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Earth Resources
A Continuing
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NASA SP-7041 (28)
January 1981

National Aeronautics and
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NASA SP-7041 (28)

EARTH RESOURCES

A Continuing Bibliography
With Indexes
Issue 28

A selection of annotated references to unclassified reports and journal articles that were introduced into the NASA scientific and technical information system and announced between October 1 and December 31, 1980 in

- *Scientific and Technical Aerospace Reports (STAR)*
- *International Aerospace Abstracts (IAA).*

NASA Scientific and Technical Information Branch 1981
National Aeronautics and Space Administration
Washington, DC

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INTRODUCTION

The technical literature described in this continuing bibliography may be helpful to researchers in numerous disciplines such as agriculture and forestry, geography and cartography, geology and mining, oceanography and fishing, environmental control, and many others. Until recently it was impossible for anyone to examine more than a minute fraction of the earth's surface continuously. Now vast areas can be observed synoptically, and changes noted in both the earth's lands and waters, by sensing instrumention on orbiting spacecraft or on aircraft.

This literature survey lists 436 reports, articles, and other documents announced between October 1 and December 31, 1980 in *Scientific and Technical Aerospace Reports (STAR)*, and *International Aerospace Abstracts (IAA)*.

The coverage includes documents related to the identification and evaluation by means of sensors in spacecraft and aircraft of vegetation, minerals, and other natural resources, and the techniques and potentialities of surveying and keeping up-to-date inventories of such riches. It encompasses studies of such natural phenomena as earthquakes, volcanoes, ocean currents, and magnetic fields; and such cultural phenomena as cities, transportation networks, and irrigation systems. Descriptions of the components and use of remote sensing and geophysical instrumentation, their subsystems, observational procedures, signature and analyses and interpretive techniques for gathering data are also included. All reports generated under NASA's Earth Resources Survey Program for the time period covered in this bibliography will also be included. The bibliography does not contain citations to documents dealing mainly with satellites or satellite equipment used in navigation or communication systems, nor with instrumentation not used aboard aerospace vehicles.

The selected items are grouped in nine categories. These are listed in the Table of Contents with notes regarding the scope of each category. These categories were especially chosen for this publication, and differ from those found in *STAR* and *IAA*.

Each entry consists of a standard bibliographic citation accompanied by an abstract. The citations and abstracts are reproduced exactly as they appeared originally in *STAR*, or *IAA*, including the original accession numbers from the respective announcement journals. This procedure, which saves time and money, accounts for the variation in citation appearance.

Under each of the nine categories, the entries are presented in one of two groups that appear in the following order:

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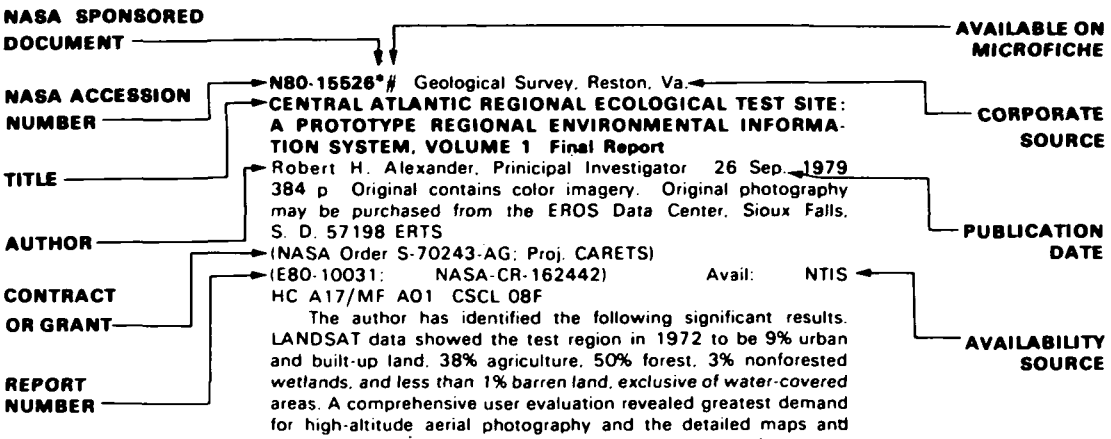

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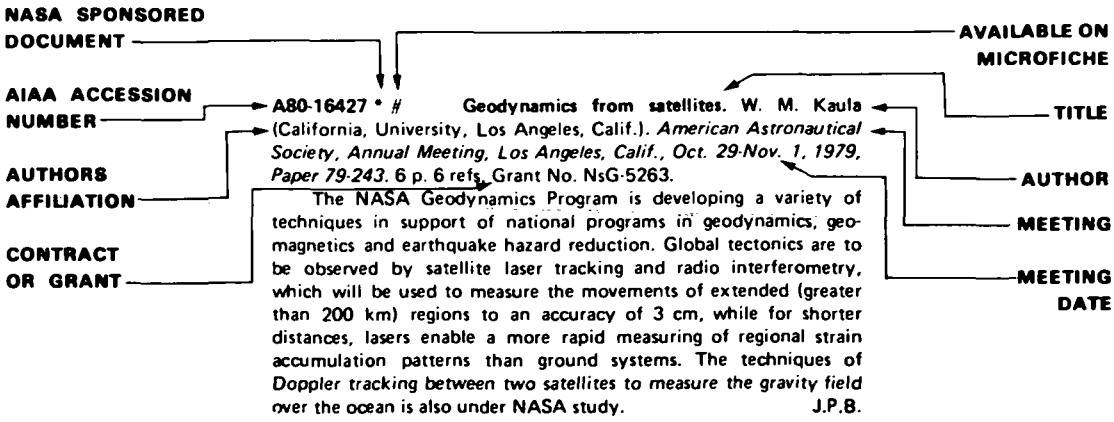

EARTH RESOURCES

A Continuing Bibliography (Issue 28)

JANUARY 1981

01
AGRICULTURE AND FORESTRY

Include crop forecasts, crop signature analysis, soil identification, disease detection, harvest estimates, range resources, timber inventory, forest fire detection, and wildlife migration patterns.

A80-44262 * **Vegetation clutter model.** F. T. Ulaby (Kansas University Center for Research, Inc., Lawrence, Kan.). *IEEE Transactions on Antennas and Propagation*, vol. AP-28, July 1980, p. 538-545. 14 refs. Contract No. NAS9-15421.

The statistical behavior of the radar backscattering coefficient of agricultural crops is examined. The data used were obtained by the microwave active spectrometer (MAS) systems in 1975 and 1976. Based on an evaluation of the angular and spectral variation of the mean, median, and 90-percent dynamic range of the coefficient (dB) histograms, empirical expressions describing the joint angular and frequency dependence of the mean and median were generated for each linear polarization configuration. The clutter model thus generated covers the angular range between 0 deg (nadir) and 80 deg and the frequency range between 1 GHz and 18 GHz. Decorrelation of the coefficient with frequency spacing was also evaluated and modeled. (Author)

A80-46451 * **Simulation of solar radiation absorption in vegetation canopies.** D. S. Kimes (NASA, Goddard Space Flight Center, Earth Resources Branch, Greenbelt, Md.) and J. A. Smith (Colorado State University, Fort Collins, Colo.). *Applied Optics*, vol. 19, Aug. 15, 1980, p. 2801-2811. 26 refs. Grant No. DAAG29-78-G-0045.

A solar radiation canopy absorption model, including multiple scattering effects, was developed and tested for a lodgepole pine (*Pinus contorta*) canopy. Reflectance above the canopy, spectral transmittance to the ground layer, and geometric and spectral measurements of canopy elements were made. Relatively large differentials occurred in spectral absorption by canopy layers, especially in the photosynthetically active region, as a function of solar zenith angle. In addition, the proportion of total global irradiance absorbed by individual layers varied greatly as a function of solar zenith angle. However, absorption by the entire canopy system remained relatively constant. (Author)

A80-47744 * **Unsupervised classification of MSS Landsat data for mapping spatially complex vegetation.** J. R. G. Townshend and C. O. Justice (NASA, Goddard Space Flight Center, Greenbelt, Md.). *(Remote Sensing Society, Annual Conference, 5th, Durham, England, Dec. 18-20, 1978.) International Journal of Remote Sensing*, vol. 1, Apr.-June 1980, p. 105-120. 15 refs.

The various stages in carrying out a monocluster block unsupervised classification using Landsat MSS data are described. Procedures for carrying out these various stages were found to be far from well-established for the type of terrain being investigated, which is rugged and contains many small land cover units. Two particular difficulties were encountered: first, that of precise ground location of pixels; and, secondly, that of objectively evaluating the results. Ways in which these can be surmounted are suggested. (Author)

A80-47748 **Soil water and plant canopy effects on remotely measured surface temperatures.** J. Cihlar (Canada Centre for Remote Sensing, Ottawa, Canada). *International Journal of Remote Sensing*, vol. 1, Apr.-June 1980, p. 167-173. 7 refs.

A study was performed to assess the effects of soil water and crop canopy on apparent temperatures observed by means of remote sensors, and to determine the impact of these effects on remote soil water monitoring. Airborne thermal scanner and apparent reflectance data (one date) and ground PRT-5 data (three dates) were collected primarily over barley and other small grain canopies. Plant heights, cover, and available soil water for four layers in the top 20 cm were determined. Analysis of the data showed a close inverse linear relationship between the available water and the day minus night temperature difference for thick barley canopies (plant cover above 90%) only. The use of apparent reflectance values in the visible region did not improve available soil water regression equations substantially. These results suggest that the available water or plant stress could only be accurately determined for thick canopies, and that the reflectance data could probably be used to identify such canopies but would not improve regression estimates of soil water from remote sensing data. (Author)

A80-49100 * **Separability of agricultural cover types in spectral channels and wavelength regions.** R. Kumar (General Electric Co., Space Div., Lanham, Md.). *IEEE Transactions on Geoscience and Remote Sensing*, vol. GE-18, July 1980, p. 263-267. 7 refs. Research supported by the Conselho Nacional de Desenvolvimento Científico e Technológico; Grant No. NGL-15-005-112.

This study was a continuation of a more complete evaluation of the spectral channels as well as wavelength regions - visible, near infrared, middle infrared, and thermal infrared - with respect to their estimated probability of correct classification Pc in discriminating agricultural cover types reported previously by Kumar and Silva (1977). Multispectral scanner data in twelve spectral channels in the wavelength range of 0.4-11.7 microns acquired in the middle of July for three flightlines were analyzed by applying automatic pattern recognition techniques. The same analysis was performed for the data acquired in the middle of August 1971, over the same three flightlines, to investigate the effect of time on the results. The effect of deletion of each spectral channel as well as each wavelength region on Pc is given. Values of Pc for all possible combinations of wavelength regions in the subsets of one to twelve spectral channels are also given. The overall values of Pc were found to be greater for

the data of the middle of August than the data of the middle of July. (Author)

A80-49136 Identifying irrigated lands using remote sensing techniques: State of the Art; Proceedings of the Symposium, Sioux Falls, S. Dak., November 15, 16, 1979. Symposium sponsored by the Missouri River Basin Commission and U.S. Geological Survey. Omaha, Neb., Missouri River Basin Commission, 1980. 85 p.

Papers are presented reviewing the status of irrigated land identification by means of remote sensing techniques, with particular emphasis on applications in the Missouri River Basin. Specific topics include the Landsat series of remote sensing satellites, processing techniques for remotely sensed data, the identification and location of land irrigated by center-pivot irrigation systems using satellite imagery, irrigation mapping in western Kansas, the Klamath River Basin of Oregon and in California using Landsat imagery, and the application of Landsat-derived irrigated cropland maps for water use determination in the high plains. A.L.W.

A80-49137 # Overview of the Landsat system. W. H. Anderson (U.S. Geological Survey, EROS Data Center, Sioux Falls, S. Dak.). In: Identifying irrigated lands using remote sensing techniques: State of the Art; Proceedings of the Symposium, Sioux Falls, S. Dak., November 15, 16, 1979. Omaha, Neb., Missouri River Basin Commission, 1980, p. 1-4. 8 refs.

Information available from the Landsat series of earth observation satellites is reviewed. It is pointed out that an individual Landsat scene records an area of 185 x 178 km and that continual coverage of most of the world is available at 18-day intervals. The Landsat Multispectral Scanner (MSS) and the processing of MSS data into false-color images are discussed, and the return beam vidicon camera, data collection system and computer-compatible tape capabilities of the Landsat satellites are indicated. Documented applications of Landsat data are noted to include the production of general agricultural resource maps, the selection of areas for more detailed investigation, the determination of optimal dates for larger scale overflights, the updating of land use and agricultural data, and the location of areas of early ephemeral forage production. A.L.W.

A80-49139 * # A review of future remote sensing satellite capabilities. M. A. Calabrese (NASA, Resource Observation Div., Washington, D.C.). In: Identifying irrigated lands using remote sensing techniques: State of the Art; Proceedings of the Symposium, Sioux Falls, S. Dak., November 15, 16, 1979. Omaha, Neb., Missouri River Basin Commission, 1980, p. 17-26.

Existing, planned and future NASA capabilities in the field of remote sensing satellites are reviewed in relation to the use of remote sensing techniques for the identification of irrigated lands. The status of the currently operational Landsat 2 and 3 satellites is indicated, and it is noted that Landsat D is scheduled to be in operation in two years. The orbital configuration and instrumentation of Landsat D are discussed, with particular attention given to the thematic mapper, which is expected to improve capabilities for small field identification and crop discrimination and classification. Future possibilities are then considered, including a multi-spectral resource sampler supplying high spatial and temporal resolution data possibly based on push-broom scanning, Shuttle-maintained Landsat follow-on missions, a satellite to obtain high-resolution stereoscopic data, further satellites providing all-weather radar capability and the Large Format Camera. A.L.W.

A80-49140 * # Identifying and locating land irrigated by center-pivot irrigation systems using satellite imagery. R. O. Hoffman (Nebraska, University, Lincoln, Neb.). In: Identifying irrigated lands using remote sensing techniques: State of the Art; Proceedings of the Symposium, Sioux Falls, S. Dak., November 15, 16, 1979. Omaha, Neb., Missouri River Basin Commission, 1980, p. 31-36. 5 refs. Research supported by the U.S. Department of the Interior, University of Nebraska, and Nebraska Natural Resources Commission; Grant No. NGL-28-004-020.

A methodology for using Landsat imagery for the identification and location of land irrigated by center-pivot irrigation systems is presented. The procedure involves the use of sets of Landsat band 5 imagery taken separated in time by about three weeks during the irrigation season, a zoom transfer scope and mylar base maps to record the locations of center pivots. Further computer processing of the data has been used to obtain plots of center-pivot irrigation systems and tables indicating the distribution and growth of systems by county for the state of Nebraska, and has been found to be in 95% agreement with current high-altitude IR photography. The information obtainable can be used for models of ground-water aquifers or resource planning. A.L.W.

A80-49141 # The Columbia River and Tributaries Irrigation Withdrawals Analysis Project - Feasibility analysis and future plans. G. E. Johnson (U.S. Geological Survey, EROS Data Center, Sioux Falls, S. Dak.) and T. R. Loveland. In: Identifying irrigated lands using remote sensing techniques: State of the Art; Proceedings of the Symposium, Sioux Falls, S. Dak., November 15, 16, 1979. Omaha, Neb., Missouri River Basin Commission, 1980, p. 37-47.

The Columbia River and Tributaries Irrigation Withdrawals Analysis Project was instituted as a demonstration project to examine the utility of remote sensing techniques for meeting the information requirements for estimating the water requirements for future irrigation development in the Columbia River Basin. Project plans are for the evaluation of the irrigated agriculture of the Umatilla and Yakima sub-basins by the manual interpretation and digital analysis of Landsat images. A feasibility analysis has been conducted to evaluate existing land cover, soil characteristics and slope as well as distance from water resources as variables to be used in creating a composite map of suitability for irrigation development of a small area. The analysis has effectively demonstrated the usefulness of a geobased information system in combination with remotely sensed data to predict the location of irrigation development and will be applied to the larger project study areas. A.L.W.

A80-49142 * # Irrigation mapping in western Kansas using Landsat. I - Key parameters. J. Poracsky. In: Identifying irrigated lands using remote sensing techniques: State of the Art; Proceedings of the Symposium, Sioux Falls, S. Dak., November 15, 16, 1979. Omaha, Neb., Missouri River Basin Commission, 1980, p. 48-54. 14 refs. Grant No. NGL-17-004-024.

The procedure used in the identification and mapping of irrigated lands in six counties of western Kansas is presented and key considerations for the identification of irrigated lands during the project are discussed. The procedure involved the compilation of a field-by-field map of irrigated lands on the basis of multi-date Landsat band 5 imagery, the entry of map data into a computer, and the retrieval of the data in the form of maps, tables and statistics. Comparison of the positional results of the image interpretation with statistical data for a single county was used to verify the mapping procedure, as accuracies of from 80-100% were obtained, depending on the type of crop. Considerations relevant to the identification of irrigated land on the basis of remote sensing data include the form of the final data, irrigation practices in the area, the soil moisture budget, the number and kinds of crops, the crop calendar, and the availability of usable imagery. A.L.W.

A80-49143 # Irrigation mapping in western Kansas using Landsat. II - Practices and problems. T. H. L. Williams (Kansas, University, Lawrence, Kan.). In: Identifying irrigated lands using remote sensing techniques: State of the Art; Proceedings of the Symposium, Sioux Falls, S. Dak., November 15, 16, 1979. Omaha, Neb., Missouri River Basin Commission, 1980, p. 55-63.

Refinements and alternatives to the techniques used to produce maps of irrigated lands in six western Kansas counties on the basis of multi-date Landsat band 5 imagery are discussed, and the relation

between irrigation parameters and ground water decline is considered. Modifications planned to reduce interpretation time and simplify data coding include the increase in the size of the reporting unit and the use of a digitizer to input location coordinates into the computer, while digital image analysis techniques may be used to replace manual interpretation. Considerations in the selection of interpretation techniques are discussed, with emphasis on the types of crop data required. A model of the effects of irrigation on the decline of ground water levels is then developed on the basis of the results of the irrigation study. A.L.W.

A80-49144 # **Development and application of Landsat-derived irrigation cropland maps for water use determination in the High Plains.** F. J. Heimes (U.S. Geological Survey, Denver, Colo.) and G. P. Thelin (U.S. Geological Survey, Moffett Field, Calif.). In: Identifying irrigated lands using remote sensing techniques: State of the Art; Proceedings of the Symposium, Sioux Falls, S. Dak., November 15, 16, 1979. Omaha, Neb., Missouri River Basin Commission, 1980, p. 76, 77.

A80-49652 # **Evaluation of the fire hazard of taiga forests from their thermal radio emission (Otsenka pozharnoi opasnosti taezhnykh lesov po radioteplovomu izlucheniiu).** E. N. Valendik, E. K. Kisiliakhov, and A. I. Sukhinin (Akademiia Nauk SSSR, Institut Lesai Drevesiny, Krasnoyarsk, USSR). *Issledovanie Zemli iz Kosmosa,* May-June 1980, p. 14-19. 9 refs. In Russian.

A microwave remote sensing method has been developed for investigating the fire hazard of taiga forests. The seasonal dynamics of the microwave thermal emission intensity of forest elements is considered as a function of the moisture content of these elements. The limiting brightness temperature (above which there is a fire hazard) is determined for an emission wavelength of 2.25 cm. B.J.

A80-49655 # **A method for mapping soil reflectance (K voprosu o metodike sostavleniia kart otrazhatel'noi sposobnosti pochvennogo pokrova).** A. P. Tishchenko and G. I. Stepanova (Gosudarstvennyi Nauchno-Issledovatel'skii Tsentr Izucheniia Prirodnykh Resursov, Moscow, USSR). *Issledovanie Zemli iz Kosmosa,* May-June 1980, p. 34-40. In Russian.

A method based on the spectral brightness coefficient has been developed for the mapping of soil reflectance. As an example, soil reflectance maps were compiled for various types and subtypes of soils in the European part of the Soviet Union. Maps were compiled for wavelengths of 0.5-0.6 micron and 0.7-0.8 micron. B.J.

A80-50877 **Inventory, mapping and evaluation of the agricultural potential of soils - Status of studies and needs of remote sensing (Inventaire, cartographie et évaluation des potentialités agricoles des sols - Etat des recherches et des besoins en télédétection).** B. Naert, M. Jamagne, J. Kilian, N. Leneuf, E. Servat (Institut National de la Recherche Agronomique; Institut de Recherches Agronomiques Tropicales et des Cultures Vivrières; Office de la Recherche Scientifique et Technique Outre-Mer, Paris, France). In: Cartographic processing and analysis of satellite imagery; International Conference, 3rd, Toulouse, France, June 19-22, 1979, Proceedings. Saint-Etienne, Loire, France, Edition Gedim, 1980, p. 6-13. In French.

The utilization of aerial and spatial remote sensing techniques for soil mapping and classification in France is discussed. A theoretical model separates the soil mapping procedure into three successive phases: (a) a preliminary study, (b) the actual survey, and (c) an analysis of the results. The relative importance of each phase is dependent upon the chosen scale. The application of remote sensing at four different levels with the model is emphasized: (1) the exploitation of raw data from existing references and documents, (2) the preparation of various types of soil models before the actual survey, (3) the addition of complementary data before synthesizing the results, and (4) the transfer and preparation of data for the final map. The amount of remote sensing data which is needed during the procedure varies at different stages and for different scales. A.C.W.

A80-50900 **The cartography of Chizé forest through remote sensing (La cartographie de la forêt de Chizé par télédétection).** J.-M. Monget, M. Poisson (Paris, Ecole Nationale Supérieure des Mines, Paris, France), and F. Verger (Ecole Normale Supérieure, Montrouge, Hauts-de-Seine, France). In: Cartographic processing and analysis of satellite imagery; International Conference, 3rd, Toulouse, France, June 19-22, 1979, Proceedings. Saint-Etienne, Loire, France, Edition Gedim, 1980, p. 182-190. In French.

A simple classification method for multispectral imagery has been developed using digitized ground truth data. An application to Landsat data for forestry is discussed. (Author)

A80-50903 **The use of satellite imagery for mapping - The study of soil moisture (Approche cartographique à partir des images spatiales - Connaissance du l'humidité des sols).** M. C. Girard and J. P. Rogala (Institut National Agronomique Paris Grignon, Thiverval-Grignon, Yvelines, France). In: Cartographic processing and analysis of satellite imagery; International Conference, 3rd, Toulouse, France, June 19-22, 1979, Proceedings. Saint-Etienne, Loire, France, Edition Gedim, 1980, p. 204-211. In French.

The possibility of using satellite imagery for the mapping of soil moisture is examined; Landsat observations of a region of Val de Loire are considered as an example. The region was characterized: (1) radiometrically, through the mean and type of variation, and (2) pedologically, through ground profiles and moisture medians. The use of satellite imagery for the mapping of ground water resources available to plant life is assessed. B.J.

A80-51944 * **Aerial color infrared photography applications to citriculture.** C. H. Blazquez (Florida, University, Lake Alfred, Fla.) and F. W. Horn, Jr. (NASA, Kennedy Space Center, Sciences, Technology, and Applications Office, Cocoa Beach, Fla.). In: A new era in technology; Proceedings of the Seventeenth Space Congress, Cocoa Beach, Fla., April 30-May 2, 1980. Cocoa Beach, Fla., Canaveral Council of Technical Societies, 1980, p. 4-21 to 4-32. 14 refs.

Results of a one-year experimental study on the use of aerial color infrared photography in citrus grove management are presented. It is found that the spring season, when trees are in flush (have young leaves), is the best season to photograph visible differences between healthy and diseased trees. It is also shown that the best photography can be obtained with a 12-in. focal length lens. The photographic scale that allowed good photo interpretation with simple inexpensive equipment was 1 in. = 330 ft. The use of a window-overlay transparency method allowed rapid photo interpretation and data recording in computer-compatible forms. Aerial color infrared photography carried out during the spring season revealed a more accurate status of tree condition than visual inspection. V.L.

A80-53052 **Errors incurred in estimating an area of uniform land cover using Landsat.** P. F. Crapper (Commonwealth Scientific and Industrial Research Organization, Div. of Land Use Research, Canberra, Australia). *Photogrammetric Engineering and Remote Sensing,* vol. 46, Oct. 1980, p. 1295-1301. 11 refs.

A method of estimating areas of uniform land cover using the Landsat satellites is examined. It is pointed out that when the areas are small or when the boundaries are highly contorted, the relative errors in the area estimate may be very high: 1 percent for areas of 132 ha, 5 percent for areas of 15 ha, and 10 percent for areas of 6 ha. A formula has been developed for the Landsat pixel which gives the variance of this area estimate. S.S.

A80-53056 * **Using 70-mm aerial photography to identify rangeland sites.** J. H. Everitt, A. H. Gerbermann, M. A. Alaniz, and R. L. Bowen (U. S. Department of Agriculture, Weslaco, Tex.). *Photogrammetric Engineering and Remote Sensing,* vol. 46, Oct. 1980, p. 1339-1348. 17 refs. NASA Order S-53876-G.

A south Texas rangeland area was used as a study site to test the

use of microdensitometry on 70-mm color-infrared and black-and-white photographs (scale 1:19,000) for distinguishing among 11 range sites (two brushland, seven grassland, two barren land) during the winter (February), spring (May), and summer (August) of 1976. Color-infrared photographs were also taken at a scale of 1:42,000 for the summer date. Film optical density readings were made on one color-infrared film with white light only. The best separations among density readings for all range sites were obtained using white light exposed on color-infrared film in the summer when vegetation was at peak foliage development. Results from this study indicate that 70-mm aerial color-infrared photography at a scale of 1:19,000 or 1:42,000 has good potential for identifying range sites in large and inaccessible areas, and could be a useful tool for range management. (Author)

A80-53890 * **Microwave radiometer measurements of soil moisture content.** R. W. Newton (Texas A & M University, College Station, Tex.) and J. W. Rouse, Jr. (Missouri-Columbia, University, Columbia, Mo.). *IEEE Transactions on Antennas and Propagation*, vol. AP-28, Sept. 1980, p. 680-686. 12 refs. Contract No. NAS9-13904.

A unique set of radiometer measurements is presented, recorded during a 1000-h day and night monitoring of irrigated fields from fully saturated to completely dry. Radiometer measurements were recorded at 2.8-cm (X-band) and 21.4-cm (L-band) wavelengths for a range of incident angles from nadir to 50 deg. Soil moisture and soil temperature profile measurements were recorded to a depth of 15 cm. The test site was located in east-central Texas on a clay soil (Miller clay). Three bare-surface plots were used, each having a distinctly different surface roughness. Vegetated plots were also measured. The data quantify the sensitivity of microwave radiometer measurements to soil moisture variations, the effect of surface roughness on the measurement, and the influence of surface vegetation. (Author)

N80-29797*# Lockheed Electronics Co., Houston, Tex. Aerospace Systems Div.
OPERATIONAL CHANGES FOR THE KANSAS STATE UNIVERSITY WHEAT MODEL
R. L. Davenport, Principal Investigator Dec. 1977 30 p ERTS
(Contract NAS9-15200)
(E80-10223; NASA-CR-160633; LEC-11393; JSC-13813) Avail: NTIS HC A03/MF A01 CSCL 02C

N80-29804*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
REMOTE SENSING OF TOTAL DRY-MATTER ACCUMULATION IN WINTER WHEAT
Compton J. Tucker, Brent N. Holben, James H. Elgin, Jr. (Agricultural Research Center, Beltsville, Md.), and James E. McMurtrey, III, Principal Investigators (Agricultural Research Center, Beltsville, Md.) Jan. 1980 28 p refs Submitted for publication ERTS
(E80-10235; NASA-TM-80631) Avail: NTIS HC A03/MF A01 CSCL 02C

The author has identified the following significant results. Red and photographic-infrared spectral data collected on 21 dates over the growing season with a hand-held radiometer was quantitatively correlated with total dry-matter accumulation in winter wheat. The spectral data were found to be highly related to vigor and condition of the plant canopy. Two periods of drought stress and subsequent recovery from it were readily apparent in the spectral data. Simple ratios of the spectral data compensated for variations in solar intensities and, when integrated over the growing season, explained 79% of the variation in total above-ground accumulation of dry matter.

N80-29815*# California Univ., Santa Barbara.
USE OF COLLATERAL INFORMATION TO IMPROVE LANDSAT CLASSIFICATION ACCURACIES Semiannual Progress Report, Oct. 1979 - Mar. 1980
Alan H. Strahler and John E. Estes, Principal Investigators Mar. 1980 75 p refs Original contains imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls, S.D. 57198 ERTS
(Grant NsG-2377)
(E80-10268; NASA-CR-163340) Avail: NTIS HC A04/MF A01 CSCL 08B

N80-29819*# Lockheed Engineering and Management Services Co., Inc., Houston, Tex.
SAMPLING OF RECTANGULAR REGIONS
George Terrell, Principal Investigator Jun. 1980 16 p refs Sponsored by NASA, USDA, Dept. of Commerce, Dept. of Interior, and Agency for International Development ERTS
(Contract NAS9-15800; Proj. AgRISTARS)
(E80-10272; NASA-CR-160730; SR-L0-00460; LEMSCO-14806; JSC-16362) Avail: NTIS HC A02/MF A01 CSCL 08B

N80-29821*# Lockheed Electronics Co., Houston, Tex. Systems and Services Div.
EOD SYSTEMS AND FACILITIES WORKLOAD REQUIREMENTS FORECAST
W. A. Stevens and J. A. Vitellaro, Principal Investigators Apr. 1977 175 p ERTS
(Contract NAS9-15200)
(E80-10277; NASA-CR-160708; LEC-10522; JSC-12881) Avail: NTIS HC A08/MF A01 CSCL 05A

N80-29824*# Lockheed Engineering and Management Services Co., Inc., Houston, Tex.
COMPOSITION AND ASSEMBLY OF A SPECTRAL DATA BASE FOR CORN AND SOYBEAN MULTICROP SEGMENTS
M. H. Trenchard, M. L. Sestak, and M. C. Kinsler, Principal Investigators Jun. 1980 338 p Sponsored by NASA, USDA, Dept. of Commerce, Dept. of Interior, and Agency for International Development ERTS
(Contract NAS9-15800; Proj. AgRISTARS)
(E80-10281; NASA-CR-160726; AR-10-00407; LEMSCO-14250; JSC-13723) Avail: NTIS HC A15/MF A01 CSCL 20C

N80-30823*# Purdue Univ., Lafayette, Ind. Lab for Applications of Remote Sensing.
[REMOTE SENSING RESEARCH STUDIES] Final Report, 1 Dec. 1978 - 30 Nov. 1979
D. A. Landgrebe Nov. 1979 126 p refs Sponsored by NASA, USDA, Dept. of Commerce, Dept. of Interior and Agency for International Development ERTS
(Contract NAS9-15466; Proj. AgRISTARS)
(E80-10117; NASA-CR-160551; SR-P9-00414; LARS-120279) Avail: NTIS HC A07/MF A01 CSCL 02C

N80-30825*# Purdue Univ., Lafayette, Ind. Lab. for Applications of Remote Sensing.
FOREST RESOURCE INFORMATION SYSTEM, PHASE 3 Quarterly Report, 1 Jan. - 31 Mar. 1980
R. P. Mroczynski, Principal Investigator, S. Schwingendorf, D. Freeman, C. Kozlowski, C. Smith, and C. Peterson 18 Apr. 1980 121 p Original contains imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls, S.D. 57198 ERTS
(Contract NAS9-15325)
(E80-10242; NASA-CR-160725; LARS-CR-041880) Avail: NTIS HC A06/MF A01 CSCL 02F

N80-30841*# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
EVALUATING THE REFORESTED AREA FOR THE MUNICIPALITY OF BURI BY AUTOMATIC ANALYSIS OF LANDSAT IMAGERY [AVALIACAO DE AREAS REFLORESTADAS DO

MUNICIPIO DE BURI, ATRAVES DE ANALISE AUTOMATICA DE IMAGENS DO LANDSAT]
Nelson deJesusParada, Principal Investigator, David Chung Liang Lee, Redro Hernandez Filho, and Yosio Edemir Shimabukuro Dec. 1979 24 p refs In PORTUGUESE; ENGLISH summary Sponsored by NASA *Original contains imagery. Original photography may* be purchased from the EROS Data Center, Sioux Falls, S.D. 57198 ERTS
(E80-10258; NASA-CR-163365; INPE-1635-RPE/094) Avail: NTIS HC A02/MF A01 CSCL 02F

The author has identified the following significant results. The class of reforestation (Pinus, Eucalyptus, Araucaria) was defined using iterative image analysis (1-100) and LANDSAT MSS data. Estimates of class area by 1-100 were compared with data supplied by the forestry institute in Sao Paulo. LANDSAT channels 4 and 5 served to differentiate the Pinus, Eucalyptus, and Araucaria from the other trees. Channels 6 and 7 gave best results for differentiating between the classes. A good representative spectral response was obtained for Aurаucaria on these two channels. The small relative differences obtained were +4.24% for Araucaria, -7.51% for Pinus, and -32.07% for Eucalyptus.

N80-30843*# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
USE OF LANDSAT DATA FOR ESTIMATING THE AREA OF SUGAR CANE IN THE STATE OF SAO PAULO M.S. Thesis [USO DE DADOS DO LANDSAT PARA AVALIACAO DE AREAS OCUPADAS COM CANA-DE-ACUCAR NO ESTADO DE SAO PAWLO]
Nelson deJesusParada, Principal Investigator and Francisco Jose Mendonca Apr. 1980 83 p refs In PORTUGUESE; ENGLISH summary Sponsored by NASA ERTS
(E80-10260; NASA-CR-163367; INPE-1713-TDL/023) Avail: NTIS HC A05/MF A01 CSCL 02C

N80-30844*# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
UTILIZATION OF LANDSAT DATA TO INVENTORY THE SUGAR CANE IN THE STATE OF SAO PAULO [UTILIZACAO DE DADOS DO LANDSAT PARA INVENTARIO DA CANA-DE-ACUCAR DO ESTADO DE SAO PAULO]
Nelson DeJesusParada, Principal Investigator, Francisco Jose Mendonca, David Chung Liang Lee, Yosio Edemir Shimabukuro, Antonio Tebaldi Tardin, Rene Antonio Novaes, and Sherry Chou Che Jan. 1980 18 p refs In PORTUGUESE; ENGLISH summary Sponsored by NASA ERTS
(E80-10261; NASA-CR-163368; INPE-1668-NTE/157) Avail: NTIS HC A02/MF A01 CSCL 02C

N80-30847*# Lockheed Engineering and Management Services Co., Inc., Houston, Tex.
THE INTEGRATED ANALYSIS PROCEDURE FOR IDENTIFICATION OF SPRING SMALL GRAINS AND BARLEY
R. W. Payne, Principal Investigator May 1980 20 p refs Sponsored by NASA, USDA, Dept. of Commerce, Dept. of Interior, and Agency for International Development ERTS
(Contract NAS9-15800; Proj. AgRISTARS)
(E80-10274; NASA-CR-160727; FC-LO-451; LEMSCO-14385; JSC-16360) Avail: NTIS HC A02/MF A01 CSCL 02C

N80-30851*# Pan American Univ., Edinburg, Tex. Dept. of Physical Science.
LIGHT REFLECTANCE, TRANSMITTANCE, AND UTILIZATION WITHIN A VEGETATIVE CANOPY Final Report, 1 Oct. 1978 - 30 Sep. 1979
E. W. LeMaster and J. E. Chance, Principal Investigators Apr. 1980 39 p refs ERTS
(Grant NsG-9015)
(E80-10282; NASA-CR-163347) Avail: NTIS HC A03/MF A01 CSCL 20F

N80-30860*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
AGRISTARS CROPPING PRACTICES AND CROP CHARACTERISTICS BASED ON 1979 ESCS OBSERVATIONS
M. A. Wise and D. E. Pitts, Principal Investigators Apr. 1980 448 p Sponsored by NASA, USDA, Dept. of Commerce, Dept. of Interior and Agency for International Development
(Proj. AgRISTARS)
(E80-10292; NASA-TM-81105; SR-JO-00438; JSC-16353) Avail: NTIS HC A19/MF A01 CSCL 02C

N80-30863*# Lockheed Engineering and Management Services Co., Inc., Houston, Tex.
AN EXPLORATORY STUDY TO DEVELOP A CLUSTER-BASED AREA ESTIMATION PROCEDURE
R. K. Lennington, Principal Investigator May 1980 102 p refs Sponsored by NASA, USDA, Dept. of Commerce, Dept. of Interior and Agency for International Development ERTS
(Contract NAS9-15800; Proj. AgRISTARS)
(E80-10295; NASA-CR-160729; SR-LO-00442; LEMSCO-14670; JSC-16358) Avail: NTIS HC A06/MF A01 CSCL 02C

N80-30867*# Montana Univ., Missoula. Wildlife-Wildlands Inst.
GRIZZLY BEAR HABITAT ANALYSIS. SECTION 3: LANDSAT-1 MULTISPECTRAL IMAGERY AND COMPUTER ANALYSIS OF GRIZZLY BEAR HABITAT
John J. Craighead, Principal Investigator 1980 300 p refs Sponsored by NASA Original contains color imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls, S.D. 57198 ERTS
(E80-10300; NASA-CR-163382) Avail: NTIS HC A13/MF A01 CSCL 06C

N80-30869*# Kansas State Univ., Manhattan. Evapotranspiration Lab.
USE OF SOIL MOISTURE INFORMATION IN YIELD MODELS
Edward Kanemasu, Arlin Feyerherm, John Hanks, Mel Keener, Dan Lawlor, Phil Rasmussen, Harold Reetz, Keith Saxton, and Craig Wiegand, Principal Investigators Jul. 1980 48 p refs Sponsored by NASA, USDA, Dept. of Commerce, Dept. of Interior and Agency for International Development ERTS
(Contract NAS9-14899; Proj. AgRISTARS)
(E80-10302; NASA-CR-160749; SM-MO-00462) Avail: NTIS HC A03/MF A01 CSCL 08M

N80-30882# Rocky Mountain Forest and Range Experiment Station, Fort Collins, Colo.
REMOTE SENSING OF WILDLAND RESOURCES: A STATE-OF-THE-ART REVIEW Forest Service Final General Technical Report
Robert C. Aldrich Dec. 1979 62 p refs
(PB80-184609; FSGTR-RM-71) Avail: NTIS HC A04/MF A01 CSCL 14E

A review, with literature citations, of current remote sensing technology, applications, and costs for wildland resource management, including collection, interpretation, and processing of data gathered through photographic and nonphotographic techniques for classification and mapping, interpretative information for specific applications, measurement of resource parameters, and observations and counts of occurrences is presented.
GRA

N80-32805*# Florida Univ., Gainesville. Inst. of Food and Agricultural Sciences.
EVALUATION OF REMOTE SENSING TECHNIQUES ON SELECTED FOREST SITES IN FLORIDA Final Report
L. G. Arvanitis, R. Reich, and R. Newburne, Principal Investigators Feb. 1980 127 p refs Original contains color imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls, S. D. 57198 ERTS
(Contract NAS10-9466)
(E80-10296; NASA-CR-154635) Avail: NTIS HC A07/MF A01 CSCL 08B

N80-32809*# Environmental Research Inst. of Michigan, Ann Arbor. Infrared and Optics Div.
AN ALGORITHM FOR ESTIMATING CROP CALENDAR SHIFTS OF SPRING SMALL GRAINS USING LANDSAT SPECTRAL DATA
Eric P. Crist and William A. Malila, Principal Investigators Jun. 1980 40 p refs Sponsored by NASA, USDA, Dept. of Commerce, Dept. of Interior, and Agency for International Development ERTS
(Contract NAS9-15476; Proj. AgRISTARS)
(E80-10314; NASA-CR-160762; ERIM-132400-41-T; SR-EO-00459) Avail: NTIS HC A03/MF A01 CSCL 02C

N80-32815*# California Univ., Berkeley. Space Sciences Lab.
IRRIGATED LANDS ASSESSMENT FOR WATER MANAGEMENT APPLICATIONS PILOT TEST (APT) Final Report
Robert N. Colwell, John E. Estes, and Larry Tinney, Principal Investigators 31 Jan. 1980 156 p refs Original contains imagery. *Original photography may be purchased from the EROS Data Center, Sioux Falls, S.D. 57198 ERTS*
(Grant NsG-2207)
(E80-10324; NASA-CR-163404; SSL-Ser-21-Issue-5) Avail: NTIS HC A08/MF A01 CSCL 08H

N80-32818*# California Univ., Berkeley. Space Sciences Lab.
DEVELOPMENT OF AI PROCEDURES FOR DEALING WITH THE EFFECTS OF EPISODAL EVENTS ON CROP TEMPORAL SPECTRAL RESPONSE AND DEVELOPMENT OF AI GUIDELINES FOR CORN AND SOYBEAN LABELING Annual Progress Report, 15 Nov. 1978 - 14 Nov. 1979
Robert N. Colwell, Principal Investigator Nov. 1979 193 p refs Sponsored by NASA, USDA, Dept. of Commerce, Dept. of Interior, and Agency for International Development Original contains color imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls, S. D. 57198 ERTS
(Contract NAS9-14565; Proj. AgRISTARS)
(E80-10327; NASA-CR-160733; SSL-Ser-20-Issue-44; SR-B9-00434) Avail: NTIS HC A09/MF A01 CSCL 02C

N80-32819*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
USING LANDSAT DIGITAL DATA FOR ESTIMATING GREEN BIOMASS
D. W. Deering and Robert H. Haas, Principal Investigators (Texas A and M Univ., College Station) Jun. 1980 26 p refs Presented at the 30th Ann. Meeting of the Soc. for Range Management Symp. on Rangeland Remote Sensing, Portland, Oreg., 17 Feb. 1977 Submitted for publication Original contains imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls, S.D. 57198 ERTS
(E80-10328; NASA-TM-80727) Avail: NTIS HC A03/MF A01 CSCL 06C

The author has identified the follwoing significant results. Relationships between the quantity of mixed prairie rangelenad vegetation and LANDSAT MSS response were studied during four growing seasons at test sites throughout the United States Great Plans region. A LANDSAT derived parameter, the normalized difference was developed from theoretical considerations fro statistical estimation of the amount and seasonal condition of rangeland vegetation. This parameter was tested for application to local assessment of green forage biomass and regional monitoring of range feed conditions and drought. Results show that for grasslands in the Great Plains with near continuous vegetative cover and free of heavy brush and forbs, the LANDSAT digital data can provide a useful estimate of the quantity of green forage biomass (within 250 kg/ha), and at least five levels of pasture and range feed conditions can be adequately mapped for extended regions.

