

Soviet and Japanese Aerospace Literature

Throughout 1990 the *AIAA Journal* will carry selected abstracts on leading research topics from the Soviet aerospace literature and, as space permits, from similar Japanese literature. The topics will be chosen and the abstracts reviewed for pertinency by *AIAA Journal* editors. This month features Geophysics and Planetary Descriptions from the USSR and Astrophysics from Japan.

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Soviet Aerospace Literature This month: *Geophysics and Planetary Descriptions*

A89-40552 Theory of the Cerenkov radiation of plasma waves by a charge moving in a magnetoactive plasma (K teorii cherenkovskogo izlucheniia plazmennikh voln zariadom, dvizhushchimsia v magnitoaktivnoi plazme). A. G. BOEV and M. I. LUK'IANOV, *Ukrainskii Fizicheskii Zhurnal* (ISSN 0503-1265), Vol. 34, April 1989, pp. 554-558. 12 Refs.

The possibility of using the Cerenkov radiation mechanism for developing the theory of the sporadic decameter-range radio emission of Jupiter is examined. The properties of the Cerenkov radiation of plasma waves of anomalous dispersivity generated by a charge moving uniformly in a magnetoactive plasma along a magnetic force line are investigated in detail. The characteristics of the wave beam are determined, as are the frequency dependence of wave radiation, plasma electron temperature, magnetic field intensity, and charge velocity.

A89-40500 Construction of a catalog of reference points on Venus on the basis of radar imagery (Postroenie kataloga opornykh tochek na Venere po materialam radiolokatsionnoi s'emki). I. U. S. TIUFLIN, E. G. BELEN'KII, N. I. A. BERGER, L. M. KADNICHANSKAIA, T. A. POLIAKOVA et al., *Geodeziia i Kartografiia* (ISSN 0016-7126), March 1989, pp. 29-34. 6 Refs.

The construction of a catalog of reference points on Venus on the basis of Venera 15 and 16 radar imagery is described. Emphasis is placed on techniques of data acquisition, entry, and preprocessing with rejection of crude errors. These techniques along with the associated software were used to process almost all the radar panoramas obtained by the Venera probes. As a result, catalogs of orbital elements and coordinates on the panoramas were generated along with a preliminary catalog of reference points in the northern hemisphere of the planet to a latitude of 30 deg.

A88-34695 Geological-morphological description of the Vinmara and Ganiki Planitiae area (Venus surface photomap, sheet B-8) (Geologo-Morfologicheskoe opisanie raiona ravnin vinmary i ganiki /fotokarta poverkhnosti Venery, list B-8/). A. A. PRONIN, A. L. SUKHANOV, V. P. SHASHKINA, G. A. BURBA, V. A. KOTEL'NIKOV et al., *Astronomicheskii Vestnik* (ISSN 0320-930X), Vol. 22, Jan.-Mar. 1988, pp. 13-22. 5 Refs.

An analysis of sheet B-8 of the Venus surface photomap obtained from Venera 15 and 16 radar data is presented. The main features on this sheet are volcanic plains and ridge belts formed by intrusions of magmatic matter at fractures along weakened zones under conditions of lithospheric extension.

A89-38822 On the surface composition of the M-type asteroids. D. F. LUPISHKO and I. N. BEL'SKAIA, *Icarus* (ISSN 0019-1035), Vol. 78, April 1989, pp. 395-401. 21 Refs.

Photometric and polarimetric observations of the largest M-type asteroids conducted over the period 1978-1986 are presently interpreted in view of results from laboratory photometric and polarimetric measurements of meteoritic, terrestrial silicate, and metallic samples. The samples, including among its 13 meteorites suitable representatives of iron, chondrite, and achondrite types, are of similar structure, with grain sizes smaller than 50 microns. An analysis of all data extant indicate that the surfaces of the largest M-type asteroids, namely 16, 21, 22, 69, and 110, cannot consist of pure metal; they must instead include silicate component-like stony-iron and enstatite chondrite meteorites.

A89-37376 Scientific objectives of the Mars Rover/Sample Return mission (Nauchnye zadachi proekta 'Marsokhod/Vozvrat obraztsov porod'). M. H. CARR, *Astronomicheskii Vestnik* (ISSN 0320-930X), Vol. 23, Jan.-Mar. 1989, pp. 3-13. 12 Refs.

