NASA

Earth Resources
A Continuing
Bibliography
with Indexes

NASA SP-7041(38)
July 1983

National Aeronautics and
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25th Anniversary
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NASA SP-7041(38)
Earth Resources
A Continuing Bibliography with Indexes
Pages 1-90
July 1983

ACCESSION NUMBER RANGES

Accession numbers cited in this Supplement fall within the following ranges.

STAR (N-10000 Series)	N83-16275 - N83-23266
IAA (A-10000 Series)	A83-19624 - A83-29977

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NASA SP-7041(38)

EARTH RESOURCES

A CONTINUING BIBLIOGRAPHY WITH INDEXES

Issue 38

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 April 1 and June 30, 1983 in

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

Scientific and Technical Information Branch 1983
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 623 reports, articles, and other documents announced between April 1 and June 30, 1983 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.

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

IAA entries identified by accession number series A83-10,000 in ascending accession number order;

STAR entries identified by accession number series N83-10,000 in ascending accession number order.

After the abstract section, there are six indexes:

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All publications abstracted in this Section are available from the Technical Information Service, American Institute of Aeronautics and Astronautics, Inc. (AIAA), as follows: Paper copies of accessions are available at $8.00 per document. Microfiche[1] of documents announced in *IAA* are available at the rate of $4.00 per microfiche on demand, and at the rate of $1.35 per microfiche for standing orders for all *IAA* microfiche.

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N83-14561*# Department of Agriculture, Washington, D.C. Statistical Reporting Service.
CONSTRUCTION OF A REMOTELY SENSED AREA SAMPLING FRAME FOR SOUTHERN BRAZIL
R. FECSO, W. GARDNER, B. HALE, V. JOHNSON, and S. PAVLASEK, Principal Investigators Jun. 1982 44 p refs
Sponsored by NASA, USDA, Dept. of Commerce, Dept. of the Interior, and Agency for International Development ERTS
(Contract PROJ. AGRISTARS)
(E83-10052; NASA-CR-169568; IT-U2-04332; NAS 1.26:169568; AGES-820526) Avail: NTIS HC A03/MF A01 CSCL 08B

A remotely sensed area sampling frame was constructed for selected areas in Southern Brazil. The sampling unit information was stored in digital form in a latitudinal/longitudinal characterized population. Computerized sampling procedures were developed which allow for flexibility in sample unit specifications and sampling designs. Author

TYPICAL CITATION AND ABSTRACT FROM *IAA*

NASA SPONSORED DOCUMENT — AVAILABLE ON MICROFICHE — AIAA ACCESSION NUMBER — TITLE — AUTHORS — AUTHOR'S AFFILIATION — MEETING — MEETING DATE

A83-16701*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
OSTA-1/OCEAN COLOR EXPERIMENT
H. H. KIM (NASA, Goddard Space Flight Center, Greenbelt, MD) and H. VAN DER PIEPEN (Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen, West Germany) American Institute of Aeronautics and Astronautics, Aerospace Sciences Meeting, 21st, Reno, NV, Jan. 10-13, 1983, 8 p.
(AIAA PAPER 83-0415)

Ocean Color Experiment (OCE) on the OSTA-1 mission acquired ocean images at several widely separated locations on the earth. Digital computer enhancement and band ratioing techniques were used to emphasize patterns of chlorophyll and sediment distribution in the Yellow Sea and, in one case, of bottom topography in the Great Bahama Bank. Two scenes in the Gulf of Cadiz from orbits 30 and 32 were geometrically corrected to show the movement of plankton patches. This technique enabled ocean current velocities to be deduced. A duplicate of the OCE instrument mounted on a DFVLR aircraft was flown over an area of the Atlantic Ocean off the coast of Portugal during the Shuttle mission. (Author)

EARTH RESOURCES

A Continuing Bibliography (Issue 38)

JULY 1983

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AGRICULTURE AND FORESTRY

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

A83-19848* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
THE APPLICATION OF FOREST CLASSIFICATION FROM LANDSAT DATA AS A BASIS FOR NATURAL HYDROCARBON EMISSION ESTIMATION AND PHOTOCHEMICAL OXIDANT MODEL SIMULATIONS IN SOUTHEASTERN VIRGINIA
J. SALOP (Virginia State Air Pollution Control Board, Virginia Beach, VA), N. T. WAKELYN (NASA, Langley Research Center, Hampton, VA), G. F. LEVY (Old Dominion University, Norfolk, VA), W. M. MIDDLETON, and J. C. GERVIN (NASA, Goddard Space Flight Center, Greenbelt, MD) Air Pollution Control Association, Journal, vol. 33, Jan. 1983, p. 17-22. refs

The possible contribution by natural hydrocarbon emissions to the total ozone budget recorded in the Tidewater region of southeastern Virginia during the height of the summer period was examined. Natural sources investigated were limited to the primary HC emitters and most prevalent natural vegetation, the forests. Three types and their areal coverage were determined for Region VI of the Virginia State Air Pollution Control Board using remotely sensed data from Landsat, a NASA experimental earth resources satellite. Emission factors appropriate to the specific types (coniferous 0.24 x 10 to the 13th, mixed 0.63 x 10 to the 13th, deciduous 1.92 x 10 to the 13th, microgram/h), derived from contemporary procedures, were applied to produce an overall regional emission rate of 2.79 x 10 to the 13th microgram/h for natural non-methane hydrocarbons (NMHC). This rate was used with estimates of the anthropogenic NO(x) and NMHC loading, as input into a photochemical box model. Additional HC loading on the order of that estimated to be produced by the natural forest communities was required in order to reach certain measured summer peak ozone levels as the computer simulation was unable to account for the measured episodic levels on the basis of the anthropogenic inventory alone. (Author)

A83-20223*# Computer Sciences Corp., Silver Spring, Md.
A MODEL FOR MICROWAVE EMISSION FROM VEGETATION-COVERED FIELDS
T. MO (Computer Sciences Corp., Silver Spring, MD), B. J. CHOUDHURY, T. J. SCHMUGGE, J. R. WANG (NASA, Goddard Space Flight Center, Greenbelt, MD), and T. J. JACKSON (U.S. Department of Agriculture, Hydrology Laboratory, Beltsville, MD) *Journal of Geophysical Research, vol. 87, Dec. 20, 1982, p. 11229-11237.* refs

The measured brightness temperatures over vegetation-covered fields are simulated by a radiative transfer model which treats the vegetation as a uniform canopy with a constant temperature, over a moist soil which emits polarized microwave radiation. The analytic formula for the microwave emission has four parameters: roughness height, polarization mixing factor, effective canopy optical thickness, and single scattering albedo. A good representation has been obtained with the model for both the horizontally and vertically polarized brightness temperatures at 1.4 and 5 GHz frequencies, over fields covered with grass, soybean and corn. A directly proportional relation is found between effective canopy optical thickness and the amount of water present in the vegetation canopy. The effective canopy single scattering albedo depends on vegetation type. O.C.

A83-21435* Ohio State Univ., Columbus.
LANDSAT-DERIVED LAND-COVER CLASSIFICATIONS FOR LOCATING POTENTIAL KESTREL NESTING HABITAT
J. G. LYON (Ohio State University, Columbus, OH) Photogrammetric Engineering and Remote Sensing, vol. 49, Feb. 1983, p. 245-250. NASA-sponsored research refs
(Contract NOAA-04-M01-134)

A83-21617* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
A CONCEPT FOR GLOBAL CROP FORECASTING
U. M. LOVELACE and R. L. WRIGHT (NASA, Langley Research Center, Hampton, VA) British Interplanetary Society, Journal (Space Chronicle) vol. 36, Feb. 1983, p. 59-65.

The mission, instrumentation, and design concepts for microwave radiometer satellites for continuous crop condition forecasting and monitoring on a global basis are described. Soil moisture affects both crop growth and the dielectric properties of the soil, and can be quantified by analysis of reflected radiance passively received by orbiting spacecraft. A dedicated satellite reading a swath 200 km across, with 1 km and 1 K temperature resolution, could track the time-varying changes of solid moisture, sea ice, and water surface temperature. Launched by the Shuttle into an interim orbit, a boost would place the satellite in a 400 or 700 km orbit. Resolution requirements indicate a 45-725 m diam antenna, with 70 dB gain, operating at frequencies of 1.08, 2.03, and 4.95 GHz to ensure atmospheric transparency. Alternative structural concepts include either double-layer tetrahedral or single-layer geodesic trusses as the basic structural members. An analysis of the electrostatic positioning of the parabolic antenna membrane is outlined. D.H.K.

A83-21917
CLASSIFICATION OF SAR IMAGERY FROM AN AGRICULTURAL REGION USING DIGITAL TEXTURAL ANALYSIS
D. R. NUESCH (Zurich, Universitat, Zurich, Switzerland) In: International Society for Photogrammetry and Remote Sensing, International Symposium, Toulouse, France, September 13-17, 1982, Transactions. Volume 1. Toulouse, Groupement pour le Developpement de la Teledetection Aerospatiale, 1982, p. 231-240. refs

In June 1981, four channel Synthetic Aperture Radar (SAR) data were gathered over the St. Aubin test area in Switzerland. Digital imagery from a 2 x 2 km area was obtained using optical processing of the signal film and digital recording of the output image (Hybrid processor). A digital filter algorithm was developed to minimize the effect of coherent speckle. Digital measures of image texture, as well as the local approximation to the mean value of individual agricultural fields, were used to perform crop discrimination. (Author)

A83-21918
EVALUATION OF DIGITAL SLAR IMAGES FOR AN AGRICULTURAL AREA
S. MOHAN (Indian Space Research Organization, Space Applications Centre, Ahmedabad, India) and J. NITHACK (Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen, West Germany) In: International Society for Photogrammetry and Remote Sensing, International Symposium, Toulouse, France, September 13-17, 1982, Transactions. Volume 1. Toulouse, Groupement pour le Developpement de la Teledetection Aerospatiale, 1982, p. 241-248. refs

The evaluation of digital SLAR images is considered for an agricultural area in India, the Kundal test site southwest of Ahmedabad in Gujarat. The effects of row direction, soil moisture conditions, land/water interfaces, and the characteristics of different land-use categories were investigated. It is shown that the influence of radiometric errors can be eliminated by the use of the mean return characteristics of the sensors, and that the interpretation key can be generated on the basis of local statistics of various ground features. B.J.

A83-21923
MICROWAVE RADIOMETRIC SIGNATURES OF CORN
F. BENINCASA, G. FASANO, A. MATERASSI, S. PALOSCIA, P. PAMPALONI, and G. ZIPOLI (CNR, Istituto di Analisi Ambientale e Telerilevamento Applicati all'Agricoltura, Florence, Italy) In: International Society for Photogrammetry and Remote Sensing, International Symposium, Toulouse, France, September 13-17, 1982, Transactions. Volume 1. Toulouse, Groupement pour le Developpement de la Teledetection Aerospatiale, 1982, p. 279-287. refs

A83-21928
THE INFLUENCE OF TIME OF YEAR AND THE COLORS OF PRAIRIE FLORA BLOOM ON THEIR SPECTRAL BEHAVIOR AND THAT OF THE PRAIRIE WHERE THEY ARE FOUND [INFLUENCE DES DATES ET DES COULEURS DE FLORAISON D'ESPECES PRAIRIALES SUR LE COMPORTEMENT SPECTRAL ET CELUI DE LA PRAIRIE OU ELLES SE TROUVENT]
C. M. GIRARD (Institut National Agronomique Paris-Grignon, Thiverval-Grignon, Yvelines, France) In: International Society for Photogrammetry and Remote Sensing, International Symposium, Toulouse, France, September 13-17, 1982, Transactions. Volume 1. Toulouse, Groupement pour le Developpement de la Teledetection Aerospatiale, 1982, p. 335-344. In French. refs

A83-21929
A SPOT-LANDSAT COMPARISON SIMULATION IN A FORESTED REGION - ERMENONVILLE 1980 [COMPARAISON SIMULATION SPOT-LANDSAT EN MILIEU FORESTIER - ERMENONVILLE 1980]
R. CHAUME (Office de la Recherche Scientifique et Technique d'Outre Mer, Bureau de Teledetection, Bondy, Seine-Saint-Denis, France) In: International Society for Photogrammetry and Remote Sensing, International Symposium, Toulouse, France, September 13-17, 1982, Transactions. Volume 1. Toulouse, Groupement pour le Developpement de la Teledetection Aerospatiale, 1982, p. 357-366. In French.

Simulated Spot satellite imagery from a forested region was compared with Landsat data for the same area. The forest was dominated by oak and beech trees in calcine brown soil, silvester pines and spruce on sandy soil, and also featured clear areas and water bodies. The comparisons were made for the Spot XS2 and XS3 channels and the Landsat channels 5 and 7. Landsat was found to depend weakly on the scene dynamics and displayed varying signal strengths with the channel used, while the Spot Daedalus radiometer produced consistent amplitude imagery. Higher correlations were observed between the Spot channels than those of the Landsat bands. Polling the channels revealed equal capabilities of identifying the tree populations in terms of deciduous or coniferous trees, although clear zones in the forest were not clearly defined. Finally, the finer resolution of the Spot instrumentation demonstrated the ability to distinguish spaces between trees. M.S.K.

A83-21930* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
RESEARCH ADVANCES IN SATELLITE-AIDED CROP FORECASTING
J. ERICKSON, J. DRAGG, R. BIZZELL, and M. TRICHEL (NASA, Johnson Space Center, Houston, TX) In: International Society for Photogrammetry and Remote Sensing, International Symposium, Toulouse, France, September 13-17, 1982, Transactions. Volume 1. Toulouse, Groupement pour le Developpement de la Teledetection Aerospatiale, 1982, p. 367-376. refs

The underlying concept of the technology is to estimate crop area and yield for specified regions and to multiply the two to obtain production at the regional level. The treatment here is mainly of area estimation. The approach to non-U.S. crop forecasting does not require ground observations. Among the problems hampering development are the need to estimate crop areas much earlier in the season and the need for information extraction methods that reduce the quantity and quality of the data required. C.R.

A83-21931
MAPPING SEMI-ARID VEGETATION IN NORTHERN KENYA FROM LANDSAT DIGITAL DATA
G. H. GRIFFITHS and W. G. COLLINS (Aston, University, Birmingham, England) In: International Society for Photogrammetry and Remote Sensing, International Symposium, Toulouse, France, September 13-17, 1982, Transactions. Volume 1. Toulouse, Groupement pour le Developpement de la Teledetection Aerospatiale, 1982, p. 381-386. Research supported by the Overseas Development Administration.

A83-21932
A CANADIAN APPROACH TO LARGE REGION CROP AREA ESTIMATION WITH LANDSAT
R. A. RYERSON (Canada Centre for Remote Sensing, Ottawa, Canada), J.-L. TAMBAY, and R. PLOURDE (Statistics Canada, Ottawa, Canada) In: International Society for Photogrammetry and Remote Sensing, International Symposium, Toulouse, France, September 13-17, 1982, Transactions. Volume 1. Toulouse, Groupement pour le Developpement de la Teledetection Aerospatiale, 1982, p. 387-396. Research supported by Statistics Canada, Canadian Centre for Remote Sensing, and Canola Council of Canada. refs

This paper describes the methodology used and results of an application of Landsat data to timely Canola/rapeseed area estimation in a 140,000 sq. km. region of western Canada. Of special importance is the integration of the strongest features of digital image analysis with visual image interpretation. The resulting methodology is particularly useful for radid estimation of crop areas in large regions. (Author)

A83-21933
COMPUTER-AIDED SOIL EVALUATION METHODS ON LANDSAT IMAGES IN CULTURED LANDSCAPES
J. JAKOB, J. LAMP (Kiel, Neue Universitat, Kiel, West Germany), and M. LEHNER (Deutsche Forschungs- und Versuchsanstalt fur Luft- und Raumfahrt, Oberpfaffenhofen, West Germany) In: International Society for Photogrammetry and Remote Sensing, International Symposium, Toulouse, France, September 13-17, 1982, Transactions. Volume 1. Toulouse, Groupement pour le Developpement de la Teledetection Aerospatiale, 1982, p. 397-405. refs

For intensively cultivated North-German landscapes, Landsat-imagery can make an important contribution for general soil survey. Computer aided methods that improve the visibility not only of spectral, but of spatial patterns stand in the foreground. A bitemporal approach serves to narrow down spectral classes. Interpretation is done visually by analogy, using known relations between soils, parent material, physiography, landuse, crops and parcelling pattern. (Author)

A83-21935
THE VISUAL INTERPRETATION OF LANDSAT IMAGERY - THE POSSIBILITIES OF THE UTILIZATION OF LANDSAT IMAGERY IMPROVED FOR FORESTRY STUDIES IN TROPICAL REGIONS [ANALYSE VISUELLE D'IMAGES LANDSAT - POSSIBILITES D'UTILISATION D'IMAGES LANDSAT AMELIOREES DANS LE CADRE D'ETUDES FORESTIERES EN ZONE TROPICALE]
J. GUELLEC (Centre Technique Forestier Tropical, Nogent-sur-Marne, Val-de-Marne, France) In: International Society for Photogrammetry and Remote Sensing, International Symposium, Toulouse, France, September 13-17, 1982, Transactions. Volume 1. Toulouse, Groupement pour le Developpement de la Teledetection Aerospatiale, 1982, p. 433-442. In French.

A83-21936
PLANT FORMATIONS CARTOGRAPHY FOR THE REPUBLIC OF SENEGAL USING REMOTE SENSING [CARTOGRAPHIE DES FORMATIONS VEGETALES DE LA REPUBLIQUE DU SENEGAL PAR TELEDETECTION]
M. PAIN (Centre Technique Forestier Tropical, Nogent-sur-Marne, Val-de-Marne, France) In: International Society for Photogrammetry and Remote Sensing, International Symposium, Toulouse, France, September 13-17, 1982, Transactions. Volume 1. Toulouse, Groupement pour le Developpement de la Teledetection Aerospatiale, 1982, p. 443-449. In French.

A83-21938
SATELLITE REMOTE SENSING OVER QUEBEC FOR INVENTORY OF THE VEGETAL CANOPY [APPLICATION AU QUEBEC DE LA TELEDETECTION PAR SATELLITES A L'INVENTAIRE DU COUVERT VEGETAL]
J. BEAUBIEN (Environment Canada, Laurentian Forest Research Centre, Sainte-Foy, Quebec, Canada) In: International Society for Photogrammetry and Remote Sensing, International Symposium, Toulouse, France, September 13-17, 1982, Transactions. Volume 1. Toulouse, Groupement pour le Developpement de la Teledetection Aerospatiale, 1982, p. 461-471. In French. refs

A83-21939
PROSPECTS FOR MULTITEMPORAL STUDIES FOCUSING ON A FORESTED REGION - PROOF OF CLEAR-CUTTING [PERSPECTIVES DES ETUDES MULTI-TEMPORELLES EN PARTICULIER EN MILIEU FORESTIER - LA MISE EN EVIDENCE DES DEBOISEMENTS]
A. COMBEAU (Office de la Recherche Scientifique et Technique d'Outre Mer, Bondy, Seine-Saint-Denis, France) In: International Society for Photogrammetry and Remote Sensing, International Symposium, Toulouse, France, September 13-17, 1982, Transactions. Volume 1. Toulouse, Groupement pour le Developpement de la Teledetection Aerospatiale, 1982, p. 473-482. In French.

Landsat imagery and simulated imagery from the Spot satellite were tested for their capability to detect clear-cut forest areas. A temperate forest was surveyed, which featured beech and oak trees on calcine soil and silvester pine on sandy soil, in addition to 300 ha of clear-cut land. Landsat surveys of the area were performed on five days using channels 5, 6, and 7 to obtain 1:100,000 resolution; the Spot simulation was performed for conditions on two different days. The clear-cut areas were not detected with the Landsat imagery in channels 6 and 7, and were randomly found with channel 5. The razed areas were easily identified with the Spot simulation, which revealed clear-cut areas down to 5 ha. A numerical analysis including channel polling was performed, with the result that spectral resolution was found not to be the cause of the failure of Landsat to detect the clear-cut areas. The Spot satellite is concluded to be acceptable for monitoring large scale lumbering projects, particularly in remote regions. M.S.K.

A83-21940
MONITORING RECENT CHANGES IN EXTENT OF NATURAL FORESTS IN KENYA USING REMOTE SENSING TECHNIQUES
N. OCHANDA and H. EPP (Ministry of Environment and Natural Resources, Nairobi, Kenya) In: International Society for Photogrammetry and Remote Sensing, International Symposium, Toulouse, France, September 13-17, 1982, Transactions. Volume 1. *Toulouse, Groupement pour le Developpement de la* Teledetection Aerospatiale, 1982, p. 489-496. Research supported by the Canadian International Development Agency. refs

A83-21943
SOIL COVER INTERPRETATION ON MULTIZONAL SPACE PHOTOS MADE BY THE USE OF CAMERA 'MKF-6' AND 'FRAGMENT' SYSTEM [INTERPRETATION DES SOLS SUR DES PHOTOS SPATIALES MULTIZONALES FAITES AVEC LA CAMERA 'MKF-6' ET LE SYSTEME 'FRAGMENT']
V. L. ANDRONIKOV (Vsesoiuznaia Akademiia Sel'skokhoziaistvennykh Nauk, Moscow, USSR) In: International Society for Photogrammetry and Remote Sensing, International Symposium, Toulouse, France, September 13-17, 1982, Transactions. Volume 1. Toulouse, Groupement pour le Developpement de la Teledetection Aerospatiale, 1982, p. 533-541. In French. refs

Technical aspects of the soil mapping section of the Intercosmos remote sensing program are described, with particular note made of uses of the MKF-6 camera and the Fragment system. Research has shown that the desert and steppes reflect radiance best observed in the blue-green and red spectral regions. A relation between the spectral signatures in the 0.5-0.52 micron and 0.6-0.62 micron ranges has been employed to determine the nature of the rocks underlying the different terrains. A 0.85-0.92 spectral coefficient is used for the brown rocks beneath deserts, while steppes have formed over green-gray rocks. An autumnal scanning program was carried out at a scale of 1:2,100,000 and involved 6 channels. The red zone at 660 nm was found best suited for snow cover, prairie alpine soils, and subalpine soils. Readings were available from 0-20 cm depth in the steppes and 0-15 cm depths in the dry steppes. Aerial photography in the IR was then used to define the zonal and subzonal distributions of the geomorphological formations. M.S.K.

A83-22434
PROCESSING INFRARED IMAGES FOR FIRE MANAGEMENT APPLICATIONS
J. R. WARREN (U.S. Forest Service, Boise, ID) and W. K. PRATT (Vicom Systems, Inc., San Jose, CA) In: Processing of images and data from optical sensors; Proceedings of the Meeting, San Diego, CA, August 25, 26, 1981. Bellingham, WA, SPIE - The International Society for Optical Engineering, 1981, p. 127-132.

The system described features interactive graphics, high-resolution color display, and computer model compatibility. Images are acquired by an IR line scanner and converted to 1024 x 1024 x 8 bit frames for transmission to the ground at a rate of 1.544 M bit over a 14.7 GHz carrier. After being received and stored, individual frames are transferred to a solid state memory to refresh the display at a conventional rate of 30 frames per second. It is pointed out that line length and area calculations, false color assignment, X-Y scaling, and image enhancement are available. Fire spread can be calculated for display, and fire perimeters can be plotted on maps. Descriptions are given of the performance requirements, basic system, and image processing. C.R.

A83-22680* National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

MULTIFREQUENCY MEASUREMENTS OF THE EFFECTS OF SOIL MOISTURE, SOIL TEXTURE, AND SURFACE ROUGHNESS

J. R. WANG, P. E. ONEILL (NASA, Goddard Space Flight Center, Greenbelt, MD), T. J. JACKSON, and E. T. ENGMAN (U.S. Department of Agriculture, Beltsville Agricultural Research Center, Beltsville, MD) IEEE Transactions on Geoscience and Remote Sensing, vol. GE-21, Jan. 1983, p. 44-51. refs

An experiment on remote sensing of soil moisture content was conducted over bare fields with microwave radiometers at the frequencies of 1.4, 5, and 10.7 GHz, during July-September of 1981. Three bare fields with different surface roughnesses and soil textures were prepared for the experiment. The experimental results show that the effect of surface roughness is to increase the soil's brightness temperature and to reduce the slope of regression between brightness temperature and moisture content. The slopes of regression for soils with different textures are found to be comparable and the effect of soil texture is reflected in the difference of regression line intercepts at brightness-temperature axis. Measurements on wet smooth bare fields give lower brightness temperatures at 5 than at 1.4 GHz. This phenomenon is not expected from current radiative transfer theory, using laboratory measurements of the relationship between permittivity and moisture content for different soil-water mixtures at frequencies of not greater than 5 GHz. (Author)

A83-22681* Kansas Univ. Center for Research, Inc., Lawrence.

EFFECTS OF VEGETATION COVER ON THE MICROWAVE RADIOMETRIC SENSITIVITY TO SOIL MOISTURE

F. T. ULABY, M. C. DOBSON (University of Kansas Center for Research, Inc., Lawrence, KA), and M. RAZANI IEEE Transactions on Geoscience and Remote Sensing, vol. GE-21, Jan. 1983, p. 51-61. refs

(Contract NAG5-30)

The reduction in sensitivity of the microwave brightness temperature to soil moisture content due to vegetation cover is analyzed using airborne observations made at 1.4 and 5 GHz. The data were acquired during six flights in 1978 over a test site near Colby, Kansas. The test site consisted of bare soil, wheat stubble, and fully mature corn fields. The results for corn indicate that the radiometric sensitivity to soil moisture S decreases in magnitude with increasing frequency and with increasing angle of incidence (relative to nadir). The sensitivity reduction factor, defined in terms of the radiometric sensitivities for bare soil and canopy-covered conditions Y = 1 - Scan/Ss was found to be equal to 0.65 for normal incidence at 1.4 GHz, and increases to 0.89 at 5 GHz. These results confirm previous conclusions that the presence of vegetation cover may pose a serious problem for soil moisture detection with passive microwave sensors. (Author)

A83-24223

DETERMINATION OF THE HUMUS CONTENT OF SOILS FROM REMOTE SENSING DATA [OPYT OPREDELENIIA SODERZHANIIA GUMUSA V POCHVAKH PO DANNYM AEROKOSMICHESKIKH IZMERENII]

K. IA. KONDRATEV, V. V. KOZODEROV, and P. P. FEDCHENKO (Glavnaia Geofizicheskaia Observatoriia, Leningrad, USSR) Akademiia Nauk SSSR, Doklady, vol. 268, no. 4, 1983, p. 973, 974. In Russian.

A83-24224

THE QUANTITATIVE EXPRESSION OF THE FUNCTION OF THE REMOTE SENSING OF SOIL MOISTURE [KOLICHESTVENNOE VYRAZHENIE FUNKTSII DISTANTSIONNOI INDIKATSII VLAZHNOSTI POCHVY]

B. V. VINOGRADOV (Akademiia Nauk SSSR, Institut Evoliutsionnoi Morfologii i Ekologii Zhivotnykh, Moscow; Akademiia Nauk SSSR, Institut Okeanologii, Leningrad, USSR) Akademiia Nauk SSSR, Doklady, vol. 268, no. 4, 1983, p. 1011-1013. In Russian.

A83-24315*# Geological Survey, Reston, Va.

SEASAT SYNTHETIC APERTURE RADAR /SAR/ RESPONSE TO LOWLAND VEGETATION TYPES IN EASTERN MARYLAND AND VIRGINIA

M. D. KROHN, N. M. MILTON, and D. B. SEGAL (U.S. Geological Survey, Reston, VA) Journal of Geophysical Research, vol. 88, Feb. 28, 1983, p. 1937-1952. refs

(Contract NAS7-100)

Examination of Seasat SAR images of eastern Maryland and Virginia reveals botanical distinctions between vegetated lowland areas and adjacent upland areas. Radar returns from the lowland areas can be either brighter or darker than returns from the upland forests. Scattering models and scatterometer measurements predict an increase of 6 dB in backscatter from vegetation over standing water. This agrees with the 30-digital number (DN) increase observed in the digital Seasat data. The brightest areas in the Chickahominy, Virginia, drainage, containing P. virginica about 0.4 m high, contrast with the brightest areas in the Blackwater, Maryland, marshes, which contain mature loblolly pine in standing water. The darkest vegetated area in the Chickahominy drainage contains a forest of Nyssa aquatica (water tupelo) about 18 m high, while the darkest vegetated area in the Blackwater marshes contains the marsh plant Spartina alterniflora, 0.3 m high. The density, morphology, and relative geometry of the lowland vegetation with respect to standing water can all affect the strength of the return L band signal. (Author)

A83-24540#

SOIL CLASSIFICATION AND POTENTIALS IN SINAI PENINSULA FROM LANDSAT IMAGES

A. G. ABDEL SAMIE, T. M. LABIB, and M. ABDEL HADY (Academy of Scientific Research and Technology, Remote Sensing Center, Cairo, Egypt) In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 1. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 161-169. refs

A83-24542#

QUANTIFYING AGRICULTURAL INDICATORS OF DESERT ENCROACHMENT

W. G. HANCE (U.S. Department of Agriculture, Soil Conservation Service, Washington, DC) and H. SERGHINI (Ministry of Agriculture, Rabat, Morocco) In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 1. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 181-185.

Cooperation between the USDA Statistical Reporting Service and the government of Morocco has been implemented to develop supplemental sampling practices to identify areas where desertification is occurring. The point method has been chosen to upgrade a previous survey of all individual farms, a program which lacked the definition necessary to characterize critical areas where sand encroachment was becoming a serious problem. The remote sensing point technique comprises definition of a grid of points, and the percentage of points covered with vegetation is multitemporally monitored to detect positive or negative changes. The use of a configuration of increasingly smaller sample cells, which are then themselves sampled statistically, is expected to yield sufficiently accurate data for decisions regarding the most critical areas of desertification. M.S.K.

A83-24543#
ANALYSIS OF MAN-INDUCED AND NATURAL RESOURCES OF AN ARID REGION IN CALIFORNIA
G. MAY and M. CRAIG (U.S. Department of Agriculture, Statistical Reporting Service, Washington, DC) In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 1. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 187-215. refs

A study site in California was analyzed with respect to both its man-induced and natural resources. For man-induced resources, estimates were made for major crops and for irrigated cropland based on regressing Landsat digital information onto ground enumerated, probability sampled areas. A manual interpretation of Landsat images (both from raw and computer classified data) was made to determine the feasibility of mapping soils and land use in an arid climate for the region not under intensive irrigation. Results indicate that a general soils and land use map, over such an environment, can be produced from Landsat photointerpretation. (Author)

A83-24563#
IMAGE RESOLUTION AND ACCURACY OF MEASUREMENTS OF SOIL MOISTURE WITH MICROWAVE SENSORS IN LOW EARTH AND GEOSYNCHRONOUS ORBITS
M. AFIFI and K. TOMIYASU (General Electric Co., Valley Forge Space Center, Philadelphia, PA) In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 1. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 485-495. refs

A83-24567*# California Univ., Berkeley.
A LANDSAT-BASED INVENTORY PROCEDURE FOR THE ESTIMATION OF IRRIGATED LAND IN ARID AREAS
S. L. WALL, R. W. THOMAS, C. E. BROWN, M. ERIKSSON (California University, Berkeley, CA), and E. H. BAUER (NASA, Ames Research Center, Moffett Field, CA) In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 1. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 523-532. Research supported by the California Department of Water Resources (Contract NAS5-20969; NCC2-54; NSG-2207)

A83-24572#
MAPPING OASES AND SOIL TYPES FROM LANDSAT DIGITAL MULTISPECTRAL SCANNER DATA - KHARGA DEPRESSION, WESTERN DESERT, EGYPT
R. E. ARVIDSON and P. A. JACOBBERGER (Washington University, St. Louis, MO) In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 1. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 565-569.

Landsat MSS data are employed in an attempt to map those areas of the Kharga Depression in which clay-rich, potentially fertile soils may be made more porous and water-retentive through a plowing of present sand veneers into the soil. Principal components analysis and clustering techniques were applied to Landsat data for the Kharga Oasis, yielding a total of four clusters. Three of the clusters delineate areas within cases, while the fourth consists of highly reflective sands surrounding the oasis area. While ground truth is required for the decisive relating of the clusters to the surface materials conditions sought, it is noted that the techniques presently employed permit thematic mapping by means of the Landsat digital MSS data. O.C.

A83-24579#
THE NATURAL WEALTH OF THE FLORA OF SAUDI ARABIA - AN ECOLOGICAL FOUNDATION FOR A REMOTE SENSING SURVEY
M. A. ZAHRAN (King Abdulaziz University, Jeddah, Saudi Arabia; Mansoura University, Mansoura, Egypt) and H. A. YOUNES (King Abdulaziz University, Jeddah, Saudi Arabia; National Research Centre, Soil and Water Use Laboratory, Giza, Egypt) In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 1. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 643-663. refs

A83-24581#
EVALUATING THE SOIL RESOURCES AND POTENTIAL OF THE BAHR EL JEBEL REGION IN SOUTHERN SUDAN USING LANDSAT
A. A. KLINGEBIEL, F. C. WESTIN, V. I. MYERS (South Dakota State University, Brookings, SD), and M. ABDEL-HADY (Academy of Scientific Research and Technology, Remote Sensing Center, Cairo, Egypt) In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 2. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 675-683.

A83-24587#
USE OF VEGETATION INDICATORS FOR CROP GROUP STRATIFICATION AND EFFICIENT FULL FRAME ANALYSIS
C. M. HAY, L. H. BECK, and E. J. SHEFFNER (California, University, Berkeley, CA) In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 2. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 737-745. refs

A method of preliminary stratification of full frame Landsat data to reduce processing costs for agricultural monitoring in semiarid regions is presented. The technique is based on the temporal growth of crops, and involves identification of a single variable in the multispectral data. The variable is dated in each image and referenced to a known set of 'greenness' levels which signal stages of development. Five general stages have been found for crops, i.e., bare soil, green vegetation canopy, senescence, post-harvest stubble, and plowed-under soil. Threshold values are assigned to computer bins to denote the phenologic crop calender progress, and are derived from the MSS band 7 (near-IR) to band 5 (red) ratio. The values are calculated for each pixel by means of an automated procedure, which is described. D.H.K.

A83-24588#
MONITORING THE GROWTH OF CROPS USING DIGITAL LANDSAT MSS DATA
E. DERENYI, R. YAZDANI (New Brunswick, University, Canada), and R. A. RYERSON (Canada Centre for Remote Sensing, Ottawa, Canada) In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 2. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 747-753. Research supported by the Natural Sciences and Engineering Research Council. refs

A83-24590#
SAND DISTRIBUTION IN THE KHARGA DEPRESSION OF EGYPT - OBSERVATIONS FROM LANDSAT IMAGES
P. L. STRAIN and F. EL-BAZ (National Air and Space Museum, Washington, DC) In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 2. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 765-774. refs

Encroaching sands constitute a serious threat to the farmlands and villages of the Kharga Oasis in the Western Desert of Egypt. Landsat images of the region provide a broad overview allowing the identification of areas of future encroachment as well as zones apparently sheltered from the onslaught of the southward moving sand dunes. Five such sheltered sites were explored in the field to determine their feasibility for agricultural and village expansion. Additionally, observations were made on the effectiveness of various kinds of natural obstacles within the region as barriers to sand and wind. (Author)

A83-24594#
LANDSAT SPECTRAL SIGNATURE - STUDIES WITH SOIL ASSOCIATION AND VEGETATION
A. K. SINHA and P. VENKATACHALAM In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 2. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 813-822. refs

A83-24596#
USING LANDSAT IMAGERIES TO MAKE SOIL-VEGETATION MAPS FOR LARGE AREAS IN MALI, WEST AFRICA
R. LAURIN (Michigan, Environmental Research Institute, Ann Arbor, MI) and I. SIBI (Projects Inventaire des Resources Terrestres, Bamako, Mali) In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 2. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 829-838.

As part of an AID project designed to aid in land use and in the allocation of natural resources in Mali, a resource inventory project was undertaken in the southern part of the country over an area of approximately 570,000 sq km. The principal goal was to compile a soil-vegetation map from which land use and land capability maps and forage production data could be derived. Landsat data were digitally mosaicked and fitted to the configuration of existing topographic maps. False color imageries were prepared using a scale of 1:200,000. Natural vegetation associations were found to correspond to particular 'soil groups' in such a consistent pattern that extremely large areas could be mapped with a relatively small amount of field checking. C.R.

A83-24601#
IRRIGATED AGRICULTURAL MAPPING AND WATER DEMAND ESTIMATION IN ARID ENVIRONMENTS FROM REMOTE SENSING
J. D. BAGGETT, J. E. ESTES, and L. R. TINNEY (California, University, Santa Barbara, CA) In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 2. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 885-897. refs

The development and management of large-area water supplies for agriculture in arid environments require accurate and timely data on water demand. The Geography Remote Sensing Unit, University of California, Santa Barbara, has provided such information to the Kern County (California) Water Agency since 1973 using remotely sensed data. The mapped data is used as input into a regional groundwater basin model. Outlined herein is a step-by-step procedure for the manual interpretation and mapping of irrigated agricultural lands using Landsat and merged ancillary data. An evaluation of the 1979 map, using twelve sample units (total area = 11.138 ha) from the 1979 California Irrigated Lands Assessment for Water Management APT project, reveals a high level of accuracy (r-squared = 0.988). The low cost procedure is readily adaptable and should aid arid agricultural resource managers to better understand and anticipate water requirements within areas of management responsibilities. (Author)

A83-24602#
SOIL DEGRADATION MAPPING FROM LANDSAT IN NORTH AFRICA AND THE MIDDLE EAST
C. W. MITCHELL (Reading University, Reading, England), J. A. HOWARD (United Nations, Food and Agriculture Organization, Rome, Italy), and M. M. MAINGUET (Reims, Universite, Reims, France) In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 2. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 899-908. refs

A83-24605#
AGRICULTURAL RESOURCE ASSESSMENT IN TROPICAL ARID DJIBOUTI
A. DUALE (Soil and Water Analysis Laboratory, Djibouti) and J. E. GOEBEL (Resources Development Associates, Djibouti) In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 2. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 931-935.

A83-24606#
DROUGHT-INDUCED WIND EROSION IN SOUTHWESTERN KANSAS, U.S.A. - INTEGRATION OF LANDSAT, SEASAT, AND AIRBORNE MULTISPECTRAL DATA
P. A. JACOBBERGER (Washington University, St. Louis, MO) In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 2. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 937-946.

A83-24609*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
MONITORING VEGETATION IN THE NILE DELTA WITH NOAA-6 AND NOAA-7 AVHRR IMAGERY
C. J. TUCKER, J. A. GATLIN (NASA, Goddard Space Flight Center, Greenbelt, MD), S. R. SCHNEIDER, and M. A. KUCHINOS (NOAA, National Environmental Satellite Service, Washington, DC) In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 2. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 973-987. refs

A83-24615#
REMOTE SENSING INVESTIGATIONS ON SOME FRUIT ORCHARDS IN EL FAIYOUM GOVERNORATE, EGYPT
H. Z. ABOUL EID, A. G. ABDEL SAMIE, and M. A. ABDEL HADY (Academy of Scientific Research and Technology, Remote Sensing Center, Cairo, Egypt) In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 2. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 1047-1055.

