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 GEOPHYSICS, ASTRONOMY AND SPACE

No. 394

This serial publication contains abstracts of articles from USSR and Eastern Europe scientific and technical journals on the specific subjects reflected in the table of contents.

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## I. ASTRONOMY

### News

CONTENTS OF POLISH JOURNAL "URANIA" -- No 5, 1976

Moscow REFERATIVNYY ZHURNAL 51. ASTRONOMIYA, OTDEL'NYY VYPUSK in Russian  
No 10, 1976 10.51.93

[Table of Contents; Warsaw, Urania, Vol 47, No 5, 1976, 16 pages]

[Text] The following articles and communications are included: S. Lubertowicz -- "Problems of Communication with Scientific-Technical Civilizations in the Universe"; H. Korpikiewicz -- "Guests from Space (4)"; "News: East-West Asymmetry on the Solar Surface; Names of Jovian Satellites"; "Observations: Solar Activity in 1975"; "News -- POLA"; "Conferences and Congresses"; "Publication News"; "Astronomical Calendar."

[300]

Abstracts of Scientific Articles

ORBITAL ELEMENTS IN UNPERTURBED TWO FIXED BODIES PROBLEM

Moscow REFERATIVNYY ZHURNAL 51. ASTRONOMIYA, OTDEL'NYY VYPUSK in Russian  
No 10, 1976 10.51.138

[Abstract of article by R. A. Lyakh; Leningrad, UCH. ZAP. LGU, No 385,  
1976, pp 119-130, "Differential Improvement of Orbital Elements in Un-  
perturbed Problem of Two Fixed Centers"]

[Text] The author has determined the coefficients of condition equations  
for improving orbital elements in the generalized problem of two fixed  
centers. The coefficients of the periodic terms were computed with an  
accuracy to  $\varepsilon^2$ . The  $\sim\varepsilon^4$  values are retained in the secular terms. Motion is  
assumed to be unperturbed.

[300]

DETERMINING PARAMETERS OF MOTION OF CELESTIAL BODIES

Moscow REFERATIVNYY ZHURNAL 51. ASTRONOMIYA, OTDEL'NYY VYPUSK in Russian  
No 10, 1976 10.51.155

[Abstract of article by A. M. Chernitsov; Tomsk, TRUDY TOMSKOGO UNIVERS-  
ITETA, 262, 1975, pp 6-19, "Analysis of Some Simplified Schemes for Deter-  
mining Estimates of the Parameters of Motion of Celestial Bodies"]

[Text] A study was made of the problem of evaluating the parameters of mo-  
tion of a celestial object in a case when the number of evaluated para-  
meters exceeds the number of measurements. A study was also made of the  
possibility of using simplified schemes for the computation of the partial  
derivatives of the measured parameters on the basis of the evaluated para-  
meters. As a model example, the author has considered the motion of a  
material point in the equatorial plane of a level ellipsoid of revolution.  
Bibliography of five items.

[300]

#### ABSOLUTE SPECTROPHOTOMETRY OF CHROMOSPHERIC LINES

Moscow REFERATIVNYY ZHURNAL 51. ASTRONOMIYA, OTDEL'NYY VYPUSK in Russian No 10, 1976, 10.51.436

[Abstract of article by V. M. Sobolev and G. F. Vyal'shin; Moscow, SOLNECHNYYE DANNYYE, No 2, 1976, pp 74-80, "Absolute Spectrophotometry of the Chromospheric Lines H $\epsilon$ , H $\delta$ , H $\gamma$  and He 3888.65 A from Photographs of the Total Solar Eclipse of 30 June 1973"]

[Text] The paper gives the results of photometric processing of slitless spectrograms of the chromosphere obtained during the eclipse of 30 June 1973. For different altitudes it was possible to obtain the absolute intensities of the lines H $\epsilon$ , H $\delta$ , H $\gamma$  and He I  $\lambda$ 3889. The  $\beta$  gradients were determined for the mentioned lines. Bibliography of seven items.  
[300]

#### CONTRASTS OF FACULAR GRANULES

Moscow REFERATIVNYY ZHURNAL 51. ASTRONOMIYA, OTDEL'NYY VYPUSK in Russian No 10, 1976, 10.51.451

[Abstract of article by I. V. Yudina; Moscow, SOLNECHNYYE DANNYYE, No 2, 1976, pp 88-92, "Contrasts of Facular Granules"]

[Text] On the basis of photographs of the photosphere taken during the flight of the Fourth Stratospheric Solar Observatory it was possible to measure the contrast of 52 facular granules on the basis of the ratio to the adjacent background and the background of the undisturbed photosphere. It was found that near the limb facular matter at times is bounded only in the direction of the limb. It therefore follows that facular granules are translucent clouds hovering over the photosphere. Bibliography of seven items.  
[300]

#### CORRELATION BETWEEN SUN AND COSMIC RAY VARIATIONS

Moscow REFERATIVNYY ZHURNAL 51. ASTRONOMIYA, OTDEL'NYY VYPUSK in Russian No 10, 1976, 10.51.467

[Abstract of article by T. S. Razmadze; Tbilisi, TRUDY IN-TA GEOFIZ. AN GruzSSR, 35, 1976, pp 45-52, "Some Peculiarities of the Correlation Between the Sun and Cosmic Ray Variations"]

[Text] A study was made of the correlation between solar activity and cosmic ray variations in different stages of the 11-year cycle. In years of the maximum and minimum the correlation was expressed more weakly than in the intermediate epochs of the 11-year cycle. Bibliography of five items.  
[300]

#### NARROW-BAND IMAGE SCANNER FOR CELESTIAL OBJECTS

Moscow REFERATIVNYY ZHURNAL 51. ASTRONOMIYA, OTDEL'NYY VYPUSK in Russian No 10, 1976 10.51.220DEP

[Abstract of article by V. D. Vdovichenko, S. M. Gaysin and K. Kuratov; Alma-Ata, UZKOPOLOSNYY SKANER IZOBRAZHENIYA NEBESNYKH OB'YEKTOV NA BAZE SPEKTROGRAFA ASP-21 (Narrow-Band Scanner of the Image of Celestial Objects on the Basis of the ASP-21 Spectrograph), Astrophysical Institute Academy of Sciences Kazakh SSR, 1976 [Manuscript deposited at the All-Union Institute of Scientific and Technical Information]]

[Text] The authors describe an apparatus which in combination with the ASP-21 diffraction spectrograph makes it possible to scan the images of celestial objects in the wavelength range  $\lambda 3200 - \lambda 11\ 000$  with a width of the transmission band 0.3A-240A. Using the apparatus it has been possible to obtain  $> 3000$  scanograms along the disks of Jupiter and Saturn.  
[300]

#### SCALE FACTOR OF LOWER LAYERS OF CONVECTIVE ZONE ON SUN

Moscow REFERATIVNYY ZHURNAL 51. ASTRONOMIYA, OTDEL'NYY VYPUSK in Russian No 10, 1976 10.51.449

[Abstract of article by V. P. Mikhaylutsa; Moscow, SOLNECHNYE DANNYYE, No 2, 1976, pp 70-73, "Scale Factor of the Lower Layers of the Convective Zone on the Sun and the Structure of Magnetic Fields of Active Regions"]

[Text] On the basis of the distribution of the longitudinal component of the magnetic field in an active region it is possible to estimate the value

$$\frac{\overline{H_z^+}}{\overline{H_z^-}} = \frac{\iint_S H_z(x,y) x dS}{\iint_S H_z^+(x,y) dS} .$$

being some characteristic scale, and precisely the difference in the mean weighted coordinates of magnetic fields of different polarity. Computations of this value for 11 spot groups on the average give identical values of  $\sim 10^{10}$  cm. Since the configuration of the magnetic field should be determined by conditions in the lower layers of the convective zone, the determined scale probably relates to those deep layers which are not directly observed.

[300]

#### OBSERVATIONS OF SOLAR AND LUNAR LIMBS

Moscow REFERATIVNYY ZHURNAL 51. ASTRONOMIYA, OTDEL'NYY VYPUSK in Russian No 10, 1976 10.51.133

[Abstract of article by A. N. Demidova; Moscow, SOLNECHNYYE DANNYYE, No 2, 1976, pp 102-105, "Observations of the Solar and Lunar Limbs"]

[Text] At Pulkovo over the course of 11 years specialists have carried out observations of the solar and lunar limbs (415 and 105 observations were made respectively). It was possible to establish the presence of relatively thin layers in the earth's atmosphere with a jumplike-changing air refractive index. As a result, wavelike distortions are observed at the solar and lunar limbs. Observation of this phenomenon made it possible to construct histograms for daytime and nighttime. Along the x-axis the author plotted the altitudes of observation of atmospheric inhomogeneities and along the y-axis the values of the air refractive index in units  $N = (n - 1) \cdot 10^6$ . According to daytime observations the mean altitude was found to be 1.4 km and N attains values 120 (for the sun) and the nighttime values are 3.3 km and N is up to 13 (for the moon).

[300]

#### VERTICAL STRUCTURE OF LARGE SOLAR FLARES

Moscow REFERATIVNYY ZHURNAL 51. ASTRONOMIYA, OTDEL'NYY VYPUSK in Russian No 10, 1976 10.51.455

[Abstract of article by V. G. Banin; Moscow, ISSLED PO GEOMAGNETIZMU, AERON. I FIZ. SOLNTSA, No 38, "Nauka," 1976, pp 219-224, "Vertical Structure of Large Solar Flares According to Data on the Width and Asymmetry of  $H\alpha$ "]

[Text] A large solar flare is regarded as a uniform system consisting of relatively static nuclei and a system of flare loops (SFL), similar to a system of loop prominences. In the early stages of flare development the observed emission of  $H\alpha$  is a mixture of the radiations of the nuclei and

the SFL. In this model the red asymmetry is caused by downward-directed fluxes of luminescent gas in the lateral branches of the SFL and the width of the line outside the central part of the disk is caused by movements at the tops of the SFL. The computed curves of change in asymmetry and width with transition from the center to the limb agree well with the observed curves. Bibliography of 18 items.

[300]

#### PHYSICAL PROPERTIES OF PLANETARY ATMOSPHERES

Moscow REFERATIVNYY ZHURNAL 51. ASTRONOMIYA, OTDEL'NYY VYPUSK in Russian No 10, 1976 10.51.240

[Abstract of article by A. V. Chalyy; Moscow, PROBL. KOSMICH. FIZ. MEZHVED. NAUCH. SB., No 11, 1976, pp 37-40, "Peculiarities of the Physical Properties of Planetary Atmospheres in Layers with a Near-Critical State of Matter"]

[Text] This is a discussion of the peculiarities of the dependence on altitude and temperature of a number of physical properties of planetary atmospheres which are associated with the possibility of occurrence in them of a state of matter close to critical under the influence of a gravitational field. Using the methods of scale transformations the author has derived formulas for the vertical distribution of density in the atmosphere in spherical layers where the specific nature of the near-critical state is manifested. On the basis of the theory of critical opalescence of electromagnetic waves, with the gravitational effect taken into account, the author examines the peculiarities of the scattering capacity of planetary atmospheres. Bibliography of 15 items.

[300]

#### INTERPOLATION AND FILTERING OF READINGS OF RADIOBRIGHTNESS DISTRIBUTION

Moscow REFERATIVNYY ZHURNAL 51. ASTRONOMIYA, OTDEL'NYY VYPUSK in Russian No 10, 1976 10.51.123

[Abstract of article by L. M. Risover; Moscow, ISSLED. PO GEOMAGNETIZMU, AERON. I FIZ. SOLNTSA, No 38, "Nauka," 1976, pp 235-238, "Interpolation and Filtering of Readings of Two-Dimensional Radiobrightness Distribution"]

[Text] Radiotelescopes with two-dimensional resolution make it possible to obtain readings of the radio image at the points of intersection of uniform oblique-angled grids. The configuration of these grids is determined by the scanning method. For constructing maps of the distribution of radiobrightness and further processing of the radio image it is necessary to

have readings at the points of intersection of some standard grid, most frequently rectangular. The paper gives the algorithm for filtering of two-dimensional masses of readings of the radio image, making it possible to transform from arbitrary uniform grids of readings of points of intersection to standard grids.

[300]

#### MAGNETIC FIELD STRUCTURE IN QUIET CHROMOSPHERE

Moscow REFERATIVNYY ZHURNAL 51. ASTRONOMIYA, OTDEL'NYY VYPUSK in Russian No 10, 1976 10.51.438

[Abstract of article by V. Ye. Merkulenko; Moscow, SOLNECHNYYE DANNYYE, No 2, 1976, pp 84-87, "Rope Structure of the Magnetic Field in the Quiet Chromosphere. I. Condition of Equilibrium of a Straight Twisted Magnetic Rope"]

[Text] A study was made of the conditions of equilibrium for a straight magnetic rope of finite length and a variable section under conditions of slight, moderate and strong twisting. It was found that the magnetic rope in the absence of external forces can be in equilibrium only in a case when the gradient of the flux of the toroidal component of the magnetic field becomes equal to zero. If there is some mechanism of generation of the magnetic flux in the local sectors of the magnetic tube of force, as a result of this there should be a redistribution of the flux, accompanied by movement of matter along the rope. It is proposed that such a process be regarded as a possible reason for the motion of the spicules.

[300]

## II. METEOROLOGY

### News

#### ARTICLES ON ATMOSPHERIC PHYSICS AND CLIMATOLOGY

Moscow REFERATIVNYY ZHURNAL, GEOFIZIKA, SVODNYY TOM in Russian No 1, 1977, 1B40K

[Abstract of collection of articles edited by Ye. I. Sofiyev and O. I. Subbotina; Leningrad, FIZIKA ATMOSFERY I VOPROSY KLIMATOLOGII (Physics of the Atmosphere and Problems in Climatology), TRUDY SREDNEAZ. REGIONAL'N. N.-I. GIDROMETEOROL. IN-TA, No 38(119), Gidrometeoizdat, 1976, 120 pages]

[Text] Contents: Yu. M. Denisov, Ye. I. Sofiyev -- "A New Algorithm for Computing the Coordinates of a Pilot Balloon in Base Observations"; N. T. Timofeyev -- "Experience in Single-Point Pilot Balloon Observations with the Measurement of the Angular Diameter of a Balloon in the Mountains"; O. A. Dudina, Yu. V. Petrov -- "Southerly Winds at Tamga"; A. D. Dzhurayev, T. V. Sevast'yanova, V. G. Soroka -- "The Problem of the Influence of the Wind Shear on Hail Processes"; V. P. Kurbatkin -- "Some Characteristics of a Mountain Wind"; S. G. Chanysheva, O. I. Subbotina -- "On Quantitative Determination of the Influence of Mountain Relief on the Meteorological Regime"; Kh. L. Lutfiyev -- "On the Problem of Inversions in Different Relief Forms"; V. A. Volodina, A. Sapayev -- "Surface Temperature Inversions on the Central Asiatic Shore of the Caspian Sea"; B. E. Amankulov, V. A. Volodina -- "Aerosynoptic Conditions of the Appearance of Surface Temperature Inversions Over the Lowland Part of Central Asia"; O. A. Lyapina -- "On Day-time Changes in Transparency of the Dust-Filled Atmosphere in Central Asia"; A. A. Tikhanovskaya, Z. A. Gerasimova -- "Some Characteristics of the Distribution of the Coefficient of Atmospheric Transparency Over the Mountainous Territory of Central Asia"; G. P. Polezhayev -- "Some Results of an Investigation of the Vertical Distribution of Harmful Impurities Using a Helicopter"; O. A. Podrezov -- "Regional Investigations of Extremal Temperatures, Air Pressures and Densities, Wind Velocity and Glaze Phenomena in the Tien Shan Dangerous for Technical Structures"; V. A. Vitovskiy -- "Regional Investigations of Specific Thunderstorm Activity and Lightning Damage of Mountainous Regions in the Tien Shan"; V. V. Fateyev -- "Deviations of

Air Temperature from the Temperature of the Standard Atmosphere Over the Stations Moscow, Ural'sk, Aral Sea, Tashkent"; R. S. Arislanov -- "Aerological Characteristics of the Atmosphere on Clear and Overcast Days in Winter Over Tashkent"; R. B. Bilyalov, I. A. Yuldasheva -- "Correlation Between Low Clouds and Synoptic Processes at Selected Airports in Central Asia"; V. V. Fateyeva, Kh. Urazayeva, R. B. Bilyalov -- "Characteristics of the Mean Temperature and Wind Field Over Moscow, Tashkent, Delhi."  
[276]

#### CLIMATE OBSERVATIONS AT IRKUTSK HYDROMETEOROLOGICAL OBSERVATORY

Moscow PRAVDA in Russian 3 Jan 77 p 3

[Article by V. Khodiy: "Studying the Climate of a City"]

