, Tectonics and Geophysics Institute, Far Eastern Scientific Center, USSR Academy of Sciences, Khabarovsk; Sakhalinmorneftegazprom Geological Production Association, Sakhalin Scientific Research Institute of Petroleum and Gas, Okha-na-Sakhaline]

[Abstract] Available data are now adequate for prediction of hydrocarbon deposits on Northern Sakhalin, including detection of new types of petroleum and gas reservoirs and traps, one of these being structures of sedimentary envelopment of erosional projections of the pre-Cenozoic basement. Little attention has been given to such formations and the literature gives little or no information concerning them. This is in part attributable to the fact that Lower Cenozoic and Upper Cretaceous formations most frequently are at depths exceeding 5-6 km. On the basis of magnetotelluric sounding, gravimetric prospecting, deep drilling and other data it has now been possible to construct a hypsometric map of the surface of the pre-Cenozoic basement which reveals sedimentary envelopment structures. Three such confirmed zones and five postulated zones have been defined. In addition, similar structures may exist offshore, as well as in certain poorly studied regions of the island. Such formations vary greatly in size and are usually simple in structure. They usually have smooth gently sloping configurations with rock dips rarely exceeding 15°. Rarely faulted, they can be reliable traps for accumulation and preservation of hydrocarbons. Porous and fissured collectors may exist. The most promising areas for initial exploration have been selected. Figures 2; references: 2 Russian.

5303/12955
CSO: 1865/120

UDC 550.340.551.1

SPATIAL DISTRIBUTION OF VELOCITY RATIOS FOR LONGITUDINAL AND TRANSVERSE WAVES AND POISSON COEFFICIENT IN LITHOSPHERE IN SOUTHERN PART OF KURIL ISLAND SYSTEM

Novosibirsk TIKHOOKEANSKAYA GEOLOGIYA in Russian No 4, Jul-Aug 86 (manuscript received 7 May 84) pp 88-94

[Article by T. K. Zlobin, Marine Geology and Geophysics Institute, Far Eastern Scientific Center, USSR Academy of Sciences, Novoaleksandrovsk]

[Abstract] Records of near earthquakes obtained during seismic observations with mobile "Cherepakha" stations in the southern part of the Kuril island arc were used in determining the values and spatial distribution of V_p/V_s ratios, which were then used in a study of the internal structure of the lithosphere. The "Cherepakha" registers the vertical and two horizontal components of oscillations. The five "Cherepakha" outfits were used on Kunashir, Shikotan and Yuriya Islands. Numerous near earthquakes were registered and data for 20 with epicenters in the studied area were processed. The V_p/V_s ratios and the Poisson coefficient were determined over the area of the Greater and Lesser Kurils at different depths and sections of the lithosphere were constructed for the southern part of the Kuril arc. On the basis of these and other data it could be postulated that the position of magma hearths of volcanoes and zones of magma generation in the studied area are possibly associated with the defined regions of increased V_p/V_s and σ values. The Poisson coefficient σ in the earth's crust in the Kuril island arc averages 0.27, characteristic for a crust of the continental type. Partially molten matter may be present in areas with an increased Poisson coefficient value. Figures 3; references 14: 9 Russian, 5 Western.

5303/12955
CSO: 1865/120

UDC 550.311

DYNAMICS OF FORMATION OF SEISMIC ANISOTROPY IN OCEANIC UPPER MANTLE

Moscow IZVESTIYA AKADEMII NAUK SSSR: FIZIKA ZEMLI in Russian No 11, Nov 86 pp 58-68

[Article by A. G. Bugayevskiy and Ye. M. Chesnokov, Earth Physics Institute imeni O. Yu. Shmidt, USSR Academy of Sciences]

[Abstract] A model is proposed which could explain the process of formation of an ordered structure in the polycrystalline mantle. The primary statistically ordered structure is formed as a result of rotation of nonisometric grains of olivine during the flow of mantle matter. As the structure of the medium becomes ordered, its evolution to an ever-increasing degree is determined by the mechanism of plastic deformation of the olivine by

means of intragranular gliding. Proceeding on the basis of such a working hypothesis, it is possible to estimate the times of formation of the ordered structure of the initially macroscopically isotropic medium. On this basis it was possible to compute the dependence of the characteristics of anisotropy of the elastic properties of the oceanic lithosphere on its age. This mechanism of formation of seismic anisotropy is possibly operative in regions of oceanic rifts and in other regions of rising and spreading of the anomalous mantle. The main merit of the proposed model is the introduction of the time factor into description of the process of formation of medium anisotropy, making it possible to relate the dynamic characteristics of this process and especially the temporal dependence of the coefficient of azimuthal seismic anisotropy to the rate of deformation and thermodynamic conditions in the mantle flow near a rift zone. Accordingly, within the framework of this model it is possible to take into account real variations in mineralogical composition, quantity of oriented olivine, direction, rate and gradients of tectonic processes leading to some peculiarities in the geographical distribution of seismic anisotropy of the oceanic upper mantle. Figures 6; references 42: 12 Russian, 30 Western.

5303/12955
CSO: 1865/178

UDC 553.411'3/'9(479.25)

SOME HYDROCHEMICAL INDICES OF GOLD-POLYMETALLIC MINERALIZATION USED IN EXPLORATION WORK (EXEMPLIFIED BY ONE GOLD-POLYMETALLIC DEPOSIT IN ARMENIAN SSR)

Yerevan IZVESTIYA AKADEMII NAUK ARMYANSKOY SSR: NAUKI O ZEMLE in Russian Vol 39, No 4, Jul-Aug 86 (manuscript received 18 Feb 86) pp 29-36

[Article by G. V. Shaginyan, Geological Sciences Institute, Armenian Academy of Sciences]

[Abstract] The characteristics of metamorphization of the chemical composition of waters in vein gold-polymetallic deposits are discussed, as well as anomalous contents of macro- and microcomponents as mineralization indices. Their importance for vein gold-polymetallic ores indication was studied. The ore field of the studied deposit was in Middle- to Upper Eocene formations represented by lavas, lava breccias and tuffs of andesite-basalts with intercalations of tuff sandstones, together with subvolcanic bodies of andesites and basalts. The ore bodies are represented by veins and vein zones developed in pyroclastic formations. As a result of the metamorphization of waters under the influence of ore mineralization there are substantial changes in their microcomponent composition. (This is illustrated by data for one of the streams draining the central part of the deposit.) It is shown that there are a number of components whose anomalous contents can be used as criteria in a search for gold-polymetallic mineralization under similar natural conditions. The article defines the primary and secondary, direct and indirect geochemical indices suitable for carrying

out hydrochemical exploration at a scale 1:25,000. The pH of an aqueous solution within deposits of the considered type can serve as the principal indirect criterion for predicting mineralization in the stage of detailed exploration for the detection of ore bodies. Different components vary in the importance of the information which they supply. The principal direct, principal indirect, secondary direct and secondary indirect components used as geochemical indices are defined. Figures 2; references: 6 Russian.

5303/12955
CSO: 1865/311

UDC 550.343.6:537

DEPENDENCE OF SEISMOELECTRIC EFFECT OF ROCKS ON TEMPERATURE

Yerevan IZVESTIYA AKADEMII NAUK ARMYANSKOY SSR: NAUKI O ZEMLE in Russian Vol 39, No 4, Jul-Aug 86 (manuscript received 28 Jun 85) pp 48-53

[Article by E. I. Parkhomenko, T. V. Tonoyan and Kh. D. Topchyan, Earth Physics Institute imeni O. Yu. Shmidt, USSR Academy of Sciences; Geophysics and Engineering Seismology Institute, Armenian Academy of Sciences]

[Abstract] The seismoelectric effect, like the piezoelectric and triboelectric effects, is among the possible earthquake precursors. The nature of manifestation of electric precursors during seismic activity in some cases suggests that they have an electrokinetic nature. The seismoelectric effect can also be used in exploratory geophysics and mining. However, at present too little is known concerning the role of the seismoelectric effect in the electrification of rocks in a focal zone and outside it during periods of earthquake preparation. Accordingly, a study was made of the seismoelectric effect under stressed the thermodynamic conditions. A research method and special apparatus was developed for this purpose under conditions precluding the diffusion of pore solution from a sample at high temperature (because the magnitude of the seismoelectric effect is determined by the presence of moisture in the sample). The apparatus is a thick-walled metal cylinder to which is attached a heater making it possible to raise temperature in the working part to 200°C. The sample to be studied, with attached electrodes, is placed in the container, which is then placed in a high-pressure chamber. The influence of temperature on the seismoelectric effect was studied in pyrophyllite and felsite in the temperature range from room temperature to 150°C. A decrease in this effect was discovered, attributable primarily to an increase in resistivity (other factors are of insignificant importance). The potential ζ did not increase in the studied samples because of their fine pores and a poorly developed diffuse layer in the capillaries. The results should be taken into account in determining the nature of the potentials arising during the pre-earthquake period. Figures 5; references: 5 Russian.