N80-32821*# Arizona Univ., Tucson. Office of Arid Lands Studies.
APPLIED REMOTE SENSING PROGRAM (ARSP) Annual Report, 1979 - 1980
Jack D. Johnson, Charles F. Hutchinson, David A. Mouat, Principal Investigators, Robert A. Schowengerdt, Linda S. Leigh, Michael C. Parton, Karen L. Reichardt, Charles H. Sauerwein, and Peter L. Warren Jul. 1980 87 p Original contains imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls, S.D. 57198 ERTS
(Grant NGL-03-002-313)
(E80-10330; NASA-CR-163416) Avail: NTIS HC A05/MF A01 CSCL 08B

N80-32822*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
INFRARED-TEMPERATURE VARIABILITY IN A LARGE AGRICULTURAL FIELD
John P. Millard, Robert C. Goettelman (LFE Corp., Richmond, Calif.), and Mary L. LeRoy, Principal Investigators Aug. 1980 26 p refs Submitted for publication Original contains imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls, S.D. 57198 ERTS
(E80-10331; NASA-TM-81222; A-8283) Avail: NTIS HC A03/MF A01 CSCL 02C

The combined effect of water carved gullies, varying soil color, moisture state of the soil and crop, nonuniform phenology, and bare spots was measured for commercially grown barley planted on varying terrain. For all but the most rugged terrain, over 80% of the area within 4, 16, 65, and 259 ha cells was at temperatures within 3 C of the mean cell temperature. The result of using relatively small, 4 ha instantaneous field of views for remote sensing applications is that either the worst or the best of conditions is often observed. There appears to be no great advantage in utilizing a small instantaneous field of view instead of a large one for remote sensing of crop canopy temperatures. The two alternatives for design purposes are then either a very high spatial resolution, of the order of a meter or so, where the field is very accurately temperature mapped, or a low resolution, where the actual size seems to make little difference.

N80-32823*# Joint Research Centre of the European Communities, Ispra (Italy).
HCMM SATELLITE FOLLOW-ON INVESTIGATION NO. 025: SOIL MOISTURE AND HEAT BUDGET EVALUATION IN SELECTED EUROPEAN ZONES OF AGRICULTURAL AND ENVIRONMENTAL INTEREST (TELLUS PROJECT) Progress Report, 1 Sep. 1979 - 31 Mar. 1980
S. Galli deParatesi, Principal Investigator 31 Mar. 1980 63 p refs Sponsored by NASA HCMM
(Proj. TELLUS)
(E80-10332; NASA-CR-163539; PR-2) Avail: NTIS HC A04/MF A01 CSCL 08M

N80-32824*# Joint Research Centre of the European Communities, Ispra (Italy).
FURTHER DEVELOPMENTS OF THE TELL-US MODEL. 1: AN IMPLICIT FINITE DIFFERENCE SCHEME FOR THE NUMERICAL APPROXIMATION OF THE GROUND HEAT FLUX. 2: A SIMPLE ALGORITHM FOR ESTIMATING THE ACTUAL AND POTENTIAL EVAPOTRANSPIRATION OF VEGETATED SURFACES FROM ONE REMOTELY SENSED SURFACE TEMPERATURE NEAR THE DAILY MAXIMUM
J. Huygen, Principal Investigator Nov. 1979 19 p refs Sponsored by NASA HCMM
(Proj. TELLUS)
(E80-10333; NASA-CR-163540) Avail: NTIS HC A02/MF A01 CSCL 05B

N80-32830*# Martin Marietta Aerospace, Denver, Colo.
THE APPLICABILITY OF REMOTE SENSING TO EARTH BIOLOGICAL PROBLEMS. PART 2: THE POTENTIAL OF REMOTE SENSING IN PEST MANAGEMENT Final Report
J. T. Polhemus Aug. 1980 41 p refs 2 Vol.
(Contract NAS9-15918)
(NASA-CR-163589; MCR-80-610-pt-2; FR-2-Pt-2) Avail:

NTIS HC A03/MF A01 CSCL 06C

Five troublesome insect pest groups were chosen for study. These represent a broad spectrum of life cycles, ecological indicators, pest management strategies, and remote sensing requirements. Background data, and field study results for each of these subjects is discussed for each insect group. Specific groups studied include tsetse flies, locusts, western rangeland grasshoppers, range caterpillars, and mosquitoes. It is concluded that remote sensing methods are aplicable to the pest management of the insect groups studied. J.M.S.

N80-32833# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).

PLANNING AND EXECUTION OF A PHOTOGRAPHIC MISSION OVER A WHEAT PRODUCING REGION IN RIO GRANDE DO SUL, BRAZIL

Paulo Cesar Gurgel deAlbuquerque and Dal Arthur Cottrell Jun. 1980 11 p

(INPE-1793-RPE/165) Avail: NTIS HC A02/MF A01

A *wheat survey program was completed with the execution* of a photographic mission during the booting growth stage of wheat. Three 20 km. by 40 km. target areas in Rio Grande do Sul were flown after cost/time saving changes in aircraft, oxygen requirements, geometric parameters and base of operations. A WILD RC-10 metric camera with WRATTEN filter was used to expose color IR film to produce 1:20,000 scale transparencies and semicontrolled mosaics for hectareage estimations and data integration with hardware for CCT analyses. R.K.G.

N80-32835# Instituto de Pesquisas Espaciais, Sao Jose dos *Campos (Brazil).*

CHARACTERIZATION OF CERRADO VEGETATION USING AUTOMATICALLY CLASSIFIED LANDSAT MSS DATA

Joao Roberto Dos Santos, Vitor Celso DeCarvalho, and Hideyo Aoki (Sao Paulo Univ.) Jun. 1980 13 p refs Presented at the 14th Intern. Symp. on Remote Sensing of Environ., San Jose, Costa Rica, 23-30 Apr. 1980

(INPE-1790-RPE/162) Avail: NTIS HC A02/MF A01

The characterization of physiognomic unities of cerrado vegetation through automatic IMAGE 100 analysis of LANDSAT MSS data was studied. The separability of the unities analyzed was verified (cerrado, campo cerrado, campo sujo) from respective spectral signatures obtained using a MAXVER and a JM distances algorithm. A correlation analysis of correctly classified values was performed. The results obtained include the following: (1) the use of four channels together presented the best class separation, independent of season; (2) in considering the use of isolated channels, channel 5 provided the largest percent correct classification; and (3) the highest separability was observed between cerrado and campo sujo forms. It is concluded that the separability of physiognomic unities can contribute to studies for the rational use of cerrado areas. R.K.G.

N80-32836# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).

THE USE OF LANDSAT DATA FOR EVALUATION AND CHARACTERIZATION OF DEFORESTED PASTURELAND AND REFORESTED AREAS IN BRAZIL

Pedro Hernandez Filho, Armando Pacheco Dossantos, Evlyn Marcia Leao DeMoraesNovo, Yosio Edemir Shimabukuro, Valdete Duarte, Jose Simeao deMedeiros, Eduardo Carlos Mignone Alves, and Carlito Chefer deSantana Jun. 1980 9 p refs Presented at the 14th Intern. Symp. on Remote Sensing of Environ., San Jose, Costa Rica, 23-30 Apr. 1980 Prepared in cooperation with Brazilian Inst. for Forest Development, Sao Jose dos Campos

(INPE-1794-RPE/166) Avail: NTIS HC A02/MF A01

The compatibility of using LANDSAT data for pastureland and reforestation studies was studied. The degradation of pastureland after deforestation was identified automatically using four indicators: the percentages of exposed soil, lateritic soil, types of juquira and Gramineae species. Pine and eucalypt plantations were identified manually and automatically. The classification accuracy is 94.31 percent for pine and ranges from 67.23 to 92.30 percent for eucalypt. S.F.

N80-33828 Texas A&M Univ., College Station.

DEVELOPMENT OF A SOIL MOISTURE MODEL FOR USE WITH PASSIVE MICROWAVE REMOTE SENSORS Ph.D. Thesis

Walter Charles Bausch 1980 185 p

Avail: Univ. Microfilms Order No. 8023014

Soil moisture profiles were simulated for a hypothetical loamlike soil with a water and heat balance model. Expected X-band and L-band radiometer response to these conditions were simulated by a radiative transfer model. From these simulations, a model was developed to estimate soil water content in two layers of a 1.5 m soil profile. This model was tested with measurements of soil water content and soil temperature collected during the four seasons of the year in a sandy loam soil contained in an array of lysimeters. X-band and L-band emissivities required in the predictor equations were calculated by the radiative *transfer model from measured soil moisture and soil temperature* data. The technique developed from simulated results to classify inverted soil moisture profiles was found to be seasonally dependent. It was also found that the second layer algorithm showed seasonal dependence. Predictions of soil water content in the top 21 cm of the soil profile from L-band emissivity calculated by the radiative transfer model occasionally conformed with measured soil water content. Dissert. Abstr.

N80-33829*# Freiburg Univ. (West Germany). Geographisches Inst.

THE INFLUENCE OF TOPOGRAPHIC STRUCTURES ON NIGHT-TIME SURFACE TEMPERATURES: EVALUATION OF A SATELLITE THERMAL IMAGE OF THE UPPER RHINE PLAIN AND THE SURROUNDING HIGHLANDS

Hermann Gossmann, Principal Investigator Ispra, Italy Joint Research Centre of the European Communities Jun. 1980 63 p refs In GERMAN; ENGLISH summary Sponsored by NASA Original contains imagery. Original imagery may be purchased from NASA Goddard Space Flight Center, (code 601), Greenbelt, Md. 20771. Domestic users send orders to 'Attn: National Space Science Data Center'; non-domestic users send orders to 'Attn: World Data Center A for Rockets and Satellites'. HCMM

(E80-10228; NASA-CR-163543) Avail: NTIS HC A04/MF A01 CSCL 05B

The author has identified the following significant results. Satellite data supplied the same information as aerial IR registrations with corresponding averaging for all studies requiring a survey of the thermal pattern within an area measuring 10 km x 10 km or more, provided that sufficiently precise control points could be established for the purpose of geometric rectification in the surroundings of the area observed. Satellite thermal data are more comprehensive than aircraft data for studies *on a regional, rather than a local scale, since airborne images* often obscure the basic correlation in thermal patterns because of a variety of irrelevant topographical detail. The satellite data demonstrate the dependence of surface temperature on relief more clearly than comparable airborne imagery.

N80-33835*# Purdue Univ., Lafayette, Ind. Lab. for Applications of Remote Sensing.

A MODEL OF PLANT CANOPY POLARIZATION RESPONSE

V. C. Vanderbilt, Principal Investigator 1980 11 p refs Presented at the 1980 Machine Process. of Remotely Sensed Data Symp. ERTS

(E80-10336; NASA-CR-163444) Avail: NTIS HC A02/MF A01 CSCL 20F

N80-33839# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil). Dept. of Remote Sensing.

THE USE OF RADIATION TEMPERATURE TO DETECT WATER-STRESS IN SUGARCANE CROP M.S. Thesis [O USO DA TEMPERATURA DE RADIACAO PARA DETECTAR

O ESTRESSSE DE AGUADA CULTURA DA CANA-DE-ACUCAR]

Liane Antunes Maciel Lucht Jun. 1980 156 p refs In PORTUGUESE; ENGLISH summary Revised
(INPE-1767-TDL/028) Avail: NTIS HC A08/MF A01

A 36m by 150m section of a 150m by 150m plot in which sugar cane was planted was irrigated periodically over a 4 month period to maintain optimum water level. Field measurements of radiation temperature, soil moisture, and plant water content taken at different times of the year were used to determine a relationship between the radiation temperature (which can be remotely determined), and the soil water content. A heat transfer model for the plant was used to extrapolate the temperature for the complete range of possible values of soil water potential. From the results obtained it is concluded that, in the case of sugar cane, the differences in temperature due to water stress are not so accentuated as in the case of wheat and cotton. The relationship between plant temperature and soil water content show the existence of four distinct regions. An aerial thermal scanner was used to obtain infrared images of the field plot. The contrast between irrigated and nonirrigated images areas leads to a difference of 1 deg C in temperature, which is in close agreement with predictions. A.R.H.

N80-33841# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).

THERMAL BALANCE OF SOILS [BALANCO TERMICO DE SOLOS]

L. M. Moreira-Nordemann and L. A. Maciel Lucht Aug. 1980 21 p refs In PORTUGUESE; ENGLISH summary Presented at 32d Ann. Meeting of SBPC Revised
(INPE-1859-RPE/210) Avail: NTIS HC A02/MF A01

Soil temperature is a decisive factor controlling bacterial activity, and the processes of plant development and production. For a specific climate condition, soil temperature is a function of the soil geological nature and humidity. The soil energy balance was studied. Measurements of the soil temperatures were made in the infrared region, using a PRT-5 radiometer. The relation between soil absorption heat and its cooling process was determined from terrestrial radiation emission. Correlations between temperature and the main constituents of the soils were studied by means of photoacustic spectroscopy. Thermal inertia and the ratio of heating and cooling of different soil types were determined and these parameters were related to vegetation coverage. A.R.H.

02

ENVIRONMENTAL CHANGES AND CULTURAL RESOURCES

Includes land use analysis, urban and metropolitan studies, environmental impact, air and water pollution, geographic information systems, and geographic analysis.

A80-47746 **Effects of radar system parameters, population, and environmental modulation on settlement visibility.** F. M. Henderson and M. A. Anuta (New York, State University, Albany, N.Y.). *International Journal of Remote Sensing*, vol. 1, Apr.-June 1980, p. 137-151. 8 refs.

The detectability of settlements and factors influencing their visibility are explored using imagery from two side-looking airborne radar systems. K-band and X-band imagery of diverse areas in the United States are examined to discover the minimum population needed for a settlement to be consistently detected. The percentage of settlements visible by size of population are calculated and omission/commission errors analyzed. Particular attention is devoted to the effects of environmental modulation and a near-, mid-, or far-range location, but the factors of scale, resolution, and system are also addressed. Results indicate that imagery at a scale of 1:200,000 or larger is requisite for settlement detection. At this scale, 60-70 percent of settlements with 200-300 population can be identified with accuracies rising as population increases. Errors of commission were less than 1 percent. A settlement's location in the range direction had significant bearing on detectability but in an unpredictable manner. Environmental characteristics (e.g., landform, land cover) were determined to be of little or no significance in explaining variation in settlement detection except for the effect of vegetation on selected settlements. (Author)

A80-47750 **The application of remote sensing to environmental management.** J. F. Handley (Merseyside County Council, Liverpool, England). *(Remote Sensing Society, Annual Conference, 5th, Durham, England, Dec. 18-21, 1978.) International Journal of Remote Sensing*, vol. 1, Apr.-June 1980, p. 181-195. 36 refs.

The contribution of remote sensing to environmental management procedures at the sub-regional scale is examined in relation to the County Structure environmental management plan for Merseyside County, England. The various seasons, scales and emulsions used for aerial photography in the county are indicated, and results of aerial surveys of the distribution of derelict and despoiled land and of natural environments are presented and compared with ground surveys. The use of color infrared and panchromatic aerial photographs indicating areas of environmental stress and land use in the formulation, implementation and monitoring of environmental management activities is then discussed. A.L.W.

A80-48534 **Conversion of nitrogen oxide gases to nitrate particles in oil refinery plumes.** F. P. Parungo and R. F. Pueschel (NOAA, Atmospheric Physics and Chemistry Laboratory, Boulder, Colo.). *(Symposium on Budget and Cycles of Trace Gases and Aerosols in the Atmosphere, Boulder, Colo., Aug. 12-18, 1979.) Journal of Geophysical Research*, vol. 85, Aug. 20, 1980, p. 4507-4511. 6 refs.

An instrumented aircraft was used to survey the plume constituents of oil refineries in southern Los Angeles. Concentrations of NO, NO2, O3, Aitken nuclei, and aerosol size distribution were measured continuously in situ. Aerosols were collected with an impactor and were later analyzed with an electron microscope for particle morphology and chemical composition. The results led to the following conclusions: (1) The refineries are a strong source of NO; as the plume travels, NO reacts with entrained O3 to form NO2 and subsequently converts to nitrate particles. (2) Diurnal variations in NO, NO2, O3 concentrations are directly correlated with solar radiation. In nocturnal stable conditions, NO concentration is as high as 0.7 ppm in the plume. NO2 is low, and O3 approaches nil. After sunrise, NO decreases, and NO2 and O3 increases. (3) Inorganic nitrate particles, which can be identified with an electron microscopic spot test, are found farther downwind of the refineries. They are observed as particles imbedded in droplets with diameters between 1 and 10 microns. (4) Because these large nitrate particles are hygroscopic, they can serve as cloud condensation nuclei to form large cloud droplets and enhance droplet coalescence. Thus they play very important roles in the processes of cloud formation and precipitation. (Author)

A80-48908 * **Fluorescence lidar.** T. J. McIlrath (Maryland, University, College Park, Md.). *Optical Engineering*, vol. 19, July-Aug. 1980, p. 494-502. 18 refs. Grant No. NsG-5315.

The physics of fluorescence lidar is reviewed, with emphasis placed on understanding the features which determine its applicability to particular species and environments. The successful applications of fluorescence lidar to date are covered, and a range of proposed measurements is considered. Attention is given to stratospheric applications. V.T.

A80-48909 * **Development of a pulsed 9.5 micron lidar for regional scale O3 measurement.** R. W. Stewart (NASA, Goddard Space Flight Center, Greenbelt, Md.). *Optical Engineering*, vol. 19, July-Aug. 1980, p. 503-507. 22 refs.

A pulsed infrared lidar system designed for application to the remote sensing of atmospheric trace gases from an airborne platform is described. The system is also capable of measuring the infrared backscatter characteristics of the ocean surface, terrain, cloud, and aerosol targets. The lidar employed is based on dual wavelength pulse energy measurements in the 9-11 micrometer wavelength region. V.T.

A80-50882 **A study of the needs of French government agencies in remote sensing mapping (Etude des besoins des administrations françaises en cartographie par télédétection).** M. Bied-Charreton, P. Fournier (Opération Pilote Interministérielle de Télédétection, Paris, France), B. Susplugas (Groupement pour le Développement de la Télédétection Aérospatiale, Paris, France), and P. Gonfreville (Centre National d'Etudes Spatiales, Paris, France). In: Cartographic processing and analysis of satellite imagery; International Conference, 3rd, Toulouse, France, June 19-22, 1979, Proceedings. Saint-Etienne, Loire, France, Edition Gedim, 1980, p. 36-43. In French.

A study of existing and potential remote sensing mapping needs within France is presented, providing a detailed outline of mapping applications and several tables cataloging the utilization of territories and agricultural zones. References are made to the principal French bureaus responsible for the management of national territory and natural resources, the development of agricultural policies, and international cooperation in managing earth resources. The study aims to help initiate an improvement of administrative procedures for the exploitation and future application of remote sensing in France. A.C.W.

A80-51935 * **The environmental program at Kennedy Space Center - Baseline to monitoring.** W. M. Knott (NASA, Kennedy Space Center, Cocoa Beach, Fla.). In: A new era in technology; Proceedings of the Seventeenth Space Congress, Cocoa Beach, Fla., April 30-May 2, 1980. Cocoa Beach, Fla., Canaveral Council of Technical Societies, 1980, p. 2-44 to 2-49.

KSC has developed an environmental program to ensure that its activities do not adversely affect the surrounding environment. Two essential elements of the total program are the baseline and monitoring programs. The goal of the baseline program is to collect sufficient information about the environment prior to Shuttle launches so that adverse changes in the environment - if and when they occur after the Shuttle program becomes active - can be detected and cause-effect relationships established when possible.

The goal of the monitoring program is to use information from the baseline program along with survey and sampling operations during the period of initial Shuttle launches to document adverse changes in the environment. B.J.

A80-52332 Remote sensing of NO using a differential absorption lidar. N. Menyuk, D. K. Killinger, and W. E. DeFeo (MIT, Lexington, Mass.). *Applied Optics,* vol. 19, Oct. 1, 1980, p. 3282-3286. 15 refs. USAF-supported research.

Single-ended remote sensing measurements of atmospheric NO have been made using differential absorption of frequency-doubled pulsed CO2 laser radiation backscattered from topographic targets. Returns were obtained from targets at ranges out to 1.4 km, and significant NO concentrations above ambient were observed over a path which crossed a traffic roadway at a range of 0.5 km. In view of the severe atmospheric water vapor absorption in the spectral region containing the NO absorption band, the range dependence of the lidar returns was also measured in order to determine the differential absorption of the ambient atmosphere. The results differed significantly from those computed from atmospheric transmission data tapes. (Author)

A80-52346 * Polar nephelometer for atmospheric particulate studies. M. Z. Hansen (NASA, Goddard Space Flight Center, Laboratory for Atmospheric Sciences, Greenbelt, Md.) and W. H. Evans (Arizona, University, Tucson, Ariz.). *Applied Optics,* vol. 19, Oct. 1, 1980, p. 3389-3395. 20 refs. Contract No. N00014-75-C-0208.

A unique polar nephelometer was designed and constructed for the measurement of atmospheric particulate characteristics. The nephelometer produces visible light from a self-contained laser to irradiate an air sample drawn into the instrument. The light scattered from the particulates and molecules in the sample is detected as a function of scattering angle for each of four different incident light polarizations. These measurements are used to determine the particulate scattering matrix which is a function of the size, shape, and index of refraction of the particles. The region of sensitivity for the measurements corresponds to the size range of particles that strongly affects visible radiative transfer in the atmosphere, which is the primary application for the derived information. (Author)

A80-53131 Laser studies of the atmosphere and underlying surface (Issledovanie atmosfery i podstilaiushchei poverkhnosti s ispol'zovaniem lazernoi tekhniki). Edited by A. I. German. Moscow, Gidrometeoizdat (Tsentral'naia Aerologicheskaia Observatoriia, Trudy, No. 138), 1979. 128 p. In Russian.

Papers are presented on such topics as the use of spaceborne lidar to study space-time variations of atmospheric aerosol, lidar measurements of stratospheric and tropospheric ozone, experimental studies of air pollution, and optical measurements of NO2 concentration in the atmosphere. Consideration is also given to intensity fluctuations of light beams reflected from the turbulent sea surface, lidar studies of sea surface patterns, and lidar studies of clouds and underlying surfaces. B.J.

A80-53265 Smoke as a quantitative atmospheric diffusion tracer. F. A. Gifford (NOAA, Air Resources Atmospheric Turbulence and Diffusion Laboratory, Oak Ridge, Tenn.). *(Workshop on Atmospheric Tracers and Tracer Applications, University of California, Los Alamos, N. Mex., May 23, 24, 1979.) Atmospheric Environment,* vol. 14, no. 10, 1980, p. 1119-1121. 8 refs.

Generalizations of the 'opacity method' of analyzing visible smoke-plume diffusion are presented. The horizontal dispersion length, sigma-y, is derived from the outline of a plume having an arbitrary vertical concentration distribution. The vertical dispersion length, sigma-z, is derived for a plume with concentration varying as arbitrary powers of y and z in the exponential terms. Examples of observations of sigma-y and sigma-z based on Skylab-4, U-2, and ordinary land-based photographs are presented. (Author)

A80-53269 Airborne sulfur dioxide to sulfate oxidation studies of the INCO 381M chimney plume. W. H. Chan, R. J. Vet, M. A. Lusis, J. E. Hunt, and R. D. S. Stevens (Ontario Ministry of the Environment, Air Resources Branch, Toronto, Canada). *Atmospheric Environment,* vol. 14, no. 10, 1980, p. 1159-1170. 20 refs.

A80-54074 Volcanic material from Mount St Helens in the stratosphere over Europe. M. Ackerman, C. Lippens (Institut d'Aéronomie Spatiale de Belgique, Brussels, Belgium), and M. Lechevallier (Etablissement Technique Central Armement, Arcueil, Val-de-Marne, France). *Nature,* vol. 287, Oct. 16, 1980, p. 614, 615. 9 refs.

Observations of aerosols in the stratosphere prior to and following the eruption of Mount St. Helens volcano on May 18, 1980 are reported. Photographic observations of the earth limb in the azimuthal direction of the sun at low solar elevations were obtained at balloon altitudes over Europe on October 10, 1979 and May 7 and June 5, 1980. Analysis of the limb pictures acquired reveals an abrupt increase in earth limb radiance between 15 and 16 km altitude on June 5 relative to the earlier dates, at which radiance varied smoothly with altitude. The increased radiance is attributed to aerosols from the volcanic event, and possible mechanisms for the decrease of the amount of solar radiation reaching the ground due to the stratospheric aerosols are indicated. A.L.W.

N80-30868*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
MAPPING URBANIZED AREA EXPANSION THROUGH DIGITAL IMAGE PROCESSING OF LANDSAT AND CONVENTIONAL DATA
Steven Z. Friedman, Principal Investigator 1 Mar. 1980 88 p refs Original contains color imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls, S.D. 57198 ERTS
(Contract NAS7-100)
(E80-10301; NASA-CR-163355; JPL-Pub-79-113) Avail: NTIS HC A05/MF A01 CSCL 08B

N80-30877# Wisconsin Univ. - Madison.
MONITORING THE USE OF RIVERWAYS WITH AERIAL PHOTOGRAPHY: THE DEVELOPMENT, TESTING, AND EVALUATION OF A COMPUTER ASSISTED METHODOLOGY Final Report
R. H. Becker, William A. Gates, and Bernard J. Niemann, Jr. 31 Mar. 1980 363 p
(Contract DACW25-79-C-0008)
(AD-A086471) Avail: NTIS HC A16/MF A01 CSCL 14/5

The objectives of this investigation were to develop, test and evaluate a recreational monitoring methodology using aerial photography and computer assisted data capture with auxiliary equipment. To meet these objectives, photography was flown, interpretation techniques were developed and utilized, hardware was assembled, software was written and recreational monitoring results were obtained. Section 1, includes a statement of objectives, how the report is organized, a summary of available photography, a brief summary of methods employed, and some conclusions. Section 2, Pool 16 Users Results, includes the results obtained from applying the methodology for six flights over Pool 16. It also includes discussion of the results and provides graphic examples of results. Section 3, Evaluation of the Methodology, includes equipment and personnel requirements, the time utilized developing and testing the methodology, and the costs incurred. The reliability of the methodology, error control and error discovery are discussed. Section 4, Aerial Photographic Methods, includes a detailed discussion of the methods and equipment employed to purchase, obtain and process the aerial photography for the riverway. Section 5, Interpretative methods, discusses the methods employed to interpret, locate and encode targets from the photography. Section 6, Handbook/Codebook, includes a detailed description of each variable encoded as part of the methodology. It also includes the rules used to interpret each of the target types. GRA

N80-31862# Rockwell International Corp., Richland, Wash. Energy Systems Group.

LANDSAT DATA AS A BASIS FOR REGIONAL ENVIRONMENTAL ASSESSMENT WITHIN THE COLUMBIA PLATEAU

L. S. Leonhart and J. G. Stephan (Battelle Pacific Northwest Labs., Richland, Wash.) May 1980 19 p Presented at the 6th Can. Symp. on Remote Sensing, Halifax, Canada, 21-23 May 1980

(Contract DE-AC06-77RL-01030)

(RHO-BWI-SA-43; CONF-800577-1) Avail: NTIS HC A02/MF A01

An environmental assessment is being performed in conjunction with siting a radioactive waste terminal-storage facility within the federally operated Hanford Site in south-central Washington. Initial assessments involved classification of four contiguous LANDSAT scenes recorded over the region and about 300 high-altitude (U-2) photographs. The resulting mosaic was segregated into ten land-cover classes. The classified land-cover data were then machine-integrated with digital irrigation well-location data. The resulting groundwater multi-source data product was required by hydrologists to segregate potential artificial recharge areas from artificial groundwater discharge areas. Related studies employed LANDSAT data and aerial imagery to identify linear structures and other geologic features which may have a significant bearing on the tectonic and/or hydrological setting of the Columbia Plateau. DOE

N80-31969*# University of Central Florida, Orlando. Dept. of Biological Sciences.

A CONTINUATION OF BASE-LINE STUDIES FOR ENVIRONMENTALLY MONITORING SPACE TRANSPORTATION SYSTEMS (STS) AT JOHN F. KENNEDY SPACE CENTER. VOLUME 4: THREATENED AND ENDANGERED SPECIES OF THE KENNEDY SPACE CENTER. PART 1: MARINE TURTLE STUDIES Final Report, 1976 - 1979

L. M. Ehrhart Sep. 1980 417 p refs

(Contract NAS10-8986)

(NASA-CR-163122-Vol-4-Pt-1; TR-51-2-Vol-4Pt-1) Avail: NTIS HC A18/MF A01 CSCL 13B

The status of marine turtle populations in the KSC area was studied using data from previous results from ground and aerial surveillance conducted from 1976 to April 1979. During ground surveillance, various data were recorded on emergent turtles such as: species, weight, tag number (if previously tagged), time discovered, activity at discovery and the location of discovery. Observations were also made on nesting and reproductive characteristics, population estimates, immigration and emigration and growth rate of the turtles. Mortality studies were additionally made and autopsies performed on dead turtles found in the area. It is concluded that further mortality documentation should be done just prior to and just after a future space launch operation in order to accurately assess the cause and effect relationship of such a launch on the turtle population. A.R.H.

N80-31970*# University of Central Florida, Orlando. Dept. of Biological Sciences.

A CONTINUATION OF BASE-LINE STUDIES FOR ENVIRONMENTALLY MONITORING SPACE TRANSPORTATION SYSTEMS (STS) AT JOHN F. KENNEDY SPACE CENTER. VOLUME 4: THREATENED AND ENDANGERED SPECIES OF THE KENNEDY SPACE CENTER. PART 2: THREATENED AND ENDANGERED BIRDS AND OTHER THREATENED AND ENDANGERED FORMS Final Report, Sep. 1976 - Apr. 1979

L. M. Ehrhart Sep. 1980 148 p refs

(Contract NAS10-8986)

(NASA-CR-163122-Vol-4-Pt-2; TR-51-2-Vol-4-Pt-2) Avail: NTIS HC A07/MF A01 CSCL 06C

Data are presented which were collected by ground and aerial surveillance of 37 species of birds observed within the environs of KSC which are on lists of rare and endangered biota in Florida. Additional information was obtained on other threatened species such as the West Indian manatee, the salt marsh snake, the Indigo snake, the Gopher tortoise, the American alligator, and the Florida mouse. Results of the literature search were used to obtain a historical perspective and aid in the analysis of the field data collected. A.R.H.

N80-32817*# California Univ., Berkeley. Space Sciences Lab.

APPLICATION OF REMOTE SENSING TO SELECTED PROBLEMS WITHIN THE STATE OF CALIFORNIA Annual Report

Robert N. Colwell, Andrew S. Benson, John E. Estes, and Claude Johnson, Principal Investigators 1 May 1980 438 p refs Original contains color imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls, S. D. 57198 ERTS

(Grant NsG-7220)

(E80-10326; NASA-CR-163405; SSL-Ser-21-Issue-14) Avail: NTIS HC A19/MF A01 CSCL 05B

N80-32825*# Kansas Univ. Center for Research, Inc., Lawrence. Space Technology Center.

THE APPLICATION OF REMOTE SENSING TO RESOURCE MANAGEMENT AND ENVIRONMENTAL QUALITY PROGRAMS IN KANSAS Annual Report, 1 Apr. 1979 - 31 Mar. 1980

B. G. Barr and E. A. Martinko, Principal Investigators Jul. 1980 108 p Original contains color imagery. Orginal photography may be purchased from the EROS Data Center, Sioux Falls, S.D. 57198 ERTS

(Grant NGL-17-004-024)

(E80-10337; NASA-CR-163417) Avail: NTIS HC A06/MF A01 CSCL 13B

N80-32826*# Mississippi State Univ., Mississippi State.

APPLICATION OF REMOTE SENSING TO STATE AND REGIONAL PROBLEMS Semiannual Progress Report, 1 May - 31 Oct. 1979

W. Frank Miller, Dale A. Quattrochi, Bradley D. Carter, Gary K. Higgs, and Jimmy L. Solomon, Principal Investigators 1 Nov. 1979 55 p Original contains color illustrations ERTS

(Grant NGL-25-001-054)

(E80-10338; NASA-CR-163418; SAPR-12) Avail: NTIS HC A04/MF A01 CSCL 05B

N80-33928*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

IN SITU OZONE DATA FOR EVALUATION OF THE LASER ABSORPTION SPECTROMETER OZONE REMOTE SENSOR: 1979 SOUTHEASTERN VIRGINIA URBAN PLUME STUDY SUMMER FIELD PROGRAM

Gerald L. Gregory, David S. McDougal, and Joe J. Mathis, Jr. Oct. 1980 57 p refs

(NASA-TM-81831) Avail: NTIS HC A04/MF A01 CSCL 13B

Ozone data from the 1979 Southeastern Virginia Urban Study (SEV-UPS) field program are presented. The SEV-UPS was conducted for evaluation of an ozone remote sensor, the Laser Absorption Spectrometer. During the measurement program, remote-sensor evaluation was in two areas; (1) determination of the remote sensor's accuracy, repeatability, and operational characteristics, and (2) demonstration of the application of remotely sensed ozone data in air-quality studies. Data from six experiments designed to provide in situ ozone data for evaluation of the sensor in area 1, above, are presented. Experiments consisted of overflights of a test area with the remote sensor aircraft while in situ measurements with a second aircraft and selected surface stations provided correlative ozone data within the viewing area of the remote sensor. T.M.

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03
GEODESY AND CARTOGRAPHY

Includes mapping and topography.

A80-45297 # The use of space data for the mapping of coastal areas (Ispol'zovanie kosmicheskoi informatsii dlia kartografirovaniia shel'fa). E. S. Zubchenko and V. D. Kondiurin. *Geodeziia i Kartografiia,* June 1980, p. 54-58. 13 refs. In Russian.

Recent work on the use of remote sensing data for the mapping of coastal areas is reviewed. Consideration is given to such topics as the digital mapping of coastal areas from Landsat, the use of point classification methods for the mapping of estuarine areas from Landsat, and the geometric and cartographic accuracy of ERIS-1 imagery. B.J.

A80-46967 # A photogrammetric method of processing space photographs (Ob odnom sposobe fotogrammetricheskoi obrabotki kosmicheskikh snimkov). V. D. Bol'shakov and I. G. Zhurkin (Moskovskii Institut Inzhenerov Geodezii, Aerofotos'emki i Kartografii, Moscow, USSR). *Geodeziia i Aerofotos'emka, no.* 3, 1980, p. 76-85. In Russian.

The paper examines a method of determining the relative position in space of two surveying systems with respect to a fixed absolute (inertial) coordinate system using support points of a moving object. It was shown that in a general case, a violation of coplanarity of the three vectors occurs in solving this problem. One of these vectors is oriented along the line which connects two mapping points, and the other two vectors are oriented from each mapping point toward the object of the survey. An algorithm for the solution of this problem is presented for the case of mapping of the earth surface from a satellite. A.T.

A80-50876 Cartographic processing and analysis of satellite imagery; International Conference, 3rd, Toulouse, France, June 19-22, 1979, Proceedings (Traitement et exploitation cartographique des images spatiales; Colloque International, 3rd, Toulouse, France, June 19-22, 1979, Proceedings). Conference sponsored by the Groupement pour le Développement de la Télédétection Aérospatiale. Saint-Etienne, Loire, France, Edition Gedim *(Annales des Mines,* Apr.-May 1980), 1980. 232 p. In French and English. $42.37.

The use of remote sensing imagery for purposes of mapping is considered with attention given to photogrammetric processing, methods for the extraction of cartographic information, topographic mapping, and the use of satellite imagery for thematic mapping. Particular consideration is given to soil inventory and mapping, cartographic display of space information, the needs of French government agencies in remote sensing mapping, the geometric processing of remote sensing images, and Spacelab photogrammetric experiments. B.J.

A80-50888 Automatic mapping of snow cover by means of Landsat - Application to the central Pyrenees (Cartographie automatique du manteau neigeux à l'aide due satellite Landsat - Application aux Pyrénées centrales). C. Leprieur (Ecole Nationale Supérieure Agronomique, France), M. Traizet, and J. C. Favard *(Centre National d'Etudes Spatiales, Toulouse, France).* In: Cartographic processing and analysis of satellite imagery; International Conference, 3rd, Toulouse, France, June 19-22, 1979, Proceedings. Saint-Etienne, Loire, France, Edition Gedim, 1980, p. 92-99. In French.

A criterion for the automatic recognition of snow cover is developed. The application of this criterion to Landsat images of the central Pyrenees is discussed. B.J.

A80-50892 Spatial filtering of Landsat data for urban cartography (Filtrage spatial des données Landsat en vue de la cartographie urbaine). M. Bozet, H. Dotu, M. Installe, and J. Wilmet (Louvain, Université, Louvain-la-Neuve, Belgium). In: Cartographic processing and analysis of satellite imagery; International Conference, 3rd, Toulouse, France, June 19-22, 1979, Proceedings. Saint-Etienne, Loire, France, Edition Gedim, 1980, p. 122-129. 12 refs. In French.

Several techniques of unsupervised classification of multispectral scanner (MSS) data using spectral-spatial information and spectral information only are examined. The shortcomings of these techniques are pointed out and spatial filtering based on the contrast property is proposed in order to improve the classification using spectral information only. In addition to the greater accuracy, the advantages of classification using this filtering are the preservation of really small and filiform objects, the great consideration of local details of the image and the results are in a more desirable form for interpretation. Two urban-area Landsat 1 images are used to illustrate the results of the proposed technique. (Author)

A80-50895 The combined plotting of satellite photographs and aerial photographs for topographic mapping (Restitution combinée de photographies de satellite et de photographies aériennes pour la cartographie topographique). O. R. Kölbl (Lausanne, Ecole Polytechnique Fédérale, Lausanne, Switzerland). In: Cartographic processing and analysis of satellite imagery; International Conference, 3rd, Toulouse, France, June 19-22, 1979, Proceedings. Saint-Etienne, Loire, France, Edition Gedim, 1980, p. 145-151. In French.

It is shown that topographic mapping can be rationalized by the use of satellite photographs and is especially applicable to the needs of developing countries. It is suggested that satellite photographs be used both for aerial triangulation and for supplying the geometrical information for topographic mapping. Aerial photographs are used at picture scales between 1:50,000 and 1:100,000 for the purpose of topographic photointerpretation. The combined plotting of satellite and aerial photographs is discussed. B.J.

A80-50896 Tidal land mapping from Landsat. H.-P. Bahr and E. Dennert-Moller (Hannover, Universität, Hanover, West Germany). In: Cartographic processing and analysis of satellite imagery; International Conference, 3rd, Toulouse, France, June 19-22, 1979, Proceedings. Saint-Etienne, Loire, France, Edition Gedim, 1980, p. 152-160. 11 refs.

Precise digital geometrical rectification of Landsat MSS data leading to m(x) equals plus or minus 25.7 m and m(x) equals plus or minus 51.3 m rms was executed in order to prepare multispectral classification of the North Fresian tidal flats at the German North Sea coast. The maximum likelihood method was applied to 7 classes resulting in an accuracy better than 89 percent. (Author)

A80-50897 Basic topographic mapping - Renewal and revision (Cartographie topographique de base - Réfection et révision). J. Poulain (Institut Géographique National, Paris, France). In: Cartographic processing and analysis of satellite imagery; International Conference, 3rd, Toulouse, France, June 19-22, 1979, Proceedings. Saint-Etienne, Loire, France, Edition Gedim, 1980, p. 161-165. In French.

The use of remote sensing for topographic mapping is reviewed with particular attention given to the application of interactive image processing to the revision of small-scale maps and the compilation of new maps. Two examples are discussed: (1) the revision of a 1:100,000 *map of Verdun-sur-Meuse; and (2) the compilation of a* color map of the Sudan. B.J.

A80-50902 Evaluation of Landsat image data for the extraction of land use information and its presentation in thematic maps. W. Kirchhof, P. Haberacker, E. Krauth, G. Kritikos, and R. Winter (Deutsche Forschungs- und Versuchsanstalt für Luft- und Raumfahrt, Institut für Nachrichtentechnik, Wessling, West Germany). In: Cartographic processing and analysis of satellite imagery; *International Conference,* 3rd, Toulouse, France, June 19-22, 1979,

Proceedings. Saint-Etienne, Loire, France, Edition Gedim, 1980, p. 196-203. 20 refs.

For the northern part of the Rhinegraben a supervised classification of Landsat image data has been performed. As a result, a geometrical rectified map of land use at a scale 1:200,000 has been produced, coinciding with the topographical map CC 7110, Mannheim, 8500 sq km. By overprinting this map with features the geometrical rectification and consistency of eight land use classes was verified. For the community of Speyer a demonstration of consistency with aerial photo interpretation was made on the level of land use inventory and spatial distribution of discrepancies. The study yields, that for a central European region the available Landsat image data may be suitable for the construction of thematic maps of land use, for land use inventories and as interpretation aids for a variety of applications. (Author)

A80-53051 **Applications of statistics to thematic mapping.** G. H. Rosenfield and M. L. Melley (U.S. Geological Survey, Reston, Va.). *Photogrammetric Engineering and Remote Sensing,* vol. 46, Oct. 1980, p. 1287-1294. 11 refs.

Two statistical problems occurring in the effort to analyze thematic maps and mapping are determining the accuracy of thematic content and comparing factors studied in thematic mapping. Statistical procedures applicable to thematic mapping involve sampling, determining accuracy, and comparing factors. A sampling procedure using an unaligned pattern within a square grid network is applicable for use with thematic maps. Sample size may be determined using the binomial distribution based upon the confidence interval to define the true mean of the population within certain limits. The confidence interval may also be used to define the upper and lower limits of the accuracy of the thematic map. Several tests for comparing factors using differences of paired samples are the t test, the signed rank test, and the sign test. When more than two factors are being studied, analysis of variance is the most efficient procedure to use. (Author)

A80-54021 # **Optimal conditions for determining the coordinates of the earth's center of mass (Ob optimal'nykh usloviiakh opredeleniia koordinat tsentra mass zemli).** B. L. Kaplan and K. K. Nasretdinov. *Geodeziia i Kartografiia,* Aug. 1980, p. 12-14. In Russian.

Gravimetric and satellite data are used to determine the parameters of the total ellipsoid of the earth, referred to the earth's center of mass. The method is applied to the case when the geocentric radius-vectors of points in the reference system are known. B.J.