A83-24617#
CONTRAST ENHANCEMENT APPLIED TO GUAYULE DISTRIBUTION IN MEXICO FOR COMMERCIAL RUBBER PRODUCTION
M. K. RIDD and R. L. POWER (Utah, University, Salt Lake City, UT) In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 2. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 1067-1075. refs

A83-24625#
ESTIMATION OF THE FORAGE PRODUCTION OF SEMI-ARID RANGELANDS WITH VARIABLE TREE AND SHRUB COVER USING LAND RESOURCE SATELLITES
I. R. LANE (Edinburgh, University, Edinburgh, Scotland) In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 2. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 1167-1175. Research supported by the University of Edinburgh. refs

A83-25287
FIRE MOSAICS IN SOUTHERN CALIFORNIA AND NORTHERN BAJA CALIFORNIA
R. A. MINNICH (California, University, Riverside, CA) Science, vol. 219, Mar. 18, 1983, p. 1287-1294. Research supported by the University of California. refs

Landsat data from 1972-1980 was employed to evaluate the effectiveness of fire suppression techniques practiced by land managers in southern and Baja California. Small fires are set in areas which are dry to prevent the accumulation of tinder and defuse the chance of a large fire at a later date. Vegetative species in the area comprise grassland, coastal sage scrub, and chaparral, and fire danger is greatest in the dry summer weather. Burnt-out areas in Landsat imagery are visible due to ash presence absorbing near-IR radiation. A total of 118 images of eight scenes were acquired for southern California and three for Baja at a scale of 1:3,369,000. Fire areas were tracked to determine distributions, locations, and size. It was found that fire suppression has had a limited effect, mainly reducing the number of smaller fires while causing the occurrence of larger fires. It is concluded that chaparral were more common before fire control was introduced in 1910, and should be fostered to produce a steady mosaic of smaller fires, which was the case before fire suppression increased the size of the conflagrations. M.S.K.

A83-25967
SOME AIR-PHOTO SCALE EFFECTS ON DOUGLAS-FIR DAMAGE TYPE INTERPRETATION
P. A. MURTHA (British Columbia, University, Vancouver, Canada) Photogrammetric Engineering and Remote Sensing, vol. 49, Mar. 1983, p. 327-335. Research supported by the Natural Sciences and Engineering Research Council. refs

Interpretability differences for damaged forest species photographed at 1:1000 and 1:4000 scales are discussed, with attention focused on color-IR imagery used by forest resource managers. A test forest featuring a predominance of Douglas fir trees, as well as pine, spruce, and aspen, was considered. A 2 x 5 km area was surveyed with aerial photography followed by stereoscopic interpretation for tree identification, total number of damaged trees, and tree crown assessment. An 11-category index of tree health or disease was used, and identified trees in the stereoscopic pairs were statistically analyzed by means of the MIDAS computer program. The total counts on both scales were equivalent, as were the counts of dead tops and live trees. Significant differences appeared in total counts of diseased trees, and some damage categories were not visible on the 1:4000 scale. Only dead trees are concluded to be identifiable with the 1:4000 photos, while trees with various stress levels can be detected with the 1:1000 scale photos. M.S.K.

A83-26825
ON A METHOD OF FOREST MAPPING [O METODIKE KARTOGRAFIROVANIIA LESOV]
V. I. SUKHIKH Geodeziia i Kartografiia, Feb. 1983, p. 42-44. In Russian.

The paper examines the principles of the small-scale thematic mapping of forests on the basis of space imagery (e.g., multispectral data). Three stages of data acquisition are examined: (1) space photography, data from which are used to construct a topographic basis for the map; (2) aerial-photographic or aerial-visual studies; and (3) ground-truth studies. Particular consideration is given to a forest-inventory procedure on the basis of a four-stage sampling scheme. B.J.

A83-28146
REMOTE SENSING AND CARTOGRAPHY FOR SOIL USE IN ALGERIA: COMPARATIVE STUDY OF THE INTERPRETATION OF ANALOG IMAGERY /AERIAL PHOTOGRAPHS/ AND OF DATA TREATMENT OF DIGITIZED VERSIONS OF THE SAME IMAGES AND SPACIAL IMAGERY - APPLICATION TO THE MOUTH OF THE ISSER WADI /COSTAL KABYLIE/ - ALGERIA [TELEDETECTION ET CARTOGRAPHIE DE L'UTILISATION DU SOL EN ALGERIE: ETUDE COMPARATIVE DES RESULTATS DE L'INTERPRETATION D'IMAGES ANALOGIQUES /PHOTOGRAPHIES AERIENNES/ ET DU TRAITEMENT INFORMATIQUE DES MEMES IMAGES DIGITALISEES ET DES IMAGES SPATIALES - APPLICATION A L'EMBOUCHURE DE L'OUED ISSER /KABYLIE LITTORALE/ - ALGERIE. S,A. DAGORNE (NICE, UNIVERSITE, NICE, FRANCE]
(Universite de Picardie, Colloque sur la Teledetection et l'Amenagement Regional, Amiens, France, Oct. 26, 27, 1981.) Societe Francaise de Photogrammetrie et de Teledetection, Bulletin, no. 87, 1982, p. 17-38. In French. refs

N83-16806*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
EVALUATION OF THE CEAS MODEL FOR BARLEY YIELDS IN NORTH DAKOTA AND MINNESOTA
T. L. BARNETT, Principal Investigator Dec. 1981 49 p Sponsored by NASA, USDA, Dept. of Commerce, Dept. of the Interior, and Agency for International Development ERTS
(Contract PROJ. AGRISTARS)
(E83-10042; NASA-TM-85168; YM-U2-04288; JSC-18235; NAS 1.15:85168) Avail: NTIS HC A03/MF A01 CSCL 02C

The CEAS yield model is based upon multiple regression analysis at the CRD and state levels. For the historical time series, yield is regressed on a set of variables derived from monthly mean temperature and monthly precipitation. Technological trend is represented by piecewise linear and/or quadriatic functions of year. Indicators of yield reliability obtained from a ten-year bootstrap test (1970-79) demonstrated that biases are small and performance as indicated by the root mean square errors are acceptable for intended application, however, model response for individual years particularly unusual years, is not very reliable and shows some large errors. The model is objective, adequate, timely, simple and not costly. It considers scientific knowledge on a broad scale but not in detail, and does not provide a good current measure of modeled yield reliability. Author

N83-16807*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
COMPARISON OF CEAS AND WILLIAMS-TYPE MODELS FOR SPRING WHEAT YIELDS IN NORTH DAKOTA AND MINNESOTA
T. L. BARNETT, Principal Investigator Mar. 1982 62 p Sponsored by NASA, USDA, Dept. of Commerce, Dept. of the Interior, and Agency for International Development ERTS
(Contract PROJ. AGRISTARS)
(E83-10043; NASA-TM-85167; YM-U2-04289; JSC-18236; NAS 1.15:85167) Avail: NTIS HC A04/MF A01 CSCL 02C

The CEAS and Williams-type yield models are both based on multiple regression analysis of historical time series data at CRD level. The CEAS model develops a separate relation for each CRD; the Williams-type model pools CRD data to regional level (groups of similar CRDs). Basic variables considered in the analyses are USDA yield, monthly mean temperature, monthly precipitation, and variables derived from these. The Williams-type model also used soil texture and topographic information. Technological trend is represented in both by piecewise linear functions of year. Indicators of yield reliability obtained from a ten-year bootstrap test of each model (1970-1979) demonstrate that the models are very similar in performance in all respects. Both models are about equally objective, adequate, timely, simple, and inexpensive. Both consider scientific knowledge on a broad scale but not in detail.

Neither provides a good current measure of modeled yield reliability. The CEAS model is considered very slightly preferable for AgRISTARS applications. Author

N83-16808*# Department of Agriculture, Houston, Tex. Statistical Reporting Service.
A COMPARISON OF MEASURED AND ESTIMATED METEOROLOGICAL DATA FOR USE IN CROP GROWTH MODELING
C. R. PERRY, JR., J. L. ROGERS, and J. T. RITCHIE Sep. 1982 5 p refs Presented at the Ann. Meeting of the Am. Statist. Assoc., Business and Econ. Statist. Sect., Cincinnati, 16-19 Aug. 1982 Sponsored by NASA, USDA, Dept. of Commerce, Dept. of the Interior, and Agency for International Development ERTS
(Contract PROJ. AGRISTARS)
(E83-10092; NASA-CR-169602; YM-J2-04359; JSC-18573; NAS 1.26:169602) Avail: NTIS HC A02/MF A01 CSCL 02C

Gridded spatial estimates of maximum temperature, minimum temperature, precipitation, and solar radiation, prepared for agricultural use from World Meteorological Organization surface reports and enhanced by polar orbiting satellites were compared with daily meteorological data measured at various agricultural research facilities across the United States to determine their level of accuracy. Preliminary results indicate that daily maximum temperature can be determined to within 9.1 degrees Celsius with ninety percent confidence. With similar levels of confidence, daily minimum temperature can be determined to within 6.7 degrees Celsius, daily solar radiation to within 231.2 cal/cm2 min, and daily precipitation to within 9.7 millimeters. A.R.H.

N83-16813*# Department of Agriculture, Houston, Tex. Statistical Reporting Service.
IMPUTING HISTORICAL STATISTICS, SOILS INFORMATION, AND OTHER LAND-USE DATA TO CROP AREA
C. R. PERRY, JR., R. W. WILLIS, and L. LAUTENSCHLAGER Sep. 1982 5 p refs Presented at the Ann. Meeting of the Am. Statist. Assoc. Survey Res. Methods Sect., Cincinnati, 16-19 Aug. 1982 Sponsored by NASA, USDA, Dept. of Commerce, Dept. of the Interior, and Agency for International Development ERTS
(Contract PROJ. AGRISTARS)
(E83-10138; NASA-CR-169773; EW-J2-04358; JSC-18572; NAS 1.26:169773) Avail: NTIS HC A02/MF A01 CSCL 02C

In foreign crop condition monitoring, satellite acquired imagery is routinely used. To facilitate interpretation of this imagery, it is advantageous to have estimates of the crop types and their extent for small area units, i.e., grid cells on a map represent, at 60 deg latitude, an area nominally 25 by 25 nautical miles in size. The feasibility of imputing historical crop statistics, soils information, and other ancillary data to crop area for a province in Argentina is studied. Author

N83-16816*# National Aeronautics and Space Administration. Earth Resources Labs., Bay St. Louis, Miss.
AUTOMATIC SEGMENT MATCHING ALGORITHM THEORY, TEST AND EVALUATION
M. T. KALCIC, Principal Investigator Jun. 1982 46 p refs Sponsored by NASA, USDA, Dept. of Commerce, Dept. of the 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 PROJ. AGRISTARS)
(E83-10141; NASA-TM-85200; DC-Y2-04325; NSTL/ERL-209; NAS 1.15:85200) Avail: NTIS HC A03/MF A01 CSCL 02C

Currently, an initial registration of sample segment data to raw LANDSAT data is obtained using a least-squares fit based on selected control points. The initial registration gives an adequate fit on a global basis, but on a local basis more precision can be obtained. The USDA/SRS presently accomplishes this by manually shifting the segments in the locality of the initial gross registration until a 'good' fit can be visually detected. An algorithm that would automate process of segment shifting is presented. A.R.H.

N83-16818*# Missouri Univ., Columbia. Dept. of Atmospheric Science.
EVALUATION OF THE CEAS TREND AND MONTHLY WEATHER DATA MODELS FOR SOYBEAN YIELDS IN IOWA, ILLINOIS, AND INDIANA
V. FRENCH, Principal Investigator Oct. 1982 77 p refs Sponsored by NASA, USDA, Dept. of Commerce, Dept. of the Interior, and Agency for International Development ERTS
(Contract PROJ. AGRISTARS)
(E83-10143; NASA-CR-169765; YM-12-04364; JSC-18575; NAS 1.26:169765) Avail: NTIS HC A05/MF A01 CSCL 02C

The CEAS models evaluated use historic trend and meteorological and agroclimatic variables to forecast soybean yields in Iowa, Illinois, and Indiana. Indicators of yield reliability and current measures of modeled yield reliability were obtained from bootstrap tests on the end of season models. Indicators of yield reliability show that the state models are consistently better than the crop reporting district (CRD) models. One CRD model is especially poor. At the state level, the bias of each model is less than one half quintal/hectare. The standard deviation is between one and two quintals/hectare. The models are adequate in terms of coverage and are to a certain extent consistent with scientific knowledge. Timely yield estimates can be made during the growing season using truncated models. The models are easy to understand and use and are not costly to operate. Other than the specification of values used to determine evapotranspiration, the models are objective. Because the method of variable selection used in the model development is adequately documented, no evaluation can be made of the objectivity and cost of redevelopment of the model. Author

N83-16819*# Purdue Univ., Lafayette, Ind. Lab. for the Applications of Remote Sensing.
EVALUATION OF SLAR AND THEMATIC MAPPER MSS DATA FOR FOREST COVER MAPPING USING COMPUTER-AIDED ANALYSIS TECHNIQUES Quarterly Report, 1 Jun. - 31 Aug. 1979
R. M. HOFFER, Principal Investigator 31 Aug. 1979 28 p refs ERTS
(Contract NAS9-15889)
(E83-10144; NASA-CR-167787; NAS 1.26:167787; LARS-CR-083179) Avail: NTIS HC A03/MF A01 CSCL 02F

A literature review on radar and spectral band information was conducted and a NC-130 mission was flown carrying the NS001 scanner system which basically corresponds to the channel configuration of the proposed thematic mapper. Aerial photography and other reference data were obtained for the study site, an area approximately 290 sq miles in north central South Carolina. A cover type map was prepared and methods were devised for reformatting and geometrically correcting MSS CRT data. Arrangements were made to obtain LANDSAT data for dates approximating the NC-130 mission. Because of the waveband employed to obtain SEASAT radar data, it was decided to determine if X-band (2.40 cm to 3.75 cm wavelength) imagery is available. A.R.H.

N83-16820*# Purdue Univ., Lafayette, Ind. Lab. for the Applications of Remote Sensing.
EVALUATION OF SLAR AND THEMATIC MAPPER MSS DATA FOR FOREST COVER MAPPING USING COMPUTER-AIDED ANALYSIS TECHNIQUES Quarterly Progress Report, 1 Sep. - 30 Nov. 1979
R. M. HOFFER, Principal Investigator 30 Nov. 1979 29 p refs Original contains imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls, S.D. 57198 ERTS
(Contract NAS9-15889)
(E83-10145; NASA-CR-167788; NAS 1.26:167788; LARS-CR-120379) Avail: NTIS HC A03/MF A01 CSCL 02C

The spatial characteristics of the data were evaluated. A program was developed to reduce the spatial distortions resulting from variable viewing distance, and geometrically adjusted data sets were generated. The potential need for some level of radiometric adjustment was evidenced by an along track band of high reflectance across different cover types in the Varian imagery. A multiple regression analysis was employed to explore the viewing angle effect on measured reflectance. Areas in the data set which appeared to have no across track stratification of cover type were identified. A program was developed which computed the average reflectance by column for each channel, over all of the scan lines in the designated areas. A regression analysis was then run using the first, second, and third degree polynomials, for each channel. An atmospheric effect as a component of the viewing angle source of variance is discussed. Cover type maps were completed and training and test field selection was initiated. A.R.H.

N83-16821*# Purdue Univ., Lafayette, Ind. Lab. for the Applications of Remote Sensing.
EVALUATION OF SLAR AND THEMATIC MAPPER MSS DATA FOR FOREST COVER MAPPING USING COMPUTER-AIDED ANALYSIS TECHNIQUES Quarterly Progress Report, 1 Dec. 1979 - 29 Feb. 1980
R. M. HOFFER, Principal Investigator 29 Feb. 1980 6 p ERTS
(Contract NAS9-15889)
(E83-10146; NASA-CR-167789; NAS 1.26:167789; LARS-CR-022680) Avail: NTIS HC A02/MF A01 CSCL 02F

The column normalizing technique was used to adjust the data for variations in the amplitude of the signal due to look angle effects with respect to solar zenith angle along the scan lines (i.e., across columns). Evaluation of the data set containing the geometric and radiometric adjustments, indicates that the data set should be satisfactory for further processing and analysis. Software was developed for degrading the spatial resolution of the aircraft data to produce a total of four data sets for further analysis. The quality of LANDSAT 2 CCT data for the test site is good for channels four, five, and six. Channel seven was not present on the tape. The data received were reformatted and analysis of the test site area was initiated. A.R.H.

N83-16822*# Purdue Univ., Lafayette, Ind. Lab. for the Applications of Remote Sensing.
EVALUATION OF SLAR AND THEMATIC MAPPER MSS DATA FOR FOREST COVER MAPPING USING COMPUTER-AIDED ANALYSIS TECHNIQUES Quarterly Progress Report, 1 Mar. - 31 May 1980
R. M. HOFFER, Principal Investigator 31 May 1980 13 p refs ERTS
(Contract NAS9-15889)
(E83-10147; NASA-CR-167790; NAS 1.26:167790; LARS-CR-060780) Avail: NTIS HC A02/MF A01 CSCL 02F

Several possibilities were considered for defining the data set in which the same test areas could be used for each of the four different spatial resolutions being evaluated. The LARSYS CLUSTER was used to sort the vectors into spectral classes to reduce the within-spectral class variability in an effort to develop training statistics. A data quality test was written to determine the basic signal to noise characteristics within the data set being used. Because preliminary analysis of the LANDSAT MSS data revealed the presence of high cirrus clouds, other data sets are being sought. A.R.H.

N83-16823*# Purdue Univ., Lafayette, Ind. Lab. for Applications of Remote Sensing.
EVALUATION OF SLAR AND THEMATIC MAPPER MSS DATA FOR FOREST COVER MAPPING USING COMPUTER-AIDED ANALYSIS TECHNIQUES Quarterly Progress Report, 1 Jun. - 31 Aug. 1980
R. M. HOFFER, Principal Investigator, R. S. LATTY, E. DEAN, and D. J. KNOWLTON 31 Aug. 1980 57 p refs Original contains imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls, S.D. 57198 ERTS
(Contract NAS9-15889)
(E83-10148; NASA-CR-167791; NAS 1.26:167791; LARS-CR-083080) Avail: NTIS HC A04/MF A01 CSCL 02F

Separate holograms of horizontally (HH) and vertically (HV) polarized responses obtained by the APQ-102 side-looking radar were processed through an optical correlator and the resulting image was recorded on positive film from which black and white negative and positive prints were made. Visual comparison of the HH and HV images reveals a distinct dark band in the imagery which covers about 30% of the radar strip. Preliminary evaluaton of the flight line 1 date indicates that various features on the HH and HV images seem to have different response levels. The amount of sidelap due to the look angle between flight lines 1 and 2 is negligible. NASA mission #425 to obtain flightlines of NS-001 MSS data and supporting aerial photography was successfully flown. Flight line 3 data are of very good quality and virtually cloud-free. Results of data analysis for selection of test fields and for evaluation of waveband combination and spatial resolution are presented. A.R.H.

N83-16824*# Purdue Univ., Lafayette, Ind. Lab. for Applications of Remote Sensing.
EVALUATION OF SLAR AND THEMATIC MAPPER MSS DATA FOR FOREST COVER MAPPING USING COMPUTER-AIDED ANALYSIS TECHNIQUES Quarterly Progress Report, 1 Sep. - 30 Nov. 1980
R. M. HOFFER, Principal Investigator 30 Nov. 1980 21 p ERTS
(Contract NAS9-15889)
(E83-10149; NASA-CR-167792; NAS 1.26:167792; LARS-CR-120180) Avail: NTIS HC A02/MF A01 CSCL 02F

To facilitate comparison between the four different spatial resolution of the NS-001 MSS data sets, a supervised approach was taken in defining training blocks for each of the different cover types. The training fields representing each cover type category were grouped and this group was clustered to determine the individual spectral classes within each cover type category which would effectively characterize the entire test site. Graphs show the variation in spectral response level with respect to distance in the across track dimension for four sampling intervals. Radar digitization procedures were developd. Flight characteristics and parameters for digitization of radar imagery are tabulated. The statement of work for phase 3 was reviewed and modifications were suggested to meet funding reduction. A.R.H.

N83-16825*# Purdue Univ., Lafayette, Ind. Lab. for Applications of Remote Sensing.
EVALUATION OF SLAR AND THEMATIC MAPPER MSS DATA FOR FOREST COVER MAPPING USING COMPUTER-AIDED ANALYSIS TECHNIQUES Quarterly Progress Report, 1 Dec. 1980 - 28 Feb. 1981
R. M. HOFFER, Principal Investigator 28 Feb. 1981 21 p Original contains imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls, S.D. 57198 ERTS
(Contract NAS9-15889)
(E83-10150; NASA-CR-167793; NAS 1.26:167793; LARS-CR-022681) Avail: NTIS HC A02/MF A01 CSCL 02F

Training and test data sets for CAM1S from NS-001 MSS data for two dates (geometrically adjusted to 30 meter resolution) were used to evaluate wavelength band. Two sets of tapes containing digitized HH and HV polarization data were obtained. Because the SAR data on the 9 track tapes contained no meaningful data, the 7 track tapes were copied onto 9 track tapes at LARS. The

LARSYS programs were modified and a program was written to reformat the digitized SAR data into a LARSYS format. The radar imagery is being qualitatively interpreted. Results are to be used to identify possible cover types, to produce a classification map to aid in the numerical evaluation classification of radar data, and to develop an interpretation key for radar imagery. The four spatial resolution data sets were analyzed. A program was developed to reduce the spatial distortions resulting from variable viewing distance, and geometrically adjusted data sets were generated. A flowchart of steps taken to geomtrically adjust a data set from the NS-001 scanner is presented. A.R.H.

N83-16826*# Purdue Univ., Lafayette, Ind. Lab. for Applications of Remote Sensing.
EVALUATION OF SLAR AND THEMATIC MAPPER MSS DATA FOR FOREST COVER MAPPING USING COMPUTER-AIDED ANALYSIS TECHNIQUES Quarterly Progress Report, 1 Mar. - 31 May 1981
R. M. HOFFER, Principal Investigator, D. J. KNOWLTON, and M. E. DEAN 31 May 1981 33 p Original contains imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls, S.D. 57198 ERTS
(Contract NAS9-15889)
(E83-10151; NASA-CR-167794; NAS 1.26:167794; LARS-CR-053181) Avail: NTIS HC A03/MF A01 CSCL 02F

A set of training statistics for the 30 meter resolution simulated thematic mapper MSS data was generated based on land use/land cover classes. In addition to this supervised data set, a nonsupervised multicluster block of training statistics is being defined in order to compare the classification results and evaluate the effect of the different training selection methods on classification performance. Two test data sets, defined using a stratified sampling procedure incorporating a grid system with dimensions of 50 lines by 50 columns, and another set based on an analyst supervised set of test fields were used to evaluate the classifications of the TMS data. The supervised training data set generated training statistics, and a per point Gaussian maximum likelihood classification of the 1979 TMS data was obtained. The August 1980 MSS data was radiometrically adjusted. The SAR data was redigitized and the SAR imagery was qualitatively analyzed. A.R.H.

N83-16827*# Purdue Univ., Lafayette, Ind. Lab. for Applications of Remote Sensing.
EVALUATION OF SLAR AND THEMATIC MAPPER MSS DATA FOR FOREST COVER MAPPING USING COMPUTER-AIDED ANALYSIS TECHNIQUES Quarterly Progress Report, 1 Jun. - 31 Aug. 1981
R. M. HOFFER, Principal Investigator, D. J. KNOWLTON, and M. E. DEAN 31 Aug. 1981 27 p refs Original contains imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls, S.D. 57198 ERTS
(Contract NAS9-15889)
(E83-10152; NASA-CR-167795; NAS 1.26:167795; LARS-CR-082981) Avail: NTIS HC A03/MF A01 CSCL 02F

Supervised and cluster block training statistics were used to analyze the thematic mapper simulation MSS data (both 1979 and 1980 data sets). Cover information classes identified on SAR imagery include: hardwood, pine, mixed pine hardwood, clearcut, pasture, crops, emergent crops, bare soil, urban, and water. Preliminary analysis of the HH and HV polarized SAR data indicate a high variance associated with each information class except for water and bare soil. The large variance for most spectral classes suggests that while the means might be statistically separable, an overlap may exist between the classes which could introduce a significant classification error. The quantitative values of many cover types are much larger on the HV polarization than on the HH, thereby indicating the relative nature of the digitized data values. The mean values of the spectral classes in the areas with larger look angles are greater than the means of the same cover type in other areas having steeper look angles. Difficulty in accurately overlaying the dual polarization of the SAR data was resolved. A.R.H.

N83-16828*# Purdue Univ., Lafayette, Ind. Lab. for Applications of Remote Sensing.
EVALUATION OF SLAR AND SIMULATED THEMATIC MAPPER MSS DATA FOR FOREST COVER MAPPING USING COMPUTER-AIDED ANALYSIS TECHNIQUES Final Report
R. M. HOFFER, M. E. DEAN, D. J. KNOWLTON, and R. S. LATTY 1982 284 p refs Original contains imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls, S.D. 57198 ERTS
(Contract NAS9-15889)
(E83-10153; NASA-CR-167796; NAS 1.26:167796; LARS-TR-083182) Avail: NTIS HC A13/MF A01 CSCL 02F

Kershaw County, South Carolina was selected as the study site for analyzing simulated thematic mapper MSS data and dual-polarized X-band synthetic aperture radar (SAR) data. The impact of the improved spatial and spectral characteristics of the LANDSAT D thematic mapper data on computer aided analysis for forest cover type mapping was examined as well as the value of synthetic aperture radar data for differentiating forest and other cover types. The utility of pattern recognition techniques for analyzing SAR data was assessed. Topics covered include: (1) collection and of TMS and reference data; (2) reformatting, geometric and radiometric rectification, and spatial resolution degradation of TMS data; (3) development of training statistics and test data sets; (4) evaluation of different numbers and combinations of wavelength bands on classification performance; (5) comparison among three classification algorithms; and (6) the effectiveness of the principal component transformation in data analysis. The collection, digitization, reformatting, and geometric adjustment of SAR data are also discussed. Image interpretation results and classification results are presented. A.R.H.

N83-16853# Lockheed Engineering and Management Services Co., Inc., Houston, Tex.
A PROCEDURES MANUAL FOR USING HIGH-ALTITUDE PANORAMIC PHOTOGRAPHY FOR FOREST PEST DAMAGE SURVEYS
R. D. DILLMAN, B. B. EAV, and S. S. SHEN Apr. 1982 22 p refs
(Contract USDA/FS-53-3187-1-42)
(PB82-250531; LEMSCO-17270; NFAP-269) Avail: NTIS HC A02/MF A01 CSCL 02F

The procedures used in a large-area survey of ponderosa pine mortality caused by the mountain pine beetle are described. These procedures are based on the use of high-altitude panoramic photography as a means of sampling the study area. They can be modified, based on local conditions, for other types of natural resource surveys. Author (GRA)

N83-16854# Lockheed Engineering and Management Services Co., Inc., Houston, Tex.
PHOTOINTERPRETATION GUIDE FOR IDENTIFYING PINES KILLED BY THE MOUNTAIN PINE BEETLE
R. D. DILLMAN and W. B. WHITE (Forest Service, Houston, Tex.) Washington Apr. 1982 54 p refs
(Contract USDA/FS-53-3187-0-29)
(PB82-251778; LEMSCO-16333; NFAP-267) Avail: NTIS HC A04/MF A01 CSCL 02F

The photographic characteristics of two major host trees killed by the mountain pine beetle are illustrated in this guide. The two hosts are ponderosa pine (Pinus ponderosa) and lodgepole pine (Pinus contorta). These photographic characteristics were developed from high-altitude panoramic aerial photography and are applicable throughout the insect's natural range in the Western United States. GRA

N83-17921*# California Univ., Berkeley.
IRRIGATED LANDS ASSESSMENT FOR WATER MANAGEMENT: TECHNIQUE TEST Annual Report
S. L. WALL, C. E. BROWN, M. ERIKSSON, C. A. GRIGG, R. W. THOMAS, R. N. COLWELL, J. E. ESTES (California Univ., Santa Barbara), L. R. TINNEY (California Univ., Santa Barbara), J. O. BAGGETT (California Univ., Santa Barbara), G. SAWYER (California Dept. of Water Resources, Sacramento) et al. Apr. 1981 342 p refs Original contains imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls, S.D. 57198 ERTS
(Contract NCC2-54)
(E83-10154; NASA-CR-166370; NAS 1.26:166370) Avail: NTIS HC A15/MF A01 CSCL 08H

A procedure for estimating irrigated land using full frame LANDSAT imagery was demonstrated. Relatively inexpensive interpretation of multidate LANDSAT photographic enlargements was used to produce a map of irrigated land in California. The LANDSAT and ground maps were then linked by regression equations to enable precise estimation of irrigated land area by county, basin, and statewide. Land irrigated at least once in California in 1979 was estimated to be 9.86 million acres, with an expected error of less than 1.75% at the 99% level of confidence. To achieve the same level of error with a ground-only sample would have required 3 to 5 times as many ground sample units statewide. A procedure for relatively inexpensive computer classification of LANDSAT digital data to irrigated land categories was also developed. This procedure is based on ratios of MSS band 7 and 5, and gave good results for several counties in the Central Valley. Author

N83-17926*# Technicolor Government Services, Inc., Moffett Field, Calif.
FORESTRY TIMBER TYPING. TANANA DEMONSTRATION PROJECT, ALASKA ASVT Final Report
L. A. MORRISSEY and V. G. AMBROSIA Jun. 1982 72 p refs Original contains color imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls, S.D. 57198 ERTS
(Contract NAS2-11101)
(E83-10162; NASA-CR-166391; NAS 1.26:166391) Avail: NTIS HC A04/MF A01 CSCL 02F

The feasibility of using LANDSAT digital data in conjunction with topographic data to delineate commercial forests by stand size and crown closure in the Tanana River basin of Alaska was tested. A modified clustering approach using two LANDSAT dates to generate an initial forest type classification was then refined with topographic data. To further demonstrate the ability of remotely sensed data in a fire protection planning framework, the timber type data were subsequently integrated with terrain information to generate a fire hazard map of the study area. This map provides valuable assistance in initial attack planning, determining equipment accessibility, and fire growth modeling. The resulting data sets were incorporated into the Alaska Department of Natural Resources geographic information system for subsequent utilization. A.R.H.

N83-17933*# California Univ., Santa Barbara. Geography Remote Sensing Unit.
PRIME AGRICULTURAL LAND MONITORING AND ASSESSMENT COMPONENT OF THE CALIFORNIA INTEGRATED REMOTE SENSING SYSTEM Final Report
J. E. ESTES, L. TINNEY, Principal Investigators, and T. STREICH Sep. 1981 32 p ERTS
(Contract NAG2-24)
(E83-10169; NASA-CR-166371; NAS 1.26:166371) Avail: NTIS HC A03/MF A01 CSCL 02C

The use of digital LANDSAT techniques for monitoring agricultural land use conversions was studied. Two study areas were investigated: one in Ventura County and the other in Fresno County (California). Ventura test site investigations included the use of three dates of LANDSAT data to improve classification performance beyond that previously obtained using single data techniques. The 9% improvement is considered highly significant. Also developed and demonstrated using Ventura County data is an automated cluster labeling procedure, considered a useful example of vertical data integration. Fresno County results for a single data LANDSAT classification paralleled those found in Ventura, demonstrating that the urban/rural fringe zone of most interest is a difficult environment to classify using LANDSAT data. A general raster to vector conversion program was developed to allow LANDSAT classification products to be transferred to an operational county level geographic information system in Fresno. M.G.

N83-17953*# Oregon State Univ., Corvallis. Environmental Remote Sensing Applications Lab.
PERFORMING AND UPDATING AN INVENTORY OF OREGON'S EXPANDING IRRIGATED AGRICULTURAL LANDS UTILIZING REMOTE SENSING TECHNOLOGY
M. J. HALL *In* Purdue Univ. CORSE-81: The 1981 Conf. on Remote Sensing Educ. p 103-107 1981 refs ERTS
Avail: NTIS HC A16/MF A01 CSCL 02C

An inventory technique based upon using remote sensing technology, interpreting both high altitude aerial photography and LANDSAT multispectral scanner imagery, is discussed. It is noted that once the final land use inventory maps of irrigated agricultural lands are available and approximately scaled they may be overlaid directly onto either multispectral scanner or return beam vidicon prints, thereby providing an inexpensive updating procedure. M.G.

N83-18000# National Aerospace Lab., Amsterdam (Netherlands). Flight and Informatics Div.
PROCESSING AND INTERPRETATION OF LANDSAT MSS DATA OF TEST AREAS IN FLEVOLAND AND FRIESLAND
W. VERHOEF, H. A. VANINGENSCHENAU, N. J. J. BUNNIK, and H. W. J. VANKASTEN (Center for Agrobiological Research Cabo) 30 Oct. 1981 62 p refs Original contains color illustrations
(NLR-TR-81108-U) Avail: NTIS HC A04/MF A01

The image processing methods used on Landsat multispectral data for classification of agricultural areas in Southern Flevoland and Eastern Flevoland and for investigation of the soil moisture in the southern area of Friesland are described. The results of the classification are analyzed by the crop maps of the agricultural areas. The soil moisture investigation was based on contrast enhanced images and their correlation with the grassland survey map and soil map. E.A.K.

N83-18001# National Aerospace Lab., Amsterdam (Netherlands). Flight Div.
INFLUENCE OF CROP GEOMETRY ON MULTISPECTRAL REFLECTANCE DETERMINED BY THE USE OF CANOPY REFLECTANCE MODELS
W. VERHOEF and N. J. J. BUNNIK 14 Jul. 1981 21 p refs Presented at Intern. Colloq. on Spectral Signatures of Objects in Remote Sensing, Avignon, France, 8-11 Sep. 1981 Previously announced in AIAA as A82-45422
(NLR-MP-81042-U) Avail: NTIS HC A02/MF A01

Descriptions of canopy geometry and on different models for predicting canopy reflectance are reviewed. The influence of canopy geometry on the reflectance of incident radiation by agricultural crops and natural vegetation is of vital importance for proper processing and interpretation of multispectral image data acquired by earth resources satellites and aircraft. Some models are applied to study the nonLambertian character of canopy reflectance for various crop geometries and provide the keys to a more quantitative interpretation of multispectral images of vegetated areas. A new model the SAIL, is applied to generate examples of the relations which are studied by canopy reflectance modelling. E.A.K.

N83-18002# National Aerospace Lab., Amsterdam (Netherlands). Flight Div.
PREPROCESSING OF AIRBORNE REMOTE SENSING DATA. PART 2: NEW DEVELOPMENTS
P. BINNENKADE Feb. 1981 10 p refs Presented at Remote Sensing Soc. Conf. on Matching Remote Sensing Technol. and Their Appl., London, 16-18 Dec. 1981
(NLR-MP-81060-U) Avail: NTIS HC A02/MF A07

A number of sensor systems operated from airborne platforms are described. Thus far it was not possible to correct the acquired imagery for platform motion and position. a multidisciplinary team shows the affects of the combination of aircraft data with SLAR imagery to obtain geometrically and radiometrically corrected data for further use defined processing and interpretation. E.A.K.

N83-19147*# Lockheed Engineering and Management Services Co., Inc., Houston, Tex.
LACIE AND AGRISTARS
B. H. MOORE *In* NASA. Goddard Space Flight Center 2nd Eastern Reg. Remote Sensing Appl. Conf. p 47-50 1981 ERTS
Avail: NTIS HC A17/MF A01 CSCL 02C

Involvement of the USDA in the development and use of remote sensing in support of major departmental missions began in the 1940's with the use of aerial cameras mounted in fixed wing aircraft to obtain photographs of the country's land area. Cooperation with NOAA and NASA in the large area crop inventory experiment (1974 to 1978) and results from the Illinois crop acreage experiment (1977) led to the establishment in 1978 of the AgRISTARS project program, a six-year effect to determine the usefulness, cost, and extent to which aerospace remote sensing data can be integrated into existing or future USDA systems to improve the objectivity, reliability, timeliness, and adequacy of information required to carry out agency missions. The objectives of the eight technical projects of AgRISTARS are summarized. A.R.H.

N83-19148*# Midwest Research Inst., Golden, Colo. Solar Energy Research Inst.
BIOMASS MEASUREMENT FROM LANDSAT: DROUGHT AND ENERGY APPLICATIONS
E. L. MAXWELL *In* NASA. Goddard Space Flight Center 2nd Eastern Reg. Remote Sensing Appl. Conf. p 51-72 1981 refs Original contains imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls, S.D. 57198 ERTS
Avail: NTIS HC A17/MF A01 CSCL 02F

The theory supporting the use of vegetation indices derived from LANDSAT data for the direct measurement of biomass is reviewed. The use of multispectral data to measure biomass is a natural and viable application since the photosynthetic production of biomass gives vegetation its unique spectral properties. Vegetation indices also perform a normalization function which tends to make them insensitive to atmospheric and soil color variations. Optical and digital LANDSAT products are discussed relative to the use of vegetation indices to monitor drought impact. Based on results obtained in Colorado, operational use of LANDSAT to monitor drought is cost effective, practical and ready for implementation today. The direct measurement of biomass energy resources may also benefit from LANDSAT technology. Measurement of total biomass and annual primary production may be feasible. Identification of that component of biomass resources available for energy use will require other sources of information, however. Author

N83-19149*# Cornell Univ., Ithaca, N. Y.
REMOTE SENSING FOR FOREST APPLICATIONS IN NEW YORK: TWO CASE STUDIES
J. A. STANTURF, W. R. PHILIPSON, L. K. BALLIETT, and K. L. JAHN *In* NASA. Goddard Space Flight Center 2nd Eastern Reg. Remote Sensing Appl. Conf. p 73-80 1981 refs ERTS
(Contract NGL-33-010-171)
Avail: NTIS HC A17/MF A01 CSCL 20F

Under-utilized forest resources in the Northeast can supply fiber to new markets. Information on forest resources, however, is often too aggregated to estimate available woody material with sufficient detail for planning specific projects. Over the past year, staff of Cornell University's Remote Sensing Program, under a grant from NASA, assisted New York State agency personnel by assessing available woody material for two potential development projects, a wood-fired power plant and a particle board manufacturing plant. These feasibility studies are reviewed, illustrating how information derived from high-altitude aircraft photographs, LANDSAT imagery, and available supporting data were integrated to arrive at estimates of woody material. Author

N83-19150*# Forest Service, Annapolis, Md.
MAPPING FOREST TYPES IN WORCESTER COUNTY, MARYLAND, USING LANDSAT DATA
J. BURTIS, JR. and R. G. WITT *In* NASA. Goddard Space Flight Center 2nd Eastern Reg. Remote Sensing Appl. Conf. p 81-87 1981 refs ERTS
Avail: NTIS HC A17/MF A01 CSCL 02F

The feasibility of mapping Level 2 forest cover types for a county-sized area on Maryland's Eastern Shore was demonstrated. A Level 1 land use/land cover classification was carried out for all of Worcester County as well. A June 1978 LANDSAT scene was utilized in a classification which employed two software packages on different computers (IDIMS on an HP 3000 and ASTEP-II on a Univac 1108). A twelve category classification scheme was devised for the study area. Resulting products include black and white line printer maps, final color coded classification maps, digitally enhanced color imagery and tabulated acreage statistics for all land use and land cover types. Author

N83-19151*# Yale Univ., New Haven, Conn. School of Forestry and Environmental Studies.
EXTENDING THE UTILITY OF FOREST COVER MAPS
J. K. BERRY and A. MANSBACH *In* NASA. Goddard Space Flight Center 2nd Eastern Reg. Remote Sensing Appl. Conf. p 89-99 1981 refs Sponsored by General Services Foundation and Northwest Area Foundation ERTS
Avail: NTIS HC A17/MF A01 CSCL 02F

A computer-assisted map analysis system is discussed that characterizes timber supply in terms of standing timber; accessibility considering various harvesting factors; and availability as affected by ownership patterns of timberlands. Factors affecting harvesting include proximity to existing roads and consideration of terrain characteristics. Availability considerations include size of ownership, housing density and excluded areas. The model is demonstrated for a seventy square mile tract in western Massachusetts. Author

N83-19154*# Adirondack Park Agency, Ray Brook, N.Y.
LANDSAT APPLICATIONS BY THE ADIRONDACK PARK AGENCY FOR LAND COVER ANALYSES AND FOREST COVER CHANGE
J. S. BANTA and R. P. CURRAN *In* NASA. Goddard Space Flight Center 2nd Eastern Reg. Remote Sensing Appl. Conf. p 121-123 1981 ERTS
Avail: NTIS HC A17/MF A01 CSCL 08B

The New York State Adirondack Park Agency is using LANDSAT imagery to provide current, consistent parkwide data on forest cover, forest change and other land cover characteristics for the Adirondack Park, an area of 9,375 sq. miles (24,280 sq km). Boundaries of the study area were digitized and the data were enhanced and geographically rectified. A classification scheme was devised which emphasized the basic land cover types of the Park: hardwoods, spruce-fir, pine, wet conifer, brushland, grassland, agricultural areas, exposed earth, urban areas, and water bodies. Cover type classifications for disturbed forest land were also chosen: cut hardwoods, regenerating hardwoods, and cut spruce fir. Field verification of 1978 classification revealed an accurate differentiation of forest types within types and between nonforested/forested areas. The classification accurately detects forest land disturbances; however, it is not always descriptive of the level of disturbance. A.R.H.