The prospective Mars Rover/Sample Return mission is designed to better understand the origin and evolution of Mars, to search for evidence of former life, and to improve knowledge of the Martian environment in preparation for subsequent human exploration. Mars is of particular interest because it formed in a different part of the solar system from the earth, has experienced a wide range of geologic and meteorological processes, is the only planet other than earth where life is likely to have started, and will be the first among the planets to be explored by humans. The rover provides a means of exploring the planet on a human scale and of performing a wide range of in situ measurements at different locations.

A89-37369 Turbulent-dynamo generation of the large-scale magnetic fields of Uranus and Neptune (Generatsiia krupnomasshtabnogo magnitnogo polia Urana i Neptuna turbulentnym dinamo). A. A. RUZMAIKIN and S. V. STARCHENKO, *Kosmicheskie Issledovaniia* (ISSN 0023-4206), Vol. 27, Mar.-Apr. 1989, pp. 14 Refs.

It is shown that the observed magnetic field of Uranus is a vector sum of fields generated by the turbulent dynamo in the core of the planet and the thin conducting shell surrounding the core. The large inclination of the dipole moment to the axis of rotation is connected with the predominant excitation of an axisymmetric field in the core, and the predominant excitation of a nonaxisymmetric field in the conducting shell. A configuration with a small inclination of the dipole to the axis of rotation is expected for Neptune.

A89-46565 Collisional destruction of particles in planetary rings (Stolknovitel'noe razrushenie chastits v planetnykh kol'tsakh). N. N. GOR'KAVYI and T. A. TAIDAKOVA, *Pis'ma v Astronomicheskii Zhurnal* (ISSN 0320-0108), Vol. 15, June 1989, pp. 534-546. 11 Refs.

The dynamics of a cloud of fragments during the collisional destruction of friable particles in the gravitational field of a central body is analyzed in the framework of the four-body problem. It is shown that the efficiency of the collisional destruction of particles increases considerably near the planet, determining the existence of planetary rings. An upper density limit of 0.2-0.3 g/cu cm is obtained for the material in the Saturn rings.

A89-43871 Springtime ozone minimum (ozone hole) in Antarctica - Observational evidence and possible causes. K. IA. KONDRAT'EV, *Zeitschrift fuer Meteorologie* (ISSN 0084-5361), Vol. 39, No. 1, 1989, pp. 1-15. 81 Refs.

A review has been made of satellite and conventional (surface and balloon) observational data on total ozone content in the antarctic stratosphere which has led to the discovery of the springtime total ozone minimum (ozone hole) repeatability. Probable natural and anthropogenic factors of the springtime ozone minimum formation have been analyzed including an impact of large-scale stratospheric dynamics (planetary waves), polar stratospheric clouds, heterogeneous chemical reactions and solar activity.

A88-47276 Magnetic fields in the Venus ionosphere - General features. A. M. KRYMSKII and T. K. BREUS, *Journal of Geophysical Research* (ISSN 0148-0227), Vol. 93, Aug. 1, 1988, pp. 8459-8472. 41 Refs.

Analysis of the properties of the dayside ionosphere at Venus has shown that two situations are characteristic. One corresponds to the high dynamic pressure of the solar wind, and the other is realized at low dynamic pressure. In both regimes the ionopause manifests itself as a change of the dominant chemical component of plasma rather than the boundary of the magnetized and unmagnetized plasmas (the widely used definition). The nonstationary convection of the magnetized plasma in the Venus dayside ionosphere is analyzed qualitatively. It is argued that the observable large-scale magnetic field in the dayside ionosphere of Venus is the solar wind magnetic field pushed down into the ionosphere during the periods of high solar wind dynamic pressure which evolves under the action of convection and diffusion. The upper boundary of the magnetic belt forms in the vicinity of the upper boundary of the photochemical region. At low dynamic pressures of the solar wind, in a region from approximately 300 km to the ionopause, an upward flux of ionospheric plasma can exist due to motion of plasma to the terminator under the day-to-night pressure gradient. With the plasma convection and the results of the study of the Venus ionopause stability taken into account, the destruction of the large-scale ionospheric field is a probable source of flux ropes in the Venus lower ionosphere rather than small-scale ionopause instabilities.

A89-42522 Spreading on Venus (Spreading na Venere). ALEKSEI L. SUKHANOV and ALEKSEI A. PRONIN, *Priroda* (ISSN 0032-874X), May 1989, pp. 27-37.

With reference to Venus imagery obtained by Venera 15 and 16 orbital stations and other observations, it is argued that the Venus range belts are analogs of the spreading phenomenon on the earth, an important element in plate tectonics. The discussion covers the structure of the valleys, problems involved in the interpretation of Venus surface imagery, the range belt relief and patterns, volcanoes in the range belts, and the breakdown of the range belts. Evidence is presented in support of the conclusion that the Venus range belts represent zones of tension rather than compression.

