Russian and Japanese Aerospace Literature

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Russian Aerospace Literature
This month: *Planetary Atmospheres*

A92-30463   Water vapor and sulfur dioxide in the (Venus' atmosphere from the Venera-15 data). V. I. MOROZ, D. SPAENKUCH, D. V. TITOV, W. DOEHLER, L. V. ZASOVA, K. SCHAEFER, A. V. D'IACHKOV, D. OERTEL, V. M. LINKIN, and J. NOPIRAKOWSKI, *Middle atmosphere of Venus* (A92-30451 11-91). Berlin, Akademie-Verlag Berlin, 1990, pp. 205-216. 22 Refs.

An investigation of about 1500 spectra of Venus' thermal radiation in the spectral range from 250 to 1600/cm obtained in the IR experiment on board the Venera-15 orbiter is presented, with emphasis on obtaining the gas abundances for various latitudes and local times. The column density of sulfur dioxide and water vapor above the tau-a level of 1 was determined from the measured spectra for seven revolutions of Venera 15. The altitude of the tau-alpha = 1 level varies with latitude and local time but is known for each spectrum. The integral mixing ratio varies from 1 ppm at 50 deg N to 10-20 ppm at 70-80 deg N. The observed strong latitude dependence of N sub SO2 is argued to be due to two effects: the lowering of the cloud tops with latitude and the increase of SO2 abundance in polar regions as compared to the low latitudes. The water vapor integral mixing ratio at a height of 58-60 km is 20 +/- 10 ppm.

A92-30348   A measuring and computing system for lidar monitoring of atmospheric impurities (Izmeritel'no-vychislitel'naia sistema dlia lidarnogo monitoringa atmosfernykh primesei). P. V. GOLUBTSOV, IU. P. PYT'EV, and O. A. FILATOVA, *Optika Atmosfery* (ISSN 0235-277X), Vol. 4, Oct. 1991, pp. 1100-1105. 6 Refs.

Attention is given to the determination of concentrations of atmospheric impurities by the differential absorption method. Analysis of the complex nonlinear multidimensional measurement system makes it possible to perform series-parallel decomposition of measurements into their simpler components, for each of which an optimal reduction transformation can be constructed.

A92-21016   An approach to the detection of microbe life in planetary environments through charge-coupled devices. S. V. LYSENKO, M. IU. KOZLOVSKII, IU. S. POGODIN, and M. D. NUSSINOV, *British Interplanetary Society Journal* (ISSN 0007-094X), Vol. 45, Jan. 1992, pp. 13, 14. 6 Refs.

Charge-coupled devices are proposed for detecting the growth of microorganism colonies. The accuracy of the method is characterized by a channel width, and its sensitivity is characterized by the signal-to-noise ratio. The method was tested on a dense nutrient medium, which is considered to be more suitable for microorganisms of the dry Martian soil than the water solution of nutrients employed in the Viking's strategy.

A92-25328   Choice of the main spectral characteristics of a limb microwave spectrometer for measuring minor gas components of the atmosphere (Vybor osnovnykh spektral'nykh kharakteristik limbovogo mikrovolnovogo spektrometra dlia izmereniia malykh gazovykh sostavliaiushchikh atmosfery). V. D. GROMOV, E. N. KADYGROV, A. S. KOSOV, M. G. SOROKIN, and I. A. STRUKOV, *Issledovanie Zemli iz Kosmosa* (ISSN 0205-9614), Sept.–Oct. 1991, pp. 16–21. 8 Refs.

The choice of optimal spectral characteristics of a limb microwave spectrometer for the measurement of concentrations of O3, ClO, N2O, and temperature in the stratosphere and mesosphere are discussed. A brief description of the spectrometer is given; the calculation of weight functions is presented for the case of the use of nine spectral channels; and measurement errors are estimated.

A92-23539   Total-ozone and nitrogen-dioxide measurements at the Molodezhnaya and Mirnyi Antarctic stations during spring 1987-autumn 1988 (Izmereniia obshchego soderzhaniia ozona i dvuokisi azota na antarkticheskikh stantsiiakh Molodezhnaia i Mirnyi vesnoi 1987-osen'iu 1988 gg.). A. S. ELOKHOV and A. N. GRUZDEV, *Optika Atmosfery* (ISSN 0235-277X), Vol. 4, Sept. 1991, pp. 1006–1009. 12 Refs.

Results of measurements of the total-ozone and NO2 content during November-December (Molodezhnaya) and February-April 1988 (Mirnyi) are reported. During the November-December period an irregular total ozone increase was observed, which characterized the filling up of the ozone hole. Stratospheric warming and the total NO2 increase occurred simultaneously. During the summer-autumn period the total NO2 content decreased gradually. The evening total NO2 content was systematically greater than the morning one, which reflects changes in the NO2 abundance from day to night.

