

# Soviet and Japanese Aerospace Literature

Throughout 1988 the *AIAA Journal* will carry selected abstracts on leading research topics from the Soviet aerospace literature and, as space permits, from similar Japanese literature. The topics will be chosen and the abstracts reviewed for pertinency by *AIAA Journal* editors. This month features Spacecraft and Satellite Technology and Systems from the USSR 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 N0014-87-6-0137.

Abstracts in this listing have been taken from the semimonthly abstract journal International Aerospace Abstracts (IAA), published by the American Institute of Aeronautics and Astronautics (AIAA) in cooperation with the National Aeronautics and Space Administration (NASA) under Contract No. NASW-4112. 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 Service, 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 John Newbauer, AIAA Administrator, Technical Publications.

## Soviet Aerospace Literature This month: *Spacecraft and Satellite Technology and Systems*

**A88-44965** The use of multispectral analysis to evaluate nonlinear interactions of VLF waves in the magnetosphere (Ispol'zovanie mul'tispektral'nogo analiza dlia otsenki nelineinykh vzaimodeistvii ONCh-voin v magnitosfere). L. B. VOLKOMIRSKAIA, *Geomagnetizm i Aeronomiia* (ISSN 0016-7940), Vol. 28, May-June 1988, pp. 518-520. 6 Refs.

The advantages of multispectral analysis are described, including the ability to study interwave interactions and to determine filter characteristics and noise properties. This method is used to evaluate Aureole-3 satellite data: the presence of a nonlinear interaction between the first and second harmonics of proton gyrofrequency was observed along with the nonlinear frequency interaction in the oxygen gyrofrequency harmonic region.

**A88-44918** The mathematical representation of time-dependent parameters in some global geodynamics problems. I - Theoretical principles (O matematicheskoi predstavlenii parametrov, zavisishchikh ot vremeni, v nekotorykh zadachakh global'noi geodinamiki. I - Teoreticheskie osnovy). A. N. MARCHENKO, *Kinematika i Fizika Nebesnykh Tel* (ISSN 0233-7665), Vol. 4, May-June 1988, pp. 55-62. 12 Refs.

The problem of the mathematically homogeneous representation of time-dependent parameters is considered in the solution of global geodynamics problems associated with the processing of satellite observations. Two variants of the time-dependent geodynamic model of the geopotential are considered: (1) the conventional spherical harmonic expansion and (2) field approximation by a system of point masses. Formulas are obtained for the computation of the Chebyshev expansions for time-dependent phenomena (i.e., nutation, earth tides, and the tidal variation of UT1).

**A88-43790** Structure analyzer for aerial and space photographic images (Analizator struktury aerokosmicheskikh fotoizobrazhenii). A. N. DROKHANOV, *Geodeziia i Kartografiia* (ISSN 0016-7126), May 1988, pp. 39-44. 8 Refs.

The design and the operating principles of a structure analyzer for photographic images (SAPI) are discussed. The device, used to analyze aerial and space images obtained by a MKF-6 camera, provided for the prompt execution of the image structural analysis and the possibility of following the results in the course of the analysis on a video device and of entering current results into a computer. In addition, the SAPI makes it

possible to quickly change operational apertures and analytical masks. SAPI was used to experimentally verify the method developed by Ziman (1980) for the processing of remote images.

**A88-43672** Correction of spatial and temporal distortions in the photographic image input into an interactive processing system (Korrektsiia prostranstvenno-vremennykh iskazhenii vvoda fotoizobrazhenii v sistemu interaktivnoi obrabotki). S. A. BARTALEV and M. D. BREIDO, *Issledovanie Zemli iz Kosmosa* (ISSN 0205-9614), Mar.-Apr. 1988, pp. 83-89.

This paper describes a method for correcting spatial and temporal distortions in photographic images, which makes it possible to generate digital imagery invariant to the input conditions in an interactive processing system. The efficiency of the method was evaluated using real black-and-white images of an area covered with saxaul bushes for the determination of crown diameters and of the number of bushes.