5303/12955
CSO: 1865/311

UDC 550.348.425+550.384

EXPERIMENTAL EVALUATION OF SEISMOMAGNETIC EFFECT ACCOMPANYING SHOTS

Yerevan IZVESTIYA AKADEMII NAUK ARMYANSKOY SSR: NAUKI O ZEMLE in Russian
Vol 39, No 4, Jul-Aug 86 (manuscript received 20 Jun 83) pp 66-69

[Article by S. R. Oganesyan, Geophysics and Engineering Seismology Institute, Armenian Academy of Sciences]

[Abstract] Artificial shots can be used in earthquake prediction to the extent that they make it possible to model the earthquake mechanism. During a shot it is possible to study changes in the geomagnetic field associated with propagation of an elastic wave and changes of the relaxation type. This process roughly simulates the tectonomagnetic effect. The slow accumulation of elastic stresses at an earthquake focus to a certain degree can be compared with relaxational changes in elastic stresses after a shot. The article gives the results of registry of changes in the local geomagnetic field in rocks with different magnetic properties accompanying shots of different intensity. This involved 300 shots in tuffs, tuff breccias and basalts for estimating the effect threshold (the minimum elastic stresses ensuring field changes). Registry of field changes during shots was with two quantum T magnetometers. It was possible to discriminate three types of effects (reversible, irreversible, relaxational) in geomagnetic field changes. Analyses of the reversible and irreversible effects revealed that the sign of the seismomagnetic effect is dependent on the sign of remanent magnetization, placement of shot holes, shock wave direction and other factors. The maximum field changes were in those cases when the medium was most monolithic (basalt blocks cemented by tuffs). A seismomagnetic effect was clearly detected in the studied rocks but the results do not fully characterize the phenomena arising during slow accumulation of mechanical stresses. During shots great pressures arise which lead to geomagnetic field changes exceeding the true seismomagnetic effect in nature and a shot does not fully simulate the process of formation of an earthquake focus. However, there is a directly proportional correlation between the amplitude of field change, degree and direction of rock magnetization. Figures 4; references: 2 Russian.

5303/12955
CSO: 1865/311

UDC 553.412.2+548.4

NEW DATA ON CHEMICAL PROPERTIES AND TEMPERATURE OF ORE-FORMING SOLUTIONS OF GOLD-SILVER MINERALIZATION AT SHALLOW DEPTHS

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 291, No 3, Nov 86 (manuscript received 8 Jul 85) pp 672-676

[Article by V. A. Kovalenker, V. B. Naumov, V. Yu. Prokofyev and N. S. Bortnikov, Geology of Ore Deposits, Petrography, Mineralogy and Geochemistry Institute, USSR Academy of Sciences; Geochemistry and Analytical Chemistry Institute imeni V. I. Vernadskiy, USSR Academy of Sciences, Moscow]

[Abstract] A great volume of data has now been accumulated on the PT regime of mineral formation and composition of ore-forming fluids, including those forming gold ores. However, there is a paucity or complete lack of information for some types of shallow gold and silver deposits characterized by relatively high contents of sulfides, sulfo salts and tellurides, such as occurs in the Kuraminskaya subzone of tectonic-magmatic activation of the ancient folded system. The Au-Ag deposits there are represented by lean or intermediate sulfide ores (sulfides 2-3 and 5-10% by mass respectively, but locally 20-30%). A special thermal and cryometric study was made of the inclusions in minerals of such a deposit. It was found that the mineralization of the early productive stage was formed in a wide temperature range (330-<50°C). Temperatures 330-190°C correspond to gold-bearing quartzes and calcites, whereas lower temperatures correspond to drusoid quartz, sphalerite and barite, completing mineral formation of the considered stage. The principal gold-bearing parageneses with sulfo salts and tellurides were formed at still lower temperatures (190-100°C). The early productive associations of gold-silver deposits of the Kuraminskaya subzone were formed from potassium-sodium low-concentration solutions which had an initial temperature of 330°C. Mineralization of the main productive stage occurred at temperatures 190-100°C from potassium-sodium-calcium-magnesium chloride high-concentration solutions. Figures 2; references: 7 Russian.

5303/12955
CSO: 1865/173

UDC 548.5:549.283:553.44

NEW INFORMATION ON NATURE OF NATIVE GOLD OF HYDROTHERMAL DEPOSITS

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 291, No 3, Nov 86 (manuscript received 12 Jul 85) pp 669-671

[Article by V. V. Ivanov, Far Eastern Geological Institute, Far Eastern Scientific Center, USSR Academy of Sciences, Vladivostok]

[Abstract] A new genetic type of native gold, metamorphic, has been defined in hydrothermal deposits on the basis of geological and mineralogical research

and experimental modeling. This gold was crystallized in native form in the course of thermal metamorphism of ores due to the thermal decomposition of its telluride compounds. Such native gold, together with ordinary hydrothermal gold, was discovered in 1975 in two Far Eastern deposits. The existence of such gold in other regions can be postulated. The studied ores were characterized by a variability of the composition of productive associations and a diversity of forms of manifestation of gold mineralization, one of which was the newly defined metamorphic type of native gold. An effort was made at experimental reproduction of the growth of gold crystals of a definite composition and the characteristic anomalous morphology. In this process an attempt was made at producing micro-intergrowths of gold with hessite during thermal modification of natural gold and silver tellurides. A series of experiments was made with heating of finely fragmented telluride in evacuated glass ampules and porcelain crucibles in the air and in an atmosphere of inert gases in a temperature range comparable with real processes. The products of the reaction were analyzed. The morphology and composition of the natural metamorphic and artificially produced gold were extremely close. The experiments confirmed that the crystallization of some part of the native gold was not from hydrothermal solutions but occurred in the process of solid-phase decomposition of gold and silver telluride. Figures 2; references: 9 Russian.

5303/12955
CSO: 1865/173

UDC 550.834

DYNAMICS OF STONELEY WAVE AT FLUID AND SOLID INTERFACE AND POSSIBILITIES OF ITS USE IN SEISMOACOUSTICS

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 291, No 3, Nov 86 (manuscript received 14 Oct 85) pp 563-566

[Article by A. V. Kalinin, I. D. Tsvankin and B. L. Pivovarov, Moscow State University imeni M. V. Lomonosov]

[Abstract] In the course of seismic research in the ocean it is common to register a Stoneley wave associated with the bottom. A numerical study was therefore made of the dynamics of the Stoneley wave, taking into account the real values of the absorption coefficients in a solid, and an analysis was made of the possibilities of its use for study of the properties of bottom deposits. It is shown that the Stoneley wave, especially the strong dependence of its amplitude on β_{sl} and b_l [b_l is the velocity and β_{sl} is the absorption coefficient of transverse waves], makes it useful for studying bottom deposits in seismoacoustics. The b_l and β_{sl} parameters are correlated: the less consolidated the bottom layer, the lesser is the velocity b_l of transverse waves, and usually the greater is the β_{sl} value (that is, the lesser is the amplitude of the Stoneley wave). The Stoneley wave can therefore serve as an indicator of the degree of consolidation of bottom deposits. The influence of the β_{sl} and b_l parameters can also be separated. Any

appreciable change in the intensity of the Stoneley wave without significant variations of its velocity is indicative of a change in the absorption of transverse waves in the bottom layer. The discrimination of the Stoneley wave on seismograms is simple, although the seismic source must be close to the bottom. Figures 3; references 7: 4 Russian, 3 Western.