N83-19157*# Minnesota State Planning Agency, St. Paul. Land Management Information Center.
MONITORING LAND CONVERSIONS FROM FOREST/WETLAND TO AGRICULTURE
M. L. DUDDING *In* NASA. Goddard Space Flight Center 2nd Eastern Reg. Remote Sensing Appl. Conf. p 139-146 1981 Original contains imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls, S.D. 57198 ERTS
Avail: NTIS HC A17/MF A01 CSCL 08B

The utility of LANDSAT data in monitoring largescale land clearance and drainage activities in a forest/wetland environment in northern Minnesota was investigated. LANDSAT tapes from 1973, 1978 and 1980 were used in a multitemporal unsupervised land cover classification of the 9 x 15 mile site. Results show quite clearly and in a cost-effective manner, where the greatest activity occurred. It was also possible to integrate the LANDSAT data with other data available through the Land Management Information Center's geographic information system. Author

N83-19158*# Michigan State Univ., East Lansing. Center for Remote Sensing.
AREA ESTIMATION OF FORESTLANDS IN SOUTHWESTERN MICHIGAN FROM LANDSAT IMAGERY
M. A. KARTERIS, W. R. ENSLIN, and J. THIEDE (Michigan Dept. of Natural Resources, East Lansing) *In* NASA. Goddard Space Flight Center 2nd Eastern Reg. Remote Sensing Appl. Conf. p 147-155 1981 refs ERTS
(Contract NGL-23-004-083)
Avail: NTIS HC A17/MF A01 CSCL 02F

The accuracy of mapping and estimating the area of forestlands in southwestern Michigan from winter and fall LANDSAT images was evaluated. All omission and commission errors in the LANDSAT forest maps were identified and mapped through comparison with an existing detailed forest cover type map. Accuracies ranged from 74.0% to 98.5% and were higher for the winter imagery. Most errors (85%) occurred along the perimeter of forestlands and were less than 4 hectares (10 acres) and size. Other factors affecting interpretation are reported as well as time and image availability considerations. Author

N83-19178*# Vermont State Planning Office, Burlington.
CHITTENDEN COUNTY, VERMONT LAND COVER PROJECT
D. E. MALLOY *In* NASA. Goddard Space Flight Center 2d Eastern Reg. Remote Sensing Appl. Conf. p 367-371 1981 ERTS
Avail: NTIS HC A17/MF A01 CSCL 08B

The testing of LANDSAT applicability to urban and agricultural land use analysis at the substate level is described. It is concluded that the LANDSAT system has a place in Vermont and places like it, but that the present operation is inadequate and the need for technology transfer and excellent communication between the producers and users is fundamental to the future of the system and for the realization of benefit from the investment. M.G.

N83-20308*# California Univ., Berkeley. Space Sciences Lab.
DEVELOPMENT OF TECHNIQUES FOR PRODUCING STATIC STRATA MAPS AND DEVELOPMENT OF PHOTOINTERPRETIVE METHODS BASED ON MULTITEMPORAL LANDSAT DATA Quarterly Progress Report, 15 Feb. - 14 May 1977
R. N. COLWELL, Principal Investigator, C. M. HAY, R. W. THOMAS, and A. S. BENSON 5 Aug. 1977 79 p refs ERTS
(Contract NAS9-14565)
(E83-10156; NASA-CR-167761; NAS 1.26:167761; SSL-SER-18-ISSUE-60) Avail: NTIS HC A05/MF A01 CSCL 08B

Progress in the evaluation of the static stratification procedure and the development of alternative photointerpretive techniques to the present LACIE procedure for the identification of training fields is reported. Statistically significant signature controlling variables were defined for use in refining the stratification procedure. A subset of the 1973-74 Kansas LACIE segments for wheat was analyzed. M.G.

N83-20309*# California Univ., Berkeley. Space Sciences Lab.
DEVELOPMENT OF TECHNIQUES FOR PRODUCING STATIC STRATA MAPS AND DEVELOPMENT OF PHOTOINTERPRETATION METHODS BASED ON MULTITEMPORAL LANDSAT DATA Monthly Summary Progress Report, 15 May - 14 Nov. 1976
R. N. COLWELL, Principal Investigator, C. M. HAY, R. W. THOMAS, and A. S. BENSON 15 Dec. 1976 104 p refs ERTS
(Contract NSG-14565)
(E83-10160; NASA-CR-167760; NAS 1.26:167760; SSL-SER-ISSUE-2) Avail: NTIS HC A06/MF A01 CSCL 08B

The progress of research conducted in support of the Large Area Crop Inventory Experiment (LACIE) is documented. Specific tasks include (1) evaluation of the static stratification procedure and modification of that procedure if warranted, and (2) the development of alternative photointerpretative techniques to the present LACIE procedures for the identification and selection of training fields (areas). M.G.

N83-20310*# Missouri Univ., Columbia. Dept. of Atmospheric Sciences.
EVALUATION OF THOMPSON-TYPE TREND AND MONTHLY WEATHER DATA MODELS FOR CORN YIELDS IN IOWA, ILLINOIS, AND INDIANA
V. FRENCH, Principal Investigator Apr. 1982 88 p refs Sponsored by NASA, USDA, Dept. of Commerce, Dept. of the Interior, and Agency for International Development ERTS
(Contract PROJ. AGRISTARS)
(E83-10161; NASA-CR-170007; YM-12-04365; JSC-18576; NAS 1.26:170007) Avail: NTIS HC A05/MF A01 CSCL 02C

An evaluation was made of Thompson-Type models which use trend terms (as a surrogate for technology), meteorological variables based on monthly average temperature, and total precipitation to forecast and estimate corn yields in Iowa, Illinois, and Indiana. Pooled and unpooled Thompson-type models were compared. Neither was found to be consistently superior to the other. Yield reliability indicators show that the models are of limited use for large area yield estimation. The models are objective and consistent with scientific knowledge. Timely yield forecasts and estimates can be made during the growing season by using normals or long range weather forecasts. The models are not costly to operate and are easy to use and understand. The model standard errors of prediction do not provide a useful current measure of modeled yield reliability. M.G.

N83-20312*# California Univ., Berkeley. Space Sciences Lab.
LABELING RESEARCH IN SUPPORT OF THROUGH-THE-SEASON AREA ESTIMATION Final Report, 15 Nov. 1980 - 30 Jun. 1982
R. N. COLWELL, Principal Investigator, C. M. HAY, and E. J. SHEFFNER Nov. 1982 103 p refs Sponsored by NASA, USDA, Dept. of Commerce, Dept. of Interior, and Agency for International Development ERTS
(Contract PROJ. AGRISTARS; NAS9-14565)
(E83-10190; NASA-CR-167804; SR-B2-04375; NAS 1.26:167804)
Avail: NTIS HC A06/MF A01 CSCL 02C

The development of LANDSAT-based through-the-season labeling procedures for corn and soybeans is discussed. A model for predicting labeling accuracy within key time periods throughout the growing season is outlined. Two methods for establishing the starting point of one key time period, viz., early season, are described. In addition, spectral-temporal characteristics for separating crops in the early season time period are discussed. M.G.

N83-20313*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.

THEMATIC MAPPER DATA QUALITY AND PERFORMANCE ASSESSMENT IN RENEWABLE RESOURCE/AGRICULTURAL REMOTE SENSING

J. D. ERICKSON and R. B. MACDONALD, Principal Investigators 15 Sep. 1982 126 p refs Original contains imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls, S.D. 57198 ERTS
(E83-10191; NASA-TM-85242; IT-12-04369; JSC-18579; NAS 1.15:85242) Avail: NTIS HC A07/MF A01 CSCL 02C

A 'quick look' investigation of the initial LANDSAT-4, thematic mapper (TM) scene received from Goddard Space Flight Center was performed to gain early insight into the characteristics of TM data. The initial scene, containing only the first four bands of the seven bands recorded by the TM, was acquired over the Detroit, Michigan, area on July 20, 1982. It yielded abundant information for scientific investigation. A wide variety of studies were conducted to assess all aspects of TM data. They ranged from manual analyses of image products to detect obvious optical, electronic, or mechanical defects to detailed machine analyses of the digital data content for evaluation of spectral separability of vegetative/nonvegetative classes. These studies were applied to several segments extracted from the full scene. No attempt was made to perform end-to-end statistical evaluations. However, the output of these studies do identify a degree of positive performance from the TM and its potential for advancing state-of-the-art crop inventory and condition assessment technology. M.G.

N83-20314*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.

PROGRAM REVIEW PRESENTATION TO LEVEL 1, INTERAGENCY COORDINATION COMMITTEE Semiannual Review, 30 Apr. - 30 Sep. 1982

29 Nov. 1982 135 p refs Sponsored by NASA, USDA, Dept. of Commerce, Dept. of Interior, amd Agency for International Development ERTS
(Contract PROJ. AGRISTARS)
(E83-10192; IT-J2-04378; JSC-18581; NAS 1.15:85243; SAR-6; NASA-TM-85243) Avail: NTIS HC A07/MF A01 CSCL 02C

Progress in the development of crop inventory technology is reported. Specific topics include the results of a thematic mapper analysis, variable selection studies/early season estimator improvements, the agricultural information system simulator, large unit proportion estimation, and development of common features for multi-satellite information extraction. M.G.

N83-20316*# Aster Consulting Associates, Binghamton, N.Y.

BIOPHYSICAL AND SPECTRAL MODELING Final Report

N. S. GOEL, Principal Investigator 1 Dec. 1982 14 p ERTS
(Contract NAS9-16662)
(E83-10194; NASA-CR-167808; NAS 1.26:167808) Avail: NTIS HC A02/MF A01 CSCL 02C

Activities and results of a project to develop strategies for modeling vegetative canopy reflectance are reported. Specific tasks included the inversion of canopy reflectance models to estimate agronomic variables (particularly leaf area index) from in-situ reflectance measurements, and a study of possible uses of ecological models in analyzing temporal profiles of greenness. M.G.

N83-20317*# Texas A&M Univ., College Station. Inst. of Statistics.

AREA ESTIMATION USING MULTIYEAR DESIGNS AND PARTIAL CROP IDENTIFICATION Final Report, 1 Mar. 1981 - 31 Dec. 1982

R. L. SIELKEN, JR. Jan. 1983 16 p Sponsored by NASA, USDA, Dept. of Commerce, Dept. of the Interior, and Agency for International Development ERTS
(Contract NAS9-13894; PROJ. AGRISTARS)
(E83-10195; NASA-CR-167806; IT-T3-04395; NAS 1.26:167806) Avail: NTIS HC A02/MF A01 CSCL 02C

Progress is reported for the following areas: (1) estimating the stratum's crop acreage proportion using the multiyear area estimation model; (2) assessment of multiyear sampling designs; and (3) development of statistical methodology for incorporating partially identified sample segments into crop area estimation. M.G.

N83-20318*# Lockheed Engineering and Management Services Co., Inc., Houston, Tex.

LINEAR DISCRIMINANT ANALYSIS WITH MISALLOCATION IN TRAINING SAMPLES

R. CHHIKARA, Principal Investigator and J. MCKEON (Old Dominion Univ.) Dec. 1982 34 p refs Sponsored by NASA, USDA, Dept. of Commerce, Dept. of the Interior, and Agency for International Development ERTS
(Contract NAS9-15800; PROJ. AGRISTARS)
(E83-10196; NASA-CR-167813; SR-L3-04388; JSC-18590; NAS 1.26:167813; LEMSCO-19020) Avail: NTIS HC A03/MF A01 CSCL 02C

Linear discriminant analysis for a two-class case is studied in the presence of misallocation in training samples. A general appraoch to modeling of mislocation is formulated, and the mean vectors and covariance matrices of the mixture distributions are derived. The asymptotic distribution of the discriminant boundary is obtained and the asymptotic first two moments of the two types of error rate given. Certain numerical results for the error rates are presented by considering the random and two non-random misallocation models. It is shown that when the allocation procedure for training samples is objectively formulated, the effect of misallocation on the error rates of the Bayes linear discriminant rule can almost be eliminated. If, however, this is not possible, the use of Fisher rule may be preferred over the Bayes rule. M.G.

N83-20319*# State Univ. of New York, Binghamton. Dept. of Systems Science.

MODELING OF VEGETATION CANOPY REFLECTANCE: STATUS, ISSUES AND RECOMMENDED FUTURE STRATEGY

N. S. GOEL, ed. 30 Aug. 1982 84 p refs Prepared for Lockheed Engineering and Management Services Co., Inc., Houston, Tex. ERTS
(Contract NAS9-15800)
(E83-10197; NASA-CR-167816; JSC-18666; NAS 1.26:167816) Avail: NTIS HC A05/MF A01 CSCL 02F

Various technical issues related to mapping of vegetative type, condition and stage of maturity, utilizing remotely sensed spectral data are reviewed. The existing knowledge base of models, especially of radiative properties of the vegetation canopy and atmosphere, is reviewed to establish the state of the art for addressing the problem of vegetation mapping. Activities to advance the state of the art are recommended. They include working on canopy reflectance and atmospheric scattering models, and field measurements of canopy reflectance as well as of canopy components. Leaf area index (LAI) and solar radiation interception (SRI) are identified as the two most important vegetation variables requiring further investigation. It is recommended that activities related to sensing them or understanding their relationships with measurable variables, should be encouraged and supported. M.G.

N83-20320*# Lockheed Engineering and Management Services Co., Inc., Houston, Tex.
ON THE ERROR IN CROP ACREAGE ESTIMATION USING SATELLITE (LANDSAT) DATA
R. CHHIKARA, Principal Investigator Jan. 1983 24 p refs
Sponsored by NASA, USDA, Dept. of Commerce, Dept. of the Interior, and Agency for International Development ERTS
(Contract NAS9-15800; PROJ. AGRISTARS)
(E83-10198; NASA-CR-167811; SR-L3-04389; JSC-18591; NAS 1.26:167811; LEMSCO-19021) Avail: NTIS HC A02/MF A01 CSCL 02C

The problem of crop acreage estimation using satellite data is discussed. Bias and variance of a crop proportion estimate in an area segment obtained from the classification of its multispectral sensor data are derived as functions of the means, variances, and covariance of error rates. The linear discriminant analysis and the class proportion estimation for the two class case are extended to include a third class of measurement units, where these units are mixed on ground. Special attention is given to the investigation of mislabeling in training samples and its effect on crop proportion estimation. It is shown that the bias and variance of the estimate of a specific crop acreage proportion increase as the disparity in mislabeling rates between two classes increases. Some interaction is shown to take place, causing the bias and the variance to decrease at first and then to increase, as the mixed unit class varies in size from 0 to 50 percent of the total area segment. M.G.

N83-20321*# Purdue Univ., Lafayette, Ind. Lab. for Applications of Remote Sensing.
RELATION OF AGRONOMIC AND MULTISPECTRAL REFLECTANCE CHARACTERISTICS OF SPRING WHEAT CANOPIES
M. E. BAUER, Principal Investigator and J. S. AHLRICHS Dec. 1982 29 p refs Sponsored by NASA, USDA, Dept. of Commerce, Dept. of the Interior, and Agency for International Development ERTS
(Contract NAS9-15466; PROJ. AGRISTARS)
(E83-10199; NASA-CR-167805; SR-P2-04384; NAS 1.26:167805; LARS-12082) Avail: NTIS HC A03/MF A01 CSCL 02C

The relationships between crop canopy variables such as leaf area index (LAI) and their multispectral reflectance properties were investigated along with the potential for estimating canopy variables from remotely sensed reflectance measurements. Reflectance spectra over the 0.4 to 2.5 micron wavelength range were acquired during each of the major development stages of spring wheat canopies at Williston, North Dakota, during three seasons. Treatments included planting date, N fertilization, cultivar, and soil moisture. Agronomic measurements included development stage, biomass, LAI, and percent soil cover. High correlations were found between reflectance and percent cover, LAI, and biomass. A near infrared wavelength band, 0.76 to 0.90 microns, was most important in explaining variation in LAI and percent cover, while a middle infrared band, 2.08 to 2.35 microns, explained the most variation in biomass and plant water content. Transformations, including the near infrared/red reflectance ratio and greenness index, were also highly correlated to canopy variables. The relationship of canopy variables to reflectance decreased as the crop began to ripen. the canopy variables could be accurately predicted using measurements from three to five wavelength bands. The wavelength bands proposed for the thematic mapper sensor were more strongly related to the canopy variables than the LANDSAT MSS bands.

N83-20322*# Texas A&M Univ., College Station. Remote Sensing Center
DEVELOPMENT OF AN EARLY WARNING SYSTEM OF CROP MOISTURE CONDITIONS USING PASSIVE MICROWAVE Final Report, 1 Nov. 1981 - 31 Oct. 1982
M. J. MCFARLAND and P. H. HARDER, II, Principal Investigators Nov. 1982 119 p refs Sponsored by NASA, USDA, Dept. of Commerce, Dept. of the Interior, and Agency for International Development ERTS
(Contract NAS9-16556; PROJ. AGRISTARS)
(E83-10200; NASA-CR-167820; SR-T2-04383; NAS 1.26:167820) Avail: NTIS HC A06/MF A01 CSCL 02C

Emissivities were calculated from the Nimbus 5 electrically scanning microwave radiometer (ESMR) over 25 km grid cells for the southern Great Plains includin the western two-thirds of Kansas and Oklahoma and northwest Texas. These emissivities, normalized for seasonal temperature changes, were in excellent agreement with theory and measurements made from aircraft and truck sensors at the 1.55 cm wavelength of ESMR. These emissivities were related to crop moisture conditions of the winter wheat in the major wheat producing counties of the three states. High correlations were noted between emissivity and an antecedent precipitation index (API) used to infer soil moisture for periods when the soils were essentially bare. The emissivities from ESMR were related through API and actual crop condition reports to progress of fall planting, adequacy of crop moisture for stand establishment, and periods of excessive moisture that necessitated replanting. Periods of proloned frozen soil in the winter were observable at several grid points. The average emissivities of the canopy/soil surface during the maximum canopy development times in the spring showed a good agreement with moisture stress inferred from rainfall and yield data. M.G.

N83-20338# Indian Inst. of Tech., New Delhi. Dept. of Applied Mechanics.
A STUDY OF THE DETERMINATION OF WHEAT CROP STATISTICS IN INDIA THROUGH THE UTILIZATION OF LANDSAT DATA Ph.D. Thesis
M. K. MUNSHI 1982 161 p refs
(PB83-109546) Avail: NTIS HC A08/MF A01 CSCL 02B

The major drawbacks of the Indian crop information system and the problems of crop monitoring in the country utilizing remote sensing technology are discussed. An operational methodology is developed for deriving wheat crop acreage statistics directly from LANDSAT Multispectral Scanner data, utilizing manual visual techniques. GRA

N83-21425*# Minnesota Dept. of Natural Resources, St. Paul. Div. of Waters.
IRRIGATION SURVEY IN SHERBURNE COUNTY, MINNESOTA
D. BEISSEL and D. WOODWARD *In* NASA. Goddard Space Flight Center Eastern Reg. Remote Sensing Appl. Conf. p 63-68 Jan. 1981 refs Original contains imagery. Original photography may be purchased from EROS Data Center, Sioux Falls, S.D. 57198 ERTS
Avail: NTIS HC A11/MF A01 CSCL 08H

Approximately 70% of Minnesota's irrigation is with center pivot distribution systems whose diagnostic appearance on remotely sensed imagery is a circular pattern which can be readily identified on LANDSAT MSS band imagery. Fields irrigated with traveling guns, laterals, booms, or cornering systems either result in angular field patterns or obscure the circular patterns normally visible on imagery. The IDMS system at Goddard was used to develop a LANDSAT digital classification of the Sherburne County area, which located fields regardless of shape, and was not dependent of visual interpretation. Ground truth collection and classification attempts are described in an effort to inventory all wells in the area. A.R.H.

N83-21428*# Michigan Dept. of Natural Resources, Lansing.
WILDLIFE HABITAT EVALUATION DEMONSTRATION PROJECT
G. E. BURGOYNE, JR. and L. G. VISSER *In* NASA. Goddard Space Flight Center Eastern Reg. Remote Sensing Appl. Conf. p 87-89 Jan. 1981 ERTS
Avail: NTIS HC A11/MF A01 CSCL 06C

To support the deer range improvement project in Michigan, the capability of LANDSAT data in assessing deer habitat in terms of areas and mixes of species and age classes of vegetation is being examined to determine whether such data could substitute for traditional cover type information sources. A second goal of the demonstration project is to determine whether LANDSAT data can be used to supplement and improve the information normally used for making deer habitat management decisions, either by providing vegetative cover for private land or by providing information about the interspersion and juxtaposition of valuable vegetative cover types. The procedure to be used for evaluating in LANDSAT data of the Lake County test site is described.
A.R.H.

N83-21429*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
LAND COVER ANALYSIS OF JAMES CITY COUNTY, VIRGINIA
J. A. COPONY (Virginia Div. of Forestry, Charlottsville), E. M. MIDDLETON, and B. G. BLY (Computer Sciences Corp., Silver Spring, Md.) *In its* Eastern Reg. Remote Sensing Appl. Conf. p 91-97 Jan. 1981 refs Original contains imagery. Original photography may be purchased from EROS Data Center, Sioux Falls, S.D. 57198 ERTS
Avail: NTIS HC A11/MF A01 CSCL 08B

The approach used to obtain reliable countywide forest resource data, including statistics and a forest cover distribution map from LANDSAT data is described. Comparison of results of the LANDSAT anlysis and U.S. Forestry Survey data is presented in a table. Pine, oak/pine, and oak/hickory accounted for 22.3%, 32.6% and 45.2% respectively of the total forest area in the LANDSAT analysis, compared to 22.8%, 30.1%. and 47.1% in the Forest Survey. The corresponding figures for each forest type differ at most 2.5% for the mixed forest. The total county area in forest land measured using LANDSAT was underestimated by 1,409 acres, a 2.2% error based on the Forest Survey statistics. However, the estimate of 61,242 acres fell well within the known 4% uncertainty of the estimate for the Forest Survey figures (62,651 acres + or - 2,544 acres).
A.R.H.

N83-21432*# Michigan Dept. of Natural Resources, Lansing. Div. of Forestry.
LANDSAT, A DATA SUPPLEMENT TO FOREST SURVEY
G. THIEDE *In* NASA. Goddard Space Flight Center Eastern Reg. Remote Sensing Appl. Conf. p 111-113 Jan. 1981 ERTS
Avail: NTIS HC A11/MF A01 CSCL 02F

The use of LANDSAT in providing forest data on a county basis was investigated. Image interpretation and classification techniques and their accuracy are addressed. LANDSAT data was also used to detect and delineate defoliation caused by tent caterpillars.
M.G.

N83-21433*# New Hampshire Univ., Durham. Cooperative Extension Service.
CLEARCUT MAPPING AND FOREST TYPE MAPPING IN EASTERN FORESTS WITH LANDSAT DATA
K. SUTHERLAND *In* NASA. Goddard Space Flight Center Eastern Reg. Remote Sensing Appl. Conf. p 115-118 Jan. 1981 ERTS
Avail: NTIS HC A11/MF A01 CSCL 02F

The development and use of signature packages which provide a forest type map and which identify clearcut areas is discussed. The type map divides the forest land into three categories: softwood, mixed wood, and hardwood. The user defines each of these categories and adjusts the signature package to fit his needs. Success in identifying clearcuts and their stage of regrowth was demonstrated in New Hampshire where clearcuts range in size from 5 to 100 acres with between 30 and 40 acres being the most common.
M.G.

N83-21434*# Dartmouth Coll., Hanover, N.H. Earth Resources Group.
FORESTRY APPLICATIONS OF LANDSAT DATA IN NEW HAMPSHIRE
E. BRYANT and K. SUTHERLAND (New Hampshire Univ., Durham) *In* NASA. Goddard Space Flight Center Eastern Reg. Remote Sensing Appl. Conf. p 119-122 Jan. 1981 refs ERTS
Avail: NTIS HC A11/MF A01 CSCL 02F

The applications of forest clearcut maps derived from LANDSAT data are dicussed. Such maps provide harvest location information useful in general management and indicate the stage of regrowth which helps determine timber stand improvement practices. The clearcut maps are also used in fire control planning and in determining wildlife habitats.
M.G.

N83-21440*# Massachusetts Univ., Amherst. Dept. of Forestry and Wildlife Management.
MODELING A BEAVER POPULATION ON THE PRESCOTT PENINSULA, MASSACHUSETTS: FEASIBILITY OF LANDSAT AS AN INPUT
J. T. FINN and R. HOWARD *In* NASA. Goddard Space Flight Center Eastern Reg. Remote Sensing Appl. Conf. p 155-162 Jan. 1981 refs Original contains imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls, S.D. 57198 ERTS
Avail: NTIS HC A11/MF A01 CSCL 06C

A preliminary dynamic model of beaver spatial distribution and population growth was developed. The feasibility of locating beaver ponds on LANDSAT digital tapes, and of using this information to provide initial conditions of beaver spatial distribution for the model, and to validate model predictions is discussed. The techniques used to identify beaver ponds on LANDSAT are described. M.G.

N83-21441*# Rhode Island Univ., Kingston. Dept. of Ocean Engineering.
LAND COVER CLASSIFICATION IN SOUTHERN RHODE ISLAND USING MULTIDATE LANDSAT MSS DATA
P. CORNILLON *In* NASA. Goddard Space Flight Center Eastern Reg. Remote Sensing Appl. Conf. p 163-166 Jan. 1981 Original contains imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls, S.D. 57198 ERTS
Avail: NTIS HC A11/MF A01 CSCL 08B

The use of LANDSAT multispectral scanner data from several different dates to classify ground cover in Rhode Island is discussed. The advantage of using several dates is that seasonal data can be incorporated in the classification. In order to circumvent the problem of increased computer computation time, the dimensionality of the input data is reduced by the 'principal components method'. This technique and its implementation are described along with regisration, classification, and verification tasks.
M.G.

N83-21442*# Vermont Univ., Burlington. School of Natural Resources.
FORESTRY: FORUM SUMMARY
R. WHITMORE *In* NASA. Goddard Space Flight Center Eastern Reg. Remote Sensing Appl. Conf. p 167-168 Jan. 1981 ERTS
Avail: NTIS HC A11/MF A01 CSCL 02F

A synopsis of a forum addressing the use of LANDSAT data in forestry is given. Broad inventory studies, clear-cut monitoring, and insect and disease detection were among the subject areas discussed. Concerns regarding the vailability of data, cloud cover, resolution and classification accuracy, and product format were expressed by foresters.
M.G.

N83-21460*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
YIELD MODEL DEVELOPMENT PROJECT IMPLEMENTATION PLAN
R. A. AMBROZIAK 15 Sep. 1982 100 p ERTS
(Contract PROJ. AGRISTARS)
(E83-10219; NASA-TM-85262; YM-U2-C0655; JSC-18564; NAS 1.15:85262) Avail: NTIS HC A05/MF A01 CSCL 02C

Tasks remaining to be completed are summarized for the following major project elements: (1) evaluation of crop yield models; (2) crop yield model research and development; (3) data acquisition processing, and storage; (4) related yield research: defining spectral and/or remote sensing data requirements; developing input for driving and testing crop growth/yield models; real time testing of wheat plant process models) and (5) project management and support. A.R.H.

N83-21463*# California Univ., Berkeley. Space Sciences Lab.
REMOTE SENSING RESEARCH FOR AGRICULTURAL APPLICATIONS Semiannual Progress Report, 1 Aug. 1982 - 31 Jan. 1983
R. N. COLWELL, Principal Investigator 31 Jan. 1983 13 p ERTS
(Contract NCC2-205)
(E83-10222; NASA-CR-170080; NAS 1.26:170080) Avail: NTIS HC A02/MF A01 CSCL 02C

The thematic mapper simulator (TMS) flown by the U-2/ER-2 aircraft is being used as a surrogate for LANDSAT-4TM data. Progress is reported on spectral data acquisition including TMS, color infrared high altitude aerial photography, and LANDSAT 3 MSS and ground data collection to support classification and testing. A test site in San Joaquin County was selected for analysis. A.R.H.

N83-22685* National Aeronautics and Space Administration, Washington, D. C.
RESEARCH AND TECHNOLOGY: REPORT, FY 1982 Annual Report
8 Mar. 1983 76 p refs Original contains color illustrations
(NASA-TM-85175; NAS 1.15:85175) Avail: NTIS HC A05 CSCL 05B

Sensor systems, data analysis programs, agriculture and resources inventory survey through aerospace remote sensing (AgRISTARS), applied research and data analysis, joint research project, and testing and evaluation are reported. Author

N83-22688*# Minnesota Univ., St. Paul. Remote Sensing Lab.
INTEGRATION OF ENVIRONMENTAL AND SPECTRAL DATA FOR SUNFLOWER STRESS DETERMINATION Final Report, 24 Aug. 1981 - 30 Sep. 1982
T. LILLESAND and M. SEELEY 31 Jan. 1983 60 p refs
Original contains imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls, S.D. 57198 ERTS
(Contract NAS9-16427)
(E83-10211; NASA-CR-167834; NAS 1.26:167834; REPT-0663-5551) Avail: NTIS HC A04/MF A01 CSCL 02C

Stress in sunflowers was assessed in western and northwestern Minnesota. Weekly ground observations (acquired in 1980 and 1981) were analyzed in concert with large scale aerial photography and concurrent LANDSAT data. Using multidate supervised and unsupervised classification procedures, it was found that all crops grown in association with sunflowers in the study area are spectrally separable from one another. Under conditions of extreme drought, severely stressed plants were differentiable from those not severely stressed, but between-crop separation was not possible. Initial regression analyses to estimate sunflower seed yield showed a sensitivity to environmental stress during the flowering and seed development stages. One of the most important biological factors related to sunflower production in the Red River Valley area was found to be the extent and severity of insect infestations. A.R.H.

N83-22690# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
THE EFFECTS OF A TROPICAL RAIN FOREST COVER ON AIRBORNE GAMMA RAY SPECTROMETRY
E. B. PEREIRA and D. J. R. NORDEMANN Mar. 1983 36 p refs
(INPE-2665-PRE/275) Avail: NTIS HC A03/MF A01

A simple experiment is made to demonstrate the strong influence of the forest biomass on the soil gamma photons measured at low altitudes. Next, theoretical calculations are made to estimate the effects of attenuation and generation of gamma photons by a tropical rain forest environment. For typical flight altitudes of 100 meters, it is shown that a 35 meter high canopy can attenuate from 40% to 60% of the original gamma photons, depending on the energy considered. It is also shown that the 1.46 MeV photopeak of 40-K measured at flight altitudes is completely dominated by the forest generated component, while this effect is probably negligible for the 2.62 MeV of 108-Tl and the 1.76 MeV of 214-Bi. Of major importance are the effects of forest clearings on the gamma-ray spectrum, which can lead to serious misinterpretations of aerial profile data if not taken into account. Besides the theoretical evaluation of these and other effects from the viewpoint of applied airborne gamma-ray spectrometry, a short review on the biocycles of potassium from the soil to the biomass of the tropical rain forest is also presented. Author

N83-22692# Pacific Southwest Forest and Range Experiment Station, Berkeley, Calif.
REMOTE SENSING TECHNIQUES AID IN PREATTACK PLANNING FOR FIRE MANAGEMENT
L. A. SALAZAR Sep. 1982 25 p refs
(PSW-162) Avail: NTIS HC A02/MF A01

A basic preattack plan that included fuel types, road systems, and water sources was developed for 25,288 acres (10,234 ha) of the Six Rivers National Forest in northwestern California. Digital data recorded by LANDSAT were computer analyzed through unsupervised and guided clustering classification techniques to produce a preattack fuel type map of the area. Aerial photography and ground truth data were used to support the satellite information. Access routes and water sources were delineated through visual interpretation of small- (1:130,000) and medium-scale (1:31,284) color-infrared (CIR) photography taken from U-2 jet aircraft. The final product was a series of mylar overlays with a 7 1/2-minute topographic quad used as a base map. A cluster sampling method evaluated LANDSAT classification accuracy. Photointerpretation determined the true land cover category. A.R.H.

N83-22735# Kansas State Univ., Manhattan. Evapotranspiration Lab.
USE OF SATELLITE DATA IN SOIL MOISTURE AND CROP YIELD MODELS Final Report, Mar. 1981 - Jun. 1982
E. T. KANEMASU Jun. 1982 135 p refs
(Contract NA800AA-D-00046)
(PB83-117457; NOAA-82091503) Avail: NTIS HC A07/MF A01 CSCL 02D

An evapotranspiration yield model for winter wheat was used to assess the impact of using GOES derived solar radiation estimates on plant growth models. Evapotranspiration (ET) rates were predicted using observed solar radiation estimates and those predicted from GOES using Tarpley's model and KSU's model. The yield model predicted grain yields that were similar regardless of the model used in estimating solar radiation. It appears that either of these two models (Tarpley's or KSU's) are appropriate for estimating daily solar radiation in a crop growth model such as KSU wheat model. GRA

02

ENVIRONMENTAL CHANGES AND CULTURAL RESOURCES

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

A83-21925
REFLECTIVE PROPERTIES OF ASPHALT AND CONCRETE SURFACES
K. STAENZ and K. I. ITTEN (Zurich, Universitat, Zurich, Switzerland) In: International Society for Photogrammetry and Remote Sensing, International Symposium, Toulouse, France, September 13-17, 1982, Transactions. Volume 1. Toulouse, Groupement pour le Developpement de la Teledetection Aerospatiale, 1982, p. 307-316. refs

Radiometric field measurements of eight asphalt and concrete surface types were obtained using a Landsat MSS-compatible EXOTECH 100 radiometer in order to investigate the reflective properties of these surface types and to assess the suitability of these surface types as reference targets for the calibration of ground, airborne, and satellite data. Results show that asphalt as well as concrete surfaces can be utilized as standard reflectors. However, the reflectance of factor of concrete which has a distinct surface structure, such as grooves, is found to be dependent on the illumination and the viewing geometry and, therefore, is not constant over a specific time period. In addition, a wide range in the reflectance factor is found for different asphalt types of 5-11 percent in the visible and 6-13 percent in the near infrared bands and for different concrete types of 9-35 percent and 12-40 percent, respectively. It is suggested that this variation of the reflectance factor is mainly due to the material composition, surface structure, and age (weathering process), as well as to the illumination and viewing geometry. N.B.

A83-21937
MONITORING ECOLOGY IN INACCESSIBLE AREAS OF TROPICAL ZONES BY INTERPRETATION OF MACHINE PROCESSED LANDSAT-SCENES
W. M. C. MUEKSCH (Dar es Salaam, University, Dar es Salaam, Tanzania; Bonn, Universitat, Bonn, West Germany) In: International Society for Photogrammetry and Remote Sensing, International Symposium, Toulouse, France, September 13-17, 1982, Transactions. Volume 1. Toulouse, Groupement pour le Developpement de la Teledetection Aerospatiale, 1982, p. 451-460. refs

A83-21950
SATELLITE IMAGERY CHARACTERISTICS FOR SURVEYS FOR THE PROTECTION OF OASES AGAINST SAND INVASION [INDICATIONS DES IMAGES SATELLITES POUR DES RECHERCHES CONCERNANT LA PROTECTION DES OASIS CONTRE L'ENSABLEMENT]
M. MAINGUET (Reims, Universite, Reims, France) In: International Society for Photogrammetry and Remote Sensing, International Symposium, Toulouse, France, September 13-17, 1982, Transactions. Volume 1. Toulouse, Groupement pour le Developpement de la Teledetection Aerospatiale, 1982, p. 621-629. In French. refs

A83-21951
APPLICATION OF REMOTE SENSING FOR PREPARATION OF NATURE CONSERVATION MAPS AND NATURAL PROCESSES DYNAMICS STUDY
N. G. KHARIN and A. BABAEV (Turkmen Academy of Sciences, Desert Institute, Ashkhabad, Turkmen SSR) In: International Society for Photogrammetry and Remote Sensing, International Symposium, Toulouse, France, September 13-17, 1982, Transactions. Volume 1. Toulouse, Groupement pour le Developpement de la Teledetection Aerospatiale, 1982, p. 651-659.

Space imagery and aerial photography were used to study the ecological effect of the Karakum Canal on the Karakum desert. Two missions were involved, conducted at 11-13 year intervals. The specifications of the space photography are shown, including the season, sun elevation, spectral bands, and ground resolution. Spectral bands used by individual satellites are also shown. Results are obtained for the natural state of the desert environment before the construction, during the construction, 10 years after construction, and 20 years after construction. The most notable effect of the canal was waterlogging of the soil, resulting in the formation of new lakes and a change in the indigenous flora. The effects of wind erosion are discussed, and thematic maps of the area showing the effects of the canal are presented C.D.

A83-21952
RENEWAL OF LAND USE DATA BASE WITH THE AID OF REMOTE SENSING
H. SHIMODA, K. FUKUE, and T. SAKATA (Tokai University, Tokyo, Japan) In: International Society for Photogrammetry and Remote Sensing, International Symposium, Toulouse, France, September 13-17, 1982, Transactions. Volume 1. Toulouse, Groupement pour le Developpement de la Teledetection Aerospatiale, 1982, p. 677-686. refs

Feasibility studies on the renewal of the land use data in the Numerical National Land Information (NNLI) in Japan using remote sensing data and digital processing techniques are described. In the approach followed, the overall object areas are classified without manual selection of training areas. Landsat data are used for change detection, and high-altitude infrared color aerial photographs are used for classification. The method is found to be more rapid and economical than conventional interpretation methods. It is also found that the maximum likelihood classification algorithm cannot achieve sufficient classification accuracy for land use classification. C.R.