A91-39142   The choice of shape for bodies with minimal aerodynamic heating during motion in the atmospheres of the solar system planets (O vybore formy tel s minimal'nym aerodinamicheskim nagrevom pri dvizhenii v atmosferakh planet solnechnoi sistemy). M. A. KORCHAGINA and N. N. PILIUGIN, *Kosmicheskie Issledovaniia* (ISSN 0023-4206), Vol. 29, Mar.–Apr. 1991, pp. 298–309. 20 Refs.

Expressions are developed for the convective and the radiant-heat fluxes and the coefficients of friction and the wave drag for axisymmetric and planar bodies moving in the atmospheres of solar-system planets. Values of total heat and drag for blunted cones moving in the atmospheres of the earth, Venus, Mars, and Jupiter are calculated, and the results are used to examine the problem of the choice of satellite shape for minimizing its aerodynamic heating.

A92-23520 **Observations of the total content of atmospheric ozone in the Arctic during the polar night of 1991 (Nabliudeniia obshchego soderzhaniia atmosfernogo ozona v Arktike v period poliarnoi nochi 1991 goda).** V. M. DOROKHOV, S. V. DOLGII, IU. S. IVANOV, V. I. SITNIKOVA, *Optika Atmosfery* (ISSN 0235-277X), Vol. 4, Aug. 1991, pp. 852–855. 6 Refs.

Data are presented from measurements of the total ozone content over Heiss Island (81 deg N, 58 deg E) during the polar night of 1991. It was found that, compared with the ozone content in January 1989, the ozone content in January 1991 was higher by 14 percent.

A92-22491 **Scientific and engineering solutions about interstellar piloted vehicle.** U. N. ZAKIROV, IAF Paper 91-722 presented at the 42nd IAF International Astronautical Congress, Montreal, Canada, Oct. 5–11, 1991. 5 pp. 2 Refs.

A possible way of returning an interstellar piloted vehicle to the earth is examined. The approach is based on the relativistic theory of a continuous medium and the solution of a dynamic equation for a point of variable rest mass. The engineering solutions embody the idea of vehicle deceleration when part of the construction on the return trajectory to the earth is burned up. The atmospheres of the planets of the solar system may act as such a medium. This procedure makes it possible to save fuel necessary for deceleration.

A92-19916 **Numerical kinetic simulation of the upper atmosphere photochemistry and dynamics.** M. IA. MAROV, V. I. SHEMATOVICH, and D. V. BISIKALO, Ionospheric and thermospheric studies; Proceedings of the Topical Meetings of the Interdisciplinary Scientific Commission P /Meeting P2/ and C /Meetings C4 and C8/ of the COSPAR 28th Plenary Meeting, The Hague, Netherlands, June 25–July 6, 1990. A92-19876 06-46 Advances in Space Research (ISSN 0273-1177), Vol. 12, No. 6, 1992, pp. 303–308. 7 Refs.

Attention is given to the kinetic approach as a prerequisite for the investigation of the atmospheric gas flow in a transition region between the dense atmosphere at low altitudes and the collisionless atmospheric layers at very high altitudes. The kinetic approach, based on the stochastic simulation method, is found to be an effective numerical technique for examining nonequilibrium physical and chemical systems. The stochastic simulation of collisions in rarefied natural gas makes it possible to estimate the efficiency of energy transfer from atomic and molecular translational degrees of freedom to inner ones as well as the efficiency of ionization-recombination reactions in partially ionized rarefied gas. By extending this technique to so-called photoprocesses, it may be applied to the study of physical and chemical processes in the upper layers of planetary atmospheres. The results of a detailed numerical analysis of the excited and ionized particle production kinetic rates in multichannel dissociation and ionization reactions are presented.

A92-18261 **Theory of the motion of planetary atmospheres (K teorii dvizheniia atmosfery planet).** A. I. DOBROLIUBOV, *Akademiia Nauk BSSR, Doklady* (ISSN 0002-354X), Vol. 35, Nov. 1991, pp. 1018–1022. 3 Refs.

A possible mechanism for the west-to-east motion of the equatorial belt of a planetary atmosphere is considered with reference to a theory of wavelike mass transfer. According to this mechanism, a traveling-wave process of the transition of the medium into another phase state, leading to a change in its density, causes mass transport along the medium along the trajectory of the traveling wave. This mechanism is capable of explaining Voyager-2 data concerning atmospheric motions on Jupiter, Saturn, Uranus, and Neptune.

A91-55360 **Determination of the altitude distributions of ozone and other minor atmospheric gas components from satellite limb measurements in the microwave range (Ob opredelenii vysotnykh raspredelenii ozona i drugikh malykh gazovykh sostavliaiushchikh atmosfery po limbovym izmereniiam so sputnikov v SVCh-diapazone).** K. P. GAIKOVICH, SH. D. KITAI, and A. P. NAUMOV, *Issledovanie Zemli iz Kosmosa* (ISSN 0205-9614), May–June 1991, pp. 73–81. 25 Refs.