5303/12955
CSO: 1865/173

UDC 550.4

ORIGIN OF GRANITE MATTER IN CONTINENTAL CRUST

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 291, No 2, Nov 86 (manuscript received 21 Nov 85) pp 444-447

[Article by A. A. Yaroshevskiy, Moscow State University imeni M. V. Lomonosov; Geochemistry and Analytic Chemistry Institute imeni V. I. Vernadskiy, USSR Academy of Sciences, Moscow]

[Abstract] In an earlier article it was demonstrated that independent geochemical information can be used in determining the geochemical balance of matter in the continental crust, assuming that it was formed virtually exclusively by island-arc (geosynclinal) volcanism and has a mean composition corresponding to a mixture of basalts, andesites and rhyolites of 6:3:1. The more acidic composition of the upper continental crust results from the formation and movement of granitoid masses into the upper structural stages. This approach allows concepts concerning the nature of the granite matter in the continental crust to be integrated into a single scheme: 1) The formation of the main mass of granitoids was an entirely crustal process; 2) granitization is a natural component of the entire complex of palingenetic-metamorphic processes developing in certain stages of the geological history of geosynclinal zones at depths of 15-20 km; 3) the specifics of the composition of the granitoid masses unambiguously indicates that the main factor in the formation of the granitoid systems is melting; 4) the partially melted granitoid masses must apparently be considered gravitationally unstable, drawn into vertical movement, the natural result of which should be chemical stratification of the continental crust. References: 15 Russian.

6508/12955
CSO: 1865/189

UDC 553.411:553.(45+463)

ASSOCIATION OF GOLD AND TIN-TUNGSTEN MINERALIZATION IN NORTHEASTERN USSR

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 291, No 2, Nov 86
(manuscript received 18 Nov 85) pp 425-429

[Article by B. O. Ivanyuk]

[Abstract] Data from recent studies indicate regular association of gold, silver and tin in gold-silver and tin in gold-silver and cassiterite-sulfide volcanogenic formations. Data recently obtained on the spatial association of gold-quartz and cassiterite-quartz formations in an ore field in the Northeastern USSR supplement and expand knowledge on the correlation of gold, silver, tin and tungsten mineralization in the Pacific zone. The studies of this area have established that the gold and silver in tin-tungsten ores are present both in the native state and as impurities in sulfides. Native gold is quite rare and found only in heavy fractions. The native gold is bluish in lumps or droplets and closely associated with arsenopyrite or pyrite, sometimes in fissures in these minerals. The gold and silver are distributed quite nonuniformly with significant differences in the concentration of these metals in various minerals. The gold content increases in the sequence of segregation of sulfides from the earliest to arsenopyrite, then decreases in lighter specimens. The data indicate that the hydrothermal solutions forming the mineralization in this ore field differed in their PTX parameters. The spatial association of different types of ore formations genetically related to different ages of intrusive complexes resulted from the repetition of tectonic-magmatic processes within the same area. References: 13 Russian.

6508/12955
CSO: 1865/189

UDC 551.21+550.3

SEISMIC STUDIES IN EPICENTRAL ZONE OF ASACHA EARTHQUAKE SWARM

Moscow VULKANOLOGIYA I SEYSMOLOGIYA in Russian No 6, Nov-Dec 87
(manuscript received 30 Oct 85) pp 46-59

[Article by A. A. Kargopoltsev, G. Pak, A. I. Farberov and Ye. S. Pribylov (deceased), Volcanology Institute, Far Eastern Scientific Center, USSR Academy of Sciences]

[Abstract] An earthquake swarm was recorded in the region of the Asacha group of dormant volcanoes in March and April of 1983, 90 km south of Petropavlosk-Kamchatskiy. Immediately after the beginning of the swarm, detailed observations of the epicenter were begun using the regional network and a temporary network of highly sensitive seismic stations set up in the area. This article presents the results of the observations. It was found

that the region and adjacent Southern Kamchatka have increased P-wave velocities at 10±5 km depth with reduced V_P/V_S values in comparison with the averages for Kamchatka. No stable volcanic tremors were observed in the epicentral zone, indicating that there was no magmatic melt activity near the surface, eliminating the possibility of an eruption. The earthquakes occurred within the Asacha volcanic mass in an area of not over 60 km^2. During the final stages the epicentral zone a northeasterly strike entirely within the volcanotectonic depression. The swarm was probably a manifestation of a present-day deep process leading to formation of the structure. Figures 7; references 21: 18 Russian, 3 Western.

6508/12955
CSO: 1865/303

UDC 550.34

DETAILED STUDY OF FOCUS OF DEEP EARTHQUAKE OF 15 FEBRUARY 1971 (FIJI) AS ELASTIC WAVE RADIATOR. II. CALCULATION OF FIRST-AND SECOND-ORDER SEISMIC MOMENTS OF FOCUS

Moscow VULKANOLOGIYA I SEYSMOLOGIYA in Russian No 6, Nov-Dec 86 (manuscript received 24 Jun 85) pp 67-83

[Article by A. A. Gusev and V. M. Pavlov, Volcanology Institute, Far Scientific Center, USSR Academy of Sciences]

[Abstract] This article is a continuation of a study of the focus of a deep earthquake which occurred on 15 February 1971 in the Fiji Islands. It gives the results of calculation of first- and second-order moments using the method first suggested by G. Backus and M. Mulkahy in 1976. Combined application of the results of calculation of seismic moment tensors and normalized first- and second-order moments allows the practical use of a model of the focus as a planar shear fault and determination of the orientation of the focal plane. A rather detailed description of the space-time structure of the focus is presented: a relatively narrow area with the process developing asymmetrically, though not purely unilaterally, the rupture propagating along the long axis of the focus. Figures 8; references 15: 8 Russian, 7 Western.

6508/12955
CSO: 1865/303

UDC 550.341.4+550.345

SPECIFICS OF TSUNAMI-GENERATING EARTHQUAKES IN KURIL-KAMCHATKA ZONE DETERMINED FROM NEARBY STATIONS

Moscow VULKANOLOGIYA I SEYSMOLOGIYA in Russian No 6, Nov-Dec 86
(manuscript received 21 May 84) pp 84-89

[Article by R. N. Burymskaya and A. I. Ivashchenko, Marine Geology and Geophysics Institute, Far Eastern Scientific Center, USSR Academy of Sciences]

[Abstract] Continuing studies made earlier, the authors present data collected at stations on Sakhalin Island and the Kuril Islands on the characteristics of tsunami-generating earthquakes, taking into account the specifics of timely tsunami prediction. More than 70 earthquakes recorded between 1959 and 1983 were selected for the study. The apparatus used has a flat frequency characteristic from 0.1 to 3 s with a slight rise from 7 to 80. The earthquakes studied were all at short epicentral distances, magnitude 6.0-8.2, focal depth 3 km or more. One of the major parameters of the wave field, representing the rise time of the maximum displacement of seismic waves on the recordings made by mechanical instruments, was analyzed. It was found that joint use of magnitude-geographic criteria and time of attainment of maximum amplitude can discriminate tsunami-generating earthquakes with an accuracy to 86.9%. Figures 4; references 13: 11 Russian, 2 Western.