[Summary] At the Irkutsk Hydrometeorological Observatory in Siberia specialists have completed a yearlong cycle of observations under the program for study of the climate of large cities. It is noted that during recent decades there has been a considerable warming at Irkutsk. The microclimate in different parts of the city is different. A year ago climatologists for the first time went out into the streets of Irkutsk, accompanied by meteorologists, aerologists, chemists and agrometeorologists. In addition to the ten permanent stations of the hydrometeorological service in the city and in its neighborhood, specialists established temporary observation points at places with singular relief, on the dam of the hydroelectric power station, in parks and in newly built-up areas. Measurements of temperature and air humidity, wind direction and velocity and observations of cloud cover and atmospheric phenomena, as well as the state of the soil surface, were also made along highways. The results of these observations now show that Irkutsk on the average is warmer than the suburban zone by 3°. In the city there are several "islands" of heat and cold and the temperature difference attains five degrees. Earlier it was believed that the climate of the city was affected by the Angara River. Instruments were set up at different distances from the river. They revealed that in winter the influence of the Angara is restricted to its valley and only in the spring and autumn does it increase to a half-kilometer. In January a new cycle of observations is to begin, according to M. Furman, Director of the Irkutsk Hydrometeorological Observatory. The objective will be to clarify how the microclimate of Irkutsk is affected by the "breathing" of the reservoir, whose surface area exceeds 150 square kilometers. Its influence will be studied in different types of built-up area. Particular attention will be given to the influence on stone and wood built-up areas. A study will be made of processes transpiring over the city; balloons and TV towers will be used in this work. In 1977 climate microsveys will also be made in Bratsk and Angarsk, both of which have more than 200,000 inhabitants.  
[213]

## Abstracts of Scientific Articles

### TEMPERATURE AND WIND VARIATIONS IN UPPER ATMOSPHERE

Moscow REFERATIVNYY ZHURNAL, GEOFIZIKA, SVODNYY TOM in Russian No 1, 1977  
1B367

[Abstract of article by S. S. Gaygerov, V. V. Fedorov, M. Ya. Kalikhman and B. P. Zaychikov; Moscow, ISSLED. DINAMICH. PROTSESSOV V VERKHN. ATMOSFERE, Gidrometeoizdat, 1976, pp 253-262, "Variations of Temperature and Wind in the Upper Atmosphere"]

[Text] On the basis of an analysis of time sections of the atmosphere and pressure pattern charts for the strato-mesosphere a study was made of tropospheric-mesospheric and strato-mesospheric interaction. In winter, especially during periods of stratospheric warmings, in the high latitudes (to the north of 40°N) there is a synchronous dependence between pressure formations in the middle troposphere and temperature in the middle stratosphere. The periods of warmings and coolings noted on the time sections for altitudes 40-50 and 65-80 km and the times of appearance of regions of heat and cold on the pressure pattern charts for altitudes 40 and 60 km are synchronously interrelated. The regions of warmth in the upper part of the mesosphere are accompanied by westerly components of the prevailing wind, whereas regions of cold are accompanied by easterly components at these same altitude levels. Bibliography of 12 items.  
[276]

### PREDICTION OF PRECIPITATION FOR FIVE DAYS

Moscow REFERATIVNYY ZHURNAL, GEOFIZIKA, SVODNYY TOM in Russian No 1, 1977  
1B466

[Abstract of article by G. K. Turulina; Alma-Ata, TRUDY KAZAKHISK. N.-I. GIDROMETEOROL. IN-TA, No 57, 1976, pp 15-18, "Use of Linear Discriminant Analysis for Predicting Precipitation for Five Days"]

[Text] For predicting the five-day sums of precipitation in three classes (considerable, moderate, light) the author used linear discriminant analysis. The probable success in such an approach for the considerable precipitation class was 92.1%, for moderate -- 89% and for light -- 91%. The results indicate the fundamental possibility of using discriminant analysis for predicting precipitation. Bibliography of nine items.  
[276]

#### SHORT-PERIOD CLIMATIC FLUCTUATIONS

Moscow REFERATIVNYY ZHURNAL, GEOFIZIKA, SVODNYY TOM in Russian No 1, 1977  
1B535

[Abstract of article by Yu. I. Vozovik; Moscow, XXIII MEZHDUNAR. GEOGR. KONGR., MOSKVA, Vol 12, 1976, DOP., 1976, pp 277-281, "Short-Period Fluctuations of Climate and Ecological Forecasting"]

[Text] An attempt has been made to predict ecological conditions. The article sets forth some preliminary results of a climatic forecast for the territory of the USSR. It is postulated that there will be an increase in the quantity of precipitation in the northern part of Eurasia with an advance of the forests into the higher latitudes and a degradation of permafrost, a universal increase in the temperature indices in the northern half of the temperate zone (as a result of a direct increase in the heat balance and a decrease in the moistening norms) with a gradual northward advance of the steppe zone and the replacement of coniferous forests by mixed forests. In the southern half of the temperate zone it is expected that as a result of the increase in moistening and some increase in the temperature index wooded steppe associations will advance to the east at the expense of the dry steppes and semideserts, with replacement of deserts by semideserts. In the subtropical zone an increase in dryness will be manifested ecologically only locally.  
[276]

#### USE OF AEROLOGICAL DATA IN AEROLOGY

Moscow REFERATIVNYY ZHURNAL, GEOFIZIKA, SVODNYY TOM in Russian No 1, 1977  
1B16

[Abstract of article by V. D. Reshetov; Moscow, TRUDY TSENTRAL'NOY AEROL. OBSERV., No 117, 1976, pp 5-21, "Requirements of the Weather Forecasting Service for Aerological Data"]

[Text] Data are presented on the variability of meteorological elements in the atmosphere with time and in space. The author examines the problem of the necessary density of the network of stations and sounding times ensuring data for at least several soundings for the lifetime of the atmospheric disturbance or the characteristic time of its passage. According to these considerations, the optimum distances between stations are found to be equal to 250-300 km and the interval between soundings is 12 hours. In order to ensure forecasting of dangerous phenomena in some regions the network of stations should be more dense with a distance between stations of 150 km and sounding times of 6 hours. The ageing time and characteristic averaging scales are considered. The necessary sounding accuracy (0.5 and 1 m/sec) is established. Bibliography of 17 items.  
[276]

#### DETERMINING CHARACTERISTICS OF SEA SURFACE FROM SATELLITE

Moscow REFERATIVNYY ZHURNAL, GEOFIZIKA, SVODNYY TOM in Russian No 1, 1977  
1B155

[Abstract of article by B. A. Nelepo and V. S. Suyetin; Sevastopol', MOR. GIDROFIZ. ISSLED., No 2(73), 1976, pp 61-67, "Distinguishing Variations of Characteristics of the Sea Surface and the Atmosphere on the Basis of the Thermal Radioemission Measured from a Satellite"]

[Text] A study was made of the Jacobi matrix for the radiobrightness temperature measured during remote sensing of the ocean surface. The article gives an analysis of the results of measurements of radiobrightness temperature from a satellite. Bibliography of seven items.  
[276]

#### STUDY OF RADIOBRIGHTNESS TEMPERATURE FUNCTIONS OVER OCEAN

Moscow REFERATIVNYY ZHURNAL, GEOFIZIKA, SVODNYY TOM in Russian No 1, 1977  
1B151

[Abstract of article by B. A. Nelepo and V. S. Suyetin; Sevastopol', MOR. GIDROFIZ. ISSLED., No 2(73), 1976, pp 140-147, "Investigation of Radiobrightness Temperature Functions and the General Inverse Problem of Sounding from Artificial Earth Satellites Over the Ocean"]

[Text] The authors investigated the multidimensional radiobrightness temperature function in the centimeter part of the spectrum of thermal radiation in the "atmosphere-ocean surface" system with all the most important characteristics taken into account. The article demonstrates the

admissibility of a linear representation and gives an analysis of the functional matrix. A numerical example is cited which illustrates the incorrectness of the problem of determining temperature and the state of the ocean surface. Bibliography of eight items.  
[276]

#### ATMOSPHERIC PRESSURE IN ANTARCTICA

Moscow REFERATIVNYY ZHURNAL, GEOFIZIKA, SVODNYY TOM in Russian No 1, 1977  
1B300

[Abstract of article by V. A. Grigor'yan; Leningrad, PROBL. ARKTIKI I ANTARKTIKI, No 48, Gidrometeoizdat, 1976, pp 135-143, "Statistical Distribution and Variability of Atmospheric Pressure in Antarctica"]

[Text] Data on monthly observations of atmospheric pressure at eight Antarctic stations during 1956-1970 are analyzed. It was possible to establish two types of annual variation of pressure: "simple," with one maximum and one minimum, at the intracontinental stations of Antarctica and with a double wave, when in the course of the year the pressure curve has two maxima and two minima. The latter type is observed at the coastal stations of Antarctica. Analysis of the standard deviations ( $\sigma$ ) and mean ( $\bar{p}$ ) deviations of pressure made it possible to detect a clearly expressed annual variation of the variability of pressure with a maximum in winter and a minimum in summer. During the winter months there is a marked accentuation of the territorial differences in the distribution of deviations. The author computed the moving averages for five and ten years. A 15-year observation period makes possible a clear determination of the patterns of distribution of atmospheric pressure in Antarctica. Bibliography of four items.  
[276]

#### LASER MEASUREMENT OF ATMOSPHERIC TRANSPARENCY OVER SEA

Moscow REFERATIVNYY ZHURNAL, GEOFIZIKA, SVODNYY TOM in Russian No 1, 1977  
1B107

[Abstract of article by V. S. Gorshkov, V. I. Yeregin, K. S. Lamden, V. V. Simakin and K. S. Shifrin; Tomsk, IV VSES. SIMPOZ. PO LAZERN. ZONDIR. ATMOSFERY. TEZISY DOKL., 1976, pp 101-102, "Measurement of Atmospheric Transparency Over the Sea by the Laser Method"]

[Text] If a laser operates at a wavelength of  $1.06\mu\text{m}$  the need arises for scaling the attenuation index at this wavelength to the attenuation index in the visible region. The correlation between them has a stochastic character and is different under different meteorological conditions. However, the encountered situations can be broken into groups, for each of which it is possible to establish the mean value of the ratio of the attenuation indices and indicate its standard deviation, unambiguously determining the measurement error (about 40%). Bibliography of two items.

[276]

#### DIURNAL VARIATION OF METEOROLOGICAL PARAMETERS AT EQUATOR

Moscow REFERATIVNYY ZHURNAL, GEOFIZIKA, SVODNYY TOM in Russian No 1, 1977  
1B345

[Abstract of article by R. V. Abramov; Leningrad, TROPEKS-74. TR. MEZHDUVED. EKSPEDITSII PO PROGRAMME MEZHDUNAR. ATLANTICH. TROPICH. EKSPERIMENTA, Vol I, Gidrometeoizdat, 1976, pp 437-448, "Diurnal Variation of Meteorological Parameters of the Near-Water Air Layer at the Equator"]

[Text] Data from hourly meteorological observations at position 24 (scientific research ship "Akademik Kurchatov"; equator,  $23^{\circ}30' \text{W}$ ) were subjected to spectral, dispersion and harmonic analysis. The author demonstrates and evaluates numerically the controlling role of fluctuations of insolation with a 24-hour period and atmospheric pressure with a 12-hour period in the mean diurnal variation of meteorological parameters of the near-water layer by phases of the GATE program. In addition to the mentioned parameters, the article examines the modulus of wind velocity, water temperature, air temperature and their difference, absolute and relative humidity, excess water vapor elasticity, extent of coverage of general and lower clouds. The least ordered is the mean diurnal variation of the modulus of wind velocity and absolute humidity (water vapor elasticity). The author gives a physical model of mutually interrelated changes in meteorological parameters in their diurnal variation. The correct (harmonic) part of the mean diurnal fluctuations is approximately 1/7 of the total changes; this is true not only at the equator, but also in broader limits within the tropical zone. Bibliography of 12 items.

[276]

#### COMMENTARY ON MAN'S EFFECT ON CLIMATE

Moscow REFERATIVNYY ZHURNAL, GEOFIZIKA, SVODNYY TOM in Russian No 1, 1977  
1B589

[Abstract of article by M. I. Budyko; Moscow, SOVREM. PROBL. GEOGR., 1976, pp 5-18, "Man's Effect on Climate"]

[Text] The influence of man's economic activity on global climate has come to be manifested for the most part during the last 20-30 years. At the present time the increase in the content of atmospheric carbon dioxide has increased the mean air temperature at the earth's surface by 0.2-0.3°, whereas anthropogenic aerosol has reduced this temperature in the northern hemisphere by 0.2-0.3°. In connection with the active struggle against atmospheric contamination the prospects arise for a change in climate in the direction of a warming, determined by an increase in the production of energy and the concentration of carbon dioxide. The computations indicate that the increase in air temperature under the influence of these factors by the year 2000 can exceed the anomalies of natural fluctuations of global temperature observed in the course of the first half of the 20th century. By the year 2050 there can be a complete melting of the polar ice, which will lead to enormous changes in the heat regime in the high latitudes, an increase in the level of the world ocean, a change in moisture cycle conditions on the continents. In order to maintain the existing meteorological regime under conditions of an increase in the concentration of carbon dioxide in the atmosphere and an increase in energy production, the authors propose artificial modification of the aerosol layer of the lower atmosphere. An increase in the concentration of aerosol can decrease the quantity of solar radiation entering the atmosphere; this will reduce the air temperature at the earth's surface. Bibliography of nine items.  
[276]

#### GAS CONTAINERS USED IN FORMING ARTIFICIAL LUMINESCENT CLOUDS

Moscow REFERATIVNYY ZHURNAL, GEOFIZIKA, SVODNYY TOM in Russian No 1, 1977  
1A92

[Abstract of article by V. N. Balabanova, K. D. Bychkova and N. S. Pankov; Moscow, TRUDY INSTITUTA EKSPERIMENTAL'NOY METEOROLOGII GUGMS, No 5(62), 1976, pp 137-145, "Gas Containers for Formation of Artificial Luminous Ethylene Clouds in the Upper Atmosphere"]

[Text] This article describes the design for gas containers used in studying the concentration of atomic nitrogen in the upper atmosphere by the method of luminescent ethylene clouds. The principal difference in the containers is in the different capacities of the cylinders (50 and 17 liters) and the different duration of escape of the reagent into the atmosphere (0.3 and 3.5 sec). It is noted that the quantity of introduced ethylene governs the dimensions of the forming clouds and the threshold of sensitivity of the luminescent clouds method. The authors give an estimate of the maximum possible ethylene concentration in the clouds created by means of the described containers carried on rockets and the threshold of sensitivity of [N] measurement on the basis of the intensity of cloud emission ( $\sim 10^7$  atoms·cm<sup>-3</sup>) when using small containers. Bibliography of 12 items.  
[276]

## ATMOSPHERIC TRANSFORMATION OF RADIATION REFLECTED FROM OCEAN

Moscow IZVESTIYA AKADEMII NAUK SSSR, FIZIKA ATMOSFERY I OKEANA in Russian  
Vol 13, No 1, 1977 pp 21-34

[Article by M. S. Malkevich, L. G. Istomina and W. Hovis, Institute of Atmospheric Physics and Goddard Spaceflight Center, "Atmospheric Transformation of Solar Radiation Reflected from the Ocean"]

[Abstract] On the basis of an analysis of measurements of the spectral brightness of the ocean in the interval  $0.4-0.7 \mu\text{m}$ , obtained using an aircraft, the authors made an evaluation of the contribution of the atmosphere to the total brightness of the ocean-atmosphere system. It was discovered that the atmosphere greatly changes both the absolute brightness of the ocean, increasing it by a factor of 5-10, and the spectral variation of the solar radiation reflected from the ocean surface. The contribution of the atmosphere can vary greatly under real conditions. The spectral distribution of solar radiation has a number of peculiarities, the most important of which are: a) presence of a maximum of scattered radiation in the region  $0.400-0.450 \mu\text{m}$ , caused by the finely dispersed particles with an effective radius of  $0.3-0.4 \mu\text{m}$ ; b) a rapid decrease in spectral brightness of the atmosphere with  $\lambda > 0.450 \mu\text{m}$  with a wavelength conforming to the Rayleigh scattering law, as  $\lambda^{-4}$ . For such weakly reflecting surfaces as the ocean the atmospheric transfer function describing the transformation of solar radiation reflected from the ocean is extremely sensitive to variations of the albedo of the water surface and therefore does not ensure reliable allowance for the atmosphere. For evaluating the role of the atmosphere it is better to use the transfer function of spectral contrasts. In the described experiment the transfer function of the spectral contrasts was close to unity. The reason for this was a close spectral variation of the coefficients of brightness of the ocean and atmosphere.

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### III. OCEANOGRAPHY

#### News

#### "VSEVOLOD BEREZKIN" SETS OUT FOR NORTH ATLANTIC

Moscow PRAVDA in Russian 8 Feb 77 p 3

[Article by A. Khramtsov: "Toward the Storms"]

[Text] Murmansk, 7 February. The "Vsevolod Berezkin," which is the flagship of the scientific research fleet of the Murmansk Hydrometeorological Service Administration, has set out for the North Atlantic on its fifth expeditionary voyage.

The participants of the expedition headed by experimental oceanologist N. A. Lapin will perform a large series of studies in the water areas of the Barents, Norwegian and Greenland Seas during the 80-day voyage. The program of these investigations is extensive. Using radar which is installed on board the research ship, the specialists will perform radiosounding of the upper layers of the atmosphere. They will take samples of the surface layers of the sea water to determine the degree of contamination and survival of the microorganisms living in these waters. [5]

#### RESEARCH SHIP "VULKANOLOG" TO DEPART ON FIRST CRUISE

Moscow TRUD in Russian 22 Jan 77 p 4

[Article by B. Batarchuk: "The Ship Looks for Volcanoes"]

[Text] The scientific research ship "Vulkanolog" is making ready for departure on its first voyage to places where more than ten centers of submarine volcanoes are situated.

