

Soviet and Japanese Aerospace Literature

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Soviet Aerospace Literature

This month: *Astrophysics, Astronomy, Geophysics, and Planetary Exploration*

A88-52762 The mean characteristics of the radiation field in an M-giant atmosphere (Usrednennyye kharakteristiki polia izlucheniia v atmosfere M-giganta). IA. V. PAVLENKO, *Kinematika i Fizika Nebesnykh Tel* (ISSN 0233-7665), Vol. 4, July-Aug. 1988, pp. 74-79. 14 Refs.

The radiative transfer in an M-giant atmosphere ($T_{\text{eff}} = 3800 \text{ K}$, $\lg g = 1.5$) is studied for a small UV region of the spectrum (wavelengths in the range of 225.86-225.96 nm). Two models of the red giant atmosphere are used. In the first one, the temperature decreases monotonically toward the outer layers; the second model includes the chromosphere. The mean characteristics of the field are calculated using the absorption averaging method. It is shown that the radiation field formed in the M-giant chromosphere does not penetrate into the photosphere.

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.

A88-52756 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 poverkhnostei so slozhnoi strukturoi). IU. G. SHKURATOV, *Kinematika i Fizika Nebesnykh Tel* (ISSN 0233-7665), Vol. 4, July-Aug. 1988, pp. 33-39. 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).

A88-52291 The geology of Venus. ALEXANDER T. BASILEVSKY and JAMES W. HEAD III, IN: Annual review of earth and planetary sciences. Vol. 16 (A88-52285 22-46). Palo Alto, CA, Annual Reviews, Inc., 1988, pp. 295-317. 71 Refs.

This paper summarizes the emerging picture of the surface of Venus provided by high-resolution earth-based radar telescopes and orbital radar altimetry and imaging systems. The nature and significance of the geological processes operating there are considered. The types of information needed to complete the picture are addressed.

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.

A88-48157 Orbital geometry of Jupiter's satellites (Geometricheskie svoistva orbit sputnikov Iupitera). M. KH. KHASANOVA, *Prikladnaia Matematika i Mekhanika* (ISSN 0032-8235), Vol. 52, May-June 1988, pp. 508-510.

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.

A88-47276 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.

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. ZELENYI 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.

A88-45463 Evolution of the motion of a viscoelastic planet with reverse rotation in the gravitational field of two point masses (Evolutsiia dvizheniia v'iazkouprugoï planety s obratnym vrashcheniem 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.

A88-44229 Effect of geophysical factors on the characteristics of the oblique sounding of the ionosphere (Vliianie geofizicheskikh faktorov na kharakteristiki naklonnogo zondirovaniia ionosfery). A. N. BARANETS, N. F. BLAGOVESHCHENSKAIA, T. D. BORISOVA, and V. A. BUBNOV, *Radiofizika* (ISSN 0021-3462), Vol. 31, no. 4, 1988, pp. 401-408. 14 Refs.

The variations of the characteristics of the oblique sounding of the ionosphere on a subauroral path 9000-km long are examined for various geophysical conditions, i.e., season, local time, and degree of magnetic activity. The sounding characteristics considered are maximum and minimum observed frequencies, mechanisms of radio-wave propagation, and the relative delay between modes. Measured and calculated oblique-sounding ionograms are compared.

A88-44202 Structural geology of the earth's interior (Strukturnaia geologiya glubokikh neдр zemli). LEV PAVLOVICH VINNIK, *Priroda* (ISSN 0032-874X), May 1988, pp. 36-45. 8 Refs.

Current research in the structural geology of the earth's interior is reviewed with emphasis on global models of the mantle, regional models of the lithosphere, the mapping of boundaries in the deep mantle, and the mapping of elastic anisotropy. Particular consideration is given to several planned seismic experiments, including Iris, Pascal, Geoscope, and Orpheus.

