

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

efficient image-processing software. Further, the recent advent of charge-coupled devices (CCDs) has made the technique effective even with relatively small telescopes. Because of their very high sensitivity, especially in the red wavelength region, CCDs have opened a new era of surface photometry. The methodology of surface photometry of galaxies is reviewed and recent results are summarized. Future prospects of the technique in galaxy research are briefly discussed.

A88-31181 Bipolar outflow in B335. NAOMI HIRANO, OSAMU KAMEYA, MASATOSHI NAKAYAMA, and KEIYA TAKAKUBO, *Astrophysical Journal, Part 2 - Letters to the Editor* (ISSN 0004-637X), Vol. 327, April 15, 1988, pp. L69-L72. 15 Refs.

The high-velocity (C-12)O ($J = 1-0$) emission in B335 with a high angular resolution of 16 arcsec has been mapped. The high-velocity emission shows distinct bipolar pattern centered at IRAS 19345 + 0727, toward which a strong high-velocity (C-12)O emission has been detected. The bipolar lobes delineate remarkable collimation toward the IRAS source, indicating that the flow is focused within 0.02 pc of the driving source. Each lobe is accompanied by significant wing emission with the opposite velocity shift, which clearly shows the association with IRAS 19345 + 0727. This feature is well explained as a bipolar flow the axis of which is nearly perpendicular to the line of sight. There is no evidence of another evolved bipolar flow which does not associate with any dense core as previously suggested. This suggests that B335 is a site of very recent star formation, containing a single bipolar flow with an age of about 30,000 yr.

A88-51856 Two-stage model for chemical evolution of galactic halo. YASUKI KUMAI, YUTAKA SABANO, and MAKOTO TOSA, *Astrophysics and Space Science* (ISSN 0004-640X), Vol. 143, no. 2, April 1988, pp. 257-268. MOESC-supported research. 40 Refs.

A model of chemical evolution of the galactic halo is proposed which consists of a succession of two different evolutionary stages; each stage is characterized by a different outflow rate of gas from the star-forming region so that different metal-enrichment rates result. The low-metal stars with an Fe/H abundance ratio of less than -0.8 are formed mainly during the first 3×10 to the 8th yr, and most of the high-metal stars with an Fe/H abundance ratio of not less than -0.8 are formed during the succeeding 2×10 to the 9th yr. This model naturally explains the metallicity distribution of globular clusters in the galactic halo including both the metal-rich and the metal-poor clusters. The implications of the present model on the formation and evolution of the galactic halo are also discussed.

A88-51861 Markarian 313 - An intermediate object between a Seyfert and a starburst galaxy. HIDEO MAEHARA and TAKESHI NOGUCHI, *Astrophysics and Space Science* (ISSN 0004-640X), Vol. 143, no. 2, April 1988, pp. 339-348. 33 Refs.

An ultraviolet-excess galaxy Markarian 313 (NGC 7465), which consists of a multiple system with NGC 7463 and NGC 7464, is studied using the low-resolution and high-resolution optical spectrum. Emission lines of H-alpha, H-beta, forbidden N II, and forbidden O III have conspicuous blueward asymmetrical wings or blue slanted profiles in the spectrum of the nuclear region of the galaxy. The width of these emission lines is as broad as about 600 km/s at the zero-intensity level, and the velocity difference between the narrow and broad components is estimated at around 80 km/s from the two-component Gaussian profile fitting. This fact could be evidence of a large-scale dynamical motion in or surrounding the nuclear region of the galaxy, implying that it bears intermediate characteristics between a Seyfert and a starburst galaxy.

A88-28808 Discovery of a reflection dust envelope around IRC + 10216. M. TAMURA, T. HASEGAWA, N. UKITA, I. GATLEY, I. S. MCLEAN et al., *Astrophysical Journal, Part 2 - Letters to the Editor* (ISSN 0004-637X), Vol. 326, March 1, 1988, pp. L17-L21. SERC-MOESC-supported research. 31 Refs.

IR polarimetric and photometric mapping observations at K and H have revealed an extended dust envelope around the late-type star IRC + 10216. The IR envelope is nearly circularly symmetric with radial extent greater than about 0.09 pc, comparable to the size of the molecular gas envelope. The polarization vectors of the NIR continuum radiation from the envelope show a clear centrosymmetric pattern, indicating that the IR nebulosity is due to scattering by dust grains in the envelope. The radial distribution of dust grains inferred from the polarized intensity most likely obeys an inverse-square law, which suggests a steady mass loss between $r = 15$ arcsec and $r = 60$ arcsec.