It was by no means simple to build the ship. But a ship specially designed for the investigation of submarine volcanoes was created for the first time. What apparatus would it have to carry? Who would be assigned

to develop and construct it? N. Seliverov, V. Sologub, Yu. Chernov, V. Rashidov, A. Paluyeva and other specialists of the laboratory of underwater volcanology of the Volcanology Institute of the Far Eastern Center USSR Academy of Sciences visited tens of cities and many enterprises. In many cases at the end of these trips the volcanologists, throwing up their hands, decided to take the planning on their own shoulders. For example, half the acoustic instrumentation was developed in the laboratory under the direction of N. Seliverstov.

And now the "Vulkanolog" stands alongside one of the wharves at Petropavlovsk-Kamchatskiy, standing out among the great number of large and small ships clustered here by its severe elegance of lines and snowy whiteness as it tosses on the slight waves within the bay.

Aboard the ship everything is now proceeding vigorously. The "Vulkanolog" is making ready for its first voyage. The equipment is being adjusted and tested.

One after the other, we visited all nine laboratories. The scientists are outfitted with equipment which will enable them to investigate the ocean floor at any depth and give a complete picture of the magnetic, gravitational and heat fields of the underwater volcanoes, to detect their breathing, to hear all the noises, to register the movement of lava, to photograph the necessary parts of the ocean...

Aboard the ship there is an automatic system for the collection and speedy processing of geological-geophysical, acoustic and navigation information on the basis of third-generation electronic computers.

G. Avdeyko, the chief of this expedition, told me: "It is well known that volcanism is one of the principal processes in the geological development of the earth. And a knowledge of the laws of its development is a knowledge of the distribution of minerals. On the ocean floors at depths of three to five kilometers there are enormous concentrations of ferromanganese nodules. In addition, they contain chromium, nickel, cobalt and other valuable metals. In all probability their sources are volcanoes. It is important to trace the entire path of the useful components from the source to ore deposits. This can be done by only one method: by studying underwater volcanoes."

"It must be added that no one has ever yet carried out such a complex program for the investigation of submarine volcanism as is being planned by the Volcanology Institute of the Far Eastern Center USSR Academy of Sciences."

The "Vulkanolog" is heading for the region of the Nampo Islands. The work will be carried out for 75 days in two polygons at depths as great as a thousand meters.

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COMMENTS ON RESEARCH VOYAGE OF THE "DMITRIY MENDELEYEV"

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 29 Jan 77 p 4

[Article by Ye. M. Suzyumov: "To the Secrets of the Marine Depths"]

[Text] The "Dmitriy Mendeleev," scientific research vessel for marine expeditionary work of the USSR Academy of Sciences, after a four-month voyage, has returned from the southeastern part of the Pacific Ocean, where for the first time it carried out a broad complex of investigations in the fields of marine geology, geophysics, hydrology, hydrochemistry, biology and bathymetry. The first results of this expedition are described by one of its participants, the chief of the Division of Marine Expeditionary Work USSR Academy of Sciences Candidate of Geographical Sciences Ye. M. Suzyumov.

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During the voyage of the "Dmitriy Mendeleev," which carried 72 scientific workers from 19 scientific research institutes and schools of higher education in our country, under the direction of Doctor of Biological Sciences L. A. Ponomareva, and also six foreign scientists, a distance of more than 20,000 miles was covered. The expedition carried out investigations in three regions of the extensive Australian-New Zealand region of the Pacific Ocean. We sailed in the Tasman and Coral Seas, in the waters from New Zealand to the zone of Antarctic ice, in the Somov Sea and in the Great Australian Bight. The "Dmitriy Mendeleev" was at drift 157 times, stood at anchor, and scientists in different fields of specialization collected the necessary material.

On one occasion a storm broke upon the ship along the shores of Antarctica while a regular oceanographic station was being occupied. Even without this the strong current carried the ship away from the stipulated point and it was necessary to interrupt the investigations. The great navigational skills of Captain Anatoliy Stepanovich Svetaylo were adequate to the circumstances.

Particularly interesting was the multiday work in the complex structural maze of deep narrow troughs and a submarine ridge in the neighborhood of Macquarie Island and to the south of it to the Antarctic ice. Here for the first time we carried out biological investigations from the surface to depths greater than 6,000 meters. It was possible to carry out trawling in the Macquarie and Kort trenches to maximum depths and to collect representative fauna to the very bottom of the trenches. To the joy of biologists, the number of known fish in the bottom zone of the ocean was almost tripled. Four genera and six species of fish unknown to science were discovered. The collected material made possible a considerable broadening of our ideas concerning the species composition of deep-water ichthyofauna in the investigated ocean areas.

The "Dmitriy Mendeleev" made depth measurements along more than 18,000 miles of its track and took samples of bottom deposits. Scientists expected the most interesting finds in the region of the Macquarie submarine ridge. In the middle part of the Kort trench a new maximum depth of 6,600 meters was discovered, and to the south of it many of the geological samples taken were found to contain rocky material brought in by icebergs and ice from the Antarctic continent.

It has been established that the so-called Macquarie complex is a system of narrow abyssal depressions and ridges of different types. A study was made of the hydrological and hydrochemical structure of water masses, including for the first time in this region to a depth of 6,300 meters.

The expedition visited the ports of Sidney, Hobart, Fremantle and Wellington, where useful contacts were made with the scientists of local institutes and universities. In addition, brief landings were made for the collection of geological and biological collections on the subtropical islands Lord Howe and Norfolk and on the subantarctic islands Campbell and Macquarie where specialists of the New Zealand and Australian subantarctic scientific team were very hospitable to the Soviet researchers.

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#### IV. TERRESTRIAL GEOPHYSICS

##### News

#### SCIENTISTS CONSTRUCT MAP OF UKRAINIAN HEAT FLOWS

Moscow IZVESTIYA in Russian 28 Jan 77 p 4

[Article by N. Samoylenko: "Map of the Earth's Depths"]

[Text] The inhabitants of the villages of Zaluzh'ye in Transcarpathia and Novoselovskiy in the Crimea evidently do not suspect that they dwell at the hottest points in the territory of the Ukraine. Specialists have determined that the temperature of the underground horizons in these places at depths from 2 to 2.5 thousand meters is: in the neighborhood of Zaluzh'ye -- 108 degrees and near Novoselovskiy on the Tarkhankutskiy Peninsula -- 102 degrees above zero Celsius. Each thousand meters in depth in the earth the temperature here increases by 50 degrees.

It has been noted that within the borders of the republic there is a considerable differentiation of the heat field. Near Krivoy Rog, for example, the underground layers are the coldest: at this same depth of 2-2.5 thousand meters here the temperature is only 25-30°.

These interesting facts were determined by scientists of the Division of Deep Processes in the Earth and Gravimetry of the Geophysical Institute Ukrainian Academy of Sciences. They served as a basis for the creation of the first map of the distribution of heat flows from the earth's interior in the territory of the republic.

"Our planet," says Candidate of Technical Sciences R. Kutas, a scientific specialist in the division and director of the work, "is a sort of machine which is fed by radiogenic energy, that is, by the heat of decay of radioactive elements. On the map we plotted the heat flows emitted by the planet from a unit surface of the earth. The work done was complex: we determined the heat flows as far as the earth's upper mantle and measured temperature at different depths. The map reflects the thermal state of

the earth's crust and its energy characteristics in different regions. The investigations confirmed that the nature of the heat anomalies, the nature of the hottest points on the planet, is related to tectonic and seismic activity."

"What is the practical and scientific importance of the map?"

"The geothermal map illustrates not only the energy present in the earth's crust, but also its geological structure. And these data are extremely important for an investigation of mineral deposits, each of which, as is well known, has its heat flow level. For example, an increased heat balance is characteristic of petroleum, gas and metal sulfides. This means that such a map is a great aid for prospecting precisely for these minerals. On the basis of this map specialists are computing temperatures in the deep layers of the earth's crust."

"The collected data are also necessary for the drilling of deep boreholes to depths of 5,000-7,000 meters where the temperature attains 200° or more. This is necessary in the construction of mine shafts at depths greater than 1,000 meters. Finally, the map is a good aid in the search for areas promising from the point of view of the use of the earth's deep heat for the production of energy. It is used quite extensively in world practice."

"Study of heat flows and clarification of the patterns of their distribution over the earth's surface are of great importance for understanding the nature of such phenomena as earthquakes, the origin of volcanoes, the formation of the highest mountain peaks and deep depressions in the oceans."

"The map of heat flows in the Ukraine will become an integral part of the geothermal map of the European part of the USSR and the countries of socialistic cooperation."

[264]

#### ELECTRICAL RESISTANCE METHOD FOR EARTHQUAKE PREDICTION

Moscow SOVETSKAYA ROSSIYA in Russian 26 Jan 77 p 4

[Article by G. Pol'skoy: "At the Pulse of the Planet"]

[Text] Today man is not completely helpless in the face of the powerful forces of nature. Whereas it is impossible to prevent an earthquake, for example, it can be predicted. Soviet scientists, in particular, have been able to discover that on the eve of a catastrophe there is a sharp increase in the content of radon in geothermal springs. There is a series of other indirect data.

An interesting method for the electric prediction of earthquakes has been discovered by a scientific specialist of the Institute of Physics of the Earth Candidate of Technical Sciences O. M. Barsukov.

What is the essence of this method? As is well known, an earthquake arises as a result of enormous tectonic processes, spectacular in scale, occurring within the earth. Scientists have undertaken the task of clarifying whether any changes occur in the earth's crust prior to the onset of an earthquake.

If this threatening event is preceded by some changes in the physical properties of the ground, there is no doubt that there should be a change in its electric conductivity. During the periods preceding an earthquake within the earth there evidently should be a development of fissures which are filled with some fluid substance, as a result of which there is an improvement in the electric conductivity of the ground and accordingly also a decrease in electric resistance of rocks. If one constantly measures the magnitude of this resistance, in the case of its sharp decrease it is immediately possible to predict how soon the earthquake will occur.

This simplified method looks like this. A strong electrical discharge is sent directly into the ground at the particular point where the geophysical station is situated. Receiving stations are set up in a radius of 10-12 kilometers. They measure the strength of the electric pulse in the earth arriving at the stations. On the basis of the decrease in signal strength it is possible to judge the decrease in the resistance of the particular rocks. As soon as the instrument begins to plot a descending curve this means that the resistance is decreasing, and accordingly, an earthquake is developing.

Naturally, the stronger the electric current sent into the earth, the greater is the distance over which the receiving stations can be distributed and the greater will be the area of the seismic zone which will be under the observation of scientists. Magnetohydrodynamic apparatus has now been set up in Uzbekistan for sending into the earth a pulse with a power of 10,000 KW...

There are still more impressive possibilities in regions where there are giant hydroelectric power stations. There the intensity of the current sent into the earth can attain a million or more kilowatts. Such a type of geophysical station (true, for the time being with a small power) is now operating in one of the most seismically dangerous regions of the country -- Dagestan.

And what is the effectiveness of the new method? In the course of its development it was possible to predict some number of local earthquakes in the region of the Garm geophysical polygon in Tadzhikistan and near Tashkent -- in Uzbekistan. In the summer and autumn of last year, employing an

apparatus using power from the Chirkeyskaya Hydroelectric Power Station, Dagestan geophysicists, using the new method, predicted two earthquakes with an intensity of about four scale units in the neighborhood of the village of Novo-Chirkey, near the city of Buynaksk. The experiment with use of this method in combination with others gives basis for asserting that the probability of predicting a major calamity is now quite great.  
[263]

## Abstracts of Scientific Articles

### DEVELOPMENT OF GRAVIMETRIC APPARATUS AT TULA POLYTECHNIC INSTITUTE

Moscow REFERATIVNYY ZHURNAL, GEOFIZIKA, SVODNYY TOM in Russian No 1, 1977  
1G249

[Abstract of article by Ye.G. Voropayev; Tula, GRAVIMETRICH. PRIBOROSTROYENIYE, 1975, pp 3-4, "Development of Gravimetric Apparatus at the Tula Polytechnic Institute"]

[Text] Information is given on completed scientific research work carried out at the Tula Polytechnic Institute in the field of gravimetry. The paper gives the technical specifications of individual products and data on their introduction.

[276]

### ACTUATING DEVICE FOR PENDULUM INSTRUMENT

Moscow REFERATIVNYY ZHURNAL, GEOFIZIKA, SVODNYY TOM in Russian No 1, 1977  
1G250

[Abstract of article by V. V. Blinov; Tula, GRAVIMETRICH. PRIBOROSTROYENIYE, 1975, pp 8-18, "Investigation of an Actuating Device for a Pendulum Instrument"]

[Text] The article gives an analysis of the influence of technological and design and other characteristics on the constancy of amplitude of an oscillating pendulum. Also given is the criterion for the purity of processing of contact surfaces, their kinematics and methods for checking them in the laboratory.

[276]

#### DIFFERENTIAL EQUATION FOR SEA GRAVIMETER PENDULUM MOTION

Moscow REFERATIVNYY ZHURNAL, GEOFIZIKA, SVODNYY TOM in Russian No 1, 1977  
1G243DEP

[Abstract of article by A. A. Abgaryan, M. I. Kiselev and V. A. Kuzivanov; Moscow, METODY OBRAB. I INTERPRETATSII GEOFIZ. POLEY I VOPR. IZMERENIY SILY TYAZHESTI NA MORE, Institute of Physics of the Earth, 1976, pp 85-91, "Solution of a 'Shortened Differential Equation of Motion for the Pendulum (Lever) of a Sea Gravimeter with a Nonlinear Restoring Force'" [Manuscript deposited at the All-Union Institute of Scientific and Technical Information, 17 August 1976, No 3149-76DEP]]

[Text] A method is proposed for solving the differential equation of motion of a pendulum with a nonlinear restoring force. It is noted that it is necessary to take the nonlinearity into account when solving the equation.

[276]

#### DIFFERENTIAL EQUATION FOR SENSING SYSTEM PENDULUM MOTION

Moscow REFERATIVNYY ZHURNAL, GEOFIZIKA, SVODNYY TOM in Russian No 1, 1977  
1G244DEP

[Abstract of article by Ye. S. Bragina, Ye. A. Vorontsova, B. G. Zelenskiy, S. V. Kuzivanov, S. P. Fomin and A. V. Chernyshev; Moscow, METODY OBRAB. I INTERPRETATSII GEOFIZ. POLEY I VOPR. IZMERENIY SILY TYAZHESTI NA MORE, Institute of Physics of the Earth, 1976, pp 72-84, "Method for Solving the Differential Equation of Motion of a Sensing System Pendulum (Lever)" [Manuscript deposited at the All-Union Institute of Scientific and Technical Information, 17 August 1976, No 3149-76DEP]]

[Text] A method is proposed for solving a differential equation of motion for a gravimeter pendulum. It is shown that the solutions for the "complete" and "shortened" (without the term with the second derivative) equations virtually coincide.

[276]

#### USE OF "POINTS OF INTERSECTION" METHOD FOR GRAVIMETER SENSING SYSTEMS

Moscow REFERATIVNYY ZHURNAL, GEOFIZIKA, SVODNYY TOM in Russian No 1, 1977  
1G245DEP

[Abstract of article by Ye. A. Vorontsova, B. G. Zelenskiy, V. A. Kuzivanov, S. V. Kuzivanov, L. D. Nemtsov, S. P. Fomin and A. V. Chernyshov; Moscow, METODY OBRAB. I INTERPRETATSII GEOFIZ. POLEY I VOPR. IZMERENIY SILY

TYAZHESTI NA MORE, Institute of Physics of the Earth, 1976, pp 92-102, "On the Problem of Use of the 'Points of Intersection' Method in the Case of Nonidentity of Gravimeter Sensing Systems" [Manuscript deposited at the All-Union Institute of Scientific and Technical Information, 17 August 1976, No 3149-76DEP]]

[Text] A study was made of the possibility of using the "points of intersection" method for measuring the acceleration of gravity on a moving base in the case of a nonidentity of the angular sensitivities of two gravimeter pendulums (levers).

[276]

#### EVALUATION OF "POINTS OF INTERSECTION" METHOD FOR THREE-HARMONIC PROCESS

Moscow REFERATIVNYY ZHURNAL, GEOFIZIKA, SVODNYY TOM in Russian No 1, 1977  
1G257DEP

[Abstract of article by V. A. Kuzivanov; Moscow, METODY OBRAB. I INTERPRETATSII GEOFIZ. POLEY I VOPR. IZMERENIY SILY TYAZHESTI NA MORE, Institute of Physics of the Earth, 1976, pp 24-27, "Evaluation of the 'Points of Intersection' Method for Three-Harmonic Processes" [Manuscript deposited at the All-Union Institute of Scientific and Technical Information, 17 August 1976, No 3149-76DEP]]

[Text] It is shown that at the points of "intersections" the residual influence of vertical accelerations, represented in the form of a process with three harmonics, is 50-100 times less than this influence for a single pendulum.