A88-44048 Feedback in devices based on an optically controlled spatial modulator (Obratnaia svyaz' v ustroistvakh na osnove opticheskii upravliaemogo prostranstvennogo moduliatora). G. G. VOEVODKIN, E. M. DIANOV, A. A. KUZNETSOV, S. M. NEFEDOV, and A. V. PARFENOV, *Kvantovaya Elektronika* (ISSN 0368-7147), Vol. 15, April 1988, pp. 805-810. 5 Refs.

A number of optical devices which can be applied to interferometry, holography, and data processing are discussed. The use of feedback in devices based on an optically controlled liquid crystal spatial modulator makes it possible to create a stabilizer of laser radiation intensity and an

intensity modulator and to perform image filtering. The importance of the realization of dynamic memory is noted, suggesting that it makes image conversion into binary form possible. The use of feedback devices in solving mathematical physics equations is presented.

A88-43800 Spectrometry of the minor planets. IV - Mineral inhomogeneity of the Vesta surface (Spektometriia malykh planet. IV - Mineral'naia neodnorodnost' poverkhnosti Vesty). L. F. GOLUBEVA and D. I. SHESTOPALOV, *Astronomicheskii Vestnik* (ISSN 0320-930X), Vol. 22, Apr.-June 1988, pp. 173-182. 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.

A88-43797 The nature of the polarimetric inhomogeneity of the surface of the asteroid 4 Vesta (O prirode poliarimetricheskoi neodnorodnosti poverkhnosti asteroida 4 Vesta). I. U. G. SHKURATOV, *Astronomicheskii Vestnik* (ISSN 0320-930X), Vol. 22, Apr.-June 1988, pp. 152-158. 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.

A88-43793 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.

A88-43791 The geological-morphological description of the Louky-Athalanta area (Photomap of the Venusian surface, sheet B-7) (Geologiko-morfologicheskoe opisanie 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.

A88-43505 Close encounters with Phobos. ALEKSANDR V. ZAKHAROV, *Sky and Telescope* (ISSN 0037-6604), Vol. 76, July 1988, pp. 17-21.

Aspects of the Soviet mission to Phobos are examined, including the objectives of the mission, the spacecraft, experiments, and landers. Past Mars research and unanswered questions concerning Mars and its satellites are discussed. The spacecraft is expected to reach Mars in early 1989 and to observe the planet from two orbits, coming as close as 500 km from the surface, before moving into a third path close to Phobos. After studying the Phobos terrain from above, the craft will jettison one or two small long-duration automated landers, which will perform surface experiments, including work on celestial mechanics, the history of the Phobos orbit, surface composition, and mechanical properties. In addition to studying Phobos and Mars, the craft will examine the interplanetary medium, make observations of the Sun, and possibly study Deimos.

A88-40852 Evolution of structure building in the early Precambrian in the southwestern part of the East European platform (Evolutsiia strukturoobrazovaniia v rannem dokembrii na yugo-zapade Vostochno-Evropeiskoi platformy). N. V. AKSAMENTOVA, *Akademiia Nauk BSSR, Doklady* (ISSN 0002-354X), Vol. 32, no. 5, 1988, pp. 433-436. 10 Refs.

The sequence of Early Precambrian endogenic processes and the evolution of structure building in the southwestern part of the East European platform are examined in the framework of the theory of the stage-by-stage development of the continental crust. Three stages of crust formation in this region are identified: protooceanic, transitional, and continental. It is shown that, in the southwestern part of the East European platform, the structural plan of the crystalline foundation was created toward the end of the Early Proterozoic as a result of interconnected processes of lithogenesis, magmatism, and metamorphism. At this time, the crust acquired the properties and composition of the mature continental crust.

A88-40619 Radiation transfer in stochastic media. R. S. VARDANIAN, *Astrophysics and Space Science* (ISSN 0004-640X), Vol. 141, no. 2, Feb. 1988, pp. 375-387. 15 Refs.

The present paper deals with certain problems of the radiation transfer in one-dimensional and three-dimensional infinite media with the assumption that the quantum survival probability is a homogeneous isotropic gaussian arbitrary field. The Dyson equation relative to the first moment of the source function is obtained, and the condition of its solvability is studied. In the known Bourret approximation, the average number of the quantum scatterings and radiation intensities are calculated.