**A88-43662** Evaluation of stratospheric ozone annual dynamics using satellite data (Diagnostika dinamiki stratosfernogo ozona v godovom khode po sputnikovym dannym). A. N. GRUZDEV and I. I. MOKHOV, *Issledovanie Zemli iz Kosmosa* (ISSN 0205-9614), Mar.-Apr. 1988, pp. 3-10. 8 Refs.

Using satellite data for the period between 1978 and 1982 (Keating and Young, 1985), annual variations of the stratospheric average ozone mixing ratio were determined for the altitudes from 25 to 50 km between 80 deg N and 80 deg S. Special attention is given to the features of latitude and height shifts in the ozone mixing ratios in the upper and middle stratosphere in the Northern and Southern hemispheres and at polar and equatorial latitudes. The results obtained on the seasonal changes in the ozone mixing ratio agree with the analysis of changes in the ozone profiles by Mc Peters et al. (1984).

**A88-43149** Automatic identification of star configurations on photographs (Avtomaticheskoe otozhdestvlenie konfiguratsii zvezd na snimke). V. V. KHARICHEV, *Avtometriia* (ISSN 0320-7102), March-Apr. 1988, pp. 97-99.

A method for the identification of star configurations from sky photographs using two criteria is described. The method is based on the use of full systems of invariants with respect to the plane motion groups and

similitude. Recursion formulas for calculating the invariants are presented. The method is particularly efficient in the case of approximate proportionality between the visible star magnitudes in the catalog and their optical densities or diameters on the photograph. The method, however, does not require that the majority of the stars on the photograph be listed in the catalog.

**A88-39919 Comparative analysis of results of photographic observations of natural objects from Salyut-7 (Sravnitel'nyi analiz rezul'tatov fotos'emki prirodnykh ob'ektov so stantsii 'Saliut-7').** L. A. RONZHIN and I. U. L. RESHTOGA, *Geodeziia i Kartografiia* (ISSN 0016-7126), April 1988, pp. 45-47. 5 Refs.

Photographs taken from space in spectral bands 10 and 40 nm wide are compared. It is shown that, in the 10-nm case, it is possible to satisfactorily identify a significant number of natural objects, as well as to substantially enhance the contrast of objects on the background. Here, a positive effect is achieved for various natural objects, including soils, rocks, vegetation, and water bodies.

**A88-36205 Observations of cosmic gamma-ray bursts on the Prognoz-9 satellite (Nabliudenie kosmicheskikh gamma-VS leskov na ISZ 'Prognoz-9').** M. I. KUDRIAVTSEV and S. I. SVETILOV, *Pis'ma v Astronomicheskii Zhurnal* (ISSN 0320-0108), Vol. 14, March 1988, pp. 216-223. 25 Refs.

Fifteen gamma-ray bursts were detected during a seven-month experiment on Prognoz-9. No significant concentration of gamma-ray burst sources near the Galactic center was found. The influence of temporal and spectral selection on the interpretation of the flux distribution of the observed gamma-ray bursts is discussed.

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

An examination of sheet B-2 obtained from Veerna 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.

**A88-36168 Submillimeter-emission spectra of the earth's atmosphere obtained using space observations (Spektry submillimetrovogo izlucheniia atmosfery zemli v kosmos).** E. P. KROPOTKINA and S. V. SOLOMONOV, *Issledovanie Zemli iz Kosmosa* (ISSN 0205-9614), Jan.-Feb. 1988, pp. 81-88. 15 Refs.

The paper examines effects expected in spaceborne observations of atmospheric submillimeter radiation ( $\lambda = 0.5$  mm). Attention is given to typical features of this radiation which produce a complicated pattern of water vapor and ozone spectral lines. Requirements to be met by instrumentation for measuring the amounts of water vapor, ozone, and nitric oxide at various altitudes in the atmosphere are defined.

**A88-36165 Investigation and mapping of forests using space scanner imagery obtained in winter (Izuchenie i kartografirovanie lesov po materialam zimnei skanernoi s'emki iz kosmosa).** V. I. KRAVTSOVA and E. P. SALAKHETDINOVA, *Issledovanie Zemli iz Kosmosa* (ISSN 0205-9614), Jan.-Feb. 1988, pp. 56-65. 6 Refs.