[276]

#### USE OF DYNAMIC ANOMALIES OF EARTH'S GRAVITY FIELD

Moscow REFERATIVNYY ZHURNAL, GEOFIZIKA, SVODNYY TOM in Russian No 1, 1977  
1G258

[Abstract of article by Yu. A. Tarakanov, M. B. Stepanova and N. S. Medvedeva; Moscow, METODY OBRAB. I INTERPRETATSII GEOFIZ. POLEY I VOPR. IZMERENIY SILY TYAZHESTI NA MORE, Institute of Physics of the Earth, 1976, pp 157-164 [Manuscript deposited at the All-Union Institute of Scientific and Technical Information, 17 August 1976, No 3149-76DEP]]

[Text] The authors have made a quantitative evaluation of anomalies generated by changes in excesses of the geoid during movement of a ship. The dynamic anomalies, proportional to the rate of ship movement, can be used in

determining the second derivatives of the disturbing potential, plumb-line deflections and the horizontal derivatives of the disturbing potential.  
[276]

#### SMOOTHING AND DIFFERENTIATION OF POTENTIAL FIELDS

Moscow REFERATIVNYY ZHURNAL, GEOFIZIKA, SVODNYY TOM in Russian No 1, 1977  
1G259DEP

[Abstract of article by G. N. Karelina; Moscow, METODY OBRAB. I INTERPRETATSII GEOFIZ. POLEY I VOPR. IZMERENIY SILY TYAZHESTI NA MORE, Institute of Physics of the Earth, 1976, pp 109-122 [Manuscript deposited at the All-Union Institute of Scientific and Technical Information, 17 August 1976, No 3149-76]]

[Text] The article gives procedures for the smoothing and differentiation (computations of the first and second horizontal and the second vertical derivatives) of potential fields with smoothing, based on the use of orthogonal polynomials in the best approximation, the values of the coefficients of the computation methods and the corresponding programs in BESM-4 codes with their description. The article points out the merits of transformations of smoothing and differentiation by the cited procedures.  
[276]

#### COMPUTATION OF EARTH'S GRAVITY FIELD

Moscow REFERATIVNYY ZHURNAL, GEOFIZIKA, SVODNYY TOM in Russian No 1, 1977  
1G261DEP

[Abstract of article by G. N. Karelina; Moscow, METODY OBRAB. I INTERPRETATSII GEOFIZ. POLEY I VOPR. IZMERENIY SILY TYAZHESTI NA MORE, Institute of Physics of the Earth, 1976, pp 165-172 [Manuscript deposited at the All-Union Institute of Scientific and Technical Information, 17 August 1976, No 3149-76DEP]

[Text] The paper cited above gives a program with description (in ALGOL-60 language) for computing the undulation of the geoid, the pure attractive force anomaly, gravity anomaly in the Faye reduction and plumb-line deflections on the basis of the coefficients of expansion of geopotential in spherical functions. The computed anomalies are intended for the purposes of geological interpretation of regional anomalies and determination of the figure of the earth.  
[276]

## DEEP STRUCTURE OF CRUST IN PACIFIC OCEAN

Moscow REFERATIVNYY ZHURNAL, GEOFIZIKA, SVODNYY TOM in Russian No 1, 1977  
1G49

[Abstract of article by A. G. Gaynanov, A. M. Gorodnitskiy, L. I. Krasnyy, Yu. A. Pavlov, O. G. Sorokhtin, S. A. Ushakov and V. V. Fedynskiy; Moscow, MEZHDUNAR. GEOL. KONGR. XXV SESSIYA. DOKL. SOV. GEOLOGOV. GEOFIZ. ISSLED. ZEMN. KORY, "Nedra," 1976, pp 9-18, "Geophysical Fields and Deep Structure of the Earth's Crust in the Pacific Ocean"]

[Text] The authors have generalized data for the entire area of the Pacific Ocean and its margins. Maps at a scale of 1:10,000,000 were compiled for gravitational anomalies in different reductions, as well as for seismicity, magnetic anomalies, heat flow and thickness of the earth's crust. The data were analyzed from the point of view of the tectonics of lithospheric plates. The article describes a model of formation of the oceanic lithosphere due to the crystallization of the basaltic component in the matter of the asthenosphere. The thickness of the oceanic lithosphere increases proportionally to the square root of its age. It is noted that the greater part of the heat within the limits of the East Pacific Ocean Rise is removed by the ocean water circulating through a system of fissures and therefore the total heat losses of the earth must be considered greater than those generally accepted by 30-40%. In the regions of plunging of the lithospheric plates a wedgelike projection with a length up to 100-150 km and a thickness at the base up to 20-25 km is formed in the frontal part of the overthrust plate. The dynamic effect of the underthrust leads to an impairment of isostasy and to the characteristic relief of the island arcs. The lithosphere of the Pacific Ocean and its margins is regionalized. Bibliography of 11 items.

[276]

## PROCESSING AND INTERPRETATION OF GEOPHYSICAL FIELDS

Moscow REFERATIVNYY ZHURNAL, GEOFIZIKA, SVODNYY TOM in Russian No 1, 1977  
1G240DEP

[Abstract of collection of articles; Moscow, METODY OBRABOTKI I INTERPRETATSII GEOFIZICHESKIKH POLEY I VOPROSY IZMERENIY SILY TYAZHESTI NA MORE (Methods of Processing and Interpretation of Geophysical Fields and Problems in Measuring Gravity at Sea), Institute of Physics of the Earth, 1976, 174 pages [Manuscript deposited at the All-Union Institute of Scientific and Technical Information, 17 August 1976, No 3149-76DEP]]

[Text] The authors of these articles examine problems in the theory and method for measuring gravity on a moving base by the "points of intersection method and the possibilities of discriminating a weakly disturbed low-frequency gravitational signal against a background of high-frequency inertial interference. An analysis is given of solution of the differential equation of motion of a gravimeter pendulum for a case with a non-linear restoring force. A solution is given for the inverse problem of gravimetric prospecting by the methods of analytical continuation of potential fields into a lower half-space.

[276]

#### MORE ON "POINTS OF INTERSECTION" METHOD IN SEA GRAVIMETRY

Moscow REFERATIVNYY ZHURNAL, GEOFIZIKA, SVODNYY TOM in Russian No 1, 1977  
1G255DEP

[Abstract of article by Ye. A. Vorontsova and S. V. Kuzivanov; Moscow, METODY OBRAB. I INTERPRETATSII GEOFIZ. POLEY I VOPR. IZMERENIY SILY TYAZHESTI NA MORE, Institute of Physics of the Earth, 1976, pp 103-108, "More on Application of the 'Points of Intersection' Method in the Case of Non-identity of Gravimeter Sensing Systems" [Manuscript deposited at the All-Union Institute of Scientific and Technical Information, 17 August 1976 No 3149-76DEP]]

[Text] A study was made of the possibility of using the "points of intersection" method under the condition that the sensing systems of gravimeters are not identical not only with respect to damping, but also with respect to the frequencies of the characteristic oscillations of the pendulums (levers) in the systems.

[276]

#### FREQUENCY CHARACTERISTICS OF FILTER IN "POINTS OF INTERSECTION" METHOD

Moscow REFERATIVNYY ZHURNAL, GEOFIZIKA, SVODNYY TOM in Russian No 1, 1977  
1G256DEP

[Abstract of article by G. N. Karelina and V. A. Kuzivanov; Moscow, METODY OBRAB. I INTERPRETATSII GEOFIZ. POLEY I VOPR. IZMERENIY SILY TYAZHESTI NA MORE, Institute of Physics of the Earth, 1976, pp 49-71 [Manuscript deposited at the All-Union Institute of Scientific and Technical Information, 17 August 1976, No 3149-76DEP]]

[Text] This article gives formulas and an analysis of frequency characteristics and also the modulus and phase spectrum of the latter for transformation in the "points of intersection" method proposed by V. A. Kuzivanov (Institute of Physics of the Earth). The author shows a good selectivity of the low-frequency filter and the method. An ALGOL scheme is presented which makes it possible to obtain a set of frequency characteristics for arbitrary values of the input parameters. The set makes it possible to select the necessary frequency characteristic in each specific case for suppressing "noise."

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#### GRAVITATIONAL ANOMALIES IN THE OCEANS

Moscow REFERATIVNYY ZHURNAL, GEOFIZIKA, SVODNYY TOM in Russian No 1, 1977  
1G34

[Abstract of article by A. G. Gaynanov; Moscow, GEOFIZ. POLYA TVERDOY OBOLOCHKI ZEMLI. GEODINAMICH. ISSLED., No 4, "Sov. Radio," 1976, pp 20-38, "Gravitational Anomalies in the Oceans and Their Correlation with the Deep Structure of the Earth's Crust and Upper Mantle"]

[Text] Information on the structure of the earth's crust and the upper mantle of the ocean floor can be obtained on the basis of the anomalous gravitational field by analyzing the gravitational anomalies of the free atmosphere, Bouguer and isostatic anomalies. The most preferable for a quantitative interpretation is the Bouguer reduction, under the condition that bottom topography is taken into account. For the areas of the Atlantic, Indian and Pacific Oceans specialists have compiled maps of Bouguer and free-air gravitational anomalies. The joint interpretation of gravimetric and seismic data made it possible to demonstrate density inhomogeneities in the upper mantle. The largest and most intense density inhomogeneities in the upper mantle are discovered in the regions of the mid-oceanic ridges, in zones of transition from the continent to the ocean, in the regions of the island arcs and abyssal trenches formed by active abyssal processes. Profiles of the earth's crust and upper mantle were compiled on the basis of gravimetric and seismic data for the transition zones of South America, India, the Far East and the Arabian Sea-Indian Ocean Ridge. Bibliography of 50 items.

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## V. UPPER ATMOSPHERE AND SPACE RESEARCH

### News

#### PAPERS ON IONOSPHERIC PHYSICS

Moscow REFERATIVNYY ZHURNAL 62. ISSLEDOVANIYE KOSMICHESKOGO PROSTRANSTVA, OTDEL'NYY VYPUSK in Russian No 1, 1977 1.62.76K

[Abstract of collection of articles; Moscow, FIZIKA IONOSFERY. KRATKIYE SOOBSHCHENIYE (Physics of the Ionosphere. Brief Communications), Interdepartmental Geophysical Committee Presidium USSR Academy of Sciences, "Nauka," 1976, 184 pages]

[Text] This collection of articles contains brief expositions of reports presented by a number of authors at the All-Union Conference on Physics of the Ionosphere held at Rostov-on-Don in October 1974. The reports were devoted to the following matters: lower ionosphere and methods for its investigation; formation of the sporadic E layer and the inhomogeneous structure of the ionosphere; physical processes in the F2 region and a model of the ionosphere; interrelationship between individual regions of the atmosphere.

[294]

#### ATLAS OF FAR SIDE OF MOON

Moscow REFERATIVNYY ZHURNAL 62. ISSLEDOVANIYE KOSMICHESKOGO PROSTRANSTVA, OTDEL'NYY VYPUSK in Russian No 10, 1976, 10.62.55K

[Abstract of Part 3 of monograph; Moscow, ATLAS OBRATNOY STORONY LUNY, Ch. 3 (Atlas of the Far Side of the Moon, Part 3), "Nauka," 1975, 239 pages]

[Text] Contents: I. Photographic Experiments Aboard the Zond-6, 7, 8 Spacecraft; II. Selenocentric Coordinate System in the Eastern Sector of the Far Side of the Moon; III. Unified System of Selenodetic Coordinates of 2,900 Points in the Visible Hemisphere of the Moon; IV. Selenodetic Plane Base on the Far Hemisphere of the Moon; V. Cartometric Investigations of

the Visible and Far Hemispheres of the Moon; VI. Photometric Maps of the Eastern Sector of the Far Side of the Moon. Appendices: 1. Information on Workers in Science and Engineering for Whom Craters on the Far Side of the Moon Were Named; 2. Photographs of the Lunar Surface from the Space Vehicle Zond-8.

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#### ARTICLES ON SOLAR-TERRESTRIAL RELATIONSHIPS AND COSMIC RAY PHYSICS

Moscow REFERATIVNYY ZHURNAL 62. ISSLEDOVANIYE KOSMICHESKOGO PROSTRANSTVA, OTDEL'NYY VYPUSK in Russian No 10, 1976 10.51.90K

[Abstract of collection of articles; Tbilisi, SOLNECHNO-ZEMNYYE SVYAZI I FIZIKA KOSMICHESKIKH LUCHEY (Solar-Terrestrial Relationships and Cosmic Ray Physics), TRUDY IN-TA GEOFIZ. AN GRUZ SSR, 35, 1976, 171 pages]

[Text] This is a collection of articles on cosmic rays and solar-terrestrial relationships. For the most part it contains original papers written at the Geophysical Institute Georgian Academy of Sciences. The collection contains two parts. The first part contains papers on modulation effects in cosmic rays and experimental techniques and articles of a methodological nature relating to cosmic ray variations. The second part contains theoretical and experimental studies relating to problems of study of geomagnetic and ionospheric phenomena. The collection also includes a series of articles of a general character. It is of interest for a broad range of specialists concerned with problems in solar physics, the interplanetary medium, the modulation effect in cosmic rays, the geomagnetic field and physics of the upper atmosphere.

[300]

#### MONOGRAPH ON SPACE METHODS FOR STUDYING ENVIRONMENT

Moscow REFERATIVNYY ZHURNAL 62. ISSLEDOVANIYE KOSMICHESKOGO PROSTRANSTVA, OTDEL'NYY VYPUSK in Russian No 1, 1977, 1.62.247K

[Abstract of monograph by B. V. Vinogradov; Moscow, KOSMICHESKIYE METODY IZUCHENIYA PRIRODNOY SREDY (Space Methods for Studying Environment), "Mysl'," 1976, 288 pages]

[Text] This book consists of three parts: I. Space Means for Observing the Environment; II. Development of Space Methods for Studying the Environment; III. Use of Space Methods. On the basis of a generalization of numerous investigations carried out beginning since 1965 the author gives an analysis of the principal problems in study of the environment by space methods.

There is a review of space systems from ballistic rockets to stationary artificial earth satellites and orbiting space stations carrying measuring instrumentation. Also examined are the principal characteristics of the measuring apparatus and the forms of representation of space images of the earth in the visible, IR and radio ranges. Also given are individual results of the first experiments for the interpretation of space materials in the interests of the earth sciences and the national economy. Bibliography of 411 items.  
[294]

#### EXPERIMENTS CONTINUED BY GORBATKO AND GLAZKOV

Moscow IZVESTIYA in Russian 13 Feb 77 p 2

[Article by B. Konovalov: "Seedlings of the Future"]

[Text] Cosmonautics is a very young field of human activity. Here for the time being there is a great deal which is occurring for the first time and the future is being born before our eyes. At times it seems modest, inconspicuous, like the first sprouts in fields. Some may wither away and others yield a remarkable harvest. For scientists, in the first stage all these "sprouts" are identically important. This is because scientists cannot foresee absolutely precisely in advance those which merit the most careful care and cultivation. It is precisely in this sense which the first exploratory experiments must be regarded, those experiments which are now being carried out aboard Soviet scientific orbiting stations.

One of the most promising "plots" in the space "field" is technical experiments. Weightlessness, a vacuum, low temperatures, intensive solar radiation and other peculiarities of the new world into which man is penetrating make it necessary to create complex apparatus for the mastery of space. But these same unusual conditions can become the basis for some forms of production impossible under terrestrial conditions. Aboard the "Salyut-5" experiments are being carried out whose purpose is to clarify how different physical processes transpire, such as the transfer of heat and mass and crystallization of matter under spaceflight conditions.

The cosmonauts B. Volynov and V. Zholobov during the time of the first expedition began the "Crystal" experiment. The instrument designed for carrying out this experiment is a thermostat with three cylindrical crystallizers in which it is possible to cultivate crystals from a supersaturated aqueous solution of potassium alum. In the first crystallizer this solution is in pure form; in the second it is slightly colored by a blue dye, whereas in the third the concentration of this dye is intensified. Inserting

special seed crystal plates on which growth of the crystal begins, the cosmonauts began the experiment. Before returning to the earth, B. Volynov and V. Zholobov opened the first crystallizer and extracted a crystal growing on the seed crystal plate. It was found that in addition to it, other "unplanned" crystals had been formed and grew spontaneously in the solution. The cosmonauts brought this product of the space factory with them for a detailed analysis by scientists.

The rate of growth of the crystal under space conditions was somewhat less than postulated and there is a difference in configuration and internal structure in comparison with terrestrial samples. The gas and fluid-gas inclusions in the body of the crystal were extremely considerable. This is the most important difference from terrestrial crystals and it now serves scientists, as they say, as "food for thought."

One of the first scientific tasks of V. Gorbatko and Yu. Glazkov aboard the "Salyut-5" was work with the "Crystal" instrument.

The technological experiments pursue the purpose not only of creating future orbital factories for the production of some unique crystals, especially pure specific substances and medicines, "exotic" alloys which cannot be obtained under terrestrial conditions. Equally important is another direction -- technological experiments for the needs of cosmonautics itself. After all, the extensive mastery of space is unthinkable without technological work of the welding and cutting of metals type. Aboard the "Salyut-5" B. Volynov and V. Zholobov for the first time carried out the soldering of metals. In the "reaction" experiment using "excontainers" which after "combustion" yield a great quantity of energy due to the chemical reaction, the cosmonauts carried out the fusion of a corrosion-resistant manganese-nickel solder and carried out the soldering of a sample of stainless steel.

As they told us at the Center, testing of the sample returned to earth revealed that the spreading of the molten metal was uniform, the quality of the solder was excellent and the joint successfully withstood a pressure of about 500 atmospheres.

Now the scientific program of the second expedition aboard the "Salyut-5" is successfully developing. To be sure, this time scientists will obtain equally interesting results.