A83-21960
THE DEVELOPMENT OF A SAMPLING PROCEDURE FOR URBAN LAND USE MAPPING FROM AERIAL PHOTOGRAPHS - A STUDY IN CALABAR, NIGERIA
E. U. ESIN (Calabar, University, Calabar, Nigeria), W. G. COLLINS (Aston, University, Birmingham, England), and C. EMMOTT (Preston Polytechnic, Preston, Lancs., England) In: International Society for Photogrammetry and Remote Sensing, International Symposium, Toulouse, France, September 13-17, 1982, Transactions. Volume 1. Toulouse, Groupement pour le Developpement de la Teledetection Aerospatiale, 1982, p. 825-833. refs

A83-21961
MULTITEMPORAL REMOTE SENSING OF LAND USE IN THE SAHELIAN REGION OF AFRICA BY METEOSAT I [TELEDETECTION MULTITEMPORELLE DE L'OCCUPATION DU SOL EN AFRIQUE SAHELIENNE PAR METEOSAT I]
C. BARDINET (Ecole Normale Superieure, Paris; Centre de Teledetection et d'Analyse du Milieu Naturel, Valbonne, Alpes-Maritimes, France), J. M. MONGET (Centre de Teledetection et d'Analyse du Milieu Naturel, Valbonne, Alpes-Maritimes, France), and Y. PATOUREAUX (Societe d'Etudes Techniques et d'Entreprises Generales, Division Espace, Le Plessis-Robinson, Hauts-de-Seine, France) In: International Society for Photogrammetry and Remote Sensing, International Symposium, Toulouse, France, September 13-17, 1982, Transactions. Volume 1. Toulouse, Groupement pour le Developpement de la Teledetection Aerospatiale, 1982, p. 845-855. In French. refs

A83-21962
STUDY OF THE BIOPHYSICAL LAND COVER OF THE FRENCH NATIONAL PARKS [ETUDE DE L'OCCUPATION BIOPHYSIQUE DU SOL DES PARCS NATIONAUX FRANCAIS]
M. LENCO (Ministere de l'Environnement, Delegation a la Qualite de la Vie, Neuilly-sur-Seine, Hauts-de-Seine, France) In: International Society for Photogrammetry and Remote Sensing, International Symposium, Toulouse, France, September 13-17, 1982, Transactions. Volume 1. Toulouse, Groupement pour le Developpement de la Teledetection Aerospatiale, 1982, p. 865-871. In French.

A83-21963
THE POSSIBILITIES OF USING AEROSPACE REMOTE SENSING TECHNIQUES IN THE NORTH SAHELIAN REGIONS OF AFRICA [POSSIBILITES DE MISE EN OEUVRE DE LA TELEDETECTION AEROSPATIALE DANS LES REGIONS NORD-SAHELIENNES D'AFRIQUE]
J. HURAULT (Institut Geographique National, Paris, France) In: International Society for Photogrammetry and Remote Sensing, International Symposium, Toulouse, France, September 13-17, 1982, Transactions. Volume 1. Toulouse, Groupement pour le Developpement de la Teledetection Aerospatiale, 1982, p. 873-888. In French.

A83-21964
OVERCOMING URBAN MONITORING PROBLEMS WITH THE NEW GENERATION SATELLITE SENSORS
B. C. FORSTER (New South Wales, University, Kensington, Australia) In: International Society for Photogrammetry and Remote Sensing, International Symposium, Toulouse, France, September 13-17, 1982, Transactions. Volume 1. Toulouse, Groupement pour le Developpement de la Teledetection Aerospatiale, 1982, p. 889-896. refs

The spatial and spectral problems of the data from Landsat I-III for use in detailed urban studies are evaluated. Topics examined include the loss of contextural clues of site and association needed for manual interpretation, the heterogeneous nature of urban areas which causes mixed pixel response, and the integrating effect of the sensor point spread function which significantly affects a pixel size single cover class. Other spatial problems addressed are the existence of a continuum of cover classes in urban areas not amenable to current classification procedures and the spatially varying nature of additive atmospheric effects due to the variation in urban background reflectance. Spectral problems due to the overlapping and parallel nature of the urban spectral signatures are considered and it is shown that an increase in the number of spectral bands will increase the potential for percentage surface cover prediction. N.B.

A83-21965
SOME PROBLEMS OF COMPUTER-ASSISTED MAPPING OF LAND USE FROM LANDSAT DATA - THE HONG KONG CASE
C. P. LO (University of Hong Kong, Hong Kong) In: International Society for Photogrammetry and Remote Sensing, International Symposium, Toulouse, France, September 13-17, 1982, Transactions. Volume 1. Toulouse, Groupement pour le Developpement de la Teledetection Aerospatiale, 1982, p. 909-919. Research supported by the University of Hong Kong. refs

A83-21966
PHOTOINTERPRETATION FOR LAND USE PLANNING
J. BESENICAR (Geodetski Zavod SRS, Ljubljana, Yugoslavia) In: International Society for Photogrammetry and Remote Sensing, International Symposium, Toulouse, France, September 13-17, 1982, Transactions. Volume 1. Toulouse, Groupement pour le Developpement de la Teledetection Aerospatiale, 1982, p. 931-936.

The photogrammetrical program to map the Slovenia region of Yugoslavia is described. The area considered covers 20,000 sq km, and has been photographed at resolutions of 1:5000, 1:10,000, 1:25,000, 1:50,000, and in a cadastral mode in intensively developed areas. Land use has been inventoried during a four-phase program. The data base was developed to include the terrain relief, the geology, the hydrology, and the cadastral formations. Additional divisions were made of urban, rural, and forested areas, and subcategories were defined in terms of climatic, social, economic, and ecological factors. Aerial surveys have been performed in B/W, IR B/W, color, and IR color at scales of 1:5000, 1:10,000, 1:17,500, and 1:30,300. The final products are employed for land use planning. M.S.K.

A83-21967
LOW COST MONITORING OF LAND USE AND SOIL EROSION IN THE HUMID TROPICS - AN APPLICATION OF AERIAL PHOTOGRAPHY
P. COLLIER (Portsmouth Polytechnic, Portsmouth, England) and W. G. COLLINS (Aston, University, Birmingham, England) In: International Society for Photogrammetry and Remote Sensing, International Symposium, Toulouse, France, September 13-17, 1982, Transactions. Volume 1. Toulouse, Groupement pour le Developpement de la Teledetection Aerospatiale, 1982, p. 937-943. refs

A83-21968
AN INVESTIGATION METHODOLOGY FOR TERRITORIAL STUDIES IN UNKNOWN AREAS /EAST KALIMANTAN - TIMUR, INDONESIA/
E. AMADESI, G. GIORGI, and G. VIANELLO (Bologna, Universita, Bologna, Italy) In: International Society for Photogrammetry and Remote Sensing, International Symposium, Toulouse, France, September 13-17, 1982, Transactions. Volume 1. Toulouse, Groupement pour le Developpement de la Teledetection Aerospatiale, 1982, p. 951-963.

The first phase of the study involved the preparation of three maps: a base map, a landform map, and a land-use map. The base map shows the hydrographic network, the watersheds, and the most prominent peaks. The landform map has four classes of slope gradients: 0 to 3 percent, 3 to 8 percent, 8 to 15 percent, and gradients above 15 percent. The land-use map distinguishes between the following: primary forest, secondary forest, swamp forest, swamp grassland, secondary growth, and cultivated areas. The second phase of the study involved a division of the land into topographic and morphologic sections by means of photo-plotting. The third phase involved an assessment of land units in order to determine suitability for human habitation. C.R.

A83-21970
SATELLITE IMAGERY - APPLICATION TO A HIGHWAY PROJECT IN AN ARID REGION - PROSPECTS OFFERED BY SPOT SIMULATION [IMAGERIE SATELLITE, APPLICATION A UN PROJET ROUTIER EN ZONE ARIDE PERSPECTIVES OFFERTES PAR LA SIMULATION S.P.O.T.]
G. CHAMPETIER DE RIBES (Laboratoire Central des Ponts et Chaussees, Paris, France) and M. DORIDOT (Laboratoire Regional de l'Est Parisien, Paris, France) In: International Society for Photogrammetry and Remote Sensing, International Symposium, Toulouse, France, September 13-17, 1982, Transactions. Volume 1. Toulouse, Groupement pour le Developpement de la Teledetection Aerospatiale, 1982, p. 1003-1010. In French.

A83-22837
RURAL SCENE PERSPECTIVE TRANSFORMATIONS
R. N. DEVICH and F. M. WEINHAUS (ESL, Inc., Sunnyvale, CA) In: Visual simulation and image realism II; Proceedings of the Conference, San Diego, CA, August 27, 28, 1981. Bellingham, WA, SPIE - The International Society for Optical Engineering, 1982, p. 54-66. refs

This paper presents a method for converting Landsat imagery of natural rural scenes to horizontal viewing perspectives in a digital image processing system. The technique uses digital terrain images for a three-dimensional representation of the scene. Full color pixel-by-pixel (as opposed to skeletal or graphical) images are synthesized, and hidden pixels are eliminated. A sequence of synthesized images of the Colorado River basin is shown. Examples of panoramic and orthographic projections are also shown. An appendix presents a method for converting a contour map into a digital terrain map in raster format. (Author)

A83-23816
SPACE INVESTIGATIONS FOR URBAN PLANNING [KOSMICHESKIE ISSLEDOVANIIA DLIA GRADOSTROITEL'STVA]
A. ALEKSEEV, A. BOGDANOV, G. VANIUSHIN, G. GRECHKO, D. GRNCHIAR, IU. ZONOV, I. IVANOV, V. KAZNACHEEV, I. KVITKOVICH, A. LISHEVSKII et al. Leningrad, Stroiizdat, 1981. 192 p. In Russian. refs

The applications of remote sensing techniques for regional planning, urban planning, and environmental investigations are examined. The use of photographs taken from outer space for studies of the natural resources of the earth is also considered. Attention is focused on the information gathered in the 'Interkosmos' program, which has involved scientific researchers from Bulgaria, Poland, East Germany, Czechoslovakia, and the USSR. Topics discussed include the methods and techniques of remote sensing, the analysis of space photographs for urban planning applications, and the possibilities of studying cities by means of space photographs. N.B.

A83-24526
REMOTE SENSING OF ARID AND SEMI-ARID LANDS; PROCEEDINGS OF THE INTERNATIONAL SYMPOSIUM ON REMOTE SENSING OF ENVIRONMENT, CAIRO, EGYPT, JANUARY 19-25, 1982. VOLUMES 1 & 2
Symposium sponsored by the Environmental Research Institute of Michigan, Ministry of State for Education and Scientific Research of Egypt, U.S. Agency for International Development, et al. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982. Vol. 1, 677 p.; vol. 2, 619 p.

Specific problems associated with the habitability, maintainability, desertification, and improvement of arid and semiarid regions are discussed, with an emphasis on the role of remote sensing technologies. Various applications of the Landsat imagery are described, and use of spaceborne and airborne sensors to monitor, assess, and manage arid and semiarid regions is explored. The development of remote sensing techniques and methodology is investigated, together with manual and machine-assisted data analysis and interpretation. Applications of Landsat imagery for crops, mineralogical and petrological exploration, and water supply identification are reviewed. Remote sensing programs in the U.S., Egypt, India, China, Morocco, Tunisia, Qatar, and Djibouti are summarized. M.S.K.

A83-24527#
REMOTE SENSING IN THE GLOBAL MONITORING OF ENVIRONMENT
M. K. TOLBA (United Nations, Nairobi, Kenya) In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 1. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 13-18.

The areas in which remote sensing techniques are needed for monitoring the increased use of natural resources and desertification processes in developing nations are explored. All developmental projects need to be considered in the context of their total impact on the surrounding environment. The Global Environmental Monitoring System (GEMS) of the UN provides the monitoring activities of the UN Earthwatch program. Assessments have been made of the status of the earth's tropical forests and the earth's ozone layer, and desertification has been identified as an area of primary concern. Aircraft and satellite monitoring of farming, mining, and grazing activities which do not take into account erosion serves to locate problem areas which can be rectified before irreversible damage occurs. Further discussion is devoted to the principles of transferability, universality, geographical congruity of scales, flexibility of statification, and of clinal sampling employed by the GEMS operations. M.S.K.

A83-24529#
POTENTIAL APPLICATION OF REMOTE SENSING TO THE STUDY OF ARID AND SEMI-ARID LANDS IN ARGENTINA
M. SANCHEZ PENA, M. G. CAMPI, and N. MARLENKO (Comision Nacional de Investigaciones Espaciales, Buenos Aires, Argentina) In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 1. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 33-36.

A83-24533#
EOLIAN SAND BODIES OF THE WORLD
E. D. MCKEE (U.S. Geological Survey, Denver, CO) In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 1. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 75-82. refs

Techniques for the classification of sand dune types to provide ground truth data for calibrating and classifying Landsat imagery of eolian formations in arid and semiarid regions is detailed. Dunes are characterized by the number of slip faces or the angle of repose, in addition to the general form of the mounds, e.g., linear, crescendic, parabolic, etc. Landsat imagery can lead to understanding of the processes causing dune encroachment on artificial structures such as roads and houses, while providing data on the geologic structure of the dunes. It has been determined that sand dune formation and movement are governed by the prevailing wind direction, variability, and strength, the underlying topography, vegetation, moisture, distance from the sand source, and the amount of available dune material. M.S.K.

A83-24534#
RESOURCE INVENTORIES OF ARID AND SEMI-ARID LANDS USING LANDSAT
F. C. WESTIN (South Dakota State University, Brookings, SD) In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 1. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 83-88. refs

Three sample resource inventories performed using Landsat imagery are reviewed. A general data base for an area, covering such features as topography, vegetation types, soil types, and climate can be integrated with Landsat imagery, which is analyzed by means of standard photointerpretation techniques. Pattern elements from the data provide a synoptic view of large landscape regions on a scale of 3,500,000 hectares per image. Color composite transparencies, single band transparencies, and enlargement prints have served for a soil map of a county in South Dakota, and verified in the field. The imagery for the county cost $100. Soil resources in Mauritania have been surveyed in order to set priorities for soil conservation to stave off desertification in critical areas. Fourteen Landsat images have been employed to assess the soil properties, potentials, and agricultural limitations of the Bahr El Jebel region of the Sudan, and confirmed that field surveys and low-level flights can be accurately directed with Landsat imagery. M.S.K.

A83-24537*# Hunter Coll., New York.
DYNAMIC MODELING OF VEGETATION CHANGE IN ARID LANDS
V. B. ROBINSON, J. C. COINER, and T. H. BARRINGER (Hunter College, New York, NY) In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 1. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 121-131. Research supported by Ebon Research Systems, Inc., and Hunter College refs
(Contract NSG-5325)

A general framework for a digital desertification monitoring system (DDMS) for assessing the worldwide desertification growth rate is presented. The system relies on the development of Landsat derived indicators to identify local processes signalling the growth of arid regions. A study area consisting of the eastern edge of the Niger River delta in Mali was used to characterize three indicators in terms of the covariance of the multispectral scanner (MSS) bands 2 and 4, the correlation of the two bands, and the percent variance expressed by the first eigenvalue. The scenes are imaged multitemporallly in a 400 x 400 pixel array to detect vegetation cover changes. Criteria were defined which characterized the decrease or increase of vegetation. It was determined that the correlation coefficients are the best indicators, and are easily computed. M.S.K.

A83-24538#
MONITORING OF SEASONAL AND YEARLY LAND-USE CHANGES ON AERIAL PHOTOGRAPHY AND LANDSAT IMAGERY - A CASE STUDY IN THE YEMEN ARAB REPUBLIC
R. SCHOCH and H. HAEFNER (Zuerich, Universitaet, Zurich, Switzerland) In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 1. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 133-143. refs

A83-24539#
RECLAMATION OF SALT-AFFECTED SOILS IN CALIFORNIA
G. J. HOFFMAN (U.S. Department of Agriculture, Salinity Laboratory, Riverside, CA) and J. L. MEYER (California, University, Riverside, CA) In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 1. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 147-159. refs

A83-24541#
USE OF AERIAL PHOTOGRAPHS IN LAND RECLAMATION
M. ATEF ABDEL SALAM (Desert Institute, Cario, Egypt) In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 1. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 171-180.

Aerial photographs have been used for several decades in the study of the earth's surface. As a means of illustrating and explaining landscape phenomena, the bird's eye view which air photographs provide is without rival at comparable cost. Perhaps like anywhere else, the possibility provided by aerial photographs, of examing a terrain without actually being on it, was quickly grasped by Egyptian military people. The use of aerial photography was limited to military objectives for quite awhile until the large scale development of the Egyptian deserts started with the formulation of the 'General Desert Development Organization', (G.D.D.O.) in 1959. (Author)

A83-24544#
URBAN ENCROACHMENT ON AGRICULTURAL LAND
A. B. PARK, T. F. WESCOTT, and J. A. ROYAL (General Electric Co., Lanham, MD) In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 1. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 217-226.

In many countries of the world an important limitation to the increase of agricultural production is not insects or disease or lack of water or fertilizer but rather the transformation of prime agricultural land to other uses. Remote sensing research has addressed many aspects of this problem. The monitoring of land cover/land use patterns at virtually any political level; local, regional or national, is possible with Landsat. The purpose of this paper is to discuss the process of change detection, to report on some recent work using interactive techniques and to show some results. (Author)

A83-24545#
REMOTE SENSING IN RANGE MANAGEMENT - AN APPROACH FOR PRACTICAL APPLICATION IN DEVELOPMENT
O. DRAZ (United Nations, Food and Agriculture Organization; Desert Institute, Cairo, Egypt) In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 1. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 227-238. refs

An approach to monitoring and characterization of semi-arid rangelands threatened by desertification processes is presented in the form of an integrated remote sensing program on national and regional levels. The experience with the Hema system is described as an example of local management of rangelands. The Hema system in Syria allowed tribal, family, village, and individual control and management of rangelands, and required that grazing be prohibited, restricted to specific seasons, or allowed for specific animals. The reserves could also be for beekeeping or for forest protection. Localized practices of the concept in the near East are detailed, together with internationally financed programs for exploiting the rangeland resources. The implementation of Landsat monitoring in digital or micrographic form offers the potential to manage developmental activities affecting the integrity of the rangelands, the health of crops, and the variations in vegetal cover. M.S.K.

A83-24546#
APPLYING LANDSAT AND ANCILLARY DATA TO ARID LAND INVENTORIES - A CASE STUDY
W. J. BONNER, JR. (U.S. Bureau of Land Management, Div. of Scientific Systems Development, Denver, CO) In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 1. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 239-255. refs

A natural resources inventory program performed with remote sensing techniques in the NW area of Arizona by the Bureau of Land Management is reviewed. The program is an example of surveys being undertaken to assess the resources potential in areas experiencing rapid population growth and land development. Preprocessed Landsat digital data served for stratifying the area into cover units, followed by sampling with 1:6000 scale color photographs. The data were combined in a data base with Landsat and digital terrain data to correct the Landsat classifications on an elevation bases. A total of 83 elevation based computer categories were generated to form a geographically referenced data base of Landsat elevation, slope, and aspect data, and road networks were added as a complement. The costs associated with the effort amounted to $.15/hectare, while field costs would have been $1.00/hectare. M.S.K.

A83-24558#

APPROACHES TO DESERTIFICATION MONITORING IN THE SUDAN USING LANDSAT DATA: A TEST OF A GEOGRAPHICAL DATA BASE APPROACH - PRELIMINARY RESULTS

U. HELLDEN (Lunds Universitet, Lund, Sweden) In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 1. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 427-435. refs

A83-24559#

LANDSAT DATA FOR MONITORING RURAL SETTLEMENT AND POPULATION A TEST IN THE UMM RUWABA REGION, THE SUDAN

M. STERN (Lunds Universitet, Lund, Sweden) In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 1. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 437-447. refs

A83-24560#

REFUGEE SETTLEMENTS AND VEGETATION CHANGE - A MULTISTAGE LANDSAT DATA ANALYSIS OF A SEMI-ARID REGION IN KENYA

F. P. CONANT (Hunter College, New York, NY) In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 1. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 449-461. Research supported by the City University of New York, Wenner-Gren Foundation for Anthropological Research, and Ministry of Economic Planning and Development of Kenya refs
(Contract NSF BNS-77-15622; NSF 79-14954)

A83-24564#

DESERT CONSTRUCTION SITING UTILIZING REMOTE SENSING TECHNOLOGY

T. W. FORESMAN (U.S. Navy, Naval Civil Engineering Laboratory, Port Hueneme, CA) and R. C. BROWN, JR. (U.S. Marine Corps, Air Ground Combat Center, Twentynine Palms, CA) In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 1. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 497-501. refs

Automating construction siting for a Land Management System (LMS) developed by the Naval Civil Engineering Laboratory (NCEL) has been augmented by remotely sensed terrain data. Construction efficiency by Marine Corps engineers has been estimated to improve by 20% from this system. Under a contract with NCEL, the Geography Remote Sensing Unit at the University of California at Santa Barbara has demonstrated the feasibility of automating Landsat multispectral scanner digital data and Defense Mapping Agency digital elevation data for terrain inputs into the LMS with the VICAR/IBIS system. This paper deals with the continuation of this research towards testing the automation of remotely sensed data as construction siting inputs for an arid environment at the Marine Corps Air Ground Combat Center in the Mojave Desert. (Author)

A83-24569#

SATELLITE MONITORING OF RECENT DESERTIFICATION IN THE YULIN REGION THE PEOPLE'S REPUBLIC OF CHINA

S.-H. LUK and A. KALINAUSKAS (Toronto, University, Mississauga, Ontario, Canada) In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 1. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 543-550. Research supported by the Social Sciences and Humanities Research Council of Canada. refs

A83-24570#

USE OF SATELLITE IMAGES FOR DETECTING WIND DYNAMICS - SAND DEPOSITS, FIXED DUNES, WIND EROSION AND DESERTIFICATION IN THE SAHEL, SOUTH OF SAHARA

M. MAINGUET (Reims, Universite, Reims, France) In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 1. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 551, 552.

A83-24571#

COMPUTER MAPPING OF SHORELINE FLUCTUATIONS BY SATELLITE GREAT SALT LAKE, UTAH, U.S.A.

M. K. RIDD, J. A. MEROLA, and R. A. JAYNES (Utah, University, Salt Lake City, UT) In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 1. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 553-564. refs

Shoreline fluctuation of terminal lakes is often a matter of concern to folks dependent upon littoral zone conditions. Changing inflow/evaporation relationships alter the lake level and the concentrations of salinity. In addition, shoreline position in these typically flat lakebed environments can be dramatically altered. Chainging shoreline position complicates mineral extraction, waterfowl habitat, recreation, and other uses. This investigation maps the shifting shoreline of such a lake through an eight-year period. Landsat provided the only historical data with which to 'look back' through time and reconstruct shoreline configuration at specified levels of the lake. Digital processing is ideally suited to the task. (Author)

A83-24574#

REMOTE SENSING APPLICATIONS IN ROAD DEVELOPMENT PROJECT IN MAURITANIA, AFRICA - A VALUABLE TOOL FOR PROJECTS IN ARID AND SEMI-ARID ENVIRONMENTS

H. T. RIB (Federal Highway Administration, Washington, DC) and R. L. BRAIDA (U.S. Department of Transportation, Trade and Foreign Projects Div., Washington, DC) In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 1. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 579-588. refs

A83-24575#

URBAN EXPANSION IN THE NILE RIVER VALLEY AND DELTA

M. H. INGLIS and T. K. BUDGE (New Mexico, University, Albuquerque, NM) In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 1. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 589-597.

A83-24582#

INTERPRETATION OF WEATHERED SURFACES IN ARID REGIONS USING LANDSAT MULTISPECTRAL IMAGES

J. B. ADAMS, D. L. EVANS, T. G. FARR, M. SMITH, J. T. STALEY, F. PALMER, D. J. BORNS, B. CURTISS, S. TAYLOR-GEORGE, T. ROUSH (Washington, University, Seattle, WA) et al. In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 2. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 685-694. refs

A83-24589#

MONITORING ARID LAND CHANGES IN THE TURPAN DEPRESSION, PEOPLE'S REPUBLIC OF CHINA

A. S. WALKER (U.S. Geological Survey, Reston, VA) and S. LIU (Chinese Academy of Sciences, Institute of Desert Research, Lanzhou, People's Republic of China) In: Remote sensing of *arid and semi-arid lands; Proceedings of the International* Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 2. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 755-762. refs

A83-24592#

LANDSAT AS AN AID IN CONSULTING PROJECTS IN THE MIDDLE EAST AND AFRICA SOME EXAMPLES OF APPLICATIONS ON VBB/SWECO PROJECTS

U. KIHLBLOM (VBB/SWECO, Stockholm, Sweden) In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982, Volume 2. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 785-794. refs

The applications of Landsat imagery to mapping of various areas of the world on different scales are examined. The imagery has been used in the fields of agriculture, land use, hydrology, ecology, geology, and for offshore exploration. The data is analyzed automatically to provide IR color images on a 1:250,000 scale and BW RBV pictures on a 1:250,000 scale. Water resources have been mapped in an 80,000 sq km area around Teheran, Iran, and agricultural imaging was accomplished for a 3500 sq km area in the highlands of SW Saudi Arabia. Landsat data on forests and grasslands of Ethiopia resulted in the identification of 19 different classes of vegetation cover, which were found to greatly improve on previously performed ground surveys. Tectonic features were discovered using Landsat imagery over a prospective dam reservoir area in Tanzania, and 100 km of coastal area water depths to 30 m have been mapped in the Red Sea as a prelude to construction of a phosphate port. M.S.K.

A83-24593#

APPLICATION OF MULTISPECTRAL AERIAL PHOTOGRAPHY IN LAND USE AND LAND COVER MAPPING OF A PART OF EL FAYOUM DEPRESSION NORTHWESTERN EGYPT

A. G. ABDEL SAMIE, M. A. ABDEL HADY, A. O. SAAD, and I. A. EL KASSAS (Academy of Scientific Research and Technology, Remote Sensing Center; Nuclear Materials Corp., Cairo, Egypt) In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 2. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 795-808. refs

Aerial multispectral photography was performed over the El Fayoum depression in Egypt to identify the spectral bands best fitted for characterizing specific surface features. The survey involved use of the blue, green, red, and near-IR bands for photography on a scale of 1:4000, with the flights being made at 600 m altitude. Regional patterns of land use and land cover were characterized for use in land planning and management programs. Comparisons of feature tone, shape, and texture were effected among the images acquired in each band, with account taken of the climatic and geographic conditions viewed. A two-level classification scheme was devised, based on the USGS land use and land cover classification system. A first level denoted urban agricultural areas, water channels, and barren land, while a second level provided finer resolutions of the first four levels. D.H.K.

A83-24604#

TERRAIN ANALYSIS FOR GEOTECHNICAL ENGINEERING STUDIES RELATED TO A PART OF CHANDRAPUR DISTRICT, MAHARASHTRA - INDIA

G. VENKATACHALAM, P. R. SARAPH, and S. Y. MHAISKAR (Indian Institute of Technology, Bombay, India) In: Remote sensing *of arid and semi-arid lands; Proceedings of the International* Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 2. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 921-930. refs

The techniques and results of a Landsat and aerial survey of 350 sq km of the Indian Chandrapur district are presented, with an emphasis on geologic and engineering considerations for development. The region is semiarid and underpopulated, and is a candidate for road construction, irrigation, industry, and residential construction. Terrain analysis was performed by automated processing of Landsat data and the generation of a digital terrain model. Aerial photographs were taken on a 1:40,000 scale to characterize the region on a basis of slope, sparse vegetation, and erosion in one group, steeper slopes, forests, and negligible erosion in another, and gentle slopes, cultivated or inhabited areas, and significant erosion in a third category. The entire area was studied using a maximum likelihood classifier system with the Landsat data. The terrain model served for analyses of possible road routes in terms of necessary labor, costs, and materials needed. The remotely sensed data was concluded useful for preliminary planning, particularly for road construction. D.H.K.

A83-24608#

MONITORING LAND USE AND LAND USE APPROPRIATENESS IN THE CENTRAL SUDAN - A COMBINATION OF LANDSAT DATA AND STATISTICAL ANALYSIS OF CLIMATIC DATA

L. OLSSON (Lund, Universitet, Lund, Sweden) In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 2. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 963-971. refs

A83-24616#

CLASSIFICATION OF SURFACE SEDIMENTS IN KUWAIT USING LANDSAT DATA

A. ASEM, F. KHALAF (Kuwait Institute for Scientific Research, Kuwait), S. ATTASI, and F. PALOU (IBM Kuwait Scientific Center, Kuwait) In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 2. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 1057-1064. refs

A83-24618#

A SURVEY OF BRAZIL'S SEMI-ARID LANDS WITH THE USE OF THE REMOTE SENSING

L. H. AGUIAR DE AZEVEDO (Instituto de Estudos da Terra, Rio de Janeiro, Brazil) In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 2. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 1077-1088.

A83-24619#

A LAND USE SURVEY OF NORTHWEST SOMALIA AS INTERPRETED FROM LANDSAT IMAGERY

E. JAWORSKI, A. DAAR (Eastern Michigan University, Ypsilanti, MI), L. E. REED, and J. PERSHOUSE (Michigan, Environmental Research Institute, Ann Arbor, MI) In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 2. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 1089-1098. refs

False color Landsat imagery was utilized to map land use changes and geologic lineaments in Northwest Somalia. Manual photograph interpretation and multi-temporal image comparison comprised the research techniques. Map products which were generated included maps of land use types, rangeland grazing intensity, and geologic lineaments. Lack of access to available aerial photography and existing large-scale maps precluded computer processing, except for a Band 7/Band 5 ratio image. This study demonstrates that manual interpretation of Landsat images can provide useful products at a cost of less than $0.2/square kilometer. (Author)

A83-24620#
LAND USE MAPPING FROM LANDSAT IMAGERY APPLIED TO CENTRAL TUNISIA
A. HAMZA, A. MAMI (Ministry of Agriculture, Soil Div., Tunis, Tunisia), and F. SADOWSKI (U.S. Geological Survey, Sioux Falls, SD) In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 2. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 1099-1111. refs

Land use mapping of 12,000 sq km of the southern Tunisia high steppes was performed, with the data subjected to both automated and manual analyses. Landsat data from two MSS channels were employed on a 1:500,000 scale to identify areas of dense and very dense vegetation. The data considered were taken from 1973 and 1980 to detect changes in vegetative areas and the gain or loss of vegetation. Manual analyses were performed to characterize unit colors, textures, and homogeneous tones, and were compared with ground truth data and other data sets. The final land use-vegetative cover maps were arranged by 39 soil types. It is suggested that the extent of semiarid areas can best be quantified by using stratification in the Landsat image processing. M.S.K.

A83-24621#
MULTIDISCIPLINARY EVALUATION OF SATELLITE DATA, AN EFFECTIVE AND ECONOMIC TOOL FOR RECONNAISSANCE MAPPING OF SEMIARID REGIONS
W. KRUCK and R. MUEHLFELD (Bundesanstalt fuer Geowissenschaften und Rohstoffe, Hanover, West Germany) In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 2. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 1113-1115. refs

A83-24622#
MONITORING THE CHANGING AREAL EXTENT OF IRRIGATED LANDS OF THE GEFARA PLAIN, LIBYA
J. A. ALLAN (London, University, London, England), J. E. COLWELL, R. REINHOLD, E. H. JEBE (Michigan, Environmental Research Institute, Ann Arbor, MI), and J. S. LATHAM In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 2. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 1119-1126.

A83-24628#
CAUSES AND EFFECTS OF INCREASING ARIDITY IN NORTHWEST BANGLADESH
M. A. JABBAR, M. U. CHAUDHURY, and M. H. Q. HUDA (Bangladesh Space Research and Remote Sensing Organization, Dacca, Bangladesh) In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 2. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 1195-1204. refs

A83-24630#
ENVIRONMENTAL CHANGE DETECTION IN THE NILE USING MULTIDATE LANDSAT IMAGERY
N. F. LEE and W. D. BRUCE (Canada Centre for Remote Sensing, Ottawa, Canada) In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 2. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 1219-1226. refs

A83-24632#
PARTICLE SIZE AND SPACING VARIATIONS IN DESERT SURFACE SEDIMENTS - IMPORTANCE FOR REMOTE SENSING OF ARID REGIONS
T. A. MAXWELL (National Air and Space Museum, Washington, DC) In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 2. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 1239-1248. refs

A83-24637#
NATURAL RESOURCES INVESTIGATION IN WEST KHARGA OASIS PLAIN, WESTERN DESERT, EGYPT USING LANDSAT IMAGERY INTERPRETATION
E. M. EL SHAZLY, M. A. ABDEL HADY, A. B. SALMAN, M. M. EL RAKAIBY, and I. E. EL AASSY (Academy of Scientific Research and Technology, Remote Sensing Center; Nuclear Materials Corp., Cairo, Egypt) In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 2. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 1283-1305. refs

A83-28144
REMOTE SENSING AND REGIONAL LAND MANAGEMENT; CONFERENCE, UNIVERSITE DE PICARDIE, AMIENS, FRANCE, OCTOBER 26, 27, 1981, REPORTS [TELEDETECTION ET AMENAGEMENT REGIONAL; COLLOQUE, UNIVERSITE DE PICARDIE, AMIENS, FRANCE, OCTOBER 26, 27, 1981, COMMUNICATIONS]
Conference sponsored by the Universite de Picardie. Societe Francaise de Photogrammetrie et de Teledetection, Bulletin, no. 87, 1982. 72 p. In French.

Topics covered at the second conference on remote sensing held at the University of Picardie in 1981 are outlined. Landsat imagery was demontrated to be useful for defining possible developments along the shore of the region, particularly the alluvial bed of Somme Bay. Particular note was taken of remote sensing applications in coastal zone land use management. Mention was made of land usage in Morocco, natural resources in Columbia and Algeria, and multitemporal imaging of Thailand. Finally, the intended missions of the SPOT satellite were discussed. M.S.K.

A83-28147
LAND USE MAPPING IN LOWER CHAOUIA [L'OCCUPATION DU SOL EN BASSE CHAOUIA]
R. FOSSET (Paris XIII, Universite, Villetaneuse, Seine-St-Denis, France) (Universite de Picardie, Colloque sur la Teledetection et l'Amenagement Regional, Amiens, France, Oct. 26, 27, 1981.) Societe Francaise de Photogrammetrie et de Teledetection, Bulletin, no. 87, 1982, p. 39-42. In French.

Landsat MSS imagery was examined to assess the reflectance contrasts available from the clear, muddy, and deep water, limestone and sandstone hills, and agricultural features of the Moroccan region of Chaouia. Attention was given to the characteristic formations around the Mellah wadi, the lake and the valley, the NW hills, and to large cultivated plots. Large land parcels were easiest to identify, while farm plots of less than a hectare required the superposition of several images. M.S.K.

A83-28148
AN ANALYSIS OF NATURAL FEATURES OF THE COLUMBIAN PLANS BY REMOTE SENSING [ANALYSE DES MILIEUX NATURELS DES LLANOS DE COLOMBIE PAR TELEDETECTION]
J. P. TIHAY, P. REGNACQ, M. MENDY-HARAN, and J. PEBAYLE (Pau et Pays de l'Adour, Universite, Pau, Pyrenees-Atlantiques, France) (Universite de Picardie, Colloque sur la Teledetection et l'Amenagement Regional, Amiens, France, Oct. 26, 27, 1981.) Societe Francaise de Photogrammetrie et de Teledetection, Bulletin, no. 87, 1982, p. 43-54. In French.

Three representative sectors of the Columbian plains on the eastern piedmont of the Andes Cordillera were examined by Landsat imagery and aerial photography. Attention was given to a partly vegetated section of the Arauca river basis, to a paleo-alluvial river channel, and to a swamp with floating vegetation and murky waters. The full survey covered 600 sq km. Taxonomic classifications were obtained for the river, vegetated and barren river banks, forests, pastures, cultivated lands, and, and arboreal and treeless savannah, as well as evidence of a recently burned-out area. The aerial photography pictures were enlarged and used to identify specific species of vegetation, and comparisons were made among Landsat images from the MSS channels 4-7, with consideration given to multitemporal differences. It was found that the satellite images at the 1:50,000-1:100,000 scale did not improve on aerial photography. M.S.K.

A83-28149
REGIONAL LAND USE RESEARCH WITH MULTITEMPORAL CLASSIFICATION - ON AN IMAGE OF THAILAND [RECHERCHES SUR LA MORPHOLOGIE DES PAYSAGES A PARTIR D'UNE CLASSIFICATION MULTITEMPORELLE, SUR UNE IMAGE DE THAILANDE]
M. BRUNEAU (Centre d'Etudes de Geographie Tropicale, Bordeaux, France) and J. P. ROGALA (IBM France, S.A., Centre Scientifique, Paris, France) (Universite de Picardie, Colloque sur la Teledetection et l'Amenagement Regional, Amiens, France, Oct. 26, 27, 1981.) Societe Francaise de Photogrammetrie et de Teledetection, Bulletin, no. 87, 1982, p. 55-66. In French.

Multitemporal images were obtained of a densely populated alluvial plain in northern Thailand using Landsat MSS channels 4, 5, and 7 in January 1973 and channels 5 and 7 in April 1975. Thirteen categories of land use were identified and subgrouped under classifications for vegetation and soil humidity. Digital processing of the imagery was undertaken in order to generate ecological and land use maps with well-defined borders. M.S.K.

A83-29690
VERIFICATION OF SATELLITE OBSERVATIONS OF STRATOSPHERIC MINOR CONSTITUENTS
W. G. PLANET (NOAA, National Earth Satellite Service, Washington, DC) (COSPAR, Topical Meeting on Weather Satellites: Stereoscopy and Sounding, Ottawa, Canada, May 16-June 2, 1982) Advances in Space Research (ISSN 0273-1177), vol. 2, no. 6, 1982, p. 79-87. refs

The TIROS-N operational meteorological observing system will have the ability to determine global ozone amounts from two instruments by 1985. It is noted that the satellite ozone products will require verification using commonly accepted references: for total ozone, Dobson spectrophotometer determinations are to be used; for vertical profiles, no clear choice now exists among balloon-launched chemical sondes, rocket-launched optical sondes, and Dobson Umkehr measurements. The applicability and utilization of these measurement systems are examined, emphasizing the need for verification data consistent with the operational satellite lifetimes. Comparisons of vertical ozone profiles from several concurrent satellites (another major source of data for verification) are examined, with attention given to results from SAGE, LIMS, and SBUV. B.J.

A83-29920
AN AERIAL PHOTOGRAPHIC METHOD FOR ESTIMATING URBAN POPULATION
P. O. ADENIYI (Lagos, University, Lagos, Nigeria) Photogrammetric Engineering and Remote Sensing (ISSN 0099-1112), vol. 49, April 1983, p. 545-560. Research supported by the University of Lagos. refs

The application of aerial photography for estimating the urban population in Nigeria is discussed. A land-use model is adopted as the preferred method, involving a characteristic population density for a particular residential classification. The effectiveness of the model was tested on an estimate of the Lagos population. First, it was determined if residential housing in one part of the city had the same density as the same residential buildings in another, and what variables could account for any variations. The capability of remote sensing to detect the variables was also assessed. Block population samples were obtained for a cluster analysis for comparison with aerial data. Medium scale photographs were suitable for planned housing areas, if accompanied by a minimum amount of field work. Large scale photographs, combined with a fairly thorough sampling procedure, would be required for a survey of unplanned areas. M.S.K.