6508/12955
CSO: 1865/303

UDC 550.34.038.8:528.087.4

AUTONOMOUS DIGITAL RECORDING TILTMETER STATION

Moscow VULKANOLOGIYA I SEYSMOLOGIYA in Russian No 6, Nov-Dec 86
(manuscript received 15 Mar 85) pp 98-101

[Article by V. M. Ivshin, V. S. Kuznetsov and P. B. Vetrov, Volcanology Institute, Far Eastern Scientific Center, USSR Academy of Sciences]

[Abstract] In order to allow long-term observation of earth surface tilting at any point in the Kamchatka region, an autonomous tiltmeter station has been developed on the basis of the TM-1V tiltmeter. Measured data are registered in programmable read-only memory (PROM) devices. The stored information is read directly in the field by means of a digital indicator or computer through a special interface. The station measures the tilt in 2 mutually perpendicular directions. The soil temperature was measured at two points, near the surface and at the depth of the tiltmeter sensor, in order to compensate for meterological interference. A block diagram of the device and description of the main technical specifications are presented. Figure 1; references 4: 3 Russian, 1 Western.

6508/12955
CSO: 1865/303

UDC 550.837.218

INFLUENCE OF ALLUVIAL-DELUVIAL DEPOSITS AND HIGH-RESISTANCE LAVA FLOWS ON RESULTS OF INVESTIGATIONS BY STRAY CURRENTS METHOD

Yerevan IZVESTIYA AKADEMII NAUK ARMYANSKOY SSR: NAUKI O ZEMLE in Russian Vol 39, No 5, Sep-Oct 86 (manuscript received 23 Jun 86) pp 53-57

[Article by V. B. Gamoyan, A. Z. Chilingaryan, F. S. Unusyan, Ye. M. Lulechyan and R. V. Ovsepyan, Geophysics and Engineering Seismology Institute, Armenian Academy of Sciences]

[Abstract] The distortion of electric field distributions produced by high-resistance covering deposits over ore-bearing volcanogenic and volcanogenic-sedimentary rock is determined by the thickness of the surface deposits and the ratio of resistivity of the crustal and cover rock. Theoretical, field and laboratory studies were made to investigate this influence on the results of the stray current research method. An infinite three-layer medium with intermediate layer thickness twice that of the cover layer was used in the theoretical studies. A simple linear bipolar source of the electric field was assumed to be located beneath the intermediate layer and at some distance from it. The influence of the alluvial-deluvial deposits was found to be significant, related by a direct curve to the thickness of the unconsolidated deposits and the ratio of resistivities of the crustal and sedimentary rock. A lava cover with ratios of resistivity of 1:60 has practically no influence on the results of stray current studies. Figures 2.

6508/12955
CSO: 1865/310

UDC 550.312:550.831

KINEMATIC PECULARITIES OF TELESEISMIC P-WAVES BASED ON ARMENIAN SEISMIC STATION RECORDS

Yerevan IZVESTIYA AKADEMII NAUK ARMYANSKOY SSR: NAUKI O ZEMLE in Russian Vol 39, No 5, Sep-Oct 86 (manuscript received 23 Jun 86) pp 11-17

[Article by A. Kh. Bagramyan, A. M. Avetisyan, M. B. Mkrtchyan and K. A. Zakaryan, Geophysics and Engineering Seismology Institute, Armenian Academy of Sciences]

[Abstract] The purpose of this work was to find station corrections for the seismic stations of the Armenian SSR based on studies of earthquakes in several seismically active regions of the earth: the Aleutian and Kuril Islands, Indonesia and the Mediterranean Sea. Twelve seismic stations in Armenia were studied, using data recorded during some 500 earthquakes between 1975 and 1981 with varying depths of crustal epicenter. All of the stations studied were found to have positive correction, i.e., the travel time of the P-wave was greater, its velocity therefore being less. The degree of

correction varied from station to station. A system of velocity anomalies was constructed in the form of a map of velocity variations in the upper mantle. Figures 2; references 14: 12 Russian, 2 Western.

6508/12955
CSO: 1865/310

UDC 550.831

EFFECTIVE METHODS OF GRAVIMETRIC AND MAGNETOMETRIC DATA PROCESSING

Yerevan IZVESTIYA AKADEMII NAUK ARMLYANSKOY SSR: NAUKI O ZEMLE in Russian Vol 39, No 5, Sep-Oct 86 (manuscript received 23 Jun 86) pp 35-39

[Article by S. M. Oganesyan, A. G. Manukyan and M. G. Oganesyan, Order of Red Banner of Labor Geophysics and Engineering Seismology Institute, Armenian Academy of Sciences]

[Abstract] A changeover to three-dimensional modeling of media and fields is a pressing problem. One of the most important aspects of this problem is the formulation of theoretical and technological principles for the derivation of effective algorithms for solving three-dimensional direct and inverse problems in gravimetry and magnetometry, taking into account the spherical figure of the earth. This article presents major results obtained at the computer center of the authors' institute in 1981-1985 related to development of methods for processing gravimetric and magnetometric data for the construction of three-dimensional geophysical models of the earth's crust. The theoretical results and effective numerical methods for solving direct and inverse problems in gravimetry and magnetometry which have been developed allow the construction of algorithms for computation of three-dimensional geophysical models of the crust and upper mantle as well as structures promising for locating oil, gas and other useful minerals. References: 15 Russian.

6508/12955
CSO: 1865/310

UDC 550.344.37

RESULTS OF STUDY OF GEOPHYSICAL PRECURSORS OF EARTHQUAKES IN NORTHWESTERN ARMENIA

Yerevan IZVESTIYA AKADEMII NAUK ARMYANSKOY SSR: NAUKI O ZEMLE in Russian Vol 39, No 5, Sep-Oct 86 (manuscript received 23 Jun 86) pp 40-47

[Article by E. G. Gedakyan, G. V. Sargsyan, Kh. V. Kirakosyan and Ye. P. Tonoyan, Geophysics and Engineering Seismology Institute, Armenian Academy of Sciences]

[Abstract] An attempt is made to discriminate earthquake precursors based on the seismic quiet, changes in body wave velocity ratios and parameters of electrotelluric and magnetic fields in one of the most seismically active areas of the Caucasus, where geomagnetic and electrotelluric observations are made in a dense network of stations. A number of strong earthquakes occurred in the area during the time of the study. The methodological approach suggested allows exclusion of changes related to external sources and analysis of seismogenic variations as scalar and vector changes. The method is considered promising both for an understanding of the mechanism by which seismotectonic processes influence electric and magnetic fields and for prediction of earthquakes, particularly for a territory such as the Armenian SSR which is complex in its geologic-tectonic characteristics. The time of appearance of anomalous changes in fields before seismic events is 2 to 15 days, varying with distance from the epicenter and energy characteristics of the impending earthquake. Figures 5; references 7: 6 Russian, 1 Western.

6508/12955
CSO: 1865/310

UDC 551.14(924.1/9+477)

SEISMIC MODEL OF GEOTRAVERSE VIII

Kiev DOKLADY AKADEMII NAUK UKRAINSKOY SSR, SERIYA B: GEOLOGICHESKIYE, KHIMICHESKIYE I BIOLOGICHESKIYE NAUKI in Russian No 12, Dec 86 (manuscript received 29 Jul 86) pp 15-18

[Article by V. B. Sollogub, corresponding member, Ukrainian Academy of Sciences and T. V. Ilchenko, Geophysics Institute, Ukrainian Academy of Sciences, Kiev]

[Abstract] Geotraverse VIII extends from Reni to Krivoy Rog, intersecting the southern slope and central portion of the Ukrainian shield. The interpretation of field materials from deep seismic sounding along the slope was utilized to construct a structural seismic section of the lithosphere and a two-dimensional velocity model. The results of the interpretation are illustrated in a cross-sectional diagram, showing reflecting and

refracting areas and horizons, multiple diffraction points, isolines of velocities and deep fractures. The Odessa regional fault is found to be a "wake" on the surface of a sloping plane along which the Kirovograd block thrusts over the Odessa-Yadlovsk zone, not a typical subvertical deep fault as was previously thought. Figure 1; references: 3 Russian.