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## "SOYUZ-24" COSMONAUTS GATHER INFORMATION FOR GLACIOLOGISTS

Moscow TRUD in Russian 13 Feb 77 p 3

[Article by L. Desinov: "Glaciers Through the Lens"]

[Summary] Gradually space vehicles and apparatus are becoming ordinary tools for glaciological research. Specialists of the State Scientific Research and Production Center "Priroda," coordinating work on the use of space research methods in the national economy of the country, have prepared an experimental program. One of the experiments is the observation, in different seasons of the year, of the high-mountain regions from aboard the "Salyut-5" orbital station. A half-year has passed since implementation of the first part of the experimental program. A space patrol considerably facilitates the work of glaciologists, for example, in investigation of the Pamirs. At present specialists of the Tadzhik Administration of the Hydrometeorological Service, under the direction of Yu. S. Uskov, are studying the snow cover of key river basins. The information obtained by "Soyuz-24" cosmonauts will help in tying-in fragmentary observations in key river basins. Later reliable methods will be created for predicting snow reserves on the basis of space photographs. And then it will be possible to completely exclude time-consuming and dangerous snow surveys on the ground. The inventorying of mountain glaciers in the USSR has still not been completed. But even today it is clear that in the Pamirs, Tien Shan, Caucasus and Altay there are more than 20,000 square kilometers of area occupied by glaciers. (Some of these are no larger than a soccer field.) The largest is the Fedchenko Glacier, which supplies the Vakhsh River with more than a billion cubic meters of water each year. In Central Asia the glaciers of the Pamirs supply Central Asia with more than 12 billion cubic meters of vital moisture per year. Combined use of space and ground surveys and electronic computers will make it possible to predict the dynamics of movement of the largest glaciers and the runoff from them. [260]

## SYMPOSIUM ON SOLAR-TERRESTRIAL PHYSICS

Moscow REFERATIVNYY ZHURNAL, GEOFIZIKA, SVODNYY TOM in Russian No 1, 1977 1A48K

[Abstract of collection of reports; Moscow, SIMPOZIUM KAPG PO SOLNECHNO-ZEMNOY FIZIKE, TBILISI, Sentyabr' 1976. TEZISY DOKLADOV. CH. 2 (KAPG Symposium on Solar-Terrestrial Physics. Tbilisi, September 1976. Summaries of Reports. Part 2), Institute of Terrestrial Magnetism, Ionosphere and Radio Wave Propagation, "Nauka," 1976, 224 pages]

[Text] This second part of this collection contains summaries of reports presented at the KAPG Symposium on Solar-Terrestrial Physics (Tbilisi, September 1976) on the subject matter of KAPG working group 2.1 ("Physics of the Magnetosphere").

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#### MORE FROM THE SYMPOSIUM ON SOLAR-TERRESTRIAL PHYSICS

Moscow REFERATIVNYY ZHURNAL, GEOPHYSICS, SVODNYY TOM in Russian No 1, 1977  
1A49K

[Abstract of collection of reports; Moscow, SIMPOZIUM KAPG PO SOLNECHNO-ZEMNOY FIZIKE, TBILISI, Sentyabr' 1976. TEZISY DOKLADOV. CH. 3 (KAPG Symposium on Solar-Terrestrial Physics. Tbilisi, September 1976. Summaries of Reports. Part 3), Institute of Terrestrial Magnetism, Ionosphere and Radio Wave Propagation, "Nauka," 1976, 220 pages]

[Text] This is the third part of this collection. It contains summaries of reports presented at the KAPG Symposium on Solar-Terrestrial Physics on the subject matter of KAPG working group 2.2 ("Physics of the Upper Atmosphere").

[276]

#### MONOGRAPH ON ATMOSPHERIC OPTICS

Moscow REFERATIVNYY ZHURNAL, GEOFIZIKA, SVODNYY TOM in Russian No 1, 1977  
1A47K

[Abstract of monograph edited by V. N. Lebedinets; Moscow, OPTIKA ATMOSFERY (Atmospheric Optics), TRUDY IN-TA EKSPERIMENTAL'NOY METEOROLOGII GUGMS, No 4(61), Gidrometeoizdat, 1976, 136 pages]

[Text] This collection of articles consists of papers devoted to an analysis of the present status and prospects for development of optical methods for investigating the atmosphere, laboratory modeling of the processes of interaction between radiation and the atmosphere, laser sounding of the atmosphere, and direct and indirect methods for investigating aerosols in the upper atmosphere. Analysis of the results obtained by different methods in study of dust of cosmic origin in the atmosphere, at the earth's surface and in space and allowance for the physics of interaction between dust and the atmosphere made it possible to formulate a working model of the aerosol component of the thermosphere and exosphere. Included is the theory of twilight sounding of the atmosphere, some results of twilight investigations and measurements of atmospheric transparency. Also given are the

results of model investigations of the attenuation of IR radiation in the atmosphere. The papers in the collection are individually abstracted.  
[276]

Abstracts of Scientific Articles

ENERGY ASPECTS OF SOLAR-TERRESTRIAL RELATIONSHIPS

Moscow REFERATIVNYY ZHURNAL 62. ISSLEDOVANIYE KOSMICHESKOGO PROSTRANSTVA, OTDEL'NYY VYPUSK in Russian No 1, 1977 1.62.207

[Abstract of brochure by I. V. Kovalevskiy; Moscow, ENERGETICHESKIYE ASPEKTY SOLNECHNOZEMNYKH SVYAZEY, "Nauka," 1976, 52 pages]

[Text] This brief monograph contains the following chapters: The Sun as an Energy Source; Interplanetary Medium; Results of Interaction Between the Interplanetary Medium and the Earth's Magnetic Field; Energy Fluxes in the Interplanetary Medium at 1 a.u.; Energy Incident on the Magnetosphere; Energy Transfer Within the Magnetosphere; Energy of the Geomagnetosphere; Energy Exchange and Energy Dissipation in the Magnetosphere.

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NASA RESULTS UNDER EARTH RESOURCES OBSERVATION PROGRAM

Moscow REFERATIVNYY ZHURNAL 62. ISSLEDOVANIYE KOSMICHESKOGO PROSTRANSTVA, OTDEL'NYY VYPUSK in Russian No 1, 1977 1.62.249

[Abstract of article by L. N. Kell', B. I. Zarubin and V. Z. Maklin; Sverdlovsk, FOTOGRAFFIYA V GORN. DELE, No 3, 1976, pp 94-98, "Preliminary Review of the Principal Results Obtained by NASA Under the Earth Resources Observation Program"]

[Text] This is a review of the principal results obtained under the program whose purpose was an evaluation of remote methods for determining earth resources from artificial earth satellites.

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#### HYDRODYNAMIC BRAKING OF SOLAR WIND BY INTERSTELLAR MEDIUM

Moscow REFERATIVNYY ZHURNAL 62. ISSLEDOVANIYE KOSMICHESKOGO PROSTRANSTVA, OTDEL'NYY VYPUSK in Russian No 1, 1977 1.62.190

[Abstract of article by V. B. Baronov and K. V. Krasnobayev; Moscow, AEROMEKHANIKA I GAZ. DINAMIKA, "Nauka," 1976, pp 281-295, "Hydrodynamic Braking of Solar Wind by Interstellar Medium"]

[Text] A study was made of the problem of the escape of the supersonic solar wind into the interstellar medium. It is demonstrated that the charge exchange of solar wind protons on neutral hydrogen atoms in the interstellar medium cannot impair the model proposed earlier by the authors in collaboration with A. G. Kulikovskiy in which the solar wind is braked on the charged component of the interstellar medium. Charge exchange only somewhat changes the parameters of the solar wind. Bibliography of 32 items.

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#### RELATIVE EQUILIBRIUM OF SATELLITE-GYROSTAT

Moscow REFERATIVNYY ZHURNAL 62. ISSLEDOVANIYE KOSMICHESKOGO PROSTRANSTVA, OTDEL'NYY VYPUSK in Russian No 1, 1977 1.62.291

[Abstract of article by G. Kairbekov; Alma-Ata, SBORNIK PO VOPR. MAT. I MEKH. KAZAKHSK. UN-TA, No 7, 1975, pp 87-100, "On Stability of the Relative Equilibrium of a Satellite-Gyrostet in an Axially Symmetric Field"]

[Text] The article analyzes the equation of motion for a satellite-gyrostet in an axially symmetric field. The author has obtained one particular solution and by means of constructing the Lyapunov function a study is made of the stability of the position of relative equilibrium of the gyroscope. Adequate conditions for the stability of motion are obtained.

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#### PROGRAM FOR COMPUTING NAVIGATIONAL INFORMATION

Moscow REFERATIVNYY ZHURNAL 62. ISSLEDOVANIYE KOSMICHESKOGO PROSTRANSTVA, OTDEL'NYY VYPUSK in Russian No 1, 1977, 1.62.304

[Abstract of preprint by V. I. Prokhorenko; Moscow OPISANIYE UNIVERSAL'NOY PROGRAMMY RASCHETA NAVIGATSIONNOY INFORMATSII O POLOZHENII ISKUSSTVENNOGO SPUTNIKA ZEMLI (Description of a Universal Program for Computing Navigational Information on the Position of an Artificial Earth Satellite), Space Research Institute, Pr-263, 1976, 80 pages in rotaprint]

[Text] This preprint describes the structure, possibilities and methods for use of a universal program, written in FORTRAN IV language, for computing the navigational parameters of an artificial earth satellite characterizing its position in orbit.

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#### REMOTE PROSPECTS FOR SPACE FLIGHTS

Moscow REFERATIVNYY ZHURNAL 62. ISSLEDOVANIYE KOSMICHESKOGO PROSTRANSTVA, OTDEL'NYY VYPUSK in Russian No 1, 1977 1.62.318

[Abstract of article by Stefan Kowal; Warsaw, ASTRONAUTYKA, 19, No 4, 1976, pp 4-7, "Remote Prospects for Space Flights"]

[Text] This is a discussion of remote prospects for the use of nuclear energy in cosmonautics and in particular, the problems which must be solved for constructing photon engines.

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#### EXPLORATION OF EARTH FROM SPACE

Moscow REFERATIVNYY ZHURNAL 62. ISSLEDOVANIYE KOSMICHESKOGO PROSTRANSTVA, OTDEL'NYY VYPUSK in Russian No 1, 1977, 1.62.254

[Abstract of article by Karl-Heinz Neumann; Berlin, ASTRON. UND RAUMFAHRT, No 3, 1976, pp 78-83, "Exploration of the Earth from Space"]

[Text] The results of an investigation of IR aerial photographs at a scale of 1:420,000 revealed that the technique of obtaining and processing information at this stage cannot ensure an identification probability close to 100%. Photographs from artificial earth satellites have a still lesser percentage of identification probability; they make it possible to distinguish only the principal classes of objects and not the quality of their state. In order to accelerate the processing of information it is necessary to use digital computers or the presence of a specialist directly aboard a spaceship, which can give the most effective results.

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#### RELIEF-FORMING PROCESSES STUDIED FROM MULTIZONAL PHOTOGRAPHS

Moscow REFERATIVNYY ZHURNAL 62. ISSLEDOVANIYE KOSMICHESKOGO PROSTRANSTVA, OTDEL'NYY VYPUSK in Russian No 1, 1977, 1.62.258

[Abstract of article by V. I. Kravtsova and G. A. Saf'yanov; Moscow, MNOGO-ZONAL'N. AEROKOSMICH. S'YEMKA I YEYE ISPOL'Z. PRI IZUCH. PRIROD. RESURSOV, Moscow University, 1976, pp 56-64, "Study of Relief-Forming in the Coastal Zone Using Multizonal Photographs"]

[Text] On the basis of multizonal photographs from the "Soyuz-12" spaceship the authors carried out interpretation for the purpose of studying relief-forming processes and ancient forms of shore relief and also for the study of water masses at different depths in the coastal zone. The results of the investigations make it possible to conclude that the green zone ( $\lambda = 500-600$  nm) is best for the solution of these problems and using photographs in different zones it is possible to obtain the pattern of propagation of suspended material at different depths, the image of the bottom and the water surface.

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#### USE OF SPACE PHOTOGRAPHS FOR METALLOGENIC RESEARCH

Moscow REFERATIVNYY ZHURNAL 62. ISSLEDOVANIYE KOSMICHESKOGO PROSTRANSTVA, OTDEL'NYY VYPUSK in Russian No 1, 1977 1.62.264

[Abstract of article by N. T. Kochneva and I. N. Tomson; Moscow, ISSLED. PRIROD. SREDY KOSMICH. SREDSTVAMI. GEOL. I GEOMORFOL., Vol 5, 1976, pp 222-30, "Ways to Use Space Photographs for Medium-Scale Metallogenic Research"]

[Text] A study was made of the problems involved in an analysis of space photographs for the purpose of detecting and documenting new types of ore-controlling structures, frequently having a hidden nature. It is demonstrated that in a number of cases space photographs make possible a more detailed description of important ore-controlling structures and preparation of prognostic metallogenic maps. Many of these structures are manifested inadequately clearly on geological maps and therefore the use of space photographs is of enormous importance for their documentation. Bibliography of 15 items.

[294]

## STATISTICAL ANALYSIS OF GEOMAGNETIC PULSATIONS

Moscow REFERATIVNYY ZHURNAL. 62. ISSLEDOVANIYE KOSMICHESKOGO PROSTRANSTVA, OTDEL'NYY VYPUSK in Russian No 1, 1977 1.62.237

[Abstract of article by P. A. Vinogradov and I. P. Kharchenko; Moscow, IS-SLED. PO GEOMAGNETIZMU, AERON. I FIZ. SOLNTSA, No 39, "Nauka," 1976, pp 71-73, "Some Results of a Statistical Analysis of the Distribution of Geomagnetic Pulsations in the Range Pc3-4"]

[Text] A study was made of data on geomagnetic pulsations published in the Catalogue of Geomagnetic Pulsations. The authors compare the number of cases and the frequency of appearance of variations of different periods on the basis of observations at the stations Borok, Irkutsk, Petropavlovsk-na-Kamchatka and Noril'sk. During the daytime at all middle-latitude stations there are variations with periods 15-40 sec during the daytime hours local time and 50-90 sec during the nighttime hours. The correlation coefficient between data for different stations is 0.85. There is a dependence between the periods of the pulsations and the geomagnetic activity index  $\sum K_p$ . This dependence is characterized by the correlation coefficients -0.69, 0.80 and 0.63 for Borok, Irkutsk and Petropavlovsk-na-Kamchatka respectively.

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## ASTRONAUTICAL EXHIBIT IN POLAND

Moscow REFERATIVNYY ZHURNAL 62. ISSLEDOVANIYE KOSMICHESKOGO PROSTRANSTVA, OTDEL'NYY VYPUSK in Russian No 1, 1977 1.62.8

[Abstract of article by Bohdan Wegrzyn; Warsaw, ASTRONAUTYKA, 19, No 4, 1976, pp 17-18, "Astronautical Exhibit at Fromborku"]

[Text] It is reported that on the eve of the 15th anniversary of the first space flight an exhibit was held at Fromborku for the purpose of demonstrating models of technical apparatus by means of which modern satellite astronomy is being developed. Several tens of models of rockets, space-ships and space vehicles were presented at the exhibit. It is proposed that the next similar exhibit be held in 1978.

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#### AURORAL SPECTRA DURING SUBSTORM

Moscow REFERATIVNYY ZHURNAL 62. ISSLEDOVANIYE KOSMICHESKOGO PROSTRANSTVA, OTDEL'NYY VYPUSK in Russian No 10, 1976 10.62.199

[Abstract of article by G. F. Totunova; Ashkhabad, ISSLED. IZLUCH. VERKHN. ATMOSF., "Ydym," 1976, pp 52-57, "Observations of Auroral Spectra During the Substorm of 18-19 February 1972"]

[Text] The observation of an aurora at Loparskaya station in the course of development of the substorm of 18-19 February 1972 indicated a close correlation between spectral composition and auroral intensity with the phase of development and degree of magnetic disturbance. Bibliography of 14 items.  
[290]

#### OSCILLATIONS OF ASYMMETRICAL ROTATING FLIGHTCRAFT

Moscow REFERATIVNYY ZHURNAL 62. ISSLEDOVANIYE KOSMICHESKOGO PROSTRANSTVA, OTDEL'NYY VYPUSK in Russian No 10, 1976, 10.62.243

[Abstract of article by V. N. Penya, A. P. Moroz and G. L. Madatov; Kiev, KOSMICH. ISSLED. NA UKRAINE. RESP. MEZHVED. SB., No 8, 1976, pp 82-87, "Nonstationary Spatial Oscillations of an Asymmetrical Rotating Flightcraft During Motion in a Planetary Atmosphere"]

[Text] A study was made of the angular motions of a rotating asymmetrical flightcraft under nonstationary flight conditions in a planetary atmosphere. The authors examine stationary regimes for the case of variable parameters of motion of an asymmetrical flightcraft and give an analysis of the stability of free oscillations of a flightcraft having axial asymmetry and rotating with a variable angular velocity. Bibliography of six items.  
[290]

#### METHOD FOR CONTROL OF HYPERSONIC FLIGHTCRAFT

Moscow REFERATIVNYY ZHURNAL 62. ISSLEDOVANIYE KOSMICHESKOGO PROSTRANSTVA, OTDEL'NYY VYPUSK in Russian No 10, 1976, 10.62.339

[Abstract of article by V. R. Zhuravskiy, V. P. Mamatov, A. D. Skorik and V. N. Shvets; Kiev, KOSMICH. ISSLED. NA UKRAINE. RESP. MEZHVED. SB., No 8, 1976, pp 43-48, "One Method for Control of Hypersonic Flightcraft"]

[Text] The paper gives the results of an investigation of flow around a conical body with an obstacle and determination of the flow parameters on the body in the neighborhood of the obstacle and on the obstacle. It is shown that the presence of a gap between the end of the conical body and the obstacle in the form of a plane screen leads to elimination of the detachment zone and a pressure pulsation. A method is proposed for determining the aerodynamic characteristics of the screen and the authors give a comparison of the results obtained using this method with experimental results. Bibliography of nine items.

