AIAA JOURNAL
Vol. 32, No. 7, July 1994

Russian and Japanese Aerospace Literature

During 1994 the *AIAA Journal* will carry selected abstracts on leading research topics from Russian aerospace literature and, as space permits, from similar Japanese literature. The topics will be chosen and the abstracts reviewed for pertinency by *AIAA Journal* editors. This month features Remote Sensing from Russia and Japan.

Support for assembling and publishing the selected abstracts has been provided by the Innovative Science and Technology Directorate of the Strategic Defense Initiative Organization (SDIO), with the sponsorship and technical management of the abstract service by the Office of Naval Research (ONR) under ONR Grant N00014-93-I-1074.

Abstracts in this listing have been taken from the monthly abstract journal *International Aerospace Abstracts* (IAA), published by the American Institute of Aeronautics and Astronautics (AIAA). Additional material can be obtained through searching the Aerospace Database—available online via DIALOG or NASA RECON.

Paper copies and microfiche of the original documents cited are available from AIAA Library, Technical Information Division, American Institute of Aeronautics and Astronautics, Inc., 555 W. 57th St., New York, NY 10019 (212) 247-6500, ext. 231. Use the "A" number to identify material you want. Please be advised that most of the original documents are in the original language. Direct questions concerning this abstract section of the *AIAA Journal* to Norma Brennan, Division Director, Journals.

Russian Aerospace Literature This month: *Remote Sensing*

A93-55035 Interval estimation of the measurement model parameters in remote sensing problems (Interval'noe otsenivanie parametrov modeli izmerenij v zadachakh distantsionnogo zondirovaniya). YU. P. PYT'EV, V. A. GAZARYAN, G. V. SUKHORUKOVA, and T. V. MATVEEVA, *Moskovskij Universitet, Vestnik, Seriya 3—Fizika, Astronomiya* (ISSN 0579-9392), Vol. 34, No. 2, Mar.–Apr. 1993, pp. 3–9. 6 Refs. Documents available from AIAA Technical Library.

The interval estimation method is presented as an efficient approach to the estimation of atmosphere parameters from measurements of solar radiation intensity. The dimensions of the confidence set provide a quantitative measure of the information value of a specific experiment with respect to the parameters of the object of interest. Estimates of the total ozone and aerosol contents, optical aerosol parameter, and vertical ozone distribution are presented as an example.

A93-53546 Stochastic synthesis of thermal microwave images of earth surface covers on the basis of optical images (Stokhasticheskij sintez radioteplovykh izobrazhenij zemnykh pokrovov po optich-eskim). G. A. ANDREEV, L. V. ZAENTSEV, and D. K. TKHABISIMOV, *Radiotekhnika i Ehlektronika* (ISSN 0033-8494), Vol. 38, No. 4, April 1993, pp. 678–685. 11 Refs. Documents available from AIAA Technical Library.

The synthesis of thermal microwave images of the earth's surface on the basis of aerial photographs and radiometric flight data at 37.5 GHz is described. Images with a format of 512 x 512 resolution elements were synthesized on the basis of linear integral transformations.

A93-53325 The Azimut spectropolarimeter for the remote sensing of natural objects (Spektropolyarimetr 'Azimut' dlya distantsionnogo zondirovaniya prirodnykh ob''ektov). A. A. BUZNIKOV, P. S. ELISEEV, and G. A. LAKHTANOV, *Priborostroenie* (ISSN 0021-3454), Vol. 35, No. 1–2, 1992, pp. 100–106. 5 Refs. Documents available from AIAA Technical Library.

A spectropolarimeter for the remote sensing of natural objects is described in which a wide dynamic range (60 dB) is achieved by using a digital gain control system. The digital gain control system employs resistive attenuators controlled by digital codes. A microprocessor-based data processing and control system is used to obtain the spectropolarimetric characteristics of the observed objects in a time frame close to real time.

A93-46964 The feasibility of implicit regularization of solutions to ill-posed problems in remote sensing of the atmosphere (O vozmozhnosti neyavnoj regulyarizatsii reshenij nekorrektnykh zadach distantsionnogo zondirovaniya atmosfery). V. A. SMERKALOV and L. K. USHAKOVA, *Issledovanie Zemli iz Kosmosa* (ISSN 0205-9614), No. 3, May–June 1993, pp. 107–117. 16 Refs. Documents available from AIAA Technical Library.