A88-30292 Infrared polarimetry of dark clouds. III - The relationship between the magnetic field and star formation in the NGC 1333 region. MOTOHIDE TAMURA, TAKUYA YAMASHITA, SHUJI SATO, TETSUYA NAGATA, and IAN GATLEY, *Royal Astronomical Society Monthly Notices* (ISSN 0035-8711), Vol. 231, March 15, 1988, pp. 445-453. MOESC-SERC-supported research. 40 Refs.

The K-band polarization of 15 infrared sources toward the NGC 1333 region has been measured. The distribution of the position angles of polarization vectors is bimodal: one component, composed of the majority of the observed infrared sources, has a center at a position angle of $125^\circ \pm 30^\circ$ deg, while the other component, composed of three sources, shows position angles of $40^\circ \pm 20^\circ$ deg, nearly perpendicular to the first. The origin of the former component is assigned to the magnetic field threading the NGC 1333 region, and that of the latter to anisotropic reflection nebulosity associated with those young stellar objects. The perpendicularity of

the position angles between field stars and young stellar objects suggests that star formation and cloud evolution in the NGC 1333 region might have occurred under the influence of the magnetic field: the parent molecular cloud has contracted preferentially along the field, resulting in a flattened shape, and subsequently, when circumstellar disks are formed, their planes are constrained to lie orthogonal to the field.

A88-39509 Photometric and colorimetric properties of the solar aureole. KIMIO ARAO and MASAYUKI TANAKA, *Meteorological Society of Japan Journal* (ISSN 0026-1165), Vol. 66, Feb. 1988, pp. 167-177. 21 Refs.

Using atmospheric models described by Arai and Tanaka (1986), the photometric and colorimetric properties of the solar aureole were studied for various conditions of atmospheric turbidity, with special consideration given to the effect of the circumsolar radiation on the measurement of direct solar radiation and to the error in the determination of atmospheric turbidity due to additional circumsolar radiation. The results show that the solar aureole significantly affects the values of the Angstrom's turbidity parameters determined from direct solar radiation measurements, suggesting that the spectral extinction measurements should be made by a photometer with the aperture angle as narrow as possible. It was found that the colorimetric property of the solar aureole varies noticeably from one place to another, especially for the atmosphere containing large particles, although the most reddish point does not change its position of about 1.6-deg from the sun for different turbidity conditions.

A88-23804 A two-component dark matter universe. II - Linear fluctuation theory. SATORU IKEUCHI, COLIN NORMAN, and ZHAN YIN, *Astrophysical Journal, Part 1* (ISSN 0004-637X), Vol. 324, Jan. 1, 1988, pp. 35-45. NSF-supported research. 25 Refs.

The development of linear fluctuations is studied in a universe dominated by two components consisting of hot and cold particles. The initial fluctuation amplitudes in the two species at $t(\text{eq})$ are comparable. This is related to suitable choices of the fluctuation levels of the associated linearly independent adiabatic and isocurvature modes. Below the cutoff mass the fluctuations in the hot particles are driven by the gravity of the existing cold particle fluctuations. Detailed analytic and numerical calculations are given that exhaustively describe the behavior of the two-component fluctuations over a wide range of parameters. Implications for large-scale structure, large-scale streaming motions, and the microwave background are briefly noted.

A88-29558 Structure of the Jovian magnetospheric boundary region. TAKASHI AOYAMA and HIROSHI OYA, *Journal of Geomagnetism and Geoelectricity* (ISSN 0022-1392), Vol. 40, no. 1, 1988, pp. 1-32. 34 Refs.

A model in which the Jovian magnetospheric boundary region near the equatorial plane is produced by the interaction between the solar wind plasma and the internal planetary wind plasma in the magnetodisk is investigated. Results obtained using the two-dimensional Rankine-Hugoniot relation in the MHD regime show that the internal shock is strong in the dawn side of the Jovian magnetodisk, while the shock formed in the dusk side is weak and disappears at the intermediate position. The Jovian low latitude magnetospheric boundary structure is modeled as a double shock (a bow shock and internal shock) and a double magnetopause (a magnetopause and internal magnetopause).

A88-40477 Color photographs of an accretion disk around a black hole. JUN FUKUE and TAKUSHI YOKOYAMA, *Astronomical Society of Japan Publications* (ISSN 0004-6264), Vol. 40, no. 1, 1988, pp. 15-24. 15 Refs.