A89-37478 The effect of ground water level variations on some gravitational field characteristics in Poltava (O vlianii izmeneniia urovnia gruntovykh vod na nekotorye kharakteristiki gravitatsionnogo polia v Poltave). V. B. BAKUSHEVICH and P. D. DVULIT, *Kinematika i Fizika Nebesnykh Tel* (ISSN 0233-7665), Vol. 5, Mar.-Apr. 1989, pp. 13-15.

It is established that seasonal ground water level variations (of about 2 m) lead to a free-fall acceleration variation with an amplitude of 30×10^{-10} to the -8 th m/sq sec. This leads to variations of the components of deflections of the vertical of about 0.001 arcsec as well as a quasi-geoid height variation of up to 2 mm. Therefore, allowance should be made for ground water level variations during precise gravimetric, astrometric, and geodetic work.

A89-37378 The migration of planetesimals during the last stages of giant planet accumulation (Migratsiia planetezimalei na poslednikh stadiakh akkumulatsii planet-gigantov). S. I. IPATOV, *Astronomicheskii Vestnik* (ISSN 0320-930X), Vol. 23, Jan.-Mar. 1989, pp. 27-38. 7 Refs.

The migration and accumulation of bodies from giant planet feeding zones after the formation of the main part of the mass of these planets are studied. These investigations are based on computer simulation results for the evolution of spatial disks which initially consisted of nearly formed planets and hundreds of identical bodies in the zones of Uranus and Neptune. The total mass of the bodies which penetrated into the asteroid zone from the giant planet zone could be ten times as large as the earth's mass.

A88-34696 Models of Uranus and Neptune with partially mixed envelopes (Modeli Urana i Neptuna s chastichno peremeshannymi obolochkami). T. V. GUDKOVA, V. N. ZHARKOV, and V. V. LEONT'EV, *Astronomicheskii Vestnik* (ISSN 0320-930X), Vol. 22, Jan.-Mar. 1988, pp. 23-40. 57 Refs.

The numerical modeling of models of Uranus and Neptune is described, and results of the construction of two- and three-layer models are presented. It is shown that the best models are three-layer models with mixing layers. A new value for the gravitational moment J_4 for Uranus constrains the concentration of the ice material in the H₂-He envelope, while the value of J_2 determines the degree of mixing of the core rock material with ice mantle, which makes up about 70 percent of the core material. Evolution models are also considered, and a trend indicating a systematic increase of the age of the planets from Neptune to Jupiter is observed.

A89-40747 Periodicity of the light variability of In Com - The peculiar central star of the planetary nebula LT5 (O periodichnosti izmeneniia bleska IN Com - Pekuliarnoi tsentral'noi zvezdy planetarnoi tumannosti LT 5). R. I. NOSKOVA, *Pis'ma v Astronomicheskii Zhurnal* (ISSN 0320-0108), Vol. 15, April 1989, pp. 346-352. 8 Refs.

Photoelectric UVB observations of IN Com in 1987-1988 have confirmed the periodic light variations observed by Schnell and Purgathofer (1983). A Fourier analysis of the 1983 and 1987-1988 observations led to the best period of 5.9522d. It is suggested that the observed periodicity may be caused by the reflection effect in a binary system or by the axial rotation of a G star with a long-lived spot or group of spots.

A89-37384 Transplutonian cometary families (O transplutonovykh kometnykh semeistvakh). A. S. GULIEV and A. S. DADASHOV, *Astronomicheskii Vestnik* (ISSN 0320-930X), Vol. 23, Jan.-Mar. 1989, 11 Refs.

Five transplutonian cometary families were identified based on the proximity of their aphelion distances. The possibility of the formation of these groups by hypothetical planets is considered. It is shown that, for two groups at distances of 55 and 100 a.u. with angles of inclination of 30 deg, the existence of a mother planet is likely. For the remaining three groups, this possibility is unlikely.

A89-37379 The morphometry of impact craters on Venus (Morfometriia udarnykh kraterov Venery). B. A. IVANOV, *Astronomicheskii Vestnik* (ISSN 0320-930X), Vol. 23, Jan.-Mar. 1989, pp. 39-49. 21 Refs.