An implicit regularization method is presented which makes it possible to solve ill-posed inverse problems in aerosol optics, without the use of special regularizing functionals. Numerical examples are presented which show that the use of this method makes it possible to retrieve reliably the concentration and the size spectrum of aerosol particles from data of remote measurements of aerosol light scattering indicatrices with errors up to 50 percent.

A93-51041 Subsurface radar sounding of the stratified-inhomogeneous soil of a planet (Podpoverkhnostnaya radiolokatsiya sloisto-neodnorodnogo grunta planety). V. A. ANDRIANOV, *Radiotekhnika i Ehlektronika* (ISSN 0033-8494), Vol. 37, No. 11, Nov. 1992, pp. 1937–1948. 9 Refs. Documents available from AIAA Technical Library.

The problem of the radar sounding of the soil of a planet from a space probe is studied theoretically with particular reference to Mars. It is shown that two variants of the solution of the inverse problem for determining the subsurface structure and the dielectric properties of the soil are possible: on the basis of pulsed sounding and on the basis of measurements of the frequency dependence of the reflection coefficient in a wide frequency range.

A93-47168 Principles of creating a system of global heliogeophysical monitoring based on unmanned space vehicles (Printsipy sozdaniya sistemy global'nogo geliogeofizicheskogo monitoringa na baze avtomaticheskikh kosmicheskikh apparatov). V. M. KOVTUNENKO, S. I. AVDYUSHIN, and A. V. ZAJTSEV, *Astronomicheskij Vestnik: Issledovaniya Solnechnoj Sistemy* (ISSN 0320-930X), Vol. 27, No. 2, Mar.–Apr. 1993, pp. 96–109. 6 Refs. Documents available from AIAA Technical Library.

The basic principles of the development of the Ground/Space System for Global Heliogeophysical Monitoring (SGHM) are outlined. The SGHM is intended for operational monitoring and forecasting of solar activity, the state of the magnetosphere, ionosphere, and the upper atmosphere, as well as of some processes that occur on the surface or inside the earth and are reflected in circumterrestrial space. Attention is given to the composition and specifications of the SGHM's main space components, some parameters of proposed space vehicles, and a possible list of controlled parameters and measuring instrumentation for all echelons of the system.

A93-46965 Remote sensing of the environment and natural resources in India (Distantsionnoe zondirovanie okruzhayushchej sredy i prirodnykh resursov v Indii). AL. A. GRIGOR'EV and K. YA. KONDRAT'EV, *Issledovanie Zemli iz Kosmosa* (ISSN 0205-9614), No. 3, May–June 1993, pp. 118–123. 17 Refs. Documents available from AIAA Technical Library.

An overview is presented of satellite investigations of the natural resources and ecology of India. Particular attention is given to the progress made in the fields of agriculture, urban dynamics, water resources, and monitoring natural disasters, such as floods and desertification.

A93-45646 Methods of integrating image transducers of different physical types (Review) (Metody integratsii datchikov izobrazhenij razlichnoj fizicheskoj prirody /Obzor/). YU. V. BOJKO, V. M. BOJTSOV, and M. V. ORDA, *Radioehlektronika* (ISSN 0021-3470), Vol. 36, No. 3, March 1993, pp. 3–12. 14 Refs. Documents available from AIAA Technical Library.

Published work concerning the integration of various types of image transducers (e.g., radar, TV, infrared, and lidar) is reviewed. Attention is given to problems related to representing and combining information from image tranducers. General requirements are formulated for image transducer integration systems, and advantages of such systems are discussed.

A93-46962 Analysis of the hydrological and biological conditions in the Onega Lake from the results of joint spacebone radar, airborne, and in situ measurements (Analiz gidrobiologicheskikh uslovij v Onezhskom ozere po dannym sovmestnykh kosmicheskikh radiolokatsionnykh, samoletnykh i kontaktnykh izmerenij). M. A. NAUMENKO, V. S. EHTKIN, K. TS. LITOVCHENKO, A. V. SMIRNOV, D. V. BELETSKIJ, and V. B. RUMYANTSEV, *Issledovanie Zemli iz Kosmosa* (ISSN 0205-9614), No. 3, May–June 1993, pp. 91–101. 6 Refs. Documents available from AIAA Technical Library.