Boundaries of forest regions and felled areas were identified on Meteor-30 Fragment scanner imagery obtained over the Kostroma region in the winter of 1984. In terms of optical density, the forests in this area belong to four categories with different coniferous/deciduous ratios. The data obtained are compared with old maps in order to trace patterns of forest-land percentage, forest border lengths, and overall changes in forests over 40 years.

**A88-36162 The South Alamyrynian ring structure - A new promising area to search for hydrocarbon deposits (Iuzhno-Alamyrynskaia kol'tsevaia struktura-novyi vozmozhnyi ob'ekt poiskov zalezhei uglevodorodov).** V. I. POPKOV and A. A. RABINOVICH, *Issledovanie Zemli iz Kosmosa* (ISSN 0205-9614), Jan.-Feb. 1988, pp. 37-41.

Several ring structures were identified on space photographs of Mangyshlak. It is suggested that the South Alamyrynian ring structure situated in the northwest Kara Bogaz Gol region may be a promising area for oil and gas exploration.

**A88-36161 The use of space data to study Precambrian structures (Ispol'zovanie kosmicheskoi informatsii pri izuchenii dokembriiskikh struktur).** L. N. UIMANOVA, *Issledovanie Zemli iz Kosmosa* (ISSN 0205-9614), Jan.-Feb. 1988, pp. 30-36.

The possibility of using space photographic data to identify and study the development of Precambrian structures is assessed on the example of Central East Africa. As a rule, these are deep-seated structures which have been repeatedly activated during tectonic-magmatic cycles up to the period of recent rifting.

**A88-36148 Linear digital filtering of photographic images of galaxies (Lineinaia tsifrovaia fil'tratsiia fotograficheskikh izobrazhenii galaktik).** V. V. MAKAROV, *Leningradskii Universitet, Vestnik, Matematika, Mekhanika, Astronomiia* (ISSN 0024-0850), Jan. 1988, pp. 91-96.

The possibility of optimal Wiener filtering for increasing angular resolution in photographic images of galaxies is investigated. The use of homomorphic linear filters for this purpose is recommended. Various methods for calculating the frequency characteristics of linear filters are examined, and the possibility of estimating their parameters is discussed.

**A88-33872 Climatological interpretation of time series of satellite observations of the earth's radiation balance (Klimatologicheskaiia interpretatsiia vremennykh riadov sputnikovykh nabliudenii radiatsionnogo balansa zemli).** G. I. MARCHUK, K. IA. KONDRAT'EV, and V. V. KOZODEROV, *Akademiia Nauk SSSR, Doklady* (ISSN 0002-3264), Vol. 299, no. 1, 1988, pp. 88-94. 8 Refs.

A method for the reliable determination of climatic-effect regions of energy active ocean zones is developed. The method involves a principal-components analysis of mean-monthly field anomalies of the outgoing long-wavelength radiation with a step of 5 deg for the whole globe. The data used include time series for observations made with NOAA (1974-1977) and Nimbus-7 (1978-1983) satellites.

**A88-33869 A statistical approach to the automated identification of linear elements on aerial and space remote-sensing imagery (Ob odnom statisticheskom podkhode k zadache avtomatizirovannogo vydeleniia lineinykh elementov na aerokosmicheskikh snimkakh).** L. P. ARGUNOV, V. N. DEMENT'EV, I. A. IGUMENOVA, V. P. PIATKIN, and G. I. SALOV, *Akademiia Nauk SSSR, Doklady* (ISSN 0002-3264), Vol. 299, no. 1, 1988, pp. 76-79. 5 Refs.

An algorithm and programs have been developed for the automated objective and sufficiently rapid detection of linear elements on remote-sensing images. The judgment about the presence or absence of a linear element for each direction is made by verifying a statistical hypothesis for the processed image fragment. This approach has been applied to the processing of medium-scale geological images of the eastern part of the Siberian platform in the Irkutsk region.