6508/12955
CSO: 1865/304

UDC 553.411'452'463.061.2(574.3)

NEW TYPE OF GOLD-RARE METAL ORE FORMATION IN CENTRAL KAZAKHSTAN

Alma-Ata VESTNIK AKADEMII NAUK KAZAKHSKOY SSSR in Russian, No 10, Oct 86, pp 64-68

[Article by E. A. Baydildin, candidate of geological and mineralogical sciences]

[Abstract] By summarizing materials from prospecting operations and special studies in the Saryobinsk ore body of the Northwestern Balkhash area, the authors have found a new ore formation for Kazakhstan (gold, tungsten, tin, etc) similar to a Bolivian type of ore formation. The geological structure of the area is described. The new Bolivian-type gold-tungsten-tin ore formation is located in a block of subvolcanic porphyry associated with a circular fault zone. The subvolcanic block is circular in form, 0.5 x 0.4 km, consisting of spherulites and with a micrographic structure of the pink liparitic porphyry. At the western end, opened by a mine, are brecciated varieties resulting from the presence of angular fragments of andesite prophyrites captured during rising of magma. In places they resemble eruptive breccias. The block ore formation is located at the intersection of a quartz zone with north-northwest oriented fractures. The block area is a network of thin steeply dipping quartz veins associated with two systems of fractures in pinkish gray lava. The most stable gold content coincides with areas of crushed chloritized lava without veins. The ore formation is thus demonstrated to be associated with volcanism, making the detection of such ore in other volcanic zones in Kazakhstan probable. Figure 1; references: 9 Russian.

6508/12955
CSO: 1865/185

UDC 550.4.551.411:553.982.001.5(479.24)

GOLD IN PETROLEUM OF MURADKHANLY DEPOSIT (CENTRAL KURA DEPRESSION)

Baku DOKLADY AKADEMII NAUK AZERBAYDZHANSKOY SSR in Russian No 12, Dec 85 (manuscript received 25 Apr 85) pp 39-42

[Article by Sh. F. Mekhtiyev, academician, AzSSR Academy of Sciences, R. Kh. Mirzoyev and V. M. Kharitonov, Geology Institute imeni Gubkina, Azerbaijan Academy of Sciences]

[Abstract] The content of gold and other trace elements in petroleum of hte Muradkhanly deposit was compared and correlated. The oil within these deposits is in direct contact with stratal water and surrounding rock; the authors therefore directly determined the content of gold in these media as well. The petroleum of these deposits is characterized by a high tar content (14%) in the fraction boiling at over 200°C, and a particularly high content of asphaltenes (up to 17%) in this fraction. The gold content in the oil was found to be 0.8-9.0 mg/t. The petroleum of the Chokraksk horizon and the Eocene contains not over 1 mg/t, while oil in the Upper Cretaceous characteristically has relatively higher gold content. Figures 2; reference: 1 Russian.

6508/12955
CSO: 1865/211

UDC 552.511:553.411(574.3+574.5)

GOLD-BEARING EXPLOSIVE BRECCIA OF DZHUNGARO-BALKHASH PROVINCE

Alma-Ata IZVESTIYA AKADEMII NAUK KAZAKHSKOY SSR in Russian No 6, Nov-Dec 86, pp 35-41

[Article by A. B. Diarov and K. I. Kim, Geological Sciences Institute, imeni K. I. Satpayev, Kazakh Academy of Sciences, Alma-Ata]

[Abstract] Explosive ore-bearing structures are located primarily in areas of deep faults. Most of these structures are associated with the Dauletbay deep fault. In this area the associated explosive breccia are mixed in nature. In local structures the explosive breccia are located in systems of deep fractures of second or higher order. The regularities of ore formation near the surface are discussed and optimal ore localization conditions, occurring with a combination of zones highly permeable for magmatism and shielded fluid-explosive structures, are modeled. Occurrence of these conditions is related to the generation of fluid-explosive systems in the frontal parts of epizonal plutons and subsequent transformation of explosions to structures favorable for deposition of ores. The prediction of explosive ore-bearing structures and related commercial concentrations of gold must take into account both regional and local criteria. The most important of the regional characteristics are fields of Middle Carboniferous

volcanic-plutonic associations, specifics of the deep structure of the basement and zones of large disjunctive structures. Among the local factors, the most important are points of intersection of deep fractures with deep higher-order faults and complex volcanotectonic structures with contrast-differentiated magmatism. Figures 3; references: 6 Russian.

6508/12955
CSO: 1865/184

UDC 550:4:553.411.3(574.52)

CHANGE IN CHEMICAL COMPOSITION OF NATIVE GOLD UPON TRANSITION FROM ORE TO PLACER UNDER ARID CONDITIONS

Alma-Ata IZVESTIYA AKADEMII NAUK KAZAKHSKOY SSR in Russian No 6, Nov-Dec 86, pp 70-74

[Article by V. B. Klitin (deceased) and M. M. Bakenov, Zhetysuy Geological Prospecting Expedition, Yuzhkazgeologiya Geological Production Association, Nikolayevka; Kazakh Polytechnic Institute imeni V. I. Lenin, Alma-Ata]

[Abstract] A study was made of the change in chemical composition of native gold upon transition from ore to placer in the Western Balkhash area in a typically arid semidesert region. Individual nuggest were analyzed by atomic absorption and laser spectral methods after collection uniformly over the entire ore and placer areas, collecting 5 to 10 grains of gold and 3 to 5 grains for determination of impurity elements at each collection point. The assay of nugget gold was found to increase in placers moistened with fresh water and decrease in placers flooded with highly mineralized chloride water. In the first case, impurities were leached from the gold, whereas in the second a portion of the gold also was dissolved. Figures 2; references: 6 Russian.

6508/12955
CSO: 1865/184

UDC 556.38:628.175

STATUS AND PROSPECTS OF WATER SUPPLIES IN ATASU MINING REGION IN CENTRAL KAZAKHSTAN

Alma-Ata IZVESTIYA AKADEMII NAUK KAZAKHSKOY SSR in Russian, No 6, Nov-Dec 86, pp 42-48

[Article by S. B. Kunanbayev, Hydrogeology and Hydrophysics Institute, Kazakh Academy of Sciences, Alma-Ata]

[Abstract] The quality characteristics of waters of several reservoirs in use in the Atasu mining area are discussed. Many of the reservoirs in

this area are nearly exhausted. However, there are significant reserves of ground water not presently in use, although anticipated industrial expansion of the area will tax the capacity of these sources as well. Industrial and agricultural water supply of the area can also be supplemented by water from the Irtysh-Karaganda-Dzhezkazgan Canal. The search for new ground water sources should be directed toward analysis of promising geological structures and areas for prospecting for water. Figures 2; references: 4 Russian.

6508/12955
CSO: 1865/184

UDC 550.834:553.98

ISOLATION OF LOCAL VELOCITY HETEROGENITIES IN THE SEARCH FOR OIL AND GAS IN COMPLEX MEDIA

Moscow EKSPRESS-INFORMATSIYA. SERIYA: NEFTEGAZOVAYA, GEOLOGIYA I GEOFIZIKA in Russian No 11, 1986, pp 7-11

[Article by A. V. Gorokhov, Dalmorneftegazgeofizrazvedka]

[Abstract] Velocity analysis is widely used in oil and gas prospecting, particularly study of the nature of changes in interval velocities, which can frequently isolate zones of facies substitution and reveal low-velocity heterogeneities in a cross section. Changes in interval velocities are determined by a number of factors, including lithofacial changes, changes in hypsometric position, fluid saturation and porosity. It is therefore frequently difficult to isolate an anomalous effect from low velocity heterogeneties against a background of overall velocity variation. This article studies the standard case and a possible variant of its solution. The problem is reduced to discrimination of residual variations by elimination of the regional background of variations. This approach allows objective discrimination of the influence of factors determining the nature of changes in velocities, ascertaining the absolute values of anomalies and their location in the cross section, as well as their position in plan where area studies are carried out. Figure 1.