The paper presents simulations of the color photographs of a geometrically thin relativistic accretion disk around a Schwarzschild black hole. The X-ray and optical photographs are compared with the bolometric photograph. Calculations are made of X-ray light curves when the relativistic accretion disk is eclipsed by its companion.

A88-40479 Photometric, spectroscopic, and 21-cm line investigation of selected ultraviolet-excess galaxies. HIDEO MAEHARA, MASARU HAMABE, LUCETTE BOTTINELLI, LUCIENNE GOUGUENHEIM, JEAN HEIDMANN et al., *Astronomical Society of Japan Publications* (ISSN 0004-6264), Vol. 40, no. 1, 1988, pp. 47-67. Research supported by the Japan Society for the Promotion of Sciences and CNRS. 41 Refs.

Three Kiso ultraviolet-excess galaxies (KUGs), 1618 + 378, 1624 + 404, and 1626 + 413, and a Markarian galaxy, Mrk 297, all of which have clumpy features, were selected for an investigation in the optical and radio wavelength ranges in order to obtain data on the star forming activity in these galaxies. For this purpose, direct photographs, spectrograms, and 21-cm line profiles were obtained with an intensified camera attached to the Pic du Midi 2-m telescope, the Okayama 188-cm telescope Cassegrain spectrograph, and the Nançay 300-m radio telescope, respectively. Optical observations reveal that a number of bright blue clumps are scattered over the main body of the galaxy whose physical conditions are similar to low- to high-excited H II regions. It is shown from the optical, radio, and the IRAS data that these galaxies have H I masses and luminosities much larger than for classical irregulars, and they are powerful far-infrared emitters of more than three to ten times of the starburst galaxy M82, while their ratios to blue luminosities are slightly smaller than the M82 level. In conclusion, Mrk 297 is confirmed as a clumpy irregular galaxy, and KUG 1626 + 413 is a possible new galaxy of the same type. The two other KUGs may be spiral galaxies much perturbed by active bursts of star formation.

A88-40480 Diffuse molecular gas toward W49A. RYOSUKE MIYAWAKI, TETSUO HASEGAWA, and MASAHICO HAYASHI, *Astronomical Society of Japan Publications* (ISSN 0004-6264), Vol. 40, no. 1, 1988, pp. 69-78, 21 Refs.

Two CS(J = 1-0) absorption features were detected at $V(\text{LSR}) = 39$ and 60 km/s against strong radio continuum emission from W49A. The two features are formed in the diffuse molecular gas situated on the near and far sides of the Sagittarius arm along the line of sight toward W49A. The lower limits to the optical depth and the upper limits to the excitation temperature of CS are determined to be $\tau = 0.99$ and $T(\text{ex}) = 3.55$ K for the 39-km/s feature and 0.31 and 4.65 K for the 60-km/s feature, respectively.

A88-49838 Grazing incidence optics for the X-ray astronomy mission SXO. YASUO TANAKA and FUMIYOSHI MAKINO, *Grazing incidence optics for astronomical and laboratory applications; Proceedings of the Meeting*, San Diego, CA, Aug. 17-19, 1987 (A88-49826 21-74). Bellingham, WA, Society of Photo-Optical Instrumentation Engineers, 1988, pp. 242-244, 5 Refs.

Following three X-ray astronomical satellites, Hakucho (1979), Tenma (1983), and Ginga (1987), the Japanese X-ray astronomers are planning an X-ray telescope mission called SXO in the early 1990's. The main project is X-ray spectroscopy with $E/\Delta E$ greater than 20 at 6 keV and with spatial resolution of about 1 arc min. A thin foil mirror is considered to cover the energy range up to 10 keV with high throughput. A position sensitive gas scintillation proportional counter and some types of solid state detector are studied as the focal plane instruments.

A88-50442 X-ray observations of IC 4329. SHIGERU MIYOSHI, KOUJUN YAMASHITA, YOSHIHARU OKUMURA, SATIO HAYAKAWA, HIDEYO KUNIEDA et al., *Astronomical Society of Japan Publications* (ISSN 0004-6264), Vol. 40, no. 2, 1988, pp. 127-138, 40 Refs.

The X-ray spectrum of the Seyfert 1 galaxy IC 4329 A was observed from May 31 to June 5, 1984 in the energy range 1.4 - 31 keV. During the observations, the flux was nearly constant, $(13.8 \pm 0.8) \times 10^{-11}$ erg/cm² sec in the energy range 2 - 10 keV, which was 1.5 - 2 times the fluxes observed by HEAO 1 in 1978. The spectrum was also constant and represented by a power law with the photon spectral index of 1.63 ± 0.05 in the energy range 1.4 - 12 keV. No significant line feature was found in the energy range 5 - 9 keV. The energy spectrum exhibited an excess of the flux in the high-energy range above 15 keV, and the overall spectrum can be simulated by the sum of two Comptonization spectra processed in hot plasmas.