**A88-36172 Remote sensing of the earth's surface in the ultraviolet range (Distantionnoe zondirovanie zemnoi poverkhnosti v ul'trafiol'etovom diapazone).** V. A. SELIVANOV, *Issledovanie Zemli iz Kosmosa* (ISSN 0205-9614), Jan.-Feb. 1988, pp. 111-120. 53 Refs.

The published literature on the remote sensing of the earth's surface in the UV range is reviewed. Particular consideration is given to the history of the question, the reflective properties of natural formations in the UV range, the observation conditions, and UV imaging techniques. It is concluded that UV sensing can provide information in various areas (geology, environment protection, etc.) that does not duplicate information obtainable in the visible range.

**A88-33872 Climatological interpretation of time series of satellite observations of the earth's radiation balance (Klimatologicheskaiia interpretatsiia vremennykh riadov sputnikovykh nabliudenii radiatsionnogo balansa zemli).** G. I. MARCHUK, K. IA. KONDRAT'EV, and V. V. KOZODEROV, *Akademiia Nauk SSSR, Doklady* (ISSN 0002-3264), Vol. 299, no. 1, 1988, pp. 88-94. 8 Refs.

A method for the reliable determination of climatic-effect regions of energy active ocean zones is developed. The method involves a principal-components analysis of mean-monthly field anomalies of the outgoing long-wavelength radiation with a step of 5 deg for the whole globe. The data used include time series for observations made with NOAA (1974-1977) and Nimbus-7 (1978-1983) satellites.

**A88-15899 Experience of image processing through of display processor for geological purposes.** I. G. GORDIENKO, *IAF, 38th International Astronautical Congress*, Brighton, England, Oct. 10-17, 1987. 3 pp. (IAF Paper 87-145).

A display processor using an interactive image processing method for the automatization of geological interpretation and the visualization of digital models of geophysical and geochemical features and terrain is discussed. In the present method small lineaments are marked on the image by a convolution, and long straight lineaments are mapped using a

HOUGH transform. Geological objects are then identified based on the scheme statistics. The designing of a geological map by segmentation and the structural analysis of images is also demonstrated.

**A88-15893 Radar systems of the type employed onboard the 'Cosmos-1500' satellite and their remote sensing capabilities.** V. I. DRONOVSKII and A. I. KALMYKOV, *IAF, 38th International Astronautical Congress*, Brighton, England, Oct. 10-17, 1987. 7 pp. (IAF Paper 87-135).

Advances have been made in ocean and ice research with side-looking radars of the 'Cosmos-1500' series. The principles of determining the underlying surface parameters are based on the measurement of the scattered signal intensities. The precise parameter values of underlying surfaces are calculated by the established dependences relating the specific scattering cross-section to ocean and ice parameters.

**A88-48107 An attempt at a normative ecological prediction on the basis of a long-term space experiment (Opyt normativnogo ekologicheskogo prognoza po dolgovremennomu kosmicheskomu eksperimentu).** B. V. VINOGRADOV and V. A. POPOV, *Akademiia Nauk SSSR, Doklady* (ISSN 0002-3264), Vol. 300, no. 4, 1988, pp. 1017-1020. 7 Refs.

The paper describes a 10-year (1975-1985) experiment carried out on Salyut 4, 6, and 7. Repeated space photographs of the same territory were used to construct a mathematical model of the dynamics of a complex ecological system, and to obtain an extrapolational forecast for 5-25 years into the future. The experiment focused on ecological classes of landscapes of the Amu Darya delta over an area of 10,000 sq km, which, beginning with the 1960s, have been subject to progressive desertification.

**A88-25595 Mean statistical structure of the magnetospheric tail according to satellite data (Srednestatisticheskaia struktura magnitosfernogo shleifa po sputnikovym dannym).** N. A. TSYGANENKO, *Geomagnetizm i Aeronomiia* (ISSN 0016-7940), Vol. 27, Nov.-Dec. 1987, pp. 987-993. 10 Refs.