A88-40618 Specificity of Parker instability in polytropic disks. G. D. CHAGELISHVILI, J. G. LOMINADZE, and Z. A. SOKHADZE, *Astrophysics and Space Science* (ISSN 0004-640X), Vol. 141, no. 2, Feb. 1988, pp. 361-374. 21 Refs.

This paper investigates the specificity of the Parker (1984) instability in the disks with finite perpendicular dimension, in particular, in the presence of the polytropic relation between the equilibrium pressure and the density. To single out the influence of the effect of disk limitation in the perpendicular direction on the Parker instability, the investigation is centered on the flat layer of the gas, where the gravitational acceleration is directed perpendicular to the layer and linearly depends on the distance from it. The Alfvén velocity, $V(A)$, is considered to be variable. It is shown that, unlike the case where the $V(A)$ is constant, the even and odd modes (in reference to the disk perpendicular coordinate) consist of nonfinite sum of the harmonics, and that the zero (fundamental) harmonic of the even mode will mainly increase. Consequently, the structure obtained as a result of the Parker instability development will be determined by this fundamental harmonic.

A88-39924 Time variations of the polarization properties of regions of the Saturn disk (O vremennykh variatsiakh poliarizatsionnykh svoistv oblasti 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.

A88-39917 Transformation of Venera 15 and 16 altimeter data into a hypsometric map of Venus (Preobrazovanie vysotomernykh dannyykh AMS 'Venera-15 i -16' v gipsometricheskuu kartu planety). A. V. ABRAMOV, A. F. BOGOMOLOV, A. V. GRECHISHCHEV, N. V. ZHERIKHIN, I. A. ZHELIKOV 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.

A88-39569 The problems of Mars' paleomagnetism (Problema paleomagnetizma planety Mars). SH. SH. DOLGINOV, *Kosmicheskie Issledovaniia* (ISSN 0023-4206), Vol. 26, Mar.-Apr. 1988, pp. 306-314. 38 Refs.

The precession dynamo model suggests that Mars' magnetic field was more intense in the distant past than it is in the present epoch. The orbital parameters of hypothetical Martian satellites, determined from the angular momentum deficit of the present Mars-Phobos-Deimos system, are compared with orbital parameters determined from the precession dynamo model and data on the paleofield of SNC meteorites. It is concluded that the investigation of the paleofields of Mars at the surface and in rock specimens returned to earth is an important way to study the history of the planet, its paleoclimate, and problems of dynamo theory.

A88-38862 The interpretation of the emission-line spectrum of planetary nebulae with large angular dimensions (Ob interpretatsii lineichatogo spektra planetarnykh tumannostei bol'shikh yglyovykh razmerov). V. V. GOLOVATYI and B. S. NOVOSIADLYI, *Astronomicheskii Zhurnal* (ISSN 0004-6299), Vol. 65, Mar.-Apr. 1988, pp. 341-348. 8 Refs.

The interpretation of the spectra of nebulae which are extended due to radiation stratification is discussed. The study is based on theoretical models of nebular emission with varying central-star-temperature values. A variation of the relative intensities of high- and low-excitation emission lines from the center to the edge of the nebula is found in all cases.

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

Chaikova (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.

A88-37623 The influence of melting on the evolution of the fluid and redox regimes of the earth's upper mantle (Vliianie plavleniia na evolutsiiu fluidnogo i oksilitel'no-vostanovitel'nogo rezhimov verkhnei mantii zemli). A. A. KADIK, *Geokhimiia* (ISSN 0016-7525), Feb. 1988, pp. 236-245. 40 Refs.

The effect of melting processes in the earth's mantle on the composition and the oxidation state of volatile elements in the mantle is examined. Large-scale melting is considered to be the major causative factor in the primary stages of the differentiation of volatile elements. It is suggested that the initial stages of the fractionation of the volatile components of the magmatic ocean were characterized by the separation of reduced gaseous compounds (such as CO, H₂, and CH₄), while late fractionation stages were characterized by the separation of oxidized gas molecules (such as CO₂ and H₂O), leading to the ultimate oxidation of the mantle matter and to the accumulation of CO₂. Furthermore, it is considered that the migration of reduced fluids of the lower mantle initiated the melting process in the relatively oxidized rocks of the upper mantle and the lithosphere.