6508/12955
CSO: 1865/306

UDC 550.37:626.814

LOCAL NATURAL ELECTRIC FIELDS OF RESERVOIRS, CANALS AND RIVERS

Yerevan DOKLADY AKADEMII NAUK ARMYANSKOY SSSR in Russian Vol 83, No 3, 1986, pp 122-126

[Article by D. A. Khachatryan, Yerevan State University]

[Abstract] The natural electric field method involves measurement of the potential or potential gradient of the natural electric field in a local area and subsequent discrimination of anomalous zones on potential graphs. Local natural electric fields in water bodies result from diffusion-adsorption phenomena at the liquid-solid interface. Studies made by the author indicate that local electric fields are influenced by the direction of movement of the water and are also formed where two streams flow together. The natural electric field in reservoirs, canals and rivers is significantly influenced by natural fields of biogenic origin resulting from hydrophilic plants growing in the water and on the banks. A table presents the potentials of several such plants quite common in rivers. The biophysical fields are comparable to fields measured in electric prospecting and must therefore be considered. Local natural fields are also created by artificial structures such as bridges, stone walls, water engineering structures and hydrogeological measurement posts. Figures 4; references: 6 Russian.

6508/12955
CSO: 1865/300

YE. VELIKHOV COMMENTS ON IDEA OF GLOBAL SEISMIC-STATION NETWORK

Moscow IZVESTIYA 11 Nov 86 p 5

[Abstract] The article records a brief interview in Rome with academician Ye. P. Velikhov, vice-president of the USSR Academy of Sciences, after he took part in a seminar called "World Cooperation for Peaceful and Safe Use of Nuclear Energy", which was sponsored by the international committee Science for Peace. Velikhov said the participants discussed important questions of international cooperation in nuclear energy safety and also of the development of new kinds of nuclear reactors. He said there was discussion of advancing from scientific to technological cooperation in thermonuclear energy, and that M. S. Gorbachev's proposal for building an international test reactor of the tokamak type received support of scientists and engineers who took part in the seminar.

Velikhov said the seminar also discussed a project called "Archimedes" for global monitoring of the environment, which would involve first of all the creation of a global network of seismic stations. He said that in addition to reliable verification of a possible ban on nuclear-weapons testing, this network could be used for international cooperation in earthquake prediction and geological studies. Velikhov mentioned that the Soviet Union has achieved important results in the field of electromagnetic probing of the Earth's crust, and that these results could become a part of the "Archimedes" project.

FTD/SNAP
/12955
CSO: 1865/314

LAUNCH OF 'KOSMOS-1809', EQUIPPED FOR IONOSPHERE STUDIES

Moscow IZVESTIYA 20 Dec 86 p 2

[Excerpt] An artificial Earth satellite, 'Kosmos-1809', was launched from the Soviet Union on 18 December 1986.

The satellite is intended for perfecting research apparatus and methods for probing and monitoring the condition of Earth's ionosphere, and also for studying conditions of the propagation of radio waves in the ionosphere.

The satellite was placed into an orbit with the parameters: initial period of revolution -- 104.2 minutes; apogee -- 980 kilometers; perigee -- 960 kilometers; orbit inclination -- 83 degrees.

The apparatus installed on the satellite is functioning normally.

The information that is being received is being transmitted to institutes of the USSR State Committee for Hydrometeorology and Monitoring of the Natural Environment, and of the USSR Academy of Sciences for processing and utilization.

FTD/SNAP
CSO: 1865/152

IL-14 LABORATORY AIRPLANE USED BY INSTITUTE OF ATMOSPHERIC OPTICS

Moscow VOZDUSHNYY TRANSPORT 20 Nov 86 p 2

[Article by A. Lavrentyev]

[Abstract] The article gives an account of a flight on board an IL-14 laboratory airplane which is used by researchers of the Tomsk Institute of Atmospheric Optics. The group on this flight included candidates of physical-mathematical sciences Boris Belan, head of the expedition, and Mikhail Panchenko, senior project associate; and researchers D. Kabanov and S. Terpugova.

Belan related that his group was completing work in Siberia. This year the IL-14 and other laboratory airplanes have made flights for the institute over an area extending from Sakhalin Island to the Black Sea. The researchers have gathered exhaustive information on the condition of the atmosphere over different regions of the USSR. Effects on the atmosphere of natural and anthropogenic factors are being studied in the course of the project.

During the flight, observations were made while the airplane was climbing from a reference point to an altitude of 5,100 meters, from which several areas were surveyed. Observations were made inside clouds and in clear air. Panchenko mentioned that the information gathered from laboratory airplanes was being used to supplement spacecraft observations, in the interest of greater accuracy. He explained that spacecraft instruments can measure the temperature of the earth's surface only in degrees, but instruments on board the IL-14 can measure it in fractions of a degree.

FTD/SNAP
/12955
CSO: 1865/314

RESEARCH SHIPS 'VIZE' AND 'ZUBOV' BEGIN ANTARCTIC CRUISE

Moscow IZVESTIYA 14 Nov 86 p 6

[Article by S. Krayukhin]

[Text] On November 12, the scientific research ship 'Professor Vize' set out with participants of the 32nd Soviet Antarctic Expedition on board, headed for the Antarctic Circle. This floating observatory also carries a team of researchers headed by Doctor of Technical Sciences L. A. Timokhov. Nikolay Aleksandrovich Kornilov, deputy director of the Arctic and Antarctic Scientific Research Institute, commented on this important event:

"With this voyage, the 'Professor Vize' is marking a kind of anniversary -- its scientific work in the waters of the world's oceans began 20 years ago. This time, the ship is to conduct important ice experiments in Ross and Weddell seas. Another ship, 'Professor Zubov', also will take part in the study of currents and biological resources of the southern part of the world's oceans.

"In addition to scientific studies, this vessel will pick up Soviet polar explorers at 'Leningradskaya' and 'Russkaya' stations. The 'Vize' will visit 'Bellingshausen' station on its return trip."

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CSO: 1865/314

POLAR GEOPHYSICAL INSTITUTE'S STUDIES OF MAGNETOSPHERE, IONOSPHERE

NTR: PROBLEMY I RESHENIYA 4-17 Nov 86 p 5

[Text] Scientists of the Polar Geophysical Institute [of the Kola affiliate of the USSR Academy of Sciences] have been studying processes in the magnetosphere and ionosphere for more than 25 years.

Extensive experimental material that the institute has gathered has made it possible to reach a new level of understanding of interactive processes of the sun with the earth. Moving away from an emphasis on the morphology of geophysical phenomena, the institute's scientists have delved into the physical nature of processes, and have begun constructing mathematical models of processes of the magnetosphere and ionosphere.

In the magnetosphere, the solar wind causes large-scale electrodynamic processes which are accompanied by the formation of systems of electric current reaching millions of amperes in power, and by the generation of electromagnetic radiation in a wide range of frequencies. Polar auroras are a visible manifestation of these powerful processes.

The institute's scientists study the structure of the magnetosphere as a medium in which radio waves are propagated and try to forecast its condition. They are working to solve problems of stable operation of radio communication and navigation systems, and of precise time-keeping.

Methods have been developed for the utilization of the magnetosphere's natural electromagnetic radiation in geophysical prospecting, and experiments are being conducted.

Automated geophysical observatories have been created, including a regional center for gathering and processing data from remote terminal complexes.

The institute takes part in the carrying out of national and international programs: "ARAKS" (creation of artificial polar auroras), "SAMBO" (high-altitude aerophysical experiments), and in the "Interkosmos" program.

(Three photographs show the director of the institute, Doctor of Physical-Mathematical Sciences O. M. Raspopov; science associate A. M. Prilutskiy working on an antenna of the telemetry system for receiving information from satellites of the "Intercosmos" series; and a high-altitude balloon being released.)

FTD/SNAP
/12955
CSO: 1865/314

1,000-WATT SOLAR POWER UNIT FOR FAR NORTH

Moscow PRAVDA 5 Dec 86 p 3

[Article by V. Artemenko]

[Text] Tashkent, December 4 -- Scientists of the Uzbek Academy of Sciences' physical-technical institute and design and experimental bureau have developed the solar power station "Arktika" for the Far North.