The radio-emission characteristics of the atmosphere and its minor gaseous components are analyzed using data from satellite limb measurements near the resonance millimeter-wave frequencies. Inverse problems are solved for the limb sounding of height distributions of ozone and CO2. It is shown that, within a measurement error of 0.5 K, the retrieval accuracy was 2 to 5 percent. Requirements are formulated for the main parameters of the satellite sounding devices.

A91-39091 **Construction of the maps of reflectivity and roughness of the Venusian surface (Poluchenie kart otrazhatel'noi sposobnosti i sherokhovatosti poverkhnosti Venery).** A. V. ABRAMOV, A. V. GRECHISHCHEV, N. V. ZHERIKHIN, I. A. ZHELTIKOV, G. M. LEVCHENKO et al., *Geodeziia i Kartografiia* (ISSN 0016-7126), Jan. 1991, pp. 49–54. 6 Refs.

Data collected by the Venera-15 and Venera-16 side-looking (SL) radar systems and radio altimeters (RAs), in terms of the coefficient of the Venusian-surface reflection and the rms values of the surface slope, are used to construct maps of the Venusian-surface reflectivity and roughness. A method is developed for calculating these values by comparing amplified signals from SL and RA channels. These maps can be used to derive information on the electrophysical characteristics, the mineral composition, and the structure of the Venusian crust.

A91-55306 **Giant planets—Theoretical and observational aspects (Planety-giganty—Teoreticheskie i nabliudatel'nye aspekty).** A. P. VID'MACHENKO, *Astronomicheskii Vestnik* (ISSN 0320-930X), Vol. 25, May–June 1991, pp. 277–292. 31 Refs.

Theoretical aspects and observational results regarding the atmospheres, ionospheres, and magnetospheres of giant planets are discussed. Consideration is given to the photochemistry of the main components of, and the general energy balance in, the upper atmospheres, magnetic fields, and the dynamics and models of general and local circulation of the atmospheres of giant planets. Topics for future observational and theoretical investigations are discussed.

A91-50806 **Results of concentration measurements of carbon-containing aerosol in the eastern-Arctic atmosphere (Rezul'taty izmerenii kontsentratsii uglerodsoderzhashchego aerozolia v atmosfere vostochnoi Arktiki).** A. D. A. HANSEN, V. N. KAPUSTIN, and A. V. POLISSAR, *Akademiia Nauk SSSR, Izvestiia, Fizika Atmosfery i Okeana* (ISSN 0002-3515), Vol. 27, June 1991, pp. 614–619. supported by NOAA. 8 Refs.

Results are presented on measurements of carbon-soot concentration in the atmosphere over the region in the vicinity of Vrangel in the Soviet Arctic, conducted between March 27 and May 21, 1989 during a joint USSR-U.S. ecological study. Background values of atmospheric carbon in this industry-free region were found to be between 10 and 100 ng/cu m, similar to values obtained in the U.S. for Alaska and northern Canada.

A91-50217 **Speed-resonance in space—General concept and realization conditions.** V. P. VASIL'EV, *Astrophysics and Space Science* (ISSN 0004-640X), Vol. 179, No. 2, May 1991, pp. 237–248. 15 Refs.

Consideration is given to a new class of nonstationary phenomena in the spatially modulated interaction of the cosmic radiation with absorptive matter. The peculiarity of these phenomena is the dynamic regeneration of longitudinal compression waves by scanning nonuniformities of external radiative heating, for the case when the propagation velocity of oscillations excited by the hem is close to the scanning velocity, i.e., the speed-resonance occurs. It is suggested that, before the speed-resonance pumping saturation level is attained, such a radiation-wave echo probably transforms into a set of shock waves, for excitation of which much more powerful sources are required, provided that the energy release is of the pulsing type. In its turn, dissipation of the shock waves, turbulization of matter, and local changes of its radiative balance can stimulate various instabilities and can result in observable nonstationary objects even in stationarily irradiated ones.

A91-49493 **Inverse problem of in situ photometry of scattered solar radiation in a planetary atmosphere—Retrieval of atmospheric scattering characteristics—Mathematical formalism and numerical experiments (Obratnaia zadacha in situ fotometrii rasseiannogo solnechnogo izlucheniia v planetnoi atmosfere—Vosstanovlenie kharakteristik atmosfernogo rasseianiia—Matematicheskii apparat i chislennye eksperimenty).** E. A. USTINOV, *Kosmicheskie Issledovaniia* (ISSN 0023-4206), Vol. 29, May–June 1991, pp. 443–457. 18 Refs.