A88-37618 Potential mechanisms for the formation of planetary crust matter (O vozmozhnykh mekhanizmax obrazovaniia veshchestva planetnykh kor). V. L. BARSUKOV, A. T. BAZILEVSKII, M. IA. FRENKEL', and E. V. ZABALUEVA, *Geokhimiia* (ISSN 0016-7525), Feb. 1988, pp. 150-179. 59 Refs.

The geochemical composition of the terrestrial planets' crust matter is described, and the possible mechanisms responsible for its formation are discussed using results obtained in earlier studies. These data, together with the information on the thermal history of planets during their evolution, are used to develop a model of planetary matter differentiation due to evaporation-condensation processes in the course of impact events during accretion. The results of a computer simulation of early magmatic differentiation of an earth-type planet are given.

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.

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.

A88-37535 Hubble radio diagrams for quasars at wavelengths of 6 and 11 cm (Radiodiagrammy Khabbla dlia kvazarov na dlinakh voln 6 i 11 sm). M. F. KHODIACHIKH, *Kinematika i Fizika Nebesnykh Tel* (ISSN 0233-7665), Vol. 4, Mar.-Apr. 1988, pp. 53-58. 10 Refs.

The paper determines the redshift dependence of the radio magnitude for the statistically most powerful quasar on lg z for 902 quasars. The mean slope of the redshift-magnitude relation is 1.5. This may be explained by a decrease in quasar luminosity which is more rapid in the radio range (0.60m for one-billion years at $q_{\text{sub } 0} = 1$) than in the optical range.

A88-37121 Powerful radio sources in clusters of galaxies and jet-like structures. E. M. CHURAZOV, M. R. GILFANOV, and R. A. SUNIAEV, *Comments on Modern Physics, Part C - Comments on Astrophysics* (ISSN 0146-2970), Vol. 12, no. 3, 1988, pp. 137-153. 12 Refs.

Jets arising from the scattering of radiation in the medium surrounding an active galaxy are discussed. It is noted that these jets have the potential of providing information about compact sources of beamed radiation in AGN that are invisible from the earth due to unsuitable orientation of the beaming axis. Sources considered include an isotropic variable source, a beamed nonvariable source, and a beamed variable source. It is suggested that if powerful extragalactic sources of beamed radio, optical, or X-ray radiation exist in nature, they should manifest themselves by the presence of jet-like structures generated by Thompson scattering on intergalactic gas electrons.

A88-36093 The spectrum of supersymmetric sound (phonino propagation velocity computation) (Spektr supersimmetrichnogo zvuka). V. V. LEBEDEV and A. V. SMILGA, *Pis'ma v Zhurnal Eksperimental'noi i Teoreticheskoi Fiziki* (ISSN 0370-274X), Vol. 47, March 10, 1988, pp. 233-236. 13 Refs.

It is shown that the propagation velocity of a phonino is computable purely phenomenologically and is equal to $c = P/E$. The solution of the Bethe-Salpeter equation is used to find the phonino dispersion law and the domain of its existence.

A88-34695 Geological-morphological description of the Vinmara and Ganiki Planitiae area (Venus surface photomap, sheet B-8) (Geologo-Morfologicheskoe opisanie oblasti 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.

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.

A88-33911 Bistatic radar investigation of the sun from Venera 16 (Opyt bistaticheskoi radiolokatsii solntsa s primeneniem apparata 'Venera-16'). A. G. PAVEL'EV, O. I. IAKOVLEV, A. I. KUCHERIKOV, S. N. RUBTSOV, R. A. ANDREEV et al., *Radiofizika* (ISSN 0021-3462), Vol. 31, no. 2, 1988, pp. 127-132. 9 Refs.