A83-29949#
RADIATION-AEROSOLS INTERACTION - APPLICATIONS TO REMOTE SENSING AND FOR CALCULATION OF THE RADIATIVE BALANCE [INTERACTION RAYONNEMENT-AEROSOLS - APPLICATIONS ALA TELEDETECTION ET AU CALCUL DU BILAN RADIATIF]
D. TANRE Lille I, Universite, Docteur es Sciences Physiques Thesis, 1982, 245 p. In French. Research supported by the Centre National d'Etudes Spatiales. refs

Analytical studies were performed for the effects of aerosols on the transfer of solar radiation in the clear atmosphere and the energetic effect of aerosols. A sampling of representative aerosols was examined to develop numerical simulations of aerosol properties and to determine the dominant parameters which distort the radiation field. The numerical model was applied to a model atmosphere intervening between a target and a satellite sensor. Examples are presented of ocean color disturbances due to the atmosphere and aberrations experienced during resource surveys. The energetics study served to define the energetic impact of aerosols as a function of the principle parameters of the particles in the aerosol. The study is applied to assay the climatic effect of stratospheric aerosols, using a simplified climatic model. M.S.K.

N83-17918*# Computer Sciences Corp., Silver Spring, Md.
LANDSAT IMAGE DIFFERENCING AS AN AUTOMATED LAND COVER CHANGE DETECTION TECHNIQUE Interim Report
M. L. STAUFFER and R. L. MCKINNEY Aug. 1978 31 p refs
Original contains color imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls, S.D. 57198
ERTS
(Contract NAS5-24350)
(E83-10129; NASA-CR-170476; NAS 1.26:170476;
CSC/TM-78/6215) Avail: NTIS HC A03/MF A01 CSCL 05B

Image differencing was investigated as a technique for use with LANDSAT digital data to delineate areas of land cover change in an urban environment. LANDSAT data collected in April 1973 and April 1975 for Austin, Texas, were geometrically corrected and precisely registered to United States Geological Survey 7.5-minute quadrangle maps. At each pixel location reflectance values for the corresponding bands were subtracted to produce four difference images. Areas of major reflectance differences are isolated by thresholding each of the difference images. The resulting images are combined to obtain an image data set to total change. These areas of reflectance differences were found, in general, to correspond to areas of land cover change. Information on areas of land cover change was incorporated into a procedure to mask out all nonchange areas and perform an unsupervised classification only for data in the change areas. This procedure identified three broad categories: (1) areas of high reflectance (construction or extractive), (2) changes in agricultural areas, and

(3) areas of confusion between agricultural and other areas. M.G.

N83-17925*# California Inst. of Tech., Pasadena.
DEVELOPMENT OF MATHEMATICAL TECHNIQUES FOR THE ASSIMILATION OF REMOTE SENSING DATA INTO ATMOSPHERIC MODELS Final Technical Report
J. H. SEINFELD, Principal Investigator 1982 106 p refs ERTS
(Contract NAG1-71)
(E83-10159; NASA-CR-169769; NAS 1.26:169769) Avail: NTIS HC A06/MF A01 CSCL 05B

The problem of the assimilation of remote sensing data into mathematical models of atmospheric pollutant species was investigated. The problem is posed in terms of the matching of spatially integrated species burden measurements to the predicted three dimensional concentration fields from atmospheric diffusion models. General conditions are derived for the 'reconstructability' of atmospheric concentration distributions from data typical of remote sensing applications, and a computational algorithm (filter) for the processing of remote sensing data is developed. M.G.

N83-17937*# Colorado State Univ., Fort Collins. Dept. of Earth Resources.
URBAN AREA CHANGE DETECTION PROCEDURES WITH REMOTE SENSING DATA Final Report
E. L. MAXWELL, Principal Investigator and C. J. RIORDAN 26 Nov. 1980 79 p refs ERTS
(Contract NAS5-26127)
(E83-10174; NASA-CR-170440; NAS 1.26:170440) Avail: NTIS HC A05/MF A01 CSCL 05B

The underlying factors affecting the detection and identification of nonurban to urban land cover change using satellite data were studied. Computer programs were developed to create a digital scene and to simulate the effect of the sensor point spread function (PSF) on the transfer of modulation from the scene to an image of the scene. The theory behind the development of a digital filter representing the PSF is given as well as an example of its application. Atmospheric effects on modulation transfer are also discussed. A user's guide and program listings are given. M.G.

N83-18818# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
A BRIEF DESCRIPTION OF THE BRAZILIAN SATELLITES
A. B. CARLEIAL Nov. 1982 20 p Presented at the Reg. Meeting of Latin Am. Users of Remote Sensing Satellites, Sao Jose dos Campos, Brazil, 30 Nov. - 2 Dec. 1981
(INPE-2600-PRE/246) Avail: NTIS HC A02/MF A01

Four Brazilian experimental satellites are described based on the results of the preliminary studies phase. The satellites have environmental data restransmission and remote sensing as applications, and are scheduled for launch in the 1989 to 1992 time period. Author

N83-19145*# Georgia Dept. of Natural Resources, Atlanta. Environmental Protection Div.
GEORGIA RESOURCE ASSESSMENT PROJECT: INSTITUTIONALIZING LANDSAT AND GEOGRAPHIC DATA BASE TECHNIQUES
R. R. PIERCE, B. Q. RADO, and N. L. FAUST (Georgia Inst. of Tech., Atlanta) *In* NASA. Goddard Space Flight Center 2nd Eastern Reg. Remote Sensing Appl. Conf. 19-42 1981 refs Original contains imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls, S.D. 57198 ERTS
Avail: NTIS HC A17/MF A01 CSCL 08B

Digital data from LANDSAT for each 1.1-acre cell in Georgia were processed and the land cover conditions were categorized. Several test cases were completed and an operational hardware and software processing capability was established at the Georgia Institute of Technology. The operational capability was developed to process the entire state (60,000 sq. miles and 14 LANDSAT scenes) in a cooperative project between eleven divisions and agencies at the regional, state, and federal levels. Products were developed for State agencies such as in both mapped and statistical formats. A computerized geographical data base was developed for management programs. To a large extent the applications of the data base evolved as users of LANDSAT information requested that other data (i.e., soils, slope, land use, etc.) be made compatible with LANDSAT for management programs. To date, geographic data bases incorporating LANDSAT and other spatial data deal with elements of the municipal solid waste management program, and reservoir management for the Corps of Engineers. LANDSAT data are also being used for applications in wetland, wildlife, and forestry management. A.R.H.

N83-19152*# New Jersey Dept. of Environmental Protection, Trenton. Office of Green Acres.
USE OF LANDSAT FOR LAND USE AND HABITAT INVENTORIES FOR THE NEW JERSEY PINELANDS
C. TRACY *In* NASA. Goddard Space Flight Center 2nd Eastern Reg. Remote Sensing Appl. Conf. p 101-108 1981 ERTS
Avail: NTIS HC A17/MF A01 CSCL 08B

The New Jersey Heritage program surveyed available mapping information on landcover and vegetative communities and found that most commonly used sources, such as local land use maps and aerial photographs, were useful for individual sites, but either varied in their classifications or could not be used over extensive areas. A demonstration project using LANDSAT satellite information for the Great Egg Harbor/Tuckahoe watersheds was initiated with the goals of application (providing an inventory of vegetative communities and land use) flexibility (providing a method of collecting data which can be updated or modified in the future); and efficiency (allowing for an acceptable cost level by having staff undertake the project and avoid the more costly methods from air photo interpretation or on-site surveying. The classification procedure used is described and the spatial distributions of the 10 landcover classes determined are listed. A.R.H.

N83-19153*# Piedmont Planning District Commission, Farmville, W. Va.
LANDSAT LANDCOVER INFORMATION APPLIED TO REGIONAL PLANNING DECISIONS
C. M. DIXON *In* NASA. Goddard Space Flight Center 2nd Eastern Reg. Remote Sensing Appl. Conf. p 109-120 1981 ERTS
Avail: NTIS HC A17/MF A01 CSCL 05B

Land cover information derived from LANDSAT is being utilized by Piedmont Planning District Commission located in the State of Virginia. Progress to date is reported on a level one land cover classification map being produced with nine categories. The nine categories of classification are defined. The computer compatible tape selection is presented. Two unsupervised classifications were done, with 50 and 70 classes respectively. Twenty-eight spectral classes were developed using the supervised technique, employing actual ground truth training sites. The accuracy of the unsupervised classifications are estimated through comparison with local county statistics and with an actual pixel count of LANDSAT information compared to ground truth. A.R.H.

N83-19168*# Yale Univ., New Haven, Conn. School of Forestry and Environment Studies.
FUNDAMENTAL PROCEDURES OF GEOGRAPHIC INFORMATION ANALYSIS
J. K. BERRY and C. D. TOMLIN (Harvard Univ.) *In* NASA. Goddard Space Flight Center 2d Eastern Reg. Remote Sensing Appl. Conf. p 269-281 1981 refs ERTS
Avail: NTIS HC A17/MF A01 CSCL 08F

Analytical procedures common to most computer-oriented geographic information systems are composed of fundamental map processing operations. A conceptual framework for such procedures is developed and basic operations common to a broad range of applications are described. Among the major classes of primitive operations identified are those associated with: reclassifying map categories as a function of the initial classification, the shape, the position, or the size of the spatial configuration associated with each category; overlaying maps on a point-by-point, a category-wide, or a map-wide basis; measuring distance; establishing visual or optimal path connectivity; and characterizing cartographic neighborhoods based on the thematic or spatial attributes of the data values within each neighborhood. By organizing such operations in a coherent manner, the basis for a generalized cartographic modeling structure can be developed which accommodates a variety of needs in a common, flexible and intuitive manner. The use of each is limited only by the general thematic and spatial nature of the data to which it is applied. M.G.

N83-19169*# Minnesota State Planning Agency, St. Paul. Land Management Information Center.
THE INTEGRATION OF A LANDSAT ANALYSIS CAPABILITY WITH A GEOGRAPHIC INFORMATION SYSTEM
E. A. NORDSTRAND *In* NASA. Goddard Space Flight Center 2d Eastern Reg. Remote Sensing Appl. Conf. p 283-302 1981 refs Original contains imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls, S.D. 57198 ERTS
Avail: NTIS HC A17/MF A01 CSCL 08F

The integration of LANDSAT data was achieved through the development of a flexible, compatible analysis tool and using an existing data base to select the usable data from a LANDSAT analysis. The software package allows manipulation of grid cell data plus the flexibility to allow the user to include FORTRAN statements for special functions. Using this combination of capabilities the user can classify a LANDSAT image and then selectivity merge the results with other data that may exist for the study area. M.G.

N83-19170*# Massachusetts Univ., Amherst. Remote Sensing Center.
REMOTE SENSING AT THE UNIVERSITY OF MASSACHUSETTS
R. L. HUGUENIN *In* NASA. Goddard Space Flight Center 2d Eastern Reg. Remote Sensing Appl. Conf. p 303-305 1981 ERTS
Avail: NTIS HC A17/MF A01 CSCL 05B

The projects, faculty, and computer resources involved in remote sensing research at the University of Massachusetts are discussed. Field instrumentation and technology transfers from other disciplines are also described. M.G.

N83-19171*# New Jersey Dept. of Environmental Protection, Trenton.
IMPLEMENTATION OF STATEWIDE LANDSAT IMAGE PROCESSING CAPABILITIES
R. F. MILLS *In* NASA. Goddard Space Flight Center 2d Eastern Reg. Remote Sensing Appl. Conf. p 307-310 1981 ERTS
Avail: NTIS HC A17/MF A01 CSCL 05B

Problems involved in establishing a LANDSAT image processing capability are discussed. Cost estimates and tradeoffs, association with geographic information systems, and hardware and software requirements are addressed. M.G.

N83-19172*# Commonwealth Data Base Task Force, Richmond, Va.
IMPLEMENTATION OF LANDSAT TECHNOLOGY IN THE COMMONWEALTH OF VIRGINIA
E. SAHAYDAK *In* NASA. Goddard Space Flight Center 2d Eastern Reg. Remote Sensing Appl. Conf. p 311-315 1981 ERTS
Avail: NTIS HC A17/MF A01 CSCL 05B

A brief history of events which led to the formal implementation of LANDSAT technology in Virginia is outlined. The concept of the Commonwealth Data Base (CDB) is explained as it is perceived by the users and the systems development task force. Furthermore, the CDB organization which was established to implement the CDB concept in Virginia is covered. M.G.

N83-19173*# State Univ. of New York, Oneonta.
USING LANDSAT TO UPDATE THE SCHOHARLIE COUNTY, NEW YORK, LAND COVER INVENTORY
P. R. BAUMANN *In* NASA. Goddard Space Flight Center 2d Eastern Reg. Remote Sensing Appl. Conf. p 317-323 1981 refs ERTS
(Contract NAS5-25967)
Avail: NTIS HC A17/MF A01 CSCL 08B

A demonstration project to examine the utility of LANDSAT at the county and local government level is discussed. The project deals with the updating of the New York State land use and natural resources maps, valuable planning and development tools utilized by county governments. Both the feasibility of producing these maps and the transferability of them to the county government level are evaluated. M.G.

N83-19174*# Minnesota State Planning Agency, St. Paul. Land Management Information Center.
THE EVALUATION OF ALTERNATE METHODOLOGIES FOR LAND COVER CLASSIFICATION IN AN URBANIZING AREA
R. M. SMEKOFSKI *In* NASA. Goddard Space Flight Center 2d Eastern Reg. Remote Sensing Appl. Conf. p 325-336 1981 refs ERTS
Avail: NTIS HC A17/MF A01 CSCL 08B

The usefulness of LANDSAT in classifying land cover and in identifying and classifying land use change was investigated using an urbanizing area as the study area. The question of what was the best technique for classification was the primary focus of the study. The many computer-assisted techniques available to analyze LANDSAT data were evaluated. Techniques of statistical training (polygons from CRT, unsupervised clustering, polygons from digitizer and binary masks) were tested with minimum distance to the mean, maximum likelihood and canonical analysis with minimum distance to the mean classifiers. The twelve output images were compared to photointerpreted samples, ground verified samples and a current land use data base. Results indicate that for a reconnaissance inventory, the unsupervised training with canonical analysis-minimum distance classifier is the most efficient. If more detailed ground truth and ground verification is available, the polygons from the digitizer training with the canonical analysis minimum distance is more accurate. M.G.

N83-19180*# Michigan State Univ., East Lansing. Center for Remote Sensing.
THE MICHIGAN DATA NEEDS QUESTIONNAIRE
R. HILL-ROWLEY *In* NASA. Goddard Space Flight Center 2d Eastern Reg. Remote Sensing Appl. Conf. p 377-386 1981 refs ERTS
Avail: NTIS HC A17/MF A01 CSCL 05B

The data needs questionnaire is an element in the project design study for the Michigan Resource Inventory Act and is aimed at gathering information on what inventory information is required by land use planners throughout the state. Analysis of questionnaire responses is discussed. Some information on current use categories was tabulated. The respondents selected a broad range of categories at all levels of detail. Those most frequently indicated were urban categories. M.G.

N83-19181*# Vermont Univ., Burlington. School of Natural Resources.
A LAND COVER CLASSIFICATION FOR VERMONT
R. A. WHITMORE, JR. *In* NASA. Goddard Space Flight Center 2d Eastern Reg. Remote Sensing Appl. Conf. p 387-393 1981 Original contains imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls, S.D. 57198 ERTS
Avail: NTIS HC A17/MF A01 CSCL 08B

A university project to develop land cover classification capabilities is discussed. Specific objectives were to: (1) demonstrate the feasibility of using LANDSAT data for resource management; (2) establish projects and meet state needs for specific resource information; and (3) assist state personnel in obtaining technical expertise in the processing and analysis of LANDSAT data. M.G.

N83-20471# Environmental Monitoring and Support Lab., Cincinnati, Ohio.
THE NATIONAL AIR POLLUTION BACKGROUND NETWORK, 1976 - 1980 Project Report, May 1976 - Dec. 1980
G. EVANS, P. FINKELSTEIN, B. MARTIN, N. POSSIEL, and M. GRAVES (Northrop Services Inc., Research Triangle Park, N.C.) Aug. 1982 56 p refs
(PB83-100412; EPA-600/4-82-058) Avail: NTIS HC A04/MF A01 CSCL 04A

The U.S. Environmental Protection Agency in cooperation with the U.S. Forest Service has established a network of air monitoring stations designed to measure levels of ozone in remote areas within the contiguous 48 states. There are currently eight sites, at various National Forests, which measure ozone, wind speed and direction, temperature, relative humidity, and solar radiation. This is a study of the network data gathered from 1976 through 1980 with analytical emphasis on the year 1979, for which the most complete meteorological and ozone records were available. The mean ozone level for 1979 at these sites fell within the range of 0.025 ppm to 0.04 ppm. At most sites, there were several days in 1979 when hourly concentrations of ozone exceeded 0.08 ppm. Examination of several individual days in 1979 with relatively high ozone levels using a back trajectory model showed that in almost all of these cases, the air had passed over large urban areas within the previous three days. The hypothesis is presented that high levels of ozone at remote sites may be due in part to the long range transport of ozone and/or its precursors. GRA

N83-21420*# Council of State Planning Agencies, Washington, D.C.
THE EARTH RESOURCES DATA PROJECT
P. HARWOOD *In* NASA. Goddard Space Flight Center Eastern Reg. Remote Sensing Appl. Conf. p 19-24 Jan. 1981 ERTS
Avail: NTIS HC A11/MF A01 CSCL 05B

The Council of State Planning Agencies, in consultation with the National Governor's Association and NASA, initiated the Earth Resources Data Project to encourage the appropriate application of cost-effective science and technology to state natural resources issues and problems. This project was established to provide a focal point for identifying those issues associated with state use of remote sensing and related technology. One project goal is to elevate to the consciousness of state policy and program officials new technologies, such as LANDSAT, by association with major issues to which policy officials are attuned. The project assists the coordination between the states and NASA and promotes communication on those issues. A related project objective is to encourage technical assistance opportunities for states that will promote better use of remote sensing and natural resources data in state programs. A.R.H.

N83-21421*# National Aeronautics and Space Administration. Earth Resources Labs., Bay St. Louis, Miss.
EARTH RESOURCES LABORATORY TECHNOLOGY TRANSFER PROGRAM
R. S. ESTESS *In* NASA. Goddard Space flight Center Eastern Reg. Remote Sensing Appl. Conf. p 25-29 Jan. 1981 ERTS
Avail: NTIS HC A11/MF A01 CSCL 05B

The approach to the transfer of satellite remote sensing technology used at the National Space Technology Laboratories'/Earth Resources Laboratory represents an effective program for the assigned area and is composed of demonstrations; a comprehensive in-house training program; user awareness activities (brochures, slide sets, and documentation); university short courses to stimulate university capabilities; and a technical awareness effort aimed at providing the states with consultation in the areas of hardware/software systems and advice on specific applications. Particular focus is on the transfer of LANDSAT technology in the context of geobased information system development, as well as on how the states approach the problem of institutionalizing the capabilities. The status of demonstration projects and of the state LANDSAT geographic information systems is examined. A.R.H.

N83-21422*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
THE WESTERN REGIONAL APPLICATIONS PROGRAM (WRAP)
S. D. NORMAN *In* NASA. Goddard Space Flight Center Eastern Reg. Remote Sensing Appl. Conf. p 31-37 Jan. 1981 ERTS
Avail: NTIS HC A11/MF A01 CSCL 05A

The states encompassed by the Western Regional Applications Program (WRAP) include Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, North Dakota, Oregon, South Dakota, Utah, Washington, and Wyoming. The features of the western United States which both help and hinder the use of LANDSAT are discussed as well as their effects on the institutional approaches used for resources management in these states. Operational alternatives and some of the representative LANDSAT projects that WRAP is engaged in are presented. A.R.H.

N83-21423*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
NASA'S EASTERN REGIONAL REMOTE SENSING APPLICATIONS PROGRAM
P. J. CRESSY, JR. *In its* Eastern Reg. Remote Sensing Appl. Conf. p 39-42 Jan. 1981 ERTS
Avail: NTIS HC A11/MF A01 CSCL 05B

The goals of the Eastern Regional Remote Sensing Applications Program are to establish capability for using LANDSAT technology in state institutions and organizations in an operational mode, and to assist in handling new data, introducing new techniques as they become available, and in building and nurturing the technology within the states. Techniques for application development are supported and workshops and demonstrations are provided to pass information on to users. Major areas of project interest are forest inventory, water inventory, and water clarity, and land cover change detection. Another activity is in adopting software, modifying it to work on users' computers, and in identifying hardware that can be used and tied to user computer systems. Involvement of universities as resources for state and local governments is another element of the program. A.R.H.

N83-21424*# Maryland Dept. of State Planning, Baltimore.
LAND USE PROJECT (COMPARISON OF LANDSAT WITH AIRCRAFT-DERIVED LAND COVER DATA FOR A PROPOSED HIGHWAY PROJECT)
T. RUGOSKI (Defense Mapping Agency, Rockville, Md.) *In* NASA. Goddard Space Flight Center Eastern Reg. Remote Sensing Appl. Conf. p 45-53 Jan. 1981 Original contains imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls, S.D. 57198 ERTS
Avail: NTIS HC A11/MF A01 CSCL 08B

The Maryland Automated Geographic information System is described as well as the development of a general land cover classification with level 2 separation for vegetation categories for a 95,000-acre study area in Howard and Anne Arundel Counties. An accuracy analysis was performed on two subsections of the entire study area. The 1:24,000 scale land use map and the high in altitude infrared photography were determined to the best source of ground truth for the analysis. Results show that (1) delineation of deciduous and coniferous forested areas from LANDSAT data compared well with results from infrared photography; (2) general classification of agricultural areas showed acceptable results; (3) delineation of residential areas had the highest error rates (difference in interpretation and cover type assignment methods was a primary factor); and (4) LANDSAT-derived land cover data is to be used as an ancillary data source in a Maryland statewide land cover inventory. A.R.H.

N83-21455*# Utah Univ., Salt Lake City. Center for Remote Sensing and Cartography.
INVENTORY AND ANALYSIS OF RANGELAND RESOURCES OF THE STATE LAND BLOCK ON PARKER MOUNTAIN, UTAH
R. A. JAYNES, Principal Investigator 1983 153 p refs Original contains color imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls, S.D. 57198 ERTS
(Contract NAGW-95)
(E83-10214; NASA-CR-170073; NAS 1.26:170073; CRSC-82-6)
Avail: NTIS HC A08/MF A01 CSCL 08B

High altitude color infrared (CIR) photography was interpreted to provide an 1:24,000 overlay to U.S.G.S. topographic maps. The inventory and analysis of rangeland resources was augmented by the digital analysis of LANDSAT MSS data. Available geology, soils, and precipitation maps were used to sort out areas of confusion on the CIR photography. The map overlay from photo interpretation was also prepared with reference to print maps developed from LANDSAT MSS data. The resulting map overlay has a high degree of interpretive and spatial accuracy. An unacceptable level of confusion between the several sagebrush types in the MSS mapping was largely corrected by introducing ancillary data. Boundaries from geology, soils, and precipitation maps, as well as field observations, were digitized and pixel classes were adjusted according to the location of pixels with particular spectral signatures with respect to such boundaries. The resulting map, with six major cover classes, has an overall accuracy of 89%. Overall accuracy was 74% when these six classes were expanded to 20 classes. A.R.H.

N83-21456*# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
APPLICATION OF REMOTE SENSING DATA TO LAND USE AND LAND COVER ASSESSMENT IN THE TUBARAO RIVER COASTAL PLAIN, SANTA CATARINA, BRAZIL
N. D. J. PARADA, Principal Investigator and D. D. M. VALERIANO Nov. 1982 26 p refs Presented at the Intern. Symp. on Util. of Coastal Ecosystems: Planning, Pollution and Productivity, Rio Grande, Brazil, 22-27 Nov. 1982 Original contains imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls, S.D. 57198 ERTS
(E83-10215; NASA-CR-170074; NAS 1.26:170074; INPE-2591-PRE/239) Avail: NTIS HC A03/MF A01 CSCL 08B

By means of aerial photography and MSS-LANDSAT data a land use/land cover classification was applied to the Tubarao River coastal plain. The following classes were identified: coal related areas, permanently flooded wetlands, periodically flooded wetlands, agricultural lands, bare soils, water bodies, urban areas, forestlands. Author

N83-21457*# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
VERTICAL EDDY DIFFUSION COEFFICIENT FROM THE LANDSAT IMAGERY
N. D. J. PARADA, Principal Investigator, Y. VISWANADHAM, and J. A. TORSANI Sep. 1982 24 p refs Original contains imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls, S.D. 57198 ERTS
(E83-10216; NASA-CR-170075; NAS 1.26:170075; INPE-2530-PRE/197) Avail: NTIS HC A02/MF A01 CSCL 08C

Analysis of five stable cases of the smoke plumes that originated in eastern Cabo Frio (22 deg 59'S; 42 deg 02'W), Brazil using LANDSAT imagery is presented for different months and years. From these images the lateral standard deviation (sigma sub y) and the lateral eddy diffusion coefficient (K sub y) are obtained from the formula based on Taylor's theory of diffusion by continuous moment. The rate of kinetic energy dissipation (e) is evaluated from the diffusion parameters sigma sub y and K sub y. Then, the vertical diffusion coefficient (K sub z) is estimated using Weinstock's formulation. These results agree well with the previous experimental values obtained over water surfaces by various workers. Values of e and K sub z show the weaker mixing processes in the marine stable boundary layer. The data sample is apparently to small to include representative active turbulent regions because such regions are so intermittent in time and in space. These results form a data base for use in the development and validation of mesoscale atmospheric diffusion models. M.G.

N83-21464*# Utah Univ., Salt Lake City. Center for Remote Sensing and Cartography.
IDENTIFYING ENVIRONMENTAL FEATURES FOR LAND MANAGEMENT DECISIONS Semiannual Report
11 Mar. 1982 31 p ERTS
(Contract NAGW-95)
(E83-10223; NASA-CR-170081; NAS 1.26:170081) Avail: NTIS HC A03/MF A01 CSCL 08B

The major accomplishments of the Center for Remote Sensing and Cartography are outlined. The analysis and inventory of the Parker Mountain rangeland and the use of multitemporal data to study aspen succession stages are discussed. New and continuing projects are also described including a Salt Lake County land use study, Wasatch-Cache riparian study, and Humboldt River riparian habitat study. Finally, progress in digital processing techniques is reported. M.G.

N83-21657# Fermi National Accelerator Lab., Batavia, Ill.
ENVIRONMENTAL MONITORING
S. I. BAKER 1 May 1982 93 p refs
(Contract DE-AC02-76CH-03000)
(DE82-014429; FERMILAB-82/22) Avail: NTIS HC A05/MF A01

The accelerator operated routinely at 400 GeV during CY-1981 with about the same number of protons accelerated during CY-1981 as in CY-1980. The total number of protons accelerated in 1981 was 1.4 X 10 to the 19th power. Typical operation was at about 45 percent of the design intensity of 5 X 10 to the 13th power protons per acceleration cycle. During CY-1981 there were no abnormal occurrences which had an impact on the facility and its operation. Copper sulfate was used this year to control algae and weed growth in ditches and is suspected of causing the death of three birds. The maximum potential radiation exposure at the site boundary during CY-1981 (fence line assuming 24 hr/day occupancy) was 1.8 mrem compared to 0.3 mrem last year. The total potential radiation exposure to the general off-site population from Fermilab operations during CY-1981 was 11 person-rem compared to 1 person-rem last year. The increase in potential exposure occurred as a result of the off-site neutron dose this year. All exposure was from external radiation. Airborne radioactivity was released across the site boundary in small amounts throughout the year from the stack ventilating a Neutrino Area. DOE

N83-21713*# National Aeronautics and Space Administration. Wallops Flight Center, Wallops Island, Va. Field Measurement Support Office.
METEOROLOGICAL AND CONSTITUENT DATA FOR JUNE, JULY AND AUGUST 1981
20 Oct. 1981 139 p refs
(NASA-TM-85279; WFC-032.1-81-109; NAS 1.15:85279) Avail: NTIS HC A07/MF A01 CSCL 04B

Electrochemical conversion cell (ECC) balloon data consisting of a plot showing the mixing ratio of ozone partial pressure and temperature versus pressure altitude are included. Author

N83-22099# Technische Universitaet, Clausthal-Zellerfeld (West Germany). Lehrstuhl fuer Regeltechnik und Electronik.
IMAGE SUPPORTED NAVIGATION IN LOW ALTITUDES BASED ON THE DETECTION OF ROADS AND RIVERS
R. D. THERBURG *In* AGARD Advan. in Guidance and Control Systems 7 p Jan. 1983
Avail: NTIS HC A11/MF A01

If a flight navigation system has to operate independently of ground stations or satellites, it has to be updated by acquisition of ground data. Position-fixing by automated detection of rivers, roads, and other traffic routes in the visual image underneath the aircraft is discussed. These patterns, undistorted even if viewed from low altitudes, are detected by an electrooptical sensor, which correlates the image with a rotating slit. As this sampling pattern is matched to line-shaped image patterns, traffic routes are detected in highly structured background in spite of weak contrast. For position fixing data of detected traffic routes are fed to a micro computer on board, to be compared with stored map data of traffic routes. This approach forced the development of a suitable nonlinear filtering method, yielding an optimal estimation of the real position and thereby the position offset of a dead reckoning system. R.J.F.

N83-22254*# National Aeronautics and Space Administration. Goddard Space Flight Center, Albuquerque, N. Mex.
AN ATLAS OF NOVEMBER 1978 SYNTHETIC APERTURE RADAR DIGITIZED IMAGERY FOR OIL SPILL STUDIES
H. E. MAURER, W. ODERMAN (Computer Sciences Corp.), and W. F. CROSSWELL (Harris Corp.) Dec. 1982 106 p refs
(NASA-TM-84419; NAS 1.15:84419) Avail: NTIS HC A06/MF A01 CSCL 17I

A data set is described which consists of digitized synthetic aperture radar (SAR) imagery plus correlative data and some preliminary analysis results. This data set should be of value to experimenters who are interested in the SAR instrument and its application to the detection and monitoring of oil on water and other distributed targets. Author

N83-22289*# Systematics General Corp., Sterling, Va.
THE SHUTTLE ENVIRONMENT WORKSHOP Final Report
J. LEHMANN, S. G. TANNER, ed., and T. WILKERSON, ed. Feb. 1983 327 p refs Workshop held in Calverton, Md., 5-7 Oct. 1982
(Contract NAS5-27362)
(NASA-CR-170496; NAS 1.26:170496; REPT-24-5087) Avail: NTIS HC A15/MF A01 CSCL 22B

Results of shuttle environmental measurement programs were presented. The implications for plasma, infrared and ultraviolet experiments were discussed. The prelaunch environmental conditions, results of key environmental measurements made during the flights of STS 1, 2, 3, 4, and postlanding environmental conditions were covered.

N83-22290*# Systematics General Corp., Sterling, Va.
THE SHUTTLE ENVIRONMENT WORKSHOP, EXECUTIVE SUMMARY AND WORKSHOP PROCEDURES
J. LEHMANN, S. G. TANNER, ed., and T. WILKERSON, ed. *In its* The Shuttle Environ. Workshop p 1-7 Feb. 1982
Avail: NTIS HC A15/MF A01 CSCL 22B

One of the main experimental monitors used to determine the environment in the payload bay was the Induced Environment Contamination Monitor. This package of instruments has made environmental measurements during STS flights with a high degree of success. This has shown that the shuttle environment is relatively free of contaminants, except for special instances of increased abundance of methane, water vapor and particulates. Results of these measurements are rapidly becoming more available. In establishing the Shuttle Environment Workshop, the findings were shared with scientific experimenters, users and other individuals who need to know what the Shuttle is like and what experimenters may expect in the payload bay. The Workshop was centered around results obtained from the environmental measurements made on the Shuttle. The program agenda for the workshop is given. The procedures and flow of communications for the workshop are indicated. S.L.

N83-22291*# Systematics General Corp., Sterling, Va.
ENVIRONMENTAL MEASUREMENTS SESSION SUMMARIES
J. LEHMANN, S. G. TANNER, ed., and T. WILKERSON, ed. *In its* The Shuttle Environ. Workshop p 9-17 Feb. 1983
Avail: NTIS HC A15/MF A01 CSCL 13B

Emphasis was placed on data from payloads flown on the subject flights including results from the Induced Environment Contamination monitor (IECM). Brief summaries of the vibroacoustics, loads, electromagnetic and thermal aspects of the environment, as derived from Shuttle system measurements, were presented primarily to indicate where the environment was different than observed and, therefore, where specification changes may be forthcoming. In addition, brief summaries of two somewhat unexpected effects, the vehicle glow and interaction between the low Earth environment and Shuttle payload by materials were presented as an aid in interpreting other environmental data. Papers for each payload/experiment involved in Shuttle flights were presented essentially in flight related chronological order. A significant portion of time was allocated for presentation of IECM data since this payload was flown on STS-2, STS-3, and STS-4 and, therefore, represents the largest data base relative to the contamination environment. Summaries of papers are presented. S.L.

N83-22292*# Systematics General Corp., Sterling, Va.
REPORT OF THE INFRARED, ULTRAVIOLET AND SPACE PLASMA PANELS
J. LEHMANN, S. G. TANNER, ed., and T. WILKERSON, ed. *In its* The Shuttle Environ. Workshop p 19-29 Feb. 1983
Avail: NTIS HC A15/MF A01 CSCL 20F

The status of the payload bay and the needs of infrared, ultraviolet and space plasma experiments were discussed. Those measurements important in each area were reviewed. Issues of concern and how these environmental conditions might impact experiments were considered. Several common issues were revealed, and recommendations were made. S.L.

N83-22293*# Systematics General Corp., Sterling, Va.
FUTURE OUTLOOK AND COMMENTS
J. LEHMANN, S. G. TANNER, ed., and T. WILKERSON, ed. *In its* The Shuttle Environ. Workshop p 31-39 Feb. 1983
Avail: NTIS HC A15/MF A01 CSCL 22A

The events of the workshop panel sessions are summarized and a synopsis of the future of the shuttle and the shuttle environment is given. Comments and projections in a number of areas addressed include: environmental measurements, contamination effects, orbiter constraints on deployable payloads, documentation and environmental information, ultraviolet experiments, infrared experiments, plasma experiments, and shuttle lidar. S.L.

N83-22294*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
INTRODUCTORY COMMENTS
L. J. LEGER and E. R. MILLER *In* Systematics General Corp. The Shuttle Environ. Workshop 6 p Feb. 1983
Avail: NTIS HC A15/MF A01 CSCL 22A

Vibroacoustic and thermal environment data gathered from the first three flights of the space shuttle are presented. The characterization of the particulate, gaseous, and electromagnetic emissions associated with the shuttle flight is emphasized. Measurements of vehicle glow light emissions and material effects (mass loss) due to the low Earth environment interactions with the shuttle vehicle are presented. S.L.

N83-22295*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
SUMMARY OF EMI/EMC AND VIBROACOUSTICS
R. A. COLONNA *In* Systematics General Corp. The Shuttle Environ. Workshop 18 p Feb. 1983
Avail: NTIS HC A15/MF A01 CSCL 22B

The space shuttle payload bay environment data relating to vibroacoustics and electromagnetic effects are presented. Measurements were taken with low frequency accelerometers. Comparisons were made during ascent and descent. S.L.

N83-22296*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
ORBITER CARGO BAY THERMAL ENVIRONMENT DATA
R. G. BROWN *In* Systematics General Corp. The Shuttle Environ. Workshop 16 p Feb. 1983
Avail: NTIS HC A15/MF A01 CSCL 22B
The orbiter cargo bay thermal environment data is presented. Measurements include: insulation surface temperatures, wire tray surface temperatures, sill longeron temperatures, gas temperatures, radiator temperatures, and gas pressure. S.L.

N83-22300*# National Aeronautics and Space Administration. Marshall Space Flight Center, Huntsville, Ala.
INDUCED ENVIRONMENT CONTAMINATION MONITOR ASCENT/ENTRY, OPTICAL AND DEPOSITION MEASUREMENTS
E. R. MILLER *In* Systematics General Corp. The Shuttle Environ. Workshop 15 p Feb. 1983
Avail: NTIS HC A15/MF A01 CSCL 13B
The induced environment contamination monitor is described. Optical and deposition measurements for ascent and descent are presented. S.L.

N83-22301*# Michigan Univ., Ann Arbor. Space Physics Research Lab.
NEUTRAL GAS MASS SPECTROMETER ON THE IECM
G. R. CARIGNAN *In* Systematics General Corp. The Shuttle Environ. Workshop 8 p Feb. 1983
Avail: NTIS HC A15/MF A01 CSCL 14B
The neutral gas mass spectrometer on the Induced Environment Contamination Monitor is described. The results of the measurements are presented. S.L.

03

GEODESY AND CARTOGRAPHY

Includes mapping and topography.

A83-19908
CARTOMETRIC ASPECTS OF THE USE OF SPACE SCANNER IMAGES OF THE EARTH [KARTOMETRICHESKIE ASPEKTY ISPOL'ZOVANIIA SKANERNYKH KOSMICHESKIKH IZOBRAZHENII ZEMLI]
A. M. BERLIANT and B. A. NOVAKOVSKII (Moskovskii Gosudarstvennyi Universitet, Moscow, USSR) Issledovanie Zemli iz Kosmosa, Nov.-Dec. 1982, p. 35-41. In Russian.
The analysis of the cartometric aspects of the use of space scanner images of the earth is considered with regard to: (1) the direct extraction of quantitative characteristics and (2) map compilation. An examination of results obtained with the Fragment multispectral system shows that this type of cartometric analysis is especially effective in the case when photogrammetric and mapping methods are combined. Maps of isolines of total geometric distortions have been obtained for images obtained by high- and medium-resolution scanners on the Meteor satellite. B.J.

A83-21524* McDonald Observatory, Austin, Tex.
RELATIVE LATERATION ACROSS THE LOS ANGELES BASIN USING A SATELLITE LASER RANGING SYSTEM
E. C. SILVERBERG (McDonald Observatory, Austin, TX), T. CAHILL, and J. DORMAN (Texas, University, Galveston, TX) Bulletin Geodesique, vol. 56, no. 4, 1982, p. 329-340.
(Contract NAS5-25948; NAS5-25897)
In January of 1981 the Transportable Laser Ranging System (TLRS) developed for NASA by the University of Texas was used to conduct a four-day test of the relative lateration technique. The test evolved making repeated measurements of six lines over the Los Angeles basin varying in distance from 26 to 84 kilometers. Although the raw times-of-flight to the various targets changed typically by 5 parts in 10 to the 6th, their line ratios varied nearly an order of magnitude less. The test suggests that the TLRS or other pulsed laser ranging systems might be able to economically combine Lageos ranging and long baseline horizontal work to survey large areas for accumulating crustal strain. (Author)

A83-22032
PHOTOGRAMMETRY AND DIGITAL ELEVATION MODELS - CURRENT STATUS OF DEVELOPMENT AND APPLICATION [PHOTOGRAMMETRIE UND DIGITAL HOEHENMODELLE GEGENWAERTIGER STAND DER ENTWICKLUNG UND ANWENDUNG]
K. TORLEGARD (Kungl. Tekniska Hogskolan, Stockholm, Sweden) Bildmessung und Luftbildwesen, vol. 51, Jan. 1983, p. 11-20. In German. refs
The Digital Terrain Model (DTM) is an aid for the description of the characteristics of the terrestrial surface. The DTM is important in connection with the solution of a number of different problems. The present investigation is confined to a consideration of Digital Elevation Models (DEM) based on photogrammetric measurements. The considered applications are related to automatic contour line plotting, the digital production of orthophotos, and the calculation of earth volumes in connection with construction projects. Attention is given to the characteristics of a DTM, photogrammetric DEMs, the photogrammetric devices for the measurement of terrain elevations on the basis of aerial photographs, methods for taking into consideration the terrain characteristics, the generation of the DEM, approximate interpolation methods, approaches for terrain classification, and comparative investigations. G.R.