A88-30726 The linear response of a global atmosphere to tropical heating - Effect of planetary rotation. YOSHIHISA MATSUDA and TERUYUKI KATO, *Meteorological Society of Japan Journal* (ISSN 0026-1165), Vol. 65, Dec. 1987, pp. 819-842, 10 Refs.

The basic features of linear stationary response of a global atmosphere to tropical heating and the effect of planetary rotation on the tropical circulation were investigated. Using linearized shallow water equations on a sphere, the horizontal structure of circulation was calculated for a wide range of the dimensionless parameter (epsilon) representing the planetary rotation, with special consideration given to calculating the stationary response of atmosphere to tropical heating, either symmetrical or antisymmetrical about the equator, and to the stationary response to heating not confined to the equatorial region.

A88-38678 Evidence for beaming of Jupiter's decametric radiation - Simultaneous observations from Voyagers and ground-based observatories. KOITIRO MAEDA and THOMAS D. CARR, *Universitaet Graz und Oesterreichische Akademie der Wissenschaften, 2nd International Workshop on Radio Emissions from Planetary Magnetospheres*, Graz, Austria, Sept. 7-9, 1987, Paper. 40 pp. 19 Refs. Contract No.: NSF AST-84-00208; NAG5-773.

The paper presents incontrovertible evidence for the beaming of the Jovian decametric radiation, based on simultaneous observations at about 22 MHz from one or both of the Voyager spacecraft and one or the other of two ground-based observatories. The data are used to test the hollow-cone beaming models that have been proposed to account both for the long-term statistics of the ground-based observations and for the arc structures discovered in the dynamic spectral plots of Voyager data. It is concluded that occurrences of non-lo-related Source A events are determined by the corotation with the inner Jovian magnetosphere of curved-sheet beams, and those of lo-related Source B storms by a similar type of beam that moves with the northern foot of the lo flux tube. Both types of beam can be approximated by hollow-cone beam sectors. Rough measurements of the observed portions of some of the beams have been made.

A88-18606 Multiple planetary flow regimes in the Southern Hemisphere. SHIGEO YODEN, MASATO SHIOTANI, and ISAMU HIROTA, *Meteorological Society of Japan Journal* (ISSN 0026-1165), Vol. 65, Aug. 1987, pp. 571-586, 29 Refs. Contract No.: NASA ORDER W-15439; NASA ORDER W-16215.

Low-frequency variations in the general circulation of the Southern Hemisphere during 1983 were studied using daily geopotential height and temperature analyses for 12 pressure levels from 1000 mb up to 50 mb, performed by the National Meteorological Center of Japan. Results disclosed the presence, in the Southern Hemisphere troposphere, of an

irregular fluctuation of two zonal mean geostrophic wind patterns (named single-jet and double-jet regimes) during wintertime. The fluctuation is characterized by the persistence of one geostrophic wind regime, with characteristic duration of a month, followed by a rather rapid transition to another regime.

A87-42598 Stratospheric multiple equilibria and seasonal variations. Y. WAKATA and M. URYU, *Meteorological Society of Japan Journal* (ISSN 0026-1165), Vol. 65, Feb. 1987, pp. 27-42. Research supported by the Japan Society for the Promotion of Science. 20 Refs.

The equilibrium of planetary wave and the mean zonal flow in the stratosphere and its stability are discussed using a simplified, vertical one-dimensional model. It is shown that there are two stable equilibria and one unstable equilibrium around late autumn and around late winter or early spring, while one stable state with mean zonal wind close to the basic state is found in midwinter. These stratospheric events can be interpreted as transitions between two stable states due to change in the vertical shear of the basic zonal wind corresponding to seasonal change in solar heating. This transition is essentially a cusp-type catastrophe.

A87-32923 A trial prediction of the values of some surface-layer turbulence constants using Schumann's method for promoting realizability. NOBUO YAMADA, *Boundary-Layer Meteorology* (ISSN 0006-8314), Vol. 38, no. 1-2, Jan. 1987, pp. 1-15, 24 Refs.

Based on a suggestion by Yamada (1986), values of the unknown constants in a particular second-order closure model are determined by applying Schumann's method (Schumann, 1977), using empirical data under neutral conditions. It is found that this closure model predicts favorably the Monin-Obukhov universal functions on both the stable and the unstable sides. It is likely that Schumann's method can be used as an expedient means of determining values of unknown model constants.