A80-54023 # **An automated aerial-photographic information-search system (Aerofotos'emochnaia avtomatizirovannaia informatsionno-poiskovaia sistema).** A. G. Zhuchenko, L. A. Morozova, and V. Ia. Petrov. *Geodeziia i Kartografiia,* Aug. 1980, p. 33-37. 12 refs. In Russian.

The paper describes an automated system for the extraction of geological information from aerial photographs; the system used is an information-search language of descriptor type, represented in the form of classifiers. A block diagram of the system is presented. B.J.

A80-54024 # **The geometric calibration of multispectral photographic equipment (Geometricheskaia kalibrovka mnogozonal'noi fotoapparatury).** V. I. Iurov. *Geodeziia i Kartografiia,* Aug. 1980, p. 37-42. In Russian.

A method for determining the geometric parameters of a multispectral photography system is presented. The method is used to calibrate a nine-channel system. Calibration results are presented and calibration accuracy is discussed. B.J.

A80-54025 # **The use of space photographic data for the study and mapping of anthropogenic landscapes (Primenenie kosmicheskoi fotoinformatsii dlia izucheniia i kartografirovaniia antropogennykh landshaftov).** S. V. Skatershchikov. *Geodeziia i Kartografiia,* Aug. 1980, p. 47-54. 14 refs. In Russian.

The paper examines the feasibility of using space photography to study anthropogenic landscapes (i.e., natural landscapes modified by man). The use of space data for landscape mapping and resources monitoring is considered. B.J.

N80-28809*# New South Wales Univ., Sydney (Australia). School of Surveying.

CRUSTAL DEFORMATION AT VERY LONG BASELINE INTERFEROMETRY SITES DUE TO SEASONAL AIR-MASS AND GROUND WATER VARIATIONS

A. Stolz and Douglas R. Larden (Colorado Univ., Boulder) *In* NASA. Goddard Space Flight Center Radio Interferometry Jul. 1980 p 145-151 refs

Avail: NTIS HC A20/MF A01 CSCL 08B

The seasonal deformation normal to the Earth's surface was calculated at stations involved or interested in very long baseline interferometry (VLBI) geodesy and at hypothetical sites in Australia and Brazil using global atmospheric pressure data, values for groundwater storage, and load Love numbers deduced from current Earth models. It was found that the annual range of deformation approached the centimeter level measuring potential of the VLBI technqiue at Greenbank, Haystack, and the Brazil site. R.E.S.

N80-28838*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.

SATELLITE EMISSION RADIO INTERFEROMETRIC EARTH SURVEYING (SERIES)

P. F. MacDoran *In* NASA. Goddard Space Flight Center Radio Interferometry Jul. 1980 p 403-408

(Contract NAS7-100)

Avail: NTIS HC A20/MF A01 CSCL 08B

Existing satellite radio emissions of the global positioning system were exploited as a resource for cost effective high accuracy geodetic measurements. System applications were directed toward crustal dynamics and earthquake research.R.C.T.

N80-28841*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt Md.

NASA GEODETIC APPLICATIONS OF THE MARK 3 VLBI SYSTEM

Robert Coates *In its* Radio Interferometry Jul. 1980 p 425-433 refs

Avail: NTIS HC A20/MF A01 CSCL 08B

The Mark 3 very long baseline interferometer system was used in monitoring the following geodetic phenomena: the regional deformation and strain accumulation related to large earthquakes in the plate boundary region of the western United States; contemporary relative plate tectonic motions of the North American, Pacific, South American, Eurasian, and Australian Plates; the internal deformation of continental and oceanic lithospheric plates with particular emphasis on North America and the Pacific; the rotational dynamics of the Earth and their possible correlation to earthquakes, plate motions, and other geophysical phenomena; and motions and deformation occurring in regions of high earthquake activity. R.C.T.

N80-29818*# Ohio State Univ., Columbus. Dept. of Geodetic Science.

IMPROVEMENT OF THE EARTH'S GRAVITY FIELD FROM TERRESTRIAL AND SATELLITE DATA Status Report No. 16, 1 Jan. 1979 - 30 Jun. 1980

Jul. 1980 5 p ERTS

(Grant NGR-36-008-161; OSURF Proj. 783210)

(E80-10271; NASA-CR-163343) Avail: NTIS HC A02/MF A01 CSCL 08E

N80-30876*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

THE CONTRIBUTION OF THE DIFFUSE LIGHT COMPONENT TO THE TOPOGRAPHIC EFFECT ON REMOTELY

SENSED DATA
Chris Justice and Brent Holben Jun. 1980 45 p refs Submitted for publication
(NASA-TM-80728) Avail: NTIS HC A03/MF A01 CSCL 20F

The topographic effect is measured by the difference between the global radiance from inclined surfaces as a function of their orientation relative to the sensor position and light source. The short wave radiant energy incident on a surface is composed of direct sunlight, scattered skylight, and light reflected from surrounding terrain. The latter two components are commonly known as the diffuse component. The contribution of the diffuse light component to the topographic effect was examined and the significance of this diffuse component with respect to two direct radiance models was assessed. Diffuse and global spectral radiances were measured for a series of slopes and aspects of a uniform and surface in the red and photographic infrared parts of the spectrum, using a nadir pointing two channel handheld radiometer. The diffuse light was found to produce a topographic effect which varied from the topographic effect for direct light. The topographic effect caused by diffuse light was found to increase slightly with solar elevation and wavelength for the channels examined. The correlations between data derived from two simple direct radiance simulation models and the field data were not significantly affected when the diffuse component was removed from the radiances. Radiances from a 60 percent reflective surface, assuming no atmospheric path radiance, the diffuse light topographic effect contributed a maximum range of 3 pixel values in simulated LANDSAT data from all aspects with slopes up to 30 degrees. R.K.G.

N80-31860# Army Engineer Topographic Labs., Fort Belvoir, Va.
TERRAIN ANALYST SYNTHESIZER STATION
Gunther Schwarz Jun. 1980 28 p
(DA Proj. 4A7-62707-A-855)
(AD-A087370; ETL-0231) Avail: NTIS HC A03/MF A01 CSCL 08/2

This report describes the Terrain Analyst Synthesizer Station built under contract for USAETL. Tests were performed to determine the characteristics and adherence to the specifications set forth in the Purchase Description. GRA

N80-33999*# National Aeronautics and Space Administration, Washington, D. C.
THE COORDINATED FEDERAL PROGRAM FOR THE APPLICATION OF SPACE TECHNOLOGY TO CRUSTAL DYNAMICS AND EARTHQUAKE RESEARCH
Pitt G. Thome Jan. 1979 17 p refs Prepared in cooperation with NOAA and Geological Survey and NSF and Defense Mapping Agency
(NASA-TM-82215) Avail: NTIS HC A02/MF A01 CSCL 08G

The application of space technology to important problems relating to crustal dynamics and earthquake research is described. Federal plans for such applications are summarized.T.M.

N80-34000*# National Aeronautic Association, Washington, D. C.
NASA PLAN FOR INTERNATIONAL CRUSTAL DYNAMICS STUDIES
Apr. 1979 34 p refs
(NASA-TM-82214) Avail: NTIS HC A03/MF A01 CSCL 08G

The international activities being planned as part of the NASA geodynamics program are described. Methods of studying the Earth's crustal movements and deformation characteristics are discussed. The significance of the eventual formalations of earthquake predictions methods is also discussed. R.C.T.

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04

GEOLOGY AND MINERAL RESOURCES

Includes mineral deposits, petroleum deposits, spectral properties of rocks, geological exploration, and lithology.

A80-48975 **Remote sensing for tunnel siting studies.** O. R. Russell, J. R. Everett (Earth Satellite Corp., Washington, D.C.), and D. T. Stanczuk (Science Applications, Inc., McLean, Va.). *(American Society of Civil Engineers, Annual Convention and Exposition, Atlanta, Ga., Oct. 22-26, 1979.) ASCE, Transportation Engineering Journal,* vol. 106, Sept. 1980, p. 523-537. 5 refs. U.S. Department of Transportation Contract No. FH-11-8598.

An investigation was held to evaluate the contribution of various airborne remote sensing systems and interpretive techniques to the development of improved three-dimensional geologic models needed to select and analyze highway tunnel sights. During this study, data from most types of remote sensing imaging systems were tested (Landsat, Skylab, side-looking radar; black-and-white photography, color, color-infrared, low-sun-angle black-and-white infrared photography; thermal infrared and multispectral scanner; airborne electromagnetic systems and magnetometers). All these devices are characterized and their advantages are emphasized. An economic analysis is provided, and an attempt is made to estimate costs for data acquisition using different sensors. Tables compare the units of exploratory work with the units of construction work and capability ratings of conventional and remote sensing methods under optimum conditions. S.S.

A80-49524 * **Uranium - Spectral discrimination of alteration phenomena in sediments.** J. E. Conel, M. J. Abrams, and K. W. Baird (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, Calif.). *Modern Geology,* vol. 7, no. 2, 1980, p. 115-135. Research supported by the U.S. Department of Energy; Contract No. NAS7-100.

A80-49654 # **The Mesozoic and Cenozoic depressions of the Baikalo-Amur region from the interpretation of space photographs (O mezozoiskikh i kainozoiskikh vpadinakh raiona BAM po dannym deshifrirovaniia kosmicheskikh snimkov).** L. G. Vasiutina (Vsesoiuznoe Aerogeologicheskoe Nauchno-Proizvodstvennoe Ob'edinenie Aerogeologiia, Moscow, USSR) and A. P. Kuskov. *Issledovanie Zemli iz Kosmosa,* May-June 1980, p. 27-33. 11 refs. In Russian.

Space photographs, taken in conjunction with geological, geophysical, geomorphological, and morphostructural data, make it possible to evaluate certain depressions in the Baikalo-Amur region that are not compensated (or only slightly compensated) by contemporaneous sediments. Information on the extended troughs and the erosion characteristics of these noncompensated depressions has been obtained. B.J.

A80-49663 # **Characteristics of the representation of tectonic faults on space photographs (Osobennosti otobrazheniia tektonicheskikh razlomov na snimkakh iz kosmosa).** L. N. Rozanov (Vsesoiuznyi Neftianoi Nauchno-Issledovatel'skii Geologorazvedochnyi Institut, Leningrad, USSR). *Issledovanie Zemli iz Kosmosa,* May-June 1980, p. 98-100. 6 refs. In Russian.

The use of geological surveys and spaceborne photography to detect tectonic faults is considered. It is shown that space photographs are adequate for the identification of extension faults, but are inadequate for the identification of compression-stress faults (these latter faults must be detected by geological survey methods). B.J.

A80-49664 # **The appearance of the Main Ural Fault in a cloud field on space photographs (Proiavlenie glavnogo Ural'skogo razloma v pole oblachnosti na kosmicheskikh snimkakh).** L. I. Morozova (Nizhnevolzhskii Nauchno-Issledovatel'skii Institut Geologii i Geofiziki, Saratov, USSR). *Issledovanie Zemli iz Kosmosa,* May-June 1980, p. 101-104. In Russian.

An analysis of space photographs (taken from the Meteor-25 satellite) in the visible and near-IR ranges was used to study the effects of the Main Ural Fault and the Timan ridge on the cloud cover of the Urals. The perturbed atmospheric layer above the fault was found to be 6 km high, while above the ridge the perturbed layer was 4 km high. B.J.

A80-50880 **Landsat imagery in oil exploration - Six years of experience (Les images Landsat en exploration pétrolière - 6 ans d'expérience).** A. Fontanel and J.-C. Riverau (Institut Français du Pétrole, Rueil-Malmaison, Hauts-de-Seine, France). In: Cartographic processing and analysis of satellite imagery; International Conference, 3rd, Toulouse, France, June 19-22, 1979, Proceedings.

Saint-Etienne, Loire, France, Edition Gedim, 1980, p. 27-30. In French.

A review of the most common utilizations of Landsat images in geological and petroleum studies is presented. Included in the report are characteristics of the geological surveys such as scale, percentage and type of color compositions, and type of digital processing. The cost of the surveys and various financial constraints of digital processing are also presented. A.C.W.

A80-50881 **Review of BRGM research activities in geological remote sensing and medium-term perspectives (Bilan des activités de recherche du BRGM en télédétection appliquée à la géologie et perspectives à moyen terme).** G. Weecksteen (Bureau of Recherches Géologiques et Minières, Orléans, France). In: Cartographic processing and analysis of satellite imagery; International Conference, 3rd, Toulouse, France, June 19-22, 1979, Proceedings.

Saint-Etienne, Loire, France, Edition Gedim, 1980, p. 31-35. 19 refs. In French.

Remote sensing technology as a tool for geological mapping and mineral research is discussed. The relative importance of spatial vectors and sensors for specific domains of geology are considered. Both lineaments and circular structures are discussed in relation to their various applications in geology mapping, mineral research, geothermal survey, and estimate of seismic hazards. The difference in data obtained from multispectral sensors over arid zones and soil covered regions is examined. Thermal remote sensing is shown to provide improvements for detecting sub-surface geological anomalies in soil covered areas. A.C.W.

A80-51076 **Remote sensing and mineral exploration; Proceedings of the Workshop, Bangalore, India, May 29-June 9, 1979.** Workshop sponsored by COSPAR, International Union of Geological Sciences, UNESCO, Geological Survey of India, et al. Edited by W. D. Carter, L. C. Rowan (U.S. Geological Survey, Reston, Va.) and J. F. Huntington (Commonwealth Scientific and Industrial Research Organization, North Rhyde, Australia). Oxford, Pergamon Press, Ltd. (Advances in Space Exploration. Volume 10), 1980. 182 p. $60.

Papers presented in this volume reflect the international state-of-the-art of remote sensing in the field of geology and exploration for mineral and energy resources. The papers include: contribution of Landsat data to the objectives of the geological survey of India; mineral resource exploration, inventory, and assessment; geological ground-truths and Landsat imagery interpretation for parts of Karnataka State (India); and the application of remote sensing techniques to petroleum exploration in India. V.L.

A80-51077 **Contribution of Landsat data to the objectives of the geological survey of India.** V. S. Krishnaswamy (Geological Survey of India, Calcutta, India). In: Remote sensing and mineral exploration; Proceedings of the Workshop, Bangalore, India, May 29-June 9, 1979. Oxford, Pergamon Press, Ltd., 1980, p. 1-9.

Satellite-generated data are considered in relation to geoseismological, geohydrological, geomorphological, glaciological, mineral

resource location, and tectonic studies in India. Future programs of the Geological Survey of India are considered, including the incorporation of automated systems for data handling and the procurement of equipment. R.C.

A80-51078 Characteristics of the Landsat system and data for geologic applications - Availability of data. W. D. Carter (U.S. Geological Survey, Reston, Va.). In: Remote sensing and mineral exploration; Proceedings of the Workshop, Bangalore, India, May 29-June 9, 1979. Oxford, Pergamon Press, Ltd., 1980, p. 17-21.

Characteristics of Landsat series satellites and the data available from them are outlined with respect to their geologic applications. The operational status of the Landsat 1, 2, and 3 satellites, launched in July 1972, January 1975, and March 1978, respectively, is indicated, and the direct acquisition of Landsat data by means of ground stations located throughout the world is discussed. The Landsat D satellite, planned to be launched in 1981 from a Space Shuttle Sortie mission, is described, with particular attention given to the new 5-band MSS system and thematic mapper instruments to be carried on board. Means of acquiring worldwide Landsat data are indicated, and applications of this data to mineral and energy resource exploration and to global comparative studies of rock types and mineral deposits are considered. A.L.W.

A80-51079 Status and plans of SEO satellite and receiving station. D. S. Kamat (Indian Space Research Organization, Space Applications Centre, Ahmedabad, India). In: Remote sensing and mineral exploration; Proceedings of the Workshop, Bangalore, India, May 29-June 9, 1979. Oxford, Pergamon Press, Ltd., 1980, p. 25-38.

This paper describes the data products concerning the vidicon camera payload data, the passive microwave radiometer payload data, and the data collection platform data to be collected from the Satellite for Earth Observation (SEO) which Indian Space Research Organization is to launch in the near future. This paper also describes, in brief, SEO satellite and ground receiving system for data reception when SEO is in orbit. (Author)

A80-51080 Geological ground-truths and Landsat imagery interpretation for parts of Karnataka State /India/. J. G. Krishnamurty, K. P. Gopalakrishnan, and T. V. Ramachandran (Geological Survey of India, Bangalore, India). In: Remote sensing and mineral exploration; Proceedings of the Workshop, Bangalore, India, May 29-June 9, 1979. Oxford, Pergamon Press, Ltd., 1980, p. 45-58. 23 refs.

A80-51081 Landsat exploration of Himalayan and Peninsular regions /Remote sensing and mineral exploration - Progress report of work done in India/: I.G.C.P. Project 143. B. N. Raina. In: Remote sensing and mineral exploration; Proceedings of the Workshop, Bangalore, India, May 29-June 9, 1979. Oxford, Pergamon Press, Ltd., 1980, p. 59-78.

Work on this project was started in India in August, 1977. Six project areas were selected for such studies in areas of known mineralization. Five of these projects are located on the Precambrian rocks of the Indian Peninsular Shield and one in the Himalayan area. Work carried out so far includes collection of regional and detailed geological data, interpretation of regional structure and lineaments from Landsat images and preparation of combined maps on which an attempt has been made to integrate the Landsat data with the conventional data. In most cases it has been possible to establish relationships between the reported mineral occurrences and areas of intersection between major lineaments and/or curvilinear features. In some cases such studies have thrown new light on the regional structure of the area and possible genetic relationship between the mineral occurrences, structure and lithology of the area. (Author)

A80-51082 Fracture mapping of the Narmada-Tapti basin using Landsat imagery. S. N. Pandey (Saugar, University, Sagar, India). In: Remote sensing and mineral exploration; Proceedings of the Workshop, Bangalore, India, May 29-June 9, 1979. Oxford, Pergamon Press, Ltd., 1980, p. 79-86. 5 refs. Research supported by the Association of Commonwealth Universities of England.

A80-51083 Lineament study of the Bastar district, Madhya Pradesh, India, from Landsat imagery. V. D. Bhate (Geological Survey of India, Calcutta, India). In: Remote sensing and mineral exploration; Proceedings of the Workshop, Bangalore, India, May 29-June 9, 1979. Oxford, Pergamon Press, Ltd., 1980, p. 87-93. 8 refs.

Study of the Landsat-1 MSS imagery covering the Bastar district, Madhya Pradesh, India, has brought out the lineament pattern, major structural trends, and main geological formations of the area. The lineaments in Bastar trend mainly NW-SE, NE-SW, N-S, NNE-SSW, E-W and ENE-WSW, the NW-SE trend being the most predominant. The study of the lineaments indicates that the Central Bastar Plateau probably represents an uplifted block bounded on three sides by major faults. (Author)

A80-51084 Tectonics and lineament patterns of the Vindhyan basin based on Landsat imagery data. M. Krishnamurty and V. C. Srivastava (Geological Survey of India, Lucknow, India). In: Remote sensing and mineral exploration; Proceedings of the Workshop, Bangalore, India, May 29-June 9, 1979. Oxford, Pergamon Press, Ltd., 1980, p. 95-99.

A study of Landsat imagery of the Vindhyan basin covered 124,000 sq km on 1:1 million scale extending between the coordinates 24 deg N to 26 deg N and 78 deg E to 84 deg E was conducted to review the regional tectonics of the basin. The distinct set of lineaments trending (ENE-WSW) along the Son-Narmada and Asmara directions appears to have been responsible in pre-Bijawar times for carving out the Bijawar/Vindhyan basin. There appear to be a series of movements along these geosutures during Bijawar and Semri times and also at the end of Semri time. There are diamondiferous plugs along these two fractures as well as basemetal and radioactive mineralization, thus establishing the idea that they are of deep seated crustal origin. (Author)

A80-51085 Lineaments and their tectonic significance in relation to mineral potential in south India. M. Ahmad (Geological Survey of India, Hyderabad, India). In: Remote sensing and mineral exploration; Proceedings of the Workshop, Bangalore, India, May 29-June 9, 1979. Oxford, Pergamon Press, Ltd., 1980, p. 101-104.

A lineament map of Peninsular India south of 21 deg N latitude was prepared involving 51 frames of Landsat I and Landsat II on scale 1:1 million. A study of this map has shown significant relationship of the lineaments in the tectonic history and sedimentation in parts of south India and the preferential location of features like mineralization, seismicity, hot springs, localization, and movement of groundwater along the lineaments. (Author)

A80-51086 Interfacing with SEO technology - A case study in geological application. J. K. Sircar, S. Chakravarti, P. K. Guha, and P. K. Banerji (Geological Survey of India, Photography and Remote Sensing Div., Calcutta, India). In: Remote sensing and mineral exploration; Proceedings of the Workshop, Bangalore, India, May 29-June 9, 1979. Oxford, Pergamon Press, Ltd., 1980, p. 105-108.

The present paper embodies the results of a study on remotely sensed multispectral data, including panchromatic and CIR photographs, from an airborne sensor system with the dual aim of creating the necessary interfacing infrastructure for the utilization of the anticipated Indian Satellite for Earth Observation (SEO) technology and assessing the utility of data generated in this quasi-operational system simulation of the SEO. Specifically, the study involves an inventory of the interpretational possibilities of the various airborne data products involving both visual and computer aided analysis on a well defined geological problem within a small area of the Bihar Mica

Belt, India. The study reveals that visual interpretation based on digitally enhanced data products has a distinct economic advantage over fully automated schemes of pattern recognition. (Author)

A80-51087 Surface characteristics of Precambrian stromatolitic phosphorites of a part of the Indian shield. D. M. Banerjee (Delhi, University, Delhi, India). In: Remote sensing and mineral exploration; Proceedings of the Workshop, Bangalore, India, May 29-June 9, 1979. Oxford, Pergamon Press, Ltd., 1980, p. 109-119. 10 refs.

The utility of aerial photographs and MSS imagery for exploration of Precambrian phosphorites in a part of Indian shield is discussed. In view of small dimensions of each deposit, the low altitude aerial photography has been found suitable for exploration purpose. Landsat MSS images with advance sensors may be found useful in geo-chemical mapping and for identifying individual phosphate units. (Author)

A80-51088 Application of remote sensing techniques to petroleum exploration in India. S. N. *Talukdar* (*Oil and Natural Gas* Commission, Institute of Petroleum Exploration, Dehra Dun, India). In: Remote sensing and mineral exploration; Proceedings of the Workshop, Bangalore, India, May 29-June 9, 1979.

Oxford, Pergamon Press, Ltd., 1980, p. 121-126.

The extensive use of remote sensing techniques in petroleum exploration in India had a modest beginning in 1930s when the geologists of Assam Oil Company employed photogeological methods to map the densely forested, and highly inaccessible areas in Assam, Tripura and Mizoram in the eastern part of India. After the 'Oil and Natural Gas Commission' was set up in 1956, to explore for petroleum in India, photogeological and photogeomorphological studies were extended to cover all the sedimentary basins of interest in India. With the availability of Landsat data, both visual and machine aided interpretation techniques have greatly facilitated the oil exploration efforts. An outline of the activities of Oil and Natural Gas Commission in this fascinating field is presented in this paper. (Author)

A80-51089 Evaluation of MSS imagery over part of the asbestos-barytes belt of south-western Cuddapah basin, Andhra Pradesh, India. D. N. Setti and K. Krishnanunni (Geological Survey of India, Calcutta, India). In: Remote sensing and mineral exploration; Proceedings of the Workshop, Bangalore, India, May 29-June 9, 1979. Oxford, Pergamon Press, Ltd., 1980, p. 127-130.

A80-51090 Use of Landsat data products for geological mapping - A case history in Tamilnadu, India. V. Srinivasan, A. Sevugan Chetty (Madras, State Geology Dept., Madras, India), V. L. Swaminathan, and V. Tamilarasan (Indian Space Research Organization, Space Application Centre, Ahmedabad, India). In: Remote sensing and mineral exploration; Proceedings of the Workshop, Bangalore, India, May 29-June 9, 1979. Oxford, Pergamon Press, Ltd., 1980, p. 131-137.

Under a joint project of Tamilnadu Geology Branch and Indian Space Research Organization, various data products of Landsat-2 were utilized to prepare geological maps and lineament maps of Archaean metamorphic terrain in Tamilnadu. Additional information from aerial photographs and from ground checks were also incorporated for limited area taken up as test sites. The study has shown that Landsat imagery and aerial photographs can be useful as tools in the hands of an experienced geologist, even though they have certain limitations particularly in crystalline shield areas. (Author)

A80-51091 Some results of remote sensing in Yugoslavia. B. Koscec (Industroprojekt Co., Zagreb, Yugoslavia). In: Remote sensing and mineral exploration; Proceedings of the Workshop, Bangalore, India, May 29-June 9, 1979. Oxford, Pergamon Press, Ltd., 1980, p. 143-150. 8 refs.

A short history of application of remote sensing technology and methods in Yugoslavia is given in the paper, with special emphasis to geological and affiliate purposes. Some case histories of successfull application of Landsat images, standard issues and computer enhanced, in exploration of different mineral resources in different regions of Yugoslavia are briefly discussed. Thermal infrared scanning has been carried out in order to locate possible mineralized zones, to check some geothermal anomalies, to solve certain coastal hydrogeological and water pollution problems on Adriatic shore as well as to perform the energy-loss survey for industrial and urban purposes. (Author)

A80-51092 Application of Landsat-2 data for obtaining land information. R. Haydn, F. Jaskolla, and J. Bodechtel (Zentralstelle für Geophotogrammetrie und Fernerkundung, Munich, West Germany). In: Remote sensing and mineral exploration; Proceedings of the Workshop, Bangalore, India, May 29-June 9, 1979.

Oxford, Pergamon Press, Ltd., 1980, p. 151-155.

A strategy for the routine utilization of Landsat data in the derivation of thematic information on the earth's surface is presented. The concept involves the acquisition of all available Landsat CCTs, thematic maps and additional literature, image preprocessing to obtain a preliminary interpretation of satellite images, and subsequent verification and interpretation, making use of ground truth data, digital image processing and conventional photointerpretation. The application of the concept is illustrated for the production of geological, vegetation, soil and potential land use maps for the Targant region of the Sahel area of Mauritania. A.L.W.

A80-51093 Measurement results and conclusions on the spectral reflective coefficients of volcanites, granitoides and gneisses. Kh. B. Spiridonov, A. Kh. Krumov (B'lgarska Akademiia na Naukite, Tsentralna Laboratoriia po Kosmicheski Izsledvaniia, Sofia, Bulgaria), N. K. Katskov, and S. R. Iovchev (Applied Research Laboratory, Sofia, Bulgaria). In: Remote sensing and mineral exploration; Proceedings of the Workshop, Bangalore, India, May 29-June 9, 1979. Oxford, Pergamon Press, Ltd., 1980, p. 157-163.

A80-51094 An automatic method of discriminating rock outcrops using Landsat data. P. Chagarlamudi (Haskins and Sells Associates, Ottawa, Canada). In: Remote sensing and mineral exploration; Proceedings of the Workshop, Bangalore, India, May 29-June 9, 1979. Oxford, Pergamon Press, Ltd., 1980, p. 165-168.

A method of discriminating rock outcrops has been developed using Landsat data. The method, based on a hierarchical classification scheme, has been calibrated and tested in the Coppermine River area of the Northwest Territories of Canada. Maps showing outcrop locations have been prepared using this method. These maps were compared with the published geological maps, field notes, and aerial photos. The study shows that rock outcrops can be uniquely identified and that discrimination among different rock types is possible. Further, the results indicate that the Landsat data are as good as aerial photos for locating rock outcrops. (Author)

A80-51095 L-band radar and geology - Some results in south-east of France. P. Rebillard (Institut Dolomien-Géologie et Minéralogie, Grenoble, France). In: Remote sensing and mineral exploration; Proceedings of the Workshop, Bangalore, India, May 29-June 9, 1979. Oxford, Pergamon Press, Ltd., 1980, p. 169-172. Research supported by the Centre National d'Etudes Spatiales, Institut Dolomien-Géologie et Minéralogie, and Commissariat à l'Energie Atomique.

One L-Band Side Looking Airborne Radar experiment was carried out in the SW of the French Alpes in June, 1977. A comparison has been made between geological maps and aerial views taken with HH and HV polarization. Two results are remarkable: (1) the roughness of the objects can influence the image on the pictures in HH polarization, and (2) white marks in HH (and black in HV) can be seen; a field analysis has shown the structural reality of this line. These results should be correlated with results obtained from SEASAT or other sensors. (Author)

N80-28852# Geological Survey, Reston, Va.
US GEOLOGICAL SURVEY SOURCES OF PHOTOGRAPHS AND IMAGES OF BIOSPHERE RESERVES TAKEN FROM SPACECRAFT AND AIRCRAFT, SAN JOAQUIN EXPERIMENTAL RANGE
Janet Bonner, comp. and Marrianne Moskowitz, comp. 1980 56 p
(PB80-169295) Avail: NTIS HC A04/MF A01 CSCL 08F

Photographs and images of the San Joaquin experimental range and adjacent areas available from the U.S. Geological Survey (USGS) are listed. LANDSAT, Skylab, NASA aircraft, and USGS photographs are included in the listing. Computer listings of data are provided by the EROS Data Center which contains in its archives all of the listed material in photographic form and, in the case of LANDSAT images, can make available computer-compatible magnetic tapes of any LANDSAT scene.
GRA

N80-29798*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
GEOLOGIC APPLICATION OF THERMAL INERTIA IMAGING USING HCMM DATA Quarterly Report, Oct. - Dec. 1979
Helen N. Paley, Anne B. Kahle, and Stuart E. Matsh, Principal Investigators May 1980 4 p HCMM
(Contract NAS7-100)
(E80-10229; NASA-CR-163334) Avail: NTIS HC A02/MF A01 CSCL 05B

N80-29799*# Geological Survey, Denver, Colo.
GEOLOGIC APPLICATION OF THERMAL-INERTIA MAPPING FROM SATELLITE Progress Report, Mar. - May 1980
Terry W. Offield, Principal Investigator, Susanne H. Miller, and Kenneth Watson Jun. 1980 5 p Sponsored by NASA HCMM
(E80-10230; NASA-CR-163335) Avail: NTIS HC A02/MF A01 CSCL 08B

The author has identified the following significant results. Two night-time thermal images of the Powder River Basin, Wyoming distinctly show a major thermal feature. This feature is substantially coincident with a drainage divide and the southward facing slope appears cooler, suggesting a lower thermal inertia. An initial examination of regional geologic maps provides no clear evidence to suggest what type of geologic feature or structure may be present, although it can be noted that its northeastern end passes directly through Lead, South Dakota where the Homestake Gold Mine is located.

N80-29800*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
GEOLOGIC APPLICATION OF THERMAL INERTIA IMAGING USING HCMM DATA Quarterly Report, Jan. - Mar. 1980
Helen N. Paley and Anne B. Kahle, Principal Investigators May 1980 4 p HCMM
(Contract NAS7-100)
(E80-10231; NASA-CR-163336) Avail: NTIS HC A02/MF A01 CSCL 08B

N80-29817*# Phoenix Corp., McLean, Va.
IMPROVED DEFINITION OF CRUSTAL ANOMALIES FOR MAGSAT DATA Quarterly Report
25 Jun. 1980 3 p ERTS
(Contract NAS5-25882)
(E80-10270; NASA-CR-163342; QR-3) Avail: NTIS HC A02/MF A01 CSCL 08G

N80-29822*# Stanford Univ., Calif. Dept. of Applied Earth Sciences.
GEOLOGICAL AND GEOTHERMAL DATA USE INVESTIGATIONS FOR APPLICATION EXPLORER MISSION-A (HEAT CAPACITY MAPPING MISSION) Technical Report, 1 Oct. - 31 Dec. 1979
R. J. P. Lyon and A. E. Prelat, Principal Investigators 31 Dec. 1979 5 p HCMM
(Contract NAS5-24232)
(E80-10279; NASA-CR-163345) Avail: NTIS HC A02/MF A01 CSCL 08B

N80-30865*# Stanford Univ., Calif. Dept. of Geology.
SOIL MOISTURE IN RELATION TO GEOLOGIC STRUCTURE AND LITHOLOGY, NORTHERN CALIFORNIA
Ernest I. Rich, Principal Investigator 21 Jul. 1980 2 p HCMM
(Contract NAS5-24479)
(E80-10298; NASA-CR-163352) Avail: NTIS HC A02/MF A01 CSCL 08M

The author has identified the following significant results. Structural features in the Norther California Coast Ranges are clearly discernable on Nite-IR images and some of the structural linears may result in an extension of known faults within the region. The Late Mesozoic marine sedimentary rocks along the western margin of the Sacramento Valley are clearly defined on the Nite-IR images and in a gross way individual layers of sandstone can be differentiated from shale. Late Pleistocene alluvial fans are clearly differentiated from second generation Holocene fans on the basis of tonal characteristics. Although the tonal characteristics change with the seasons, the differentiation of the two sets of fans is still possible.

N80-30866*# Consiglio Nazionale delle Ricerche, Milan (Italy). Inst. per la Geofisica della Litosfera.
STUDY OF GEOLOGICAL STRUCTURE OF SICILY AND OTHER ITALIAN AREAS Progress Report
Roberto Cassinis, Principal Investigator, Giovanni Lechi, Eugenio Zilioli, and Alberto Marini Jun. 1980 6 p Sponsored by NASA HCMM
(E80-10299; NASA-CR-163353; PR-3) Avail: NTIS HC A02/MF A01 CSCL 08B

N80-30881# Edgerton, Germeshausen and Grier, Inc., Sunnyvale, Calif.
AERIAL GAMMA RAY AND MAGNETIC SURVEY: RATON BASIN PROJECT. THE RATON AND SANTA FE QUADRANGLES OF NEW MEXICO Final Report
Dec. 1979 324 p refs
(Contract EY-76-C-13-1664)
(GJBX-9(80)-Vol-2) Avail: NTIS HC A14/MF A01

The Santa Fe quadrangle in central New Mexico lies principally within the Southern Rocky Mountains and Great Plains Provinces. The west is dominated by the Sangre de Cristo Mountains. The eastern and southern regions contain portions of the Sierra Grande Arch and the Las Vegas and Tucumcari Basins. These structures primarily contain permian, triassic, cretaceous, and tertiary sediments. Many areas of the quadrangle are covered by cretaceous through quaternary igneous rocks of a variety of types. Magnetic data reflect both deep and shallow sources. The basins show as regions of low frequency/low amplitude wavelengths except where significant amounts of igneous rocks are exposed. The Santa Fe quadrangle has been unproductive in terms of uranium. All known uranium occurrences to date have proven uneconomic. Two goups of anomalies in the Sangre de Cristo Mountains appear to be most significant in terms of their peak count rates.
DOE

N80-32013# Bureau of Mines and Geology, Moscow, Idaho. Dept. of Lands.
ADDITIONS AND CORRECTIONS TO THE BIBLIOGRAPHY OF GEOLOGIC STUDIES, COLUMBIA PLATEAU (COLUMBIA RIVER BASALT) AND ADJACENT AREAS, IN IDAHO, 1980
William Strowd and Gail S. Hustedde 1980 124 p refs
(Contract DE-AC02-77RL-01030)
(RHO-BWI-C-68) Avail: NTIS HC A06/MF A01

Materials that have become available since the original publication and pertinent literature that had originally been overlooked are included. Index maps that show locations of geologic studies and geochemical petrographic, remanent

paleomagnetic, and radiometric age-dated sites within the Columbia River Basalt Group field within Idaho are presented. Archeological sites, test wells, mines, quarries, and other types of excavations are also identified. DOE

N80-32837# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).

REMOTE SENSING APPLIED TO THE PROSPECTING OF GEOTHERMAL ANOMALY IN CALDAS NOVAS COUNTY, STATE OF GOIAS, BRAZIL

Paulo Veneziani and Celio Eustaquio DosAnjos Jun. 1980 6 p refs Presented at the 14th Intern. Symp. on Remote Sensing of Environ., San Jose, Costa Rica, 23-30 Apr. 1980

(INPE-1792-RPE/164) Avail: NTIS HC A02/MF A01

Thermally anomalous areas associated with hot waters in the County of Caldas Novas, State of Goias, Brazil were studied. Data collection using a 50 cm soil thermometer and a Precision Radiation Thermometer indicated the presence of four principal anomalies. These areas were verified in the field. In the area of the town of Caldas Novas, of 14 deep wells drilled, none revealed water temperatures from 33 to 41 C, two contained hot mud, and one contained sulfurous water measured at 29 C. Two day wells were also encountered. L.F.M.

N80-32844# Bureau of Mines, Denver, Colo. Denver Research Center.

DEVELOPMENT OF A METHOD TO DETECT GEOLOGIC FAULTS AND OTHER LINEAR FEATURES FROM LANDSAT IMAGES Report of Investigations, 1980

Richard G. Burdick and Robert A. Speirer 1980 81 p refs (PB80-189665; BM-RI-8413) Avail: NTIS HC A05/MF A01 CSCL 08G

A detection method for use with a minicomputer was developed. The method comprises a suite of programs that scans an image for all 'potential' lineaments. From this partially analyzed data, the final lineaments are picked by another routine. The method was field tested and results indicated good agreement between computer picked lineaments and ground features. GRA

N80-32845# Columbia Univ., New York. Aldridge Lab. of Applied Geophysics.

DETECTION OF HIDDEN MINERAL DEPOSITS BY AIRBORNE SPECTRAL ANALYSIS OF FOREST CANOPIES

William Collins, Sheng-Huei Chang, and John T. Kuo 1979 66 p refs

(Grant NSF DAR-78-16320)

(PB80-193881; NSF/RA-800041) Avail: NTIS HC A04/MF A01 CSCL 08G

Field surveys and data analysis of four biogeochemical test sites confirmed the ability of an airborne system with high spectral resolution to detect an anomalous spectral waveform that appeared to be associated with sulfide mineralization. Known or suspected sulfide zones were detected on each site. GRA

N80-33824 Colorado Univ. at Boulder.

A MULTI-STEP METHOD FOR AVALANCHE ZONE RECOGNITION AND ANALYSIS *Ph.D. Thesis*

Thomas Patrick Huber 1980 183 p

Avail: Univ. Microfilms Order No. 8021587

Analytical tools were used to determine avalanche areas and runout zone limits in the Silverton Quadrangle, Colorado, which is located in the central San Juan Mountain Range. Vegetation and geomorphic features were analyzed by the use of natural color and color infrared aerial imagery to produce map. The geomorphology of avalanche runout zones was used to verify and rectify the preceeding mapped areas. The more distinctive features of this morphology included the concave longitudinal profile of the slope, the impact evidence across valleys, and the prominent convex transverse profile. This latter feature is primarily due to the deposition of impounded detritus by the snow avalanche. Finally the changes in soil development brought about by renewed deposition of this detritus were analyzed. It was shown that soil profile differences can be used to delimit the zone of avalanche modification and, therefore, the zone of greatest hazard. Dissert. Abstr.

N80-33842# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).

CONTRIBUTIONS OF LANDSAT IMAGERY TO THE GEOLOGICAL MAPPING OF THE RIO DO GRANDE SUL SHIELD. [CONTRIBUICAO DAS IMAGENS LANDSAT AO CONHECIMENTO GEOLOGICO DE ESCUDO SUL RIOGRANDENSE]

Tomoyuki Ohara Aug. 1980 11 p refs In PORTUGUESE; ENGLISH summary Presented at 32d Ann. Reunion of the Brazilian Soc. for the Progr. of Sci., Rio de Janeiro, 6-12 Jul. 1980

(INPE-1838-RPE/199) Avail: NTIS HC A02/MF A01

The geological mapping in the central western portion of Rio Grande do Sul Shield was performed by the use of LANDSAT multispectral images at the scale of 1:500,000. The conventional photointerpretation was utilized for the geological investigation. The process of extracting information from LANDSAT imagery was based on the analysis of the various features on the Earth's surface, which reflect in diverse photographic elements such as tonal, drainage, topographic, vegetal and land use patterns, in each spectral band. A general geological view was given in the attached stratigraphic column. Interpretation of LANDSAT imagery also shows that (1) the distribution of Santa Barbara Formation is wider than that shown on the existing geological maps; (2) the subdivision of the Guaritas Formation into Varzinha and Guarda Velha Layers is possible; and (3) the granitic bodies and heterogeneous migmatites of the southeastern portion of the study area are considerably different from the existing geological maps. A.R.H.

N80-33843# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).

DIGITAL FILTERING OF LANDSAT IMAGES AS A VISUAL AID TECHNIQUE IN GEOLOGICAL PHOTOINTERPRETATION [FILTRAGENS DIGITAIS DE IMAGENS LANDSAT COMO TECNICA DE AUXILIO VISUAL NA FOTOINTERPRETACAO GEOLOGICA]

Waldir Renato Paradella Jul. 1980 14 p refs In PORTUGUESE; ENGLISH summary Presented at 31st Congr. of the Brazilian Geol. Soc., San Catarina, Brazil, 19-25 Oct. 1980 Submitted for publication

(INPE-1823-RPE/189) Avail: NTIS HC A02/MF A01

Digital filtering techniques of LANDSAT imagery were developed as an aid to geologic photointerpretation. Concepts and general procedures are provided for the utilization of these automatic enhancement techniques. S.F.

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OCEANOGRAPHY AND MARINE RESOURCES

Includes sea-surface temperature, ocean bottom surveying imagery, drift rates, sea ice and icebergs, sea state, fish location.

A80-44232 * # **Microwave radiometric aircraft observations of the Fabry-Pérot interference fringes of an ice-water system.** R. F. Harrington, C. T. Swift, and J. C. Fedors (NASA, Langley Research Center, Hampton, Va.). *COSPAR and Inter-Union Commission on Radio Meteorology, Symposium on Oceanography from Space, Venice, Italy, May 26-30, 1980, Paper.* 8 p.

Airborne stepped-frequency microwave radiometer (SFMR) observations of the Fabry-Pérot interference fringes of ice-water systems are discussed. The microwave emissivity at normal incidence of a smooth layered dielectric medium over a semi-infinite dielectric medium is examined for the case of ice over water as a function of ice thickness and attenuation coefficient, and the presence of quarter-wavelength oscillations in emissivity as the ice thickness and frequency are varied is pointed out. Experimental observations of pronounced quarter-wavelength oscillations in radiometric brightness temperature due to the Fabry-Pérot interference fringes over smooth sea ice and lake ice varying in roughness as the radiometer frequencies were scanned are then presented. A.L.W.