The paper presents the results of a morphometric analysis of impact craters on Venus identified on Venera 15/16 SAR images. Estimates are made of the depth of the craters, the heights of the central peaks over the crater floor, and the angle of the inner slope of the craters. The estimates obtained are compared with analogous data for terrestrial and lunar meteoritic craters. It is concluded that, in relation to the depth/diameter ratio, the craters of Venus are close to terrestrial impact craters.

A89-37377 The evolution of self-gravitating clusters of gas-dust nebulae participating in planetary body accumulation (Evolutsiia samogravitiruiushchikh sgustkov gazopylevoi tumannosti, uchastvuiushchikh v akkumulatsii planetnykh tel). V. P. MIASNIKOV and V. I. TITARENKO, *Astronomicheskii Vestnik* (ISSN 0320-930X), Vol. 23, Jan.-Mar. 1989, pp. 14-26. 10 Refs.

A mathematical model for the evolution of self-gravitating gas-dust clusters is presented. A method of two-scale expansion to a set of hydrodynamic and thermodynamic equations describing the behavior of the self-gravitating gas-dust clusters is used. The dependence of the pressure and temperature distribution functions on the mass and characteristic density values and the typical course of cluster evolution is analyzed.

A89-34000 Concerning the interpretation of the observed rotation of Venus (K voprosu ob interpretatsii nabliudaemogo vrashcheniia Venery). A. A. KHENTOV, *Astronomicheskii Zhurnal* (ISSN 0004-6299), Vol. 66, Jan.-Feb. 1989, pp. 202-204. 10 Refs.

The possibility of interpreting the observed rotation of Venus in terms of resonance is excluded on the basis of an examination of recent experimental and analytical results. Specifically, the hypothesis of the dynamic resonance stabilization of the angular velocity of the planet's reverse rotation is excluded. Even if it turns out that the observed angular velocity of the planet is slowly decreasing, the probability of the future capture of Venus into synchronism with the earth's orbital motion is negligible.

A88-43793 The problem of the rotation period of the asteroid 4 Vesta (Problema perioda vrashcheniia asteroida 4 Vesta). F. P. VELICHKO, *Astronomicheskii Vestnik* (ISSN 0320-930X), Vol. 22, Apr.-June 1988, pp. 131-136. 17 Refs.

Attempts made to solve the problem of the 4 Vesta rotation period are described together with photometric, polarimetric, and speckle interferometric observations. Gehrels' (1967) photometric astronomy method was used to determine the sidereal period, pole coordinates, and direction of rotation of the asteroid. Good agreement is found between the light curves when the rotation period is short.

A89-33990 Evolution equations for the rotational motion of a deformable planet in the restricted three-body problem (Evolutsionnye uravneniia vraschatel'nogo dvizheniia deformiruemoi planety v ogranichennoi zadache trekh tel). I. U. G. MARKOV and I. S. MINIAEV, *Astronomicheskii Zhurnal* (ISSN 0004-6299), Vol. 66, Jan.-Feb. 1989.

An averaging method was used to obtain approximate equations describing the evolution of the rotational motion of a viscoelastic planet within the framework of the restricted circular three-body problem. These equations are written in the form of Andoyer canonical variables. In the presence of energy dissipation, the deformable planet motion can serve as a model for tidal effects during planetary motion within the solar system.

A88-46870 The formation of magnetic filaments at the boundaries of the magnetospheres of solar-system planets (Obrazovanie magnitnykh volokon na granitsakh magnitosfer planet solnechnoi sistemy). L. M. ZELENYY and M. M. KUZNETSOVA, *Astronomicheskii Zhurnal* (ISSN 0004-6299), Vol. 65, May-June 1988, pp. 626-636. 24 Refs.

The theory of spontaneous localized reconnection at the magnetospheric boundary of solar-system planets possessing a strong internal magnetic field is considered. Such forms of reconnection (flux transfer events) leading to the formation of magnetic filaments were observed via satellite in the magnetospheres of the earth, Mercury, and Jupiter. The physical factors controlling the temporal and spatial scales of this phenomenon as a function of the distance from the sun (the solar wind parameters) and the planetary magnetic dipole moment are discussed. The theoretical estimates of the characteristic diameters of the magnetic filaments (5000, 500, and 13,000 km for the earth, Mercury, and Jupiter, respectively) are in satisfactory agreement with experimental data.

A88-52756 A diffraction mechanism for the formation of the opposition effect of the brightness of surfaces having a complex structure (for atmosphereless planet surfaces) (Difraktsionnyi mekhanizm formirovaniia oppozitsionnogo effekta iarkosti poverkhnosti so slozhnoi strukturoi). I. U. G. SHKURATOV, *Kinematika i Fizika Nebesnykh Tel* (ISSN 0233-7665), Vol. 4, July-Aug. 1988, 7 Refs.