[290]

#### HEAT TRANSFER COEFFICIENT FOR HYPERSONIC FLOW OF GAS AROUND BODY

Moscow REFERATIVNYY ZHURNAL 62. ISSLEDOVANIYE KOSMICHESKOGO PROSTRANSTVA, OTDEL'NYY VYPUSK in Russian No 10, 1976, 10.62.338

[Abstract of article by V. V. Kalenichenko; Kiev, VESTN. KIYEV. UN-TA, SER. ASTRON., No 18, 1976, pp 56-62, "Heat Transfer Coefficient for Hypersonic Flow of Rarefied Gas Around a Body"]

[Text] The author has computed the heat transfer coefficient for a unit surface area of a body (containing a forward critical point) placed in a hypersonic flow of a rarefied gas. With a change in the flow regime from free-molecular to transient the heat transfer coefficient smoothly decreases from unity to values of  $\sim 0.2$  at Knudsen numbers  $\sim 3+7$ . Bibliography of six items.

[290]

#### INFRARED SPECTROSCOPY OF MOON FROM "SALYUT-4"

Moscow REFERATIVNYY ZHURNAL 62. ISSLEDOVANIYE KOSMICHESKOGO PROSTRANSTVA, OTDEL'NYY VYPUSK in Russian No 12, 1976, 12.62.175

[Abstract of article by M. N. Markov, G. M. Grechko, A. A. Gubarev, Yu. S. Ivanov and V. S. Petrov; Moscow, INFRAKRASNAYA SPEKTROSKOPIYA LUNY S ORBITAL'NOY STANTSII "SALYUT-4" (Infrared Spectroscopy of the Moon from the "Salyut-4" Orbital Station), Physics Institute Ukrainian Academy of Sciences, Preprint No 7, 1976, 16 pages, in rotaprint]

[Text] The paper gives the results of registry of 20 emission spectra ( $\lambda = 1-8\mu\text{m}$ ) of the moon from aboard the "Salyut-4" station using the ITS-K IR telescope-spectrometer with an angular resolution of  $1.1 \cdot 10^{-5}$  sr with a spectral resolution of  $0.3\mu\text{m}$  and a time for spectrum registry of 2.5 sec. The spectra are similar to the spectra of lunar regolith registered in the

laboratory. The maximum of these spectra falls at  $\lambda = 4\mu\text{m}$ . The value of the reflection coefficient at the maximum is considerably closer to the astronomical data than to the laboratory data. The long-wave edge of the band is steeper and is situated at a lesser wavelength than for the laboratory spectra. The differences are probably associated with structural differences in laboratory and natural ground. Bibliography of six items.  
[303]

#### INTERPLANETARY MAGNETIC FIELD AND AURORAL ACTIVITY

Moscow REFERATIVNYY ZHURNAL 62. ISSLEDOVANIYE KOSMICHESKOGO PROSTRANSTVA, OTDEL'NYY VYPUSK in Russian No 11, 1976 11.62.197

[Abstract of article by Ya. I. Fel'dshteyn, G. V. Starkov, P. V. Sumaruk and N. F. Shevnina; Ashkhabad, ISSLED. IZLUCH. VERKHN. ATMOSF., "Ylym," 1976, pp 40-51, "Interplanetary Magnetic Field in the Plane of the Ecliptic and Auroral Activity"]

[Text] The article describes the effects in surface magnetic variations in the polar region and auroras related to changes in orientation of the interplanetary magnetic field in the plane of the ecliptic. Changes in orientation of the sectoral structure of the interplanetary magnetic field do not exert a significant influence on the mean value of the probability of appearance of auroras during the time of maintenance of a definite field direction. An appreciable effect exists only within the sector itself: on the first day after change in orientation the probability of appearance of auroras is maximum. Bibliography of 28 items.  
[301]

#### OPTIMUM CONTROL OF AES ANGULAR VELOCITY

Moscow REFERATIVNYY ZHURNAL 62. ISSLEDOVANIYE KOSMICHESKOGO PROSTRANSTVA, OTDEL'NYY VYPUSK in Russian No 11, 1976 11.62.256

[Abstract of article by L. I. Numellov; Kaliningrad, SB. RABOT PO TEORII OPTIMAL'N. PROTSESSOV. KALININGR. UN-T, No 2, 1975, pp 170-213, "Optimum Control of Angular Velocity of an Artificial Earth Satellite"]

[Text] A study was made of the problem of determining the optimum expenditure of the working medium for controlling the angular velocity of an artificial earth satellite. For the extinction of angular velocity the author gives the methods for optimum control and the sequence of firing of the jet engines creating controlling moments. Formulas are derived for computing the expenditure of the working medium in the case of optimum control

for an artificial earth satellite with three pairs of engines creating positive and negative controlling moments. The "branches" of the controlling moments are regarded as unequal relative to one another. An analysis of the change in angular velocities is given when activating control at different times.

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#### INCLINATION OF AXES OF ROTATION AND ORBITS OF PLANETS

Moscow REFERATIVNYY ZHURNAL 62. ISSLEDOVANIYE KOSMICHESKOGO PROSTRANSTVA, OTDEL'NYY VYPUSK in Russian No 10, 1976 10.51.145

[Abstract of article by Z. A. Aytekeyeva; Alma-Ata, FIZ. NAUKI, No 2, 1975, pp 3-16, "Inclination of Axes of Rotation and Orbits of Planets"]

[Text] In the opinion of the author, the existing values of inclinations of the axes of rotation of the planets to their orbital planes and the inclinations of the orbits to the plane of the ecliptic can be explained on the basis of the mechanism of dissipation of the matter in the protoplanetary cloud. It is asserted that the redistribution of energy and the moment of momentum in the protoplanetary cloud was caused by a redistribution of matter between the zones in the cloud, being a result of different temperature conditions. Bibliography of seven items.

[300]

#### EFFECT OF SOLAR ACTIVITY ON PRECIPITATION REGIME

Moscow REFERATIVNYY ZHURNAL 62. ISSLEDOVANIYE KOSMICHESKOGO PROSTRANSTVA, OTDEL'NYY VYPUSK in Russian No 10, 1976 10.51.469

[Abstract of article by R. A. Yagudin and A. G. Sytin; --, TRUDY ZAP.-SIB. REGIONAL'N. N.-I. GIDROMETEOROL. IN-TA, No 21, 1976, pp 12-26, "Manifestation of Solar Activity in the Precipitation Regime in the Southern Part of Western Siberia"]

[Text] The authors discovered a statistically reliable influence of the 11-year and secular cycles of solar activity on the formation of the regime of spring-summer precipitation in the southern part of Western Siberia. The probability of a deficit of monthly sums of precipitation over an extensive area (50% or more of the area) is minimum at the maximum of the 11-year cycle and maximum at the beginning and end of the cycle. The even and odd cycles have definite differences in the precipitation regime. The probability of arid months on the descending branch of the secular cycle is greater than on the ascending branch. Among the considered solar activity indices it is spot number which has the closest correlation with precipitation. Bibliography of 21 items.

[300]

#### GRAVITATIONAL ORIENTATION SYSTEMS WITH TWO DAMPERS

Moscow REFERATIVNYY ZHURNAL 62. ISSLEDOVANIYE KOSMICHESKOGO PROSTRANSTVA, OTDEL'NYY VYPUSK in Russian No 10, 1976 10.62.248

[Abstract of article by N. I. Yakovlev; Moscow, OPTIMIZATSIYA PO BYSTRO-DEYSTVIYU PARAMETROV GRAVITATSIONNYKH SISTEM ORIYENTATSII S DVUMYA DEM-PFERAMI (Speed Optimization of Parameters of Gravitational Orientation Systems with Two Dampers), Institute of Applied Mathematics USSR Academy of Sciences, Preprint No 56, 1976, 39 pages]

[Text] The author has derived the equations of motion of an artificial earth satellite-stabilizer system with a suspension with two degrees of freedom and a system consisting of an artificial earth satellite and two stabilizers with suspensions with one degree of freedom. The author has determined the positions of equilibrium of the systems in a circular orbit and cites the stability conditions. For both systems it was possible to determine the parameters optimum with respect to speed. Also examined are suspensions of the translational, rotational and mixed types.  
[290]

#### INFRARED RADIATION OF VENUSIAN CLOUDS

Moscow REFERATIVNYY ZHURNAL 62. ISSLEDOVANIYE KOSMICHESKOGO PROSTRANSTVA, OTDEL'NYY VYPUSK in Russian No 12, 1976 12.62.188

[Abstract of preprint by L. V. Ksanfomaliti, Ye. V. Dedova, L. F. Obukhova, N. V. Temmaya and G. F. Filippov; Moscow, INFRAKRASNOYE IZLUCHENIYE OBLAKOV VENERY (IR Radiation of Venusian Clouds), Space Research Institute USSR Academy of Sciences, Preprint 288, 1976, 24 pages]

[Text] The thermal IR radiation of Venus measured by the "Venera-9" and "Venera-10" has demonstrated a considerable asymmetry in the day-night direction. The emission of the nighttime side corresponds to a brightness temperature of 244°K. The brightness temperature of the daytime side is 233-243°K. The extent of the upper layer of clouds in which the thermal radiation is formed is 4-6 km. The altitude of the emitting layer above the planetary surface (64-67 km) was determined on the basis of the brightness temperature and existing models of the Venusian atmosphere. In some cases there is a correlation between inhomogeneities and details in the UV image. The daytime temperatures strangely coincide with the freezing point of sulfuric acid with a concentration of 66-77%.  
[303]

#### PERTURBATIONS FROM GEOPOTENTIAL IN QUASIPARABOLIC MOTION

Moscow REFERATIVNYY ZHURNAL 62. ISSLEDOVANIYE KOSMICHESKOGO PROSTRANSTVA, OTDEL'NYY VYPUSK in Russian No 12, 1976 12.62.281

[Abstract of article by P. A. Petroshkyavichyus; Vil'nyus, VOZMUSHCHENIYA OT GEOPOTENTIALA V BLIZPARABOLICHESKOM DVIZHENII (Perturbations from Geopotential in Quasiparabolic Motion), Vil'nyus Civil Engineering Institute, Geodesy Department, 1976, 15 pages [Manuscript deposited at the Lithuanian Scientific Research Institute of Technical Information, 29 July 1976, No 134-76]]

[Text] On the basis of expansions of the coordinates of unperturbed motion and the differential Lagrange equations derived by the author a study was made of perturbations of quasiparabolic orbits of artificial earth satellites under the influence of geopotential. The perturbations from the second zonal harmonic of geopotential are obtained separately.

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#### HEAT REGIME OF "INTERKOSMOS" SATELLITES

Moscow REFERATIVNYY ZHURNAL 62. ISSLEDOVANIYE KOSMICHESKOGO PROSTRANSTVA, OTDEL'NYY VYPUSK in Russian No 10, 1976 10.62.334

[Abstract of article by V. M. Kovtunenکو, A. I. Kopyl, P. A. Latayko and Yu. V. Petrov; Kiev, KOSMICH. ISSLED. NA UKRAINE. RESP. MEZHVED. SB., No 8, 1976, pp 3-14, "Heat Regime of 'Interkosmos' Satellites Oriented on the Sun"]

[Text] On the assumption of ideal triaxial orientation on the sun the authors have obtained analytical dependences for computing solar radiation reflected from the earth and the characteristic thermal radiation of the earth on an arbitrary surface element with a nonstationary state taken into account, the latter being caused by the kinematic peculiarities of motion of an artificial earth satellite. The authors give the structure and a brief description of the heat-regulating system for the artificial earth satellites "Interkosmos-1" and "Interkosmos-4," methods for ensuring the heat regime of the scientific instrumentation and some data on the temperatures registered during the period of orbital flight of an artificial earth satellite. Bibliography of five items.

[290]

#### METHOD FOR ORIENTING SATELLITE USING MAGNETOMETER READINGS

Moscow REFERATIVNYY ZHURNAL 62. ISSLEDOVANIYE KOSMICHESKOGO PROSTRANSTVA, OTDEL'NYY VYPUSK in Russian No 12, 1976 12.62.300

[Abstract of article by V. A. Kudryavtsev; POSTROYENIYE NULEVOGO PRIBLIZHENIYA V ZADACHE ODNOVEKTORNOGO KONTROLYA ORIYENTATSII ISZ PO POKAZANIYAM MAGNITOMERA (Obtaining a Zero Approximation in the Problem of a Single-Vector Control of the Orientation of Artificial Earth Satellites on the Basis of Magnetometer Readings), Leningrad, Leningrad Forestry Academy, 1976, 21 pages [Manuscript deposited at the All-Union Institute of Scientific and Technical Information, 20 August 1976, No 3174-76DEP]]

[Text] This unpublished article gives a brief formulation of the problem of single-vector control of the orientation of an artificial earth satellite on the basis of magnetometer readings. The coefficients of the trigonometric approximation of the angles of orientation of the artificial earth satellite are obtained in a zero approximation by nonstatistical methods using a pseudoinverse matrix. Final formulas are given for computing the zero approximation coefficients.

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#### PERIODIC OSCILLATIONS OF SATELLITE IN CIRCULAR ORBIT

Moscow REFERATIVNYY ZHURNAL 62. ISSLEDOVANIYE KOSMICHESKOGO PROSTRANSTVA, OTDEL'NYY VYPUSK in Russian No 12, 1976 12.62.289

[Abstract of preprint by N. V. Mel'nik; Moscow, PERIODICHESKIYE KOLEBANIYA SPUTNIKA NA KRUGOVOY ORBITE S UCHETOM VLIYANIYA SOPROTIVLENIYA ATMOSFERY (Periodic Oscillations of a Satellite in a Circular Orbit with Allowance for Influence of Atmospheric Drag), Institute of Applied Mathematics, Preprint No 97, 1976, 37 pages]

[Text] The author has obtained a general solution of an equation describing the plane oscillations of an artificial earth satellite in a circular orbit. It is postulated that the artificial earth satellite is acted upon by gravitational and aerodynamic moments. The author has investigated  $2\pi$ -periodic solutions of an equation describing the oscillations of an artificial earth satellite in a circular orbit in dependence on the change in the aerodynamic parameter.

[303]

#### FLYING SAUCERS DISCUSSED

Moscow REFERATIVNYY ZHURNAL 62. ISSLEDOVANIYE KOSMICHESKOGO PROSTRANSTVA, OTDEL'NYY VYPUSK in Russian No 12, 1976 12.62.426

[Abstract of article by Jan Molski; Warsaw, ASTRONAUTYKA, 19, No 2, 1976, pp 10-16, "Visits from Other Worlds"]

[Text] In connection with the problem of the existence of extraterrestrial civilizations the author discusses the problem of flying saucers. It is noted that there is no adequate and reliable information on this subject but it is necessary to carry out more careful investigations of "suspicious" cases.

[303]

#### BROCHURE ON INVESTIGATIONS OF LIFE IN SPACE

Moscow REFERATIVNYY ZHURNAL 62. ISSLEDOVANIYE KOSMICHESKOGO PROSTRANSTVA, OTDEL'NYY VYPUSK in Russian No 12, 1976 12.62.420K

[Abstract of brochure by L. V. Fesenkova; Moscow, METODOLOGICHESKIYE ASPEKTY ISSLEDOVANIY ZHIZNI V KOSMOSE (Methodological Aspects of Investigations of Life in Space), "Nauka," 1976, 128 pages]

[Text] Contents: Chapter 1. The Concepts of a Multiplicity of Habited Worlds and the Nature of the Universe; Chapter 2. Science and the Scientific Philosophy of Life in the Universe; Chapter 3. Theoretical-Empirical Problems in the Investigation of Extraterrestrial Life.

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#### CIRCUITRY FOR SPECIAL PROBLEMS IN TELEMETRY

Moscow REFERATIVNYY ZHURNAL 62. ISSLEDOVANIYE KOSMICHESKOGO PROSTRANSTVA, OTDEL'NYY VYPUSK in Russian No 12, 1976 12.62.367

[Abstract of article by H.-J. Fischer; Berlin, NACHRICHTENTECHN.-ELEKTRON., 26, No 5, 1976, pp 170-172, "Circuitry for Special Problems in Telemetry"]

[Text] The author examines circuits for the compression and transmission of information from artificial earth satellites of the Interkosmos series proposed by the Electronics Institute GDR. The article discusses promising circuits for space telemetry. Bibliography of 15 items.

[303]

#### JURIDICAL ASPECTS OF LUNAR AND PLANETARY EXPLORATION

Moscow REFERATIVNYY ZHURNAL 62. ISSLEDOVANIYE KOSMICHESKOGO PROSTRANSTVA, OTDEL'NYY VYPUSK in Russian No 1, 1977 1.62.9

[Abstract of article by Krystyna Wiewiorowska; Warsaw, ASTRONAUTYKA, 19, No 3, 1976 pp 19-21, "Juridical Aspects of Exploration of the Moon and Planets"]

[Text] The article discusses the problem of exploration of the moon and planets in the light of existing space law norms. The author lists the presently valid international agreements and the principal provisions of the draft of the "Treaty on the Moon" proposed by the USSR in the United Nations in May 1971. It has been noted that up to this time in space law there has been no definition of the concept "celestial body" (the definitions of this concept existing in other sciences are ill-suited for the solution of juridical problems). The conviction is expressed that the signing and ratification of a treaty on the moon will be advantageous for the moon being used for peaceful purposes for the welfare of all mankind.