A80-45004 * # **Ocean chlorophyll studies from a U-2 aircraft platform.** H. H. Kim, C. R. McClain, L. R. Blaine (NASA, Goddard Space Flight Center, Greenbelt, Md.), W. D. Hart (Science Systems and Applications, Inc., Lanham, Md.), L. P. Atkinson, and J. A. Yoder (Skidaway Institute of Oceanography, Savannah, Ga.). *Journal of Geophysical Research,* vol. 85, July 20, 1980, p. 3982-3990. 18 refs.

Chlorophyll gradient maps of large ocean areas were generated from U-2/OCS data obtained over test sites in the Pacific and the Atlantic Oceans. The delineation of oceanic features using the upward radiant intensity relies on an analysis method which presupposes that radiation backscattered from the atmosphere and the ocean surface can be properly modeled by using a measurement made at 778 nm. The calculation of atmospheric radiance was performed by using a method developed by Dave. An estimation of the chlorophyll concentration is performed by properly ratioing radiances measured at 472 and 548 nm after removing the atmospheric effects. The correlation between the remotely sensed data and the in situ surface chlorophyll measurements has been validated in two sets of data. The results show that the correlation between the in situ measured chlorophyll and the derived quantity is a negative exponential function, and the correlation coefficient was calculated to be -0.965. (Author)

A80-45015 # **Satellite observations of a nutrient upwelling off the coast of California.** E. D. Traganza, D. A. Nestor, and A. K. McDonald (U.S. Naval Postgraduate School, Monterey, Calif.). *Journal of Geophysical Research,* vol. 85, July 20, 1980, p. 4101-4106. 11 refs. Navy-supported research.

Satellite thermal imagery is combined with automated chemical analysis of surface waters off central California to detect and better understand a 'nutrient upwelling' entering the California Current system. While thermal surface water features have been mapped successfully from satellites for a number of years, the relationship of satellite thermal imagery to nutrients, such as nitrates and phosphates, has not been established. As a result of such efforts, satellite remote sensors may help to explain the relationship between chemical mesoscale and pelagic ecosystems of the ocean. (Author)

A80-46095 # **Methods for the extraction of long-period ocean wave parameters from narrow beam HF radar sea echo.** B. Lipa (SRI International, Menlo Park, Calif.) and D. Barrick (NOAA, Wave Propagation Laboratory, Boulder, Colo.). *Radio Science,* vol. 15, July-Aug. 1980, p. 843-853. 23 refs. Contract No. NOAA-03-78-B01-119.

A80-46309 **Observation of wavelike motion of the Gaspe Current.** C. L. Tang (Bedford Institute of Oceanography, Dartmouth, Nova Scotia, Canada). *Journal of Physical Oceanography,* vol. 10, June 1980, p. 853-860. 9 refs.

A simple theoretical model of barotropic instability proposed by Niiler and Mysak (1971) is used to investigate two events observed in the movement of the Gaspe Current in the summer of 1978. According to the current meter and satellite data, on the first occasion the axis of the current moved offshore and the deep current reversed its normal seaward direction, then a wavelike structure was formed, distorted, and finally, collapsed. The time span of the event is about 10 days. In the second event a wavelike structure with an estimated wavelength of 60 km was also preceded by a shift in the position of the Gaspe Current. The barotropic instability model predicts an e-folding time of 1 day, a wavelength of 52 km and a period of 4 days, which compare well with the observed wavelength of 60 km and a period of 3-5 days. V.L.

A80-46315 **Dynamical interpretation of satellite-sensed thermal features off Vancouver Island.** W. J. Emery and L. A. Mysak (British Columbia, University, Vancouver, Canada). *Journal of Physical Oceanography,* vol. 10, June 1980, p. 961-970. 28 refs. Contract No. N00014-77-G-0047.

Two series of very high resolution thermal infrared satellite images, off Vancouver Island, are examined for evidence of baroclinic waves. A 1979 winter sequence of three images exhibits cold tongues, extending seaward from Vancouver Island, which have separations (wavelengths), northwest phase speeds and growth rates consistent with a model of baroclinically unstable waves. An earlier summer series of eight images displays no such propagation behavior, which may be due to upper layer thermal changes from solar insolation. (Author)

A80-46316 **Direct measurement of recirculation in the Alaskan Stream.** R. K. Reed (NOAA, Pacific Marine Environmental Laboratory, Seattle, Wash.). *Journal of Physical Oceanography,* vol. 10, June 1980, p. 976-978. 10 refs. NOAA-supported research.

Three drifting buoys were deployed off Kodiak Island and tracked by satellite in summer 1978; all three veered out of the southwestward flowing Alaskan Stream and moved to the east and northeast around the Gulf of Alaska gyre. This is the first direct measurement of recirculation around the gyre, but the pattern is strikingly similar to what was inferred two to three decades ago from property distributions, and it has been predicted theoretically. (Author)

A80-48750 **Thermal fronts in the Mediterranean according to NOAA 5 satellite radiometer data /September 1977-February 1979/ (Fronts thermiques en Méditerranée, d'après les données du radiomètre du satellite NOAA 5 /septembre 1977-février 1979/).** M. Philippe (Etablissement d'Etudes et de Recherches Météorologiques, Boulogne-Billancourt, Hauts-de-Seine, France). *Académie des Sciences (Paris), Comptes Rendus, Série B - Sciences Physiques,* vol. 291, no. 1, July 7, 1980, p. 43-46. 6 refs. In French.

A map of surface thermal fronts in the Mediterranean Sea obtained from NOAA-5 satellite infrared very high resolution radiometer data for September 1977 to February 1979 is presented, and the phenomena associated with them are identified. The fronts, with thermal gradients greater than or equal to 1 C/10 km, are found to be associated with the principle Mediterranean current, especially above vortices located between the current axis and the African coast and abnormally long continental shelves, and with cyclonic circula-

tions supplied by branches of the principle current, including those of adjoining seas. A.L.W.

A80-49651 # **The three-dimensional structure of the frontal zone of the Gulf Stream from synchronous satellite and ship data (Trekhmernaia struktura frontal'noi zony Gol'fstrima po sinkhronnym dannym sputnika i korablia).** V. E. Skliarov and K. N. Fedorov (Akademiia Nauk SSSR, Institut Okeanologii, Moscow, USSR). *Issledovanie Zemli iz Kosmosa,* May-June 1980, p. 5-13. 12 refs. In Russian.

NOAA satellite data are used in conjunction with ship data to study the three-dimensional structure of the frontal zone of the Gulf Stream in the vicinity of a cold filament of slope water entrained across the front. It is shown that this part of the Gulf Stream contains a well-developed cyclonic eddy 25-30 km in diameter which moves downstream at a velocity of 50 cm/sec. B.J.

A80-50300 # **The problems of SAR imagery of ocean waves (Osobennosti izobrazheniia morskikh voln v RSA).** A. V. Ivanov (Akademiia Nauk SSSR, Institut Radiotekhniki i Elektroniki, Moscow, USSR). *Radiofizika,* vol. 23, no. 8, 1980, p. 923-933. 17 refs. In Russian.

The effect of defocusing of synthetic aperture radar (SAR) imagery of ocean waves, caused by wave motion is studied. Consideration is given to the speed modulation of imagery brightness. The analysis employs a two-scale model of VHF radiation scattering. V.T.

A80-51407 * # **Comparison of surface wind stress measurements - Airborne radar scatterometer versus sonic anemometer.** J. T. Brucks, T. D. Leming (NOAA, National Fisheries Engineering Laboratory, Bay Saint Louis, Miss.), and W. L. Jones (NASA, Langley Research Center, Hampton, Va.). *Journal of Geophysical Research,* vol. 85, Sept. 20, 1980, p. 4967-4976. 13 refs.

Sea surface wind stress measurements recorded by a sonic anemometer are correlated with airborne scatterometer measurements of ocean roughness (cross section of radar backscatter) to establish the accuracy of remotely sensed data and assist in the definition of geophysical algorithms for the scatterometer sensor aboard Seasat A. Results of this investigation are as follows: Comparison of scatterometer and sonic anemometer wind stress measurements are good for the majority of cases; however, a tendency exists for scatterometer wind stress to be somewhat high for higher wind conditions experienced in this experiment (6-9 m/s). The scatterometer wind speed algorithm tends to overcompute the higher wind speeds by approximately 0.5 m/s. This is a direct result of the scatterometer overestimate of wind stress from which wind speeds are derived. Algorithmic derivations of wind speed and direction are, in most comparisons, within accuracies defined by Seasat A scatterometer sensor specifications. (Author)

A80-51408 * **Radar observations of wave transformations in the vicinity of islands.** J. F. Vesecky, C. C. Teague (Stanford University, Stanford, Calif.), S. V. Hsiao, O. H. Shemdin (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, Calif.), and S. S. Pawka (California, University, La Jolla, Calif.). *Journal of Geophysical Research,* vol. 85, Sept. 20, 1980, p. 4977-4986. 21 refs. Contracts No. N00014-75-C-0356; No. NAS7-100.

Remote sensing by ground-based HF radar and airborne synthetic aperture radar and in situ wave measurements performed on March 25, 1977 during the West Coast Experiment have made it possible to form an overall picture of the 7-sec-period wave climate over a 35,000 sq km region off the southern California coast. The picture which emerges from these measurements shows a broad deep-ocean directional distribution arriving from the west and being significantly modified as it travels coastward passing San Clemente and Santa Catalina islands. B.J.

A80-51409 * **Comparisons between wave directional spectra from SAR and pressure sensor arrays.** S. S. Pawka, D. L. Inman (California, University, La Jolla, Calif.), S. V. Hsiao, and O. H. Shemdin (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, Calif.). *Journal of Geophysical Research,* vol. 85, Sept. 20, 1980, p. 4987-4995. 9 refs. Contracts No. N00014-75-C-0300; No. NAS7-100; No. JPL-954672.

Simultaneous directional wave measurements were made at Torrey Pines Beach, California, by a synthetic aperture radar (SAR) and a linear array of pressure sensors. The measurements were conducted during the West Coast Experiment in March 1977. Quantitative comparisons of the normalized directional spectra from the two systems were made for wave periods of 6.9-17.0 s. The comparison results were variable but generally showed good agreement of the primary mode of the normalized directional energy. An attempt was made to quantify the physical criteria for good wave imaging in the SAR. A frequency band analysis of wave parameters such as band energy, slope, and orbital velocity did not show good correlation with the directional comparisons. It is noted that absolute values of the wave height spectrum cannot be derived from the SAR images yet and, consequently, no comparisons of absolute energy levels with corresponding array measurements were intended. (Author)

A80-51411 * # **Synthetic aperture radar imaging of ocean waves - Comparison with wave measurements.** W. McLeish, D. Ross (NOAA, Sea-Air Interaction Laboratory, Miami, Fla.), R. A. Shuchman (Michigan, Environmental Research Institute, Ann Arbor, Mich.), P. G. Teleki (U.S. Geological Survey, Reston, Va.), S. V. Hsiao, O. H. Shemdin, and W. E. Brown, Jr. (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, Calif.). *Journal of Geophysical Research,* vol. 85, Sept. 20, 1980, p. 5003-5011. 34 refs. NOAA-NASA-Navy-Army-supported research.

Synthetic aperture radar images of ocean waves were obtained in conjunction with reference wave data near Marineland, Florida, December 14, 1975. Each of the various types of measurements were processed into a form that allowed direct comparisons with the others. Maxima of radar spectra occurred at the same frequencies as the maxima of reference wave height spectra. In a comparison of a radar spectrum with observed spectra of wave height, wave orbital velocity, and surface slope the high-frequency portion of the radar spectrum lay near and between the wave height and the orbital velocity spectra but differed significantly from the surface slope spectrum. The radar-derived mean directions and model-fitted directional spreads of wave energy were close to the values from a directional wave buoy and indicated the accuracy of radar measurements of wave direction. However, a directional plot of a radar spectrum near shore at the frequency of the maximum showed a sharper peak than such a plot of a fitted spectrum derived from reference data. (Author)

A80-51415 * **Modulation of sea surface radar cross section by surface stress - Wind speed and temperature effects across the Gulf Stream.** D. E. Weissman (Hofstra University, Hempstead, N.Y.), T. W. Thompson (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, Calif.), and R. Legeckis (NOAA, National Environmental Satellite Service, Washington, D.C.). *Journal of Geophysical Research,* vol. 85, Sept. 20, 1980, p. 5032-5042. 26 refs. Contract No. NAS7-100.

A80-51485 **Sensing the ocean environment from space.** J. H. Guill (Lockheed Missiles and Space Co., Inc., Sunnyvale, Calif.). *Lockheed Horizons,* Fall 1980, p. 2-15.

Cost benefits of roughly $9 billion till the end of the century and other advantages (maritime transportation, fishing, arctic operation, etc.) of oceanographic satelites are presented. The benefits from the Seasat-A satellite (launched 1978) are discussed and built upon in the proposed National Oceanic Satellite System for the 1980's. Coastal zone color scanning and Gulf Stream mapping procedures would be possible and river effluents, ice conditions and storms

could be studied. Data transmission features are considered with emphasis on the economic challenge. R.C.

A80-51490 * Nimbus-7 coastal zone color scanner - System description and initial imagery. W. A. Hovis, D. K. Clark (NOAA, National Environmental Satellite Service, Washington, D.C.), F. Anderson (National Research Institute for Oceanology, Cape Town, Republic of South Africa), R. W. Austin, W. H. Wilson (California, University, Scripps Institution of Oceanography, San Diego, Calif.), E. T. Baker (NOAA, Pacific Marine Environmental Laboratory, Seattle, Wash.), D. Ball (Computer Sciences Corp., Silver Spring, Md.), H. R. Gordon (Miami, University, Coral Gables, Fla.), J. L. Mueller (NASA, Goddard Space Flight Center, Laboratory for Atmospheric Sciences, Greenbelt, Md.), and S. Z. El-Sayed (Texas A & M University, College Station, Tex.). *Science*, vol. 210, Oct. 3, 1980, p. 60-63. 15 refs. Contract No. NAS5-22963.

Initial imagery from the Nimbus-7 Coastal Zone Color Scanner (CZCS) shows subtle variations in water color. Organisms, especially phytoplankton, play a major influence on the variations in water color. Processing of the visual data is described, and in particular, the use of an algorithm to remove aerosol from the image is discussed. Data on the six spectral bands (433-12,500 nm) are presented and comparisons are made between the CZCS and the Landsat-1 multispectral scanner. The implications for management of fisheries is noted. R.C.

A80-51491 * Phytoplankton pigments from the Nimbus-7 Coastal Zone Color Scanner - Comparisons with surface measurements. H. R. Gordon (Miami, University, Coral Gables, Fla.), D. K. Clark, W. A. Hovis (NOAA, National Environmental Satellite Service, Washington, D.C.), and J. L. Mueller (NASA, Goddard Space Flight Center, Laboratory for Atmospheric Sciences, Greenbelt, Md.). *Science*, vol. 210, Oct. 3, 1980, p. 63-66. 11 refs. Contract No. NAS5-22963.

Algorithms are developed for removing aerosol effects in visual data from the Nimbus-7 Coastal Zone Color Scanner (CZCS). The corrected imagery reveals eddy-like ocean circulation patterns. Pigment concentrations from CZCS are compared with surface determinations. CZCS imagery estimates pigment concentration to within 0.5 log C, where C is the sum of the concentrations of chlorophyll a and phaeopigments a. R.C.

A80-52331 * Oil film thickness measurement using airborne laser-induced water Raman backscatter. F. E. Hoge (NASA, Wallops Flight Center, Wallops Island, Va.) and R. N. Swift (EG & G Washington Analytical Services Center, Inc., Pocomoke City, Md.). *Applied Optics*, vol. 19, Oct. 1, 1980, p. 3269-3281. 20 refs.

The use of laser-induced water Raman backscatter for remote thin oil film detection and thickness measurement is reported here for the first time. A 337.1-nm nitrogen laser was used to excite the 3400-cm-1 OH stretch band of natural ocean water beneath the oil slick from an altitude of 150 m. The signal strength of the 381-nm water Raman backscatter was always observed to depress when the oil was encountered and then return to its original undepressed value after complete aircraft traversal of the floating slick. After removal of background and oil fluorescence contributions, the ratio of the depressed-to-undepressed airborne water Raman signal intensities, together with laboratory measured oil extinction coefficients, is used to calculate the oil film thickness. (Author)

A80-53054 Landsat detection of oil from natural seeps. M. Deutsch (U.S. Geological Survey, Reston, Va.) and J. E. Estes (California, University, Santa Barbara, Calif.). *Photogrammetric Engineering and Remote Sensing*, vol. 46, Oct. 1980, p. 1313-1322. 13 refs.

Oil on the ocean surface from the natural seeps in the Santa Barbara Channel, California, could not be detected on frames of any of the four bands of standard Landsat positive or negative film transparencies, nor could the slicks be detected using digital scaling, density slicing, or ratioing techniques. Digital contrast-stretch enhancement, however, showed the distribution of oil on the surface. Aerial observations made within a few hours of the Landsat overpass confirmed the distribution of floating oil. The detection (on Landsat images) of floating oil from submarine seeps indicates a potentially valuable application for offshore oil exploration and environmental monitoring. (Author)

A80-53683 The availability of U.S. environmental satellite data to the marine technology community. B. H. Needham (NOAA, Satellite Data Services Div., Washington, D.C.). In: Marine technology 79: Ocean energy; Proceedings of the Fifteenth Annual Conference, New Orleans, La., October 10-12, 1979.
Washington, D.C., Marine Technology Society, 1979, p. 218-222.

The United States Archive of environmental satellite data at the Satellite Data Services Division of NOAA represents a unique source of information for various investigations within many scientific disciplines. While primarily intended for meteorological purposes, many sensors orbited on the more recent spacecraft (i.e., Seasat and Nimbus-7) also provide data of great value to the marine sciences. The data held within the Archive consist of imagery in both photographic and digital tape formats, and derived parameters (i.e., wave heights, wind speed, wind directions, sea-surface temperature, etc.) on digital tapes and paper printouts. While the Archive in its present form was initiated only in late 1974, photographic imagery from the earliest meteorological satellites of the 1960s through the latest polar-orbiting and geostationary spacecraft are included in the files. (Author)

A80-53691 Platform and buoy positioning experiments in the North Sea via Doppler satellite techniques. G. Seeber (Hannover, Universität, Hanover, West Germany). In: Marine technology 79: Ocean energy; Proceedings of the Fifteenth Annual Conference, New Orleans, La., October 10-12, 1979. Washington, D.C., Marine Technology Society, 1979, p. 405-409. 9 refs. Research sponsored by the Deutsche Forschungsgemeinschaft; Bundesministerium für Forschung und Technologie Contract No. MTK-0057.

A80-54060 Observed short-time temperature variations and tidal current constants in the North Sea south east of the Dogger Bank /Comparison of two seasons/. H. W. Riepma (Koninklijk Nederlands Meteorologisch Instituut, De Bilt, Netherlands). *Deutsche Hydrographische Zeitschrift*, vol. 33, no. 2, 1980, p. 82-89. 6 refs.

N80-28847*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
SATELLITE REMOTE SENSING FACILITY FOR OCEANOGRAPHIC APPLICATIONS Final Report
R. H. Evans, S. S. Kent, and J. B. Seidman 1 Jul. 1980 76 p refs
(Contract NAS7-100)
(NASA-CR-163363; JPL-Pub-80-40) Avail: NTIS HC A05/MF A01 CSCL 08C

The project organization, design process, and construction of a Remote Sensing Facility at Scripps Institution of Oceanography at LaJolla, California are described. The facility is capable of receiving, processing, and displaying oceanographic data received from satellites. Data are primarily imaging data representing the multispectral ocean emissions and reflectances, and are accumulated during 8 to 10 minute satellite passes over the California coast. The most important feature of the facility is the reception and processing of satellite data in real time, allowing investigators to direct ships to areas of interest for on-site verifications and experiments. L.F.M.

N80-28939*# University of Central Florida, Orlando.
A CONTINUATION OF BASE-LINE STUDIES FOR ENVIRONMENTALLY MONITORING SPACE TRANSPORTATION SYSTEMS AT JOHN F. KENNEDY SPACE CENTER. VOLUME 3, PART 1: ICHTHYOLOGICAL SURVEY OF LAGOONAL

WATERS Final Report
F. F. Snelson, Jr. Jul. 1980 436 p refs
(Contract NAS10-8986)
(NASA-CR-163122; KSC-TR-51-2-Vol-3-Pt-1) Avail: NTIS HC A19/MF A01 CSCL 13B

Ichthyological species in the Indian River lagoonal system likely to be affected by NASA's aerospace activities at the Kennedy Space Center were surveyed. The importance of the fish found to inhabit the waters in the area is analyzed. A.R.H.

N80-28940*# University of Central Florida, Orlando.
A CONTINUATION OF BASE-LINE STUDIES FOR ENVIRONMENTALLY MONITORING SPACE TRANSPORTATION SYSTEMS AT JOHN F. KENNEDY SPACE CENTER. VOLUME 3, PART 2: ICHTHYOLOGICAL STUDIES, SAILFIN MOLLY REPRODUCTION STUDY Final Report
F. F. Snelson, Jr. Jul. 1980 182 p refs
(Contract NAS10-8986)
(NASA-CR-163122; KSC-TR-51-2-Vol-3-Pt-2) Avail: NTIS HC A09/MF A01 CSCL 13B

The applicability of monitoring populations of Poccilia latipinna (sailfin molly) and its reproductive efforts as reliable indicators of environmental effects of aerospace activities in the Kennedy Space Center area was investigated. Results show that the sailfin molly experiences drastic fluctuations in population and reproductive success and is not an appropriate factor for monitoring to establish perturbations of the environment due to space transportation system related activities. A.R.H.

N80-29005*# National Aeronautics and Space Administration, Washington, D. C.
NASA OCEANIC PROCESSES PROGRAM: STATUS REPORT, FISCAL YEAR 1980
Jul. 1980 160 p
(NASA-TM-80233) Avail: NTIS HC A08/MF A01 CSCL 08C

Goals, philosophy, and objectives of NASA's Oceanic Processes Program are presented as well as detailed information on flight projects, sensor developments, future prospects, individual investigator tasks, and recent publications. A special feature is a group of brief descriptions prepared by leaders in the oceanographic community of how remote sensing might impact various areas of oceanography during the coming decade. L.F.M.

N80-29637*# Applied Science Associates, Inc., Apex, N. C.
WALLOPS WAVEFORM ANALYSIS OF SEASAT-1 RADAR ALTIMETER DATA Final Report
George S. Hayne Jul. 1980 44 p refs
(Contract NAS6-2810)
(NASA-CR-156869) Avail: NTIS HC A03/MF A01 CSCL 05B

Fitting a six parameter model waveform to over ocean experimental data from the waveform samplers in the SEASAT-1 radar altimeter is described. The fitted parameters include a waveform risetime, skewness, and track point; from these can be obtained estimates of the ocean surface significant waveheight, the surface skewness, and a correction to the altimeter's on board altitude measurement, respectively. Among the difficulties encountered are waveform sampler gains differing from calibration mode data, and incorporating the actual SEASAT-1 sampled point target response in the fitted wave form. There are problems in using the spacecraft derived attitude angle estimates, and a different attitude estimator is developed. Points raised in this report have consequences for the SEASAT-1 radar altimeter's ocean surface measurements are for the design and calibration of radar altimeters in future oceanographic satellites. Author

N80-30618# Kansas Univ., Lawrence. Remote Sensing Lab.
RADAR BACKSCATTER STUDY OF SEA ICE
R. G. Onstott, George J. Dome, Clifford V. Delker, Javed S. Patel, and R. K. Moore Feb. 1980 273 p refs
(Contract N00014-76-C-1105)
(AD-A087032; CRINC/RSL-TR-331-14) Avail: NTIS HC A12/MF A01 CSCL 17/9

The ability to use radar to discriminate ice types has been investigated. Radar backscatter measurements were made of shorefast sea ice near Point Barrow, Alaska in May 1977 and April 1978, with a surface-based FM-CW scatterometer that swept from 1-2 GHz and from 8.5-17.5 GHz. The 1-2 GHz measurements showed that thick first-year and multiyear sea ice cannot be distinguished at 10 deg-70 deg incidence angles, but that undeformed sea ice can be discriminated from pressure-ridged thick first-year sea ice and lake ice. Results also indicate that frequencies between 8-18 GHz have the ability to discriminate between thick first-year sea ice, multiyear sea ice, and lake ice. The lowest frequency, 9 GHz, was found to provide the greatest separation between these ice categories with significant levels of separation existing between angles of incidence from 15 deg to 70 deg. The radar cross-sections for the like polarizations, VV and HH, were very similar in absolute level and angular response. The radar cross-sections for VV-polarization were usually the highest in absolute level. Cross-polarization provided a slightly greater separation between these categories of ice. GRA

N80-30850*# Royal Australian Navy Research Lab., Edgecliff.
HEAT CAPACITY MAPPING MISSION PROJECT HCM-051 Interim Report
C. S. Nilsson, J. C. Andrews, M. W. Lawrence, S. Ball (Weapons Systems Research Lab., Salisbury, Australia), and A. R. Latham, Principal Investigators May 1980 70 p refs Sponsored by NASA Original contains imagery. Original imagery may be purchased from NASA Goddard Space Flight Center, (code 601), Greenbelt, Md. 20771. Domestic users send orders to 'Attn: National Space Science Data Center', nondomestic users send orders to 'Attn: World Data Center A for Rockets and Satellites'. HCMM
(E80-10278; NASA-CR-163344; Internal-TM-3/80) Avail: NTIS HC A04/MF A01 CSCL 08B

N80-30880# LeSchack Associates Ltd., Silver Spring, Md.
CORRELATION OF UNDER-ICE ROUGHNESS WITH SATELLITE AND AIRBORNE THERMAL INFRARED DATA
Leonard A. LeSchack May 1980 46 p refs
(Contract N00014-76-C-0757)
(AD-A085512; TR-2) Avail: NTIS HC A03/MF A01 CSCL 08/12

This report, based on empirical data, concludes that a correlation has been found between easily obtainable sea ice surface temperature and under-ice roughness data which are obtainable only at great expense. Under-ice roughness is valuable in evaluating acoustic attenuation beneath the Arctic ice and is expressed in terms of either root-mean-square (RMS) ice depth or standard deviation about the mean ice depth, both of which are closely correlated. By showing a functional relationship between the skewness of the surface temperature distribution as derived from NOAA VHRR Satellite thermal infrared data and the under-ice roughness, the way appears clear to make a chart of Arctic under-ice roughness for Arctic acoustic programs and for nuclear submariners. In a second study, under ice data recorded in April 1976 by the SSN GURNARD was correlated with the skewness of temperature distributions derived from NOAA VHRR IR data recorded in March 1976 over nominally the same area of the Beaufort Sea. A third study was then conducted that shows, perhaps more graphically than the others, the correlation of under-ice data recorded by the British nuclear submarine HMS SOVEREIGN between 18-21 October 1976 with airborne IR data recorded during the same period over the submarine track by a Canadian Forces Argus aircraft. In all three examples, when the RMS ice depth range was between 4 and 8 m, corresponding to a standard deviation of ice depth ranging between 2 and 6 m, there is a strong, negative linear correlation between the skewness of the temperature distributions, whether measured from satellites or aircraft, and the under-ice roughness measured by submarine upward-looking sonar. GRA

N80-30884# National Technical Information Service, Springfield, Va.
REMOTE SENSING OF THE OCEAN: PHYSICAL, CHEMI-

CAL AND GEOLOGIC PROPERTIES. CITATIONS FROM THE NTIS DATA BASE Progress Report, 1976 - May 1980
Robena J. Brown Jun. 1980 123 p Supersedes NTIS/PS-79/0585; NTIS/PS-78/0563 Updates COM-73-11676
(PB80-811235; NTIS/PS-79/0585; NTIS/PS-78/0563; COM-73-11676) Avail: NTIS HC $30.00/MF $30.00 CSCL 08J

Remote sensing methods as they are applied to ocean temperature, sea ice, marine biology, and sound and light transmission are included. Techniques of measurement using radiometry, microwave spectroscopy, radar systems, infrared spectroscopy, and photography are described. These measurements are made from both aircraft and satellites. This updated bibliography contains 116 abstracts, 17 of which are new entries to the previous edition. GRA

N80-30885# National Technical Information Service, Springfield, Va.
REMOTE SENSING OF THE OCEAN: DYNAMICS. CITATIONS FROM THE NTIS DATA BASE Progress Report, 1970 - May 1980
Robena J. Brown 1980 191 p Supersedes NTIS/PS-79/0586; NTIS/PS-78/0564 Updates COM-73-11676
(PB80-811243; NTIS/PS-79/0586; NTIS/PS-78/0564; COM-73-11676) Avail: NTIS HC $30.00/MF $30.00 CSCL 08J

Remote sensing methods as they are applied to ocean currents, wind sediment transport, ocean waves, sea states, and air water interactions are included. The various techniques of measurement using radiometers, lasers, radar, and microwave and infrared equipment are described. This updated bibliography contains 183 abstracts, 18 of which are new entries to the previous edition. GRA

N80-32050*# Texas A&M Univ., College Station.
ALTIMETRY DATA OVER TRENCHES AND ISLAND-ARCS AND CONVECTION IN THE MANTLE Final Report, 1 Nov. 1979 - 31 Aug. 1980
18 Sep. 1980 26 p refs
(Contracts NCC5-11; NAGS-94)
(NASA-CR-163516) Avail: NTIS HC A03/MF A01 CSCL 08C

Transfer function techniques were developed to calculate the isostatic component of the geoid signal over trench/island arc/back arc systems. Removal of this isostatic component from geoid profiles determined by GEOS 3 radar altimetry leaves a residual geoid that can be attributed to the effect of mass inhomogeneities below the depth of compensation. Efforts are underway to extend the analysis to all the major trench/island arc systems of the world in order to provide more detailed understanding of the dynamic processes occurring beneath island arcs. A.R.H.

N80-32820*# Lancaster Univ. (England). Lunar and Planetary Unit.
SATELLITE MONITORING OF SEA SURFACE POLLUTION Final Report, Jan. 1977 - Jul. 1980
Gilbert Fielder, Timothy Stuart Hall, Principal Investigators, Duncan John Telfer, Lionel Wilson, and Richard John Fryer Jul. 1980 20 p HCMM
(NASA Order RD-1182)
(E80-10329; NASA-CR-163415; Rept-2-15/DF1) Avail: NTIS HC A02/MF A01 CSCL 13B

N80-32829*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
SEASAT. VOLUME 2: FLIGHT SYSTEMS Final Report
E. Pounder, ed. 1 Sep. 1980 369 p refs
(Contract NAS7-100)
(NASA-CR-163571; JPL-Pub-80-38-Vol-2) Avail: NTIS HC A16/MF A01 CSCL 05B

Flight systems used in the Seasat Project are described. Included are (1) launch operation; (2) satellite performance after launch; (3) sensors that collected data; and (4) the launch vehicle that placed the satellite into Earth orbit. Techniques for sensor management are explained. S.F.

N80-33068# Naval Research Lab., Washington, D. C. Environmental Sciences Div.
PASSIVE 19.3 GHz RADIOMETER AND AEROSOL DATA FROM THE NORTH SEA DURING MARSEN I, SEPTEMBER - OCTOBER 1979 Interim Report
S. G. Gathman and B. G. Julian 13 Aug. 1980 116 p refs
(AD-A088229; NRL-MR-4285) Avail: NTIS HC A06/MF A01 CSCL 04/2

The production and distribution of the various aerosols which are a result of air sea interactions were investigated. The mechanism of maritime aerosol generation was examined and the utility of satellite derived data on sea properties were analyzed. R.C.T.

N80-33076# Naval Research Lab., Washington, D. C. Space Systems Div.
ON THE INFERENCE OF OCEANIC CURRENTS OR EDDIES BY SPACEBORNE ALTIMETRY THROUGH THE DYNAMIC METHOD FOR THE DETERMINATION OF THREE DIMENSIONAL DENSITY (TEMPERATURE) FIELD Progress Report
Davidson T. Chen and Vincent E. Noble 18 Jul. 1980 33 p refs
(W05270S00)
(AD-A088082; NRL-MR-4273) Avail: NTIS HC A03/MF A01 CSCL 08/3

The physical theoretical background, the mathematical governing equations, the absolute error, and the relative error of the dynamic method used in inferring the geostrophic current and eddy systems from the spaceborne altimeter-sensed measurements of dynamic heights or slopes have been laboriously developed. Also, the conditions for the determination of the three dimensional density (temperature) field uniquely are mentioned and explained. The space-borne altimeter is shown to be the instrument for the provision of one condition, i.e., the ocean surface current condition. The three dimensional density (temperature) field and its boundary conditions at the air-sea interface play dominant roles in the weather prediction and the undersea technology. The interchangeable use of the terms of density and temperature fields is valid only when the salinity can be assumed as constant. GRA

N80-33077# Texas A&M Univ., College Station. Dept. of Oceanography.
THE GULF STREAM MEANDERS EXPERIMENT: CURRENT METER, ATMOSPHERIC, AND SEA LEVEL DATA REPORT FOR THE MOORING PERIOD Data Report, Jan. - May 1979
David A. Brooks, John M. Bane, Robert L. Cohen, and Paul Blankinship (North Carolina State Univ. at Raleigh) Jul. 1980 277 p refs Prepared in cooperation with North Carolina Univ. at Chapel Hill
(Contract N00014-77-C-0354; Grant NSF OCE-79-06710)
(AD-A088069; TAMU-REF-80-7-T) Avail: NTIS HC A13/MF A01 CSCL 08/3

The principal objective of the Gulf Stream Meanders experiment was to kinematically and dynamically describe the nature of meanders. The upper continental slope region off Onslow Bay, North Carolina was chosen for the experiment site because several previous investigations in that area provided a baseline data set giving some ideas about time and space variability scales within and a several month mean view of the stream. In addition, earlier observations ranging from reports in centuries-old ship logs to recent satellite infrared imagery made it apparent that Gulf Stream meandering was more intense between Charleston and Cape Hatteras than elsewhere in the South Atlantic Bight. Current, sea level, and atmospheric data from the Gulf Stream region off North Carolina for the period January - May 1979 are documented. GRA

N80-33833*# Miami Univ., Fla. School of Marine and Atmospheric Science.

INVESTIGATIONS OF MEDIUM WAVELENGTH MAGNETIC ANOMALIES IN THE EASTERN PACIFIC USING MAGSAT DATA Interim Report, Jun. - Sep. 1980

Christopher G. A. Harrison, Principal Investigator 30 Sep. 1980 57 p refs Sponsored by NASA ERTS
(E80-10334; NASA-CR-163412) Avail: NTIS HC A04/MF A01 CSCL 08G

The author has identified the following significant results. Three long total magnetic field profiles taken over ocean basins were analyzed. It is found that there is a significant signal in the wavelength range of 1500 to 150 km. This is too short a wavelength to be caused by the core field, which becomes insignificant at about a wavelength of 1500 km; this intermediate wavelength signal is not caused by a typical sea floor spreading process, which should give maximum power in the wavelength region about 50 km. It is shown that the external magnetic field contributes very little to this intermediate wavelength signal. Efforts to explain the cause of this signal have failed.

N80-33844# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).

COASTAL CURRENTS: STUDY OF A MODEL APPLIED TO THE COAST OF RIO GRANDE DO SUL LATITUDE 29 DEG SOUTH TO 35 DEG SOUTH [CORRENTES COSTEIRAS: ESTUDO DE UM MODELO APLICADO AO LITORAL DO RIO GRANDE DO SUL LATITUDE 29 DEG SUL 35 DEG SUL]

Claudio Solano Pereira and Luiz Bruner deMiranda Aug. 1980 7 p refs In PORTUGUESE; ENGLISH summary Presented at 32d Ann. Reunion of Brazilian Soc. for the Progr. of Sci., Rio de Janeiro, 6-12 Jul. 1980
(INPE-1841-RPE/201) Avail: NTIS HC A02/MF A01

An analytical model developed to determine coastal currents was applied to the coast of Rio Grande do Sul (lat. 29 deg S to lat. 35 deg. S). The model describes the stationary state nontidal coastal currents. The momentum balance considered is *stationary, nonaccelerated, and hydrostatic. Longshore pressure* gradients are neglected, while the Coriolis parameter and the vertical momentum exchange coefficient are assumed constant. The water mean density is taken constant in a vertical column but it is allowed to change at a constant rate in the cross shelf direction. With appropriate boundary conditions, a single relationship is obtained between the wind stress, the cross shelf mean density gradient and the fluid velocity. A.R.H.

N80-34048*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

ASSESSMENT OF THE ROLE OF REMOTE SENSING IN THE STUDY OF INLAND AND COASTAL WATERS

Howard J. Curfman, John D. Oberholtzer, and Ronald J. Schertler Sep. 1980 70 p refs
(NASA-TM-81881) Avail: NTIS HC A04/MF A01 CSCL 08C

Several problems within Great Lakes, coastal, and continental shelf water were selected and organized under the topical headings of Productivity, Sedimentation, Water Dynamics, Eutrophication, and Hazardous Substances. The measurements required in the study of each of the problems were identified. An assessment was made of the present capability and the potential of remote sensing to make these measurements. The relevant remote-sensing technology for each of these classifications was discussed and needed advancements indicated. T.M.

N80-34053# National Technical Information Service, Springfield, Va.

OCEAN WAVE SENSING. CITATIONS FROM THE NTIS DATA BASE Progress Report, 1964 - Jun. 1980

Audrey S. Hundemann Jul. 1980 271 p Supersedes NTIS/PS-79/0663 and NTIS/PS-78/0560
(PB80-812878; NTIS/PS-79/0663; NTIS/PS-78/0560) Avail: NTIS HC $30.00/MF $30.00 CSCL 08C

Abstracts pertaining to methods and equipment for measuring ocean waves and sea surface roughness are presented. Remote sensing of ocean waves, height indicators, wave spectrum measurement, the use of radar, wave direction detection, and a few abstracts dealing with general studies are included. This updated bibliography contains 263 citations, 11 of which are new entries to the previous edition. GRA

06

HYDROLOGY AND WATER MANAGEMENT

Includes snow cover and water runoff in rivers and glaciers, saline intrusion, drainage analysis, geomorphology of river basins, land uses, and estuarine studies.

A80-45005 * # Quantitative interpretation of Great Lakes remote sensing data. D. F. Shook, J. Salzman, R. A. Svehla, and R. T. Gedney (NASA, Lewis Research Center, Cleveland, Ohio). *Journal of Geophysical Research,* vol. 85, July 20, 1980, p. 3991-3996. 15 refs.

The paper discusses the quantitative interpretation of Great Lakes remote sensing water quality data. Remote sensing using color information must take into account (1) the existence of many different organic and inorganic species throughout the Great Lakes, (2) the occurrence of a mixture of species in most locations, and (3) spatial variations in types and concentration of species. The radiative transfer model provides a potential method for an orderly analysis of remote sensing data and a physical basis for developing quantitative algorithms. Predictions and field measurements of volume reflectances are presented which show the advantage of using a radiative transfer model. Spectral absorptance and backscattering coefficients for two inorganic sediments are reported. A.T.

A80-45428 Nonzero subsurface irradiance reflectance at 670 nm from Lake Ontario water masses. R. P. Bukata, J. H. Jerome, J. E. Bruton (National Water Research Institute, Burlington, Ontario, Canada), and S. C. Jain (Moniteq, Ltd., Toronto, Canada). *Applied Optics,* vol. 19, Aug. 1, 1980, p. 2487, 2488. 9 refs.

Data obtained by the satellite-borne Coastal Zone Scanner (CZCS) are discussed with reference to an atmospheric algorithm which infers the subsurface irradiance reflectance spectrum from the radiance spectrum recorded by the CZCS. The algorithm is based on the assumption that the irradiance reflectance beneath the surface at a wavelength of 670 nm is zero in which case the recorded CZCS radiance in that band is due to surface reflection and the molecular and aerosol scattering occurring in the intervening atmosphere. Analysis of the observed values of a(670), (Bb)(670, and Rv(670) for Western Lake Ontario reveals a large range of nonzero Rv(670) values. It is concluded that caution must be applied to the assumption of zero Rv(670) when considering the development of operational atmospheric algorithms for direct applications of CZCS data to water quality studies of inland lakes. V.L.

A80-46450 * Remote sensing of particulate concentrations in water. M. Sydor (Minnesota, University, Duluth, Minn.). *Applied Optics,* vol. 19, Aug. 15, 1980, p. 2794-2800. U.S. Environmental Protection Agency Grant No. R-805667-01-1; Grant No. NGL-24-005-263.

Determination of residual radiance is essential in remote sensing measurements of suspended solids in the absence of real-time ground-truth data. Some typical background corrections are presented for Lake Superior and the spectral distribution of the residual radiance is determined from three major categories of turbidity in the lake. The results tested with Landsat 2 digital tape data indicate that for large bodies of water general information on atmospheric scattering, water clarity, and optical properties of suspended solids enables one to estimate the concentrations of particulates to within + or - 0.5 mg/liter in the absence of real-time ground-truth data.

(Author)

A80-49653 # The use of space data for the prediction of mountain-river flooding in Siberia (Primenenie kosmicheskoi informatsii dlia tselei prognoza stoka polovod'ia gornykh rek). N. V. Vostriakova (Akademiia Nauk SSSR, Institut Geologii i Geofiziki, Novosibirsk, USSR). *Issledovanie Zemli iz Kosmosa,* May-June 1980, p. 20-26. 8 refs. In Russian.

It is shown that TV and multispectral images from meteorological satellites can be used to calculate and predict mountain-river flooding in Siberia related to the springtime melting of snow. The usefulness of space data on the height of the snow line and the extent of the snow cover of drainage areas is shown. B.J.

A80-49656 # Optical methods for the study of biocenoses on land and sea (Opticheskie metody izucheniia rastitel'nykh tsenozov sushi i moria). F. Ia. Sid'ko, A. D. Aponasenko, V. S. Filimonov, N. A. Frank, A. F. Sid'ko, L. A. Shur, and V. I. Sokolov (Akademiia Nauk SSSR, Institut Fiziki, Krasnoyarsk, USSR). *Issledovanie Zemli iz Kosmosa,* May-June 1980, p. 41-50. 21 refs. In Russian.

Optical techniques (remote and contact techniques) for the study of the spectral brightness of inner reservoirs and seas, crops, forests, and other types of vegetation cover are reviewed; techniques for the investigation of the optical characteristics (absorption, attenuation, etc.) of water are also described. The estimation of phytoplankton content in water by remote and contact methods is considered. B.J.