A diffraction mechanism is proposed to explain the enhanced opposition effect of surface brightness with an increase in the degree of dispersion of a medium. According to the present model, the phenomenon is due to the interactions of light beams with the same scatterers. Simple formulas are obtained for the phase dependence of the brightness in the region of the opposition effect. The results are pertinent to the study of atmosphereless planets (e.g., Mercury and Pluto).

A88-52758 The evolution of asteroid-type resonance orbits and the problem of gap existence (Evolutsiia rezonansnykh orbit asteroidnogo tipa i problema sushchestvovaniia liukov). S. I. IPATOV, *Kinematika i Fizika Nebesnykh Tel* (ISSN 0233-7665), Vol. 4, July-Aug. 1988, pp. 47-54. 21 refs.

The time dependence of the orbital elements of some fictitious asteroids in the case of 1:3, 2:5, and 1:2 commensurabilities with Jovian motion are studied via numerical integration of the equations of motion of the planar three-body problem. The time interval studied amounted to 35,000 revolutions of Jupiter around the sun. The orbits of many of the fictitious asteroids from the 1:2 and 2:5 gaps acquired such eccentricities during evolution that their perihelia lie inside the Martian orbit. Asteroid encounters with Mars may be one of the reasons for the formation of these gaps.

A88-48157 Orbital geometry of Jupiter's satellites (Geometricheskoe svoistva orbit sputnikov Iupitera). M. KH. KHASANOVA, *Priladnaia Matematika i Mekhanika* (ISSN 0032-8235), Vol. 52, May-June 1988.

The geometrical and differential-geometrical qualitative orbital characteristics of Jupiter's satellites are investigated up to the fourth zonal harmonic. The regions of the possible motion of Jupiter's satellites are determined, and perturbations of the radius vector of the boundary Hill curve due to the flattening of Jupiter are plotted. The Hill curves are oval, and some of the curves intersect, indicating the possibility of collisions between the satellites. A qualitative analysis shows that, as the trajectory height increases and the eccentricity and inclination of the orbit decrease, the Hill curves are contracted and become nearly circular.

A88-45463 Evolution of the motion of a viscoelastic planet with reverse rotation in the gravitational field of two point masses (Evolutsiia dvizheniia viazkouprugoi planety s obratnym vrascheniem v pole tiagoteniia dvukh tochechnykh mass). K. M. LEBEDEV, *Kosmicheskii Issledovaniia* (ISSN 0023-4206), Vol. 26, May-June 1988, pp. 358-365. 8 Refs.

An analysis is made of the evolution of the translational-rotational motion of a viscoelastic planet moving in the field of two point masses. A model is developed for the sun-moon-Venus system. The analysis is based on an averaging scheme for investigating resonance regimes in two-frequency oscillatory systems. The results are pertinent to the study of nonlinear resonant processes in the solar system, including the commensurability between the axial and orbital motions of planets.

A88-43800 Spectrometry of the minor planets. IV - Mineral inhomogeneity of the Vesta surface (Spektometriia malykh planet. IV - Mineral'naiia neodnorodnost' poverkhnosti Vesty). L. F. GOLUBEVA, D. I. SHESTOPALOV, *Astronomicheskii Vestnik* (ISSN 0320-930X), Vol. 22, Apr.-June 1988, 24 Refs.

The spectra of Vesta, obtained with a high resolution in the visible range, were analyzed together with the light curves of this asteroid in an attempt to study the mineral inhomogeneity of the Vesta surface. Vesta's spectra do not coincide completely with those of basalt achondrites in the 0.50-0.55 micron region. The spectrum of one of Vesta's hemispheres does not have direct analogs among the spectra of achondrites and common chondrites. An observational test for the search for diogenite material on the Vesta surface is discussed.

A88-37557 Properties of the drop model of the protoplanetary disk (O svoistvakh kapel'noi modeli protoplanetnogo diska). E. M. LEVIN, *Astronomicheskii Zhurnal* (ISSN 0004-6299), Vol. 65, Jan.-Feb. 1988, pp. 73-85. 15 Refs.

Based on the ideas of Eneev and Kozlov, coagulation theory is used to investigate the evolution of the dust model of the protoplanetary disk, i.e., a swarm of spheres moving in a single plane along circular orbits around the attracting center and accumulating in collisions. An analytical solution to the coagulation equation is obtained. Various features of evolution are observed, including the excitation of circular standing density waves as the instability modes of a differentially rotating disk of accumulating bodies; and a close connection between the radial mass redistribution with the accumulation of the intrinsic angular momentum of the bodies.