The present study considers an inverse problem of radiative transfer which makes it possible to interpret measurements of spatial and angular dependences of scattered solar radiation in an optically thick planetary atmosphere in terms of vertical profiles of parameters governing the radiative transfer in the atmosphere. These parameters are related to an extinction coefficient and coefficients of the expansion of the scattering phase function based on Legendre polynomials. The inverse problem under discussion involves numerical differencing of measured data against altitude and is therefore incorrect. To solve it, Turchin's statistical regularization method is used. Results of two numerical experiments are presented which model measurements and a retrieval procedure for atmospheric models with conservative and nonconservative scattering.

A91-37154 **The modeling of stratiform clouds in the atmospheres of giant planets with allowance for the intersolubility of condensing components. I (Modelirovanie sloistoobraznoi oblachnosti v atmosferakh planet-gigantov s uchetom vzaimorastvorimosti kondensiruiushchikhsia komponentov. I).** M. V. BUIKOV, K. IU. IBRAGIMOV, G. A. KIRIENKO, and A. M. PIRNACH, *Kinematika i Fizika Nebesnykh Tel* (ISSN 0233-7665), Vol. 7, Mar.–Apr. 1991, pp. 3–10.

The mechanism of two-component cloud formation is studied with allowance for the intersolubility of components. Equations describing the condensation growth of NH3-H2O drops are derived. It is shown that the time needed to achieve the equilibrium concentration is less than a fraction of a second, a finding which attests to the need to account for intersolubility. A computation of the water-ammonia cloud for Jupiter is presented to illustrate the laws of mixed cloud formation.

A91-26435 **High-frequency fluctuations of total ozone (Vysokochastotnye kolebaniia obshchego soderzhaniia ozona).** N. K. NIKIFOROVA and N. V. TEREB, *Meteorologiia i Gidrologiia* (ISSN 0130-2906), Jan. 1991, pp. 108–110.

Continuous (1-min-long) measurements of the total atmospheric-column concentration of ozone carried out in Kazakhstan during the summer of 1987 disclosed the presence of short-term fluctuations of total ozone concentration. Periodic fluctuations were observed with periods and dimensional scales in the range of internal gravity waves. Possible causes of wavelike fluctuations in ozone concentration are discussed.

A91-39213 **The character of isotope fractionation of terrestrial inert gases—Hydrodynamic fractionation during the dissipation of the primordial hydrogen-helium atmosphere (Priroda izotopnogo frakt-sionirovaniia inertnykh gazov zemli—Gidrodinamicheskoe frakt-sionirovanie pri dissipatsii pervichnoi vodorodno-gelievoi atmosferty).** S. SASAKI and K. NAKAZAWA, *Isotopic geochemistry and cosmochemistry* (A91-39210 16-46). Moscow, Izdatel'stvo Nauka, 1990, pp. 50–67. 32 Refs.

A model is developed for simulating the process of fractionation of the inert gases isotopes present in the primordial H2-He (plus inert gases) atmosphere of the earth during the process of dissipation of this atmosphere. According to this model, primordial atmosphere was dissipated under the effect of strong UV radiation from the protosolar body. During this process, the molecules of inert gases were captured by hydrogen and were fractionated. Further degassing resulted in the present Xe composition of the terrestrial atmosphere, which is different from isotopic compositions of the solar and meteorite Xe.

A91-39211 **Terrestrial inert gases—Restraints and conclusions concerning the evolution of the atmosphere (Zemnye inertnye gazy—Ogranicheniia i vyvody ob evoliutsii atmosfery).** M. OZIMA and G. IGARASHI, *Isotopic geochemistry and cosmochemistry* (A91-39210 16-46). Moscow, Izdatel'stvo Nauka, 1990, pp. 5–29. 84 Refs.

Recent data on the composition of inert gases in the earth's atmosphere and in the upper mantle are summarized with special attention given to inert gases that were present in the paleoatmosphere. It is shown that the composition of inert gases in the earth's system is different from the respective components of other planets. The difference found between the Ar-40/Ar-36 ratios in the earth's atmosphere and in the upper mantle (represented by the midoceanic rock basalts, MORB) indicate a history of an an incident of abrupt early degassing of the earth's mantle. On the other hand, the isotope composition of Xe in the earth's atmosphere is similar to that of MORB (with the exception of the Xe-131 to Xe-139 isotopes), but different from that of the planetary and solar Xe isotope compositions, indicating that the specific terrestrial Xe composition was established before the earth formation.

A91-39193 **Behavior of some small components (O, OH, O3) in the lower thermosphere (85-110 km) during the autumn equinox of 1987 (Povedenie nekotorykh malykh sostavliaiushchikh /O, OH, O3/ v nizhnei termosfere /85-110 km/ vo vremia osennego ravnodenstviia 1987 g.).** TS. GOGOSHEVA and M. GOGOSHEV, *B'lgarsko Geofizichno Spisanie* (ISSN 0323-9918), Vol. 16, No. 3, 1990, pp. 68–77. 8 Refs.