A83-22938* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
THE EVOLUTION OF TECTONIC FEATURES ON GANYMEDE
S. W. SQUYRES (NASA, Ames Research Center, Theoretical and Planetary Studies Branch, Moffett Field, CA) Icarus, vol. 52, Dec. 1982, p. 545-559. refs
(Contract NSG-7156)
The bands of bright resurfaced terrain on Ganymede are probably broad grabens formed by global expansion and filled with deposits of ice. Grooves within the bands are thought to be extensional features formed during the same episode of expansion. The crust of Ganymede is modeled as a viscoelastic material subjected to extensional strain. With sufficiently high strain rates and stresses, deep normal faulting will occur, creating broad grabens that may then be filled. Continuing deformation at high strain rates and stresses will cause propagation of deep faults up into the flood deposits and normal faulting at the surface, while lower strain rates and stresses will cause formation of open extension fractures or, if the crustal strength is very low, grabens at the surface. The spacing between adjacent fractures may reflect the geothermal gradient at the time of deformation. Surface topography resulting from fracturing and normal faulting will decay with time as a result of viscous relaxation and mass-wasting. (Author)

A83-24568#
DESERT TERRAIN ELEVATIONS FROM SATELLITE RADAR ALTIMETRY
R. L. BROOKS and B. B. BROOKS (Geoscience Research Corp., Salisbury, MD) In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 1. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 539-542. refs
A postflight retracking technique allows Seasat satellite radar altimeter measurements to be accurately used in determining land and ice sheet surface elevations. When compared with large scale maps, the surface elevations derived by retracking the altimeter waveforms are found to have an accuracy of + or - 1 m with respect to the reference ellipsoid. While this technique is not as yet applicable to rugged terrain, it is well suited for determining surface elevations in such areas as deserts, where conventional surveying would be difficult and costly. It is proposed that Seasat

retracked altimeter data be combined with Landsat imagery to provide three-dimensional satellite maps for desert terrain studies and desert land management. O.C.

A83-24629#

MAPPING BUILT UP AREAS USING LANDSAT MSS DIGITAL IMAGERY

I. J. DOWMAN (University College, London, England) and M. A. MOHAMMAD (Ain Shams University, Cairo, Egypt) In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 2. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 1205-1215. refs

The results of research carried out to develop new mathematical techniques for rectifying Landsat MSS data to adapt the information to topographic mapping, map revision, and thematic mapping are presented. Landsat imagery in the form of computer-compatible tapes were acquired for southeast England, the city of Northampton, and for northeast Egypt, and all data were calibrated with reference to ground truth surveys taken on a 1:50,000 scale. Examinations were performed of the accuracy of the unsupervised classification algorithms such as an equal interval slice, a modified interval slice, an equal population interval, and clustering. Development of a smoothing algorithm allowed averaging out minor image features. The algorithms were found to be effective for mapping built-up areas, and can be accompanied by occasional ground truth tests. M.S.K.

A83-26807

SOME ASPECTS OF A METHOD FOR THE ANALYSIS OF LINEAMENTS /ON THE BASIS OF THE INTERPRETATION OF SPACE PHOTOGRAPHS/ [NEKOTORYE VOPROSY METODIKI ANALIZA LINEAMENTOV /PODANNYM DESHIFRIROVANIIA KOSMICHESKIKH SNIMKOV/]

D. A. KUKUSHKIN and G. KH. IAN (Proizvodstvennoe Geologicheskoe Ob'edinenie Aerogeologiia, Moscow, USSR) Issledovanie Zemli iz Kosmosa, Jan.-Feb. 1983, p. 51-56. In Russian. refs

The analysis of lineament grids on the basis of the mapping of deformation indices of the lineament field is considered. The analysis of the lineament field of the Yenisei-Khatanga depression is examined as an example. It is shown that there is a connection between anomalies of the deformation index and basement structures, and a determination is made of the region of optimal values of this index, where oil and gas deposits are mainly localized. B.J.

A83-26808

STRUCTURAL INTERPRETATION OF SPACE PHOTOGRAPHS BASED ON A COMPARISON OF PHOTOGRAPHIC IMAGES WITH THE RELIEF OF THE EARTH'S SURFACE [STRUKTURNOE DESHIFRIROVANIE KOSMICHESKIKH SNIMKOV, OSNOVANNOE NA SOPOSTAVLENII FOTOIZOBRAZHENIIA S REL'EFOM ZEMNOI POVERKHNOSTI]

A. N. LASTOCHKIN (Vsesoiuznyi Neftianoi Nauchno-Issledovatel'skii Geologorazvedochnyi Institut, Leningrad, USSR) Issledovanie Zemli iz Kosmosa, Jan.-Feb., 1983, p. 57-60. In Russian.

It is shown that a comparison of space imagery and surface relief features can be used to distinguish between directional areal and linear anomalies in the distribution of tone, color, and pattern. These anomalies can be considered to be buried structures which are independent of the current relief. The present approach is applied in a comparison of small-scale and medium-scale space photographs with structural and tectonic maps of the eastern Siberian platform and the Turan plate. B.J.

A83-28172

3D STATISTICS OF LANDFORMS FROM SINGLE AIR-PHOTOS - A HYPOTHESIS

L. CURRY (Toronto, University, Toronto, Canada) Geo-Processing, vol. 2, Oct. 1982, p. 51-64. refs

A surface is described by its two-dimensional variance spectrum using spectral moments as parameters. When a Gaussian generating process is assumed, a large range of statistical information about a homogeneous surface can be obtained. This includes the frequency distributions of the lengths and directions of contours, of surface elevations above and below arbitrary levels and various measures of slope and slope curvature. A simple black and white air-photo obtained when there is a high sun can be used to provide these measurements. Provided the Gaussian assumption is not too unreal, the practicality of this approach and its potential benefits argue for its testing. (Author)

A83-29577* National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

DIFFERENT ATMOSPHERIC EFFECTS IN REMOTE SENSING OF UNIFORM AND NONUNIFORM SURFACES

Y. J. KAUFMAN and R. S. FRASER (NASA, Goddard Space Flight Center, Laboratory for Atmospheric Sciences, Greenbelt, MD) (COSPAR, Topical Meeting on Space Observations of Aerosols and Ozone, Ottawa, Canada, May 16-June 2, 1982) Advances in Space Research (ISSN 0273-1177), vol. 2, no. 5, 1982, p. 147-155. refs

The atmospheric effect on the radiance of sunlight scattered from the earth-atmosphere system is greatly dependent on the surface reflectance pattern, the contrast between adjacent fields, and the optical properties of the atmosphere. In addition, the atmospheric effect is described by the range and magnitude of the adjacency effects, the atmospheric modulation transfer function, and the apparent spatial resolution of remotely sensed imagery. This paper discusses the atmospheric effect on classification of surface features and shows that surface nonuniformity can be used for developing procedures to remove the atmospheric effect from the satellite imagery. Author

A83-29578

THE CHARACTERIZATION OF ATMOSPHERIC SPREAD FUNCTIONS AFFECTING SATELLITE REMOTE SENSING OF THE EARTH'S SURFACE

R. W. L. THOMAS (EG & G Washington Analytical Services Center, Inc., Riverdale, MD) (COSPAR, Topical Meeting on Space Observations of Aerosols and Ozone, Ottawa, Canada, May 16-June 2, 1982) Advances in Space Research (ISSN 0273-1177), vol. 2, no. 5, 1982, p. 157-166. refs

When a satellite-borne imaging system scans over the boundary between two contrasting regions divided by a sharp boundary, it is generally easy to define the location of the boundary itself since the observed intensity changes abruptly at that point. However, on either side of the boundary, the intensity will show variations which may not relate to the observed region but rather to radiation which has been reflected at some distance from the instantaneous field of view (IFOV). The present investigation has the objective to describe two important 'spread' functions which make it possible to compute observed intensities over any arbitrary surface albedo pattern, and to relate the characteristics of these functions to the mean height of the optically active components in the atmosphere. G.R.

A83-29579

A METHOD FOR ESTIMATING CROSS RADIANCE

D. SPAENKUCH (Meteorologisches Haupt-Observatorium, Potsdam, East Germany) and I. LASZLO (Orszagos Meteorologiai Szolgalat, Kozponti Legkorfizikai Intezet, Budapest, Hungary) (COSPAR, Topical Meeting on Space Observations of Aerosols and Ozone, Ottawa, Canada, May 16-June 2, 1982) Advances in Space Research (ISSN 0273-1177), vol. 2, no. 5, 1982, p. 167-170.

It is pointed out that imagery of the earth's surface obtained with the aid of satellite-borne equipment is modified by the atmosphere. One of the mechanisms by which the terrestrial atmosphere perturbs the measurements of ground reflectance from space is related to 'cross radiance'. This is the radiance which is scattered by the atmosphere above the object pixel from the radiation field reflelcted by the general vicinity of the object pixel. The present investigation has the objective to present a simple method for estimating the value of cross radiance. It is assumed that the phase function fo aerosol scattering can be approximated by integer-power cosine terms. An expression for the phase function is presented for the case of a height-dependent aerosol size distribution. G.R.

N83-16830*# OAO Corp., Greenbelt, Md.
NASA GEODYNAMICS PROGRAM INVESTIGATIONS SUMMARIES: A SUPPLEMENT TO THE NASA GEODYNAMICS PROGRAM OVERVIEW Final Report
12 Nov. 1982 108 p
(Contract NASW-3358)
(NASA-CR-169774; NAS 1.26:169774) Avail: NTIS HC A06/MF A01 CSCL 08B

The development of a time series of global atmospheric motion and mass fields through April 1984 to compare with changes in length of day and polar motion was investigated. Earth rotation was studied and the following topics are discussed: (1) computation of atmospheric angular momentum through April 1984; (2) comparisons of psi sub values with variations in length of day obtained by several groups utilizing B.I.H., lunar laser ranging, VLBI, or Lageos measurements; (3) computation of atmospheric excitation of polar motion using daily fields of atmospheric winds and pressures for a short test period. Daily calculations may be extended over a longer period to examine the forcing of the annual and Chandler wobbles, in addition to higher frequency nutations. E.A.K.

N83-17917*# Indian Inst. of Geomagnetism, Bombay.
MAGSAT FOR GEOMAGNETIC STUDIES OVER INDIAN REGION Progress Report, 1 Aug. - 30 Nov. 1982
R. G. RASTOGI, B. P. SINGH, D. R. K. RAO, G. K. RANGARAJAN, R. RAJARAM, M. ROY, and B. R. ARORA, Principal Investigators 1 Dec. 1982 3 p Sponsored by NASA ERTS
(E83-10116; NASA-CR-169834; NAS 1.26:169834; PR-4) Avail: NTIS HC A02/MF A01 CSCL 05B

The external current field due to ring current and the associated induced part were removed. Adjacent passes over India were elected and best function to account for the trend correction was estimated. The UPCON software sent from Canada was made operational and features of equatorial electrojet were studied from MAGSAT records. Author

N83-17919*# Indian Inst. of Geomagnetism, Bombay.
ON LONG-WAVELENGTH MAGNETIC ANOMALIES OVER INDIAN REGION
S. SRINIVASAN, L. CARLO, R. G. RASTOGI, and B. P. SINGH, Principal Investigators 1983 1 p Sponsored by NASA ERTS
(E83-10135; NASA-CR-169763; NAS 1.26:169763) Avail: NTIS HC A02/MF A01 CSCL 05B

A data set composed of vector magnetic measurements obtained by MAGSAT and very accurate altitude determinations made using Sun sensors and star cameras was used to obtain data for very quiet days over the Indian region at 10 S to 40 N and 60 E to 110 E in an effort to determine the validity of quantitative estimates made from aeromagnetic data obtained by removing the core field. To further account for the external effects, the ring current contributions estimated using both X and Z variations were subtracted from the observed values. Before this, the core contribution was eliminated through a spherical harmonic expansion with terms up to $N=13$. Analysis of the residual measurements using Fast Fourier techniques indicates that the anomalies contain substantial power for wavelengths of about 1500 kms. Because the ring current effect has a spatial structure of this dimension over India, efforts are being made to exactly eliminate these two interfering effects from the data. A.R.H.

N83-17920*# Indian Inst. of Geomagnetism, Bombay.
EQUATORIAL IONOSPHERIC CURRENTS DERIVED FROM MAGSAT DATA
M. ROY, Principal Investigator 1983 14 p refs Sponsored by NASA ERTS
(E83-10136; NASA-CR-169764; NAS 1.26:169764) Avail: NTIS HC A02/MF A01 CSCL 05B

The MAGSAT data on the three component's of the geomagnetic field are subjected to ring current correction and crustal anomaly elimination near the dip equator. The evidence of a strong west east electrojet current below the satellite height (approximately 350 km) is confirmed. Strong evidence of east-west component of the field suggests the existence of a vertical current originating at the jet level and extending upwards. A model calculation shows that such a current system can explain the satellite data as well as the ground data. Author

N83-17993*# North Carolina State Univ., Raleigh. Dept. of Marine, Earth, and Atmospheric Sciences.
CRUSTAL INTERPRETATION OF THE MAGSAT DATA IN THE CONTINENTAL UNITED STATES Final Report
I. J. WON and K. H. SON Dec. 1982 35 p refs Original contains imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls, S.D. 57198 ERTS
(Contract NAS5-26157)
(E83-10183; NASA-CR-169837; NAS 1.26:169837) Avail: NTIS HC A03/MF A01 CSCL 08G

The processing of MAGSAT scalar data to construct a crustal magnetic anomaly map over the continental U.S. involves removal of the reference field model, a path-by-path subtraction of a low order polynomial through a least-squares fit to reduce orbital offset errors, and a two dimensional spectral filtering to mitigate the spectral bias induced by the path-by-path orbital correction scheme. The resultant anomaly map shows reasonably good correlations with an aeromagnetic map derived from the project MAGNET. Prominent satellite magnetic anomalies are identified in terms of geological provinces and age boundaries. An inversion method was applied to MAGSAT data which produces both the Curie depth topography and laterally varying magnetic susceptibility of the crust. A contoured Curie depth map thus derived shows general agreements with a crustal thickness map based on seismic data. A.R.H.

N83-17997*# Lunar and Planetary Inst., Houston, Tex.
PROCESSING MAGSAT DATA FOR COMPARISON WITH GEOID ANOMALIES Final Report
C. O. BOWIN, Principal Investigator 1982 6 p refs ERTS
(Contract NASW-3389)
(E83-10187; NASA-CR-169841; NAS 1.26:169841) Avail: NTIS HC A02/MF A01 CSCL 05B

A digital data library of MAGSAT data consisting of 1,615,636 measurements from the quiet data set, is geographically sorted, and allows rapid analysis and processing of all the quiet magnetic data about any selected location. Because this library of MAGSAT data is compatible with existing gravity and geoid data library processing and display system software, correlations between MAGSAT, surface gravity, GEOS-3 radar altimeter geoid and bathymetric data sets can be conveniently detected and analyzed. Polynomial trends from each half-orbit were removed as an effective way of estimating and removing ring current effects following estimation of the core field contribution. It was found that a third order polynomial is the lowest polynomial order that appears to provide the best consistency of residual anomalies between coincident orbits. A.R.H.

N83-19139*# Purdue Univ., Lafayette, Ind. Dept. of Geosciences.
MAGSAT SCALAR ANOMALIES Quarterly Progress Report, Jul. - Sep. 1982
L. W. BRAILE and W. J. HINZE, Principal Investigators 30 Sep. 1982 2 p Sponsored by NASA ERTS
(E83-10133; NASA-CR-169761; NAS 1.26:169761) Avail: NTIS HC A02/MF A01 CSCL 05B

To facilitate processing large data arrays, elements of spherical Earth analysis programs NVERTSM, SMFLD, NVERTG and GLFD were implemented and tested on the LARS IBM 4341 computer. Currently, the problem of inverting 2 deg MAGSAT scalar anomalies for the region (80 W, 60 E) longitude and (40 S, 70 N) latitude is being implemented on the LARS-computer for quantitative comparison with free air gravity anomaly, geothermal and tectonic data. Gravity and MAGSAT anomalies from a subset of this region (30 W, 60 E), (40 S, 70 N) were already processed for a paper on satellite magnetic anomalies of Africa and Europe. A.R.H.

N83-19140*# Purdue Univ., Lafayette, Ind. Dept. of Geosciences.
SATELLITE ELEVATION MAGNETIC ANOMALY MAPS Quarterly Progress Report, Oct. - Dec. 1982
L. W. BRAILE and W. J. HINZE, Principal Investigators 30 Dec. 1982 1 p Sponsored by NASA ERTS
(E83-10134; NASA-CR-169762; NAS 1.26:169762) Avail: NTIS HC A02/MF A01 CSCL 05B

The problem of inverting 2 deg average MAGSAT scalar anomalies for the region 80 W, 60 E longitude and 40 S, 70 N latitude was attempted on the LARS computer; however, the effort was aborted due to insufficient allocation of CPU-time. This problem is currently being resubmitted and should be implemented shortly for quantitative comparison with free-air gravity anomaly, geothermal, and tectonic data. A.R.H.

N83-19190# Duetsche Gesellschaft fuer Photogrammetrie und Fernerkundung e.V., Freiburg (West Germany).
HIGH ALTITUDE RECONNAISSANCE: OBTENTION OF DATA AND MACHINES INVOLVED
Jul. 1982 61 p refs In GERMAN
Avail: NTIS HC A04/MF A01

Results from data obtained in the area of photogrammetry and remote sensing are presented. Topics discussed are: databank on terrain elevations and high altitude photography as used in remote reconnaissance, and the development of reconnaissance satellites and space shuttle systems.

N83-20326# Defense Mapping Agency Hydrographic and Topographic Center, Washington, D.C.
THE GEODETIC ACTIVITIES OF THE DEPARTMENT OF DEFENSE UNDER THE INTERNATIONAL GEOPHYSICAL YEAR PROGRAMS
O. W. WILLIAMS and K. I. DAUGHERTY Dec. 1982 19 p refs
(AD-A122057) Avail: NTIS HC A02/MF A01 CSCL 08E

The International Geophysical Year (IGY) programs have special significance to geodesists. The ILGY witnessed the launching of the first manmade Earth satellite and the beginning of the era of global geodesy. It is no wonder that the U.S. Department of Defense (DoD) with its global requirements developed an early interest in satellite geodesy. Specifically, this led to the use of early satellites of opportunity (and subsequently of dedicated satellites) for worldwide navigation, geodetic positioning and gravimetric investigations. In conjunction with other civilian satellite programs under the IGY, DoD played a major role in the achievement of geodetic goals, perhaps far beyond that which was envisioned originally. GRA

N83-20475# National Aeronautical Establishment, Ottawa (Ontario). Flight Research Lab.
THE FREQUENCY DIFFERENCE TRANSLATOR. AN IMPROVEMENT IN AIRBORNE TECHNIQUES FOR MEASURING THE EARTH'S TOTAL MAGNETIC FIELD GRADIENT
A. BARSZCZEWSKI Sep. 1982 30 p refs
(LR-612; NRC-20654) Avail: NTIS HC A03/MF A01

Improvements in airborne techniques for the measurement of the Earth's total magnetic field gradient using optically pumped magnetometers are discussed. These techniques involve fast and accurate measurements of small frequency differences and are applicable to a large class of transducers which have for an output a frequency varying with the input variable. Description and design details are given of a newly developed analog instrument which allows a continuous read-out of frequency difference with a resolution of better than 0.01 Hz. Author

N83-20478# National Aeronautical Establishment, Ottawa (Ontario).
THE FREQUENCY DIFFERENCE TRANSLATOR: AN IMPROVEMENT IN AIRBORNE TECHNIQUES FOR MEASURING THE EARTH'S TOTAL MAGNETIC FIELD GRADIENT
A. BARSZCZEWSKI Sep. 1982 29 p refs
(AD-A121395; NAE-LR-612; NRC-20654) Avail: NTIS HC A03/MF A01 CSCL 17F

Improvements in Airborne techniques for the measurement of the Earth's total magnetic field gradient using optically pumped magnetometers are discussed. These techniques involve fast and accurate measurements of small frequency differences and are applicable to a large class of transducers which have for an output a frequency varying with the input variable. Description and design details are given of a newly developed analog instrument which allows a continuous read-out of frequency difference with a resolution of better than 0.01 Hz. Author (GRA)

N83-21446*# Analytic Sciences Corp., Reading, Mass.
MAGSAT INVESTIGATION OF CRUSTAL MAGNETIC ANOMALIES IN THE EASTERN INDIAN OCEAN Final Report, Dec. 1980 - Feb. 1983
R. V. SAILOR and A. R. LAZAREWICZ 22 Feb. 1983 88 p refs ERTS
(Contract NAS5-26424)
(E83-10202; NASA-CR-170050; NAS 1.26:170050; TASC-TR-1325-1) Avail: NTIS HC A05/MF A01 CSCL 08G

Crustal magnetic anomalies in a region of the eastern Indian Ocean were studied using data from NASA's MAGSAT mission. The investigation region (0 deg to 50 deg South, 75 to 125 deg East) contains several important tectonic features, including the Broken Ridge, Java Trench, Ninetyeast Ridge, and Southeast Indian Ridge. A large positive magnetic anomaly is associated with the Broken Ridge and smaller positive anomalies correlate with the Ninetyeast Ridge and western Australia. Individual profiles of scalar data (computed from vector components) were considered to determine the overall data quality and resolution capability. A set of MAGSAT "Quiet-Time" data was used to compute an equivalent source crustal magnetic anomaly map of the study region. Maps of crustal magnetization and magnetic susceptibility were computed from the equivalent source dipoles. Gravity data were used to help interpretation, and a map of the ratio of magnetization to density contrasts was computed using Poisson's relation. The results are consistent with the hypothesis of induced magnetization of a crustal layer having varying thickness and composition. M.G.

N83-21452*# Business and Technological Systems, Inc., Seabrook, Md.
REMANENT MAGNETIZATION AND THREE-DIMENSIONAL DENSITY MODEL OF THE KENTUCKY ANOMALY REGION Quarterly Report, 12 Oct. - 31 Dec. 1982
31 Dec. 1982 3 p ERTS
(Contract NAS5-27488)
(E83-10210; NASA-CR-170056; NAS 1.26:170056; QR-1) Avail: NTIS HC A02/MF A01 CSCL 05B

Existing software was modified to handle 3-D density and magnetization models of the Kentucky body and is being tested. Gravity and magnetic anomaly data sets are ready for use. A preliminary block model is under construction using the 1:1,000,000 maps. An x-y grid to overlay the 1:2,500,000 Albers maps and keyed to the 1:1,000,000 scale block models was created. Software was developed to generate a smoothed MAGSAT data set over this grid; this is to be input to an inversion program for generating the regional magnetization map. The regional scale 1:2,500,000 map mosaic is being digitized using previous magnetization models, the U.S. magnetic anomaly map, and regional tectonic maps as a guide. A.R.H.

N83-21486*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
CRUSTAL DYNAMICS PROJECT SESSION 4 VALIDATION AND INTERCOMPARISON EXPERIMENTS 1979-1980 REPORT
P. LIEBRECHT, R. KOLENKIEWICZ, J. RYAN, and L. HOTHEM Mar. 1983 97 p refs
(NASA-TM-85003; NAS 1.15:85003) Avail: NTIS HC A05/MF A01 CSCL 08E

As part of the Crustal Dynamics Project, an experiment was performed to verify the ability of Satellite Laser Ranging (SLR), Very Long Baseline interferometry (VLBI) and Doppler Satellite Positioning System (Doppler) techniques to estimate the baseline distances between several locations. The Goddard Space Flight Center (GSFC) lasers were in operation at all five sites available to them. The ten baselines involved were analyzed using monthly orbits and various methods of selecting data. The standard deviation of the monthly SLR baseline lengths was at the 7 cm level. The GSFC VLBI (Mark III) data was obtained during three separate experiments. November 1979 at Haystack and Owens Valley, and April and July 1980 at Haystack, Owens Valley, and Fort Davis. Repeatability of the VLBI in determining baseline lengths was calculated to be at the 2 cm level. Jet Propulsion Laboratory (JPL) VLBI (Mark II) data was acquired on the Owens Valley to Goldstone baseline on ten occasions between August 1979 and November 1980. The repeatability of these baseline length determinations was calculated to be at the 5 cm level. National Geodetic Survey (NGS) Doppler data was acquired at all five sites in January 1980. Repeatability of the Doppler determined baseline lengths results were calculated at approximately 30 cm. An intercomparison between baseline distances and associated parameters was made utilizing SLR, VLBI, and Doppler results on all available baselines. The VLBI and SLR length determinations were compared on four baselines with a resultant mean difference of -1 cm and a maximum difference of 12 cm. The SLR and Doppler length determinations were compared on ten baselines with a resultant mean difference of about 30 cm and a maximum difference of about 60 cm. The VLBI and Doppler lengths from seven baselines showed a resultant mean difference of about 30 cm and maximum difference of about 1 meter. The intercomparison of baseline orientation parameters were consistent with past analysis. Author

N83-22703# Edgerton, Germeshausen and Grier, Inc., Goleta, Calif. Energy Measurements Group.
AERIAL RADIOLOGICAL SURVEY OF THE SUSQUEHANNA STEAM ELECTRIC STATION AND SURROUNDING AREA, BERWICK, PENNSYLVANIA. DATE OF SURVEY: SEPTEMBER 1980
E. L. FEIMSTER Mar. 1982 9 p refs
(Contract DE-AC08-76NV-01183)
(DE82-012284; EGG-1183-1811) Avail: NTIS HC A02/MF A01

An aerial radiological survey was performed from 12 to 22 September 1980 over a 188 square kilometer area surrounding the Susquehanna Steam Electric Station near Berwick, Pennsylvania. All gamma ray data were collected along flight lines oriented southwest to northeast. The lines were spaced 152 meters apart and flown at an altitude of 91 meters above ground level. It is shown that all gamma rays detected were those expected from naturally occurring terrestrial background emitters. Aerial platform count rates were converted to exposure rates at 1 meter above the ground and are presented in the form of a radiation contour map. The exposure rate obtained from soil samples taken from within the survey site were in agreement with the aerial data. Author

N83-22723# Technische Hogeschool, Delft (Netherlands). Onderafdeling der Wiskunde en Informatica.
DOPPLER SATELLITE POSITIONING IN UPPER VOLTA
G. J. HUSTI 1981 34 p refs
(PB83-116293; REPT-81-1) Avail: NTIS HC A03/MF A01 CSCL 08E

A wide-meshed network was established in Upper Volta by means of Doppler satellites. Such a geodetic network is needed among others for determining control points in behalf of photogrammetric survey. GRA

N83-23081*# National Aeronautics and Space Administration. Earth Resources Labs., Bay St. Louis, Miss.
PROGRESS IN THE SCENE-TO-MAP REGISTRATION TASK
D. D. DOW *In* Texas A&M Univ. Proc. of the NASA/MPRIA Workshop: Pattern Recognition p 207-222 1983
Avail: NTIS HC A11/MF A01 CSCL 09B

An assessment of geometric accuracy of scene to map registration of LANDSAT MSS and TM sensor products is made. An outline of improved procedures for the registration and rectification of LANDSAT data is presented. L.F.M.

04

GEOLOGY AND MINERAL RESOURCES

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

A83-19904
THE ROLE OF LARGE-DIAMETER RING STRUCTURES IN THE TECTONICS OF THE WESTERN SIBERIA PLATFORM [O ROLI KOL'TSEVYKH STRUKTUR BOL'SHOGO DIAMETRA V TEKTONIKE ZAPADNO-SIBIRSKOI PLITY]
L. I. SOLOVEVA (Vsesoiuznoe Proizvodstvennoe Geologicheskoe Ob'edinenie Aerogeologiia, Moscow, USSR) Issledovanie Zemli iz Kosmosa, Nov.-Dec. 1982, p. 5-10. In Russian. refs

Large-diameter ring structures revealed on space images of the Western Siberia platform are shown to resemble ovoid and ring systems of shields and ancient platforms. It is suggested that the Nadym-Taz ring structure with a diameter of 1500 km is the ancient, relatively stable element of the lithospheric platform. B.J.

A83-19905
THE USE OF SPACE IMAGES TO STUDY TECTONICS AND TO PREDICT ANTIMONY-MERCURY MINERALIZATION IN THE SOUTHERN TIEN SHAN [ISPOL'ZOVANIE KOSMICHESKIKH SNIMKOV DLIA IZUCHENIIA TEKTONIKI I PROGNOZIROVANIIA SUR'MIANO-RTUTNOGO ORUDENENIIA NA IUZHNOM TIAN'-SHANE]
N. A. IABLONSKAIA (Vsesoiuznoe Proizvodstvennoe Geologicheskoe Ob'edinenie Aerogeologiia, Moscow, USSR) Issledovanie Zemli iz Kosmosa, Nov.-Dec. 1982, p. 11-19. In Russian. refs

A83-19906
NEW MORPHOSTRUCTURAL DATA OBTAINED FROM THE INTERPRETATION OF SPACE IMAGES OF THE BAM REGION [NOVYE MORFOSTRUKTURNYE DANNYE, POLUCHENNYE PRI DESHIFRIROVANII KOSMICHESKIKH SNIMKOV RAIONA BAM]
L. G. VASIUTINA (Vsesoiuznoe Proizvodstvennoe Geologicheskoe Ob'edinenie Aerogeologiia, Moscow, USSR) and A. P. KUSKOV Issledovanie Zemli iz Kosmosa, Nov.-Dec. 1982, p. 20-26. In Russian. refs

Interpretation of space imagery of the BAM region in conjunction with geological and geophysical data has made it possible to divide the region morphostructurally into taxonomic units of various classes. Progressively evolving and newly formed (neotectonic) morphostructral zones and individual structures have been identified. New data have been obtained on the dimensions and configuration of the Baikal rift zone. The wide distribution of ring structures is established; certain relationships between relief and deep structure are indicated; and new genetic and morphological types of neotectonic depressions are identified. B.J.

A83-19907
BASIC PRINCIPLES UNDERLYING THE APPLICATION OF SPACE IMAGES TO SMALL-SCALE GEOLOGICAL MAPPING [OSNOVNYE PRINTSIPY IZPOL'ZOVANIIA KOSMICHESKIKH SNIMKOV PRI MELKOMASSHTABNOM GEOLOGICHESKOM KARTOGRAFIROVANII]
S. I. STRELNIKOV, E. A. BORKOVAIA, O. R. KOROBOVA, T. I. MALEK, and N. P. FEDOROVA (Vsesoiuznyi Nauchno-Issledovatel'skii Geologicheskii Institut, Leningrad, USSR) Issledovanie Zemli iz Kosmosa, Nov.-Dec. 1982, p. 27-34. In Russian.

The basic aspects of using space imagery to compile geological maps are examined and illustrated. Consideration is given to the generalization of an image of geological objects on photographs of different scale. A scheme for the compilation of geological maps is proposed which uses interpretations of space images at all stages of cartography. As an example, a map is presented of a volcano region on Kamchatka. B.J.

A83-19918
THE POSSIBILITY OF DETERMINING THE CHARACTER OF POSTSEDIMENTARY ROCK ALTERATION ON SPACE IMAGES [O VOZMOZHNOSTI OPREDELENIIA KHARAKTERA POSTSEDIMENTATSIONNYKH IZMENENII POROD PO IKH KOSMICHESKOMU FOTOIZOBRAZHENIIU]
V. V. MASLENNIKOV, G. M. LIUBTSOVA, and O. V. IAPASKURT (Vsesoiuznoe Proizvodstvennoe Geologicheskoe Ob'edinenie Aerogeologiia; Moskovskii Gosudarstvennyi Universitet, Moscow, USSR) Issledovanie Zemli iz Kosmosa, Nov.-Dec. 1982, p. 108-110. In Russian.

A83-21431* Jet Propulsion Lab., California Inst. of Tech., Pasadena.
GEOMETRIC RECTIFICATION OF RADAR IMAGERY USING DIGITAL ELEVATION MODELS
M. NARAGHI, W. STROMBERG, and M. DAILY (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, CA) Photogrammetric Engineering and Remote Sensing, vol. 49, Feb. 1983, p. 195-199.
(Contract NAS7-100)

Geologic analysis of radar imagery requires accurate spatial rectification to allow rock type discrimination and meaningful exploitation of multisensor data files. A procedure is described which removes distortions produced by most sources including the heretofore elusive problem of terrain induced effects. Rectified imagery is presented which displays geologic features not apparent in the distorted data. (Author)

A83-21910
PRESENTATION OF A FUNCTION WHICH MAKES IT POSSIBLE TO FOLLOW, INDEPENDENTLY OF THE DARK-LIGHT CONTRASTS, THE GEOLOGICAL STRUCTURES IN MOUNTAINOUS REGIONS [PROPOSITION D'UNE FONCTION PERMETTANT DE SUIVRE, INDEPENDAMMENT DES CONTRASTES OMBRE LUMIERE, LES STRUCTURES GEOLOGIQUES DANS LES REGIONS MONTAGNEUSES]
C. MERING and J.-F. PARROT (Office de la Recherche Scientifique et Technique d'Outre-Mer, Bondy, Seine-Saint-Denis, France) In: International Society for Photogrammetry and Remote Sensing, International Symposium, Toulouse, France, September 13-17, 1982, Transactions. Volume 1. Toulouse, Groupement pour le Developpement de la Teledetection Aerospatiale, 1982, p. 123-132. In French. refs

A83-21921* Jet Propulsion Lab., California Inst. of Tech., Pasadena.
GEOLOGIC INTERPRETATION OF TEXTURE IN SEASAT AND SIR-A RADAR IMAGES
T. G. FARR (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, CA) In: International Society for Photogrammetry and Remote Sensing, International Symposium, Toulouse, France, September 13-17, 1982, Transactions. Volume 1. Toulouse, Groupement pour le Developpement de la Teledetection Aerospatiale, 1982, p. 261-270. refs
(Contract NAS7-100)

Geological information in radar images of heavily vegetated areas is contained mainly in the depiction of topography as image texture. This paper describes three techniques for the analysis of texture in radar images: the split-spectrum technique, Fourier transforms of subareas, and spatial frequency bandpass classification. These techniques were applied to a heavily vegetated area of Belize in Central America in order to evaluate their utility for geological mapping; Seasat and Shuttle Imaging Radar (SIR-A) images were considered. B.J.

A83-21924
THE UTILIZATION OF SLAR AND THE LANDSAT SATELLITES IN GEOMORPHO-PEDOLOGICAL SURVEYS PERFORMED IN THE VENEZUELIAN AMAZON - METHODOLOGY AND INITIAL RESULTS [UTILISATION D'IMAGERIES DE RADAR LATERAL SLAR ET SATELLITES LANDSAT DANS DES LEVES GEOMORPHO-PEDOLOGIQUES REALISES EN AMAZONIE VENEZUELIENNE - METHODOLOGIE ET PREMIERS RESULTATS]
M. POUYLLAU (CNRS, Centre d'Etudes de Geographie Tropicale, Talence, Gironde, France), P. BLANCANEAUX, D. DUBROEUCQ, M. GAVAUD (Office de la Recherche Scientifique et Technique d'Outre Mer, Caracas, Venezuela), R. HIDALGO, P. MOYA, and V. SANCHEZ (Ministerio del Ambiente, Caracas, Venezuela) In: International Society for Photogrammetry and Remote Sensing, International Symposium, Toulouse, France, September 13-17, 1982, Transactions. Volume 1. Toulouse, Groupement pour le Developpement de la Teledetection Aerospatiale, 1982, p. 289-300. In French. refs

A83-21941
REMOTE SENSING METHODS OF GEOLOGICAL INVESTIGATIONS IN THE USSR TO DATE AND IN FUTURE
V. B. KOMAROV (Vsesoiuznoe Aerogeologicheskoe Nauchno-Proizvodstvennoe Ob'edinenie Aerogeologiia, Laboratoriia Aerometodov, Moscow, USSR) In: International Society for Photogrammetry and Remote Sensing, International Symposium, Toulouse, France, September 13-17, 1982, Transactions. Volume 1. Toulouse, Groupement pour le Developpement de la Teledetection Aerospatiale, 1982, p. 503-511. refs

Survey and data interpretation techniques employed in the Soviet Union in carrying out satellite-based and aircraft-based geologic remote sensing are described. The sensors are used to obtain electromagnetic, magnetic, gravitational, and chemical emission signatures from the areas viewed. Aerial photography is normally confined to the 400-900 microns range, while resolution has improved to 1:50,000. Crustal ring structures have been detected which date the stage of the earth's lunar phase of evolution. Aulacogens, rifts, and major faults have been observed beneath the sedimentary cover, indicating certain mineral deposits. Airborne IR systems used in the 1.8-5.3 and 7.0-15.0 micron bands have been used for volcano studies, the characterization of fault zones, tectonic contacts, and buried river beds. Finally, radar mapping with satellite SAR systems is being advanced into decimeter and meter wavebands to perform substrate mapping.
M.S.K.

A83-21942
THE USE OF SPOT SIMULATIONS IN GEOLOGY - COMPARISON WITH AERIAL PHOTOGRAPHIES AND LANDSAT IMAGES - EXAMPLE: CAMARES AREA - MASSIF CENTRAL - FRANCE [UTILISATION DES SIMULATIONS SPOT EN GEOLOGIE - COMPARAISON AVEC LES PHOTOGRAPHIES AERIENNES ET LES IMAGES LANDSAT - UN EXEMPLE: LA REGION DE CAMARES - MASSIF CENTRAL - FRANCE]
G. DELPONT and G. WEECKSTEEN (Bureau de Recherches Geologiques et Minieres, Orleans, France) In: International Society for Photogrammetry and Remote Sensing, International Symposium, Toulouse, France, September 13-17, 1982, Transactions. Volume 1. Toulouse, Groupement pour le Developpement de la Teledetection Aerospatiale, 1982, p. 515-522. In French.

A83-21944
COMPARISON OF LANDSAT AND SPOT SPECTRAL SIGNATURES FOR THE CASE OF SANDSTONE OUTCROPS OF THE BANDIAGARA PLATEAU OF MALI [COMPARAISON DES SIGNATURES SPECTRALES DE LANDSAT ET SPOT DANS LE CAS DES ENSEMBLES DE GRES AFFLEURANTS DU PLATEAU DE BANDIAGARA AU MALI]
C. BARDINET (Ecole Normale Superieure, Paris; Centre de Teledetection et d'Analyse du Milieu Naturel, Valbonne, Alpes-Maritimes, France), J. M. MONGET (Centre de Teledetection et d'Analyse du Milieu Naturel, Valbonne, Alpes-Maritimes, France), J. P. BLANCK, and J. TRICART (CNRS, Strasbourg, France) In: International Society for Photogrammetry and Remote Sensing, International Symposium, Toulouse, France, September 13-17, 1982, Transactions. Volume 1. Toulouse, Groupement pour le Developpement de la Teledetection Aerospatiale, 1982, p. 543-555. In French. refs

A83-21945
TECTONIC ELEMENTS REGISTERED ON THE LANDSAT IMAGERY IN AREA OF YUGOSLAVIA AND THEIR PRACTICAL MEANING
M. OLUIC (Industroprojekt, Zagreb, Yugoslavia) and D. CVIJANOVIC (Civil Engineering Institute, Zagreb, Yugoslavia) In: International Society for Photogrammetry and Remote Sensing, International Symposium, Toulouse, France, September 13-17, 1982, Transactions. Volume 1. Toulouse, Groupement pour le Developpement de la Teledetection Aerospatiale, 1982, p. 567-574. refs

A83-21946
MAIN ADVANCES AND NEEDS ON THE STUDY OF GEOTHERMAL RESOURCES IN CHILE BY USING REMOTE SENSING TECHNIQUES
M. ARAYA F., M. PARDO P. (Universidad de Chile, Santiago, Chile), and R. PIRACES L. (Prominas, Ltda., Santiago, Chile) In: International Society for Photogrammetry and Remote Sensing, International Symposium, Toulouse, France, September 13-17, 1982, Transactions. Volume 1. Toulouse, Groupement pour le Developpement de la Teledetection Aerospatiale, 1982, p. 577-586.