The paper presents the results of the first complex limnological experiment in the Onega Lake in the summer of 1989. It is shown that combining satellite (Kosmos-1870 SAR data), airborne (visual observations and IR radiometry), and ship (visual observations and measurements of the temperature and optical characteristics of water) measurements made it possible to identify extensive areas of phytoplankton in the lake.

A93-46956 A simple geographic reference model for low-resolution scanner images providing high accuracy (Prostaya model' geograficheskoj privyazki skanernykh snimkov malogo razresheniya, obespechivayushchaya vysokuyu tochnost'). M. L. ARUSHANOV, *Issledovanie Zemli iz Kosmosa* (ISSN 0205-9614), No. 3, May–June 1993, pp. 41–46. 8 Refs. Documents available from AIAA Technical Library.

The paper presents a simple model for relating geographic reference to scanner images, which makes it possible to present images as a projection on a geographic map. The model, designed for linear scanners, can be modified for applications to other, nonlinear, modes of scanning.

A93-46953 The radiation and temperature regime of the Mediterranian Sea/atmosphere system and the heliogeomagnetic activity (Radiatsionno-temperaturnyj rezhim sistemy Sredizemnoe more—atmosfera i geliomagnitnaya aktivnost'). G. A. GRISHIN, E. I. KALININ, and T. M. BAYANKINA, *Issledovanie Zemli iz Kosmosa* (ISSN 0205-9614), No. 3, May–June 1993, pp. 12–26. 23 Refs. Documents available from AIAA Technical Library.

Digitized NOAA satellite data obtained during sea-atmosphere monitoring in the summer of 1991 are used to investigate the radiation-energy state of the Mediterranian Sea/atmosphere system and its dependence on the solar activity, with allowance for the 27-day rotation period of the sun. It is found that the significant increase of solar activity in 1991 led to quasi-synchronous variations of a number of heliogeomagnetic parameters. These, in turn, changed the characteristics of cloudiness, outgoing long-wave radiation, and accessible potential energy.

A93-46952 Variations of the ocean surface emission in the 8 cm and 18 cm range (Variatsii sobstvennogo izlucheniya okeana v diapazone 8 i 18 sm). G. A. BOLOTNIKOVA, V. G. IRISOV, V. YU. RAIZER, A. I. SMIRNOV, and V. S. EHTKIN, *Issledovanie Zemli iz Kosmosa* (ISSN 0205-9614), No. 3, May–June 1993, pp. 3–11. 15 Refs. Documents available from AIAA Technical Library.

Variations of the microwave emission by the ocean surface were studied using measurements by aircraft radiometers at the 8 cm and 18 cm wavelengths. Two-band regression curves of the brightness contrasts are constructed, and the relationship between the regression coefficient and the sea-surface conditions is obtained. The experimental data are theoretically analyzed using two different approaches: a method based on the diffraction theory and a phenomenological (quasi-static) approach. A numerical simulation of the regressions under conditions of developing waves is carried out.

A93-43060 Experience with simultaneous sea sounding by ship-based and airborne lidars (Opyt odnovremennogo zondirovaniya morya sudovym i samoletnym lidarami). I. EH. PENNER and V. S. SHAMANAEV, *Optika Atmosfery i Okeana* (ISSN 0869-5695), Vol. 6, No. 1, Jan. 1993, pp. 107–111. 15 Refs. Documents available from AIAA Technical Library.

Ship-based and airborne lidars were used in an experiment on simultaneous sounding of the sea. Hydrological monitoring revealed the presence of local inhomogeneity of salinity. Not far from this location, the airborne lidar detected pulses underwater with a variable polarization state at depths of 10-15 m. In areas with homogeneous water both lidars yielded similar results both in the radiation attenuation index and the depolarization profile.

A93-25596 Accuracy of the remote sensing of carbon monoxide using the second harmonic of the TEA CO2 laser (O tochnosti distantsionnogo zondirovaniia ugarnogo gaza s ispol'zovaniem 2-i garmoniki izlucheniia TEA-CO2-lazera). V. V. ZUEV, A. A. MITSEL', and I. V. PTASHNIK, *Optika Atmosfery i Okeana* (ISSN 0869-5695), Vol. 5, No. 9, Sept. 1992, pp. 970–977. 11 Refs. Documents available from AIAA Technical Library.