It powers geodetic and navigational instruments during the dark arctic days. Experience with the utilization of solar power has been accumulated in Uzbekistan, and this experience was applied by the republic's scientists to conditions of the North. A working model of the station with a power of 400 watts has been successfully tested on an island in the Barents Sea. The power of the permanent "Arktika" station will be two and a half times as great. In their model, the scientists and designers have taken account of the severe frosts and factors of the North. With the assistance of industrial enterprises, the academy institute and the design bureau are ready to put solar power stations for the Far North into series production.

FTD/SNAP
/12955
CSO: 1865/314

KA-32 HELICOPTERS TO BE USED IN CARGO HANDLING IN FAR NORTH

Moscow VOZDUSHNYY TRANSPORT 9 Dec 86

[Text] The first KA-32 helicopter has arrived in Murmansk. This new aircraft for civil aviation is to take on a variety of jobs here in the polar region.

A crew headed by G. Provalov, commander of a flight group of the flight-testing complex of the State Scientific Research Institute of Civil Aviation, piloted the KA-32 from the plant.

An aircraft of this type has long been needed in the Far North. The KA-32 will deliver teams of drillers to rigs offshore in the Barents Sea. The helicopter will be indispensable in installing power transmission lines. It will be able to deliver foodstuffs and various goods in containers on an outside sling from ships to shores where there is no place to moor. This will allow coastal settlements to be supplied much better. The polar night is no hindrance to the KA-32, either.

Pilots V. Silov, P. Vyatkin, V. Belov and S. Starikov of the Murmansk Aviation Enterprise, who were flying MI-2 helicopters up until recently, are among those who will be working with the new helicopters.

FTD/SNAP
/12955
CSO: 1865/314

FAR NORTH PILOTS GET KA-32 HELICOPTERS

Moscow VOZDUSHNYY TRANSPORT Jan 87 p 1

[Article by I. Rekhimkulov, correspondent]

[Text] In 1987, aviators of the polar region will be able to take off in adverse weather and help to improve ice reconnaissance in the Arctic -- in short, substantially expand their range of operations on the Kola Peninsula.

This will be done with the aid of the KA-32, a transport helicopter which pilots of the Murmansk Aviation Enterprise have begun to fly. Special instruments enable this new helicopter to fly in the daytime and at night, in practically any kind of weather. From the standpoint of load and capacity, the KA-32 is a kind of record holder among aircraft of its kind. Its passenger compartment seats 15 people, and the helicopter can carry a load of 2 tons inside it, or one of 5 tons on a sling. The only other helicopter with such a lifting capactiy is the giant MI-10K.

Transporting geologists, drillers and other oil-industry workers to outpost settlements and installing high-voltage power transmission lines will be only some of the future 'occupations' of transport version of the KA-32 in the polar region.

FTD/SNAP
/12955
CSO: 1865/188

REPORT ON ACTIVITY OF ARCTIC DRIFTING STATION SP-27

Moscow VODNYY TRANSPORT 20 Dec 86 p 4

[Excerpt] Two "Severnyy polyus" scientific stations of the Arctic and Antarctic Scientific Research Institute are functioning at the present time on the drifting ice of the central Arctic basin. They are the young communist station SP-28, which was organized last spring, and the station SP-27, which is in its third year of work. The latter station has 14 scientists and specialists headed by the eminent polar researcher Yu. Tikhonov. Most of his comrades have worked before in the high latitudes of the Arctic Ocean. One of them, senior engineer-oceanologist Yu. Khistyayev, filed the following report by radio:

"At the present time, our ice floe, which is 600 by 700 meters and 5-6 meters thick, is drifting under the influence of currents and winds approximately 200 kilometers from the geographic North Pole. When our team started its long tour of duty last spring, we spent nearly two months receiving and storing a large amount of equipment, gear, food and fuel delivered by Aeroflot airplanes. The work was made difficult by strong movements of the ice. Several cracks broke up the airstrip. This hampered our efforts in bringing the goods from there to our camp, which was split in two.

"The short summer is now behind, and winter with its long polar night has set in. Temperatures fall as low as minus 25 degrees. Recently the ice fields in the vicinities of the SP-27 and SP-28 stations have experienced fractures. This is hampering efforts to make 'airfields' to receive heavy transport airplanes of the next high-latitude airlift expedition, 'Sever-38'. Its participants will have to drop dozens of tons of cargo to the stations with the aid of special parachute systems. They have experience with this kind of operation.

"While fighting the surprises of the Arctic's elements, we have not stopped making observations in line with our expanded program. We are carrying out large-scale oceanological, meteorological, geophysical, hydrochemical and other types of studies. We are studying both large-scale and small-scale drift patterns of the ice, and its structure and processes of formation. We are working in a region of the Arctic Ocean about which not a lot is known. The materials obtained here are of great scientific and practical interest."

FTD/SNAP
/12955
CSO: 1865/152

ICEBREAKERS GET ICE-CONDITION MAPS BY TV SATELLITE RELAY

Moscow SOTSIALISTICHESKAYA INDUSTRIYA 6 Dec 86 p 1

[Article by G. Daygorodov]

[Excerpt] The USSR State Committee on Hydrometeorology and Monitoring of the Natural Environment (Goskomgidromet) and the USSR ministries of the merchant fleet and communications have begun joint testing of a television automatic information system (TAIS) on the Northern Sea Route in the western sector of the Arctic.

We asked Yu. Sinyurin, head of the Hydrometeorology Bureau of Goskomgidromet's Main Radiometeorology Center (GRMTS) and one of the initiators of the new experiment, to tell about it:

"Ice forecasts can now be displayed on ordinary television sets on board the nuclear-powered vessels 'Arktika', 'Lenin', 'Sibir' and 'Rossiya', and on other Arctic icebreaker ships that are equipped with a special receiving antenna of the 'Ekran' color-TV system. The maps are transmitted from the Ostankino tower in Moscow.

"The process can be outlined as follows: data on ice conditions that are received from satellites at our GRMTS are fed into a computer. It converts this information into details of a map that are tinted in a 'pseudocolor.' These maps are then transmitted via the Ostankino tower and relayed by satellites to the television sets on ships. Periods of communication take place four times a week. Maps can be recorded on video tape if desired. Such information can be received by both Soviet and foreign vessels that are equipped with the necessary apparatus.

"The idea of television maps was proposed by A. Kapustin, head of a sector of the Murmansk affiliate of the Central Scientific Research Institute of the Merchant Fleet. The experiment is being conducted along the Northern Sea Route in the polar night, for the purpose of checking the system's performance during the darkest season of the year. The experiment will last until the end of December."

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/12955
CSO: 1865/314

IL-76 TO DROP CARGO BY PARACHUTE AFTER ARCTIC STATION'S ICE FLOE SPLITS

Moscow SOTSIALISTICHESKAVA INDUSTRIYA 17 Dec 86 p 1

[Article by Ye. Vasilkova]

[Excerpt] The high-latitude airlift operation "Sever-38" began yesterday in the Arctic.

"As you can see, 'SP-27' and 'SP-28' are hundreds of kilometers apart," said V. Drozdov, senior engineer of the department of expeditions of the USSR State Committee for Hydrometeorology and Monitoring of the Natural Environment, pointing at a map of the Arctic which showed the locations of the two stations. "The 'older' station is being carried by the current into the Greenland Sea, which means that about March or April we will have to pick up the crew of No. 27."

The station "SP-28" has been in operation for less than a year. Its leader, Aleksandr Chernyshev, raised the flag of the Motherland on its ice floe on May 21. I was shown radiograms from both stations. In addition to all kinds of measurements of temperature, wind direction, precipitation and other things, they reported on preparations to receive airplanes from the mainland, because fresh supplies of food and fuel were needed.

The air strip on "SP-28" was being prepared to receive airplanes. The crew was clearing snow, smoothing out the ice and patching small cracks. Suddenly on the night of November 9-10, a terrible cracking sound was heard. The ice floe was being compressed by other ones, and it began to break. It split right across the air strip. Before long the polar explorers' small floating island, which was about one kilometer wide and a little longer, had split into two parts which became separated by nearly 200 meters. The landing of an airplane was out of the question. The only alternative was to drop supplies from the air.