A89-20749 A Soviet view of a lunar base. VLADISLAV V. SHEVCHENKO, *Planetary Report* (ISSN 0736-3680), Vol. 8, Nov.-Dec. 1988, pp. 9-12.

Topics related to the use of lunar resources and the possible construction of a lunar base are reviewed. Geological and astronomical applications of lunar studies are examined. The use of lunar volatiles to supply oxygen and water for a lunar base is discussed. Also, the types of scientific and industrial facilities that could be housed in a lunar base are considered.

A88-55208 Distribution of planetary systems. T. V. RUZMAKINA, *Proceedings of the Ninety-ninth IAU Colloquium, Bioastronomy - The next steps*, Balaton, Hungary, June 22-27, 1987 (A88-55201 24-88). Dordrecht, Kluwer Academic Publishers, 1988, pp. 41-47. 24 Refs.

An investigation of observational data on the rotation of dark cores in molecular clouds shows that a fraction from 0.0001 to 0.1 of all clouds have the appropriate angular momentum for the formation of planets. Thus, a fraction of clouds having planetary systems can amount to 0.1 of all stars of solar mass in the Galaxy.

A89-30031 Effect of wind shear on the diffusion of pollutants (Vliianie sdviga vetra na rasseianie primesi). M. I. PEKAR', *Akademiia Nauk SSSR, Izvestiia, Fizika Atmosfery i Okeana* (ISSN 0002-3515), Vol. 25, Jan. 1989, pp. 95-98. 7 Refs.

The effect of wind shear on pollutant diffusion is assessed numerically using the finite difference method. It is shown that the cubic growth regime of the shear variance with time is not connected with constant wind shear; instead it characterizes the initial stage of the process for arbitrary $u(z)$ profiles.

A89-33999 Expansion of the spherical part of the perturbation function (Razlozhenie sfericheskoi chasti perturbatsionnoi funktsii). V. B. TITOV, *Astronomicheskii Zhurnal* (ISSN 0004-6299), Vol. 66, Jan.-Feb. 1989, pp. 199-201. 7 Refs.

An expansion is obtained for the spherical (depending on the orbit orientation - part of the perturbation function. This expansion is performed using SO(3) matrix representation elements. Consideration is given to several functions which are frequently encountered.

A89-30079 Gradiometric inertial navigation system. I (Gradiometricheskaia inertsial'naiia navigatsionnaia sistema. I). I. U. A. KORO-TAEV, *Priboorostroenie* (ISSN 0021-3454), Vol. 32, Jan. 1989, pp. 45-49.

Equations are obtained which describe conditions for the perfect operation of a gradiometric inertial navigation system. The information structure of the gradiometric measurements is identified. Versions of the algorithmic and instrumental implementations of the system are proposed.

A88-55205 Is Uranus the most promising planet for SETI? N. G. BOCHKAREV, *Proceedings of the Ninety-ninth IAU Colloquium, Bioastronomy - The next steps*, Balaton, Hungary, June 22-27, 1987 (A88-55201 24-88). Dordrecht, Kluwer Academic Publishers, 1988, pp. 29, 30. 6 Refs.

It is suggested that the layer with a temperature of 300 K and a density of 0.07 g/cm³ in the Uranus atmosphere (and perhaps the Neptune atmosphere) is the most suitable extraterrestrial location in the solar system for the appearance and maintenance of life. It is argued that the high density of CH₄, NH₃, NH₂SH, H₂O, etc., as well as the presence of water drops and electrical discharges, facilitates the emergence of life on this planet.

A88-37556 Evolution of dust condensations in the preplanetary disk (Evolutsiia pylevykh sgushchenii v doplanetnom diske). G. V. PECHERNIKOVA and A. V. VITIAZEV, *Astronomicheskii Zhurnal* (ISSN 0004-6299), Vol. 65, Jan.-Feb. 1988, pp. 58-72. 10 Refs.

It is proposed that dust condensations were formed in the circumsolar preplanetary disk after dust sedimentation in the disk and gravitational instability in the dust subdisk. Relationships between the radius, mass, density, and spin of rotating condensations are examined. The time of their growth and transformation into solid bodies is estimated. It is hypothesized that the largest of them could have evolved into protoplanets.