A80-50899 The geomorphology of Mont-Saint-Michel Bay studied from the remote sensing of instantaneous shorelines (Géomorphologie de la baie du Mont-Saint-Michel par télédétection des lignes de rivage instantanées). C. Pestre (Institut Géographique National, Saint-Mandé, Val-de-Marne, France) and F. Verger (Ecole Normale Supérieure, Montrouge, Hauts-de-Seine; Ecole Pratique des Hautes Etudes, Dinard, Côtes-de-Nord, France). In: Cartographic processing and analysis of satellite imagery; International Conference, 3rd, Toulouse, France, June 19-22, 1979, Proceedings.

Saint-Etienne, Loire, France, Edition Gedim, 1980, p. 175-181. In French.

Several Landsat-1 images of Mont-Saint-Michel Bay showing different tidal heights were processed in order to extract shorelines at given instants. An examination of the shorelines makes it possible to investigate the topography and geomorphology of the tidal flats and to obtain information on the evolution of the tidal flats between successive satellite views. B.J.

A80-51278 The contribution of space observations to water resources management; Proceedings of the Symposium, Bangalore, India, May 29-June 9, 1979. Symposium sponsored by COSPAR, ICSU, UNESCO, et al. Edited by V. V. Salomonson (NASA, Goddard Space Flight Center, Greenbelt, Md.) and P. D. Bhavsar (Indian Space Research Organization, Space Applications Centre, Ahmedabad, India). Oxford, Pergamon Press, Ltd. (Advances in Space Exploration. Volume 9), 1980. 288 p. $60.

The symposium focused on hydrology, soil moisture estimation and ground water exploration, wetlands monitoring and water quality estimation, hydrometeorology, snow and ice monitoring, and evapotranspiration estimation. Other problems discussed include surface water and flood mapping, watershed runoff estimation and prediction, and new space systems contributing to water resources management. V.L.

A80-51279 Space observations for water resources - A potential to be developed. A. J. Askew and J. Nemec (World Meteorological Organization, Hydrology and Water Resources Dept.,

Geneva, Switzerland). In: The contribution of space observations to water resources management; Proceedings of the Symposium, Bangalore, India, May 29-June 9, 1979. Oxford, Pergamon Press, Ltd., 1980, p. 3-16. 9 refs.

To make full use of space observations in hydrology and water resources, major changes in existing data acquisition, storage, and processing systems will be required. In the present paper, information is presented on the data requirements that have been established for work in hydrology and water resources. Some aspects of the transmission of hydrological data from spacecraft are examined. V.P.

A80-51280 Remote sensing application in groundwater surveys and exploration in India. B. K. Baweja and S. K. Sharma (Central Ground Water Board, New Delhi, India). In: The contribution of space observations to water resources management; Proceedings of the Symposium, Bangalore, India, May 29-June 9, 1979. Oxford, Pergamon Press, Ltd., 1980, p. 17-30.

Aerial and satellite survey methods used for groundwater investigation and exploration in India are described. The effects of weathered zones, fracture traces, and lineaments on the occurrence and behavior of groundwater are discussed. Key criteria have been employed to locate water wells of maximum capacity in areas where only poor wells have been known. It has been shown that buried pediment areas, open fractures, and trellis drainage have a marked influence on groundwater occurrence in crystalline rocks. S.S.

A80-51281 Remote sensing of coastal environment and resources. V. Klemas, D. S. Bartlett, and W. D. Philpot (Delaware, University, Newark, Del.). In: The contribution of space observations to water resources management; Proceedings of the Symposium, Bangalore, India, May 29-June 9, 1979. Oxford, Pergamon Press, Ltd., 1980, p. 31-48. 43 refs.

Remote sensing techniques are applied to coastal and estuarine areas for mapping wetland boundaries, plant species diversity and productivity, monitoring man-made and natural changes in the coastal zone, charting current circulation patterns, determining the identity, concentration and dispersion of certain natural substances and pollutants, and mapping of nutrient-rich upwelling regions and coastal fresh-water springs. However, because remote sensors fail to penetrate beyond a few meters into turbid coastal waters the need for data collection from ships and ground survey teams cannot be eliminated. S.S.

A80-51282 Satellite data for the solution of problems of land hydrology. V. V. Kuprianov, V. G. Prokacheva, and V. F. Usachev (Gosudarstvennyi Gidrologicheskii Institut, Leningrad, USSR). In: The contribution of space observations to water resources management; Proceedings of the Symposium, Bangalore, India, May 29-June 9, 1979. Oxford, Pergamon Press, Ltd., 1980, p. 49-58. 16 refs.

The paper discusses satellite data used in operational hydrology. The applications include mapping of physiographic features, land use, and snow cover; evaluation of snow cover dynamics; determination of water storage; and spring snowmelt flood measurements. Studies were made of snow cover determining urban and industrial environmental effects; evaluation of ice behavior in lakes; dates of ice pack formation and breakup; river floodings, plain inundations; and of the water balance of inland water bodies. A.T.

A80-51283 * Remote sensing applications in hydrometeorology. A. Rango (NASA, Goddard Space Flight Center, Laboratory for Atmospheric Sciences, Greenbelt, Md.). In: The contribution of space observations to water resources management; Proceedings of the Symposium, Bangalore, India, May 29-June 9, 1979. Oxford, Pergamon Press, Ltd., 1980, p. 59-66. 28 refs.

Monitoring of precipitation using remote sensing has been carried out successfully over oceans with passive microwave data and over land with visible and infrared data. Further research is necessary to improve accuracy and timeliness of estimations in a variety of rainfall situations. Snowmelt runoff prediction has been demonstrated using satellite snowcover data. Snow depth and wetness measurements are feasible using microwave techniques. The monitoring of ice cover, type, and thickness has been carried out successfully using remote methods. Results from remote sensing evapotranspiration studies have been inconclusive. The remote measurement of evapotranspiration seems to be the most challenging of all applications of remote sensing to hydrometeorology. (Author)

A80-51284 Use of satellite imagery for the derivation of the hydrogeologic characteristics of a test area in semiarid climates. C. Vaccari (Italeco S.p.A., Rome, Italy) and B. Marcolongo (CNR, Padua, Italy). In: The contribution of space observations to water resources management; Proceedings of the Symposium, Bangalore, India, May 29-June 9, 1979. Oxford, Pergamon Press, Ltd., 1980, p. 69-77.

The use of Landsat imagery to investigate the hydrogeological characteristics of semiarid areas, particularly the location of underground water resources, is illustrated. Time-spaced Landsat data in bands of 5 and 7 was obtained for a portion of Bauci province in northern Nigeria, and analog processing of the data was performed to permit interpretation. The vegetation, lithology, pedology and drainage patterns deduced from the Landsat images were compared with available ground-based geological data in order to define the various hydrogeological units and the groundwater potential, and a model of the hydrogeologic circulation was obtained by taking into account lineation morphology. The static hydrogeological map and a ground water circulation model thus obtained can be used to quantify underground water resources, and, together with further rainfall, temperature and evapotranspiration data, estimate aquifer recharge. A.L.W.

A80-51285 Terrain analysis and hydrogeologic interpretations from satellite imagery. R. A. Chansarkar (Defence Research and Development Organization, New Delhi, India). In: The contribution of space observations to water resources management; Proceedings of the Symposium, Bangalore, India, May 29-June 9, 1979. Oxford, Pergamon Press, Ltd., 1980, p. 79-84. 7 refs.

The paper discusses terrain analysis and hydrologic parameters from satellite imagery. Hydrologic interpretations also require lineament levels, delineation of lithoassociations, descriptions of surface water bodies and seasonal changes, the land use pattern, and areas for augmenting superficial porosities in hard rock terrains. Terrain analysis by satellite imagery was made possible by knowledge of regional geology, joint traces, and major geomorphic zones. Possible improvements include supplementing relief and slope data through survey maps andd use of computer processing. A.T.

A80-51286 Remote sensing of water resources in Panch Mahals district. B. Sahai, M. V. Muley, S. D. Naik, and V. Tamilarasan (Indian Space Research Organization, Space Applications Centre, Ahmedabad, India). In: The contribution of space observations to water resources management; Proceedings of the Symposium, Bangalore, India, May 29-June 9, 1979. Oxford, Pergamon Press, Ltd., 1980, p. 85-88.

A80-51287 Soil moisture estimation by correlated ground-based and Seasat microwave observation. E. Schanda, D. Wyssen (Bern, Universität, Berne, Switzerland), P. Meylan, and C. Morzier (Lausanne, Ecole Polytechnique Fédérale, Lausanne, Switzerland). In: The contribution of space observations to water resources management; Proceedings of the Symposium, Bangalore, India, May 29-June 9, 1979. Oxford, Pergamon Press, Ltd., 1980, p. 89-97. 5 refs.

The paper discusses soil moisture determination based on microwave emission at sites of different mineralogic compositions and granular size distributions. Microwave probing of soil moisture can reach a depth of 10 cm in arable land; simultaneous observations were made by ground-based and Seasat Scanning Multichannel

Microwave Radiometer at frequencies almost coinciding with the ground-based observations ranging from 1.8 to 36 GHz. Relations between moisture content and microwave radiation are described, concluding that soil moisture analysis can be improved by models which can extrapolate the moisture condition of the upper few centimeters down to the root zone of the vegetation, and separate the effects of vegetation, soil type, and roughness on backscattered and emitted radiation. A.T.

A80-51288 Evaluation of hydrogeologic conditions in Ponnaiyar River basin, South India using remotely sensed data. S. T. Govindarajan, V. Tamilarasan (Indian Space Research Organization, Space Applications Centre, Ahmedabad, India), and G. Venkataraman. In: The contribution of space observations to water resources management; Proceedings of the Symposium, Bangalore, India, May 29-June 9, 1979. Oxford, Pergamon Press, Ltd., 1980, p. 99-102.

Manual interpretations of Landsat and aerial data for mapping hydrogeological features are discussed and illustrated. Reconnaissance geomorphic, geologic, structural and land use maps of the Ponnaiyar river basin of South India were prepared using Landsat data. This was followed by aerial photointerpretation and field checks. The results of this study and the geophysical resistivity data were used to evaluate the hydrogeologic setup of the basin. Correlation of the existing bore wells data with the hydromorphic units shows that the high yielding wells are located in the lineaments, buried channels, and old river courses. (Author)

A80-51289 Remote sensing in search for ground water - Some cases histories. B. K. Baweja (Central Ground Water Board, New Delhi, India). In: The contribution of space observations to water resources management; Proceedings of the Symposium, Bangalore, India, May 29-June 9, 1979. Oxford, Pergamon Press, Ltd., 1980, p. 103-106.

Remote sensing surveys conducted in India for the purpose of ground water exploration are described. Aerial photography and photogeology techniques were applied to ground water exploration in the Narmada River Basin, the Poini River Basin, the Vedavati River Basin, and the Novil, Amrayati, and Ponnani subbasins. B.J.

A80-51290 Application of Landsat imagery to ground water studies in parts of Punjab and Haryana states, India. K. P. Singh (Delhi, University, Delhi, India), B. S. Tewari (Punjab University, Chandigarh, India), and T. H. L. Williams (Kansas, University, Lawrence, Kan.). In: The contribution of space observations to water resources management; Proceedings of the Symposium, Bangalore, India, May 29-June 9, 1979.
Oxford, Pergamon Press, Ltd., 1980, p. 107-111. 5 refs.

Multidate Landsat false color composite images were used to study geological, hydrogeological, and hydrological features in parts of the Punjab and Haryana states in India. Aquifer recharge areas, waterlogged areas, old river courses, and severely affected saline areas were delineated on the images. The interpretations were verified by exploratory drilling and field checks. The Landsat data proved useful in identifying prominent areas for groundwater development, in planning drilling programs for the construction of tube wells, in identifying areas suitable for artificial groundwater recharge, and in identification and mapping of seasonal waterlogging patterns. (Author)

A80-51291 Quantitative monitoring of sediment levels in freshwater lakes from Landsat. P. Chagarlamudi, J. S. Schubert (Deloitte, Haskins and Sells Associates, Ottawa, Canada), and R. E. Hecky (Department of Fisheries and the Environment, Freshwater Institute, Winnipeg, Canada). In: The contribution of space observations to water resources management; Proceedings of the Symposium, Bangalore, India, May 29-June 9, 1979.
Oxford, Pergamon Press, Ltd., 1980, p. 115-118.

A80-51292 Landsat application to the study of coastal processes. I. V. Muralikrishna (National Remote Sensing Agency, Secunderabad, India). In: The contribution of space observations to water resources management; Proceedings of the Symposium, Bangalore, India, May 29-June 9, 1979. Oxford, Pergamon Press, Ltd., 1980, p. 119-122. 7 refs.

Based on the patterns of suspended sediments on Landsat MSS imagery in bands 4 and 5, the flow directions of the near-shore surface and subsurface currents along certain reaches of each coast of India have been obtained. Making use of the imagery characteristics in these two bands, surface and subsurface sediment plumes have been identified. The extent of sediment suspension, zone of offshore turbulent mixing, submarine ridges and sloughs have been categorized. (Author)

A80-51293 * Snow mapping from space platforms. K. I. Itten (Zürich, Universität, Zurich, Switzerland). In: The contribution of space observations to water resources management; Proceedings of the Symposium, Bangalore, India, May 29-June 9, 1979. Oxford, Pergamon Press, Ltd., 1980, p. 125-138. 25 refs. Research supported by the World Meteorological Organization, European Space Agency, and NASA.

The paper considers problems of optimum resolution, periodicity, and wavelength bands used for snow mapping. Analog and digital methods were used for application of satellite data; techniques were developed for producing steamflow forecasts, hydroelectric power generation regulation data, irrigation potentials, and information on the availability of drinking water supplies. Future systems will utilize improved spectral band selection, new spectral regions, higher repetition rates, and more rapid access to satellite data. A.T.

A80-51294 Problems of snow cover assessment - An approach using remote sensing techniques in a pilot project in the Beas river basin, Himachal Pradesh, India. C. P. Vohra and G. S. Srivastava (Geological Survey of India, Lucknow, India). In: The contribution of space observations to water resources management; Proceedings of the Symposium, Bangalore, India, May 29-June 9, 1979. Oxford, Pergamon Press, Ltd., 1980, p. 139-142. 7 refs.

A80-51295 Eurasian snow cover extent - The NOAA satellite record, 1966-79. M. Matson, D. R. Wiesner, and C. P. Berg (NOAA, National Environmental Satellite Service, Washington, D.C.). In: The contribution of space observations to water resources management; Proceedings of the Symposium, Bangalore, India, May 29-June 9, 1979. Oxford, Pergamon Press, Ltd., 1980, p. 143-152. 12 refs.

A80-51296 Studies of snow accumulation characteristics on Himalayan slopes. A. K. Bagchi (Roorkee, University, Roorkee, India). In: The contribution of space observations to water resources management; Proceedings of the Symposium, Bangalore, India, May 29-June 9, 1979. Oxford, Pergamon Press, Ltd., 1980, p. 153-156. Research supported by the Indian Space Research Organization.

A method using sequential Landsat imageries in conjunction with temperature data for measurement of the depth of accumulated snow in high Himalayan slopes is considered. Snow accumulation pattern in Manali slope is presented. (Author)

A80-51297 Microwave emission properties of snow for monitoring hydrological parameters. E. Schanda, C. Mätzler (Bern, Universität, Berne, Switzerland), and R. Hofer. In: The contribution of space observations to water resources management; Proceedings of the Symposium, Bangalore, India, May 29-June 9, 1979. Oxford, Pergamon Press, Ltd., 1980, p. 157-161. 5 refs.

During three winter seasons ground-based microwave observations with a multichannel radiometer between 1.8 and 94 GHz at an alpine high-altitude test area have revealed important relations between hydrological parameters such as moisture content, melting

state, and depth of sounding, and the microwave emission behavior in spectrum, polarization and viewing angles. The daily variations of the state of a surface layer with thickness strongly dependent on moisture can be determined, and three stages of seasonal development of the snow cover are easily distinguishable. This allows prediction of the start of the snow melting phase with consequent runoff. These investigations are intended to yield the fundamentals for the design of monitoring payloads with near to optimum instrumentation. (Author)

A80-51299 Computer-aided watershed analyses using remote sensing based regional information systems. R. M. Ragan and J. D. Fellows (Maryland, University, College Park, Md.). In: The contribution of space observations to water resources management; Proceedings of the Symposium, Bangalore, India, May 29-June 9, 1979. Oxford, Pergamon Press, Ltd., 1980, p. 181-193. 8 refs.

The application of Landsat remotely sensed data to water resource studies is discussed with reference to a computer-based multiparameter regional information system for a 6300 sq km planning area in the vicinity of Washington, D.C. Categorized Landsat and two levels of digitized aerial photography have been merged as a matrix of five-second cells to define the land cover on a regional basis. Map data defining soil type, slope, and geology are also digitalized for storage in the same format. The data are stored on tape and disk files that can be accessed from office teletypes connected through a telephone line. Remote-sensing-based regional information systems stored on digital computers provide an efficient means of defining the quantities required by the models that must be part of the decision-making process. V.L.

A80-51300 Applications to floods of remote sensing from satellites. H. L. Ferguson, J. Kruus (Environment Canada, Atmospheric Environment Service, Ottawa, Canada), and M. Deutsch (U.S. Geological Survey, Reston, Va.). In: The contribution of space observations to water resources management; Proceedings of the Symposium, Bangalore, India, May 29-June 9, 1979.

Oxford, Pergamon Press, Ltd., 1980, p. 195-206. 17 refs.

Remote sensing from satellites can be applied to flood plain mapping, monitoring of floods in progress, and the prediction of floods through observations of storms and snowpack conditions. Case studies from the literature are used to illustrate these applications. Examples are also drawn from previously unpublished North American studies. The use of satellite snow cover analysis in the WMO/WWW Saint John Basin Project is described. Probable future technological trends are discussed briefly. (Author)

A80-51301 Assessment of cyclone-caused damage in Krishna delta region using remotely sensed data. A. Narain and S. A. Patil (Indian Space Research Organization, Space Applications Centre, Ahmedabad, India). In: The contribution of space observations to water resources management; Proceedings of the Symposium, Bangalore, India, May 29-June 9, 1979.
Oxford, Pergamon Press, Ltd., 1980, p. 207-210.

A tropical cyclone formed in the Bay of Bengal hit the coastal districts of Andhra Pradesh, India, on Nov. 19, 1977, causing large scale damage. An aerial survey, using photographic cameras with color infrared film and a multispectral scanner, was carried out during January 1978. A two-step procedure (Landsat imagery and aerial imagery) was followed for assessing cyclone-caused damage for an area of about 320 sq km. (Author)

A80-51302 Study of Kosi river characteristics using airborne/space orbital multispectral scanner data. A. K. Chakraborty (National Remote Sensing Agency, Hyderabad, India). In: The contribution of space observations to water resources management; Proceedings of the Symposium, Bangalore, India, May 29-June 9, 1979. Oxford, Pergamon Press, Ltd., 1980, p. 211-214.

A80-51303 Floodplains mapping of Gangetic basin using Landsat imagery. M. S. Dhanju (Indian Space Research Organization, Space Applications Centre, Ahmedabad, India). In: The contribution of space observations to water resources management; Proceedings of the Symposium, Bangalore, India, May 29-June 9, 1979.
Oxford, Pergamon Press, Ltd., 1980, p. 215-218. 5 refs.

The Gangetic basin of the Indian subcontinent is a scene of perennial floods during monsoon season. Using Landsat imagery, the possibility of studying the various features connected with the floodplains is investigated. The features are inundated areas, backswamps, marshy areas, oxbow lakes, and water bodies. The various features of the river action, floodplain deposits, sandy features, and river levees are also delineated. Thus it is possible to prepare appropriate floodplain maps by integrating relevant topographical features with the above-mentioned features delineated from Landsat imagery. These maps can be of great help in designing flood control measures. (Author)

A80-51304 Satellite imagery and U.P. Himalayas and Siwalik. P. N. Gupta. In: The contribution of space observations to water resources management; Proceedings of the Symposium, Bangalore, India, May 29-June 9, 1979. Oxford, Pergamon Press, Ltd., 1980, p. 219-222.

The paper describes how satellite photographs are utilized for deciding priorities for soil conservation work in U.P. Himalayas and Siwalik. Measurements for demonstrating the effect of erosion in the area are given. The use of imagery directly as maps or for map-making in natural resources surveys is emphasized. (Author)

A80-51305 Perspectives of remote sensing applications to the study of hydric balance in the EEC countries and to the global evaluation of ground water resources. C. Conedera (GEOMAP, Florence, Italy), G. Fraysse (Commission of the European Communities, Joint Research Centre, Ispra, Italy), and B. Marcolongo (CNR, Padua, Italy). In: The contribution of space observations to water resources management; Proceedings of the Symposium, Bangalore, India, May 29-June 9, 1979. Oxford, Pergamon Press, Ltd., 1980, p. 223-226.

The use of remotely sensed imagery (Landsat, HCMM, airborne thermal infrared Multispectral Scanner) integrated with conventional data (maps and ground truth) permits stablishment of a model describing the circulation pattern of deep groundwater. The model has been applied to a semiarid area in southern Italy; the main structures and the hydrogeological profile have been determined. (Author)

A80-51306 Study of floods in Bangladesh and India with the help of meteorological satellites. A. M. Choudhury (Bangladesh Atomic Energy Commission, Space and Atmospheric Research Centre, Dacca, Bangladesh). In: The contribution of space observations to water resources management; Proceedings of the Symposium, Bangalore, India, May 29-June 9, 1979.
Oxford, Pergamon Press, Ltd., 1980, p. 227-230.

It has been found that Meteorological Satellites often give useful information on floods when the flooded area is relatively cloud free. This paper describes study of floods that occurred in Bangladesh and India from August to early October, 1978 with the help of meteorological satellite data. Tracks of tropical disturbances responsible for the rainfall causing floods have been obtained using satellite and conventional meteorological data. An estimation of the flooded area and the extent of flooding has been made. Correlation has also been made with rainfall data wherever available. (Author)

A80-51307 Indian remote sensing satellite program and its contribution to water resources management. D. S. Kamat (Indian Space Research Organization, Space Applications Center, Ahmedabad, India). In: The contribution of space observations to water resources management; Proceedings of the Symposium, Bangalore, India, May 29-June 9, 1979. Oxford, Pergamon Press, Ltd., 1980, p. 233-239. 9 refs.

A80-51309 * The utility of Landsat-D for water-resources studies. V. V. Salomonson (NASA, Goddard Space Flight Center, Laboratory for Atmospheric Sciences, Greenbelt, Md.). In: The contribution of space observations to water resources management; Proceedings of the Symposium, Bangalore, India, May 29-June 9, 1979. Oxford, Pergamon Press, Ltd., 1980, p. 255-267. 9 refs.

The paper discusses applications of the Landsat-D remote sensing observations to hydrology and management of water resources. It is expected that the Landsat-D thematic mapper will provide spatial resolution of 30 m vs 79 m in the reflected solar radiation bands; additional spectral resolution in the 0.5 to 1.0 micron region and new bands covering regions in the 0.45 to 2.35 micron range will be available. The thematic mapper produces data at an 85 megabit/sec rate; an advanced data processing system will be used for improved monitoring of earth resources. A.T.

A80-51310 Earth observation systems in Japan. K. Tsuchiya (National Space Development Agency of Japan, Earth Observation Center, Hatoyama, Saitama, Japan). In: The contribution of space observations to water resources management; Proceedings of the Symposium, Bangalore, India, May 29-June 9, 1979. Oxford, Pergamon Press, Ltd., 1980, p. 269-277.

The paper describes a Japanese earth observation system which automatically collects rainfall data from 1300 unmanned automatic weather stations and distributes them to 60 forecast centers within 20 minutes. In addition, space related systems such as the geostationary meteorological satellite, rockets, and Tiros-N are discussed. The Marine Observation Satellite-1 is in a preliminary design phase, and the planning of the joint NASA/Japan research plan of managing water resources is being completed. A.T.

A80-53611 Satellite studies of fresh-water ice movement on Lake Erie. D. R. Wiesnet (NOAA, National Environmental Satellite Service, Washington, D.C.). *Journal of Glaciology*, vol. 24, no. 90, 1979, p. 415-426. 11 refs.

The paper discusses the NOAA visible and thermal satellite observations of Lake Erie ice movements. The NOAA polar-orbiting satellites collect two thermal and one visible image per day; the GOES satellites collect visible and infrared images every 30 min; and the Landsat satellite has an 18 d revisit cycle. Ice formation, movement, and break-up depend on variations in depth of water, geomorphology, and meteorological factors; the effect of wind direction on break-up patterns is critical for the forecasting of complete ice melt and day-to-day distribution of ice. A.T.

N80-29806*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

USE OF LANDSAT DATA FOR RIVER AND LAKE ICE ENGINEERING STUDIES

Dorothy K. Hall, Principal Investigator Apr. 1980 14 p refs Submitted for publication ERTS

(E80-10237; NASA-TM-80686) Avail: NTIS HC A02/MF A01 CSCL 08L

N80-29816*# National Environmental Satellite Service, Washington, D. C.

APPLICATIONS OF HCMM DATA TO SOIL MOISTURE SNOW AND ESTUARINE CURRENT STUDIES Quarterly Report

Donald R. Wiesnet, Principal Investigator, David F. McGinnis, and Michael Matson 24 Jun. 1980 3 p Sponsored by NASA HCMM

(E80-10269; NASA-CR-163341) Avail: NTIS HC A02/MF A01 CSCL 08L

The author has identified the following significant results. The HCMM thermal data are useful for monitoring estuarine surface thermal patterns. Estuarine thermal patterns, are, under certain conditions, indicative of the surface tidal current circulation patterns. Under optimum conditions, estuaries as small as the Cooper River (i.e., approximately 100 sq km) can be monitored for tidal/thermal circulation patterns by HCMM-type IR sensors.

N80-29832# Geological Survey, Tallahassee, Fla. Water Resources Div.

EVALUATION OF REMOTE HYDROLOGIC DATA-ACQUISITION SYSTEMS, WEST-CENTRAL FLORIDA

J. F. Turner, Jr. and W. M. Woodham Feb. 1980 71 p refs (PB80-176951; USGS/WRD/WRI-80/020; USGS/WRI-79/102) Avail: NTIS HC A04/MF A01 CSCL 08H

An evaluation of the hydrologic applications of a land line and tow satellite data relay systems operated during 1977-78 in the Southwest Florida Water Management District is presented. These systems were tested to evaluate operational and reliability characteristics. Telephone lines were used to relay data in the land line system, and the Geostationary Operational Environmental Satellite (GOES) and were used in the satellite system. The land system was tested for a period of 15 months at a streamflow site. Accurate data were obtained 94 percent of the time during the period. Data losses were attributed to telephone line interference, low battery voltage, and vandalism. The GOES system was tested at a rainfall site for a 17 month period. GRA

N80-30829*# Florida Univ., Gainesville. Inst. of Food and Agricultural Sciences.

FLORIDA WATER RESOURCES Final Report

Apr. 1980 325 p refs Original contains color imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls, S.D. 57198 ERTS

(Contract NAS10-9348)

(E80-10246; NASA-CR-154634; KSC-TR-51-3) Avail: NTIS HC A14/MF A01 CSCL 08H

N80-30830*# Florida Univ., Gainesville. Inst. of Food and Agricultural Sciences.

FLORIDA WATER RESOURCES, EXECUTIVE SUMMARY

Apr. 1980 18 p Original contains color imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls, S.D. 57198 ERTS

(Contract NAS10-9348)

(E80-10247; NASA-CR-154634-Summ; KSC-TR-51-3-Summ) Avail: NTIS HC A02/MF A01 CSCL 08H

N80-30864*# Environmental Research and Technology, Inc., Concord, Mass.

INVESTIGATION OF THE APPLICATION OF HCMM THERMAL DATA TO SNOW HYDROLOGY Progress Report, Apr. - Jun. 1980

James C. Barnes, Principal Investigator Jul. 1980 7 p Sponsored by NASA HCMM

(E80-10297; NASA-CR-163351) Avail: NTIS HC A02/MF A01 CSCL 08L

The author has identified the following significant results. Comparison of the thermal IR band temperatures over the rapidly melting snowcover in a number of locations in the Salt-Verde Arizona watershed by the U-2 high altitude multispectral scanner, with temperatures for these same locations measured by the corresponding HCMM pass, indicate that the U-2 temperatures are typically 5 C higher than the values analyzed from the HCMM infrared digital printout. Results tend to substantiate findings of other investigators that with the offset that has been applied to all HCMM data, the HCMM temperature values may, in fact, actually be 5 C too low. Analysis of differences between the HCMM day and night temperatures for selected snowcovered areas in the Sierra Nevada Mountains, derived from the daytime and nighttime printouts, show greater delta tau values for the sparsely vegetated higher elevations than for the lower elevation, more densely forested terrain. The differences for the 12 hour sequence are also greater in most instances than the 36 hour difference.

N80-31867# Kansas Water Resources Research Inst., Manhattan.
SIMULATION OF RESERVOIR AND LAKE SEDIMENTATION Project Completion Report, Jul. 1973 - Jun. 1975
William M. Merrill Apr. 1980 158 p refs
(Contract DI-14-31-0001-4085)
(PB80-182801; CONTRIB-215; W80-05010; OWRT-B-036-KAN(1)) Avail: NTIS HC A08/MF A01 CSCL 08H

Two lakes were used to develop a model of reservoir sedimentation and two computer programs to simulate it. Basis for the model is a statement of general relationships formulated to describe sedimentation in shallow marine basins, modified to apply to relatively small freshwater bodies. In its modified form, the statement serves as foundation for quantitative and semiquantitative expressions that are translated into algorithms to simulate reservoir processes. The model and programs are appropriate only for reservoirs established on alluvial streams in which an essentially unlimited supply of sediment, 90 percent or more of which is silt and clay and at least 30 percent of which is clay of two microns or less, can be assured. GRA

N80-31973# Army Engineer Waterways Experiment Station, Vicksburg, Miss. Environmental Lab.
REMOTE SENSING PROCEDURES FOR DETECTING AND MONITORING VARIOUS ACTIVITIES REGULATED BY THE MOBILE DISTRICT Final Report, Oct. 1976 - Sep. 1978
Horton Struve and William L. Kirk Apr. 1980 397 p refs
(AD-A087584; WES/TR/EL-80-1) Avail: NTIS HC A17/MF A01 CSCL 14/5

The objective of this study was to develop procedures for use by the U.S. Army Engineer District, Mobile, to detect and monitor activities requiring a Corps of Engineers permit pursuant to Section 404 of the Federal Water Pollution Control Act Amendments of 1972, Section 10 of the River and Harbor Act of 1899, and Section 103 of the Marine Protection, Research, and Sanctuaries Act of 1972. The detection and monitoring procedures developed in this study included three methods of acquiring remotely sensed data: satellite and aircraft borne digital scanner methods and airborne photographic methods. The two digital scanner systems investigated for the study were the LANDSAT Multispectral Scanner System and the National Aeronautics and Space Administration Modular Multispectral Scanner. The equipment and procedures used in these systems, which obtain the type of information required by the Regulatory Functions Branch, Mobile District, are described. Aerial photographic systems are described, and examples of several applications of detection and monitoring procedures involving wetlands, waterbodies, and structures are given. A summary of available remote sensing imagery from Federal and State agencies is given. GRA

N80-32024# RAND Corp., Santa Monica, Calif.
ANOMALOUS SNOWFALL CAUSED BY NATURAL-DRAFT COOLING TOWERS
Randall L. Koenig May 1980 48 p refs
(Grant DE-AC03-76EV-01191)
(RAND/N-1479-DOE) Avail: NTIS HC A03/MF A01

Tabulation of a number of aerial observations of plumes at subfreezing temperatures indicates that a cooling tower plume is likely to produce measurable snow if its temperature is colder than -13 C and the saturation deficit of the ambient air is less than 0.5 g m to the -3 power. These empirically derived criteria were tested using a numerical model of cloud microphysics that simulates the most important processes of transfer of water substance between vapor, liquid, and ice, including nucleation and development of particle-size spectra. Among the many quantities computed is the flux density of snow at the base of the plume. From this, together with average fallspeed and horizontal wind speed, the amount and pattern of snowfall at the ground was computed. Comparison of the computational results with observations of actual plumes shows that the model has skill in predicting plume behavior and strongly supports the criterion of -13 C for plume snowfall, however, the maximum snowfall depth is predicted to occur nearer the source than is observed. A.R.H.

N80-32806*# Remote Sensing Inst., Brookings, S. Dak.
HCMM ENERGY BUDGET DATA AS A MODEL INPUT FOR ASSESSING REGIONS OF HIGH POTENTIAL GROUNDWATER POLLUTION Interim Report, Apr. - Jun. 1980
Donald G. Moore, Principal Investigator and J. L. Heilman Jun. 1980 25 p refs HCMM
(Contract NAS5-24206)
(E80-10310; NASA-CR-163350; SDSU-RSI-80-07) Avail: NTIS HC A02/MF A01 CSCL 13B

The author has identified the following significant results. Significant relationships were found between surface soil temperatures estimated from HCMM radiometric temperatures and depth to ground water and near surface soil moisture.

N80-32834# Instituto de Pesquisas Espaciais, Sao Paulo (Brazil).
GEOCHEMICAL BALANCE OF THE SALGADO RIVER BASIN
L. M. Moreira-Nordemann and D. Nordemann Aug. 1980 43 p refs Submitted for publication
(INPE-1849-RPE/206) Avail: NTIS HC A03/MF A01

The Salgado River basin (Bahia State, Brazil) was studied from the point of view of present climatic and geochemical conditions: inappropriate exploitation, irregular rainfall and high evaporation rate resulting in a state of unbalanced geochemical conditions. The water of the Salgado River showed high concentration of the total dissolved salts. The mean chemical composition and weathering rate of the rocks of the river basin were measured. S.F.

N80-33064# Air Force Geophysics Lab., Hanscom AFB, Mass. Meteorology Div.
DEVELOPMENT OF TECHNIQUES TO SPECIFY CLOUDINESS AND RAINFALL RATE USING GOES IMAGERY DATA Final Report
Stuart H. Muench and Thomas J. Keegan Oct. 1979 46 p refs
(AF Proj. 6670)
(AD-A084757; AFGL-TR-79-0255; AFGL-ERP-687) Avail: NTIS HC A03/MF A01 CSCL 04/2

Methods of introducing digitized satellite imagery into short range, objective forecasting operations are presented. The data archive being assembled for this study is described, with particular attention given to the steps taken to maximize the accuracy of the satellite imagery. These steps included fine tuning the navigation and selecting procedures for normalizing the data by correcting for the effects of Lambertian and anisotropic scattering. Consistency of the data, spatial and temporal, was tested by analysis of ground reflectance during cloudless days, and a pilot test of the specification of single layers of clouds was conducted. Both of these tests gave envouraging results. An investigation of specifying precipitation rate, using just the visible reflectance and infrared temperature of the cloud top, also produced good results. Author

N80-33823 *Louisiana State Univ. and A&M Coll., Baton Rouge.*
A QUANTITATIVE EVALUATION OF LANDSAT FOR MONITORING SUSPENDED SEDIMENTS IN A FLUVIAL CHANNEL Ph.D. Thesis
Soon Tae Kim 1980 142 p
Avail: Univ. Microfilms Order No. 8021752

The utility of LANDSAT Multispectral Scanner (MSS) digital data for monitoring suspended sediment concentrations in a natural river channel was determined. Specific purposes of the study were: to investigate vertical distribution of suspended sediment concentrations at the cross section of the river channel; to develop a method of eliminating environmental effects from the MSS digital data obtained during successive LANDSAT overpasses; to evaluate the statistical properties of MSS digital data as related to suspended sediment concentrations in the surface layers of a natural river, and to evaluate the feasibility of estimating suspended sediment concentrations in entire depth of the river channel via LANDSAT MSS digital data.
Dissert. Abstr.

N80-33825 Johns Hopkins Univ., Baltimore, Md.
A WATERSHED INFORMATION SYSTEM Ph.D. Thesis
Anton Gaarde Thomsen 1980 167 p
Avail: Univ. Microfilms Order No. 8022427

A watershed information system for the analysis and simulation of mountain watersheds is described. Watershed information on topography, vegetation, and soils in digital terrain models (overlays) serve as the data base for watershed analysis, classification of snow in LANDSAT imagery, and automatic generation of parameter decks for operating distributed simulation models of snow cover dynamics and streamflow generation. The computer programs that generate the parameter decks have built-in calibration options for all major processes, that permit fast model calibration from an interactive computer terminal, on watersheds with varying characteristics. Snow processes are simulated within square (5.76 ha) grid-cell elements. The hydrograph resulting from spring snowmelt is simulated by a lateral flow model of streamflow generation driven by the simulated spatially distributed imput (snowmelt and rain). Options are available for simulating the effects of forest management alternatives (thinning, clearcutting) on selected forest stands.
Dissert. Abstr.

N80-33834*# Institute for Land and Water Management Research, Wageningen (Netherlands).
DEFINING RELATIONSHIPS BETWEEN SURFACE CHARACTERISTICS AND ACTUAL EVAPORATION RATE
M. Menenti, Principal Investigator Ispra, Italy Joint Research Center of the European Communities May 1980 25 p refs Presented at the 4th Meeting of Working Group 2 of the TELLUS Proj., Monterotondo, Italy, 20-21 Nov. 1979 Sponsored by NASA HCMM
(E80-10335; NASA-CR-163541) Avail: NTIS HC A02/MF A01 CSCL 05B

N80-33849# Lockheed Electronics Co., Inc., Las Vegas, Nev. Remote Sensing Lab.
MULTISPECTRAL TECHNIQUES FOR REMOTE MONITORING OF SEDIMENT IN WATER: A FEASIBILITY INVESTIGATION
Ronald J. Holyer Mar. 1980 173 p refs
(Contract EPA-68-03-2153)
(PB80-198500; EPA-600/4-80-019) Avail: NTIS HC A08/MF A01 CSCL 13B

A data acquisition and analysis program was undertaken to demonstrate the feasibility of remote multispectral techniques for monitoring suspended sediment concentrations in natural water bodies. Two hundred surface albedo measurements (400 to 1,000 nanometers) were made at Lake Mead with coincident water sampling for laboratory analysis. Water volume spectral reflectance was calculated from the recorded surface albedo, and volume reflectance-suspended sediment relationships were investigated. Statistical analysis has shown that quantitative estimates of nonfilterable residue (105 C) and nephelometric turbidity can be made from volume spectral reflectance data with sufficient accuracy to make the multispectral technique feasible for sediment monitoring. GRA

N80-33927*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
TURBID WATER MEASUREMENTS OF REMOTE SENSING PENETRATION DEPTH AT VISIBLE AND NEAR-INFRARED WAVELENGTH
W. D. Morris, W. G. Witte, and C. H. Whitlock Aug. 1980 11 p refs Presented at the Symp. on Surface-Water Impoundments, Minneapolis, 2-5 Jun. 1980
(NASA-TM-81843) Avail: NTIS HC A02/MF A01 CSCL 13B

Remote sensing of water quality is dicussed. Remote sensing penetration depth is a function both of water type and wavelength. Results of three tests to help demonstrate the magnitude of this dependence are presented. The water depth to which the remote-sensor data was valid was always less than that of the Secchi disk depth, although not always the same fraction of that depth. The penetration depths were wavelength dependent and showed the greatest variation for the water type with largest Secchi depth. The presence of a reflective plate, simulating a reflective subsurface, increased the apparent depth of light penetration from that calculated for water of infinite depth. T.M.

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07
DATA PROCESSING AND DISTRIBUTION SYSTEMS

Includes film processing, computer technology, satellite and aircraft hardware, and imagery.

A80-44297 **Segmentation-based boundary modeling for natural terrain scenes.** C. A. McNary, D. K. Conti, and W. O. Eckhardt (Hughes Research Laboratories, Malibu, Calif.). In: Image understanding systems II; Proceedings of the Seminar, San Diego, Calif., August 29, 30, 1979. Bellingham, Wash., Society of Photo-Optical Instrumentation Engineers, 1980, p. 108-116. 7 refs. Contract No. F33615-77-C-1227.

A segmentation-based boundary-modeling processor for natural terrain scenes is described. The processor relies on region segmentation for establishing boundary connectivity by eliminating competing line structure resulting from texture edges. Scene-boundary models and the hierarchical line representations of curvilinear features were generated using this processor. V.T.

A80-46225 * **Substorm warnings - An ISEE-3 real time data system.** B. Tsurutani (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, Calif.) and D. Baker (California, University, Los Alamos Scientific Laboratory, Los Alamos, N. Mex.). *EOS*, vol. 60, no. 41, 1979. 5 p. 18 refs. Research sponsored by the U.S. Department of Energy; Contract No. NAS7-100.

The use of solar wind measurements made by ISEE-3 in its halo orbit around the L1 libration point to predict the onsets of magnetospheric substorms and geomagnetic storms is discussed. Consideration is given to the limitations on the predictive ability of the satellite measurements set by the bulk solar wind velocity, the elliptical orbit of the satellite and the correlation lengths of the magnetic field and the solar wind plasma. The ISEE-3 real-time data system is presented, with attention given to the ground receiving stations, the NASCOM communications system, the Multisatellite Operations Control Center and Information Processing Division at the Goddard Space Flight Center, the link between Goddard and the NOAA Space Environmental Services Center, and the NOAA Space Environment Laboratory data acquisition and display data system, which includes displays allowing storm forecasts. It is noted that the entire system should be operational by March, 1980. A.L.W.

A80-46522 * # **The Landsat-D/Global Positioning System experiment.** W. H. Wooden, II and J. Teles (NASA, Goddard Space Flight Center, Greenbelt, Md.). *American Institute of Aeronautics and Astronautics and American Astronautical Society, Astrodynamics Conference, Danvers, Mass., Aug. 11-13, 1980, AIAA Paper 80-1678*. 10 p. 13 refs.

The paper presents data requirements, tests, and operational procedures to validate the receiver/processor assembly (R/PA) data to the 150 meter level and to calibrate the full capability of the R/PA to the 10 meter level for the Landsat-D/Global Positioning System experiment. Current work includes designing the software for the validation and calibration processes, determining the best methods of calibration using the Ground Space Tracking Data Network (GSTDN), and determining the tracking schedule for GSTDN data to obtain best orbital accuracy. A.T.

A80-47749 **Application of high efficiency data compression and 2-D digital filtering techniques to remote sensing data processing.** V. Cappellini (Firenze, Università, Florence, Italy). *(Remote Sensing Society, Annual Conference, 5th, Durham, England, Dec. 18-20, 1978.) International Journal of Remote Sensing*, vol. 1, Apr.-June 1980, p. 175-180.