A study is made of the effect of the finite emission width of the laser pulse on the effective differential absorption coefficient of CO2 during path sounding using the second harmonic of the TEA CO2 laser. It is shown that, for a laser mixture pressure of about 1 atm, the failure to consider the effect of spectral averaging may lead to errors in determinations of the absorption coefficient, and therefore CO concentrations, from 10 to 100 percent. A nontraditional sounding data processing method is proposed which makes it possible to avoid this error. Errors in determinations of CO2 concentrations resulting from the shift of sounding radiation lines are estimated.

A93-42393 Combined use of passive and active airborne radar equipment for remote sensing (Kompleksnoe ispol'zovanie passivnykh i aktivnykh radiolokatsionnykh sredstv na bortu VS dlya distantsionnogo zondirovaniya). EH. A. LUTIN, *Using remote sensing by radiosondes to solve problems related to the use of aviation in the national economy* (A93-42382 17-43). Moscow, Moskovskij Institut Inzhenerov Grazhdanskoj Aviatsii, 1990, pp. 116–121. 6 Refs. Documents available from AIAA Technical Library.

The combined use of active and passive airborne radar equipment for remote sensing is explored as a way of reducing the measurement dispersion. An expression is derived for the error dispersion of the monitored parameter of the underlying surface in the general case. Expressions are also presented for the rms error of dielectric constant measurements.

A93-42385 The use of a refraction model for calculating the complex dielectric permittivity of heterogeneous systems in remote sensing problems (Ispol'zovanie refraktsionnoj modeli dlya rascheta kompleksnoj diehlektricheskoj pronitsaemosti geterogennykh sistem v zadachakh distantsionnogo zondirovaniya). V. I. TROITSKIJ and N. F. PODKOVKO, *Using remote sensing by radiosondes to solve problems related to the use of aviation in the national economy* (A93-42382 17-43). Moscow, Moskovskij Institut Inzhenerov Grazhdanskoj Aviatsii, 1990, pp. 17–26. 36 Refs. Documents available from AIAA Technical Library.

The use of some of the well-known models for estimating the complex dielectric constant of various materials when interpreting remote sensing data is examined based on the available experimental data. In particular, the use of phenomenological formulas is discussed, and it is shown that the calculation of the complex dielectric constant of some natural heterogeneous materials is often practically impossible due to the variety and complexity of natural objects. It is then shown that the methodological difficulties associated with phenomenological formulas can be avoided by using the refraction model.

A93-42384 Consideration of the effect of multiple scattering by large-scale irregularities in solving inverse problems in microwave radiometry (Uchet vliyaniya mnogokratnogo rasseyaniya na krupnomasshtabnykh nerovnostyakh pri reshenii obratnykh zadach SVCh radiometrii). A. I. KOZLOV, V. I. TROITSKIJ, and YU. K. SHESTOPALOV, *Using remote sensing by radiosondes to solve problems related to the use of aviation in the national economy* (A93-42382 17-43). Moscow, Moskovskij Institut Inzhenerov Grazhdanskoj Aviatsii, 1990, pp. 9–17. 11 Refs. Documents available from AIAA Technical Library.

A method is presented for considering shielding effects and multiple scattering by large-scale irregularities in solving inverse problems in microwave radiometry. The possibility of accounting for anisotropic irregularities is examined. Ways of improving the accuracy and stability of solutions to inverse problems by evaluating the effect of irregularities and by determining the parameters of the irregularities are discussed. It is shown, in particular, that the effect of multiple scattering can be neglected for irregularities with a mean slope up to 23 deg, since the corresponding error in this case does not exceed 1 K.

A93-42383 The principal scientific and practical problems solved by remote sensing systems as part of the utilization of aviation in the national economy (Osnovnye nauchnye i prakticheskie zadachi, reshaemye sistemami distantsionnogo radiozondirovaniya pri PANKh). A. I. LOGVIN, *Using remote sensing by radiosondes to solve problems related to the use of aviation in the national economy* (A93-42382 17-43). Moscow, Moskovskij Institut Inzhenerov Grazhdanskoj Aviatsii, 1990, pp. 3–9. Documents available from AIAA Technical Library.