Available satellite data are used to construct a quantitative model of magnetic-field distribution in the magnetotail and to investigate the dependence of the tail structure on the geomagnetic-disturbance level and solar-wind parameters. It is confirmed that the plasma sheet twists around the tail axis in a direction defined by the sign of the By component of the IMF. The penetration of the By component into the plasma sheet and parts of the tail is investigated.

**A88-26779 Morphology of some new galaxies with ultraviolet excess.** V. S. TAMAZIAN, *Astrophysics* (ISSN 0571-7132), Vol. 26, no. 3, Nov. 1987, pp. 249-252. Translation. 7 Refs.

A morphological investigation of 32 new galaxies with UV excess in the third list of Kazaryan (1980) was carried out using direct photographs taken at the prime focus of the Byurakan Astrophysical Observatory 2.6-m telescope. It was found that about 2/3 of the galaxies studied are spirals, and that among the 15 galaxies in the interval Sa-Sc, seven have bars. Galaxies having interesting structural features (Nos. 281, 289, 332, and 338) are described in detail.

**A88-19463 The choice of a coordinate system for the processing of overlapping plates (O vybore sistemy koordinat pri obrabotke perekryvaiushchikhsia plastinok).** A. I. IATSENKO, *Kinematika i Fizika Nebesnykh Tel* (ISSN 0233-7665), Vol. 3, Sept.-Oct. 1987, pp. 25-29. 6 Refs.

On the basis of a mathematical model, it is found that it is better to use the equal-interval azimuthal polar projection of the celestial sphere onto the auxiliary plane in the processing of a large number of overlapping plates. The coordinates of the stars on this plate are determined from the equatorial coordinates using the expressions:  $U = (\pi/2 - \delta) \sin \alpha$ ;  $V = -(\pi/2 - \delta) \cos \alpha$ . These coordinates are related to the tangential polar coordinates  $U$ -prime,  $V$ -prime.

**A88-15919 On the use of satellite observations of the Tropical Atlantic cloudiness and temperature in the studies of climatic processes.** G. S. DVORIANINOV, G. K. KOROTAEV, V. S. SUETIN, and G. A. CHEPURIN, *IAF, 38th International Astronautical Congress*, Brighton, England, Oct. 10-17, 1987. 3 pp. (IAF Paper 87-176).

Graphs are presented of the temporal dependence of ocean surface temperature deviations and meridional displacements of ITCZ from their mean values over an 11-yr period of annual variations. The relationship between ITCZ wandering and ocean dynamics is studied. By allowing for the role of the tropics in the heat supply to the temperate and high latitudes, it is suggested that the position of the ITCZ axis can be an indicator of variations in the large-scale interaction between the atmosphere and the ocean.

**A88-19517 A geological-morphological description of the Laima Tessera, Tellus Regio and Leda Planitia (Photomap of the Venusian surface, sheet B-13) (Geologo-morfologicheskoe opisaniye tessery Laimy, oblasti Tellury i ravniny Ledy /Fotokarta poverkhnosti Venery, list B-13/).** A. L. SUKHANOV, N. N. BOBINA, G. A. BURBA, I. U. S. TIUFLIN, and M. V. OSTROVSKII, *Astronomicheskii Vestnik* (ISSN 0320-930X), Vol. 21, July-Sept. 1987, pp. 195-206. 5 Refs.

The central part of the region is occupied by Leda Planitia whose formation is explained by a plume ascent from the planetary interiors and its horizontal spreading. Systems of areal dislocations of several directions ('parquet') around Leda Planitia formed from material which moved downslope as plastic flows (Laima and Dekla Tesserae, Tellus Regio). Ridge and furrow belts (Kamari Dorsi) formed along the edges of the 'parquet' regions above the asthenospheric currents which are themselves moving downwards.

**A88-15892 Cost-effective system of remote sensing of the earth.** A. S. SELIVANOV and I. U. M. TUCHIN, *IAF, 38th International Astronautical Congress*, Brighton, England, Oct. 10-17, 1987. 8 pp. 13 Refs. (IAF Paper 87-134).