Successful preliminary results have been obtained in several pilot experiences related with the study of geothermal in Los Andes Range, Chile by using remote sensing techniques. These results are related with the prospection and explorational stages of a geothermal field. Multispectral and multitemporal satellite and aereal photographies and images have been used for these purposes. Based on these positive results, a general global program will be intended to study geothermal resources along the whole country. This methodology could also be applied to other countries along Los Andes Range. The main aspects of the performed experiences and the future activities related with this global program are included in this paper. (Author)

A83-21947* Jet Propulsion Lab., California Inst. of Tech., Pasadena.
GEOLOGIC OBSERVATIONS OF THE NORTHERN BOUNDARY OF THE CARIBBEAN PLATE ACROSS CENTRAL AMERICA AS SEEN BY SEASAT AND SIR-A
P. REBILLARD, T. DIXON, and T. FARR (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, CA) In: International Society for Photogrammetry and Remote Sensing, International Symposium, Toulouse, France, September 13-17, 1982, Transactions. Volume 1. Toulouse, Groupement pour le Developpement de la Teledetection Aerospatiale, 1982, p. 593-599.
(Contract NAS7-100)

The radar data analyzed here extend from the Amatique Bay (Golfo de Honduras) in the northeast to the Pacific Ocean (Puenta Remedios) in the southwest. Space Shuttle Imaging Radar (SIR-A) data-take 18 overlaps the principal part of the Seasat mosaic. SIR-A data make possible more observations over the Central American Cordillera, where strong layover limited the amount of information obtained by Seasat. The radar coverage delineates the principal strike-slip faults of the region (Cuilco-Chixoy-Polochic, Motagua and Jocotan), which have acted as the Caribbean-Americas plate boundary. It also demarcates volcanic terranes related to subduction of the Cocos Plate under the Caribbean Plate. Within pumice fields of the Tertiary volcanic belt, the use of two Seasat look directions (rev 759 and rev 1211), in conjunction with SIR-A data, makes possible some rock discrimination. C.R.

A83-23255
THE CERRO GALAN IGNIMBRITE
P. W. FRANCIS, L. OCALLAGHAN, G. A. KRETZSCHMAR, R. S. THORPE (Open University, Milton Keynes, Bucks., England), R. S. J. SPARKS (Cambridge University, Cambridge, England), R. N. PAGE, R. E. DE BARRIO (Servicio Geologico Nacional, Buenos Aires, Argentina), G. GILLOU, and O. E. GONZALEZ (Servicio Minero Nacional, San Miguel de Tucuman, Argentina) Nature, vol. 301, Jan. 6, 1983, p. 51-53. Research supported by the Royal Society, Servicio Minero Nacional, Servicio Geologico Nacional, Royal Geographical Society, and Mount Everest Foundation. refs

Initial results of the first scientific expedition to the caldera are presented, noting that the caldera was formed during a major eruption 2.5 m. y. ago when 1000 cu km of ignimbrite were erupted. The prewelding thickness of ignimbrite within the resurgent part of the caldera is approximately 2 km. The ignimbrite is fine-grained and devoid of large pumice and lithic clasts. It is noted that an underlying plinian air fall pumice deposit is absent. The wide dispersal of the ignimbrite is seen as indicating an unusually violent eruption, perhaps initiated by subsidence of the caldera floor into the magma chamber. C.R.

A83-24548*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
SPECTRAL REMOTE SENSING OF ROCKS IN ARID LANDS
A. B. KAHLE (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, CA) In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 1. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 279-295. NASA-supported research. refs

A83-24549#
QUATERNARY GEOCHRONOLOGY OF THE WESTERN DESERT
C. V. HAYNES (Arizona, University, Tucson, AZ) In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 1. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 297-311. refs

A83-24550#
REMOTE SENSING - A SIGNIFICANT EXPLORATION TOOL FOR THE GEOSCIENTIST
M. T. HALBOUTY In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 1. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 313-318.

Historical developments and accomplishments of geological surveys are traced from the 12th century B.C. to the present era, which is witnessing an extension of mineralogic and petrologic exploration to the use of space-based sensors such as those on Landsat. The first geologic map was constructed in Egypt around 1200 B.C. A continuum of efforts have proceeded from that time, including the establishment of the USGS in 1879 and the Geological Survey of Egypt in 1896. Geologists are currently involved in reforestation programs, earthquake prediction, water inventories, and mineral explorations. Landsat imagery has revealed lineaments which have led to the drilling of successful oil wells in the Sudan, and further applications are envisioned for the discovery of gas fields and uranium deposits. M.S.K.

A83-24551#
NNE-SSW FAULT SYSTEM IN PART OF THE GULF OF SUEZ AND ITS BEARING ON OIL EXPLORATION
M. M. KHATTAB (United Arab Emirates University, Al Ain, United Arab Emirates) In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 1. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 321-336. refs

Aeromagnetic maps and gravity profiles of the Gulf of Suez are discussed to determine the geologic structure of the basement which produces the NNE trending gravity associated with the magnetic highs observed. Historical data indicates the area is characterized by three elongated, NW-SE striking fault blocks. The gravity highs observed are designated the Ras Dib gravity high because its axis is coincident with the meridional line passing by Ras Dib on the bank of the Gulf. The magnetic high features a 9 gamma/km gradient, and the observed gravity is calculated to have a 3 km depth at center of a horizontal sheet 4.2 km thick. The magnetic profile has a center, width, and thickness of 3.1 km below sea level, 7.5 km, and 1.2 km, respectively. A tectonic analysis of the region indicates pre-upper Cretaceous age of the Ras Dib fault block, with a current interaction among a pre-Tertiary fault block, early-Tertiary faulting, and Alpine and/or Erythrean faulting. The results are significant for oil exploration in the southern part of the Gulf of Suez. M.S.K.

A83-24552#
DISCRIMINATION OF PHOSPHATE, GYPSUM, LIMESTONE, HALIDE AND QUARTZ-SAND DEPOSITS IN SOUTH-CENTRAL TUNISIA BY CLUSTER ANALYSIS OF LANDSAT MULTISPECTRAL DATA
P. A. DAVIS, JR., M. J. GROLIER, P. A. SCHULTEJANN, and P. T. ELIASON (U.S. Geological Survey, Flagstaff, AZ) In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 1. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 337-359. Research sponsored by the U.S. Agency for International Development and U.S. Department of State refs
(Contract AID PROJECT 664-0300)

A83-24561#
GEOLOGY AND STRUCTURES STUDY OF THE NUBA MOUNTAINS, SUDAN, USING LANDSAT IMAGES
A. S. ANDRAWIS (South Dakota State University, Brookings, SD) In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 1. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 465-472.

A83-24562#
LANDSAT AND THE SOUTHWARD DRIFT OF MADAGASCAR
C. M. FROIDEVAUX (Phillips Petroleum Co., Bartlesville, OK) In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 1. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 473-482. refs

Analysis of inexpensive band 5 and 7 Landsat imagery supports the mobilistic hypothesis of a southward drift of Madagascar from an initial position near the coast of Africa. Orientations of linears conform both geometrically and dynamically with the expected motion of both Madagascar and India. A knowledge of the former positions of the landmasses during their geologic history is useful in predicting the trends of economic deposits in time and space. For example, pre-drift geologic conditions are expected to have been similar in coastal Tanzania, Madagascar and India before Cretaceous time, and until the end of it, between Madagascar and India only. (Author)

A83-24573#
TECTONICS OF WEST CENTRAL NEW MEXICO AND ADJACENT ARIZONA - A REMOTE SENSING AND FIELD STUDY IN ARID AND SEMI-ARID AREAS
W. S. BALDRIDGE, A. KRON (Los Alamos National Laboratory, Los Alamos, NM), and Y. BARTOV (Los Alamos National Laboratory, Los Alamos, NM; Geological Survey of Israel, Jerusalem, Israel) In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 1. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 571-577. refs

A83-24577#
USE OF REMOTE SENSING TECHNIQUES TO STUDY GEOTHERMAL RESOURCES IN ARID AND SEMI-ARID ZONES IN CHILE
M. ARAYA F. (Universidad de Chile, Santiago, Chile) and R. PIRACES L. (Comite Geotermico, Santiago, Chile) In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 1. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 617-634. refs

A83-24591#
USE OF LANDSAT MULTISPECTRAL SCANNER DATA IN GEOLOGIC MAPPING OF THE MEATIQ DOME, CENTRAL EASTERN DESERT, EGYPT
P. A. JACOBBERGER, R. E. ARVIDSON, R. BATIZA (Washington University, St. Louis, MO), and D. L. RASHKA (Wisconsin, University, River Falls, WI) In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 2. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 775-784. refs

Landsat digital MSS data is used to delineate the contacts among rock units within the Meatiq Dome region of the central Eastern Desert of Egypt and to discriminate variations in color and albedo of sediments in a wadi in the interior of the Dome. The analysis uses two primary techniques: a principal components analysis of the digital Landsat MSS data and spectral-signature mapping between Landsat data and bidirectional reflectance spectra for samples obtained from the Dome. Results of the principal components analysis show that discrimination of subtle color differences among rock types is possible, even when such differences are obscured by desert varnish. The results of the spectral-mapping technique are found to corroborate the principal components results and to locate some areas where further field checking is warranted. It is concluded that the combination of these two techniques provides a valuable adjunct to field mapping. N.B.

A83-24597#
FURTHER STUDIES ON THE MINERAL POTENTIALS OF BERENICE AREA BASED ON LANDSAT IMAGERY
M. A. MUSSA (Geological Survey of Egypt, Cairo, Egypt) In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 2. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 839-843.

A83-24598#
APPLICATION OF VISUAL INTERPRETATION AND DIGITAL PROCESSING OF LANDSAT DATA FOR THE PREPARATION OF A GEOLOGICAL INTERPRETATION MAP OF SOUTHWESTERN EGYPT AT A SCALE OF 1:500,000
F. K. LIST, H. BURGER, E. KLITZSCH, B. MEISSNER, G. POEHLMANN, and H.-J. SCHMITZ (Berlin, Freie Universitaet; Berlin, Technische Universitaet, Berlin, West Germany) In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 2. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 849-858. refs

A83-24603*# Hawaii Univ., Honolulu.
AN EXAMPLE OF THE APPLICATION OF A PROCEDURE FOR DETERMINING THE EXTENT OF EROSIONAL AND DEPOSITIONAL FEATURES AND ROCK AND SOIL UNITS IN THE KHARGA OASIS REGION, EGYPT, USING REMOTE SENSING
T. B. MCCORD, R. N. CLARK, A. MELOY, R. B. SINGER (Hawaii, University, Honolulu, HI), J. B. ADAMS (Washington, University, Seattle, WA), and F. EL BAZ (National Air and Space Museum, Washington, DC) In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 2. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 909-919. refs

A83-24610#
LANDSAT IMAGE INVESTIGATION OF MAJOR SURFACE STRUCTURES, TOPOGRAPHY, AND HYDROLOGY IN QATAR
M. A. YEHIA (University of Qatar, Doha, Qatar), I. E. HARHASH (Ministry of Agriculture and Industry, Doha, Qatar), and M. EL-HAROUNI (IDTC, Doha, Qatar) In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 2. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 989-1000. refs

A83-24612#
LANDSAT INVESTIGATION AND TECTONIC INTERPRETATION OF THE LINEAMENTS OF THE CENTRAL EASTERN DESERT, EGYPT
G. KISVARSANYI (Missouri-Rolla, University, Rolla, MO) and M. E. HABIB (Assiut, University, Assiut, Egypt) In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 2. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 1013-1022. refs

A83-24626#
STRUCTURAL GEOMORPHOLOGY OF RAJASTHAN BASIN, INDIA-INTERPRETED THROUGH LANDSAT IMAGERY AND AERIAL PHOTOS
P. V. L. P. BABU (Oil and Natural Gas Commission, Dehra Dun, India) In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 2. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 1177-1184.

Geomorphic landforms of structural, fluvial, aeolian and aeolian-denudational origin have been identified in the Rajasthan desert, India, based on the analysis of Landsat imagery and aerial photos. The dune forms are largely related to the shape of the underlying ground. It has been found that obstacle dunes are associated with buried ridges, longitudinal and linear dunes with flat topped hills and table land, transverse dunes with hill slopes and anomalous zones and parabolic dunes with low lying areas. The regional structure under the desert is similar to that of the cuesta landscape exposed along the margin of the basin. A few structural anomalies on the desert surface may prove to be reflecting subsurface structures which are probable places for oil accumulation. (Author)

A83-24627#
A PRACTICAL ATTEMPT AT CORRELATION OF ROCK UNITS FROM CCT PRINT OUT
V. K. ANAND, G. VENKATARAMAN, S. VISWANATHAN, R. NAGARAJAN, and A. B. INAMDAR (Indian Institute of Technology, Bombay, India) In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 2. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 1185-1194.

Statistical analyses were performed on the gray levels of various rocks in order to extract more detailed data from Landsat imagery of lithographic formations with contributing features smaller than the Landsat sensor pixel resolution. A survey was undertaken of rock formation gray levels in the Indian Goa and Hubli regions. Granites, orthoquartzites, coastal sands, basalts, and laterites were studied in varying environmental conditions in terms of histograms generated of gray levels in Landsat bands. Correlation coefficients of rock types with gray levels were found to range from -.68 to -.98. Increases in vegetation and soil cover increased the gray levels and the spread of gray levels. Features which displayed similar gray levels in two different bands were distinct when viewed with other bands. However, ferrogineous and aluminous laterites with 10-15% vegetation cover had gray levels identical to granites with no cover factor. D.H.K.

A83-24634#
INFORMATION FROM SPECTRAL AND TEXTURAL FEATURES FOR GEOLOGICAL INTERPRETATION OF LANDSAT IMAGERY OF THE EASTERN SAHARA
H. BURGER, K. DOBBRICK, E. HILT, U. KOEHLER, F. K. LIST, M. STEFFAN, and A. WEIGELT (Berlin, Freie Universitaet, Berlin, West Germany) In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 2. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 1261-1267. refs

A83-24635#
NEW GEOLOGICAL, STRUCTURAL LINEAMENTS AND DRAINAGE MAPS OF EGYPT BASED ON LANDSAT IMAGERY INTERPRETATION AND FIELD INVESTIGATIONS
E. M. EL SHAZLY, M. A. ABDEL HADY, M. A. EL GHAWABY, A. B. SALMAN, I. A. EL KASSAS, S. M. KHAWASIK, H. EL AMIN, M. M. EL RAKAIBY, I. E. EL AASSY, A. A. ABDEL MEGUID (Academy of Scientific Research and Technology, Remote Sensing Center; Nuclear Materials Corp., Cairo, Egypt) et al. In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 2. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 1269-1272. refs

A83-24636#
FAULTS AND BLOCK BOUNDARIES INTERPRETED IN THE WESTERN SIDE OF THE RED SEA BETWEEN SAFAGA AND UM GHEIG, EGYPT, AND THEIR SIGNIFICANCE
E. M. EL SHAZLY, Z. M. ZAGHLOUL, and F. A. EL NASHARTY (Academy of Scientific Research and Technology, Remote Sensing Center, Cairo; El Mansoura, University, El Mansoura, Egypt) In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 2. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 1273-1281. refs

A83-25223
THE INVESTIGATION AND MAPPING OF TERRAIN WITH THE UTILIZATION OF REMOTE SENSING INFORMATION [IZUCHENIE I KARTOGRAFIROVANIE REL'EFA S ISPOL'ZOVANIEM AEROKOSMICHESKOI INFORMATSII]
S. A. SLADKOPEVTSEV Moscow, Izdatel'stvo Nedra, 1982, 216 p. In Russian. refs

The methodological principles and the practical results of the use of remote sensing photographs for studying the structure, morphology, origin, and dynamics of the terrain of the earth are examined. The use of this type of information for compiling maps for the geomorphological analysis of specific areas is considered, using examples of the Pribaikal region and the areas surrounding the route of the Baikal-Amur Mainline. Specific topics considered include the use of remote sensing information for determining the structure and development of river valleys, the areas of glacial erosion, the areas of recent elevation and sinking, and tectonic fracturing and its meaning for terrain formation. N.B.

A83-25968
CLASSIFICATION OF ARID GEOMORPHIC SURFACES USING LANDSAT SPECTRAL AND TEXTURAL FEATURES
E. H. H. SHIH and R. A. SCHOWENGERDT (Arizona, University, Tucson, AZ) Photogrammetric Engineering and Remote Sensing, vol. 49, Mar. 1983, p. 337-347. Research supported by the Geologic Society of America; U.S. Geological Survey refs
(Contract USGS-14-08-001-G-664)

An attempt to develop an improved methodology for producing geomorphological maps generated from both spectral and textural Landsat data is reported. The relative number of local gray-level extrema were chosen as the principal textural measurement, with the minimum and maximum gray levels determined on the basis of a threshold value in a computer algorithm for automated processing. A test area of southwestern Arizona was imaged with the Landsat band 5 and divided into mountain, plain, and stream complex regions. An algorithm measuring local edge amplitude and density was employed for feature identification, and classifications were performed by a program implementing the Bayesian maximum likelihood rule. Categories of bedrock, eroded desert pavement, and modern fluid deposits and vegetation were defined. The algorithm used was found to require less computer time, and therefore is less expensive to use, then current algorithms for the same purposes. M.S.K.

A83-25970* Kansas Univ. Center for Research, Inc., Lawrence.
DIGITAL ENHANCEMENT OF SAR IMAGERY AS AN AID IN GEOLOGIC DATA EXTRACTION
V. S. FROST, M. S. PERRY, L. F. DELLWIG, and J. C. HOLTZMAN (University of Kansas Center for Research, Inc., Lawrence, KS) Photogrammetric Engineering and Remote Sensing, vol. 49, Mar. 1983, p. 357-364. Research supported by the California Institute of Technology. refs
(Contract NAS7-100; NAS9-3)

The geological data content of Seasat A SAR imagery was assessed by correlating images of the Southern Appalachians with optical and digital techniques using a digital enhancement algorithm. The evaluation was performed in terms of lithology, lineaments, and geological structure. Digital correlation of the images was found to be more effective than optical correlation as a geological mapping instrument when considered in the light of ground truth data. The digital enhancement algorithm consists of a mean square error analysis which preserves the edge structure in the SAR imagery and decreases the noise content. Additionally, digital correlations allowed for faster computer processing of the imagery. M.S.K.

A83-26801
THE POSSIBILITY OF USING SPACE PHOTOGRAPHS TO STUDY THE DYNAMICS OF TECTONIC PROCESSES /USING THE EXAMPLE OF THE TURAN PLATE/ [O VOZMOZHNOSTI ISPOL'ZOVANIIA KOSMICHESKIKH SNIMKOV DLIA IZUCHENIIA DINAMIKI TEKTONICHESKIKH PROTSESSOV /NA PRIMERE TURANSKOI PLITY/]
M. I. BURLESHIN (Vsesoiuznyi Nauchno-Issledovatel'skii Institut Gidrogeologii i Inzhenernoi Geologii, Moscow, USSR) Issledovanie Zemli iz Kosmosa, Jan.-Feb. 1983, p. 5-14. In Russian. refs

Three aspects of the study of tectonic processes by the interpretation of space photographs are examined: (1) estimation of the intensity of the process, (2) identification of the stages of the process, and (3) recognition of changes in areas covered by the process during the most recent tectonic stage. The study of the Turan plate on the basis of the interpretation of space photographs is considered as an example. B.J.

A83-26802
STRUCTURAL-GEOMORPHOLOGICAL INTERPRETATION OF LINEAMANTS REVEALED FROM SPACE PHOTOGRAPHS IN THE NORTH OF THE EUROPEAN PART OF THE USSR [STRUCTURNO-GEOMORFOLOGICHESKAIA A LINEAMENTOV, VYDELENNYKH PO KO SMICHESKIM SRIMKAM NA SEVERE EVROPEISKOI CHASTI SSSR]
A. E. FEDOROV (Proisvodstvennoe Geologicheskoe Ob'edinenie Aerogeologiia, Moscow, USSR) Issledovanie Zemli iz Kosmosa, Jan.-Feb. 1983, p. 15-23. In Russian. refs

A83-26803
ANALYSIS OF THE FAULT AND BLOCK STRUCTURE OF THE BASHKIR ANTICLINORIUM ON THE BASIS OF SPACE PHOTOGRAPHS [ANALIZ RAZRYVNYKH NARUSHENII I BLOKOVOGO STROENIIA BASHKIRSKOGO ANTIKLINORIIA PO KOSMICHESKIM SNIMKAM]
IU. S. LIAKHNITSKII and S. I. STRELNIKOV (Vsesoiuznyi Nauchno-Issledovatel'skii Geologicheskii Institut, Leningrad, USSR) Issledovanie Zemli iz Kosmosa, Jan.-Feb. 1983, p. 24-31. In Russian. refs

A83-26804
GEOLOGICAL INTERPRETATION OF SPACE PHOTOGRAPHS OF THE RYN SANDS /THE CASPIAN BASIN/ [GEOLOGICHESKAIA INTERPRETATSIIA KOSMICHESKIKH SNIMKOV TERRITORII RYN-PESKAV /PRIKASPIISKAIA VPADINA/]
I. G. MARKINA and L. F. VOLCHEGURSKII (Proizvodstvennoe Geologicheskoe Ob'edinenie Aerogeologiia, Moscow, USSR) Issledovanie Zemli iz Kosmosa, Jan.-Feb. 1983, p. 32-37. In Russian.

A83-26805
RESULTS OF THE INVESTIGATION OF THE OIL AND GAS DEPOSITS OF TADZHIKISTAN ON THE BASIS OF SPACE PHOTOGRAPHS [REZUL'TATY IZUCHENIIA NEFTEGAZONOSNOSTI TADZHIKISTANA S ISPOL'ZOVANIEM SNIMKOV, POLUCHENNYKH IZ KOSMOSA]
M. KH. ISHANOV, V. P. LOZIEV, IU. N. PILGUI, and V. M. NOVIKOV (Gosudarstvennyi Nauchno-Issledovatel'skii i Proizvodstvennyi Tsentr Priroda, USSR) Issledovanie Zemli iz Kosmosa, Jan.-Feb. 1983, p. 38-43. In Russian. refs

A83-26806
THE USE OF SPACE PHOTOGRAPHS TO INTERPRET THE DEEP STRUCTURE OF NORTHWESTERN AZERBAIDZHAN [OPYT ISPOL'ZOVANIIA KOSMICHESKIKH SNIMKOV PRI INTERPRETATSII GLUBINNOGO STROENIIA SEVERO-ZAPADNOTO AZERBAIDZHANA]
V. M. ALLAKHVERDIEV, V. N. ERMOLAEV, and M. E. TISHCHENKO (Akademiia Nauk Azerbaidzhanskoi SSR, Nauchnyi Tsentr Geofizika, Baku, Azerbaidzhan SSR) Issledovanie Zemli iz Kosmosa, Jan.-Feb. 1983, p. 44-50. In Russian. refs

A83-28909* Jet Propulsion Lab., California Inst. of Tech., Pasadena.
ANALYSIS OF COREGISTERED LANDSAT, SEASAT AND SIR-A IMAGES OF VARIED TERRAIN TYPES
P. REBILLARD (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, CA) and D. EVANS Geophysical Research Letters (ISSN 0094-8276), vol. 10, April 1983, p. 277-280. NASA-supported research. refs

Multisensor image data (SIR-A, Seasat SAR and Landsat MSS) over areas in nothern Algeria and eastern Utah have been coregistered in order to assess the complementary effects of the orbital sensors for geologic mapping in two very different terrains. This first attempt at registering such a data set shows that the radar backscatter information provided by the SIR-A image increases the classification accuracy of several geologic units over the Landsat image alone, and over combined Landsat and Seasat images. Author

A83-29379* Jet Propulsion Lab., California Inst. of Tech., Pasadena.
THE INTERPRETATION OF DIGITAL RECORDINGS OF SIR-A, SEASAT, AND LANDSAT DATA OF THE ALGERIAN SALT DEPOSITS [INTERPRETATION D'ENREGISTREMENTS DIGITAUX DE DONNEES SIR-A, SEASAT ET LANDSAT SUR LES CHOTTS ALGERIENS]
P. REBILLARD (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, CA) and J.-P. BALLAIS (Caen, Universite, Caen, France) Academie des Sciences (Paris), Comptes Rendus, Serie II Mecanique, Physique, Chimie, Sciences de l'Univers, Sciences de la Terre (ISSN 0249-6305), vol. 296, no. 1, Jan. 10, 1983, p. 103-106. In French.
(Contract NAS7-100)

Seasat and SIR-A SAR and Landsat MSS imagery of the salt beds of western Algeria are compared. The Landsat image was made 5 yr before the Seasat image, which was taken nearly 9 yr before the Shuttle radar image. The latter was processed in the visible channel. Differences in the backscatter in the radar imagery are attributed to the viewing angle and the characteristics of each salt deposit. The imagery allowed a determination of the changes in the shapes and areal extent of the salt pools over time, as well as alterations in nearby vegetation cover and the evolution of aeolian formations. M.S.K.

A83-29917
AN INTEGRATED STUDY OF RESERVOIR-INDUCED SEISMICITY AND LANDSAT IMAGERY AT LAKE KARIBA, AFRICA
G. B. PAVLIN and C. A. LANGSTON (Pennsylvania State University, University Park, PA) Photogrammetric Engineering and Remote Sensing (ISSN 0099-1112), vol. 49, April 1983, p. 513-525. refs
(Contract NSF EAR-79-19915)

Seismological techniques combined with Landsat imagery were used to study the seismic activity near Lake Kariba in southern Africa. The activity began after construction of a reservoir. Under investigation since the 1930s, reservoir-induced seismicity (RIS) has been limited to reservoirs with a volume larger than 1.2 billion cu m. Attempts have been made to identify the fault plane orientation best correlated with RIS to understand the triggering mechanisms. Concatenated Landsat imagery from band 6 provided lineaments and constrained the fault parameter solutions. An occurrence of P and SH waveforms recorded during a 1963 6.0 Richter scale event served for identifying the faulting orientation, the seismic moments, source depth, and an estimation of the spatially integrated slip function at the source. The source depths were less than 10 km, and it is suggested that a precambrian basement, separated by normal faults, was adjusting dynamically to the reservoir loads. M.S.K.

N83-16811*# Texas Univ., El Paso. Dept. of Geological Sciences.
APPLICATION OF MAGSAT TO LITHOSPHERIC MODELING IN SOUTH AMERICA Quarterly Report, 1 Oct. - 31 Dec. 1982
G. R. KELLER and E. G. LIDIAK, Principal Investigators 31 Dec. 1982 1 p ERTS
(Contract NAS5-26326)
(E83-10132; NASA-CR-169760; NAS 1.26:169760) Avail: NTIS HC A02/MF A01 CSCL 05B

Progress continues on all aspects of the project. The prime emphasis is on the Rayleigh wave study and determination of both group and phase velocity dispersion is almost complete. Existing data sets were prepared for inversion. A paper on the relation of MAGSAT anomalies to the main tectonic provinces of South America was delivered at the annual meeting of the Society of Exploration Geophysicists. A.R.H.

N83-16842# Bendix Field Engineering Corp., Grand Junction, Colo.
URANIUM HYDROGEOCHEMICAL AND STREAM SEDIMENT RECONNAISSANCE OF THE LIVENGOOD NTMS QUADRANGLE, ALASKA
S. L. LANGFELDT, comp., L. C. HARDY, comp., R. F. DANDREA, JR., comp., R. J. ZINKL, comp., D. L. SHETTEL, JR., comp., W. K. HENSLEY, G. J. THOMAS, C. J. MARTELL, and L. W. MAASSEN Jan. 1982 32 p refs Prepared in cooperation with Los Alamos National Lab.
(Contract DE-AC13-76GJ-01664)
(DE82-009662; GJBX-2-82) Avail: NTIS HC A03/MF A01

Results of a hydrogeochemical and Stream Sediment Reconnaissance of the Livengood NTMS Quadrangle, Alaska are given. Presented are location data, field analyses, and laboratory analyses of several different sample media. The data were subdivided into groups of stream-water and lake-water samples. For each group which contains a sufficient number of observations, statistical tables, tables of raw data, and 1:1,000,000 scale maps of pertinent elements were included. DOE

N83-16843# Bendix Field Engineering Corp., Grand Junction, Colo.
URANIUM HYDROGEOCHEMICAL AND STREAM SEDIMENT RECONNAISSANCE OF THE BARROW NTMS QUADRANGLE, ALASKA
D. L. SHETTEL, JR., comp., S. L. LANGFELDT, comp., L. C. HARDY, comp., R. F. DANDREA, JR., comp., R. J. ZINKL, comp., S. R. GARCIA, D. HANKS, W. E. GEORGE, and S. L. BOLIVAR Jan. 1982 17 p refs Prepared in cooperation with Los Alamos National Lab.
(Contract DE-AC13-76GJ-01664)
(DE82-009665; GJBX-5-82) Avail: NTIS HC A02/MF A01
Results of a Hydrogeochemical and Stream Sediment Reconnaissance of the Barrow NTMS quadrangle, Alaska are given. The data were subdivided into lake sediment samples. DOE

N83-16844# Bendix Field Engineering Corp., Grand Junction, Colo.
URANIUM HYDROGEOCHEMICAL AND STREAM SEDIMENT RECONNAISSANCE OF THE ST. MICHAEL NTMS QUANDRANGLE, ALASKA
L. C. HARDY, comp., R. F. DANDREA, JR., comp., R. J. ZINKL, comp., D. L. SHETTEL, JR., comp., S. L. LANGFELDT, comp., S. R. GARCIA, D. HANKS, W. E. GEORGE, and S. L. BOLIVAR Jan. 1982 41 p refs Prepared in cooperation with Los Alamos National Lab.
(Contract DE-AC13-76G-01664)
(DE82-009999; GJBX-20-82) Avail: NTIS HC A03/MF A01
Results of a Hydrogeochemical and Stream Sediment Reconnaissance (HSSR) of the St. Michael NTMS Quadrangle, Alaska are presented. Presented are location data, field analyses, and laboratory analyses of several different sample media. The analytical results for each medium are summarized. The data are into groups of steam sediment and lake sediment samples. For each group which contains a sufficient number of observations, statistical tables, tables of raw data, and 1:1,000,000 scale maps of pertinent elements and maps showing results of multivariate statistical analyses are included. GRA

N83-16845# Bendix Field Engineering Corp., Grand Junction, Colo.
URANIUM HYDROGEOCHEMICAL AND STREAM SEDIMENT RECONNAISSANCE OF THE COLEEN NTMS QUADRANGLE, ALASKA
S. L. LANGFELDT, comp., L. C. HARDY, comp., R. F. DANDREA, JR., comp., R. J. ZINKL, comp., D. L. SHETTEL, JR., comp., S. R. GARCIA, D. HANKS, W. E. GEORGE, and S. L. BOLIVAR Feb. 1982 95 p refs Prepared in cooperation with Los Alamos National Lab.
(Contract DE-AC13-76GJ-01664)
(DE82-009650; GJBX-12-82) Avail: NTIS HC A05/MF A01
Results of a Hydrogeochemical and Stream Sediment Reconnaissance of the Coleen NTMS Quadrangle, Alaska are given. Presented are location data, field analyses, and laboratory analyses of several different sample media. The sample media are discribed and the analytical results for each medium are summarized. The data was subdivided into groups of stream-sediment and lake-sediment samples. For each group which contains a sufficient number of observations, statistical tables, tables of raw data, and 1:1,000,000 scale maps of pertinent elements are included. Also included are maps showing results of multivariate statistical analyses. DOE

N83-17994*# Technicolor Graphic Services, Inc., Sioux Falls, S. Dak.
AN INVESTIGATION OF MAGSAT AND COMPLEMENTARY DATA EMPHASIZING PRECAMBRIAN SHIELDS AND ADJACENT AREAS OF WEST AFRICA AND SOUTH AMERICA Quarterly Report, 1 Oct. - 31 Dec. 1982
D. A. HASTINGS, Principal Investigator 31 Dec. 1982 6 p Sponsored by NASA ERTS
(Contract DI-14-08-0001-20129)
(E83-10184; NASA-CR-169838; NAS 1.26:169838) Avail: NTIS HC A02/MF A01 CSCL 08B
Some MAGSAT data and preliminary results emphasizing Africa, Latin America, and the Caribbean were presented to geologists in Jamaica, Guyana, Brazil, and Argentina who then expressed interest in collaborating on linking computer modeling of MAGSAT data to tectionic and metallogenic interpretation for South America and in making the final interpretation. Modeling continues with the preparation of a synopsis tectonic map of South America and the initiation of semi-final modeling of northern South America. A.R.H.

N83-18011# Bendix Field Engineering Corp., Grand Junction, Colo.
URANIUM HYDROGEOCHEMICAL AND STREAM SEDIMENT RECONNAISSANCE OF THE ATLIN NTMS QUADRANGLE, ALASKA
R. J. ZINKL, comp., D. L. SHETTEL, JR., comp., S. L. LANGFELDT, comp., L. C. HARDY, comp., and R. F. DANDREA, JR., comp. Jan. 1982 9 p refs Prepared in cooperation with LASL
(Contract DE-AC13-76GJ-01664)
(DE82-009284; GJBX-17(82)) Avail: NTIS HC A02/MF A01
Results of a hydrogeochemical and stream sediment reconnaissance of the Altin NTMS Quadrangle, Alaska are given. Only 6 samples were taken in the Atlin Quadrangle. Appendix A describes the sample media and summarizes the analytical results for each medium. The data were subdivided by one of the Los Alamos National Laboratory sorting programs of Zinkl and others (1981) into stream-sediment samples. DOE

N83-18012# Bendix Field Engineering Corp., Grand Junction, Colo.
URANIUM HYDROGEOCHEMICAL AND STREAM SEDIMENT RECONNAISSANCE MISHEGUK MOUNTAIN NTMS QUADRANGLE, ALASKA
S. L. LANGFELDT, comp., L. C. HARDY, comp., R. F. DANDREA, JR., comp., R. J. ZINKI, comp., D. L. SHETTEL, JR., comp., W. K. HENSLEY, G. J. THOMAS, C. J. MARTELL, and L. W. MAASSEN Jan. 1982 85 p refs Prepared in cooperation with LASL, N. Mex.
(Contract DE-AC13-76GJ-01664)
(DE82-009932; GJBX-19(82)) Avail: NTIS HC A05/MF A01
Location data, field analyses, and laboratory analyses of several different sample media are presented. The data are subdivided into groups of stream-sediment and lake sediment samples. For each group which contians a sufficient number of observations, statistical tables, tables of raw data, and 1:1,000,000 scale maps of pertinent elements are included in this report. Also included are maps showing results of multivariate statistical analyses. DOE

N83-19155*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
ERRSAC CONTRIBUTIONS TO THE SEARCH FOR APPALACHIAN HYDROCARBONS
H. W. BLODGET *In its* 2nd Eastern Reg. Remote Sensing Appl. Conf. p 125-128 1981 refs ERTS
Avail: NTIS HC A17/MF A01 CSCL 08G
The utility of lineaments identified on LANDSAT imagery as an exploration tool in the search for hydrocarbons within three Appalachian test sites were assessed. The optimum LANDSAT imagery enhancement technique for displaying lineaments was identified. The LANDSAT lineament data were analyzed and results were correlated with oil and gas field information for each of

three tests sites. Good correlations were found for several states. Successful techniques can be incorporated into a broader exploration model. A.R.H.

N83-19156*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
POTENTIAL UTILITY OF THE THEMATIC MAPPER FOR SURFACE MINE MONITORING
J. R. IRONS, H. M. LACHOWSKI (GE, Philadelphia), and C. PETERSON (GE, Philadelphia) *In its* 2nd Eastern Reg. Remote Sensing Appl. Conf. p 129-138 1981 refs ERTS
Avail: NTIS HC A17/MF A01 CSCL 08I
One of many potential applications of the thematic mapper (TM) is surface mine monitoring. To assess this potential, data acquired by an aircraft multispectral scanner over Pennsylvania surface mines were preprocessed to simulate the anticipated spectral, spatial, and radiometric characteristics of TM data. False color imagery and thematic maps were derived from the simulated data and compared to imagery and maps derived from LANDSAT multispectral scanner subsystems data. On the basis of this comparison, TM data should definitely increase the detail and accuracy of remotely acquired surface mine information and may enable the remote determination of compliance with reclamation regulations. A.R.H.

N83-19160*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
APPLICATION OF LANDSAT DATA TO MONITOR LAND RECLAMATION PROGRESS IN BELMONT COUNTY, OHIO
H. H. L. BLOEMER (Ohio Univ., Athens), J. BRUMFIELD (Marshall Univ., Huntington, W. Va.), W. J. CAMPBELL, R. G. WITT, and B. G. BLY (Computer Sciences Corp., Greenbelt, Md.) *In its* 2nd Eastern Reg. Remote Sensing Appl. Conf. p 167-190 1981 refs Original contains imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls, S.D. 57198 ERTS
Avail: NTIS HC A17/MF A01 CSCL 08B
Strip and contour mining techniques are reviewed as well as some studies conducted to determine the applicability of LANDSAT and associated digital image processing techniques to the surficial problems associated with mining operations. A nontraditional unsupervised classification approach to multispectral data is considered which renders increased classification separability in land cover analysis of surface mined areas. The approach also reduces the dimensionality of the data and requires only minimal analytical skills in digital data processing. A.R.H.

N83-19161*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
MAPPING SAND AND GRAVEL PITS IN THE PATUXENT RIVER WATERSHED
T. J. SCHMIDT (Maryland Dept. of Natural Resources) and R. G. WITT *In its* 2nd Eastern Reg. Remote Sensing Appl. Conf. p 191-200 1981 ERTS
Avail: NTIS HC A17/MF A01 CSCL 08G
LANDSAT data from July 1973 and June 1978 for the Patuxent River Watershed of Maryland were processed in an effort to devise an economical method of monitoring the reclamation of sand and gravel pits. ASTEP-II and IDIMS software were utilized to derive signatures for sand and gravel pits and other land use/land cover types. Both unsupervised and supervised classifications of the two data sets were produced. Resultant statistics and color output products were compared in order to determine the extent of reclamation and expansion of sand and gravel pits over the five-year time span and to check the locations of more recent sand and gravel pits. Preliminary results indicate that, for a selected northern sub-acre, signatures derived for sand and gravel pits were nearly 90 percent accurate. M.G.