The use of remote sensing by airborne radar equipment for identifying ore deposits, solving various ecological problems, updating navigation maps, and performing other tasks of importance to national economy is discussed. In particular, attention is given to factors affecting the accuracy of remote sensing data. The main sources of errors are identified, and ways of optimizing the subsystems of remote sensing systems are discussed.

A93-36765 Aerospace natural-resource and ecological studies in China (Aerokosmicheskie prirodnoresursnye i ekologicheskie issledovaniia v Kitae). AL. A. GRIGOR'EV and K. IA. KONDRAT'EV, *Issledovanie Zemli iz Kosmosa* (ISSN 0205-9614), No. 2, Mar.–Apr. 1993, pp. 119–123. 20 Refs. Documents available from AIAA Technical Library.

A brief review of natural-resource and ecological investigations in China using remote sensing data is presented. Particular attention is given to such applied developments as monitoring floods and tectonic activity, as well as desertification and forest damage.

A93-25602 Correlation between space-experiment models and measurements using fractals (O soglasovanii ispol'zuemykh modelei kosmicheskogo eksperimenta s izmereniiami pri pomoshchi fraktalei). V. V. BADAEV, *Issledovanie Zemli iz Kosmosa* (ISSN 0205-9614), No. 6, Nov.–Dec. 1992, pp. 16–24. 13 Refs. Documents available from AIAA Technical Library.

An algorithm is presented for solving problems of the remote sensing of the optical properties of the atmosphere and earth surface in the visible and IR spectral regions, with correlation of the experiment models used with the measurements. The implementation potential of the algorithm is demonstrated in connection with the processing of spectrometry data obtained with the Salyut-7 station.

A93-42382 Using remote sensing by radiosondes to solve problems related to the use of aviation in the national economy (Primenenie distantsionnogo radiozondirovaniya dlya resheniya zadach PANKh). A. I. LOGVIN, ED. Moscow, *Moskovskij Institut Inzhenerov Grazhdanskoj Aviatsii,* 1990, 141 pp. (For individual items see A93-42383 to A93-42396)

The papers contained in this volume are concerned with the theoretical and practical aspects of the development and improvement of remote sensing systems used on civil aviation aircraft for solving various problems of interest to the national economy. Topics discussed include the use of a refraction model for calculating the complex dielectric permittivity of heterogeneous systems in remote sensing problems, rain and hail identification, evaluation of the reliability of data transmission in remote sensing, and some aspects of radiometric measurements in the millimeter band. Attention is also given to a statistical method of target recognition against the sea surface background, formation of polarization images of the earth surface, and combined utilization of passive and active airborne radar equipment for remote sensing.

A93-35335 Separation of light scattering components in the case of multifrequency laser sensing of the upper atmosphere (Razdelenie komponent rasseianiia pri mnogochastotnom lazernom zondirovanii verkhnei atmosfery). V. E. ZUEV, V. V. ZUEV, and B. S. KOSTIN, *Optika Atmosfery i Okeana* (ISSN 0869-5695), Vol. 5, No. 10, Oct. 1992, pp. 1076–1080. 9 Refs. Documents available from AIAA Technical Library.

Consideration is given to an algorithm for separating aerosol and molecular scattering components for the case of multifrequency laser sensing of the upper atmosphere. The proposed algorithm is shown to be stable with respect to input data uncertainties. Vertical profiles of backscattering coefficients are illustrated.

A93-35333 Kalman-Bussi filtering in DIAL temperature sensing (Fil'tratsiia Kalmana-B'iusi v lidarnom zondirovanii temperatury metodom DP). G. M. IGONIN, *Optika Atmosfery i Okeana* (ISSN 0869-5695), Vol. 5, No. 10, Oct. 1992, pp. 1065–1071. 14 Refs. Documents available from AIAA Technical Library.

The possibility of applying optimal Markovian filtering in the case of DIAL tropospheric sounding to heights of 3 km is shown on the basis of a stochastic model of vertical temperature fluctuations smoothed by a lidar pulse. Kalman-Bussi algorithms for optimal estimation of a fluctuation temperature profile and its dispersion are synthesized. An analysis of the filtering efficiency is carried out via numerical modeling as applied to sensing in the A-absorption oxygen band with a Pp27 transition at a wavelength of 768.3802 nm.