The high efficiency techniques of data compression and 2-D digital filtering for the processing of remote sensing data obtained from earth resource satellites or aircraft photographs are presented. Consideration is given to equations and techniques for 2-D digital filtering using finite impulse response and infinite impulse response filters, which is often applied before data compression techniques to improve data quality and extract useful results, and to methods of data compression using local space operators and two-dimensional transformations, which are used to reduce the amount of data and thus solve storage and handling problems. The application of these techniques to remote sensing data processing is discussed, and examples are presented. A.L.W.

A80-49099 **A color plotter system and its applications in geoscience.** K. Bladh (Lund Institute of Technology, Lund, Sweden) and M. Jern (Lund, Universitet, Lund, Sweden). *IEEE Transactions on Geoscience and Remote Sensing*, vol. GE-18, July 1980, p. 256-263. 9 refs. Research supported by the Styrelsen for Teknisk Utveckling.

A color plotter system using electrically controlled ink jets was developed for computer graphics output. The hardware and software of this system are briefly described. Some examples of the application of this plotter to geoscience are given and illustrated in color. (Author)

A80-49138 # **Remotely sensed data processing techniques, present and future.** C. L. Wilson (Michigan, Environmental Research Institute, Ann Arbor, Mich.). In: Identifying irrigated lands using remote sensing techniques: State of the Art; Proceedings of the Symposium, Sioux Falls, S. Dak., November 15, 16, 1979. Omaha, Neb., Missouri River Basin Commission, 1980, p. 5-16.

Techniques currently in use for the processing of remote sensing data at the Earth Resources Data Center of the Environmental Research Institute of Michigan are presented. Consideration is given to software for the geometrical correction of Landsat data and the generation of maps and digital files using affine transformations, nonlinear nonmodel techniques and rigid model nonlinear techniques, the enhancement of images for the improved interpretation of Landsat data, spectral pattern recognition or categorization, and the combination of Landsat data with that from other sources. It is concluded that future operational problems in the handling of remotely sensed data will be managerial and political rather than technological in nature. A.L.W.

A80-49521 **Computer-assisted production of multi-coloured maps.** P. Stefanovic and K. Sijmons (International Institute for Aerial Survey and Earth Sciences, Enschede, Netherlands). *ITC Journal*, no. 1, 1980, p. 86-94.

The paper discusses computer application in production of multicolored maps. The calendar time between compilation and publishing of a map must be minimized, particularly for thematic maps for land use, vegetation, and geology. Optronic Colorwrite C-4300 equipment can produce grey tones corresponding to the amount of yellow, magenta, and cyan required for each different area color on the map from original digital data. The continuous grey levels must be screened and enlarged in the camera before plate making; special attention was given to rapid data capture, flexibility, and elimination of slow manual processes. A.T.

A80-49657 # **Photometric problems, solved by means of space photography (Fotometricheskie zadachi, reshaemye s pomoshch'iu sredstv kosmicheskoi fotos'emki).** L. M. Matiiasevich (Gosudarstvennyi Nauchno-Issledovatel'skii i Proizvodstvennyi Tsentr Priroda, USSR). *Issledovanie Zemli iz Kosmosa*, May-June 1980, p. 51-57. In Russian.

Algorithms for solving direct, inverse, and atmospheric photometric problems relating to the remote sensing of earth resources are presented. Consideration is also given to the accuracy of photometric measurements carried out with the aid of space photography. B.J.

A80-49658 # Allowance for light scattering in the atmosphere in the processing of space photographs of the earth's surface (Uchet rasseianiia sveta v atmosfere pri obrabotke kosmicheskikh snimkov zemnoi poverkhnosti). V. G. Zolotukhin, D. A. Usikov, and V. A. Grushin (Akademiia Nauk SSSR, Institut Kosmicheskikh Issledovanii, Moscow, USSR). *Issledovanie Zemli iz Kosmosa,* May-June 1980, p. 58-68. 9 refs. In Russian.

An optical radiation transfer equation is derived that includes the atmospheric transmittance function, the light source parameters, and the spatial distribution of albedo. The kernel of the equation, which relates space imagery to ground-based imagery, was obtained both analytically and by the Monte Carlo method. An optimal filter for atmospheric noise is described. B.J.

A80-49665 # Estimates of the accuracy of the brightness conjunction of multispectral photographs (Nekotorye otsenki tochnosti energeticheskoi priviazki materialov mnogozonal'nogo fotografirovaniia). L. G. Istomina (Akademiia Nauk SSSR, Institut Okeanologii, Moscow, USSR). *Issledovanie Zemli iz Kosmosa,* May-June 1980, p. 104-107. In Russian.

The paper presents results of the photometric processing of space photographs of Lake Baikal in six regions of the visible and near-infrared bands. Emphasis is placed on the accuracy with which brightness conjunction can be estimated. A comparison of the present data with airborne measurements of the spectral brightness of the ocean-atmosphere system was used to determine the reliability with which multispectral systems can be used to determine the brightness of surface features. B.J.

A80-50879 Cartographic display of space information - The different methods available at IGN (Transcription cartographique des informations spatiales - Les différentes modalités disponibles à l'IGN). J. Denègre (Institut Géographique National, Paris, France). In: Cartographic processing and analysis of satellite imagery; International Conference, 3rd, Toulouse, France, June 19-22, 1979, Proceedings. Saint-Etienne, Loire, France, Edition Gedim, 1980, p. 21-26. In French.

The use of different methods of display and storage of space imagery information is determined by the relationship between the image and the computer. Several computer assisted mapping techniques including the raster mode plotting technique on permanent and reproducible materials are described and examined. It is shown that pixel-image techniques provide a powerful analysis and visualization in which recognition and representation of images in two dimensions become possible. A.C.W.

A80-50889 Information extraction from a Landsat image contained within an artificial outline (Extraction de l'information d'une image Landsat contenue dans un contour artificiel). G. Flouzat, P. Cassirame, G. Giordano, and T. Gilles-Lagrange (Centre d'Etude Spatiale des Rayonnements, Toulouse, France). In: Cartographic processing and analysis of satellite imagery; International Conference, 3rd, Toulouse, France, June 19-22, 1979, Proceedings. Saint-Etienne, Loire, France, Edition Gedim, 1980, p. 100-110. In French.

This paper describes a methodology used to extract a part of a remote sensing image which is delimited by a boundary obtained from external data. The processing algorithm computes the imagery coordinates of the boundary and realizes the extraction of the inner part of the image. The surface measurements permit comparison with conventional land use inventories of administrative areas. Three applications are given and show the possible help of this technique in the evaluation of a remote sensing result. (Author)

A80-50891 The use of topology concepts for supervised and unsupervised classifications (Utilisation des notions de topologie pour les classifications supervisées ou non). J. C. Lummaux (Institut Géographique National, Saint-Mandé, Val-de-Marne, France). In: Cartographic processing and analysis of satellite imagery; International Conference, 3rd, Toulouse, France, June 19-22, 1979, Proceedings. Saint-Etienne, Loire, France, Edition Gedim, 1980, p. 118-121. In French.

Topology concepts are applied to the supervised and unsupervised classification of satellite images. Particular attention is given to the distinction between 'used distance' and 'used discriminant function'. The notion of improperly classified data is also considered. B.J.

A80-50894 * The potential of Landsat-3 RBV images for thematic mapping. J. R. G. Townshend (Reading, University, Reading, Berks., England) and C. O. Justice (NASA, Goddard Space Flight Center, Greenbelt, Md.). In: Cartographic processing and analysis of satellite imagery; International Conference, 3rd, Toulouse, France, June 19-22, 1979, Proceedings. Saint-Etienne, Loire, France, Edition Gedim, 1980, p. 139-144.

The potential of Return Beam Vidicon (RBV) imagery from Landsat-3 is discussed for thematic mapping. The advantages of the imagery arising from its high spatial resolution are described as well as the restrictions stemming from its limited spectral characteristics. The principal application areas discussed are geomorphological and geological mapping and land cover mapping. (Author)

A80-50906 The SPOT/Landsat image ground station - Image preprocessing (Station sol images SPOT/Landsat - Prétraitement des images). B. Cabrieres (Institut Géographique National, Paris, France) and J. C. Cazaux (Centre National d'Etudes Spatiales, Toulouse, France). In: Cartographic processing and analysis of satellite imagery; International Conference, 3rd, Toulouse, France, June 19-22, 1979, Proceedings. Saint-Etienne, Loire, France, Edition Gedim, 1980, p. 224-232. In French.

Attention is given to the proposed ground station at Toulouse for the reception and preprocessing of SPOT and Landsat D images. The mode of operation linked to the chosen architecture, product performance, and possible applications are examined. The proposed architecture is modular, extensible, and built around three independent integrated subunits: receiving unit; the filing unit, rapid visual display, and cradle processor; and the preprocessing unit that permits the rectification of images. B.J.

A80-51013 The detection of linear features using Landsat data. C. M. Gurney (Reading University, Reading, Berks., England). *British Interplanetary Society, Journal (Image Processing),* vol. 33, Oct. 1980, p. 361-368. 10 refs. Research supported by the Atomic Energy Research Establishment.

Local operators are used to detect linear features in Landsat data of areas where such features are typically less than one pixel wide. Detection accuracy depends on the choice of threshold. The paper develops an analytical technique for threshold determination which predicts the detection accuracy for a linear feature of known width. The technique is limited by the assumption that data contained in a local window adequately represent the full data set. This assumption will not be met where the background consists of more than one cover type or has a high variance, higher noise levels being expected in these cases. The detection technique is tested on five areas of Landsat data of the UK, predicted results according well with those actually observed. (Author)

A80-51926 A new era in technology; Proceedings of the Seventeenth Space Congress, Cocoa Beach, Fla., April 30-May 2, 1980. Congress sponsored by the Canaveral Council of Technical Societies. Cocoa Beach, Fla., Canaveral Council of Technical Societies, 1980. 400 p. $30.

The topics presented are a Shuttle update, the monitoring of the environment and natural resources, payloads, space technology applications, international activities in space, and terrestrial energy systems. Particular consideration is given to mixed mode missions in the Space Transportation System, a real-time hyperbolic system for the detection and location of thunderstorms, a review of the Canadian Space Program, and the DOE Ocean Energy Program. B.J.

A80-51943 * **Satellite temperature monitoring and prediction system.** U. R. Barnett (NASA, Kennedy Space Center, Sciences, Technology, and Applications Office, Cocoa Beach, Fla.), J. D. Martsolf (Florida, University, Gainesville, Fla.), and F. L. Crosby (NOAA, National Weather Service, Ruskin, Fla.). In: A new era in technology; Proceedings of the Seventeenth Space Congress, Cocoa Beach, Fla., April 30-May 2, 1980. Cocoa Beach, Fla., Canaveral Council of Technical Societies, 1980, p. 4-9 to 4-20. 5 refs.

The paper describes the Florida Satellite Freeze Forecast System (SFFS) in its current state. All data collection options have been demonstrated, and data collected over a three year period have been stored for future analysis. Presently, specific minimum temperature forecasts are issued routinely from November through March. The procedures for issuing these forecast are discussed. The automated data acquisition and processing system is described, and the physical and statistical models employed are examined. V.P.

A80-52051 # **New data on the geological structure of the Verkhoiany-Kolyma fold region from an analysis of satellite TV images (Novye dannye o geologicheskom stroenii Verkhoiano-Kolymskoi skladchatoi oblasti na osnovanii analiza televizionnykh kosmicheskikh snimkov).** A. L. Ianshin, Z. M. Khvorostova, and V. A. Zabelin (Akademiia Nauk SSSR, Institut Geologii i Geofiziki and Vychislitel'nyi Tsentr, Novosibirsk, USSR). *Issledovanie Zemli iz Kosmosa,* July-Aug. 1980, p. 5-12. 17 refs. In Russian.

A80-52052 # **Geological analysis of the Urals-Oman superlineament from satellite imagery (Kosmogeologicheskie issledovaniia Uralo-Omanskogo superlineamenta).** V. A. Bush, V. V. Kozlov (Vsesoiuznoe Aerogeologicheskoe Nauchno-Proizvodstvennoe Ob'edinenie Aerogeologiia, Moscow, USSR), V. I. Sevast'ianov, and V. V. Kovalenok. *Issledovanie Zemli iz Kosmosa,* July-Aug. 1980, p. 13-17. 8 refs. In Russian.

The aim of the present paper is to demonstrate the effectiveness of satellite imagery application to geological studies on a global scale. The important role of the Urals-Oman superlineament in structure of the lithosphere is demonstrated. V.P.

A80-52053 # **Mapping a geologicostructural scheme of the Kola peninsula from satellite imagery (Sostavlenie geologostrukturnoi skhemy Kol'skogo poluostrova po kosmicheskim snimkam).** L. I. Uvad'ev, G. V. Matveeva, and V. A. Perevozhikova (Proizvodstvennoe Geologicheskoe Ob'edinenie Sevzapgeologiia, Leningrad, USSR). *Issledovanie Zemli iz Kosmosa,* July-Aug. 1980, p. 18-24. 7 refs. In Russian.

A method is proposed for the visual and photooptical interpretation of satellite images with the aim of obtaining a lineament scheme as a basis for analytical studies. Some results of this method are examined. A 1:500,000 scheme of the Kola peninsula, on which areas of useful earth resources are indicated, is presented and discussed. V.P.

A80-52054 # **Experiment with the composition of a geological map on the basis of interpretations of Meteor satellite television images /using Central Asia as an example/ (Opyt sostavleniia kosmogeologicheskoi karty na osnove deshifrirovaniia televizionnykh snimkov s ISZ 'Meteor' /na primere Srednei Azii/).** A. B. Kirillov and O. M. Borisov (Akademiia Nauk Uzbekskoi SSR, Institut Geologii i Geofiziki, Tashkent, Uzbek SSR). *Issledovanie Zemli iz Kosmosa,* July-Aug. 1980, p. 25-29. 6 refs. In Russian.

A80-52055 # **Analysis of the results of an interpretation of satellite and aerial protography of Western Uzbekistan (Analiz rezul'tatov deshifrirovaniia aerokosmicheskikh snimkov Zapadnogo Uzbekistana).** M. N. Tkhai (Akademiia Nauk Uzbekskoi SSR, Institut Geologii i Geofiziki, Tashkent, Uzbek SSR). *Issledovanie Zemli iz Kosmosa,* July-Aug. 1980, p. 30-34. 5 refs. In Russian.

In the present paper, the results of an interpretation of satellite and aerial photography of Western Uzbekistan are compared and examined in the light of geological and physical investigations. Conjectural, likely, and reliable lineament and structural features are identified. V.P.

A80-52056 # **Experiment aimed at standardizing anthropogenic changes of the natural environment from satellite and aerial photographs (Opyt etalonirovaniia antropogennykh izmenenii prirodnoi sredy po aerokosmicheskim snimkam).** E. V. Glushko (Moskovskii Gosudarstvennyi Universitet, Moscow, USSR). *Issledovanie Zemli iz Kosmosa,* July-Aug. 1980, p. 35-39. 26 refs. In Russian.

Standardization of images is a primary requirement in the development of methods for studying anthropogenic changes of the environment. In the present paper, identified standards are classified, using systematic and territorial critera. Image characteristics are coded with respect to anthropogenic changes of the environment, the geographic conditions, the structure of satellite and aerial imagery, and the conditions under which the photographs were taken. V.P.

A80-52057 # **Diurnal behavior of the spectral reflectivity of vegetation and soils (Dnevnoi khod spektral'noi otrazhatel'noi sposobnosti rastitel'nosti i pochv).** K. Ia. Kondrat'ev (Glavnaia Geofizicheskaia Observatoriia, Leningrad, USSR) and P. P. Fedchenko (Vsesoiuznyi Nauchno-Issledovatel'skii Institut Sel'skokhoziaistvennoi Meteorologii, Obninsk, USSR). *Issledovanie Zemli iz Kosmosa,* July-Aug. 1980. p. 40-47. 17 refs. In Russian.

The influence of the elevation of the sun on the spectral reflectivity of soils and vegetation is examined. It is shown that variation of spectral reflectivity is caused primarily by diurnal changes in the ratio of direct to scattered radiation. V.P.

A80-52058 # **Invariant photometric features of natural objects (Invariantnye fotometricheskie priznaki prirodnykh ob'ektov).** I. S. Garelik (Akademiia Nauk SSSR, Institut Geografii, Moscow, USSR). *Issledovanie Zemli iz Kosmosa,* July-Aug. 1980, p. 48-52. In Russian.

A method is proposed for calculating the invariant photometric features of natural objects, which are functions of the optical densities of zonal photographic images of the objects and which are almost independent of the conditions under which the photographs are taken. Some example applications of such features to the remote sensing of crops are examined. V.P.

A80-52059 # **Determination of the spectral characteristics of soils and vegetation (Opredelenie spektral'nykh kharakteristik pochvy i rastitel'nosti).** L. N. Vasil'ev (Akademiia Nauk SSSR, Institut Geografii, Moscow, USSR). *Issledovanie Zemli iz Kosmosa,* July-Aug. 1980, p. 53-58. In Russian.

An MSS image processing and interpretation technique is proposed and illustrated by applying it to the soils and vegetation of a steppe region. Analysis of the spectral brightness characteristics at 490 to 1060 microns showed that observations in three narrow wavelength regions - 490 to 630 microns, 685 to 730 microns, and 800 to 1100 microns - are sufficient to solve the classification problem. The general properties of the spectral brightness density functions are identified. V.P.

A80-52060 # **Practical aspects of radiative correction of multispectral video information (Prakticheskie aspekty radiatsionnoi korrektsii mnogozonal'noi videoinformatsii).** V. V. Asmus, Iu. G.

Spiridonov, and A. P. Tishchenko (Gosudarstvennyi Nauchno-Issledovatel'skii Tsentr Izucheniia Prirodnykh Resursov, Moscow, USSR). *Issledovanie Zemli iz Kosmosa,* July-Aug. 1980, p. 59-68. 6 refs. In Russian.

The radiative correction algorithms examined in the present paper require very little additional information and can be readily realized on a computer. A statistical approach to the correction problem is proposed, and the question of selecting image representation units is discussed. V.P.

A80-52061 # **Optical spatial-frequency characteristic of the atmosphere and its applications (Opticheskaia prostranstvenno-chastotnaia kharakteristika atmosfery i ee prilozheniia).** I. V. Mishin (Gosudarstvennyi Nauchno-Issledovatel'skii Tsentr Izucheniia Prirodnykh Resursov, Moscow, USSR) and T. A. Sushkevich (Akademiia Nauk SSSR, Institut Prikladnoi Matematiki, Moscow, USSR). *Issledovanie Zemli iz Kosmosa,* July-Aug. 1980, p. 69-80. 27 refs. In Russian.

A method is proposed for studying the transformation of the spatial brightness distribution of a light field in the atmosphere. The method makes use of the spatial-frequency characteristic of the scattering layer, the calculation of which is reduced to the solution of a parametric set of boundary problems of transport theory. V.P.

A80-52062 # **Imaging in many frequency bands (O strukturozonal'noi s'emke).** Ia. L. Ziman (Akademiia Nauk SSSR, Institut Kosmicheskikh Issledovanii, Moscow, USSR). *Issledovanie Zemli iz Kosmosa,* July-Aug. 1980, p. 81-84. In Russian.

The principle and distinctive features of a remote sensing method based on the use of various regions of the spatial frequency spectrum are examined. An onboard sensor design and a data management system are proposed. V.P.

A80-52063 # **Automatic selection of reference objects for comparing aerial and satellite photographs (Avtomaticheskii vybor opornykh ob'ektov dlia sopostavleniia aerokosmicheskikh snimkov).** A. N. Belinskii (Vsesoiuznyi Nauchno-Issledovatel'skii i Proektno-Tekhnologicheskii Institut Kibernetiki, Moscow, USSR) and L. P. Iaroslavskii (Akademiia Nauk SSSR, Institut Problem Peredachi Informatsii, Moscow, USSR). *Issledovanie Zemli iz Kosmosa,* July-Aug. 1980, p. 85-91. 5 refs. In Russian.

An automatic method of selecting readily identifiable landmarks on photographs is proposed. For illustration, the algorithm is applied to the selection of reference objects on aerial and satellite photographs. V.P.

A80-52064 # **Analytical geographic gridding of natural objects from aerial and satellite multispectral scanner images (Analiticheskaia geograficheskaia priviazka prirodnykh ob'ektov po skanernym aerokosmicheskim izobrazheniiam).** B. A. Novakovskii and Iu. V. Sventek (Moskovskii Gosudarstvennyi Universitet, Moscow, USSR). *Issledovanie Zemli iz Kosmosa,* July-Aug. 1980, p. 92-96. 7 refs. In Russian.

The theory underlying the analytical transition from a multispectral scanner image to a map of prescribed projection and scale, by way of modelling the corresponding coordinate determinations, is outlined. A method of allowing for the residual distortions of a multispectral scanner image is proposed. V.P.

A80-52065 # **Distortion of satellite photographs obtained by scanning systems (Iskazheniia kosmicheskikh snimkov, poluchennykh skaniruiushchimi sistemami).** V. I. Iurov (Akademiia Nauk SSSR, Institut Kosmicheskikh Issledovanii, Moscow, USSR). *Issledovanie Zemli iz Kosmosa,* July-Aug. 1980, p. 97-104. 7 refs. In Russian.

The analysis deals with the influence on the image elements of such factors as the earth's curvature and rotation, the landscape features, satellite motion, beam refraction, and imperfections of the inner geometry of the imaging system. Means of improving the geometrical quality of images by allowing for the influence of these factors are examined. V.P.

A80-52066 # **Comparison of interpretations of radar images and space photographs of a high degree of generalization on the example of the Zarkainarskii intrusive massif /southern Tien-Shan/ (Sopostavlenie rezul'tatov deshifrirovaniia radiolokatsionnykh snimkov i kosmofotosnimkov detal'nogo urovnia generalizatsii na primere Zarkainarskogo intruzivnogo massiva /iuzhnyi Tian'-Shan'/).** V. N. Kozlov (Akademiia Nauk Uzbekskoi SSR, Institut Geologii i Geofiziki, Tashkent, Uzbek SSR). *Issledovanie Zemli iz Kosmosa,* July-Aug. 1980, p. 109-112. In Russian.

A80-53004 # **Results of the complex processing of photographs taken from the Salyut space stations (Rezul'taty kompleksnoi obrabotki materialov s'emok s orbital'nykh pilotiruemykh stantsii 'Saliut').** V. D. Bol'shakov, N. P. Lavrova, B. V. Krasnopevtseva, E. M. Nikolaeva, and V. V. Usova (Moskovskii Institut Inzhenerov Geodezii, Aerofotos'emki i Kartografii, Moscow, USSR). *Geodeziia i Aerofotos'emka,* no. 4, 1980, p. 64-72. In Russian.

The features of photographs of the earth's surface taken from the Salyut 3 and 5 stations are described along with methods for the processing of these photographs. The aim of this processing is the compilation of thematic maps and the modification of small-scale topographic maps. B.J.

A80-53005 # **Investigation of the accuracy of transposition of landmarks and contour points to small-scale aerial photographs (Issledovanie tochnosti perenosa opoznakov i konturnykh tochek na melkomasshtabnye aerosnimki).** M. P. Shul'mina (Moskovskii Institut Inzhenerov Geodezii, Aerofotos'emki i Kartografii, Moscow, USSR). *Geodeziia i Aerofotos'emka,* no. 4, 1980, p. 85-92. 5 refs. In Russian.

The paper analyzes errors associated with the transposition of landmarks and contour points from aerial photographs of scale 1:17,000 (from 1949) to aerial photographs of scales 1:140,000 and 1:70,000 (from 1971). A statistical approach is used to study error distributions and the factors influencing the magnitude of error. B.J.

N80-28768*# Tennessee Univ. Space Inst., Tullahoma. Remote Sensing Div.
DIGITAL LANDSAT DATA ANALYSIS OF TENNESSEE Final Report, 1 Dec. 1978 - 31 Jan. 1980
F. Shahrokhi, Principal Investigator and Asif Kahn 28 Mar. 1980 56 p ERTS
(Contract NAS8-33218)
(E80-10130; NASA-CR-161424) Avail: NTIS HC A04/MF A01 CSCL 05B

N80-28769*# Lockheed Electronics Co., Houston, Tex. Systems and Services Div.
AS-BUILT SPECIFICATION FOR CCIT6A PROCESSOR PROGRAM
W. P. White, Principal Investigator Aug. 1978 68 p ERTS
(Contract NAS9-15200)
(E80-10168; NASA-CR-160597; LEC-12303; JSC-14368)
Avail: NTIS HC A04/MF A01 CSCL 05B

N80-28770*# Lockheed Electronics Co., Houston, Tex. Systems and Services Div.
AS-BUILT DESIGN SPECIFICATION FOR LACIE FORMATTED DOT CARDS IN EOD-LARSYS
P. J. Aucoin, Jr. and Jeannie Gor, Principal Investigators Apr. 1978 26 p ERTS
(Contract NAS9-15200)
(E80-10169; NASA-CR-160650; LEC-12154; JSC-13972)
Avail: NTIS HC A03/MF A01 CSCL 05B

N80-28771*# Lockheed Electronics Co., Houston, Tex. Systems and Services Div.
AS-BUILT DESIGN SPECIFICATION FOR THE YIELD ESTIMATION SUBSYSTEM (YES) OPERATIONAL ROBERTSON PHENOLOGICAL MODEL
K. Williams, Principal Investigator Jun. 1977 118 p ERTS
(E80-10170; NASA-CR-160680; LEC-10743; JSC-12941)
Avail: NTIS HC A06/MF A01 CSCL 02C

N80-28772*# Lockheed Electronics Co., Houston, Tex. Aerospace Systems Div.
AS-BUILT DESIGN SPECIFICATION FOR THE I-100 TAPE READ CONSOLIDATION PROGRAM (FULOI)
T. R. Kell, Principal Investigator Jul. 1977 74 p ERTS
(Contract NAS9-15200)
(E80-10171; NASA-CR-160596; LEC-9925-Rev-A; JSC-11848-Rev-A) Avail: NTIS HC A04/MF A01 CSCL 05B

N80-28773*# Lockheed Electronics Co., Houston, Tex. Systems and Services Div.
AS-BUILT DESIGN SPECIFICATION FOR THE BRAZIL AND CHINA MONTHLY DATA BASES
K. Williams, Principal Investigator May 1977 20 p ERTS
(Contract NAS9-15200)
(E80-10172; NASA-CR-160677; LEC-10573; JSC-12892) Avail: NTIS HC A02/MF A01 CSCL 05B

N80-28774*# Lockheed Electronics Co., Houston, Tex. Systems and Services Div.
FINAL DESIGN SPECIFICATION FOR EOD-LARSYS/STATISTICS AND DATA TRANSFORMATION PROCESSORS MODIFICATION
Cheevon Bo-Linn, Principal Investigator Mar. 1978 325 p ERTS
(Contract NAS9-15200)
(E80-10173; NASA-CR-160630; LEC-12030; JSC-13921) Avail: NTIS HC A14/MF A01 CSCL 05B

N80-28775*# Lockheed Electronics Co., Houston, Tex. Systems and Services Div.
AS-BUILT DESIGN SPECIFICATION FOR EOD-LARSYS PROCEDURE 1
B. E. Wills, C. T. Gardner, and P. J. Aucoin, Jr., Principal Investigators Oct. 1977 307 p ERTS
(Contract NAS9-15200)
(E80-10174; NASA-CR-160626; LEC-11293; JSC-13143) Avail: NTIS HC A14/MF A01 CSCL 05B

N80-28776*# Lockheed Electronics Co., Houston, Tex. Systems and Services Div.
AS-BUILT DESIGN SPECIFICATION FOR LACIE PHASE 3 AUTOMATIC STATUS AND TRACKING SYSTEM
D. L. Smith, J. L. Allison, J. M. Everette, and C. C. DeValcourt, Principal Investigators Jun. 1977 158 p ERTS
(Contract NAS9-15200)
(E80-10175; NASA-CR-160672; LEC-10419-Rev-A; JSC-12743-Rev-A) Avail: NTIS HC A08/MF A01 CSCL 05B

N80-28777*# Lockheed Electronics Co., Houston, Tex. Systems and Services Div.
DESIGN SPECIFICATION FOR LARSYS PROCEDURE 1 FOLLOW-ON
P. J. Aucoin, Jr., Principal Investigator Oct. 1977 9 p ERTS
(Contract NAS9-15200)
(E80-10176; NASA-CR-160627; LEC-11298; JSC-13144) Avail: NTIS HC A02/MF A01 CSCL 05B

N80-28778*# Lockheed Electronics Co., Houston, Tex. Systems and Services Div.
DESIGN SPECIFICATION FOR EOD-LARSYS/STATISTICS AND DATA TRANSFORMATION PROCESSORS MODIFICATION
Cheevon Bo-Linn, Principal Investigator Oct. 1977 48 p ERTS
(Contract NAS9-15200)
(E80-10177; NASA-CR-160628; LEC-11357; JSC-13665) Avail: NTIS HC A03/MF A01 CSCL 05B

N80-28779*# Lockheed Electronics Co., Houston, Tex. Systems and Services Div.
PROGRAM DOCUMENTATION: FINAL DESIGN SPECIFICATION FOR DOT DATA BASE UPDATE DECK CONVERSION PROGRAM (DOTDEC)
Jeannie Gor, Principal Investigator Jul. 1977 29 p ERTS
(Contract NAS9-15200)
(E80-10178; NASA-CR-160647; LEC-10969; JSC-12656) Avail: NTIS HC A03/MF A01 CSCL 05B

N80-28780*# Lockheed Electronics Co., Houston, Tex. Aerospace Systems Div.
FINAL DESIGN SPECIFICATION FOR ERIPS FIELDS DATA BASE DECK CONVERSION
Cheevon Bo-Linn, Principal Investigator Aug. 1977 41 p ERTS
(Contract NAS9-15200)
(E80-10179; NASA-CR-160646; LEC-10960; JSC-12655) Avail: NTIS HC A03/MF A01 CSCL 05B

N80-28781*# Lockheed Electronics Co., Houston, Tex. Systems and Services Div.
DETAILED DESIGN SPECIFICATION FOR THE YIELD ESTIMATION SUBSYSTEM DATA MANAGEMENT SYSTEM (YESDAMS)
T. G. Phillips, R. L. Davenport, R. F. Hansen, and K. F. Williams, Principal Investigators Jul. 1977 107 p ERTS
(Contract NAS9-15200)
(E80-10180; NASA-CR-160623; LEC-11110; JSC-13064) Avail: NTIS HC A06/MF A01 CSCL 05B

N80-28782*# Lockheed Electronics Co., Houston, Tex. Systems and Services Div.
MODIFICATIONS TO THE CLASY PROGRAM
B. McCray, Principal Investigator Apr. 1977 102 p ERTS
(Contract NAS9-15200)
(E80-10181; NASA-CR-160673; LEC-10481; JSC-12602) Avail: NTIS HC A06/MF A01 CSCL 05B

N80-28783*# Lockheed Electronics Co., Houston, Tex. Systems and Services Div.
PROGRAM DOCUMENTATIONS: MARQTY1.FTN, CAMDATA1.FTN
M. A. Mendlowitz, Principal Investigator Aug. 1978 25 p ERTS
(Contract NAS9-15200)
(E80-10182; NASA-CR-160593; LEC-12376) Avail: NTIS HC A02/MF A01 CSCL 05B

N80-28784*# Lockheed Electronics Co., Houston, Tex. Systems and Services Div.
DESIGN SPECIFICATION FOR DOT DATA BASE UPDATE DECK CONVERSION PROGRAM (DOTDEC)
Jeannie Gor, Principal Investigator Jun. 1977 8 p ERTS
(Contract NAS9-15200)
(E80-10183; NASA-CR-160681; LEC-10790; JSC-12958) Avail: NTIS HC A02/MF A01 CSCL 05B

N80-28785*# Lockheed Electronics Co., Houston, Tex. Systems and Services Div.
AS-BUILT DESIGN SPECIFICATION FOR PRODUCTION FILM CONVERTER GAINS AND BIASES PROGRAM (PFCGAB)
C. T. Gardner, Principal Investigator Nov. 1977 182 p ERTS
(Contract NAS9-15200)
(E80-10184; NASA-CR-160638; LEC-11678; JSC-13822) Avail: NTIS HC A09/MF A01 CSCL 05B

N80-28786*# Lockheed Electronics Co., Houston, Tex. Systems and Services Div.
LACIE/PHASE 3 ADJUSTABLE CROP CALENDAR (ACC) CONFIGURATION CONTROL PROCEDURES MANUAL
K. Williams, Principal Investigator Jun. 1977 16 p ERTS
(Contract NAS9-15200)
(E80-10186; NASA-CR-160682; LEC-10800; JSC-12963) Avail: NTIS HC A02/MF A01 CSCL 05B

N80-28787*# Lockheed Electronics Co., Houston, Tex. Systems and Services Div.
RECOMMENDATIONS AND COMMENTS CONCERNING DOCUMENTATION ON THE MICROWAVE ACTIVE SPECTROMETER SYSTEMS

W. A. Rosenkranz and D. P. Pounds, Principal Investigators Jun. 1977 127 p refs ERTS
(Contract NAS9-15200)
(E80-10187; NASA-CR-160679; LEC-10715; JSC-12946)
Avail: NTIS HC A07/MF A01 CSCL 05B

N80-28788*# Lockheed Electronics Co., Houston, Tex. Systems and Services Div.
FUNCTIONAL DESIGN SPECIFICATION FOR ENHANCEMENT OF THE AUTOMATIC STATUS AND TRACKING SYSTEM SOFTWARE
D. K. McCarley, J. M. Everette, and K. P. Eckel, Principal Investigators Sep. 1977 60 p ERTS
(Contract NAS9-15200)
(E80-10190; NASA-CR-160624; LEC-11199; JSC-13110)
Avail: NTIS HC A04/MF A01 CSCL 05B

N80-28789*# Lockheed Electronics Co., Houston, Tex. Systems and Services Div.
A DISCRIMINANT APPROACH TO PARAMETER ESTIMATION IN THE LINEAR MODEL WITH UNKNOWN VARIANCE-COVARIANCE MATRIX
C. R. Hallum (NASA. Johnson Space Flight Center) and M. D. Pore, Principal Investigators 1977 10 p refs Presented at the Ann. Meeting of the Am. Statist. Assoc., Chicago, 15-18 Aug. 1977 ERTS
(Contract NAS9-15200)
(E80-10192; NASA-CR-160676; LEC-10532; JSC-13036)
Avail: NTIS HC A02/MF A01 CSCL 05B

N80-28790*# Lockheed Electronics Co., Houston, Tex. Systems and Services Div.
LACIE FIELD MEASUREMENTS DATA ACQUISITION SUMMARY REPORT, 1975 - 1976 CROP YEAR
Jan. 1977 29 p ERTS
(Contract NAS9-15200)
(E80-10193; NASA-CR-160645; LEC-9970; JSC-11882) Avail: NTIS HC A03/MF A01 CSCL 05B

N80-28791*# Lockheed Electronics Co., Houston, Tex. Systems and Services Div.
USER'S GUIDE: LARGE AREA CROP INVENTORY EXPERIMENT (LACIE) PHASE 3 PDP 11/45 AUTOMATIC STATUS AND TRACKING SYSTEM
C. C. deValcourt, Principal Investigator Jun. 1977 49 p ERTS
(Contract NAS9-15200)
(E80-10194; NASA-CR-160642; LEC-10148-Rev-A; JSC-12535-Rev-A) Avail: NTIS HC A03/MF A01 CSCL 05B

N80-28792*# Lockheed Electronics Co., Houston, Tex. Systems and Services Div.
A STATISTICAL TEST PROCEDURE FOR DETECTING MULTIPLE OUTLIERS IN A DATA SET
R. S. Chhikara, Principal Investigator and A. H. Feiveson Nov. 1978 18 p refs ERTS
(Contract NAS9-15200)
(E80-10195; NASA-CR-160599; LEC-12910; JSC-14594)
Avail: NTIS HC A02/MF A01 CSCL 05B

N80-28793*# Lockheed Electronics Co., Houston, Tex. Systems and Services Div.
AS-BUILT DESIGN SPECIFICATION OF THE CAMS/CAS INTERFACE TAPE REPORT GENERATION PROGRAM FOR LACIE 6A
W. A. Holley, Principal Investigator Oct. 1977 63 p ERTS
(Contract NAS9-15200)
(E80-10196; NASA-CR-160625; LEC-11292; JSC-13142)
Avail: NTIS HC A04/MF A01 CSCL 05B

N80-28794*# Lockheed Electronics Co., Houston, Tex. Systems and Services Div.
AS-BUILT DESIGN FOR ENHANCEMENT OF THE AUTOMATIC STATUS AND TRACKING SYSTEM SOFTWARE
D. K. McCarley, Principal Investigator and L. D. Dornell Feb. 1978 146 p ERTS
(Contract NAS9-15200)
(E80-10197; NASA-CR-160631; LEC-11882; JSC-13894)
Avail: NTIS HC A07/MF A01 CSCL 02C

N80-28795*# Lockheed Electronics Co., Houston, Tex. Systems and Services Div.
AS-BUILT DESIGN SPECIFICATION FOR HISTORICAL DAILY DATA BASES FOR TESTING ADVANCED MODELS
B. Jeun and K. Williams, Principal Investigators Jan. 1978 76 p ERTS
(Contract NAS9-15200)
(E80-10198; NASA-CR-160675; LEC-10572-Rev-A; JSC-12891-Rev-A) Avail: NTIS HC A05/MF A01 CSCL 05B

N80-28796*# Lockheed Electronics Co., Houston, Tex. Systems and Services Div.
DESIGN SPECIFICATION FOR LARSYS PROCEDURE 1
B. E. Wills, C. T. Gardner, and P. J. Aucoin, Jr., Principal Investigators Apr. 1977 145 p ERTS
(Contract NAS9-15200)
(E80-10199; NASA-CR-160671; LEC-10417; JSC-12742)
Avail: NTIS HC A07/MF A01 CSCL 05B

N80-28797*# Lockheed Electronics Co., Houston, Tex. Systems and Services Div.
AS-BUILT DESIGN SPECIFICATION FOR PDP 11/45 ACCURACY ASSESSMENT SYSTEM
C. W. Ahlers, Principal Investigator Dec. 1977 190 p ERTS
(Contract NAS9-15200)
(E80-10200; NASA-CR-160632; LEC-11358-Rev-A; JSC-13666-Rev-A) Avail: NTIS HC A09/MF A01 CSCL 05B

N80-28851# Defense Mapping Agency Aerospace Center, St. Louis, Mo. Advanced Technology Div.
DIGITAL IMAGE TECHNOLOGY 1980: EMERGING PRODUCTION APPLICATIONS Final Report
Marshall B. Faintich 5 Mar. 1980 19 p ref Submitted for publication Original contains color illustrations
(AD-A085163) Avail: NTIS HC A02/MF A01 CSCL 08/2
The Defense Mapping Agency Aerospace Center has developed a program to exploit digital image technology for the advancement of mapping, charting, and geodesy. Primary investigations include image processing, analysis, and display techniques, and computer image generation. A dramatic impact has been made in the ability to produce, analyze, and validate various digital data bases produced by the Defense Mapping Agency by applying state-of-the-art digital image technology concepts to the development of new interactive prototype and production systems. GRA

N80-29780*# Lockheed Electronics Co., Houston, Tex. Systems and Services Div.
USER DOCUMENTATION EOD-LARSYS EARTH OBSERVATIONS DIVISION VERSION OF THE LABORATORY FOR APPLICATIONS OF REMOTE SENSING SYSTEM
R. T. Minter, B. E. Wills, and C. T. Gardner, Principle Investigator Jul. 1977 521 p refs Revised ERTS
(Contract NAS9-15200)
(E80-10188; NASA-CR-160617; LEC-3984-Rev-4; JSC-12504-Rev-4) Avail: NTIS HC A22/MF A01 CSCL 05B

N80-29781*# Lockheed Electronics Co., Houston, Tex. Aerospace Systems Div.
AS-BUILT DESIGN SPECIFICATION FOR METRO DATA EDIT PROGRAM
E. L. Wilson, Principal Investigator Dec. 1976 43 p ERTS
(Contract NAS9-15200)
(E80-10201; NASA-CR-160620; LEC-9888; JSC-11838) Avail: NTIS HC A03/MF A01 CSCL 05B

N80-29782*# Lockheed Electronics Co., Houston, Tex. Systems and Services Div.