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#### CONTAMINATION OF EXTRATERRESTRIAL SPACE

Moscow REFERATIVNYY ZHURNAL 62. ISSLEDOVANIYE KOSMICHESKOGO PROSTRANSTVA, OTDEL'NYY VYPUSK in Russian No 1, 1977 1.62.10

[Abstract of article by Romuald Lipnicki; Warsaw, ASTRONAUTYKA, 19, No 3, 1976, pp 14-16, "Contamination of Extraterrestrial Space"]

[Text] This is a discussion of the problems related to the contamination of circumterrestrial space by used-up space objects and contamination of the moon and other celestial bodies. Particular attention is given to the matter of the possible drifting of extraterrestrial substances onto the earth which could exert a harmful influence on terrestrial life. The author mentions the steps taken at the UN and by its specialized committees for the purpose of preventing and eliminating the contamination of space.

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#### USE OF OPTICAL INSTRUMENTS IN COSMONAUTICS

Moscow REFERATIVNYY ZHURNAL 62, ISSLEDOVANIYE KOSMICHESKOGO PROSTRANSTVA, OTDEL'NYY VYPUSK in Russian No 1, 1977, 1.62.147

[Abstract of article by Lecz Sztandar; Warsaw, ASTRONAUTYKA, 19, No 3, 1976, pp 22-24, "Some Optical Instruments and Their Use in Cosmonautics"]

[Text] The article gives a description of the IR light detectors and UV spectrometers and polarimeters which were used on space vehicles for investigating the sun and a number of planets of the solar system. There is also brief mention of the use of laser instruments and holography in cosmology. The author notes the work of Polish scientists in the investigation of space. Bibliography of nine items.

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#### RADIOMETER FOR INVESTIGATING EARTH'S ATMOSPHERE

Moscow REFERATIVNYY ZHURNAL 62. ISSLEDOVANIYE KOSMICHESKOGO PROSTRANSTVA, OTDEL'NYY VYPUSK in Russian No 1, 1977, 1.62.158

[Abstract of article by G. S. Bordonskiy; Moscow, RADIOMETR NA CHASTOTY 108-120 GHz DLYA ISSLEDOVANIY ATMOSFERY ZEMLI (Radiometer Operating at a Frequency of 108-120 GHz for Investigating the Earth's Atmosphere), Preprint, Space Research Institute USSR Academy of Sciences, Pr-281, 1976, 28 pages]

[Text] The article describes a superheterodyne radiometer operating at a frequency of 108-120 GHz. The peculiarities of the receiver are modulation at an intermediate frequency and the use of a harmonic frequency converter which has simplified design of the system. The fluctuation threshold of radiometer response is 1 K with a time constant of one second.

[294]

#### UV PHOTOMETRY OF STARS FROM ARTIFICIAL EARTH SATELLITES

Moscow REFERATIVNYY ZHURNAL 62. ISSLEDOVANIYE KOSMICHESKOGO PROSTRANSTVA, OTDEL'NYY VYPUSK in Russian No 1, 1977 1.62.161

[Abstract of article by A. M. Eerme; --, IZV. KRYM. ASTROFIZ. OBSERV., 55, 1976, pp 200-207, "Results of Ultraviolet Photometry of Stars Aboard the Artificial Earth Satellite 'Kosmos-215'"]

[Text] The artificial earth satellite "Kosmos-215" carried parallelly directed telescopes with photometers for registering the brightness of stars in the UV spectral region  $\lambda 2740$  ( $\Delta\lambda = 120$  A) and  $\lambda 2275$  ( $\Delta\lambda = 110$  A). The stars were identified using a magnetometer and two photometers for registering the radiation fluxes from stars in bands close to the bands of the B and V systems. For 36 stars it was possible to determine the monochromatic fluxes of radiation; for 15 of them the authors made a comparison with other measurements.

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## OBSERVATIONS OF CLOUD LAYER OF VENUS

Moscow REFERATIVNYY ZHURNAL 62. ISSLEDOVANIYE KOSMICHESKOGO PROSTRANSTVA, OTDEL'NYY VYPUSK in Russian No 12, 1976 12.62.185

[Abstract of article by V. I. Moroz, N. A. Parfent'yev, N. F. San'ko, V. S. Zhegulev, L. V. Zasova and Ye. A. Ustinov; Moscow, PREDVARITEL'NYYE REZULTATY UZKOPOLOSNOGO FOTOMETRICHESKOGO ZONDIROVANIYA OBLACHNOGO SLOYA VENERY V OBLASTI SPEKTRA 0.80-0.87 $\mu$  m NA SPUSKAYEMYKH APPARATAKH "VENERA-9" I "VENERA-10" (Preliminary Results of Narrow-Band Photometric Sounding of the Cloud Layer of Venus in the Spectral Region 0.80-0.87 $\mu$  m on the Descent Vehicles of the "Venera-9" and "Venera-10"), Space Research Institute, 1976, Preprint 272, 10 pages]

[Text] In the experiment the authors used three filters centered on the wavelengths:  $\lambda$  8000 -- continuous spectrum;  $\lambda$  8200 -- H<sub>2</sub>O absorption band;  $\lambda$  8700 -- CO<sub>2</sub> absorption band. Approximate estimates were made using asymptotic formulas for the intensities of transmitted and reflected radiation and the intensity within the layer. It was possible to use a particle radius  $r \approx 1\mu$  m. It is emphasized that the extrapolation of this value to depths below 50 km is unreliable. It was discovered once again that large radiation fluxes penetrate into the deep layers of the atmosphere as far as the surface, which is a necessary condition for operation of the greenhouse effect. It was found that the main cloud layer is situated above 50 km and is characterized by a mean scattering coefficient  $\sim 10^{-5}$  cm<sup>-1</sup>. There may be a second cloud layer at 35-45 km with an upper limit of the scattering coefficient  $\sim 5 \cdot 10^{-6}$  cm<sup>-1</sup>. Below 35 km the attenuation of radiation is caused by scattering in a gas Rayleigh atmosphere. It was found that the cloud layer consists of individual formations measuring from 100 m to several kilometers. In an analysis of measurements in the CO<sub>2</sub> and H<sub>2</sub>O bands the authors obtained a ratio of H<sub>2</sub>O/CO<sub>2</sub> contents of  $\sim 10^{-3}$  in the altitude range 25-45 km. The article gives an analysis of measurements using the automatic interplanetary station Venera-9 and Venera-10; this is regarded as a first approximation. Bibliography of 31 items.

[303]

## DEVICE FOR ASTROORIENTATION OF TELESCOPE

Moscow REFERATIVNYY ZHURNAL 62. ISSLEDOVANIYE KOSMICHESKOGO PROSTRANSTVA, OTDEL'NYY VYPUSK in Russian No 11, 1976 11.62.114P

[Abstract of patent by B. K. Chemodanov, V. L. Danilov, V. D. Nefedov and M. V. Zavadskaya; Moscow, Author's Certificate USSR, No 1968563, published 5 January 1976, "Device for Astroorientation of Telescopes"]

[Text] This patent describes a new system for automatic control of the position of a telescope in space. In already existing devices of this type the orientation accuracy is inadequate as a result of transformation errors and the influence of kinematic suspension errors. The proposed device differs from those already known in that the external axes of the supporting-rotating Cardan joints of the astrosensors with two degrees of freedom are mounted parallel to the optical axis of the space telescope and the internal axes -- perpendicular to it. This increases the orientation accuracy because kinematic errors and transformation errors are excluded.  
[301]

#### DEVICE FOR MEASURING SATELLITE COORDINATES

Moscow REFERATIVNYY ZHURNAL 62. ISSLEDOVANIYE KOSMICHESKOGO PROSTRANSTVA, OTDEL'NYY VYPUSK in Russian No 11, 1976 11.62.248P

[Abstract of patent by Zbigniew Boenigk; Warsaw, Polish People's Republic Patent No 75541, published 15 January 1975, "Apparatus for Measuring Artificial Earth Satellite Coordinates"]

[Text] For automation of observations and rapid determination of the position of artificial earth satellites (AES) in the celestial sphere the author proposes that a diaphragm with several groups of parallel slits situated at angles of  $180^\circ$  relative to one another be mounted in the focal plane of the optical system (in the figure shown in the form of two -- larger and smaller -- equilateral triangles, the centers of which coincide). The coordinates of the AES are determined by photoelectric registry of the moments of passage of the AES across the slits with a stipulated position of the optical axis of the instrument and the shortest distance between the slits.  
[301]

#### MONOGRAPH ON TECHNICAL MECHANICS OF FLIGHTCRAFT

Moscow REFERATIVNYY ZHURNAL 62. ISSLEDOVANIYE KOSMICHESKOGO PROSTRANSTVA, OTDEL'NYY VYPUSK in Russian No 10, 1976 10.62.282

[Abstract of monograph (unsigned); Kiev, TEKHNIЧЕСКАЯ МЕХАНИКА ЛЕТАТЕЛЬНО-APPARATOV (Technical Mechanics of Flightcraft), KOSMICH. ISSLEDOVANIYA NA UKRAINE. RESP. MEZHVED. SB., No 8, "Nauk. Dumka," 1976, 116 pages]

[Text] The monograph discusses the heat regimes and aerodynamics of AES, some problems in aerodynamics, trajectory problems of spacecraft, stability of hydraulic systems, including high-rpm centrifugal-endless screw pumps.

Also discussed are the problems of reliability of systems and the lifetime of some construction components of flightcraft and also the development of promising elements of functional elements of on-board systems on the basis of chalcogenide semiconductors.

[290]

#### ALTITUDE OF ELECTROSPHERE

Moscow REFERATIVNYY ZHURNAL, GEOFIZIKA, SVODNYY TOM in Russian No 1, 1977  
1A36

[Abstract of article by V. M. Boyko and I. G. Deminov; Moscow, FIZ. IONOSFERY. KRATK. SOOBSHCHENIYA, "Nauka," 1976, pp 29-30, "Altitude of the Electrosphere"]

[Text] The authors have evaluated the altitude of the electrosphere on the basis of solution of the problem of the propagation of an electric charge in the atmosphere with a vertically inhomogeneous electric conductivity  $\sigma$ . The authors used a model of a spherical capacitor. It was assumed that  $\sigma$  is homogeneous and isotropic in any spherical layer with the thickness  $h$  and is dependent only on its mean altitude. The solutions for an experimental vertical  $\sigma$  profile made it possible to draw the following conclusions: 1) the potential of the electrosphere is evened out vertically in a time of about five seconds; 2) the time constant of charge propagation for the electrosphere is about 30 minutes, from which it follows that the lower boundary of the electrosphere is at an altitude of about 30 km. Bibliography of two items.

[276]

#### INTERPRETATION OF OPTICAL DATA FROM "VENERA-8"

Moscow REFERATIVNYY ZHURNAL, GEOFIZIKA, SVODNYY TOM in Russian No 1, 1977  
1A52K

[Abstract of preprint by T. A. Germogenova, N. V. Konovalov, N. L. Lukashchevich and Ye. M. Feygel'son; Moscow, UTOCHENIYE INTERPRETATSII OPTICHESKIKH IZMERENIY NA AMS "VENERA-8" (Refinement of Optical Measurements on the Automatic Interplanetary Station "Venera-8"), Institute of Applied Mathematics USSR Academy of Sciences, Preprint No 93, 1976, 30 pages]

[Text] In the interpretation of optical measurements carried out aboard the automatic interplanetary station "Venera-8" the authors used asymptotic formulas for solving the transfer equation in layered plane media.

The article examines very simple models of the atmosphere of Venus consisting of two or three homogeneous layers. The authors determine the regions of change in the optical parameters of selected models and surface albedo, taking into account the scatter of experimental data.  
[276]

#### DIURNAL CHANGES IN NEUTRAL AND IONIZED COMPONENTS OF ATMOSPHERE

Moscow REFERATIVNYY ZHURNAL, GEOFIZIKA, SVODNYY TOM in Russian No 1, 1977, 1A108

[Abstract of article by A. A. Pokhunkov, S. V. Gorbunov, R. F. Starostina and A. N. Seleverstova; Moscow, FIZ. IONOSFERY. KRATK. SOOBSHCHENIYA, "Nauka," 1976, pp 85-86, "Correlation Between Diurnal Changes in Neutral and Ionized Components of the Atmosphere at Altitudes Greater than 230 km"]

[Text] The paper gives the diurnal variation of the ratio of  $n(O)$  to  $n(N_2)$  concentrations obtained in mass-spectrometer measurements at an altitude of 230 km in the middle latitudes under conditions of weak magnetic disturbance in December 1967 on the satellite "Kosmos-169." The variations of this ratio from night to day fall in the range from 5.5 to 10 for an altitude of 270 km and from 32 to 57 for an altitude of 400 km. It was possible to estimate the temperature of the neutral atmosphere on the basis of the vertical variation of  $O/N_2$  for these altitudes ( $1000^\circ K \pm 10\%$ ). The authors note a decrease in the  $O/N_2$  ratio with an increase in geomagnetic activity. On the basis of an analysis of the collected data it is concluded that there is a control of the ionosphere by the neutral atmosphere by means of dynamic processes not only during a period of geomagnetic disturbances, but also during quiet periods during the daytime. Bibliography of four items.  
[276]

#### APPLICATION OF IMAGE RECOGNITION THEORY FOR MULTIZONAL AEROSPACE PHOTOS

Moscow REFERATIVNYY ZHURNAL 62. ISSLEDOVANIYE KOSMICHESKOGO PROSTRANSTVA, OTDEL'NYY VYPUSK in Russian No 12, 1976 12.62.143

[Abstract of article by I. G. Rozanov and A. P. Tishchenko; Moscow, MNOGOZONAL'N. AEROKOSMICH. S"YEMKA I YEYE ISPOL'Z. PRI IZUCH. PRIROD. RESURSOV, Moscow University, 1976, pp 138-144, "Problems in Application of Image Recognition Theory to the Automation of Interpretation of Multizonal Aerospace Photographs"]

[Text] A method is proposed for solving the problem of recognizing the images of geographical features. It is based on the principle of minimizing the "mean risk." The authors use a method related to restoration of the probability distribution function. The article gives an example of use of the proposed recognition system for the numerical interpretation of two types of objects extremely close in their brightness interpretation criteria.

[303]

#### AZIMUTHAL DRIFT OF P11B SOURCE

Moscow REFERATIVNYY ZHURNAL 62. ISSLEDOVANIYE KOSMICHESKOGO PROSTRANSTVA, OTDEL'NYY VYPUSK in Russian No 12, 1976 12.62.233

[Abstract of article by V. A. Parkhomov, R. A. Rakhmatulin, S. I. Solov'yev, T. N. Polyushkina and L. M. Barkova; Moscow, ISSLED. PO GEOMAGNETIZMU, AERON. I FIZ. SOLNTSA, No 39, "Nauka," 1976, pp 33-38, "Azimuthal Drift of P11B Source"]

[Text] A study was made of the latitudinal-longitudinal distribution of the intensity of P11B pulsations in the course of the explosive phase of a substorm. It is shown that the region of generation of successive bursts of P11B, accompanying the explosive phase of a substorm, has a longitudinal extent of about 30° and moves in a jump toward the west. There was found to be a regular westerly drift of the P11B source with a velocity of 3-14 degrees per minute which can be associated with propagation of a convective wave in the tail of the magnetosphere. Bibliography of 17 items.

[303]

#### JOINT SOVIET-GERMAN STUDY OF GEOMAGNETIC PULSATIONS

Moscow REFERATIVNYY ZHURNAL 62. ISSLEDOVANIYE KOSMICHESKOGO PROSTRANSTVA, OTDEL'NYY VYPUSK in Russian No 12, 1976 12.62.236

[Abstract of article by L. N. Baranskiy, M. B. Gokhberg, V. A. Troitskaya, I. V. Sterlikova, B. N. Belen'kaya, N. N. Rusakov, I. Munch, K. Wilhelm, M. Ziebert, O. Hildebrandt, P. A. Vinogradov, I. P. Kharchenko, N. A. Ivanov, V. V. Paramonov, Ya. M. Gogatishvili and N. A. Kopytenko; Moscow, ISSLED. PO GEOMAGNETIZMU, AERON. I FIZ. SOLNTSA, No 39, "Nauka," 1976, pp 47-58, "Preliminary Results of Soviet-German Experiment with the Synchronous Registry of Geomagnetic Pulsations in a Global Network of Stations"]

[Text] Synchronous observations of pulsations were made along two profiles (lat 115°, lon 35-65° and lat 90-154°, lon 50°). The study gave the meridional distributions of the intensity of Pc3-4, Pi2 and their diurnal variation. Along the latitudinal profile there are "antiphase" distributions of the amplitudes  $H_x$  and  $H_y$  of the Pc3-4 and Pi2 fields. The authors note a diurnal variation of the polarization of Pc3-4 and a left rotation of the total vector of the Pi2 field independently of LT, and also an increase in the phase shift of Pc3-4, Pi2 with an increase in T. The results show that the correlation between the meridional distribution of the intensity of pulsations and the position of the projection of the plasmopause onto the earth's surface is not as simple as was assumed up to this time. Bibliography of 18 items.