A93-33369 The feasibility of determining the microphysical parameters of noctilucent and mesospheric clouds from remote twilight sensing from space (O vozmozhnosti opredeleniia mikrofizicheskikh parametrov serebristykh i mezosfernykh oblakov po dannym distantsionnogo sumerechnogo zondirovaniia iz kosmosa). A. PIKHL and R. RYYM, *Optika Atmosfery i Okeana* (ISSN 0869-5695), Vol. 5, No. 7, July 1992, pp. 734–738. 7 Refs. Documents available from AIAA Technical Library.

Data from remote twilight sensing of horizon from space were used to determine the mean radius and rms deviations of the distribution function of scatterers for noctilucent and mesospheric clouds. It was found that the color index is the optimal parameter to be measured and that it is possible to estimate both the mean radius and the particle dispersion using simultaneous measurements of two different color indices.

A93-31290 Monitoring the environment by thermal aerial mapping (Russian book) (Kontrol' sostoianiia okruzhaiushchei sredy teplovoi aeros'emkoi). BORIS V. SHILIN and IGOR' A. MOLODCHININ, *Moscow, Izdatel'stvo Nedra,* 1992, 65 pp. 15 Refs. (ISBN 5-247-02683-7).

The use of thermal aerial mapping for solving practical problems associated with the monitoring of the environment is discussed. Particular attention is given to the monitoring of water basin pollution, monitoring of the condition of irrigation systems, and fire prevention at oil and gas deposits and at landfills. The equipment used for thermal aerial mapping is described. Methods of ground-based thermometric surveys are also discussed.

A93-10161 Estimating the reliability of predictions of endogenous mineralization from spaceborne geological data (with reference to the Kamchatka peninsula) (Otsenka dostovernosti prognozirovaniia endogennogo orudeneniia na osnove kosmogeologicheskoi informatsii /na primere p-ova Kamchatka/). N. K. ANDROSOVA, V. M. MORALEV, and O. G. SHEREMET, *Issledovanie Zemli iz Kosmosa* (ISSN 0205-9614), No. 4, July–Aug. 1992, pp. 82–92. 10 Refs. Documents available from AIAA Technical Library.

Several approaches are presented for making qualitative estimates of the reliability of predictions of endogenous mineralization, made on the basis of the results of digital processing of lineament patterns on remote imagery and of geological information on the distribution of ore-bearing formations. It is shown that the reliability of predictions can be substantially increased by dividing the territory under study into tectonic subregions and processing the spaceborne geological data for each zone separately. It is found that the use of weighting values of the initial signatures and the removal of noise lead to a speed-up of the calculations, a narrowing of the forecast areas, and an increase of the prediction reliability.

A93-25658 Passive microwave diagnostics of sensible heat fluxes at the ocean-atmosphere boundary (O diagnostike integral'nykh potokov iavnogo tepla na granitse mezhdu okeanom i atmosferoi metodami SVCh-radiometrii). A. G. GRANKOV, *Rossiiskaia Akademiia Nauk, Izvestiia, Fizika Atmosfery i Okeana* (ISSN 0002-3515), Vol. 28, No. 12, Dec. 1992, pp. 1189–1196. 23 Refs. Documents available from AIAA Technical Library.

A microwave radiometry method for approximate determination of the integral (monthly or annual mean) values of the vertical turbulent fluxes of sensible heat through the ocean surface is proposed. It is proposed that the radiation characteristics of the ocean and troposphere measured from on board satellites in the centimeter-wavelength range be used for the retrieval of boundary values of heat fluxes. The microwave characteristics of active zones in the North Atlantic are calculated and compared with in situ data.

A93-25655 A comprehensive study of the polarization and spectral characteristics of radar returns from clouds and precipitation (Kompleksnye issledovaniia poliarizatsionnykh i spektral'nykh kharakteristik radiolokatsionnykh signalov ot oblakov i osadkov). A. V. RYZHKOV, V. B. ZHURAVLEV, and N. A. RYBAKOVA, *Rossiiskaia Akademiia Nauk, Izvestiia, Fizika Atmosfery i Okeana* (ISSN 0002-3515), Vol. 28, No. 12, Dec. 1992, pp. 1163–1169. 4 Refs. Documents available from AIAA Technical Library.