A88-53942 A method for investigating the terrestrial planets (Ob odnom metode issledovaniia planet zemnoi gruppy). A. V. BOGDANOV, A. V. NIKOLAEV, V. I. SERBIN, G. A. SKURIDIN, O. B. KHAVROSHKIN et al., *Kosmicheskie Issledovaniia* (ISSN 0023-4206), Vol. 26, July-Aug. 1988, 23 Refs.

The use of penetrators for the seismic investigation of the terrestrial planets is considered. The penetrator design is described, and its efficiency in planetary investigation is assessed. The possible implementation of a penetrator experiment on Venus is considered.

A88-39924 Time variations of the polarization properties of regions of the Saturn disk (O vremennykh variatsiakh polarizatsionnykh svoystv oblastei diska Saturna). L. A. SIGUA and V. P. DZHAPIASHVILI, *Akademiia Nauk Gruzinskoi SSR, Soobshcheniia* (ISSN 0132-1447), Vol. 129, Jan. 1988, pp. 73-75.

Time variations of the polarization of light reflected from the center of the Saturn disk, the eastern and western limbs of the equator, and the south pole of the planet have been observed. It is suggested that these variations may be connected with aerosol scattering.

A89-30146 The distribution of small domes on Venus based on Venera-15 and -16 radar data (Raspreделение kupolov na poverkhnosti Venery po dannym KA 'Venera-15 i -16'). E. N. SLIUTA, O. V. NIKOLAEVA, and M. A. KRESLAVSKII, *Astronomicheskii Vestnik* (ISSN 0320-930X), Vol. 22, Oct.-Dec. 1988, pp. 287-297. 9 Refs.

Radar images have revealed the presence of small (1-20 km in diameter) domes on the surface of Venus. These domes, which are volcanic in nature, are unevenly distributed with most being organized into clusters. Some of these clusters are believed to be independent structural-tectonic formations since they are well defined in the relief and gravitational field of the planet.

A88-34694 Geological-morphological description of the Lukelong-Okipeta Dorsa area (Venus surface photomap, sheet B-2) (Geologo-morfologicheskoe opisanie oblasti griad Lukelong-Okipety /fotokarta poverkhnosti Venery, list B-2/). A. L. SUKHANOV, A. A. PRONIN, N. N. BOBINA, G. A. BURBA, I. U. S. TIUFLIN et al., *Astronomicheskii Vestnik* (ISSN 0320-930X), Vol. 22, Jan.-Mar. 1988, pp. 3-12.

An examination of sheet B-2 obtained from Venera 15 and 16 radar data indicates that submeridional ridge belts at 175-245 deg E were produced by the extension of the lithosphere and the intrusion of linear magmatic bodies, forming ridges and banks on the surface. Latitudinal (normal to the belts) fault systems are visible on plain strips between the belts. The belt system as a whole is symmetric with respect to the axis along 200-210 deg E, where several hot spots are located.

A88-39917 Transformation of Venera 15 and 16 altimeter data into a hypsometric map of Venus (Preobrazovanie vysotomernykh dannykh AMS 'Venera-15 i -16' v gipsometricheskuiu kartu planety). A. V. ABRAMOV, A. F. BOGOMOLOV, A. V. GRECHISHCHEV, N. V. ZHERIKHIN, I. A. ZHELTIKOV et al., *Geodeziia i Kartografiia* (ISSN 0016-7126), April 1988, pp. 33-39.

One of the stages of the processing of Venera 15 and 16 radar data involved the compilation of a hypsometric map of the northern near-polar region of Venus. This paper examines various aspects of the computer-aided compilation of this map on the basis of radio-profile data.

A88-37649 Optimal selection of Mittag-Leffler expansion parameters for a prescribed observation region (external gravitational potential of planets) (Ob optimal'nom vybore parametrov razlozheniia Mittag-Lefflera dlia zadannoi oblasti nabludeniiia). N. A. CHUIKOVA, *Moskovskii Universitet, Vestnik, Seriya 3 - Fizika, Astronomiia* (ISSN 0579-9392), Vol. 29, Jan.-Feb. 1988, pp. 81-86.

Chuiikova (1985, 1986) obtained a representation of the external gravitational potential of a planet in the form of a spherical-function expansion. In the present paper, the parameters of the expansion are chosen in such a way for a prescribed observation region that the maximum convergence rate is achieved for the expansion.

A89-35550 The relief of the crust-mantle boundary and strain-compression stresses in the crust of Venus (O rel'efe granitsy kora-mantiia i napriazheniakh rastiazheniia-szhatiia v kore Venery). K. I. MARCHENKOV and V. N. ZHARKOV, *Pis'ma v Astronomicheskii Zhurnal* (ISSN 0320-0108), Vol. 15, Feb. 1989, pp. 182-190. 15 Refs.