[303]

#### RELATIVISTIC SPACESHIP WITH CONSTANT REST MASS

Moscow REFERATIVNYY ZHURNAL 62. ISSLEDOVANIYE KOSMICHESKOGO PROSTRANSTVA, OTDEL'NYY VYPUSK in Russian No 12, 1976 12.62.428

[Abstract of article by B. K. Fedyushkin; Moscow-Leningrad, PROBL. PROISKHOZHDENIYA TEL SOLNECH. SISTEMY, 1975, pp 306-310, "On the Theory of a Relativistic Spaceship with a Constant Rest Mass"]

[Text] A study was made of the principles of the theory of a relativistic spaceship with a constant rest mass which uses interstellar hydrogen and has a screen for its collection. The examination is made on the basis of the Meshcherskiy generalized relativistic equation and a method developed by the author in earlier articles. It is demonstrated as a result of the theoretical investigation presented here that a Bussar vehicle is not the only possible relativistic spaceship with a constant rest mass and is physically less sound than the relativistic spaceship considered in the article. Bibliography of six items.

[303]

#### MOTION OF SATELLITE WITH A MAGNETIC DAMPER

Moscow REFERATIVNYY ZHURNAL 62. ISSLEDOVANIYE KOSMICHESKOGO PROSTRANSTVA, OTDEL'NYY VYPUSK in Russian No 11, 1976 11.62.253

[Abstract of article by K. K. Lavrinovich; Kaliningrad, SB. RABOT PO TEORII OPTIMAL'N. PROTSESOV. KALININGR. UN-T, 1975, No 2, pp 214-239, "On Plane Perturbed Motion Relative to the Center of Mass of a Satellite with a Magnetic Damper"]

The paper examines nonlinear oscillations of artificial earth satellites with a magnetic damper in the plane of a circular polar orbit under the influence of gravitational and some perturbing moments. An approximate solution is obtained by the method of averaging for resonance and nonresonance regimes. For the case of a nonresonance regime the author has obtained an analytical dependence between amplitude and time. A study was made of the possibility of appearance of a stationary resonance regime in dependence on the frequency and parameters of the system. It is shown that in a broad range of values of parameters of the system the only possible motion is an attenuating oscillatory process. Bibliography of eight items.

[301]

#### DAMPING OF NUTATIONAL MOTION OF SATELLITES

Moscow REFERATIVNYY ZHURNAL 62. ISSLEDOVANIYE KOSMICHESKOGO PROSTRANSTVA, OTDEL'NYY VYPUSK in Russian No 11, 1976 11.62.258

[Abstract of article by V. A. Sarychev and V. V. Sazonov; --, CELEST. MECH., 13, No 3, 1976, pp 383-405, "Optimum Damping of Nutational Motion of Satellites Stabilized by Rotation"]

[Text] A study was made of the dynamics of one system for damping the nutational motion of a satellite stabilized by rotation. The influence of the external moments acting on the satellite was not taken into account. The authors derived the equations of motion for the satellite-damper system and the conditions of stability for stationary rotations. They also determined the optimum parameters of the satellite and damper ensuring the maximum rate of extinction of the nutational motion of the satellite. Bibliography of 14 items.

[301]

#### CORRECTION OF KINETIC MOMENT OF STABILIZED SPACECRAFT

Moscow REFERATIVNYY ZHURNAL 62. ISSLEDOVANIYE KOSMICHESKOGO PROSTRANSTVA, OTDEL'NYY VYPUSK in Russian No 10, 1976 10.62.261

[Abstract of article by A. P. Alpatov and V. S. Khoroshilov; Kiev, KOSMICH. ISSLED. NA UKRAINE. RESP. MEZHVED. SB., No 8, 1976, pp 92-95, "Magnetic System for Correcting the Kinetic Moment of Precisely Stabilized Spacecraft"]

[Text] The authors investigated the peculiarities of construction of a magnetic correction system (MCS) for the kinetic moment of a spacecraft with a precise orientation system. The article examines the possibility

of correcting the kinetic moment of a spacecraft by a correcting moment approximately equal in value to the perturbed value. An analysis is then given for an algorithm for the control of the MCS with a continuously functioning system. The results can be used in constructing orientation systems for spacecraft invariant to external perturbations. Bibliography of five items.

[290]

#### PROBLEMS IN SPACE LAW

Moscow REFERATIVNYY ZHURNAL 62. ISSLEDOVANIYE KOSMICHESKOGO PROSTRANSTVA, OTDEL'NYY VYPUSK in Russian No 1, 1977 1.62.7

[Abstract of article (unsigned); Warsaw, ASTRONAUTYKA, 19, No 3, 1976, pp 12-14, "Problems in Space Law"]

[Text] This is a report on the Second National Conference on Problems in Space Law held on 28 November 1975 at Katowice (Polish People's Republic). The following reports were presented: "Space Law in the UN," "Some Political-Juridical Problems in the Use of Space for Peaceful Purposes," "Juridical Regulation of Use of the Natural Resources of Celestial Bodies in Our Solar System," "Registry of Space Objects in the Light of the New Convention" and "The Problem of Protection Against Potentially Harmful Aftereffects of Experiments in Space and on Other Celestial Bodies of Our Solar System." Discussions were held after the reports.

[294]

#### DIELECTRIC CONSTANT OF SURFACE LAYER OF MARS

Moscow REFERATIVNYY ZHURNAL 62. ISSLEDOVANIYE KOSMICHESKOGO PROSTRANSTVA, OTDEL'NYY VYPUSK in Russian No 1, 1977 1.62.179

[Abstract of preprint by N. N. Krupenio; KARTA DIELEKTRICHESKOY PRONITSA-YEMOSTI VESHCHESTA POVERKHNOSTNOGO SLOYA MARSA (Map of the Dielectric Constant of Matter in the Surface Layer of Mars), Moscow, Space Research Institute USSR Academy of Sciences, Preprint 275, 1976, 11 pages]

[Text] The map was compiled on the basis of data from radiophysical investigations of Mars carried out from aboard the automatic interplanetary stations Mars-3 and Mars-5 at a wavelength  $\lambda_0 = 3.4$  cm and using data from ground radar measurements of 1965-1971 carried out at wavelengths of 3.8 and 12.5 cm. The minimum linear resolution along the surface is 70 cm. The map was compiled for five gradations of the dielectric constant: 2.1; 2.1-2.7; 2.7-3.4; 3.4-4.2; > 4.2, which corresponds to the following

gradations in evaluation of ground density:  $\rho < 0.9$ ; 0.9-1.3; 1.3-1.7; 1.7-2.1;  $> 2.1 \text{ gcm}^{-3}$ . Data on the dielectric constant are related to the upper layer of Martian ground with an average thickness of up to 2 m.  
[294]

#### MULTIZONAL SURVEY FOR INVESTIGATING WATER BODIES

Moscow REFERATIVNYY ZHURNAL 62. ISSLEDOVANIYE KOSMICHESKOGO PROSTRANSTVA, OTDEL'NYY VYPUSK in Russian No 1, 1977 1.62.272

[Abstract of article by T. G. Svatkova; Moscow, MNOGOZONAL'N. AEROKOSMICH. S"YEMKA I YEYE ISPOL'Z. PRI IZUCH. PRIROD. RESURSOV, Moscow University, 1976, pp 65-69, "Use of a Multizonal Survey for an Investigation of Water Bodies"]

[Text] On the basis of the results of interpretation of water bodies on photographs taken from the Salyut spaceship and the Meteor artificial earth satellite, and also using materials from research in the United States, the following recommendations were made. Multizonal photographs with a high resolution can be used for making an inventory of water bodies (photographs taken in the IR spectral region are most informative for this purpose). A space survey with a low resolution can be used for investigating the course of the largest rivers, for obtaining routine information on their ice regime and for mapping the snow cover of large watersheds. The data from space photographs make it possible to carry out modeling of the water regime of rivers and make it possible to study the dynamics of processes by means of carrying out repeated surveys and predict runoff as well at the onset of unfavorable phenomena (flooding or drying-up of rivers).  
[294]

#### SATELLITE OBSERVATIONS OF METAGALACTIC BACKGROUND AND GALACTIC GAMMA RADIATION

Moscow PIS'MA V ASTRONOMICHESKIY ZHURNAL in Russian Vol 2, No 12, 1976 pp 563-567

[Article by Ye. P. Mazets, S. V. Golenetskiy and V. N. Il'inskiy, Physical-Technical Institute USSR Academy of Sciences, "Isotropic Metagalactic Background and Gamma Radiation of the Galaxy in the Range 0.03-4.1 MeV According to Observations Aboard the Artificial Earth Satellite 'Kosmos-461'"]

[Abstract] This article gives the results of an experimental investigation of the degree of isotropy of the diffuse background and observations of considerably weaker radiation of the Galaxy. They are based on an analysis of data on cosmic  $\gamma$ -radiation in the range 30 keV-4.1 MeV, registered with a scintillation  $\gamma$ -spectrometer aboard the "Kosmos-461" satellite during a three-month period of work from December 1971 through March 1972. The experiment was made using an omnidirectional detector of  $\gamma$ -quanta (NaI(Tl) crystal measuring 70 x 70 mm), which could not give direct information on the angular characteristics of the radiation. For studying the angular distributions the authors used the successive occultation of different parts of the celestial sphere (possibly differing in the brightness of emission in gamma-rays) by the earth. The measurements made it possible to establish the isotropicity of the diffuse background and to discriminate a small anisotropic component caused by gamma-radiation of the Galaxy.

[255]

#### EMISSION VARIABILITY OF SCO X-1

Moscow PIS'MA V ASTRONOMICHESKIY ZHURNAL in Russian Vol 2, No 12, 1976, pp 568-573

[Article by Ye. I. Moskalenko, Ye. K. Sheffer, V. G. Kurt, P. I. Klimuk, V. I. Sevast'yanov and L. G. Titarchuk, Space Research Institute and State Astronomical Institute, "Variability of Emission of the Source Sco X-1 According to Observations Aboard the 'Salyut-4' Station"]

[Abstract] The authors give the results of observations of Sco X-1 on 3 June and 5 July 1975 using the "Filin" x-ray spectrometer. On 3 June there was a strong variability of emission in the energy region 0.2-2 keV which can be interpreted as the appearance of an additional "soft" source. On 5 July there was a slow change in the spectral characteristics of the source without a significant change in the mean flux value. The results are interpreted within the framework of a model of Sco X-1 as a neutron star in a binary system.

[255]

#### DETERMINATION OF SATELLITE CAMERA PARAMETERS

Moscow REFERATIVNYY ZHURNAL 62. ISSLEDOVANIYE KOSMICHESKOGO PROSTRANSTVA, OTDEL'NYY VYPUSK in Russian No 1, 1977 1.62.287

[Abstract of article by Tsv. Darakchiyev; Sofiya, IZV. GL. UPR. GEOD. I KARTOGR., No 4, 1975, pp 14-24, "Determination of the Optical Center of a Photograph, Focal Length and Distortion Coefficient for a Satellite Camera Objective"]

[Text] The paper gives an algorithm for the calibration of satellite cameras on the basis of star photographs making it possible to determine both the elements of inner orientation (coordinates of the optical center, focal length) and the distortion values along two mutually perpendicular axes. In the algorithm an ideal photograph is regarded as the central projection of a part of the star sky; the center of the projection coincides with the rear nodal point of the objective for the camera to be calibrated. The reference values are the equatorial coordinates of stars taken from the catalogue with the introduction of the necessary corrections. On the photograph there must be images of not less than three stars, but it is possible to use a greater number of stars of an identical star magnitude and uniformly distributed over the entire field of the photograph.  
[294]

#### SPECTROPHOTOMETRIC OBSERVATIONS OF ARTIFICIAL CHEMILUMINESCENT CLOUDS

Moscow REFERATIVNYY ZHURNAL, GEOFIZIKA, SVODNYY TOM in Russian No 1, 1977  
1A90

[Abstract of article by V. N. Balabanova, K. D. Bychkova and V. N. Lebedinets; Moscow, TRUDY INSTITUTA EKSPERIM. METEOROL. GUGMS, No 4(61), 1976, pp 125-135, "Investigation of the Upper Atmosphere Using Spectrophotometric Observations of Artificial Chemiluminescent Clouds"]

[Text] The authors have investigated the possible effect of reagents on some components of the upper atmosphere (N, O), during interaction with which there are chemiluminescent reactions with emission in different parts of the spectrum, which will make it possible to carry out remote optical observations of the developing luminescent clouds from the earth's surface. A detailed study was made of the effect of reagents on atomic nitrogen. The article describes the results of laboratory investigations of the corresponding reactions and also the method used, instrument and apparatus employed and the results of the experiments. The results of measurements of the concentration of atomic nitrogen by the method of artificial luminescent clouds are compared with data from rocket mass spectrometer measurements. It was possible to detect systematic variations of [N] with the phase of solar activity and also irregular rapid changes with a great amplitude. Also considered are possible reasons for these variations. Bibliography of 26 items.  
[276]

## VI. MISCELLANEOUS

### News

#### OPERATIONS AT "DRUZHNAVAYA" ANTARCTIC STATION

Moscow PRAVDA in Russian 14 Feb 77 p 4

[Article by V. Bardin: "We are from Station 'Druzhnaya'"]

[Text] The 22d Soviet Antarctic Expedition is continuing its work on the distant ice plateau. One of the groups of polar specialists is working at "Druzhnaya" station, from where a regular communication has been received in the editorial offices from our special correspondent.

Every morning, provided that the weather allows, an "IL-14" aircraft departs on an aerial photographic survey. It carries a crew headed by ship commander Boris Gorbov and the director of the radiogeodetic group Valeriy Grebnev. The weather on the coast is rarely free of clouds and at times it is possible to fly for the most part over the internal, mountainous part of the ice continent. Radio rangefinder stations have now been placed there at predesignated points; these are prefabricated houses holding apparatus and the personnel servicing it.

The stations are scattered over the most elevated points. One, whose work is directed by Ivan Safronov, is situated in the Theron Mountains in the neighborhood of an enormous bird refuge. The station headed by Oleg Yur (it is called "Leningradskaya") is situated in the western part of the Shackleton Mountains on a peak, flat as a table, which looks out over the surrounding glaciers. The station of Valentin Sosorkin, which is called "Nakhodka," is the most remote from "Druzhnaya" base. It was placed on a rocky peak protruding above the ice surface having an elevation of 1,700 m. Here the conditions are particularly severe. Astronomical stations are determined in the vicinity of the radio rangefinder stations. This work is being done by the geodesists Gennadiy Pavlov and Timur Iordanoshvili. As soon as the "IL-14" takes off on its survey, everything goes into action.

At the end of the working day, when the aircraft returns to "Druzhnaya," the film is developed. This immediately makes it possible to ascertain the quality of the survey and test prints are sent to the photogrammetrists. At times not everything is clear on the photograph, even to the experienced eye of a geographer. Either the shadow from a slope hides the true contours or the small scale is a hindrance. In order to solve debatable problems a helicopter is used for closer inspection; complex sectors are scrutinized from a low altitude and sometimes a landing is made and ground observations are carried out. This work is done by the topographic engineer Anatoliy Fedorov.

Two helicopters -- the crews of the pilots Viktor Gus'kov and Vladimir Ledkov -- help in the work of the topogeodetic detachment.

All the topographic-geodetic work is directed by the detachment chief Aleksandr Karandin. This is his fourth time in Antarctica. The coordinated, knowledgeable work of the large team of topographers, geodesists and fliers is a guarantee that the maps of this region will contain much new and interesting information, and most importantly, will be precise.

Soviet cartographers have basis for pride in what has already been done. A series of maps of the coastal regions of Antarctica has been published and specialists have created an Atlas of Antarctica, a major work which has been awarded the USSR State Prize and which has gained extensive reknown abroad. Specialists have carried out large-scale mapping of the region of the Prince Charles Mountains and the Lambert and Amery Glaciers. And now a study is being made of a new, enormous region along the shores of the Weddell Sea.

Work at "Druzhnaya" base is at its height.  
[285]

#### SOVIET EXPEDITION TO SHACKLETON MOUNTAIN RANGE

Moscow PRAVDA in Russian 30 Jan 77 p 6

[Article by B. Bardin: "To the Secrets of Shackleton"]

[Summary] Field parties of Soviet scientists -- geologists, geographers and geophysicists -- have already been making investigations in the Shackleton Range in Antarctica for a month. At one of the camps, in the far west of the region, six specialists live and work out of two large tents which are heated and otherwise adapted for polar conditions. Four of these men are from the Institute of Arctic Geology, one is an American from the University of California, and one is assigned from the Geography Institute. These specialists must cover considerable overland distances and therefore have a "Buran" snow vehicle at their disposal; it is occupied by two men and it tows a trailer for the transport of geological samples. The camp

is located in the neighborhood of Provender Mountain. It is an oasis region in the Antarctic ice desert. There are several interesting lakes at its foot. These lakes are constantly covered with ice, much like those often found in Queen Maud Land. The ice protects the water from complete freezing. Even under such severe conditions the lakes are not devoid of life. Along the shores there are dark brown or beet-red strands of algae. At the mountain peak there are luxurious colonies of dark green mosses and bright orange lichens. It is evident that the peak was not engulfed by ice at the time of the maximum development of glaciation and it constituted a refuge for Antarctic flora and fauna. Study of the lake floors with their accumulated debris will be another key to understanding the history of Antarctic glaciation.

[265]

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