The contents of O, OH, and ozone in the lower thermosphere during autumn equinox in 1987 were determined using ground-based optical observations of the characteristics of night emissions, including the green oxygen line emission at 5577 A and the hydroxyl line emissions OH(8-3) and OH(6-1, and by determining the content of ozone indirectly. It was found that the values of mean nighttime OH(8-3) intensity were 3-6 times greater than those of the OH(6-1) intensity in the periods before and after the equinox, but fell abruptly during the equinox. This fall in OH(8-3) is explained by the decrease in the efficiency of the ozone-hydrogen reaction. The contents of ozone in the lower thermosphere and the upper mesosphere decreased eightfold during equinox, as compared with the summer values.

A91-39141 **The inverse problem of temperature sounding. III—Retrieval of vertical profile of the mixing ratio of a minor gas constituent (Obratnaia zadacha termicheskogo zondirovaniia. III—Vosstanovlenie vertikal'nogo profilia otnosheniia smesi maloi gazovoi sostavliaiushchei).** E. A. USTINOV, *Kosmicheskie Issledovaniia* (ISSN 0023-4206), Vol. 29, Mar.–Apr. 1991, pp. 289–297. 18 Refs.

Using the general formula developed by Ustinov (1990), an inverse problem is formulated for retrieving the vertical profile of a minor gas constituent from measurements of the outgoing thermal radiation in the absorption band of this constituent. An analytical expression for the main body of the corresponding linearized inverse problem is obtained. A numerical experiment is carried out demonstrating the efficiency of the inverse problem.

A90-41935 **Methane absorption near 680 nm in the spectra of Jupiter and Saturn. II—Quantitative interpretation (O pogloshchenii metana vblizi lambda 680 nm v spektrakh Iupitera i Saturna. II—Kolichestvennaia interpretatsiia).** V. V. AVRAMCHUK and A. I. KARMELIUK, *Kinematika i Fizika Nebesnykh Tel* (ISSN 0233-7665), Vol. 6, May–June 1990, pp. 53–60. 28 Refs.

The intensities and halfwidths of the 681.46, 681.60, and 681.88 nm methane lines in the spectra of Jupiter and Saturn are redetermined. The physical parameters are estimated using a two-layer model of the planets' atmospheres. It is suggested that the absorption lines are formed both in the cloudy gas-aerosol and optically thin pure gaseous overcloud layers. For Saturn the mean value of pressure at the effective levels of methane absorption line formation are found to be (1.6 + or − 0.2) × 10 to the 5th Pa for the center of the disk and 91.5 + or − 0.2) × 10 to the 5th Pa at a distance 0.7 of the radius from the center. For Jupiter, the mean pressure at the level of 681.88 nm methane absorption line is (2.0 + or − 0.2) × 10 to the 5th Pa. It is shown that the volume concentration of gaseous methane molecules for Saturn is dependent on temperature and is in the range (16.0 + or − 0.2) × 10 to the 16th/cu cm. For Jupiter, the volume concentration of gaseous methane molecules is in the range (5.8 − 6.1) × 10 to the 16th/cu cm.

A91-37172 **Results of a comparison of methods for calculating thermal radiation (Rezul'taty sravneniia metodov rascheta teplovogo izlucheniia).** T. IA. PONOMAREVA and O. P. SKROTSKAIA, *Akademiia Nauk SSSR, Izvestiia, Fizika Atmosfery i Okeana* (ISSN 0002-3515), Vol. 27, March 1991, pp. 275–285. 18 Refs.

This paper compares several methods for estimating thermal radiation fluxes using data for standard atmosphere models of the sub-Arctic, temperate-zone, and tropical latitudes. It is shown that the results depend on the degree of accuracy in approximating the atmospheric gas transmission function at long waves. Also considered are the effects of pressure and temperature on the parameters of gas absorption.

A91-35667 **Description of the dynamics of atmospheric CO2 on a time scale of 1 Myr (Opisanie dinamiki atmosfernogo uglekislogo gaza v masshtabakh vremeni 10 to the 6th let).** I. V. ALTUNIN and E. P. BORISENKOV, *Akademiia Nauk SSSR, Doklady* (ISSN 0002-3264), Vol. 316, No. 3, 1991, pp. 574–576. 8 Refs.

An eight-block model of the global carbon cycle has been developed which satisfactorily describes the dynamics of atmospheric CO2 on a time scale of a million years. It is shown that the main factor determining fluctuations of CO2 levels in the atmosphere is the variation of CO2 exchange between ocean and atmosphere with variation of ocean-water temperature.