A joint analysis of the topography and nonequilibrium part of the gravitational field of the Venus was carried out for spherical harmonics with $n = 3-18$. The characteristics of the crust-mantle boundary and of the strain-compression stresses in the crust were revealed for a series of realistic models of Venus with allowance for the asthenosphere. In general, the crust-mantle boundary of Venus is sufficiently smooth. The stresses vary from + 600 bars (strain - to) 700 bars (compression) as a function of the model of the planet's interior.

A88-50115 Relaxation oscillations in the source of S-bursts of Jovian decametric radio emission (Relaksatsionnye kolebaniia v istochnike S-vspleskov dekametrovogo radioizlucheniia Iupitera). V. E. SHAPOSHNIKOV, *Pis'ma v Astronomicheskii Zhurnal* (ISSN 0320-0108), Vol. 14, July 1988, pp. 644-650. 8 Refs.

The paper presents a mechanism for the formation of long-period (tens of milliseconds) trains of Jovian decametric radio-emission S-bursts. The periodicity is due to the pulsed diffusion in momentum space of fast electrons which excite plasma waves under cyclotron resonance conditions. Conditions for the appearance of a periodic regime are determined as well as the dependence of the period on the value of the electron flux in the lasing region. It is shown that a regime with periods coinciding with observational values is possible in the Jovian ionospheric environment.

A88-43792 The amount of water on Mars (Kolichestvo vody na Marse). M. CARR, *Astronomicheskii Vestnik* (ISSN 0320-930X), Vol. 22, Apr.-June 1988, 68 Refs.

Estimates of the amount of water outgassed from Mars and still present near the surface vary by two orders of magnitude: from 5-10 m of the equivalent layer over the entire planet (estimated from the low noble gas content of the Martian atmosphere) to 500 m (according to geologic data based on the analysis of causes and implications of floods around the Chryse basin). Ground water was apparently present over the entire surface of early Mars; currently at least a 50 m layer of water is present in the ground ice at depths of 1 km. The total abundance of water on Mars is estimated to be 7.5×10 to the 6th cu km.

A88-43797 The nature of the polarimetric inhomogeneity of the surface of the asteroid 4 Vesta (O prirode polarimetricheskoi neodnorodnosti poverkhnosti asteroida 4 Vesta). I. U. G. SHKURATOV, *Astronomicheskii Vestnik* (ISSN 0320-930X), Vol. 22, Apr.-June 1988, 6 Refs.

An attempt is made to explain variations of the absolute value of P min with respect to the rough-granular surface of Vesta using model laboratory polarimetric measurements. It is shown that the polarimetric inhomogeneity of the asteroid surface is caused by variations of such microstructural characteristics as the relationship between the quantity and albedo of light and dark fragments of the surface material on 1-micron scales.

A88-33938 Generation of bursts of accelerated particles in the magnetospheres of cosmic objects (energetic particle streams in planetary magnetotails) (Generatsiia vspleskov uskorennykh chastits v magnitosferakh kosmicheskikh tel). L. M. ZELENYYI, A. L. TAKTAK-ISHVILI, *Pis'ma v Astronomicheskii Zhurnal* (ISSN 0320-0108), Vol. 14, Feb. 1988, pp. 182-188. 17 Refs.

Theoretical estimates of particle acceleration in certain planetary magnetotails are compared with experimental data. It is shown that the theory is able to provide a relatively good description of bursts of high-energy particles in the magnetotails of earth and Mercury. The acceleration mechanism is connected with the rapid development of tearing instability.

A88-43791 The geological-morphological description of the Louky-Athalanta area (Photomap of the Venusian surface, sheet B-7) (Geologo-morfologicheskoe opisanie oblasti ravnin Loukhi i Atalanty /Fotokarta poverkhnosti Venery, list B-7/). A. L. SUKHANOV, N. N. BOBINA, G. A. BURBA, I. U. S. TIUFLIN, M. V. OSTROVSKII et al., *Astronomicheskii Vestnik* (ISSN 0320-930X), Vol. 22, Apr.-May-June, 1988, pp. 99-111.

The striped plains of the Louky-Athalanta area represent a transitional region between the older dislocated elevated 'continents' in the west to the younger 'oceanic' plains with extension belts in the east. The striped plains are covered by a network of dikes and fracture zones. They can be compared to areas of dispersed spreading on earth.