AS-BUILT DESIGN SPECIFICATION OF THE CAM/CAS INTERFACE TAPE REPORT GENERATION PROGRAM FOR LACIE 7
K. P. Eckel, Principal Investigator Mar. 1978 123 p ERTS
(Contract NAS9-15200)
(E80-10203; NASA-CR-160629; LEC-12022; JSC-13917; LEC-11292) Avail: NTIS HC A06/MF A01 CSCL 05B

N80-29783*# Lockheed Electronics Co., Houston, Tex. Systems and Services Div.
AS-BUILT DESIGN SPECIFICATION OF THE CAMS/CAS INTERFACE TAPE REPORT GENERATION PROGRAM
W. A. Holley, Principal Investigator Feb. 1977 69 p ERTS
(Contract NAS9-15200)
(E80-10204; NASA-CR-160619; LEC-9882; JSC-12560) Avail: NTIS HC A04/MF A01 CSCL 05B

N80-29784*# Lockheed Electronics Co., Houston, Tex. Systems and Services Div.
DESIGN SPECIFICATION FOR SECONDARY ERROR SOURCES MULTI-TEMPORAL BAYES CLASSIFIER
P. J. Aucoin, Jr., Principal Investigator Dec. 1977 13 p ERTS
(Contract NAS9-15200)
(E80-10205; NASA-CR-160636; LEC-11677; JSC-13823) Avail: NTIS HC A02/MF A01 CSCL 05B

N80-29785*# Lockheed Electronics Co., Houston, Tex. Systems and Services Div.
DESIGN SPECIFICATION FOR EQUIPROBABLE BLOCKS DENSITY ESTIMATORY/CLASSIFIER/DOT SELECTOR
P. J. Aucoin, Jr., Principal Investigator Dec. 1977 19 p ERTS
(Contract NAS9-15200)
(E80-10206; NASA-CR-160637; LEC-11676; JSC-13824) Avail: NTIS HC A02/MF A01 CSCL 05B

N80-29786*# Lockheed Electronics Co., Houston, Tex. Systems and Services Div.
AS-BUILT DESIGN SPECIFICATION FOR THE CAMS IMAGE-100 HYBRID SYSTEM. VOLUME 1: SYSTEM DESIGN
L. E. Giddings, Principal Investigator Aug. 1977 322 p ERTS 2 Vol.
(Contract NAS9-15200)
(E80-10207; NASA-CR-160644; LEC-10822-Vol-1; JSC-13030-Vol-1) Avail: NTIS HC A14/MF A01 CSCL 05B

N80-29787*# Lockheed Electronics Co., Houston, Tex. Systems and Services Div.
AS-BUILT DESIGN SPECIFICATION FOR THE CAMS IMAGE-100 HYBRID SYSTEM. VOLUME 2: DETAILED FLOW CHARTS AND PROGRAM LISTINGS
L. E. Giddings, Principal Investigator Aug. 1977 397 p ERTS 2 Vol.
(Contract NAS9-15200)
(E80-10208; NASA-CR-160683; LEC-10822-Vol-2-Pt-2; JSC-13030-Vol-2-Pt-2) Avail: NTIS HC A17/MF A01 CSCL 05B

N80-29788*# Lockheed Electronics Co., Houston, Tex. Systems and Services Div.
AS-BUILT SPECIFICATION FOR CCIT7 PROCESSOR PROGRAM
W. P. White, Principal Investigator Nov. 1978 64 p ERTS
(Contract NAS9-15200)
(E80-10209; NASA-CR-160598; LEC-12518; JSC-14554) Avail: NTIS HC A04/MF A01 CSCL 05B

N80-29789*# Lockheed Electronics Co., Houston, Tex. Aerospace Systems Div.
FINAL DESIGN SPECIFICATION FOR LARSYS MODIFICATION/FISHER F-DISTRIBUTION THRESHOLDING
R. M. Rodriguez, Principal Investigator Dec. 1976 61 p ERTS
(Contract NAS9-15200)
(E80-10210; NASA-CR-160648; LEC-9963; JSC-11864) Avail: NTIS HC A04/MF A01 CSCL 05B

N80-29790*# Lockheed Electronics Co., Houston, Tex. Systems and Services Div.
FINAL DESIGN SPECIFICATION FOR EOD-LARSYS/DATA TRANSFORMATION PROCESSOR MODIFICATION
J. K. Rowland, Principal Investigator Apr. 1977 112 p ERTS
(Contract NAS9-15200)
(E80-10211; NASA-CR-160678; LEC-10662; JSC-12917) Avail: NTIS HC A06/MF A01 CSCL 05B

N80-29791*# Lockheed Electronics Co., Houston, Tex. Systems and Services Div.
FINAL DESIGN SPECIFICATION FOR EOD-LARSYS PROCEDURE 1 FOLLOW-ON
P. J. Aucoin, Jr., Principal Investigator Dec. 1977 44 p ERTS
(Contract NAS9-15200)
(E80-10213; NASA-CR-160635; LEC-11618; JSC-13817) Avail: NTIS HC A03/MF A01 CSCL 05B

N80-29792*# Lockheed Electronics Co., Houston, Tex. Systems and Services Div.
PROGRAM DOCUMENTATION: AS-BUILT DESIGN SPECIFICATION FOR GENERALIZED LINEAR MODEL ANALYSIS OF VARIANCE PROGRAM (GLMAOV)
Jeannie S. Gor, Principal Investigator Mar. 1978 57 p ERTS
(Contract NAS9-15200)
(E80-10214; NASA-CR-160649; LEX-12085; JSC-13945) Avail: NTIS HC A04/MF A01 CSCL 05B

N80-29793*# Lockheed Electronics Co., Houston, Tex. Systems and Services Div.
DESIGN SPECIFICATION FOR LACIE FORMATTED DOT CARDS IN EOD-LARSYS
P. J. Aucoin, Jr. and Jeannie S. Gor, Principal Investigators Dec. 1977 14 p ERTS
(Contract NAS9-15200)
(E80-10215; NASA-CR-160639; LEC-11703; JSC-13837) Avail: NTIS HC A02/MF A01 CSCL 05B

N80-29794*# Lockheed Electronics Co., Houston, Tex. Systems and Services Div.
AS-BUILT DESIGN SPECIFICATION FOR BOUNDARY DETECTION AND REGISTRATION PROGRAM (BDARP1)
D. P. McKay and F. Collen, Principal Investigators Aug. 1977 116 p ERTS
(Contract NAS9-15200)
(E80-10217; NASA-CR-160621; LEC-11074; JSC-13055) Avail: NTIS HC A06/MF A01 CSCL 05B

N80-29795*# Lockheed Electronics Co., Houston, Tex. Systems and Services Div.
AS-BUILT DESIGN SPECIFICATION FOR THE YIELD ESTIMATION SUBSYSTEM (YES) MONTHLY YIELD DATA BASE AND SUPPORTING PROGRAMS
D. Cook and C. Slemons, Principal Investigators Feb. 1977 124 p ERTS
(Contract NAS9-15200)
(E80-10218; NASA-CR-160641; LEC-10034; JSC-12537) Avail: NTIS HC A06/MF A01 CSCL 05B

N80-29796*# Lockheed Electronics Co., Houston, Tex. Systems and Services Div.
PROGRAM DOCUMENTATION: MARQUIS2.FTN
Maury A. Mendlowitz, Principal Investigator Dec. 1977 26 p ERTS
(Contract NAS9-15200)
(E80-10220; NASA-CR-160622; LEC-11092; JSC-13145) Avail: NTIS HC A03/MF A01 CSCL 05B

N80-29803*# Lockheed Electronics Co., Houston, Tex. Systems and Services Div.
DESIGN SPECIFICATION FOR A MERGING PROGRAM FOR FORMATTED IMAGE DATA FILES
P. J. Aucoin, Jr., Principal Investigator May 1978 32 p ERTS
(Contract NAS9-15200)
(E80-10234; NASA-CR-160714; LEC-12373; JSC-14289)
Avail: NTIS HC A03/MF A01 CSCL 05B

N80-29805*# Lockheed Engineering and Management Services Co., Inc., Houston, Tex.
USER MANUAL FOR THE EARTH OBSERVATIONS DIVISION R AND D TO OLPARS DOT DATA CONVERSION
R. Nugent, Principal Investigator Apr. 1980 30 p refs ERTS
(Contract NAS9-15800)
(E80-10236; NASA-CR-160666; LEMSCO-14848; JSC-16665)
Avail: NTIS HC A03/MF A01 CSCL 09B

N80-29807*# Lockheed Electronics Co., Houston, Tex. Systems and Services Div.
PROJECT DEVELOPMENT PLAN FOR THE LANDSAT IMAGERY VERIFICATION AND EXTRACTION SYSTEM (LIVES)
J. J. Carney and J. A. Vitellaro, Principal Investigators Oct. 1978 14 p ERTS
(Contract NAS9-15200)
(E80-10238; NASA-CR-160720; LEC-12856; JSC-14579)
Avail: NTIS HC A02/MF A01 CSCL 05B

N80-29808*# Lockheed Electronics Co., Houston, Tex. Systems and Services Div.
TEST PLAN FOR THE LANDSAT IMAGERY VERIFICATION AND EXTRACTION SYSTEM (LIVES)
J. J Carney and J. A. Vitellaro, Principal Investigators Oct. 1978 16 p ERTS
(Contract NAS9-15200)
(E80-10239; NASA-CR-160721; LEC-12857; JSC-14578)
Avail: NTIS HC A02/MF A01 CSCL 05B

N80-29809*# Lockheed Electronics Co., Houston, Tex. Systems and Services Div.
PRELIMINARY DESIGN SPECIFICATION FOR THE LANDSAT IMAGERY VERIFICATION AND EXTRACTION SYSTEM (LIVES)
J. M. Everette, D. K. McCarley, and K. P. Eckel, Principal Investigators Oct. 1978 43 p ERTS
(Contract NAS9-15200)
(E80-10240; NASA-CR-160719; LEC-12838; JSC-14577)
Avail: NTIS HC A03/MF A01 CSCL 05B

N80-29810*# Lockheed Electronics Co., Houston, Tex. Systems and Services Div.
AS-BUILT DESIGN SPECIFICATION FOR AREAS ADDED TO THE MONTHLY BASES OF TEXAS, MINNESOTA AND USSR
K. Williams, Principal Investigator Mar. 1977 22 p ERTS
(Contract NAS9-15200)
(E80-10241; NASA-CR-160707; LEC-10353; JSC-12708)
Avail: NTIS HC A02/MF A01 CSCL 03B

N80-29811*# Lockheed Electronics Co., Houston, Tex. Aerospace Systems Div.
AS-BUILT DESIGN SPECIFICATION FOR THE INDIA MONTHLY DATA BASE
K. Williams, Principal Investigator Feb. 1977 20 p ERTS
(Contract NAS9-15200)
(E80-10264; NASA-CR-160643; LEC-10253; JSC-12582)
Avail: NTIS HC A02/MF A01 CSCL 05B

N80-29812*# Lockheed Electronics Co., Houston, Tex. Systems and Services Div.
DESIGN SPECIFICATION FOR A LIST PROCESSING SYSTEM
C. L. Horton, C. W. Ahlers, and P. J. Aucoin, Jr. Aug. 1978 77 p ERTS
(Contract NAS9-15200)
(E80-10265; NASA-CR-160717; LEC-12696; JSC-14457)
Avail: NTIS HC A05/MF A01 CSCL 05B

N80-29813*# Texas A&M Univ., College Station. Remote Sensing Center.
DEVELOPMENT AND EVALUATION OF SCATTEROMETER DATA PROCESSING ALGORITHMS Final Report
Richard W. Newton, Principal Investigator and Billy V. Clark Aug. 1979 153 p refs ERTS
(Contract NAS9-14875)
(E80-10266; NASA-CR-160577; RSC-3337) Avail: NTIS HC A08/MF A01 CSCL 05B

N80-29814*# Purdue Univ., Lafayette, Ind. Lab. for Applications of Remote Sensing.
PIXEL LABELING BY SUPERVISED PROBABILISTIC RELAXATION
D. A. Landgrebe, Principal Investigator, J. A. Richards, and P. H. Swain Feb. 1980 18 p refs Sponsored by NASA, USDA, Dept. of Commerce, Dept. of Interior, and Agency for International Development
(Contract NAS9-15466; Proj. AgRISTARS)
(E80-10267; NASA-CR-160697; SR-PO-00454; LARS-022580) Avail: NTIS HC A02/MF A01 CSCL 02C

N80-29820*# Lockheed Engineering and Management Services Co., Inc., Houston, Tex.
SOME APPROACHES TO OPTIMAL CLUSTER LABELING OF AEROSPACE IMAGERY
C. B. Chittineni, Principal Investigator May 1980 56 p refs Sponsored by NASA, USDA, Dept. of Commerce, Dept. of Interior, and Agency for International Development ERTS
(Contract NAS9-15800; Proj. AgRISTARS)
(E80-10273; NASA-CR-160690; SR-LO-00440; LEMSCO-14597; JSC-16355) Avail: NTIS HC A04/MF A01 CSCL 20C

N80-29825*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
THEMATIC MAPPER STUDIES BAND CORRELATION ANALYSIS
Stephen G. Ungar and Richard Kiang Apr. 1976 28 p
(NASA-TM-80716) Avail: NTIS HC A03/MF A01 CSCL 08B

Spectral data representative of thematic mapper candidate bands 1 and 3 to 7 were obtained by selecting appropriate combinations of bands from the JSC 24 channel multispectral scanner. Of all the bands assigned, only candidate bands 4 (.74 mu to .80 mu) and 5 (.80 mu to .91 mu) showed consistently high intercorrelation from region to region and time to time. This extremely high correlation persisted when looking at the composite data set in a multitemporal, multilocation domain. The GISS investigations lend positive confirmation to the hypothesis, that TM bands 4 and 5 are redundant. R.K.G.

N80-29828# Electromagnetic Systems Labs., Inc., Sunnyvale, Calif.
IMAGE TRANSFORMATION STUDY Semiannual Technical Report, 1 Oct. 1979 - 30 Apr. 1980
Robert Devich, F. Weinhaus, L. Martin, D. Collier, G. Kiremidjian, A. Silvestri, D. Mcguirk, B. Gleaton, and R. LaPado 30 May 1980 75 p refs
(Contract MDA903-80-C-0108; ARPA Order 3854)
(AD-A086070; ESL-PR339; SATR-1) Avail: NTIS HC A04/MF A01 CSCL 14/5

The purpose of the Image Transformation Study is to develop techniques for converting oblique aerial photography to the ground level viewing perspectives that would be seen by an observer as he moves around within the imaged area. This report documents the first six months of the investigation. GRA

N80-30821 California Inst. of Tech., Pasadena.
DEGRADATION OF PICTURE QUALITY BY SPECKLE IN COHERENT MAPPING SYSTEMS Ph.D. Thesis
Vuaya Narayan Korwar 1980 183 p
Avail: Univ. Microfilms Order No. 8019904

The problem of specifying the extent of the degradation caused by speckle in pictures meant to be examined by a human observer was investigated. A plausible theoretical model was developed for the decision process used by the observer in the detection or discrimination task. This model was used to relate the probability of making a correct decision to the relevant picture parameters such as contrast ratio between the reflectivities of *various parts of the picture, number of looks per pixel picture* size, and dimension of the features of lines. Calculations for the reasonable SAR parameters of 1 dB contrast ratio and 12 looks per pixel show that, in order to achieve a probability of correct decision of 0.95, (1) a small square in a 100 by 100 pixel background needs to be about 7 pixels on a side; (2) a 100 by 100 pixel grating of line pairs needs to have lines about 2 pixels wide; and (3) a simple geometrical form (a specific one) needs to be at least 12 pixels on a side to be distinguished from another (specific) form of the same size, when these two forms are the only possible alternatives. Dissert. Abstr.

N80-30824*# Lockheed Electronics Co., Houston, Tex. Systems and Services Div.
AS-BUILT DESIGN SPECIFICATION FOR BOUNDARY DETECTION AND REGISTRATION PROGRAM (BDARP1)
D. P. McKay and F. Collen, Principal Investigators Apr. 1978 124 p ERTS
(Contract NAS9-15200)
(E80-10216; NASA-CR-160651; LEC-12128; JSC-13966) Avail: NTIS HC A06/MF A01 CSCL 05B

N80-30826*# Lockheed Electronics Co., Houston, Tex. Systems and Services Div.
DETAILED DESIGN SPECIFICATION FOR THE AUTOMATIC STATUS AND TRACKING SYSTEM MODIFICATIONS FOR LACIE PROCEDURE 1
J. M. Everette, D. L. Smith, and C. C. deValcourt, Principal Investigator May 1977 49 p ERTS
(Contract NAS9-15200)
(E80-10243; NASA-CR-160674; LEC-10529; JSC-12885) Avail: NTIS HC A03/MF A01 CSCL 14B

N80-30827*# Lockheed Electronics Co., Houston, Tex. Systems and Services Div.
PRELIMINARY USER GUIDE FOR THE PROGRAM GTDDM (GROUND TRUTH DOT DUMP)
C. W. Ahlers, Principal Investigator Jul. 1978 11 p refs ERTS
(Contract NAS9-15200)
(E80-10244; NASA-CR-160715; LEC-12636; JSC-14423) Avail: NTIS HC A02/MF A01 CSCL 09B

N80-30828*# Lockheed Electronics Co., Houston, Tex. Aerospace Systems Div.
DESIGN SPECIFICATION FOR COLOR CODED SPECTRAL PLOTS
B. E. Wills, Principal Investigator Sep. 1976 28 p ERTS
(Contract NAS9-12200)
(E80-10245; NASA-CR-160706; LEC-9924; JSC-11851) Avail: NTIS HC A03/MF A01 CSCL 08B

N80-30831*# Lockheed Engineering and Management Services Co., Inc., Houston, Tex.
HIGH DENSITY TAPE REFORMATTING SYSTEM/LANDSAT IMAGERY VERIFICATION AND EXTRACTION SYSTEM (HDTRS/LIVES) THROUGHPUT ANALYSIS
A. J. Bowen, Jr., Principal Investigator Feb. 1980 29 p ERTS
(Contract NAS9-15800)
(E80-10248; NASA-CR-160664; LEMSCO-14548; JSC-16967) Avail: NTIS HC A03/MF A01 CSCL 05B

N80-30832*# Lockheed Electronics Co., Houston, Tex. Systems and Services Div.
IMPLEMENTATION SPECIFICATION FOR LARGE AREA CROP INVENTORY EXPERIMENT (LACIE) PHASE 3 AUTOMATIC STATUS AND TRACKING SYSTEM
C. C. deValcourt Mar. 1977 46 p Revised ERTS
(Contract NAS9-15200)
(E80-10249; NASA-CR-160618; LEC-8675-Rev-A; JSC-11401-Rev-A) Avail: NTIS HC A03/MF A01 CSCL 02C

N80-30833*# Lockheed Electronics Co., Houston, Tex. Systems and Services Div.
AS-BUILT DESIGN SPECIFICATION FOR SCATTER PLOTS FOR DIRECT WHEAT
O. A. Wehmanen, Principal Investigator Oct. 1978 66 p ERTS
(Contract NAS9-15200)
(E80-10250; NASA-CR-160686; LEC-12822; JSC-14546) Avail: NTIS HC A04/MF A01 CSCL 02C

N80-30834*# Lockheed Electronics Co., Houston, Tex. Systems and Services Div.
CLASSIFICATION WITH SPECTRAL-SPATIAL-TEMPORAL ARCHETYPES
P. J. Aucoin, Jr. and L. E. Giddings, Principal Investigators Aug. 1978 21 p ERTS
(Contract NAS9-15200)
(E80-10251; NASA-CR-160716; LEC-12691; JSC-14456) Avail: NTIS HC A02/MF A01 CSCL 05B

N80-30835*# Lockheed Electronics Co., Houston, Tex. Systems and Services Div.
AS-BUILT DESIGN SPECIFICATION FOR FIELD STATISTICS (FIELDSTAT)
D. K. McCarley, Principal Investigator Sep. 1978 99 p ERTS
(Contract NAS9-15200)
(E80-10252; NASA-CR-160685; LEC-12804; JSC-14487) Avail: NTIS HC A05/MF A01 CSCL 05B

N80-30836*# Lockheed Electronics Co., Houston, Tex. Systems and Services Div.
AS-BUILT DESIGN SPECIFICATION FOR CLASY PROGRAM MODIFICATION
P. J. Aucoin, Jr. and C. Horton, Principal Investigators Apr. 1978 171 p ERTS
(Contract NAS9-15200)
(E80-10253; NASA-CR-160711; LEC-12185; JSC-13986) Avail: NTIS HC A08/MF A01 CSCL 05B

N80-30837*# Lockheed Electronics Co., Houston, Tex. Systems and Services Div.
DETAIL DESIGN SPECIFICATION FOR ENHANCEMENT OF THE AUTOMATIC STATUS AND TRACKING SYSTEM SOFTWARE
D. K. McCarley, Principal Investigator, J. M. Everette, and K. P. Eckel Nov. 1977 102 p ERTS
(Contract NAS9-15200)
(E80-10254; NASA-CR-160634; LEC-11512; JSC-13789) Avail: NTIS HC A06/MF A01 CSCL 05B

N80-30838*# Lockheed Electronics Co., Houston, Tex. Systems and Services Div.
DESIGN SPECIFICATION FOR MERGE OF BTREAD, PHASE 1 AND PHASE 2 ACCURACY ASSESSMENT PROGRAMS
A. Rios, Principal Investigator Oct. 1978 11 p ERTS
(Contract NAS9-15200)
(E80-10255; NASA-CR-160718; LEC-12833; JSC-14556) Avail: NTIS HC A02/MF A01 CSCL 09B

N80-30839*# Lockheed Electronics Co., Houston, Tex. Aerospace Systems Div.
USER'S GUIDE LARGE AREA CROP INVENTORY EXPERIMENT (LACIE) PHASE 3 PDP 11/45 AUTOMATIC STATUS AND TRACKING SYSTEM

C. C. deValcourt, Principal Investigator Mar. 1977 48 p ERTS
(Contract NAS9-15200)
(E80-10256; NASA-CR-160722; LEC-10148; JSC-12535) Avail: NTIS HC A03/MF A01 CSCL 14B

N80-30840*# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
CLASSIFICATION OF MULTISPECTRAL IMAGES ACCORDING TO CROSSWISE TEXTURAL CHARACTERISTICS [CLASSIFICACAO DE IMAGENS MULTIESPECTRAIS, TRAVES DE CARACTERISTICAS DE TEXTURA]
Nelson deJesusParada, Principal Investigator, Enivaldo doOFilho, Nelson D. A. Mascarenhas, and Claudio R. Sonnemburg May 1980 87 p refs In PORTUGUESE; ENGLISH summary Sponsored by NASA Original contains imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls, S.D. 57198 ERTS
(E80-10257; NASA-CR-163369; INPE-1734-RPE/134) Avail: NTIS HC A05/MF A01 CSCL 05B

N80-30842*# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
STUDY OF THE ATMOSPHERIC EFFECTS ON THE RADIATION DETECTED BY THE SENSOR ABOARD ORBITING PLATFORMS (ERTS/LANDSAT) M.S. Thesis - October 1978 [ESTUDO DOS EFEITOS ATMOSFERICOS SOBRE AS RADIACOES PELOS SENSORES A BORDO DE PLATFORMAS ORBIT AIS (ERTS/LANDSAT)]
Nelson deJesusParada, Principal Investigator and Tsutomu Morimoto Mar. 1980 110 p refs In PORTUGUESE; ENGLISH summary Sponsored by NASA Original contains color imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls, S.D. 57918 ERTS
(E80-10259; NASA-CR-163366; INPE-1689-TDL/021) Avail: NTIS HC A06/MF A01 CSCL 02C

The author has identified the following significant results. Multispectral scanner data for Brasilia were corrected for atmospheric interference using the LOWTRAN-3 computer program and the analytical solution of the radiative transfer equation. This improved the contrast between two natural targets and the corrected images of two different dates were more similar than the original ones. Corrected images of MSS data for Ribeirao Preto gave a classification accuracy for sugar cane about 10% higher as compared to the original images.

N80-30845*# Lockheed Electronics Co., Houston, Tex. Systems and Services Div.
AS-BUILT DESIGN SPECIFICATION FOR THE PATTERSON-PITT-THADANI MINIMUM LOSS CLASSIFIER
C. W. Ahlers, Principal Investigator May 1978 56 p ERTS
(Contract NAS9-15200)
(E80-10262; NASA-CR-160712; LEC-12285; JSC-14246) Avail: NTIS HC A04/MF A01 CSCL 05B

N80-30846*# Lockheed Electronics Co., Houston, Tex. Systems and Services Div.
AS-BUILT DESIGN SPECIFICATION FOR PHASE 3 MODEL AREAS ADDED TO THE MONTHLY DATA BASE OF THE US
K. Williams, Principal Investigator Mar. 1977 28 p ERTS
(Contract NAS9-15200)
(E80-10263; NASA-CR-160669; LEC-10354; JSC-12709) Avail: NTIS HC A03/MF A01 CSCL 05B

N80-30848*# Lockheed Engineering and Management Services Co., Inc., Houston, Tex.
STATISTICAL OUTLIER DETECTION (SOD): A COMPUTER PROGRAM FOR DETECTING OUTLIERS IN DATA
R. S. Chhikara, C. L. Horton, M. A. Mendlowitz, and A. H. Feiveson, Principal Investigators (NASA. Johnson Space Center) Jun. 1980 25 p refs Sponsored by NASA, USDA, Dept. of Commerce, Dept. of Interior, and Agency for International Development ERTS
(Contract NAS9-15800; Proj. AgRISTARS)
(E80-10275; NASA-CR-160728; FC-LO-00432; LEMSCO-14594; JSC-16346) Avail: NTIS HC A02/MF A01 CSCL 02C

N80-30849*# Lockheed Electronics Co., Houston, Tex. Systems and Services Div.
USER'S GUIDE FOR THE YIELD ESTIMATION SUBSYSTEM DATA MANAGEMENT SYSTEM (YESDAMS)
Roy Davenport and Mike Sestak, Principal Investigators Apr. 1978 51 p ERTS
(Contract NAS9-15200)
(E80-10276; NASA-CR-160710; LEC-12184; JSC-13985) Avail: NTIS HC A04/MF A01 CSCL 05A

N80-30852*# Lockheed Electronics Co., Houston, Tex. Systems and Services Div.
OPERATOR'S GUIDE FOR LACIE PHASE 3 AUTOMATIC STATUS AND TRACKING SYSTEM
D. L. Smith, Principal Investigator Mar. 1977 8 p ERTS
(Contract NAS9-15200)
(E80-10284; NASA-CR-160670; JSC-12729) Avail: NTIS HC A02/MF A01 CSCL 02C

N80-30853*# Lockheed Electronics Co., Houston, Tex. Systems and Services Div.
IMPLEMENTATION SPECIFICATION DOCUMENT FOR MERGE OF BTREAD, PHASE 1, AND PHASE 2 ACCURACY ASSESSMENT PROGRAMS
F. Tragni, Principal Investigator May 1978 14 p ERTS
(Contract NAS9-15200)
(E80-10285; NASA-CR-160713; LEC-12348; JSC-14277) Avail: NTIS HC A02/MF A01 CSCL 09B

N80-30854*# Lockheed Electronics Co., Houston, Tex. Aerospace Systems Div.
DESIGN SPECIFICATION FOR ERIPS FIELDS DATA BASE DECK CONVERSION
C. T. Gardner, Principal Investigator. Jun. 1977 18 p ERTS
(Contract NAS9-12200)
(E80-10286; NASA-CR-160667; LEC-10775; JSC-12950) Avail: NTIS HC A02/MF A01 CSCL 09B

N80-30855*# Lockheed Electronics Co., Houston, Tex. Systems and Services Div.
DRAFT USER PROCEDURES: SOFTWARE WHEAT YIELD PREDICTIONS/FOREIGN EQUIVALENT TEST
J. Stewart, Principal Investigator Nov. 1978 32 p ERTS
(Contract NAS9-15200)
(E80-10287; NASA-CR-160687; LEC-12975; JSC-14607) Avail: NTIS HC A03/MF A01 CSCL 02C

N80-30856*# Lockheed Engineering and Management Services Co., Inc., Houston, Tex.
ESTIMATION OF PROBABILITIES OF LABEL IMPERFECTIONS AND CORRECTION OF MISLABELS
C. B. Chittineni, Principal Investigator Mar. 1980 44 p refs Sponsored by NASA, USDA, Dept. of Commerce, Dept. of Interior and Agency for International Development ERTS
(Contract NAS9-15800; Proj. AgRISTARS)
(E80-10288; NASA-CR-160704; SR-LO-00427; LEMSCO-14356) Avail: NTIS HC A03/MF A01 CSCL 02C

N80-30857*# Lockheed Electronics Co., Houston, Tex. Systems and Services Div.
AS-BUILT DESIGN SPECIFICATION FOR THE CMAS IMAGE-100 HYBRID SYSTEM. VOLUME 2: DETAILED FLOW CHARTS AND PROGRAM LISTINGS, PART 1
L. E. Giddings, Principal Investigator Aug. 1977 395 p ERTS
(Contract NAS9-15200)
(E80-10289; NASA-CR-160709; LEC-10822-Vol-2-Pt-1; JSC-13030-Vol-2-Pt-1) Avail: NTIS HC A17/MF A01 CSCL 09B

N80-30858*# Lockheed Electronics Co., Houston, Tex. Systems and Services Div.
AS-BUILT DESIGN SPECIFICATION FOR THE CAMS IMAGE-100 HYBRID SYSTEM. VOLUME 3: UTILITIES

AND SHARED SUBROUTINES
L. E. Giddings, Principal Investigator Aug. 1977 200 p ref ERTS
(Contract NAS9-15200)
(E80-10290; NASA-CR-160684; LEC-10822-Vol-3; JSC-13030-Vol-3) Avail: NTIS HC A09/MF A01 CSCL 05B

N80-30861*# Lockheed Engineering and Management Services Co., Inc., Houston, Tex.
A LABELING TECHNOLOGY FOR LANDSAT IMAGERY
T. B. Dennis and M. D. Pore, Principal Investigators May 1980 37 p refs Sponsored by NASA, USDA, Dept. of Commerce, Dept. of Interior and Agency for International Development ERTS
(Contract NAS9-15800; Proj. AgRISTARS)
(E80-10293; NASA-CR-160689; AR-LO-00425; LEMSCO-14357; JSC-16341) Avail: NTIS HC A03/MF A01 CSCL 02C

N80-30862*# Lockheed Engineering and Management Services Co., Inc., Houston, Tex.
MAXIMAL ANALYSIS LABELING PROCEDURE (PRELIMINARY)
J. M. Disler, Principal Investigator Feb. 1980 37 p refs Sponsored by NASA, USDA, Dept. of Commerce, Dept. of Interior and Agency for International Development ERTS
(Contract NAS9-15800; Proj. AgRISTARS)
(E80-10294; NASA-CR-160665; FC-LO-00700; JSC-16399) Avail: NTIS HC A03/MF A01 CSCL 02C

N80-30870*# Lockheed Engineering and Management Services Co., Inc., Houston, Tex.
EVALUATING THE USE OF ANALYST LABELS IN MAXIMUM LIKELIHOOD CLUSTER PROPORTION ESTIMATION
R. K. Lennington and G. R. Terrell, Principal Investigators Apr. 1980 14 p refs Sponsored by NASA, USDA, Dept. of Commerce, Dept. of Interior and Agency for International Development ERTS
(Contract NAS9-15800; Proj. AgRISTARS)
(E80-10303; NASA-CR-160754; SR-LO-00456; LEMSCO-14672; JSC-16538) Avail: NTIS HC A02/MF A01 CSCL 05B

N80-30871*# Lockheed Engineering and Management Services Co., Inc., Houston, Tex.
EVALUATION OF BAYESIAN SEQUENTIAL PROPORTION ESTIMATION USING ANALYST LABELS
R. K. Lennington and K. M. Abotteen, Principal Investigators May 1980 17 p refs Sponsored by NASA, USDA, Dept. of Commerce, Dept. of Interior and Agency for International Development ERTS
(Contract NAS9-15800; Proj. AgRISTARS)
(E80-10304; NASA-CR-160753; SR-LO-00453; LEMSCO-14355; JSC-16361) Avail: NTIS HC A02/MF A01 CSCL 05B

The author has identified the following significant results. A total of ten Large Area Crop Inventory Experiment Phase 3 blind sites and analyst-interpreter labels were used in a study to compare proportional estimates obtained by the Bayes sequential procedure with estimates obtained from simple random sampling and from Procedure 1. The analyst error rate using the Bayes technique was shown to be no greater than that for the simple random sampling. Also, the segment proportion estimates produced using this technique had smaller bias and mean squared errors than the estimates produced using either simple random sampling or Procedure 1.

N80-30872*# Lockheed Electronics Co., Houston, Tex. Systems and Services Div.
AS-BUILT DESIGN SPECIFICATION OF THE CAMS/CAS INTERFACE TAPE REPORT GENERATION PROGRAM FOR LACIE 8
K. P. Eckel, Principal Investigator May 1978 131 p ERTS
(Contract NAS9-15200)
(E80-10306; NASA-CR-160750; LEC-12267; JSC-14238) Avail: NTIS HC A07/MF A01 CSCL 09B

N80-30873*# Lockheed Electronics Co., Houston, Tex. Systems and Services Div.
AS-BUILT SPECIFICATION FOR CLASSY CONVERSION
P. J. Aucoin, Jr. and C. Horton, Principal Investigators Sep. 1978 261 p ERTS
(Contract NAS9-15200)
(E80-10307; NASA-CR-160751; LEC-12743; JSC-14475) Avail: NTIS HC A12/MF A01 CSCL 09B

N80-30874*# Environmental Research Inst. of Michigan, Ann Arbor.
ANALYSIS OF SCANNER DATA FOR CROP INVENTORIES Progress Report, 15 Nov. 1979 - 15 Feb. 1980
May 1980 97 p Sponsored by NASA, USDA, Dept. of Commerce, Dept. of Interior and Agency for International Development ERTS
(Contract NAS9-15476; Proj. AgRISTARS)
(E80-10308; NASA-CR-160698; ERIM-132400-39-P) Avail: NTIS HC A05/MF A01 CSCL 05B

N80-30875*# Zentralstelle fuer Geo-Photogrammetrie und Fernerkundung, Munich (West Germany).
APPLICATION EXPLORER MISSION-A HEAT CAPACITY MAPPING MISSION Progress Report
[1980] 19 p Original contains imagery. Original imagery may be purchased from NASA Goddard Space Flight Center, (code 601), Greenbelt, Md. 20771. Domestic users send orders to Attn: National Space Science Data Center'; non-domestic users send orders to 'Attn: World Data Center A for Rockets and Satellites'. HCMM
(E80-10309; NASA-CR-163378) Avail: NTIS HC A02/MF A01 CSCL 08B

The author has identified the following significant results. Fine orogenic sediments, not detectable on the images recorded within the visible wavelength region, can be clearly recognized on all night IR-images. The area of glaciation in the northern foreland of the Alps can be partially identified on the basis of night-IR data. The terminal moraine of various glacierization phases can be mapped and the relative dry and unsorted moraine material consisting of crystalline components can be located through the vegetation cover. The eastern part of the glaciation area can be traced because of reverse temperature effect. In addition to the upper Bavarian lakes, the night-IR images clearly indicate the distribution of high soil moisture areas such as swamps and bogs. The geological border of the upper fresh water molasse in the northern part of the basin north of Munich is identifiable on night IR-imagery. Drift peat areas can be located on day-IR images of the dry season of the year.

N80-31012# World Meteorological Organization, Geneva (Switzerland).
THE 7TH WMO EXECUTIVE COMMITTE INTER-GOVERNMENT PANEL SESSION ON THE FIRST GARP GLOBAL EXPERIMENT Global Atmospheric Research Programme
1979 134 p refs Conf. held at Geneva, Nov. 1979 Prepared in cooperation with International Council of Scientific Unions, Rome (Italy)
(GARP-Spec-35) Avail: NTIS HC A07/MF A01

The performance of the First Garp Global Experiment (FGGE) Composite Observing System, the status of FGGE data management, and implementation of the regional experiments were reviewed. An assessment of data sets collected during the Global Weather Experiment by surface stations ships and buoys, balloons, satellites, and aircraft is presented. Author (ESA)

N80-31072*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
A HILL-SLIDING STRATEGY FOR INITIALIZATION OF GAUSSIAN CLUSTERS IN THE MULTIDIMENSIONAL SPACE
John K. Park, Yung H. Chen, Daryl B. Simons, and Lee D. Miller Jul. 1980 29 p refs Presented at the Joint Soil and Machine Process. of Remotely Sensed Data Symp., West

Lafayette, Ind., 3-6 Jun. 1980
(NASA-TM-80721; Rept-80F4508) Avail: NTIS HC A03/MF A01 CSCL 09B

A hill sliding technique was devised to extract Gaussian clusters from the multivariate probability density estimate of sample data for the first step of iterative unsupervised classification. Each cluster was assumed to posses a unimodal normal distribution. A clustering function proposed distinguished elements of a cluster under formation from the rest in the feature space. Initial clusters were extracted one by one according to the hill sliding tactics. A dimensionless cluster compactness parameter was proposed as a universal measure of cluster goodness and used satisfactorily in test runs with LANDSAT multispectral scanner data. The normalized divergence, defined by the cluster divergence divided by the entropy of the entire sample data, was utilized as a general separability measure between clusters. An overall clustering objective function was set forth in terms of cluster covariance matrices, from which the cluster compactness measure could be deduced. Minimal improvement of initial data partitioning was evaluated by this objective function in eliminating scattered sparse data points. The hill sliding clustering technique developed herein has the potential applicability to decomposition any multivariate mixture distribution into a number of unimodal distributions when an appropriate distribution function to the data set is employed. R.K.G.

N80-31429# National Environmental Satellite Service, Washington, D. C.
SATELLITE ACTIVITIES OF NOAA, 1979
Jul. 1980 25 p
Avail: NTIS HC A02/MF A01

Programs using satellite data from the National Oceanic and Atmospheric Administration's polar orbiting and geostationary systems are described. These include: determining winds and temperature; monitoring global radiation; environmental warning systems; monitoring agriculture conditions; determining Earth's shape and gravity field; fisheries monitoring; and determining oceans, lakes, and hydrological conditions. L.F.M.

N80-31856*# National Aeronautics and Space Administration, Washington, D. C.
A DESCRIPTION OF A SYSTEM OF PROGRAMS FOR MATHEMATICALLY PROCESSING ON UNIFIED SERIES (YeS) COMPUTERS PHOTOGRAPHIC IMAGES OF THE EARTH TAKEN FROM SPACECRAFT
V. G. Zolotukhin, B. I. Kolosov, D. A. Usikov, V. I. Borisenko, S. T. Mosin, and V. N. Gorokhov Jun. 1980 29 p refs Transl. into ENGLISH of "Opisaniye systemy Programm Mathematicheskoy Obrabutki na EVM Yedinoy Serii (ES) Fotograficheskikh Apparatov (Kompleks SOFI)", Rept. Pr-336 Acad. of Sci. USSR, Inst. of Space Research, Moscow, 1977 p 1-30 Transl. by Scientific Translation Service, Santa Barbara, Calif. Original doc. prep. by Academy of Sciences (USSR), Moscow
(Contract NASw-3198)
(NASA-TM-76208; Pr-336) Avail: NTIS HC A03/MF A01 CSCL 14E

A description of a batch of programs for the YeS-1040 computer combined into an automated system for processing photo (and video) images of the Earth's surface, taken from spacecraft, is presented. Individual programs with the detailed discussion of the algorithmic and programmatic facilities needed by the user are presented. The basic principles for assembling the system, and the control programs are included. The exchange format within whose framework the cataloging of any programs recommended for the system of processing will be activated in the future is displayed. T.M.

N80-31859# Army Engineer Topographic Labs., Fort Belvoir, Va.
ERRORS IN AUTOMATIC PASS POINT MENSURATION USING DIGITAL TECHNIQUES
Michael A. Crombie Jun. 1980 22 p refs
(DA Proj. 4A7-62707-A-855)
(AD-A087443; ETL-0232) Avail: NTIS HC A02/MF A01 CSCL 08/2

A technique for automatically measuring pass points from digital stereo images is evaluated. Numerical estimates of x-parallax and y-parallax for a specific stereo pair of images is presented as a function of terrain relief. GRA

N80-31864# Royal Aircraft Establishment, Farnborough (England).
A STUDY OF LANDSAT MULTISPECTRAL SCANNER DATA TAPES
A. H. Benny London HMSO Feb. 1980 37 p refs
(RAE-TR-80018; RAE-Space-574; BR73767) Avail: NTIS HC A03/MF A01

A detailed study is described of a number of computer compatible magnetic tapes containing LANDSAT multi-spectral scanner (MSS) data. The differences between raw and corrected data tapes are shown along with the conversion process. It also shows the differences between the existing and a new form of corrected data tape. A computer program was written to enable raw data desirable for certain computer analyses to be obtained from the existing stocks of corrected data tapes. Author (ESA)

N80-31865# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Abteilung Digitale Bildverarbeitung.
COMPARATIVE EXPERIMENTAL STUDY ON THE USE OF ORIGINAL AND COMPRESSED MULTISPECTRAL LANDSAT DATA FOR APPLIED RESEARCH
Klaus A. Ulbricht Feb. 1980 81 p refs Original contains color illustrations
(Contract ESTEC-3569/78-NL-HP(SC))
(DFVLR-FB-80-03; ESA-CR(P)-1343) Avail: NTIS HC A05/MF A01

Parts of two multispectral LANDSAT scenes, compressed by ratio 6.4 to 1, were investigated to determine the effect of the compression on the image contents. The LANDSAT image of the Bayuda desert in Sudan was submitted to supervised maximum likelihood classification before and after compression of data as a function of the rejection class parameter sigma. Different approaches as to the use of circular or rectangular training areas for classification on original and compressed scene served to investigate the influence of compression on image contents. Partitioning of classified image is given on a percentage basis as a function of sigma. Three dimensional clusters of spectral channels and histograms show the influence of compression. The heavy population of blue green algae on LANDSAT scene of the baltic of August 7, 1975, was another example used to test the influence of data compression. Three dimensional clusters of grey values of spectral channels of the investigated area and histograms show influence of compression. The effects of compression on partitioning of classified scences, are displayed in several tables and figures. Author (ESA)

N80-31975# Automation Industries, Inc., Silver Spring, Md. Vitro Labs. Div.
ENVIRONMENTAL DATA FOR SITES IN THE NATIONAL SOLAR DATA NETWORK Progress Report, Feb. 1980
Feb. 1980 221 p
(Contract DE-AC01-79CS-30027)
(SOLAR/0010-80/02) Avail: NTIS HC A10/MF A01

The network consits of (1) sensors which measure key performance parameters at a selected site; (2) a Site Data Acquisition System (SDAS); (3) telephone transmission circuits; and (4) a Central Data Processing System (CDPS). Sensor data are collected and stored on a cassette tape in the SDAS. The CDPS collects and processes the information and performs the required computations. For the majority of parameters, raw data is collected approximately every five minutes. Solar insolation and certain other parameters, which are subject to rapid variance, are sampled every 32 seconds. The CDPS interrogates each SDAS on a daily basis and retrieves all accumulated data. At the conclusion of data retrieval, the SDAS Cassette is reset by command from the CDPS for continuing data collection. Environmental information collected at the sites for the reporting month are presented. Only those sites for which the data are found to be valid are reported. DOE

N80-32808*# Purdue Univ., Lafayette, Ind. Lab. for Applications of Remote Sensing.
A MULTIPROCESSOR IMPLEMENTATION OF A CONTEXTUAL IMAGE PROCESSING ALGORITHM
B. W. Smith, H. J. Siegel, and P. H. Swain, Principal Investigators Jul. 1980 234 p refs Sponsored by NASA, USDA, Dept. of Commerce, Dept. of Interior, and Agency for International Development ERTS
(Contract NAS9-15466; Proj. AgRISTARS)
(E80-10313; NASA-CR-163402; LARS-070180; SR-PO-00474) Avail: NTIS HC A11/MF A01 CSCL 05B

N80-32810*# Lockheed Electronics Co., Houston, Tex. Systems and Services Div.
SEASAT-A LAND APPLICATIONS DATA PROCESSING PLAN
S. B. Chism, Jr., Principal Investigator Jan. 1977 50 p refs ERTS
(Contract NAS9-15200)
(E80-10317; NASA-CR-160640; JSC-12574; LEC-9978) Avail: NTIS HC A03/MF A01 CSCL 05B

N80-32811*# Lockheed Engineering and Management Services Co., Inc., Houston, Tex.
HIGH DENSITY TAPE REFORMATTING SYSTEM/LANDSAT IMAGERY VERIFICATION AND EXTRACTION SYSTEM (HDTRS/LIVES) PRODUCTION TEST THROUGHPUT ANALYSIS
A. J. Bowen, Jr., Principal Investigator Jun. 1980 39 p refs ERTS
(Contract NAS9-15800)
(E80-10319; NASA-CR-160735; JSC-16718; LEMSCO-15039) Avail: NTIS HC A03/MF A01 CSCL 05B

N80-32812*# Lockheed Engineering and Management Services Co., Inc., Houston, Tex.
AS-BUILT DESIGN SPECIFICATION FOR EQUIPROBABILITY ELLIPSES REPRESENTATION OF CLASSY CLUSTERS
C. L. Horton and R. K. Lennington, Principal Investigators Mar. 1980 52 p ref ERTS
(Contract NAS9-15800)
(E80-10320; NASA-CR-160740; JSC-16703; LEMSCO-15019) Avail: NTIS HC A04/MF A01 CSCL 05B

N80-32813*# Lockheed Engineering and Management Services Co., Inc., Houston, Tex.
OPERATION PLAN FOR THE HIGH DENSITY TAPE/LANDSAT IMAGERY VERIFICATION AND EXTRACTION SYSTEM (HDT/LIVES) DATA PROCESSING SUPPORT
A. J. Bowen, Jr., Principal Investigator Jun. 1980 28 p refs
(Contract NAS9-15800)
(E80-10322; NASA-CR-160736) Avail: NTIS HC A03/MF A01 CSCL 05B

N80-32814*# Lockheed Electronics Co., Houston, Tex. Systems and Services Div.
AS-BUILT DESIGN SPECIFICATION FOR CCIT8 PROCESSOR PROGRAM
R. F. Hansen, Principal Investigator Feb. 1979 65 p ERTS
(Contract NAS9-15800)
(E80-10323; NASA-CR-160738; LEC-13077; JSC-14704) Avail: NTIS HC A04/MF A01 CSCL 05B

N80-32816*# Lockheed Electronics Co., Houston, Tex. Systems and Services Div.
AS-BUILT DESIGN SPECIFICATION FOR A LIST PROCESSING SYSTEM
C. W. Ahlers, P. J. Aucoin, Jr., and C. L. Horton, Principal Investigators Jan. 1979 281 p refs ERTS
(Contract NAS9-15800)
(E80-10325; NASA-CR-160739; JSC-14663; LEC-13076) Avail: NTIS HC A13/MF A01 CSCL 05B

N80-32832# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
COLLECTION, PROCESSING, AND DISTRIBUTION OF REMOTE SENSING DATA FROM BRAZILIAN RECEIVING STATION
Nelson deJesusParada Jun. 1980 18 p
(INPE-1784-RPE/156) Avail: NTIS HC A02/MF A01

Basic information about the Brazilian LANDSAT tracking, receiving, processing and distribution system operated by INPE the Cachoeira Paulista Electronic and Photographic Processing Laboratory and Distribution Center. The increase of the users community - with more than 1,200 participant organizations - and the increase of the volume of images produced - near 20,000 in 1979 - are effective demonstration of the importance of remote sensing in Brazil. Types and prices of products available, product request and related items are discussed. Also, the already planned future achievements of the Brazilian Remote Sensing Satellite Program are briefly described. R.K.G.