A91-28067 **NH4SH and cloud cover in the atmospheres of the giant planets (Gidrosul'fid ammoniia i oblachnost' v atmosferakh planet-gigantov).** K. IU. IBRAGIMOV and A. A. SOLODOVNIK, *Kinematika i Fizika Nebesnykh Tel* (ISSN 0233-7665), Vol. 7, Jan.–Feb. 1991, pp. 58–63. 16 Refs.

The probability of the formation of NH4SH and (NH4)2S is examined on the basis of the Le Chatelier principle. It is shown that it is very doubtful if NH4SH can be created in the atmospheres of the giant planets in quantities sufficient for cloud formation. Thus (NH4)2S is considered as a more likely candidate for cloud formation in the atmospheres of these planets, inasmuch as the conditions for its production there are more favorable.

A91-27457 **A note on the systematics of noble gas abundance ratios in the solar system.** IU. A. SHUKOLIUKOV, *Proceedings of the International Workshop, Analysis of samples from solar system bodies with emphasis on existing and emerging technologies,* Bad Honnef, Federal Republic of Germany, June 11–13, 1990. A91-27451 10-90) Space Science Reviews (ISSN 0038-6308), Vol. 56, April 1991, pp. 37–41.

It is demonstrated that there is a general regularity in all noble gas elemental patterns in the atmospheres of the planets. A number of models are proposed to explain this, and these models are examined and judged. In order to explain the observed elemental gas ratios, it is proposed that they may have resulted from selective loss of noble gas from the initial atmospheres of the terrestrial or other planets; that they may be due to solar wind irradiation of the planets and their small precursor bodies; or the noble gases were imported by carrier grains with their peculiar abundance ratio already fixed.

A91-26433 **Acid content in atmospheric precipitation in the Baikal region (Kislotnost' atmosfernykh vypadenii v regione Baikala).** V. A. OBOLKIN, T. V. KHODZHER, IU. A. ANOKHIN, and T. A. PROKHOROVA, *Meteorologiia i Gidrologiia* (ISSN 0130-2906), Jan. 1991, pp. 55–60. 11 Refs.

The spatial distribution of the acidity of rain water and snow cover in the Lake Baikal region was investigated for the time period between 1984 and 1988. Results indicated the existence of local and regional differences in the pH pattern, due to specific anthropogenic and natural sources of H(+). The atmospheric H(+) fluxes were maximal (about 10 mg/sq km) in the region of high-altitude mountain forests.

A91-26432 **Settling of atmospheric pollutants with precipitation in the southern Baikal region (Postuplenie zagriazniaiushchikh veshchestv iz atmosfery s osadkami v luzhnom Pribaikal'e).** A. O. KOKORIN and S. V. POLITOV, *Meteorologiia i Gidrologiia* (ISSN 0130-2906), Jan. 1991, pp. 48–54. 9 Refs.

The spatial characteristics of the atmospheric pollutants precipitating with rain and snow in the southern Baikal region are examined. Data are presented on the contents of sulfates, anions, cations, metals, and suspended particles precipitated with rain water and snow in the winter of 1987-1988 and on changes in some of these pollutants with location. It is shown that an increase in precipitation at high altitudes is accompanied by chemical changes in the precipitation. The settling values for some substances were a factor of four to six greater in the Khamar-Daban mountain area than in the foothills.

A91-21931 **Influx of organic cosmic-dust particles into the atmosphere (Pritok v atmosferu organicheskikh chastits kosmicheskoi pyli).** V. N. LEBEDINETS, *Akademiia Nauk SSSR, Doklady* (ISSN 0002-3264), Vol. 314, No. 6, 1990, pp. 1363–1366. 13 Refs.

Optical and radar observations of meteoroids are examined together with Vega and Giotto data, and the investigation suggests that about half of the cosmic-dust particles in interplanetary space are organic. It is thus estimated that the influx of organic cosmic-dust into the earth's atmosphere is about the same as the influx of inorganic meteoroid particles, i.e., up to 100 tons per day.

A91-23838   The relationship between variations in total ozone and nitrogen dioxide concentrations in the atmosphere (Vzaimosviaz' variatsii obshchego soderzhaniia ozona i dvuokisi azota v atmosfere). N. E. KAMENOGRADSKII, V. K. SEMENOV, V. P. SINIAKOV, and L. A. SPEKTOROV, *Meteorologiia i Gidrologiia* (ISSN 0130-2906), May 1990, pp. 27–32. 7 Refs.

Simultaneous observations of the total ozone and nitrogen dioxide concentrations were carried out on the northern shore of Lake Issyk Kul in 1983–1988. On the basis of these data, an analysis is made of trend, seasonal, and irregular variations in the mean monthly values. An attempt is made to relate the observed ozone and nitrogen dioxide anomalies with transport processed and zonal circulation in the stratosphere.