A87-45013 Galactic shock in cloud fluid and its gravitational instability. KOHJI TOMISAKA, *Astronomical Society of Japan Publications* (ISSN 0004-6264), Vol. 39, no. 1, 1987, pp. 109-133, 29 Refs.

The response of an ensemble of molecular clouds to the Galactic spiral potential is considered in light of a cloud-coagulation model, adopting the cloud fluid approximation in which each cloud is treated as a molecule in an ordinary gas. The cloud fluid's modeling equations encompass the formation and destruction of giant molecular clouds (GMCs), the loss of random velocity due to mutual dissipative collisions, and the energy input of active star formation in GMCs. It is shown that the Galactic shock is also formed in this cloud fluid, and that GMCs are confined to the spiral arm region for a reasonable range of parameters.

A87-45015 Numerical solution of the equation of radiative equilibrium. III - Atmospheres in a binary system. KYOJI NARIAI and YASUHIRO MURATA, *Astronomical Society of Japan Publications* (ISSN 0004-6264), Vol. 39, no. 1, 1987, pp. 163-169, 7 Refs.

The method of solving the integral equation of radiative equilibrium developed by Nariai and Shigeyama (1984) and modified by Nariai and Ito (1985) is applied to the atmospheres in a binary system. The downward radiation from the other component star at the surface of the atmosphere is represented as an additional boundary condition vector in the original equation.

A87-45616 The formation of planets around stars of various masses and the origin and the evolution of circumstellar dust clouds. TAKENORI NAKANO, *Star forming regions; Proceedings of the Symposium*, Tokyo, Japan, Nov. 11-15, 1985 (A87-45601 20-90). Dordrecht, D. Reidel Publishing Co., 1987, pp. 301-312; Discussion, pp. 313, 33 Refs.

The formation of planets is investigated both in a gaseous nebula and after the nebula has been blown away. The capture of planetesimals by a protoplanet is investigated by taking into account the growth of planetesimals. The time of planet formation is determined as a function of distance from the central star. The formation time of Neptune is found to be 3.9 Gyr, a value shorter than the age of the solar system. The region where planets form within the stellar lifetime is determined, and it is found that only stars of mass less than several solar masses can have planets. The dust clouds around Alpha Lyrae and Beta Pictoris are far outside the planet-forming regions. A model for the circumstellar dust cloud is proposed which can explain the basic properties of the Pic disk.

A88-21371 Instability of interaction network for interstellar gas and interstellar diffusive energy in the shear field. MITSUAKI FUJIMOTO and TAKAO MIZUNO, *Astronomical Society of Japan Publications* (ISSN 0004-6264), Vol. 39, no. 4, 1987, pp. 605-618, 8 Refs. Contract No.: MOESC-58540131.

A model network for interaction between interstellar gas and interstellar diffusive energy is considered in the shear field. Local linearized equations are derived around the equilibrium states which are realized when no shear field exists. A wavy perturbation is followed by employing the WKB method. It is concluded that the shear field brings about various unstable waves depending on their configuration. A great variety of observed dark and luminous pattern in spiral galaxies could be understood as related to these waves.

A88-37985 Effects of the sub-grid scale surface undulations on the forecasts in the Northern Hemisphere winter. AKIMASA SUMI, *Short- and medium-range numerical weather prediction; International Symposium,*

Tokyo, Japan, Aug. 4-8, 1986, Collection of Papers (A88-37954 15-47). Tokyo, Meteorological Society of Japan, 1987, pp. 397-407. 22 Refs.

The performance of the enhanced PBL parameterization scheme of Sumi (1985) is evaluated based on 31 forecasts for three days in January, 1984. Results show that the warming bias in the lower troposphere in the polar region is much reduced, that the zonal wind field is slightly improved (due to improvement of the tropospheric temperature fields), and that the surface pressure field is improved. Overall, the inclusion of the effects due to the subgrid scale undulations represented in this scheme is found to result in improvement of the predicted fields.

A88-45595 Geohistory: Global evolution of the earth (Book). MI-NORU OZIMA, Berlin and New York, Springer-Verlag, 1987, 173 pp. 73 Refs.

This book traces the evolution of the earth as revealed by the study of radiogenic isotopes from long half-life parent elements. The terrestrial evolution is discussed in terms of the latest developments in astrophysical theory, which impose unique constraints on the earth's origin and early evolution. The use of paleomagnetism to study the history of the earth is also examined.

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Date of issue: January 1989