The bistatic radar investigation of the solar corona carried out in the decimeter-wave band from Venera 16 is described. The power, spectrum, and frequency variations of echo signals are analyzed, and the velocity of the reflecting plasma region is evaluated. It is concluded that the present study demonstrates the feasibility of the bistatic radar investigation of the sun.

A88-29477 The origin and specific features of the Martian satellites in the context of the eruption concept. E. M. DROBYSHEVSKII, *Earth, Moon, and Planets* (ISSN 0167-9295), Vol. 40, Jan. 1988, pp. 1-19. 59 Refs.

Hypotheses for the origin of Phobos and Deimos are discussed. A scenario is presented of the capture of Phobos and Deimos as a result of an explosion of a large icy C-asteroid saturated by the products of electrolysis, and the consequences of this process are addressed. An explanation is offered for the origin of the grooves on Phobos and for the differences in the general structures of Phobos and Deimos based on the Stickney event initiating the burning of electrolysis products contained in Phobos's ices. It is shown that Phobos's regolith could have been lost during the rapid acceleration of the satellite only if the material from the Stickney crater was ejected primarily due to the detonation initiated by the impact.

A88-28339 The place of Comet Halley in the general scheme of the origin of comets (Mesto komety Galleia v obshchei skheme proiskhozhdeniia komety). V. D. DAVYDOV, *Kosmicheskie Issledovaniia* (ISSN 0023-4206), Vol. 26, Jan.-Feb. 1988, pp. 103-115. 15 Refs.

It is hypothesized, based on Vega observations, that the peanut-shaped nucleus of Comet Halley may have resulted from the collisional union of two bodies. The union could have been caused by destabilization of the system, e.g., by a tidal-force burst; the two bodies that were joined were not completely destroyed, judging by the saddle between them on the comet figure. Quantitative evaluations confirm the possible conservation of the original shape of the two cosmic 'icebergs' after their union at relative velocities up to several m/sec.

A88-28338 Formation region of the Comet Halley nucleus and certain processes in the protoplanetary nebula (Oblast' obrazovaniia iadra komety Galleia i nekotorye protsessy v doplanetnoi tumannosti). M. N. IZAKOV, *Kosmicheskie Issledovaniia* (ISSN 0023-4206), Vol. 26, Jan.-Feb. 1988, pp. 96-102. 33 Refs.

Vega and Giotto data on the Comet Halley nucleus are examined. The results suggest that the nucleus was formed in the protoplanetary nebula (PN), probably in the vicinity of proto-Uranus or proto-Saturn. Its formation in the vicinity of proto-Neptune is somewhat less probable. The cometary dust grains consist partly of interstellar grains which, at some point in the past, entered the PN.

A88-28335 Solar-wind loading at Comet Halley - Lessons for Venus (Nagruzhenie solnechnogo vetra u komety Galleia: Uroki dlia Venery). T. K. BREUS, A. M. KRYMSKII, and J. G. LUHMANN, *Kosmicheskie Issledovaniia* (ISSN 0023-4206), Vol. 26, Jan.-Feb. 1988, pp. 68-76. 32 Refs.

Probe observations of the solar wind/Comet Halley interaction have shown the existence of a magnetized cometary plasma in the vicinity of the comet. This plasma region resembles the magnetized planetary plasma observed in the daytime Venus ionosphere when the dynamic pressure of the impinging solar wind exceeds the maximum pressure of the ionospheric plasma. Despite differences in detail, the magnetic-field penetration through the ionopause on Venus and the magnetic-field penetration through the cometopause at Comet Halley appear to be due to similar charge-exchange and photoionization processes.

A88-28331 Simulation and interactive procedures of parameter search for Vega 1 and 2 type landing modules (Imitatsionnye i interaktivnye protsedury v zadache poiska parametrov posadochnykh ustroistv AMS tipa 'Vega-1, -2'). S. P. BUSLAEV, *Kosmicheskie Issledovaniia* (ISSN 0023-4206), Vol. 26, Jan.-Feb. 1988, pp. 41-48. 11 Refs.