N80-32838*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
ON EXTRACTING BRIGHTNESS TEMPERATURE MAPS FROM SCANNING RADIOMETER DATA
P. Argentiero and Raul Garza-Robles Aug. 1980 27 p refs Submitted for publication
(NASA-TM-81989) Avail: NTIS HC A03/MF A01 CSCL 08B

The extraction of brightness temperature maps from scanning radiometer data is described as a typical linear inverse problem. Spatial quantization and parameter estimation is described and is suggested as an advantageous approach to a solution. Since this approach takes into explicit account the multivariate nature of the problem, it permits an accurate determination of the most detailed resolution extractable from the data as well as explicitly defining the possible compromises between accuracy and resolution. To illustrate the usefulness of the method described for algorithm design and accuracy prediction, it was applied to the problem of providing brightness temperature maps during the NOSS flight segment. The most detained possible resolution was determined and a curve which displays the possible compromises between accuracy and resolution was provided.
Author

N80-33647# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
PLATFORM ANTENNAS FOR DATA COLLECTION [ANTENA PARA PLATFORMA DE COLETA DE DEOS]
Benjamin daSilva M. C. Galvao and Carlos E. Santana Jul. 1980 33 p refs in PORTUGUESE; ENGLISH summary Presented at 32d Reunion of the Brazilian Soc. for the Prog. of Sci., Rio de Janeiro, 6-12 Jul. 1980
(INPE-1820-RPE/186) Avail: NTIS HC A03/MF A01

The theoretical development and the design of a quadrifilar helix antenna to be used in platforms for the collection and transmission of environmental data are presented. The chief characteristic of the antenna is its shaped radiation diagram, with a reduced gain in the vertical (axial) pointing direction, in order to compensate for the variation in attenuation due to slant range to a low orbit satellite. Author

N80-33830*# Purdue Univ., Lafayette, Ind. Lab. for Applications of Remote Sensing.
A MULTISPECTRAL DATA SIMULATION TECHNIQUE
Marwan J. Muasher and Philip H. Swain, Principal Investigators Jul. 1980 27 p Sponsored by NASA, USDA, Dept. of Commerce, Dept. of Interior and Agency for International Development ERTS
(Contract NAS9-15466; Proj. AgRISTARS)
(E80-10311; NASA-CR-163379; SR-PO-00469; LARS-TR-070980) Avail: NTIS HC A03/MF A01 CSCL 05B

N80-33831*# South Dakota State Univ., Brookings. Remote Sensing Inst.
IMPACT OF CELL SIZE ON INVENTORY AND MAPPING ERRORS IN A CELLULAR GEOGRAPHIC INFORMATION

SYSTEM
Michael E. Wehde, Principal Investigator Apr. 1979 96 p refs ERTS
(Grant NGL-42-003-007)
(E80-10315; NASA-CR-163403; SDSU-RSI-79-03) Avail: NTIS HC A05/MF A01 CSCL 08B

The author has identified the following significant results. The effect of grid position was found insignificant for maps but highly significant for isolated mapping units. A modelable relationship between mapping error and cell size was observed for the map segment analyzed. Map data structure was also analyzed with an interboundary distance distribution approach. Map data structure and the impact of cell size on that structure were observed. The existence of a model allowing prediction of mapping error based on map structure was hypothesized and two generations of models were tested under simplifying assumptions.

N80-33832*# Lockheed Engineering and Management Services Co., Inc., Houston, Tex.
UTILIZATION OF SPECTRAL-SPATIAL INFORMATION IN THE CLASSIFICATION OF IMAGERY DATA
C. B. Chittineni, Principal Investigator Jun. 1980 69 p refs Sponsored by NASA, USDA, Dept. of Commerce, Dept. of Interior and Agency for International Development ERTS
(Contract NAS9-15800; Proj. AgRISTARS)
(E80-10321; NASA-CR-160737; SR-LO-00419; LEMSCO-14310; JSC-16335) Avail: NTIS HC A04/MF A01 CSCL 02C

N80-33837# National Physical Research Lab., Pretoria (South Africa). Optical Sciences Division.
BONNE'S PROJECTION OF METEOSAT IMAGES
A. S. VanZyl Oct. 1979 20 p refs
(CSIR-SR-FIS-201; ISBN-0-7988-1656-2) Avail: NTIS HC A02/MF A01

Bonne projection achieves area preservation at the expense of shape in representing the curved surface of a sphere on a flat plane. Equal area map projection subroutines were developed, integrated into the CSIR-VICAR image processing system, and applied to Meteosat images for geometric transformation of specified areas. The subroutines are functionally described and factors detracting from the accuracy of the projection are examined. A.R.H.

N80-33840# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil). Division de Information.
A METHOD FOR EDGE DETECTION IN IMAGES OF NATURAL RESOURCES [PROCESSAMENTO DE IMAGENS DETECCAO DE BORDASSEGMENTACAO DE IMAGENS]
Nelson D. A. Mascarenhas and Luciano V. Dutra Dutra Jun. 1980 20 p refs In PORTUGUESE Presented at 20th Symp. of Appl. Graphics and Interactive Graphic Systems, 20-22 Aug. 1980, Sao Paulo, Brazil Revised
(INPE-1768-RPE/154) Avail: NTIS HC A02/MF A01

Images derived from remote and meteorological sensing present a problem in distinguishing the borders (edges) among regions of differing textures. Where texture is defined as localized density, a two stage algorithm is employed: (1) a binary image is statistically derived: (2) regions of high and low density are reduced to uniformity by topological methods. The LANDSAT images thus processed show improved continuity and compare favorably with the natural borders. Transl. by S.F.

N80-33847# Defense Mapping Agency Hydrographic and Topographic Center, Washington, D.C.
APPLICATION OF THEMATIC MAPPING TECHNIQUES IN TERRAIN ANALYSIS
Theodore W. Howard Jan. 1980 9 p refs Presented at the ACSM/ASP Conf.
(AD-A089061) Avail: NTIS HC A02/MF A01 CSCL 08/2

The mission to support the Department of Defense (DoD) with terrain information has recently become the responsibility of the Defense Mapping Agency (DMA). The techniques employed to produce data bases of terrain conditions and the synthesizing of this data base information into terrain analysis products are critical in supporting mission requirements. Thematic mapping procedures provide the mechanism by which remote sensors, interpretation techniques, thematic subjects, data analysis techniques, and products can be examined in terms of production feasibility and capabilities. GRA

N80-33848# IBM Federal Systems Center, Gaithersburg, Md.
INTERACTIVE DIGITAL IMAGE PROCESSING INVESTIGATION, PHASE 2
W. C. Rice and J. S. Shipman Apr. 1980 194 p
(Contract DAAK70-77-C-0166)
(AD-A087518; ETL-0221) Avail: NTIS HC A09/MF A01 CSCL 20/6

The development of the interactive multi-channel image classification capabilities of the DIAL system is addressed. Additional DIAL algorithms to support classification were developed, coded, and tested. These included a program module (PM) to apply the Karhunen-Loeve transformation to a multi-channel image, which has the effect of reducing the dimensionality of an image without significantly descreasing its information content. In addition two algorithms in refining class assignment by relaxation methods were developed. One was selected, then coded on DIAL and was applied to a classification of a site, where it removed speckle, sharpened field boundaries, and increased the overall classification accuracy. The programming of the computationally intensive part of the maximum likelihood method on the STRAN computer is described. Finally an experiment in the maximum likelihood classification of a LANDSAT scene using the DIAL PMs was performed. This experiment demonstrated the the utility of the interactive classification algorithms in the study of the relationship between flora and geological structures. M.G.

08
INSTRUMENTATION AND SENSORS

Includes data acquisition and camera systems and remote sensors.

A80-45766 # **A telemechanical system for hydrophysical studies in the ocean (Sistema telemekhaniki dlia gidrofizicheskikh issledovanii v okeane).** V. M. Zhukov, L. G. Palevich, and V. N. Tutevich (Akademiia Nauk SSSR, Institut Okeanologii, Moscow, USSR). *Okeanologiia,* vol. 20, May-June 1980, p. 545-547. In Russian.

The paper describes a pulse-code telemechanical system for the acquisition of ocean data. The system is capable of transmitting data concerning 32 different ocean parameters from the sensors to the control point aboard a ship. A block diagram of the system is presented. B.J.

A80-47480 * **Spaceborne imaging radar - Geologic and oceanographic applications.** C. Elachi (California Institute of Technology, Jet Propulsion Laboratory, Earth and Space Sciences Div., Pasadena, Calif.). *Science,* vol. 209, Sept. 5, 1980, p. 1073-1082. 35 refs. Contract No. NAS7-100.

Synoptic, large-area radar images of the earth's land and ocean surface, obtained from the Seasat orbiting spacecraft, show the potential for geologic mapping and for monitoring of ocean surface patterns. Structural and topographic features such as lineaments, anticlines, folds and domes, drainage patterns, stratification, and roughness units can be mapped. Ocean surface waves, internal waves, current boundaries, and large-scale eddies have been observed in numerous images taken by the Seasat imaging radar. This article gives an illustrated overview of these applications. (Author)

A80-48911 **Large field-of-view interferometers for environmental sensing.** D. J. Baker (Utah State University of Agriculture and Applied Science, Logan, Utah). *Optical Engineering,* vol. 19, July-Aug. 1980, p. 515-517. 7 refs.

The paper deals with the optical compensation of an interferometer-spectrometer used for remotely sensing optical emission spectra associated with the environment. For a practical instrument using prism-type compensator elements, a viewing field can be extended to more than ten degrees full range. V.T.

A80-49662 # **Spacecraft trajectories for the remote sensing of the earth (Traektorii dvizheniia kosmicheskikh apparatov, prednaznachennykh dlia issledovaniia zemli iz kosmosa).** E. L. Lukashevich (Gosudarstvennyi Nauchno-Issledovatel'skii i Proizvodstvennyi Tsentr Priroda, USSR). *Issledovanie Zemli iz Kosmosa,* May-June 1980, p. 91-97. 7 refs. In Russian.

Satellite orbit planning for the remote sensing of the earth surface is reviewed. Attention is given to orbit calculation methods and to satellite maneuver procedures for keeping earth resources satellites within the prescribed orbits. B.J.

A80-51233 * **Magsat - A new satellite to survey the earth's magnetic field.** F. F. Mobley, L. D. Eckard, G. H. Fountain (Johns Hopkins University, Applied Physics Laboratory, Laurel, Md.), and G. W. Ousley (NASA, Goddard Space Flight Center, Greenbelt, Md.). *(Institute of Electrical and Electronics Engineers, International Magnetics Conference, 18th, Boston, Mass., Apr. 21-24, 1980.) IEEE Transactions on Magnetics,* vol. MAG-16, Sept. 1980, p. 758-760. 7 refs.

The Magsat satellite was launched on Oct. 30, 1979 into a sun-synchronous dawn-dusk orbit, of 97 deg inclination, 350 km perigee, and 550 km apogee. It contains a precision vector magnetometer and a cesium-vapor scalar magnetometer at the end of a 6-m long graphite epoxy scissors boom. The magnetometers are accurate to 2 nanotesla. A pair of star cameras are used to define the body orientation to 10 arc sec rms. An 'attitude transfer system' measures the orientation of the magnetometer sensors relative to the star cameras to approximately 5 arc sec rms. The satellite position is determined to 70 meters rms by Doppler tracking. The overall objective is to determine each component of the earth's vector magnetic field to an accuracy of 6 nanotesla rms. The Magsat satellite gathers a complete picture of the earth's magnetic field every 12 hours. The vector components are sampled 16 times per second with a resolution of 0.5 nanotesla. The data will be used by the U.S. Geological Survey to prepare 1980 world magnetic field charts and to detect large-scale magnetic anomalies in the earth's crust for use in planning resource exploration strategy. (Author)

A80-51579 * **Microwave radiometric determination of oceanographic and meteorological parameters.** T. T. Wilheit (NASA, Goddard Space Flight Center, Greenbelt, Md.). In: Space research. Volume 20 - Proceedings of the Open Meetings of the Working Groups on Physical Sciences, Bangalore, India, May 29-June 9, 1979. Oxford and Elmsford, N.Y., Pergamon Press, 1980, p. 15-20. 9 refs.

The thermal microwave brightness from the atmosphere over an ocean in the range 5-40 GHz is influenced primarily by the distribution of vapor and liquid water in the atmosphere and the temperature and wind speed at the sea surface. The Scanning Multichannel Microwave Radiometer (SMMR), which was carried aboard both the Nimbus-7 and Seasat satellites (both launched in 1978), measures this radiation at five frequencies to find these four parameters. A retrieval algorithm has been developed which, on simulated data, yields accuracies of 1.5 C in sea surface temperature, 0.9 m/s in wind speed, 4 mg/ sq cm of cloud liquid water content and 0.14gm/sq cm of precipitable water vapor. Results from the Seasat SMMR, while both preliminary and sparse, are consistent with these simulations. (Author)

A80-52046 **Airborne thermal viewer having a circular scanner viewing axis.** A. A. Babaev. *(Optiko-Mekhanicheskaia Promyshlennost',* vol. 47, Jan. 1980, p. 15-17.) *Soviet Journal of Optical Technology,* vol. 47, Jan. 1980, p. 15-17. Translation.

It is shown that the use of a two-mirror scanning system, high-performance stabilization, and proper selection of the ratio of the sides of the radiant energy receiver (RER) make it possible to scan the earth's surface with practically no distortions due to line overlap and omission. Through the use of a mosaic RER and multichannel signal transmission it is possible to obtain a limited improvement in the sensitivity in the middle of the strip being scanned. (Author)

A80-53094 **Activities and future plan of earth observation by satellites.** Y. Hakura (National Space Development Agency of Japan, Tokyo, Japan). *Acta Astronautica,* vol. 7, Aug.-Sept. 1980, p. 1049-1064.

The Earth Observation Center of NASDA has been receiving MSS and RBV (return beam vidicon) data from NASA's Landsat satellites since January 1979. The data are widely used for research and applications by government institutions, universities, industries, etc. The first of the Japanese earth observation satellite series, MOS-1 (Marine Observation Satellite-1), which carries MESSR (visible and near-IR radiometer of push-broom scanning type), VTIR (visible and thermal IR radiometer), and MSR (microwave scanning radiometer), is under development with target launch date in FY 1984. (Author)

A80-53609 **Landsat-D - Overview and implications.** L. W. Warzecha and R. J. Katucki (General Electric Co., Space Div., Philadelphia, Pa.). In: Space developments for the future of mankind; International Astronautical Congress, 30th, Munich, West Germany, September 17-22, 1979, Selected Papers. Congress sponsored by the International Astronautical Federation. Oxford, Pergamon Press, Ltd., 1980, p. 91-100.

The Landsat-D mission system is reviewed with reference to the program objectives, flight segment, ground segment, and planned operation in orbit. The goal of Landsat-D is to advance the technology of remote sensing of the earth's resources from space. Landsat-D will incorporate new technology in the flight segment through the Thematic Mapper (TM), a new sensor which extends from four to seven bands the spectral region sensing capacity of previous Landsat spacecraft. High-resolution TM data will be transmitted at a rate of 84.9 Mbps, necessitating changes in the ground data processing equipment. Consideration is also given to the international implications of the mission. V.L.

A80-53891 * **Radar altimeter mean return waveforms from near-normal-incidence ocean surface scattering.** G. S. Hayne (Applied Science Associates, Inc., Apex, N.C.). *IEEE Transactions on Antennas and Propagation*, vol. AP-28, Sept. 1980, p. 687-692. 19 refs. Contract No. NAS6-2810.

Under assumptions common in radar altimetry, the mean backscattered return power for a short-pulse radar and near-normal-incidence scattering from a rough ocean surface is given by the convolution of several terms. For a nearly Gaussian transmitted pulse shape scattered from a nearly Gaussian distributed sea surface, a small-argument series expansion of one of the terms within the convolution leads to a several-term power series expansion for the mean return waveform. Specific expressions are given for the first four terms. These results, which require much less computer time than would the otherwise necessary numerical convolution, are useful for data analysis from current or past radar altimeters and for design studies of future systems. Several representative results are presented for an idealized Seasat radar altimeter. (Author)

N80-28637*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

THE DEVELOPMENT OF A STEPPED FREQUENCY MICROWAVE RADIOMETER AND ITS APPLICATION TO REMOTE SENSING OF THE EARTH

Richard F. Harrington Jun. 1980 181 p refs
(NASA-TM-81847) Avail: NTIS HC A09/MF A01 CSCL 09C

The design, development, application, and capabilities of a variable frequency microwave radiometer are described. This radiometer demonstrated the versatility, accuracy, and stability required to provide contributions to the geophysical understanding of ocean and ice processes. A closed-loop feedback method was used, whereby noise pulses were added to the received electromagnetic radiation to achieve a null balance in a Dicke switched radiometer. Stability was achieved through the use of a constant temperature enclosure around the low loss microwave front end. The Dicke reference temperature was maintained to an absolute accuracy of 0.1 K using a closed-loop proportional temperature controller. A microprocessor based digital controller operates the radiometer and records the data on computer compatible tapes. This radiometer exhibits an absolute accuracy of better than 0.5 K when the sensitivity is 0.1 K. The sensitivity varies between 0.0125 K and 1.25 K depending upon the bandwidth and integration time selected by the digital controller. Remote sensing experiments were conducted from an aircraft platform and the first radiometeric mapping of an ocean polar front; exploratory experiments to measure the thickness of lake ice; first discrimination between first year and multiyear ice below 10 GHz; and the first known measurements of frequency sensitive characteristics of sea ice. L.F.M.

N80-28853# Virginia Dept. of Highways and Transportation, Richmond. Aerial Safety Section.

AEROTRIANGULATION CONTROL OF LARGE SCALE PHOTOGRAPHY FROM SMALL SCALE PHOTOGRAPHY Final Report

George W. Habel, Jr. 26 Oct. 1979 49 p Sponsored by Federal Highway Administration
(PB80-161524; FHWA-VA-79-1) Avail: NTIS HC A03/MF A01 CSCL 14E

Tests were conducted to determine if a simultaneous adjustment of high and low altitude photography would yield results superior to either scale when used alone. These tests also offered an excellent opportunity to test the metric qualities of two different cameras and the relative metric qualities of black and white and color film. It was concluded that using a simultaneous adjustment is a good photogrammetric practice under certain circumstances. It was also found that the RC-10 camera normally gave a flatter bridge than the RC-8, and there was no appreciable difference in the metric qualities of the black and white and color film used in these tests. GRA

N80-29407# Dornier-Werke G.m.b.H., Friedrichshafen (West Germany). Hauptabteilung Raumfahrtprogramme.

CONCEPTUAL STUDY OF A EUROPEAN REMOTE SENSING SATELLITE WITH COMBINED OPTICAL AND MICROWAVE PAYLOAD Final Report

Wolfgang Gilg, E. Achtermann, K.-L. Bitzer, K. Ernsberger, K.-H. Fabiunke, G. Lehn, W. Schuler, W. Trogus, E. Velten, M. Westphal et al Bonn Bundesmin. fuer Forsch. u. Technol. Nov. 1979 110 p refs In GERMAN; ENGLISH summary Sponsored by Bundesministerium fuer Forschung und Technologie Prepared in cooperation with DFVLR, Oberpfaffenhofen, West Germany (BMFT-FB-W-79-18) Avail: NTIS HC A06/MF A01; Fachinformationszentrum, Karlsruhe, West Germany DM 22,70

The concept of a European remote sensing satellite (ERDSAT) launched by ARIANE and carrying a model payload, consisting of a synthetic aperture radar and an optical multispectral scanner with nine channels for land applications or coastal zone missions is characterized. The mission goal of ERDSAT is based on European user requirements where a strong need for optical and microwave sensor operation on board the same satellite in a simultaneous or sequential mode is expressed. A data collection system is included. The proposed satellite is three-axes-stabilized and has a Sun-synchronous, near polar circular orbit at 750 km altitude. The selected configuration separates payload module and bus module. A thermostable carbon fiber grating structure constitutes the central framework of the satellite. Each major subsystem is housed in a separate compartment and can be integrated and tested individually. First mass estimates result in 450 kg for the payload and 880 kg for the bus. The maximum power needed is 1750 W (for 6 minutes, three times a day), which is provided by a 1330 W solar array and two batteries. Author (ESA)

N80-29801*# Eastman Kodak Co., Rochester, N. Y.

ADVANCED SOLID STATE EARTH RESOURCES SATELLITE STUDY Final Report

30 Jun. 1980 70 p refs Original contains color imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls, S.D. 57198 ERTS
(Contract NASw-3375)
(E80-10232; NASA-CR-163337; RC-00221) Avail: NTIS HC A04/MF A01 CSCL 22B

N80-30822 Old Dominion Univ., Norfolk, Va.

THE DEVELOPMENT OF A STEPPED FREQUENCY MICROWAVE RADIOMETER AND ITS APPLICATION TO REMOTE SENSING OF THE EARTH Ph.D. Thesis

Richard Harrington 1980 188 p
Avail: Univ. Microfilms Order No. 8020139

The design, development, application, and capabilities of a variable frequency microwave radiometer are described. This radiometer has demonstrated the versatility, accuracy, and stability required to provide contributions to the geophysical understanding

of ocean and ice processes. The design technique utilized a closed loop feedback method, whereby noise pulses were added to the received electromagnetic radiation to achieve a null balance in a Dicke switched radiometer. Stability was achieved through the use of a constant temperature enclosure around the low loss microwave front end. Remote sensing experiments were conducted from an aircraft platform using this radiometer. Four significant scientific observations were accomplished during these experiments. These observations consisted of the first radiometric mapping of an ocean polar front, exploratory experiments to measure the thickness of lake ice, first discrimination between first year and multiyear ice below 10 GHz, and the first known measurements of frequency sensitive characteristics of sea ice.
Dissert. Abstr.

N80-31857*# National Aeronautics and Space Administration, Washington, D. C.
RADUGA EXPERIMENT: MULTIZONAL PHOTOGRAPHING THE EARTH FROM THE SOYUZ-22 SPACECRAFT
Ya. Ziman, Yu. Chesnokov, B. Dunayev, V. Aksenov, V. Bykovskiy, R. Ioaskhim, K. Myuller, V. Choppe, and V. Volter Jul. 1980 27 p refs Transl. into ENGLISH of "Eksperiment Raduga--Mnogozonal Noye Fotografirovan ye Zemli s Kosmicheskogo Korablya Soyuza-22" Rept D-254 Acad. of Sci. USSR, Inst. of Space Res., Moscow, 1977 p 1-35 Transl. by Scientific Translation Service, Santa Barbara, Calif.
(Contract NASw-3198)
(NASA-TM-76234; D-254) Avail: NTIS HC A03/MF A01 CSCL 14E

The main results of the scientific research and 'Raduga' experiment are reported. Technical parameters are presented for the MKF-6 camera and the MSP-4 projector. Characteristics of the obtained materials and certain results of their processing are reported.
L.F.M.

N80-31863# Centro Informazioni Studi Esperienze, Milan (Italy). Servizio Documentazione.
SENSORS FOR REMOTE SENSING [SENSORI PER TELERILEVAMENTO]
E. M. Bastida, F. Gardossi, A. Sona, F. Svelto, and V. Svelto Jan. 1979 53 p refs In ITALIAN; ENGLISH summary
(CISE-N-190) Avail: NTIS HC A04/MF A01

The most important remote sensing methods are discussed. Particular attention is devoted to the sensors, defined as the components transforming the electromagnetic information into usable data. Photographic methods, radar and microwave methods, and applications of infrared and laser radiation are included.
Author (ESA)

N80-32807*# Dartmouth Coll., Hanover, N.H.
AN INVESTIGATION OF VEGETATION AND OTHER EARTH RESOURCE/FEATURE PARAMETERS USING LANDSAT AND OTHER REMOTE SENSING DATA. 1: LANDSAT. 2: REMOTE SENSING OF VOLCANIC EMISSIONS *Semiannual Status Report, 1 Feb. - 31 Jul. 1980*
Richard W. Birnie and Richard E. Stoiber, Principal Investigators 31 Jul. 1980 45 p refs Original contains imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls, S. D. 57198 ERTS
(Contract NCC5-22)
(E80-10312; NASA-CR-163401; SASR-1) Avail: NTIS HC A03/MF A01 CSCL 05B

N80-33047*# Georgia Inst. of Tech., Atlanta. Engineering Experiment Station.
A 94/183 GHz MULTICHANNEL RADIOMETER FOR CONVAIR FLIGHTS Final Technical Report, 6 Apr. 1978 - 2 Feb. 1979
J. A. Gagliano, J. A. Stratigos, R. E. Forsythe, and J. M. Schuchardt Jan. 1979 243 p
(Contract NAS5-24480)
(NASA-CR-160032) Avail: NTIS HC A11/MF A01 CSCL 14B

A multichannel 94/183 GHz radiometer was designed, built, and installed on the NASA Convair 990 research aircraft to take data for hurricane penetration flights, SEASAT-A underflights for measuring rain and water vapor, and Nimbus-G underflights for new sea ice signatures and sea surface temperature data (94 GHz only). The radiometer utilized IF frequencies of 1, 5, and 8.75 GHz about the peak of the atmospheric water vapor absorption line, centered at 183.3 GHz, to gather data needed to determine the shape of the water molecule line. Another portion of the radiometer operated at 94 GHz and obtained data on the sea brightness temperature, sea ice signatures, and on areas of rain near the ocean surface. The radiometer used a multiple lens antenna/temperature calibration technique using 3 lenses and corrugated feed horns at 94 GHz and 183 GHz. Alignment of the feed beams at 94 GHz and 183 GHz was accomplished using a 45 deg oriented reflecting surface which permitted simultaneous viewing of the feeds on alternate cycles of the chopping intervals.
Author

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GENERAL

Includes economic analysis.

A80-45575 **Space law - A new proposal.** F. Lay (United Nations, New York, N.Y.). *Journal of Space Law*, vol. 8, Spring 1980, p. 41-57. 35 refs.

The paper discusses the U.N. Agreement Governing the Activities of States on the Moon which was concluded in 1979. The agreement binds the contracting states to elaborate a regime for the equitable allocation of benefits which will result when the commercial exploitation of the moon's resources becomes feasible; in addition, it provides that the international community will be informed of the results of research and findings of space powers on the moon. The U.N. is continuing work on space applications including the elaboration of principles for the regulation of future direct television broadcasting via satellite, study of remote sensing of earth resources from space, and regulation of nuclear-power sources on space vehicles. Dangers of militarization of outer space are discussed, raising a question as to whether military space technology can be considered a peaceful activity compatible with the objective of 'peaceful use' of outer space. A.T.

A80-46300 # **Concept of a research aircraft for remote sensing, using an integrated sensor/data system (Konzept eines Forschungsflugzeuges für die Fernerkundung mit integriertem Sensor- und Datensystem).** G. Miosga (Deutsche Forschungs- und Versuchsanstalt für Luft- und Raumfahrt, Institut für Optoelektronik, Braunschweig, West Germany). *Deutsche Gesellschaft für Luft- und Raumfahrt, Jahrestagung, 13th, Braunschweig, West Germany, May 28-30, 1980, Paper 80-051*. 34 p. In German.

The paper deals with a concept for defining an experimental aircraft for earth resource surveys. The mission requirements are formulated, and the determination of the type of aircraft best suited to meet these requirements is discussed, along with the onboard data-acquisition and sensor systems. V.P.

A80-50280 # **Earth observation from space today and tomorrow (Kosmicheskoe prirodovedenie segodnia i zavtra).** Iu. Kienko (Gosudarstvennyi Nauchno-Issledovatel'skii i Proizvodstvennyi Tsentr Priroda, USSR). *Aviatsiia i Kosmonavtika*, Aug. 1980, p. 38, 39. In Russian.

Soviet efforts involving the remote sensing of earth resources and environmental monitoring from space are briefly reviewed. The importance of remote sensing for economic development is emphasized. B.J.

A80-52691 **Brazil in space.** T. Pirard. *Spaceflight*, vol. 22, June 1980, p. 237-239. 5 refs.

The objectives of the Brazilian space research are reviewed, emphasizing those technical applications which will aid in Brazil's social and educational development. The various projects and research activities in Brazil are the responsibility of both the Institute for Space Research (INPE) and the Institute for Space Activities (IAE). Remote sensing of resources, such as sugar cane crops with Landsat imagery, and the use of communications satellites for economic and educational purposes are the two space applications in which INPE is interested, while the principal task of the IAE engineers and technicians is the development of the national launch vehicle, based on the technology of the present Sonda rockets. A.C.W.

A80-53148 **Utilization of space for scientific and economic purposes in the USSR in 1978 (Osvoenie kosmicheskogo prostranstva v SSSR 1978: Kosmos-nauke i narodnomu khoziaistvu).** Edited by R. Z. Sagdeev. Moscow, Izdatel'stvo Nauka, 1980. 190 p. In Russian.

This volume is a compilation of TASS communications published in the USSR in 1979, concerning the exploration of space. The communications deal with remote sensing of earth resources from Saliut 6 and satellites of the Cosmos and Molniia series, the exploration of the planet Venus by means of the Venera 11 and 12 probes, the achievements of the Saliut 6 space laboratory, the contribution to star catalogs, lunar explorations, manufacturing under conditions of weightlessness, etc. V.P.

A80-53350 # **China space report /Based on observations made during an invited tour with an AIAA delegation, November 1979/.** W. L. Pritchard (Satellite Systems Engineering, Inc., Bethesda, Md.) and J. J. Harford (American Institute of Aeronautics and Astronautics, Inc., New York, N.Y.). New York, American Institute of Aeronautics and Astronautics, Inc., 1980. 212 p. 16 refs. $20.

The book describes an invited tour of an AIAA delegation to the People's Republic of China to promote cooperation through the exchange of scientific and technological information in the fields of communication satellites, earth resources satellites, and meteorological satellites. Background of U.S.-China relations is discussed, chronology of specific visits is presented, and observations and tips for travel in China are outlined. V.T.

N80-29802*# Washington Univ., St. Louis, Mo. Center for Development Technology.
PROGRAM ON STIMULATING OPERATIONAL PRIVATE SECTOR USE OF EARTH OBSERVATION SATELLITE DATA
***Technical Progress Status Report*, 15 Jan. - 15 Jun. 1980**
Lester F. Eastwood, Jr., Jerry Foshage, Guillermo Gomez, Becky Kirkpatrick, Barry Konig, Bret Smith, Robert Stein, Francis Vithayathil, and Katherine Warner, Principal Investigators 15 Jun. 1980 125 p refs ERTS
(Contract NASw-3331)
(E80-10233; NASA-CR-163338) Avail: NTIS HC A06/MF A01 CSCL 05B

N80-29823*# Cornell Univ., Ithaca, N. Y. Remote Sensing Program.
CORNELL UNIVERSITY REMOTE SENSING PROGRAM
Semiannual Status Report, 1 Dec. 1979 - 31 May 1980
Ta Liang, Principal Investigator and Warren R. Philipson Jun. 1980 100 p refs Original contains imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls, S.D. 57198 ERTS
(Grant NGL-33-010-171)
(E80-10280; NASA-CR-163346) Avail: NTIS HC A05/MF A01 CSCL 05B

N80-31420*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
REPORT ON ACTIVE AND PLANNED SPACECRAFT AND EXPERIMENTS
Richard Horowitz, ed. and Robert W. Nostreys, ed. Aug. 1980 319 p
(NASA-TM-80905; NSSDC/WDC-A-R/S-80-06) Avail: NTIS HC A14/MF A01 CSCL 22A

Information on current and planned spacecraft activity for a broad range of scientific disciplines is presented. The information covers a wide range of disciplines: astronomy, Earth sciences, meteorology, planetary sciences, aeronomy, particles and fields, solar physics, life sciences, and material sciences. These spacecraft projects represent the efforts and funding of individual countries as well as cooperative arrangements among different countries. R.C.T.

N80-32295# Council on Environmental Quality, Washington, D.C.
THE GLOBAL 2000 REPORT TO THE PRESIDENT. ENTERING THE TWENTY-FIRST CENTURY, VOLUME 1
1980 55 p refs 2 Vol.
Avail: SOD HC

Probable trends in population, resources, and environment were estimated between the year 1975 and 2000. Trend projections were developed using the long term global models employed by federal agencies. It is indicated that if present trends continue, the world in 2000 will be more crowded, more polluted, less stable ecologically, and more vulnerable to disruption than the world today. Major findings and conclusions are reported. R.C.T.

N80-32296# Council on Environmental Quality, Washington, D.C.
THE GLOBAL 2000 REPORT TO THE PRESIDENT. ENTERING THE TWENTY-FIRST CENTURY. VOLUME 2: THE TECHNICAL REPORT
1980 775 p refs 2 Vol.
Avail: SOD HC

Changes in pollution, climate, technology, Earth resources, energy, and the environment until the end of the century as projected by U.S. Government agencies using their most frequently employed long term planning models and analytical tools are discussed. A sequential approach was used to obtain a measure of self consistency, coherence, and interrelationship so as to provide an integrated global model which reflects the implications if current U.S. policies remain unchanged. Each of the models used is described and other global models are examined and compared with the global model developed. A.R.H.

N80-33425*# National Aeronautics and Space Administration, Washington, D. C.
THE UNITED STATES SPACE OBSERVATION POLICY
Michele Chevrel Oct. 1980 10 p Transl. into ENGLISH from Les Cahiers de l'OPIT (France), Dossier no. 2, Winter 1979/1980 p 22-25 Transl. by Scientific Translation Service, Santa Barbara, Calif.
(Contract NASw-3198)
(NASA-TM-76373) Avail: NTIS HC A02/MF A01 CSCL 22A

The steps pursued since 1978 to establish an operational civil space remote sensing system are outlined. The role of the National Oceanographic and Atmospheric Agency is defined, and the problems still remaining are discussed. T.M.

N80-33845*# National Aeronautics and Space Administration, Washington, D. C.
PRIVATE SECTOR INVOLVEMENT IN CIVIL SPACE REMOTE SENSING. VOLUME 1: REPORT
15 Jun. 1979 37 p Sponsored in part by NOAA, Dept. of the Interior, Dept. of Agriculture, DOD, EPA, Army Corps of Engineers and Dept. of State
(NASA-TM-82206) Avail: NTIS HC A03/MF A01 CSCL 05B

A survey of private sector developers, users, and interpreters of Earth resources data was conducted in an effort to encourage private investment and participation in remote sensing systems. Results indicate positive interest in participation beyond the current hardware contracting level, however, there is a substantial gap between current market levels and system costs. Issues identified include the selection process for an operating entity, the public/private interface, data collection and access policies, price and profit regulation in a subsidized system, international participation, and the responsibility for research and development. It was agreed that the cost, complexity, and security implications of integrated systems need not be an absolute bar to their private operation. J.M.S.

N80-33846*# National Aeronautics and Space Administration, Washington, D. C.
PRIVATE SECTOR INVOLVEMENT IN CIVIL SPACE REMOTE SENSING. VOLUME 2: APPENDICES
15 Jun. 1980 123 p Sponsored in part by NOAA, Dept. of the Interior, Dept. of Agriculture, DOD, EPA, Army Corps of Engineers and Dept. of State
(NASA-TM-82207) Avail: NTIS HC A06/MF A01 CSCL 05B

The U.S. Space Policy concerning the investment and direct participation in the establishment and operations of remote sensing systems is addressed. Private sector views and state and local government views are presented. Results of a market analysis are pregiven and the economic feasibility of such a program is considered. J.M.S.

N80-34041# National Oceanic and Atmospheric Administration, Washington, D. C. Federal Coordinator for Meteorological Services and Supporting Research.
THE FEDERAL PLAN FOR METEOROLOGICAL SERVICES AND SUPPORTING RESEARCH, FISCAL YEAR 1981
T. B. Owen Mar. 1980 120 p
(PB80-199482; FCM-80-3; NOAA-80051901) Avail: NTIS HC A06/MF A01 CSCL 04B

This Federal Plan is the sixteenth in an annual series, produced in compliance with Section 304 of Public Law 87-843, to provide the Congress with a description of governmental programs in meteorology, and to outline the specific functions and funding requested by each agency involved. GRA

N80-34294# Committee on Commerce, Science, and Transportation (U. S. Senate).
OPERATIONAL REMOTE SENSING LEGISLATION, PART 1
Washington GPO 1979 245 p Hearings on S. 663 and S. 875 before the subcomm. on Sci., Technol., and Transportation, 96th Congr., 1st Sess., 9 and 11 Apr. 1979
(GPO-45-048) Avail: Subcomm. on Sci., Technol., and Space

Legislation to establish an Earth data and information service in NASA is presented. Legislation to provide for the establishment, ownership, operation, and regulation of a commercial Earth resources information service, utilizing satellites and other technologies, is presented. These hearings on remote sensing were before the Subcommittee on Science, Technology, and Space of the United States Senate. T.M.

N80-34295# Committee on Commerce, Science, and Transportation (U. S. Senate).
OPERATIONAL REMOTE SENSING LEGISLATION, PART 2
Washington GPO 1979 74 p refs Hearings on S. 663 and S. 875 before the Subcomm. on Sci., Technol., and Space of the Comm. on Com., Sci., and Transportation
(GPO-52-581) Avail: Subcommittee on Science, Technology, and Space

Legislation to establish an Earth data and information service in NASA is presented. Legislation to provide for the establishment, ownership, operation, and regulation of a commercial Earth resources information service, utilizing satellites and other technologies, is presented. These hearings on remote sensing were before the Subcommittee on Science, Technology, and Space of the United States Senate. T.M.

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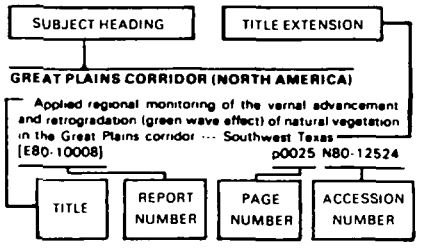

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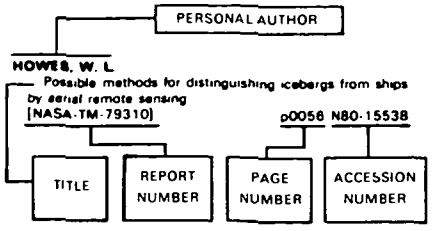

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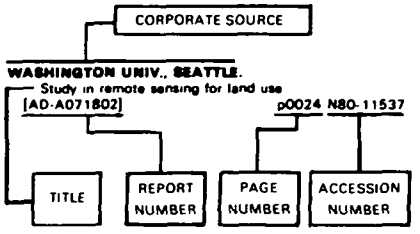

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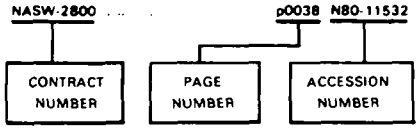

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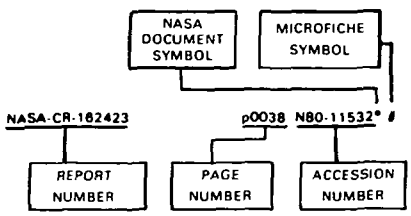

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16. Abstract

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