It has been demonstrated by experience gained in acquiring and processing sensor data from such satellites as the Kosmos-1689 that space photography and specialized ocean surveillance have reached a level of high cost effectiveness as well as accuracy. High resolution scanners are currently under development in the USSR for operation in concert with available medium-resolution scanners; a line-of-sight change capability allows the scanner to be used as a 'magnifying glass' for the observation of distant areas by broad-coverage sensors.

**A88-19563 Texture anomalies of wind waves on sea-surface images (Strukturnye anomalii vetrovogo volneniia na izobrazheniakh poverkhnosti moria).** M. KH. RAFAILOV, *Issledovanie Zemli iz Kosmosa* (ISSN 0205-9614), July-Aug. 1987, pp. 20-27. 10 Refs.

Texture anomalies of statistically quasi-homogeneous wind waves can serve as indicators of various hydrophysical phenomena in the ocean. Texture analysis based on spatial-frequency spectra as moving statistics is highly sensitive to anomalies, yields a metric of texture changes within an anomaly, and makes possible real-time investigations. This approach can be used for the interpretation of both aerial photographs and radar imagery.

**A88-19575 The International Geosphere-Biosphere Program - The role of space-based observations (Mezhdunarodnaia geosferno-biosfernaia programma - Rol' kosmicheskikh sredstv nabludenii).** K. IA. KONDRAT'EV, *Issledovanie Zemli iz Kosmosa* (ISSN 0205-9614), July-Aug. 1987, pp. 104-118. 41 Refs.

The key environmental problems treated by the International Geosphere-Biosphere Program are examined. Proposals are outlined for the optimal planning and implementation of a global survey system designed to monitor geospheric and biospheric conditions. Particular consideration is given to the optimization of space remote-sensing conditions.

**A87-53461 A comparison of different terrestrial reference frame realizations based on satellite laser ranging data (Sravnenie razlichnykh realizatsii zemnoi sistemy koordinat, postroennykh po dannym lazernoi lokatsii iskusstvennykh sputnikov zemli).** V. IA. CHOLIL, *Kinematika i Fizika Nebesnykh Tel* (ISSN 0233-7665), Vol. 3, July-Aug. 1987, pp. 75-79.

A comparison is made between the different terrestrial reference frame realizations which were constructed by different satellite data processing centers. The data were collected during the Merit campaign. Good agreement was found between results obtained with the same measuring techniques. It is noted that the results can be used to construct a combined terrestrial reference frame.

**A87-50865 An automated multichannel recorder of optical spectra (Avtomatizirovannyi mnogokanal'nyi registrator opticheskikh spektrov).** I. U. V. BONDARENKO, V. IA. BUDTSEV, A. N. KASPEROVICH, and V. I. PROKOPENKO, *Avtometriia* (ISSN 0320-7102), May-June 1987, pp. 57-63. 7 Refs.

A computer-controlled system for the multichannel recording of the optical spectra of weakly luminescent objects has been developed on the basis of a supervidicon camera. The general design, operation, and the main components of the system are described, and some test results are presented. Without image accumulation on the supervidicon target, the system is capable of detecting signals of the order of 10 to the -9th w/sq cm. Image accumulation makes it possible to further decrease this value by 1.5-2 orders of magnitude.

**A87-44302 Comparison of topographic aerial cameras with different parameters (Sravnenie topograficheskikh aerofotoapparatov s raznymi parametrami).** V. G. AFREMOV and V. B. IL'IN, *Geodeziia i Kartografiia* (ISSN 0016-7126), Feb. 1987, pp. 45-47.

Principles behind the comparison of various types of topographic aerial cameras are elaborated. Particular consideration is given to the comparison of cameras with identical square frames but with different focal distances and different FOV angles; and cameras with identical FOV angles but with different sizes of the square frames and different focal distances. It is shown that an increase in the frame format leads to an increase in the photography height and scale, resulting in an increase in productivity.