A91-23804   The effect of Space Shuttle and Energiia launches on the earth's ozone layer (Vliianie zapuskov raket 'Shattl' i 'Energiia' na ozonnyi sloi zemli). VALERII P. BURDAKOV, NIKOLAI F. ELANSKII, and VIACHESLAV M. FILIN, *Akademiia Nauk SSSR, Vestnik* (ISSN 0002-3442), No. 12, 1990, pp. 72–81. 13 Refs.

The character and magnitude of the effect of Space Shuttle and Buran-Energiia launches on the ozone layer are evaluated. Attention is given to the effects of a single launch and to the projected cumulative effect of regular launches. It is concluded that regular launches of the Shuttle and the Buran-Energiia over a 15-year period will lead to a 2.5-percent average reduction in the mass of stratospheric ozone in the Northern Hemisphere.

A91-23796   Aerosol characteristics in the Martian atmosphere according to data from the KRFM experiment (Kharakteristiki aerozolia v atmosfere Marsa po dannym eksperimenta KRFM). V. I. MOROZ, E. V. PETROVA, L. V. KSANFOMALITI, L. ESPOZITO, ZH.-P. BIBRING et al., *Kosmicheskie Issledovaniia* (ISSN 0023-4206), Vol. 28, Nov.–Dec. 1990, pp. 936–942. 15 Refs.

Photometric limb-to-limb profiles of Mars were obtained in eight narrow bands between 320 and 550 nm with the Phobos-2 KRFM instrument. The imaginary part of the refractive index between 0.02 and 0.04 for 320 nm and less than 0.01 for 550 nm was estimated for a 'constant' dust haze with a nearly wavelength-independent optical depth of about 0.3. The absorbing properties of the material can be explained as due to basaltic rocks with a small fraction of goethite (2–3 percent). Particles with a relatively narrow size distribution with n = 1.31, kappa = 0, and tau = 0.15 can explain the bright spot above Arsia Mons.

A91-13564   Spectroscopic measurements of CO, CH4, and N2O contents throughout the atmosphere over the central Arctic (The SP-28 station) (Spektroskopicheskie izmereniia soderzhaniia CO, CH4, N2O v tolshche atmosfery tsentral'noi Arktiki /Stantsiia SP-28/). E. I. GRECHKO and A. V. DZHOLA, *Akademiia Nauk SSSR, Izvestiia, Fizika Atmosfery i Okeana* (ISSN 0002-3515), Vol. 26, May 1990, pp. 547–550. 9 Refs.

The CO, CH4, and N2O concentration profiles were obtained from measurements of spectroscopic absorption at 4.67, 3.3, and 3.9 microns, respectively, carried out on board the SP-28 drifting station, using models of 'synthetic' absorption spectra of the atmosphere at these wavelengths to find correlations between integral absorption and the content of gas in a vertical air column. Results of measurements indicated that, between 45 deg N and 85 deg N, the concentrations of CO remain uniform. No significant spatial or seasonal variations were found for CH4 and N2O.

A91-11903   Diurnal variations of the vertical profile of ozone concentration in the upper atmosphere according to radiometer measurements (Sutochnye variatsii vertikal'nogo profilia kontsentratsii ozona v verkhnei atmosfere po dannym radiometricheskikh izmerenii). K. IA. KONDRAT'EV, N. I. MOSKALENKO, IU. I. FEDOROV, and F. S. IAKUPOVA, *Akademiia Nauk SSSR, Doklady* (ISSN 0002-3264), Vol. 313, No. 4, 1990, pp. 840–842. 8 Refs.

Vertical profiles of ozone concentration were retrieved from measurements of spectral radiation brightness of the atmospheric ozone in the 9.6-micron band in the horizon zone. The data on diurnal variations of ozone concentration in the upper atmosphere are shown to correspond well to diurnal variations of the spectral brightness in the horizon zone and point to the necessity of taking into account diurnal variations of the ozone concentration field in studying radiative heat transfer in the middle and upper atmosphere.

A90-45072   Molecular hydrogen in the Jupiter Red Spot (Molekuliarnyi vodorod v bol'shom krasnom piatne Iupitera). A. A. ATAI, *Astronomicheskii Vestnik* (ISSN 0320-930X), Vol. 24, Apr.–June 1990, pp. 121–126. 12 Refs.

The quadrupole hydrogen lines S(1) at 6376.76 A in the spectra of the Jupiter Red Spot, (RS), equatorial zone (EZ), and south equatorial belt (SEB) were investigated. The H2 pressure at the S(1) line formation level, the hydrogen content in the above-cloud atmosphere, the amount of absorbing gas along a mean free path between scattering events within the cloud layer, and the specific gas content per unit free path were determined in the framework of a two-layer model. It is shown that physical conditions in the RS, EZ, and SEB differ considerably at the depth of S(1) line formation.