In an earlier issue, the newspaper reported on the operation "Ekspark-86", which involved sports parachutists of the All-Union Volunteer Society for Assistance to the Army, Air Force and Navy. Now they would have to drop supplies in the dark of the polar night. Neither the parachutists nor pilots of the Design Bureau imeni Ilyushin had any experience in such circumstances.

A few days ago an IL-14 airplane dropped several drums of fuel without parachutes over "SP-28". Unfortunately, not all of them hit their mark. It is even more difficult to drop cargo accurately by parachute. This is why the airlift group performed a number of practice drops in an area near Moscow before departing for the Arctic.

An IL-76 airplane will fly out of Tiksi. Since it cannot carry 60 tons of cargo on one trip, the liner will have to make several flights.

"If the parachute method proves itself this time, we will use it in the future," said V. Drozdov. "After all, this type of delivery is faster and cheaper than the traditional way."

FTD/SNAP
/12955
CSO: 1865/314

EMERGENCY AIRDROP PROCEDURE "EKSPARK" TESTED AT ARCTIC STATIONS

Moscow SOTSIALISTICHESKAYA INDUSTRIYA 12 Nov 86 p 4

[Article by N. Selivanov, doctor of technical sciences]

The author reports on an operation which delivered supplies to the Arctic drifting stations "Severnyy polyus-27" (SP-27) and "Severnyy polyus-28" (SP-28). The operation was directed by G. Serebrenikov. It involved a new emergency parachute-drop procedure called "EKSPARK". This procedure allows heavy aircraft to deliver personnel and supplies to drifting stations without landing on the ice. The operation had support from the State Committee for Hydrometeorology and Monitoring of the Natural Environment, the USSR Academy of Sciences, and a number of ministries and agencies, and it involved the participation of parachutists of the All-Union Volunteer Society for Assistance to the Army, Air Force and Navy. Two "DT-75" tractors and other cargo items were dropped successfully on the stations' ice floes. More than 80 tons of cargo was delivered in six flights.

The author relates that he and other participants flew from the base airfield on Zhokhova Island to "SP-27" on board two IL-76 MD airplanes. Four cargo platforms loaded with 160 drums of diesel fuel were dropped by parachute from the rear ramp of each airplane. On subsequent passes, six parachutists jumped to the station's ice floe. On the next day, a tractor and fuel drums on platforms were dropped. The drums were arranged in two tiers on the platforms. Eighteen members of the expedition subsequently parachuted to "SP-28".

The author mentions that the "EKSPARK" procedure can be used to deliver personnel and supplies to any kind of adverse terrain, including desert, swamps and taiga.

A photograph is given showing parachutists standing in front of an airplane.

FTD/SNAP
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CSO: 1865/314

UDC 551.324.3(99)

NEW ESTIMATES OF MEAN ELEVATION, VOLUME AND THICKNESS OF ANTARCTIC ICE

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 291, No 1, Nov 86
(manuscript received 2 Dec 85) pp 217-220

[Article by I. A. Suyetova, Moscow State University imeni M. V. Lomonosov]

[Abstract] A "Map of Subglacial Relief" at 1:5,000,000 and a "Map of Antarctic Ice Thickness" at 1:10,000,000 have been compiled on the basis of data and maps which have become available during recent years (these are to be published in the forthcoming new edition of the ATLAS OF ANTARCTICA). The new maps were used in cartometric calculations of the morphometric characteristics of the continent (mean elevation of ice surface and bedrock surface of Antarctica, volume and thickness of ice). The rms error in computing the mean elevation of the ice surface of Antarctica is estimated at ±50 m. The results of the calculations made in 1966 are compared with the new determinations. The results are summarized in three tables. For example, there is a considerable change in the mean elevation of the ice surface of Antarctica (excluding the ice shelves, a decrease of 100 m, or including them -- a decrease of 40 m). The map of subglacial relief differs considerably from the earlier hypothetical map. Table 1 gives the area, volume and mean elevation of ice-covered Antarctica, with and without ice shelves, for all of Antarctica, West Antarctica and East Antarctica. Table 2 gives the area, volume and mean elevation (or depth) of bedrock Antarctica, broken down by parts. Table 3 gives the volume and thickness of Antarctic ice. If the ice cover completely melted away, only a part of the bedrock continent would be inundated. In addition, following the disappearance of the ice there would be an isostatic uplifting of the continental land mass. References 8: 4 Russian, 4 Western.

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CSO: 1865/186

ABORTED EXPEDITION TO SOUTH MAGNETIC POLE

Moscow KHIMIYA I ZHIZN in Russian No 11, Nov 86 pp 54-58

[Article by A. Ruvinskiy]

[Abstract] Each year a part of the Soviet Antarctic Expedition is a sledge-tractor trek from the coastal station Mirnyy to the South Geomagnetic Pole, situated not far from the intracontinental station Vostok. This trek is headed by specialists of the Polar Geomagnetic Research Laboratory of the Terrestrial Magnetism, Ionosphere and Radio Wave Propagation Institute. During the 30th expedition the trek was led by Valeriy Grigoryevich Petrov. On 25 January the sledge-tractor train headed for Dome C, near which the South Geomagnetic Pole is situated. In the neighborhood of the pole variations of the earth's magnetic field are registered by "Pingvin" automatic magnetic variation stations, supplied current from isotopic sources with a lifetime of 10 years. In these stations there are three small magnets which are attached to quartz strands. When there is the slightest change in the magnetic field the magnets are displaced from the null point. Light spots reflected from the mirrors on these magnets also move and are registered on a motion picture film which moves continuously at a rate of 3 mm per hour. The task of participants on the trek was to remove the films, reload the instruments and check the proper operation of the electronic units. First it was necessary to find all the stations, which were located 200 km apart, a distance over which the difference in magnetic field variations is significant. It was difficult to find all nine stations, even using radar. These stations, about the size of a suitcase, become drifted over by snow in the course of a year. Four-meter metal rods are installed over the stations in order to facilitate detection by radar. Although the geographical coordinates are known precisely and the radar is highly effected, detection still remains difficult. Several stations were recovered successfully, but upon arrival at a refuge hut about half the distance to Dome C an accidental fire destroyed the hut and many supplies which had been taken inside. No injuries occurred, but one of the Vehicles was destroyed. The headquarters at Mirnyy ordered the members of the trek to abort their mission to the South Geomagnetic Pole and return to the coast. The next expedition will collect the films from the stations which had not been reached. Figures 3.

5303/12955
CSO: 1865/228

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PREDICTION OF DEVELOPMENT OF SCIENCE BASED ON INVESTIGATION AND CONSERVATION OF NATURAL ARCTIC RESOURCES (NATIONAL CONFERENCE, NORILSK, 4-9 SEPTEMBER)

Leningrad IZVESTIYA VSESOYUZNOGO GEOGRAFICHESKOGO OBSHCHESTVA in Russian
Vol 118, No 6, Nov-Dec 86 (manuscript received 1 Feb 86) pp 558-559

[Article by A. D. Zhigalin and G. N. Suzyumova, Moscow]

[Abstract] The conference mentioned in the title was organized by the section on polar problems and the section on global and regional geographic prediction, USSR Scientific Council on Problems of the Biosphere, the USSR Geographical Society and the Scientific Research Institute of Agriculture of the Far North. The task of the conference was to discuss problems in development of scientific research involved in the study and conservation of the natural resources of the Arctic, such as water resources, with their possible change under the influence of economic activity; the atmosphere; its pollution due to anthropogenic factors; geological-geomorphological and permafrost conditions, their possible changes due to anthropogenic factors; soil and vegetation, with estimation of the effects of agricultural activity; the animal world and the effects of anthropogenic factors on it; and the social-ecological and legal aspects of conservation of nature in areas of intensive assimilation of the Arctic. Most of the reports contained specific suggestions directed toward improving the effectiveness of scientific studies related to rational assimilation and conservation of nature in the North.

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