**A87-42938 A method for the optimization of orbits and structures of satellite systems for the periodic round-the-clock survey of the earth (Metod optimizatsii orbit i struktury sistem ISZ dlia periodicheskogo kruglosutochnogo obzora zemli).** V. K. SAUL'SKII, *Issledovanie Zemli iz Kosmosa* (ISSN 0205-9614), Jan.-Feb. 1987, pp. 111-121. 8 Refs.

A quick-response algorithm is presented for optimizing the circular orbits and positions relative to each other of satellites which make up a space system for the periodic round-the-clock monitoring of the earth surface. The method helps to minimize the repetition period of the continuous scanning of a given global zone. The application of the method to a multisatellite system is demonstrated.

**A87-42937 Stereoscopic visualization of aerial and space photographs in thematic mapping (Stereoskopicheskaia vizualizatsiia aero- i kosmicheskikh snimkov pri tematicheskom kartirovanii).** R. IU. VITKUS, V. E. GENDLER, V. A. IL'IN, and L. P. IAROSLAVSKII, *Issledovanie Zemli iz Kosmosa* (ISSN 0205-9614), Jan.-Feb. 1987, pp. 102-110.

The paper presents a method for space-photograph interpretation in which the results obtained by the interpretation of space images containing different parameters are presented as a single stereoscopic image. The method, termed stereovision or stereoscopic visualization, uses pairs of images in which one is a brightness image (for which an original space photograph can be used) and the other determines conventional topography to synthesize artificial stereoscopic images for stereoscopic visualization.

tion. Application of the stereovision to the geological interpretation of space images is demonstrated.

**A88-46068 Space-geological mapping of the USSR (Kosmogeologiya SSSR).** V. N. BRIUKHANOV and N. V. MEZHELOVSKII, Eds. *Izdatel'stvo Nedra, Moscow*, 1987, 240 pp. No individual items are abstracted in this volume.

This work examines the theoretical and methodological principles underlying the use of satellite remote sensing data to compile geological maps. A 1:2,500,000-scale space-geological map of the Soviet Union is characterized, and a new interpretation of the geological evolution of large regions of the country is presented. The possible use of space-geological maps for tectonic, geodynamic, and mineralogical investigations is assessed.

**A88-33832 Technique for the instrumented interpretation of space scanner imagery of the earth's cloud cover (Metodika instrumental'nogo deshifirovaniia materialov kosmicheskoi skanernoi s'emki oblachnogo pokrova zemli).** A. I. SHAROV, *Geodeziia i Aerofotos'emka* (ISSN 0536-101X), no. 5, 1987, pp. 95-98.

Results of the instrumented interpretation of scanner images obtained with meteorological satellites are presented. The MSP-4 synthesizing device is used to process bispectral imagery of the earth's cloud cover, and a masking technique is used to identify the structural features of cloud formations. The proposed technique is verified using data from the NOAA 6, 9, and 10 satellites.

**A88-26099 Observations of ocean and sea bottom relief from space (Nabliudeniiia rel'efa dna morei i okeanov iz kosmosa).** A. LAZAREV, V. KOVALENOK, T. DAMINOVA, and CH. VILLMANN, *Eesti NSV Teaduste Akadeemia, Toimetised, Fuusika-Matemaatika* (ISSN 0367-1429), Vol. 36, no. 4, 1987, pp. 398-404.

Visual observations of the bottom relief of the open ocean made by cosmonauts aboard the Salyut-6 orbital station are analyzed. Under certain conditions, it is possible to study the bottom relief at a depth of 100 meters. It is shown that agitation of the ocean does not significantly affect the possibility of observing submerged objects and formations whose angular dimensions exceed the resolving power of the cosmonaut's visual system.

## Japanese Aerospace Literature This month: *Spacecraft and Satellite Technology and Systems*

**A88-40334 A relation between polar ionospheric disturbance and NNSS satellite positioning error.** TADAHIKO OGAWA, HIDEO MAENO, KIYOSHI IGARASHI, KAZUHIRO AIKYO, and YASUKAZU KURATANI, *Radio Research Laboratory Review* (ISSN 0033-801X), Vol. 34, March 1988, pp. 1-12. 15 Refs.