A90-43006   Effect of atmospheric pollution on measurements of total ozone (Vliianie zagriazneniia atmosfery na izmerenie obshchego soderzhaniia ozona). A. G. POPOV and T. D. ZHUKOVSKAIA, *Meteorologiia i Gidrologiia* (ISSN 0130-2906), Feb. 1990, pp. 58–64. 23 Refs.

The effects of various atmospheric gas pollutants on the measurement accuracy of total ozone by the broadband filter instruments used at USSR ozonometric stations were assessed, and the results were used to construct nomograms correlating the total ozone concentration with various concentrations of SO2, NO2, N2O2, HNO3, and other pollutants. It was found that the increased concentrations of SO2 and NO2 as well as of the photochemically produced near-surface ozone can significantly affect the determination of total ozone, with errors produced by the SO2 and NO2 reaching levels as high as 100 and 40 percent, respectively.

A90-32666   Sulfuric acid in the Venus atmosphere according to radio-occultation data (Sernaia kislota v atmosfere Venery po dannym radioprosvechivaniia). S. S. MATIUGOV, O. I. IAKOVLEV, and V. N. GUBENKO, *Kosmicheskie Issledovaniia* (ISSN 0023-4206), Vol. 28, Mar.–Apr. 1990, pp. 277–281. 12 Refs.

An analysis is made of Pioneer-Venus and Venera 15 and 16 data on radio-wave absorption at wavelengths of 5 and 13 cm in the Venus atmosphere at heights from 40 to 70 km. It is shown that this absorption is due to sulfuric acid vapor. At 39–44 km, the sulfuric acid concentration (amounting to 37 + or − 7 ppm) is shown to depend weakly on height. At 54 to 53 km, the H2SO4 concentration decreases with height; at 47 km, it amounts to 20 + or − 5 ppm.

Japanese Aerospace Literature
This month: *Planetary Atmospheres*

A92-17933   Sea-salt particles in the middle troposphere over the tropical Pacific Ocean. MIWAKO IKEGAMI, KIKUO OKADA, and YUJI ZAIZEN, *Papers in Meteorology and Geophysics* (ISSN 0031-126X), Vol. 42, March 1991, pp. 31–41. 17 Refs.

During the INSTAC-I flight tests, aerosol number-size distribution was measured in the middle troposphere at four to five km altitude from 0 deg N to 34 deg N by utilizing an optical counter. The upward transport of sea-salt particles through convective clouds is considered to be responsible for high particle concentrations in the midtropical troposphere.

A92-17930   Atmospheric CO2 and CH4 observed during the flight of International Strato/Tropospheric Air Chemistry I. HISAYUKI Y. INOUE, HIDEKAZU MATSUEDA, TAKASHI MIDORIKAWA, and YUKIO SUGIMURA, *Papers in Meteorology and Geophysics* (ISSN 0031-126X), Vol. 42, March 1991, pp. 3–10. 22 Refs.

Air samples were collected during the test flight of International Strato/Tropospheric Air Chemistry I from Tokyo, Japan to Biak, Indonesia in March 1989. The samples collected at four to five km were subjected to CH4 and CO2 measurement initially, then CO2 was extracted to measure the carbon isotope ratio. The relationship between carbon isotope ratio and the concentration of atmospheric CO2 shows that the high concentration over and near the Japan Islands and a hump at 13 deg N are created by the fossil fuel consumption and/or land plant respiration.

A90-24567   Equivalent widths and band intensities of CO2. MIKIHIKO HIRONO and TSUYOSHI SUDA, *Applied Optics* (ISSN 0003-6935), Vol. 29, Feb. 1, 1990, pp. 608–614. 25 Refs.

Equivalent widths of the 2.7- and 4.3-micron CO2 bands have been measured at high pressures up to 50 atm. The line-by-line calculations for the equivalent width showed that the empirical values of Winters et al. (1964) are also applicable to the high pressure experiments for the 4.3-micron CO2 band. Using the curve-of-growth method, the band intensities of the 5.2-, 9.4-, and 10.4-micron CO2 bands were estimated to be 0.0199/sq cm atm STP, 0.0340/sq cm atm STP and 0.0208/sq cm atm STP, respectively.

A90-21514   Large stratospheric sudden warming in Antarctic late winter and shallow ozone hole in 1988. HIROSHI KANZAWA and SADAO KAWAGUCHI, *Geophysical Research Letters* (ISSN 0094-8276), Vol. 17, Jan. 1990, pp. 77–80. 21 Refs.

There occurred a large stratospheric sudden warming in the Southern Hemisphere in late winter of 1988 which competes in suddenness and size with major mid-winter warmings in the Northern Hemisphere. Associated with the dynamical phenomenon of the sudden warming, total ozone increased over the eastern hemispheric part of Antarctica. The sudden warming as well as other warmings which followed it made the 1988 Antarctic ozone hole shallow in depth and small in area.