Results are presented of experiments to measure radar reflectivity and differential reflectivity and to estimate the envelope spectrum width of radar returns and the cross-correlation coefficient between orthogonally polarized backscattered signals for the case of cloud and precipitation remote sensing. The observations were made with an X-band meteorological radar.

A93-25613 The German center of aerospace research (DLR) (Germanskii tsentr aerokosmicheskikh issledovanii /GTsAKI—DLR/). K. IA. KONDRAT'EV, *Issledovanie Zemli iz Kosmosa* (ISSN 0205-9614), No. 6, Nov.–Dec. 1992, pp. 110–116. 8 Refs. Documents available from AIAA Technical Library.

A review of work performed at the DLR scientific research institutes in the area of remote sensing is presented. Attention is given to research done at the remote sensing institute, the atmospheric physics institute, the optoelectronic institute, and the high-frequency technology institute. The necessity of greater cooperation between Russian scientific institutes and the DLR is emphasized.

A93-25611 Scientific program of atmospheric and earth-surface research in the framework of the international project Cosmometry (Nauchnaia programma issledovanii atmosfery i zemnoi poverkhnosti po mezhdunarodnomu proektu 'Kosmometriia'). V. V. BADAEV, A. K. GORODETSKII, G. M. GRECHKO, M. S. MALKEVICH, V. N. SOBOLEV, G. M. TAMKOVICH, and G. TSIMMERMANN, *Issledovanie Zemli iz Kosmosa* (ISSN 0205-9614), No. 6, Nov.–Dec. 1992, pp. 91–97. 21 Refs. Documents available from AIAA Technical Library.

The paper examines the objectives and tasks of the Cosmometry project conducted in the framework of the Remote Sensing Working Group of the Intercosmos Council. The overall goal is to solve a wide range of problems connected with investigating the environment, earth resources, and climate changes using visible-range and IR sensors on the Salyut-7 and Mir orbital stations.

A93-25607 Remote-sensing studies of the statistical characteristics of atmospheric parameters (Distantsionnye issledovaniia statisticheskikh kharakteristik parametrov atmosfey). SH. A. AKHMEDOV, S. A. VEISOVA, and N. A. AGAEV, *Issledovanie Zemli iz Kosmosa* (ISSN 0205-9614), No. 6, Nov.–Dec. 1992, pp. 62–69. 7 Refs. Documents available from AIAA Technical Library.

The relationship betwees n the statistical characteristics of aerosol optical thickness and meteorological conditions is evaluated for several portions of the visible spectral region. Data for western Georgia (USSR) and the northwest Pacific were used in the study. The correlation between the statistical properties of the spectral structure of the optical radiation and meteorological parameters made it possible to elucidate physical causes for different states of atmospheric turbidity.

A93-10098 Using ultralight flight vehicles for large-scale aerial photography (Opyt primeneniia sverkhlegkogo letatel'nogo apparata dlia krupnomasshtabnoi aerofotos'emki). IV. G. AFREMOV, S. S. NEKHIN, A. G. VANIN, and V. A. MIRKIN, *Geodeziia i Kartografiia* (ISSN 0016-7126), No. 5, May 1992, pp. 27–31. 2 Refs. Documents available from AIAA Technical Library.

The paper discusses the type of ultralight flight vehicles (SFV) most suitable for large-scale (1:500 to 1:5000) aerial photography, together with technical and cost characteristics of cameras for large-scale stereotopography. Special attention is given to a newly developed motodeltaplane (MDPA) variant suitable for large-scale aerial photography of small but widely separated areas. This MDPA consists of a motodeltaplane Poisk-06 with a specially developed camera (Afremov et al., 1990) which can accommodate 18 x 18 cm films. Photography on the scales between 1:1500 and 1:6000 can be carried out at different altitudes, in the absence of turbulence. The qualitative characteristics of photographs obtained by this DPA model are presented. Compared with surface photography, the efficiency of stereotopography obtained by the use of this MDPA system is increased twofold.