An experiment for investigating a relation between ionospheric disturbance and satellite positioning error in the polar region was carried out at Syowa Station, Antarctica, in 1985 and 1986 with a two-wave (150 and 400 MHz) NNSS receiver. From the analysis of positioning data of about 10,000 passes over 245 days, it is clearly found that ionospheric disturbance affects the NNSS positioning; the positioning error increases with increasing geomagnetic disturbance level (local K-index), and the number of position fixes per day decreases by one or two when the K-index is large. It is suggested that these effects may arise from the spatial gradients of electron density and/or the radio wave scattering due to well-developed ionospheric irregularities inherent to the disturbed auroral ionosphere.

**A88-38345 Inertial guidance system for the H-I launch vehicle - NICE.** NAOTERU NAGAO and SYOZO TANI, *Mitsubishi Heavy Industries Technical Review* (ISSN 0026-6817), Vol. 25, Feb. 1988, pp. 61-73.

This report gives an outline of the NICE (NASDA Inertial-guidance and Control Equipment) inertial guidance system developed for the NASDA H-I launch vehicle, and to proprietary participation in the NICE system's integration support, the development of the flight program, and the data-interface unit. This system provides for first and second stage attitude control, navigation and guidance, second stage tank pressurization control, and vehicle sequencing functions. The functions and performance of the NICE system were perfectly certified through the first flight of the H-I launch vehicle (Test flight #1 mission) on August 13, 1986.

**A88-38311 On-board antenna pointing mechanism for multi-beam communications satellite.** EIICHI TSUKADA, SHOJIRO MIYAKE, and HISAO KURODA, *Electrical Communications Laboratories Review* (ISSN 0029-067X), Vol. 36, Jan. 1988, pp. 109-114. 8 Refs.

In a multi-beam satellite communications system, the on-board antenna reflectors must be individually driven and controlled mechanically. This paper outlines the design of a small lightweight on-board antenna pointing mechanism (APM) that takes into account satellite launching con-

ditions and the thermal-vacuum environment of space. This APM can drive a main reflector with an aperture diameter of approximately 1 or 1.5 meters loaded in a one-ton class communications satellite with an accuracy on the order of 0.001 degrees.

**A88-28974 Geostationary tether satellite system and its application to communications systems.** TETSUO YASAKA and TAKESHI HATSUDA, *IEEE Transactions on Aerospace and Electronic Systems* (ISSN 0018-9251), Vol. 24, Jan. 1988, pp. 68-75. 11 Refs.

The geostationary tether satellite system expands the geostationary orbit resource from a one-dimensional arc into a two-dimensional disk. The tethered satellites, each several thousand kilometers apart and aligned along the local vertical, are stabilized at the altitude of the geosynchronous orbital speed. When this system is applied to communications systems, it is estimated that the number of satellites can be increased as much as 13 times and the communication capacity can be increased more than 17 times, compared with a conventional geostationary satellite orbit system.

**A88-25854 Proposal of adaptively controlled transmitting array for microwave power transmission in space.** K. KOMOYAMA and I. YOKOSHIMA, *Electronics Letters* (ISSN 0013-5194), Vol. 24, Jan. 21, 1988, pp. 87-89. 6 Refs.

An adaptively controlled transmitting antenna array system is proposed for use in microwave energy transmission between spacecraft. Monitoring detectors are used for feedback control of both main beam and sidelobe. Computer simulation shows the possibility of accurate control for the main beam and a sidelobe.

**A88-40571 An energetics experiment on a space platform.** KY-OICHI KURIKI and HIROAKI OBARA, *Space Power* (ISSN 0951-5089), Vol. 7, no. 1, 1988, pp. 75-89. 5 Refs.

This paper discusses the Space Flyer Unit (SFU) free-flying platform and the on-board advanced-technology experiments planned for this system in relation to the Space Power Satellite (SPS) technology. Attention is given to the design of the SFU and payload integration, the energy-exploitation experiments, and to interactive experiments between SFU and