The problem of determining optimal parameters for a Venus landing module is examined in the framework of a mathematical-model description of the external environment. The search for the effectiveness-function minimum in the presence of noise is considered, and attention is given to the relevant simulation and interactive procedures. Search-procedure features associated with the stochastic formulation of the problem are examined.

A88-28233 Geophysical conditions of long-range short-wave propagation (Geofizicheskie uslovia dal'nego rasprostraneniia radiovoln KV-diapazona). S. M. KONIUSHENKO and V. A. PAKHOTIN, *Geomagnetizm i Aeronomiia* (ISSN 0016-7940), Vol. 28, Jan.-Feb. 1988, pp. 154-157.

A data processing method is proposed which makes it possible to define the relationship between the reception of satellite signals and geophysical conditions of long-range signal propagation according to ionospheric data. The end portions of the radio paths are shown to contain the most useful information. Cases of propagation in ionospheric wave channels and in surface channels are considered, and it is shown that the surface channel is of substantial importance for the propagation of satellite signals up to distances of 13 Mm from the reception point.

A88-28201 Radio-astronomical measurement of the velocity of interplanetary shock waves (Skorost' mezhplanetnykh udarnykh voln po radioastronomicheskim dannym). V. I. VLASOV, *Geomagnetizm i Aeronomiia* (ISSN 0016-7940), Vol. 28, Jan.-Feb. 1988, pp. 1-8. 24 Refs.

The velocities of interplanetary shock waves were determined by the radio-astronomical mapping of the scintillation indices of radio sources. It is shown that the shock-wave velocity within 0.2-1.2 AU decreases with distance from the sun as $1/r \exp \alpha$, where α ranges from 0.25 to 1. The degree of the delay of shock waves depends on their initial velocity; the radial velocity gradient is approximately proportional to the square of the initial shock-wave velocity.

A88-27992 Chemical composition of small bodies of the solar system determined from the effects of solar-wind interaction with their surfaces. G. G. MANAGADZE and R. Z. SAGDEEV, *Icarus* (ISSN 0019-1035), Vol. 73, Feb. 1988, pp. 294-302. 22 Refs.

The present analysis of primary process characteristics arising from the interaction of solar wind ions with the surfaces of asteroids or minor planetary satellites gives attention to the features of fluxes typical of secondary and backscattered ions and sputtering atoms. The analytical scheme used is applicable to the remote-sensin measurement of the physical and chemical characteristics of atmosphereless space object surfaces. A series of specific recommendations for the implementation of these methods is presented.

Japanese Aerospace Literature

This month: Astrophysics, Astronomy, Geophysics, and Planetary Exploration

A88-55482 The influence of the Southern Oscillation on extratropical circulations during the Northern Hemisphere winter. TOMOHIKO IWASAKI and ISAMU HIROTA, *Meteorological Society of Japan Journal* (ISSN 0026-1165), Vol. 66, June 1988, pp. 419-432. 18 Refs.

The relationship between variations in the Southern Oscillation Index (SOI) and the dynamics of planetary waves and zonal mean winds in the troposphere of the Northern Hemisphere was investigated using NMC data for twenty winters between 1963 and 1983. The original NMC data on polar stereographic grids were converted onto 5 x 5 deg latitude-longitude grids, and the harmonic analysis was made around latitude circles. It was found that the mean zonal winds are positively correlated to the SOI at extratropical latitudes, and negatively correlated at subtropical latitudes. Consequently, the difference of mean zonal wind speeds between the negative

and positive extremes of the SOI shows a barotropic seesaw pattern in meridional cross section with a node around 40 deg N. This pattern is associated with the strong (weak) subtropical jet and weak (strong) mid-latitude westerlies in the negative (positive) extremes. Wave quantities averaged over the January-February periods showed clear differences between the two extremes.

A88-42610 Surface photometry of galaxies. SADANORI OKAMURA, *Astronomical Society of the Pacific Publications* (ISSN 0004-6280), Vol. 100, May 1988, pp. 524-544.

Surface photometry of galaxies has undergone a great advance recently with the development of fast digital plate-measuring machines, powerful computers to process the huge amount of data from them, and