N83-19194# High Life Helicopters, Inc., Puyallup, Wash.
AIRBORNE GAMMA-RAY SPECTROMETER AND MAGNETOMETER SURVEY, CLEVELAND QUADRANGLE (PA.,OH.), ERIE QUADRANGLE (PA.), WARREN QUADRANGLE (PA.), PITTSBURGH QUADRANGLE (PA.), VOLUME 1 Final Report
1982 71 p
(Contract DE-AC13-79GJ-01692)
(DE82-009639; GJBX-42-82-VOL-1) Avail: NTIS HC A04/MF A01
Airborne gamma ray spectrometer and magnetometer data were collected by a helicopter equipped with a gamma ray spectrometer with a large crystal volume, and with a high sensitivity proton precession magnetometer. The radiometric system was calibrated at the Walker Field Calibration pads and the Lake Mead Dynamic Test Range. Data quality was ensured during the survey by daily test flights and equipment checks. Radiometric data were corrected for live time, aircraft and equipment background, cosmic background, atmospheric radon, Compton scatter, and altitude dependence. The corrected data were statistically evaluated, plotted, and contoured to produce anomaly maps based on the radiometric response of individual geological units. The anomalies were interpreted and an interpretation map produced. A description of the systems used in the survey, a discussion of the calibration of the systems, the data collection procedures, the data processing procedures, the data presentation, the interpretation rationale, and the interpretation methodology are given. DOE

N83-19195# Bendix Field Engineering Corp., Grand Junction, Colo.
URANIUM HYDROGEOCHEMICAL AND STREAM SEDIMENT RECONNAISSANCE OF THE HOWARD PASS NTMS QUADRANGLE, ALASKA
R. F. DANDREA, JR., R. J. ZINKL, D. L. SHETTEL, JR., S. L. LANGFELDT, L. C. HARDY, S. R. GARCIA, D. HANKS, W. E. GEORGE, and S. L. BOLIVAR Jan. 1982 102 p refs Prepared in cooperation with Los Alamos Scientific Lab.
(Contract DE-AC13-76GJ-01664)
(DE82-009651; GJBX-8-82) Avail: NTIS (US Sales Only) HC A06/MF A01
Results of a Hydrogeochemical and Stream Sediment Reconnaissance (HSSR) of the Howard Pass NTMS quadrangle, Alaska are given. Location data, field analysis, and laboratory analyses of several different sample media are given. For each group of stream sediment and lake sediment samples, which contains a sufficient number of observations, statistical tables, tables of raw data, and 1:1,000,000 scale maps of pertinent elements are included. Also included are maps showing results of multivariate statistical analyses. DOE

N83-19196# Bendix Field Engineering Corp., Grand Junction, Colo.
URANIUM HYDROGEOCHEMICAL AND STREAM SEDIMENT RECONNAISSANCE OF THE BARTER ISLAND NTMS QUADRANGLE, ALASKA
S. L. LANGFELDT, L. G. HARDY, R. F. DANDREA, JR., R. J. ZINKL, D. L. SHETTEL, JR., M. M. MINOR, C. MCINTEER, J. N. HANSEL, and D. R. BROXTON Jan. 1982 14 p refs Prepared in cooperation with Los Alamos Scientific Lab.
(Contract DE-AC13-76GJ-01664)
(DE82-009666; GJBX-6-82) Avail: NTIS HC A02/MF A01
Results of a hydrogeochemical and stream sediment reconnaissance (HSSR) of the Barter Island NTMS quadrangle, Alaska are reported. The sample media and summary of the analytical results for each medium are described. The data are subdivided into groups of stream sediment and lake sediment samples. DOE

N83-19197# Bendix Field Engineering Corp., Grand Junction, Colo.
URANIUM HYDROGEOCHEMICAL AND STREAM SEDIMENT RECONNAISSANCE OF THE TANACROSS NTMS QUADRANGLE, ALASKA
S. L. LANGFELDT, L. C. HARDY, R. F. DANDREA, JR., R. J. ZINKL, D. L. SHETTEL, JR., S. R. GARCIA, D. HANKS, W. E. GEORGE, and S. L. BOLIVAR Jan. 1982 140 p refs Prepared in cooperation with Los Alamos Scientific Lab.
(Contract DE-AC13-76GJ-01664)
(DE82-009664; GJBX-4-82) Avail: NTIS HC A07/MF A01

A hydrogeochemical and stream sediment reconnaissance (HSSR) of the Tanacross NTMS quadrangle Alaska is reported. Location data, field analyses, and laboratory analyses of several different sample media are presented. The sample media and the analytical results for each medium are summarized. The data are subdivided into groups of stream sediment and lake sediment samples. Each group with a sufficient number of observations, statistical tables, tables of raw data and 1:1,000,000 scale maps of pertinent elements and maps showing results of multivariate statistical analyses are included. DOE

N83-19199# Bendix Field Engineering Corp., Grand Junction, Colo.
URANIUM HYDROGEOCHEMICAL AND STREAM SEDIMENT RECONNAISSANCE OF THE MIDDLETON ISLAND NTMS QUADRANGLE, ALASKA
D. L. SHETTEL, JR., S. L. LANGFELDT, L. C. HARDY, R. F. DANDREA, JR., R. J. ZINKL, M. M. MINOR, C. MCINTEER, J. N. HANNEL, and D. E. BROXTON Feb. 1982 15 p refs Prepared in cooperation with Los Alamos Scientific Lab.
(Contract DE-AC13-76GJ-01664)
(DE82-009917; GJBX-18-82) Avail: NTIS HC A02/MF A01

Results of a Hydrogeochemical and Stream Sediment Reconnaissance (HSSR) of the Middleton Island NTMS Quadrangle, Alaska are presented. In addition to this abbreviated data release, more complete data are available to the public in machine readable form. These machine readable data, as well as quarterly or semiannual program progress reports containing further information on the HSSR program in general, or on the Los Alamos National Laboratory (LANL) portion of the program in particular, are available from DOE's Technical Library at the Grand Junction Area Office. Only 14 samples were taken in the Middleton Island Quadrangle. Appendices A and B describe the sample media and summarize the analytical results for each medium. The data have been subdivided by one of the Los Alamos National Laboratory sorting programs of Zinkl and others into groups of stream sediment and stream water samples. DOE

N83-20337# Bendix Field Engineering Corp., Grand Junction, Colo.
PLTSYM: A FORTRAN COMPUTER SYSTEM TO PLOT CANADIAN SYMBOL LOCATION MAPS FOR HYDROGEOCHEMICAL AND STREAM-SEDIMENT RECONNAISSANCE DATA
R. J. ZINKL, D. L. SHETTEL, JR., and R. F. DANDREA, JR. Sep. 1982 141 p refs
(Contract DE-AC13-76GJ-01664)
(DE83-000764; GJBX-193-82) Avail: NTIS HC A07/MF A01

The PLTSYM system plots sample location maps on a line plotter at virtually any scale with data point values represented by one of 15 Canadian symbols. Sample location data can be in latitude/longitude or (X,Y) coordinate form. Five map projections are available for converting latitude/longitude into easting/northing coordinates. Data values can be sorted into classes using any one of four different class interval options. DOE

N83-21426*# Ohio Dept. of Energy, Columbus.
CORRELATION OF LANDSAT LINEAMENTS WITH DEVONIAN GAS FIELDS IN LAWRENCE COUNTY, OHIO
G. O. JOHNSON *In* NASA. Goddard Space Flight Center Eastern Reg. Remote Sensing Appl. Conf. p 69-73 Jan. 1981 ERTS
Avail: NTIS HC A11/MF A01 CSCL 08G

In an effort to locate sources of natural gas in Ohio, the fractures and lineaments in Black Devonian shale were measured by: (1) field mapping of joints, swarms, and fractures; (2) stereophotointerpretation of geomorphic lineaments with precise photoquads; and (3) by interpreting the linear features on LANDSAT images. All results were compiled and graphically represented on 1:250,000 scale maps. The geologic setting of Lawrence County was defined and a field fracture map was generated and plotted as rose patterns at the exposure site. All maps were compared, contrasted, and correlated by superimposing each over the other as a transparency. The LANDSAT lineaments had significant correlation with the limits of oil and gas producing fields. These limits included termination of field production as well as extensions to other fields. The lineaments represent real rock fractures with zones of increased permeability in the near surface bedrock. A.R.H.

N83-21430*# Geological and Economic Survey, Morgantown, West Va.
REMOTE SENSING IN WEST VIRGINIA
P. LESSING *In* NASA. Goddard Space Flight Center Eastern Reg. Remote Sensing Appl. Conf. p 99-104 Jan. 1981 refs ERTS
Avail: NTIS HC A11/MF a01 CSCL 08B

Low altitude black and white aerial photography is the prinicipal remote sensing tool for geologic investigations in West Virginia, although side looking radar and color infrared photography are also used. The first land use/cover map for the state was produced in color infrared and is being digitized. Linear features in Cabell and Wayne Counties, as revealed by LANDSAT, were evaluated to test the possible correlations with rock fractures and gas production from shales. A LANDSAT linear features map (1:250,000) was prepared for the entire state, also. Presently investigations are being made to understand karst and to predict areas that should not be used for development. Aerial photography and field mapping is being conducted to detect the location and causes of landslides. A.R.H.

N83-21451*# Texas Univ., El Paso. Dept. of Geological Sciences.
APPLICATION OF MAGSAT TO LITHOSPHERIC MODELING IN SOUTH AMERICA Quarterly Report, 1 Oct. 1982 - 31 Dec. 1983
G. R. KELLER and E. G. LIDIAK, Principal Investigators 31 Dec. 1983 1 p ERTS
(Contract NAS5-26326)
(E83-10208; NASA-CR-170054; NAS 1.26:170054) Avail: NTIS HC A02/MF A01 CSCL 08G

Progress in the determination of relations of MAGSAT anomalies to lithospheric structures is reported. The prime emphasis was on a Rayleigh wave study and the determination of both group and phase velocity dispersion. M.G.

N83-21458*# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
ENHANCEMENT OF DIGITAL IMAGES THROUGH BAND RATIO TECHNIQUES FOR GEOLOGICAL APPLICATIONS
N. D. J. PARADA, Principal Investigator, R. A. FILHO, and I. VITORELLO Dec. 1982 23 p refs Presented at the COGEODATA-IAMG Meeting for South Am., Rio de Janeiro, 14-17 Dec. 1981 ERTS
(E83-10217; NASA-CR-170076; NAS 1.26:170076; INPE-2604-PRE/250) Avail: NTIS HC A02/MF A01 CSCL 05B

The fundamentals in the use of band ratio techniques to enhance spectral signatures of geologic interest are discussed. The path radiance, additive term of the measured radiance at any given wavelength, is almost completely eliminated from LANDSAT images by subtracting the smallest value of the radiance measured in each channel, at shadows caused by topographic relief and clouds, and deep clear water bodies. By ratioing successive spectral channels the effect of solar angle of elevation is minimized and the product expresses, to a first approximation, a relationship between reflectances, which are intrinsic characteristics of the targets. Ratios between noncorrelated channels, such as R 7/4, R 7/5, and R 6/4 are useful to show variations in the vegetation cover, probably related to geobotanical associations. M.G.

N83-21484*# Technicolor Graphic Services, Inc., Sioux Falls, S. Dak.
AN INVESTIGATION OF MAGSAT AND COMPLEMENTARY DATA EMPHASIZING PRECAMBRIAN SHIELDS AND ADJACENT AREAS OF WEST AFRICA AND SOUTH AMERICA Quarterly Report, 1 Oct. - 31 Dec. 1982
D. A. HASTINGS, Principal Investigator 31 Dec. 1982 6 p ERTS
(Contract DI-14-08-0001-20129)
(E83-10243; NASA-CR-170090; NAS 1.26:170090) Avail: NTIS HC A02/MF A01 CSCL 05B

Both MAGSAT data and preliminary results emphasizing Africa, Latin America, and the Caribbean were presented to geologists in Jamaica, Guyana, Brazil, and Argentina. Preliminary interpretations were discussed. A synopsis tectonic map of South America was completed. Semi-final modeling of northern South America was initiated. A.R.H.

N83-21498# Bendix Field Engineering Corp., Grand Junction, Colo.
STATISTICAL TECHNIQUES APPLIED TO AERIAL RADIOMETRIC SURVEYS (STAARS): CLUSTER ANALYSIS
F. L. PIRKLE, N. K. STABLEIN, J. A. HOWELL (LASL, N. Mex.), G. W. WECKSUNG (LASL, N. Mex.), and B. S. DURAN (Texas Technological Univ.) Nov. 1982 39 p refs
(Contract W-7405-ENG-36; DE-AC07-76GJ-01664)
(DE83-004397; GJBX-202(82)) Avail: NTIS HC A03/MF A01

It is shown that cluster analysis can identify groups with similar radiometric values even when no a priori knowledge of the geology of an area exists. A method of convergent k-means cluster analysis coupled with a hierarchical cluster analysis is used to classify 6691 observations (three radiometric variables at each observation location) from the Precambrian rocks of the Copper Mountain, Wyoming, area. Another method, one that combines a principal components analysis with a convergent k-means analysis, is applied to the same data. These two methods are compared with a convergent k-means analysis that utilizes available geologic knowledge. All three methods identify four clusters. Three of the clusters represent background values for the Precambrian rocks of the area, and one represents outliers (anomalously high (214)Bi). A segmentation of the data corresponding to geologic reality as discovered by other methods was achieved based solely on analysis of aerial radiometric data. The techniques employed are composites of classical clustering methods designed to handle the special problems presented by large data sets. DOE

N83-21699# California Univ., Livermore. Lawrence Livermore Lab.
MAGNITUDES OF SLIP ALONG THE GREENVILLE FAULT IN THE DIABLO RANGE AND CORRAL HOLLOW AREAS
J. J. SWEENEY Mar. 1982 12 p refs Presented at the Conf. on Earthquake Hazards in the Eastern San Francisco Bay Area, Hayward, Calif., 24-27 Mar. 1982
(Contract W-7405-ENG-48)
(DE82-012220; UCRL-87471; CONF-820355-1) Avail: NTIS HC A02/MF A01

A geological description of the Greenville fault is given. The Greenville fault forms the eastern boundary to Livermore Valley and extends into the Diablo Range south of San Antonio Valley, a probable pull-apart structure. Gravity, magnetic, structural, and petrologic data indicate that the serpentinized ophiolite units at Cedar Mountain and Red Mountain were once continuous and are displaced dextrally along the Greenville fault by 9 km. The Livermore Oil Field marks the location of the buried western end of the Corral Hollow anticline which was displaced about 2 km northward along the Greenville fault following deposition and folding of Plio-Pleistocene rocks. Further east, the Corral Hollow syncline was displaced northward about 600 m along the Corral Hollow fault in a similar manner. GRA

N83-22687*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
MONITORING STRIP MINING AND RECLAMATION WITH LANDSAT DATA IN BELMONT COUNTY, OHIO
R. G. WITT, G. M. SCHAAL, and B. G. BLY Mar. 1983 23 p refs ERTS
(E83-10209; NASA-TM-85001; NAS 1.15:85001) Avail: NTIS HC A02/MF A01 CSCL 08B

The utility of LANDSAT digital data for mapping and monitoring surface mines in Belmont County, Ohio was investigated. Two data sets from 1976 and 1979 were processed to classify level 1 land covers and three strip mine categories in order to examine change over time and assess reclamation efforts. The two classifications were compared with aerial photographs. Results of the accuracy assessment show that both classifications are approximately 86 per cent correct, and that surface mine change detection (date-to-date comparison) is facilitated by the digital format of LANDSAT data. A.R.H.

N83-22699# High Life Helicopters, Inc., Puyallup, Wash.
AIRBORNE GAMMA-RAY SPECTROMETER AND MAGNETOMETER SURVEY: WARREN QUADRANGLE, PA. Final Report
1982 149 p refs 2 Vol.
(Contract DE-AC13-79GJ-01692)
(DE82-009643; GJBX-42-82-VOL-2A) Avail: NTIS HC A07/MF A01

Airborne gamma-ray spectrometers and magnetometer were investigated. The following topics are discussed: geology; radioactive mineral occurrences in Pennsylvania; geophysical data interpretation; references; and appendices. The appendices are for the following: flight line map; geology map; explanation of geologic legend; flight line/geology map; pseudo-contour maps; anomaly maps; geologic histograms; speed and altitude histograms; statistical tables; magnetic and ancillary profiles; and test line data. DOE

N83-22701# Oak Ridge Gaseous Diffusion Plant, Tenn.
HYDROGEOCHEMICAL AND STREAM-SEDIMENT RECONNAISSANCE BASIS DATA FOR MARIPOSA AND SACRAMENTO QUADRANGLES, CALIFORNIA; NEVADA. URANIUM RESOURCE EVALUATION PROJECT
15 Nov. 1982 27 p
(Contract DE-AC13-76GJ-01664)
(DE83-004485; GJBX-168-82; K/UR-448) Avail: NTIS HC A03/MF A01

Geochemical data are compiled for the surface water and ground water of Mariposa and Sacramento quadrangles of California and Nevada. GRA

N83-22705# High Life Helicopters, Inc., Puyallup, Wash.
AIRBORNE GAMMA-RAY SPECTROMETER AND MAGNETOMETER SURVEY: BUCKSHOT, TEXAS. VOLUME 2C: DETAIL AREA Final Report
1982 305 p refs
(Contract DE-AC13-79GJ-01692)
(DE83-002726; GJBX-196-82-VOL-2C) Avail: NTIS HC A14/MF A01

An airborne combined radiometric and magnetic survey was performed over the Buckshot Detail Area of southwestern Texas. The data displays and the interpretation results for the project area are given as well as flight line maps; geology maps; explanation of geologic legend; flight line/geology maps; and geochemical factor analysis maps. DOE

N83-22707# Oak Ridge Gaseous Diffusion Plant, Tenn.
HYDROGEOCHEMICAL AND STREAM-SEDIMENT RECONNAISSANCE BASIC DATA FOR FRESNO AND DEATH VALLEY QUADRANGLES, CALIFORNIA; NEVADA. URANIUM RESOURCE EVALUATION PROJECT
15 Nov. 1982 63 p
(Contract DE-AC13-76GJ-01664)
(DE83-004484; GJBX-167-82; K/UR-447) Avail: NTIS HC A04/MF A01

Hydrogeochemical data are compiled for surface water and ground water of the Fresno and Death Valley quadrangles in California and Nevada. DOE

N83-22708# Du Pont de Nemours (E. I.) and Co., Aiken, S.C.
DATA REPORT: NEW ENGLAND. NATIONAL URANIUM RESOURCE EVALUATION PROGRAM. HYDROGEOCHEMICAL AND STREAM SEDIMENT RECONNAISSANCE
W. M. FAY, K. A. SARGENT, and J. R. COOK Feb. 1982 37 p
(Contract DE-AC09-76SR-00001)
(DE82-012357; GJBX-107-82; DPST-81-146-27) Avail: NTIS HC A03/MF A01

The results of ground water, stream water, and stream sediment reconnaissance in Connecticut, Rhode Island, Massachusetts, Vermont, New Hampshire, and Maine are given. Sediment samples were collected from 635 sites in Connecticut, 81 sites in Rhode Island, 1331 sites in Massachusetts, 1677 sites in Vermont, 1699 sites in New Hampshire, and 3024 sites in Maine. Ground water samples were collected from 798 sites in Connecticut, 77 sites in Rhode Island, 657 sites in Massachusetts, 972 sites in Vermont, 884 sites in New Hampshire, and 1938 sites in Maine. Stream water samples were collected from 656 sites in Connecticut, 81 sites in Rhode Island, 1304 sites in Massachusetts, 1663 sites in Vermont, 1694 sites in New Hampshire, and 2039 sites in Maine. Neutron activation analyses are given for U, Br, Cl, F, Mn, Na, Al, V, and Dy in ground water and stream water, and for U, Th, Hf, Ce, Fe, Mn, Na, Sc, Ti, V, Al, Dy, Eu, La, Sm, Yb, and Lu in sediments. DOE

N83-22710# Oak Ridge Gaseous Diffusion Plant, Tenn.
HYDROGEOCHEMICAL AND STREAM-SEDIMENT RECONNAISSANCE BASIC DATA FOR IDAHO FALLS QUADRANGLE, IDAHO. URANIUM RESOURCE EVALUATION PROJECT
9 Nov. 1982 46 p
(Contract DE-AC13-76GJ-01664)
(DE83-004529; GJBX-173-82; K/UR-453) Avail: NTIS HC A03/MF A01

Hydrogeochemical data are complied for ground water and surface water of the Idaho Falls quadrangle in Idaho. GRA

N83-22711# Union Carbide Corp., Oak Ridge, Tenn.
HYDROGEOCHEMICAL AND STREAM-SEDIMENT RECONNAISSANCE BASIC DATA FOR HAILEY AND CHALLIS QUADRANGLES, IDAHO
18 Nov. 1982 67 p
(Contract DE-AC13-76GJ-01664)
(DE83-004482; GJBX-172-82; K/UR-452) Avail: NTIS HC A04/MF A01

Hydrogeochemical data are compiled for ground water and surface water for the Hailey and Challis quadrangles in Idaho. GRA

N83-22880# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
GEOLOGIC MAPPING OF THE ARAGUAINHA DOME USING REMOTE SENSING TECHNIQUES M.S. Thesis [MAPEAMENTO GEOLOGICO DO DOMO DE ARAGUAINHA UTILIZANDO TECNICAS DE SENSORIAMENTO REMOTO]
A. P. CROSTA Jan. 1983 127 p refs *In* PORTUGUESE; ENGLISH summary Original contains color illustrations
(INPE-2626-TDL/109) Avail: NTIS HC A07/MF A01

The geological mapping of the Araguainha Dome structure through the utilization of remote sensing products and the search of elucidative evidences, of its origin and age are discussed. It is shown that the validity of the combined utilization of different remote sensing products in geological mapping was possible. It is concluded that the Araquainha dome is an astrobleme which was formed between 195-260 m.y. ago, from the impact of a celestial body (asteroid or comet) against the Earth's surface. E.A.K.

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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.

A83-19909
SOME FEATURES OF THE WATER CIRCULATION OF THE BLACK SEA ACCORDING TO METEOR-SATELLITE DATA [NEKOTORYE OSOBENNOSTI TSIRKULIATSII VOD CHERNOGO MORIA PO DANNYM ISZ 'METEOR']
A. S. KAZMIN and V. E. SKLIAROV (Akademiia Nauk SSSR, Institut Okeanologii, Moscow, USSR) Issledovanie Zemli iz Kosmosa, Nov.-Dec. 1982, p. 42-49. In Russian. refs

The characteristics of Black Sea surface currents during 1980-1981 are investigated on the basis of Meteor-satellite images in the visible (0.5-0.7 micron) and near infrared (0.7-1.1 micron) bands. A complex map of the Black Sea compiled on the basis of the satellite data indicates the location of eddies, fronts, zones of mixing of river and sea waters, and shore currents. An oceanographic analysis of Meteor images for the eastern and western parts of the Black Sea is presented. It is noted that there is good agreement between Meteor images in the visible region and NOAA-satellite IR images of eddy formations. B.J.

A83-20238*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
GLOBAL MEAN SEA SURFACE COMPUTATION USING GEOS 3 ALTIMETER DATA
J. G. MARSH (NASA, Goddard Space Flight Center, Geodynamics Branch, Greenbelt, MD), T. V. MARTIN, and J. J. MCCARTHY (EG & G Washington Analytical Services Center, Inc., Riverdale, MD) Journal of Geophysical Research, vol. 87, Dec. 10, 1982, p. 10955-10964. refs

A mean sea surface map has been determined for the global ocean areas between +62 deg and -62 deg latitude using GEOS 3 altimeter data. A grid of laser reference orbits computed using the GEM 10B gravity model has been used to orient the altimeter data in a center of mass coordinate system. The density of the altimeter tracks has enabled the computation of the sea surface heights above the reference ellipsoid on 1 deg x 1 deg grid in most of the oceanic areas. In the northwest Atlantic the dense coverage has enabled computations on a 0.25 deg x 0.25 deg grid. Comparisons of the global surface with an independently computed mean sea surface based upon SEASAT altimeter data indicate an rms agreement of a little over a meter. Comparisons of the regional solution in the northwest Atlantic with SEASAT profiles indicate a precision of a few decimeters in this surface. An analysis of the global crossover differences has indicated the possibility of a timing error in the altimeter data. Timing bias values of within 0.5 msec of 9.2 msec for 1975 and within 0.6 msec of

18.7 msec for 1976 have been recovered from an analysis of the altimeter data. (Author)

A83-20545

SOUTHERN HEMISPHERE WESTERN BOUNDARY CURRENT VARIABILITY REVEALED BY GEOS 3 ALTIMETER

A. L. GORDON, K.-I. HORAI, and M. DONN (Lamont-Doherty Geological Observatory, Palisades, NY) Journal of Geophysical Research, vol. 88, Jan. 20, 1983, p. 755-762. refs

(Contract N00014-80-C-0098)

Use was made of GEOS 3 altimeter data to map the sea level variability inside the western boundary currents of the Southern Hemisphere, the contiguous segment of the Antarctic Circumpolar Current, and the eastern Indian Ocean. Iterative data adjustment procedures minimized the differences at the intersections between ascending and descending orbits. Areal rms differences were developed and compared to other studies of variability. Consideration was given to differences exceeding 30 cm to compensate for instrument noise. A line of high variability was defined between the New Caledonia and East Australian currents in the western Tasman Sea. Patterns of sea level transients were observed between 22 deg and 26 deg E over the western flank of the Agulhas Plateau. Other regions were identified above 40 cm near 50 deg S, 26 deg S, north of 18 deg S, and west of 112 deg E. M.S.K.

A83-20830*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.

INFLUENCE OF SUSPENDED INORGANIC SEDIMENT ON AIRBORNE LASER FLUOROSENSOR MEASUREMENTS

L. R. POOLE (NASA, Langley Research Center, Hampton, VA) and W. E. ESAIAS (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, CA) Applied Optics, vol. 22, Feb. 1, 1983, p. 380, 381. refs

The results of Poole and Esaias (1982) are presently extended to an examination of the influence of inorganic sediment on the water Raman normalization procedure, as well as an assessment of the potential for using the Raman signal to monitor surface water attenuation properties. An optically perfect lidar system is assumed which has geometric properties representative of the Airborne Oceanographic Lidar, and is mounted on an airborne platform flying at an altitude of 150 m above the water surface. The results obtained suggest that caution should be exercised in attempts to quantitatively monitor changes in optical attenuation by means of remote measurements of the Raman scattering signal. O.C.

A83-21434

REFLECTANCE CONTRAST OBSERVED BY LANDSAT BETWEEN A CALM AND A ROUGH SEA

L. WALD and J. M. MONGET (Paris, Ecole Nationale Superieure des Mines, Valbonne, Alpes-Maritimes, France) Photogrammetric Engineering and Remote Sensing, vol. 49, Feb. 1983, p. 241, 242.

A relationship between changes in sea state and the corresponding alteration of the sea reflection coefficient is discussed, with an eye to the implications for Landsat imagery. Examination of reflectance changes at different wind speeds has shown that shifts in red wavelengths are prominent in wind-induced changes in the sea wave slopes. Calculations of the glitter reflectance for the Landsat MSS band 7 channel at 800-1100 nm have shown that sea state reflectance variations observed by a near-polar orbiting satellite are seasonally dependent. Rough seas are brighter than calm seas, and the reflectance resolution of the band 7 is 1 percent. A summary of year-round measurements with the channel demonstrate that Landsat can discriminate between rough and calm seas from the end of January to mid-December at 25 deg N latitude, from mid-Februrary to November for 35 deg N, from March to October for 45 deg N, and from April to mid-September for 55 deg N. Identifications of oil slicks are possible during these periods. M.S.K.

A83-21919

INTERPRETABILITY OF LINEAR PHENOMENA ON SEASAT-1 IMAGERY IN THE WESTERN COASTAL ZONE OF BELGIUM IN RELATION TO THE AZIMUTHAL AND RANGE RESOLUTIONS

H. DUFOURMONT (Institut tot Aanmoediging van het Wetenschappelijk Onderzoek in Nijverheid en Landbouw; Gent, Rijksuniversiteit, Ghent, Belgium) In: International Society for Photogrammetry and Remote Sensing, International Symposium, Toulouse, France, September 13-17, 1982, Transactions. Volume 1. Toulouse, Groupement pour le Developpement de la Teledetection Aerospatiale, 1982, p. 249-253.

The visual interpretation of Seasat-1 SAR images in considered, the available negatives having a 1/250,000 scale, 4 looks, and a 25 m resolution for both range and azimuth directions. The test zones chosen for this study are situated in the western coastal zone of Belgium, between Koksijde and Ostend; they include a narrow coastal strip and a polderland. It is shown that the visual interpretability of linear features on the images has a limited efficiency, especially when it concerns interrupted lines. The detectability of linear features on the image depends considerably on the tonality contrast with adjacent pixels. In addition, a directional selectivity in the reproduction of linear features appears to exist, and the tonality of some features is found to change according to their relative orientation. B.J.

A83-21955

AN OPERATIONAL PROGRAM FOR MONITORING SURFACE TEMPERATURES OF LAKES AND COASTAL-ZONE WATERS IN CANADA FROM POLAR-ORBITING SATELLITE INFRARED DATA

G. J. IRBE and A. SAULESLEJA (Department of the Environment, Atmospheric Environment Service, Downsview, Ontario, Canada) In: International Society for Photogrammetry and Remote Sensing, International Symposium, Toulouse, France, September 13-17, 1982, Transactions. Volume 1. Toulouse, Groupement pour le Developpement de la Teledetection Aerospatiale, 1982, p. 717-724. refs

A83-21956

STUDY OF TIDAL VORTICES AT THE NARUTO STRAIT THROUGH MULTI LEVEL REMOTE SENSING

T. MARUYASU, S. ONISHI, and T. NISHIMURA (Tokyo Science University, Noda, Chiba, Japan) In: International Society for Photogrammetry and Remote Sensing, International Symposium, Toulouse, France, September 13-17, 1982, Transactions. Volume 1. Toulouse, Groupement pour le Developpement de la Teledetection Aerospatiale, 1982, p. 735-744. Research supported by the Honshu Shikoku Bridge Authority.

Stirring whirlpools in the tidal stream at the Naruto Strait were surveyed through multi level remote sensing from airplane and Landsat. Small scale tidal vortices were surveyed from air at lower altitude, and the large scale tidal vortices were surveyed from Landsat and from air at higher altitude. It was revealed that the tidal vortices take the main role in the water mixing around the strait, after the hydrodynamical interpretation of the remotely sensed data aided by the hydraulic model tests. (Author)

A83-21957

SEA ICE CLASSIFICATION FROM INFRARED THERMOMETRY OVER THE NORTH WATER, WINTER 1980/81

K. STEFFEN (Zuerich, Eidgenoessische Technische Hochschule, Zurich, Switzerland) In: International Society for Photogrammetry and Remote Sensing, International Symposium, Toulouse, France, September 13-17, 1982, Transactions. Volume 1. Toulouse, Groupement pour le Developpement de la Teledetection Aerospatiale, 1982, p. 767-776. Research supported by Petro Canada, Ltd. refs

Preliminary results of a study of the polynya, an arctic sea anomaly featuring a high percentage of young ice and open water, are reported. Six airborne remote sensing flights at 300 m using an IR radiometer were performed during winter months. The IR thermometry was compared with ground truth determined at an ice station, which also recorded salinity profiles, in different ice types, ice growth rates, dew point profiles, water temperature profiles, surface radiation, and wind velocities. Techniques employed for corrections to emissivity, emission, and absorption components of the IR radiance are presented. Three categories of ice activity were identified: a very high percentage of young ice, a high percentage of young ice (21-64 percent), and a low percentage of young ice, which are categorized as three different types of polynya. The formation of the different polynyas was dependent on the location of the fast-ice boundary, strong winds, and the mechanical stability of the fast-ice boundary. M.S.K.

A83-21958
MICROWAVE REMOTE SENSING OF SEA ICE
R. K. HAWKINS, A. L. GRAY, C. E. LIVINGSTONE, and L. D. ARSENAULT (Canada Centre for Remote Sensing, Ottawa, Canada) In: International Society for Photogrammetry and Remote Sensing, International Symposium, Toulouse, France, September 13-17, 1982, *Transactions. Volume 1. Toulouse, Groupement pour le Developpement de la Teledetection Aerospatiale*, 1982, p. 789-799. refs

A83-22086#
A CONTRIBUTION TO THE STUDY OF THE SEA SURFACE TEMPERATURE BY REMOTE SENSING BY MEANS OF THE HCMM SPACE EXPERIMENT [CONTRIBUTION A L'ETUDE DE LA TEMPERATURE DE SURFACE DE LA MER PAR TELEDETECTION AU MOYEN DE L'EXPERIENCE SPATIALE HCMM]
R. FROUIN Lille I, Universite, Docteur de Specialite Thesis, 1981. 151 p. In French. Research supported by the Centre National de la Recherche Scientifique, Centre National d'Etudes Spatiales, and Centre National pour l'Exploitation des Oceans. refs

The infrared (10.5-12.5 micron) data provided by the HCMM (Heat Capacity Mapping Mission) satellite experiment, have been utilized to study the sea surface temperature in the vicinity of the French coast and the underlying oceanic phenomena. The influence of the residual marine circulation across the Calais Strait on the thermal effluent of the Rhine River is analyzed. A possible explanation is formulated for the appearance of relatively colder water on the surface of the sea during summer at the boundary of the continental shelf west of Bretagne. Large anticyclonic eddies are found in the western Mediterranean Sea, which corresponds to the division of the Atlantic current into two branches. The variability of the sea surface temperature at average scales is treated statistically. The diurnal heating of the sea surface layer is examined in relation to the low-velocity wind. N.B.

A83-22554* Science Applications, Inc., San Diego, Calif.
SATELLITE MEASUREMENTS OF AEROSOLS OVER OCEANS
M. GRIGGS (Science Applications, Inc., Electronic Vision and Systems Div., San Diego, CA) In: Atmospheric effects on electro-optical, infrared, and millimeter wave systems performance; Proceedings of the Meeting, San Diego, CA, August 27, 28, 1981. Bellingham, WA, SPIE - The International Society for Optical Engineering, 1981, p. 197-199. NOAA-MO-A01-78-00-4092. refs
(Contract NAS5-20899; NAS1-15898; N00014-77-C-0489)

A83-22676* Harris Corp., Melbourne, Fla.
OCEAN EXPERIMENTS AND REMOTELY SENSED IMAGES OF CHEMICALLY DISPERSED OIL SPILLS
W. F. CROSWELL (Harris Corp., Government Electronics System Div., Melbourne, FL), J. C. FEDORS (NASA, Langley Research Center, Hampton, VA), F. E. HOGE (NASA, Wallops Flight Center, Wallops Island, VA), R. N. SWIFT (EG & G Washington Analytical Service Center, Inc., Pocomoke, MD), and J. C. JOHNSON (Camp, Dresser, McKee, Inc., Industrial Engineering Div., Boston, MA) IEEE Transactions on Geoscience and Remote Sensing, vol. GE-21, Jan. 1983, p. 2-15. Research supported by the U.S. Environmental Protection Agency, American Petroleum Institute, U.S. Navy, NOAA, and NASA. refs

A series of experiments was performed at sea where the effectiveness of dispersants applied from a helicopter was tested on fresh and weathered crude oils released from a surface research vessel. In conjunction with these experiments, remote sensing measurements using an array of airborne optical and microwave sensors were performed in order to aid in the interpretation of the dispersant effectiveness and to obtain quantitative images of oil on the sea under controlled conditions. Surface oil thickness and volume are inferred from airborne measurements using a dual-channel microwave imaging radiometer, aerial color photography, and an airborne oceanographic lidar. The remotely sensed measurements are compared with point sampled data obtained using a research vessel. The mass balance computations of surface versus subsurface oil volume using remotely sensed and point sampled data are consistent with each other and with the volumes of oil released. Data collected by the several techniques concur in indicating that, for the oils used and under the sea conditions encountered, the dispersant and application method are primarily useful when applied to fresh oil. (Author)

A83-22677* Applied Science Associates, Inc., Apex, N. C.
THE APPLICATION OF NEAR-NADIR DELTA-K RADAR TECHNIQUES TO GEODETIC ALTIMETRY AND OCEANOGRAPHIC REMOTE SENSING
L. S. MILLER (Applied Science Associates, Inc., Apex, NC) IEEE Transactions on Geoscience and Remote Sensing, vol. GE-21, Jan. 1983, p. 16-24. refs
(Contract NAS6-2810; N00173-78-C-0138)

This paper first examines the extension of two-frequency, or Delta-k near-nadir remote sensing techniques to off-nadir radar altimetry. A different approach to sea state sensing is investigated which appears to offer much higher accuracy. The second section examines the Delta-k method of sensing rough surface area correlation or ocean wavenumber spectrum. The technique shows promise of directly sensing this parameter, in contrast with synthetic-aperture radar methods which are based on complex wave interaction mechanisms and mathematical transformations requiring the acquisition of voluminous data. (Author)

A83-22704* National Oceanic and Atmospheric Administration, Washington, D. C.
EQUATORIAL LONG WAVES IN GEOSTATIONARY SATELLITE OBSERVATIONS AND IN A MULTICHANNEL SEA SURFACE TEMPERATURE ANALYSIS
R. LEGECKIS, W. PICHEL (NOAA, National Earth Satellite Service, Washington, DC), and G. NESTERCZUK (EG & G Washington Analytical Services Center, Inc., Riverdale, MD) American Meteorological Society, Bulletin, vol. 64, Feb. 1983, p. 133-139. NOAA-supported research refs
(Contract NAS5-24467)

Geostationary satellite observations of a zonally oriented sea surface temperature front in the eastern equatorial Pacific were made between 1975 and 1981. Long waves appeared along the front mainly during the summer and fall, except during 1976, the year of an El Nino. The waves have averaged periods of 25 days and wavelengths of 1000 km. At the end of 1981, the long waves also were detected in a new sea surface temperature analysis based on multichannel infrared measurements from a polar-orbiting satellite. This quantitative analysis may improve the ability to resolve low-frequency equatorial wave motions from satellite observations. (Author)

A83-23277* Massachusetts Inst. of Tech., Cambridge.
ABSOLUTE MEASUREMENT BY SATELLITE ALTIMETRY OF DYNAMIC TOPOGRAPHY OF THE PACIFIC OCEAN
C.-K. TAI and C. WUNSCH (MIT, Cambridge, MA) Nature, vol. 301, Feb. 3, 1983, p. 408-410. refs
(Contract NSF OCE-80-18514; NAG6-9)

The three-month Seasat mission has shown that altimetry is capable of providing global observations of oceanic variability. It is shown that data from this short, suboptimum mission are also adequate for a determination of the absolute sea-surface topography of the ocean on large scales. An absolute determination of the subtropical gyre of the North Pacific Ocean is obtained. This is believed to be the first direct measurement showing the existence of such a feature that does not depend on conventional hydrography and a series of assumptions. C.R.

A83-23352
TRANSFER PROCESSES AT THE AIR-SEA INTERFACE
T. H. GUYMER, P. K. TAYLOR (Institute of Oceanographic Sciences, Wormley, Surrey, England), J. A. BUSINGER, K. B. KATSAROS, W. J. SHAW (Washington, University, Seattle, WA), W. G. LARGE (National Center for Atmospheric Research, Boulder, CO), and R. E. PAYNE (Woods Hole Oceanographic Institution, Woods Hole, MA) (Royal Society, Discussion on the Joint Air-Sea Interaction Proj. /JASIN/, London, England, June 2, 3, 1982.) Royal Society (London), Philosophical Transactions, Series A, vol. 308, no. 1503, Feb. 3, 1983, p. 253-272; Discussion, p. 273. refs

The measurement or estimation of surface turbulent fluxes is investigated, with attention given to characteristics of the daily mean heat and the momentum balance over the ocean. An estimation method employing a bulk aerodynamic formulation for the surface fluxes is defined, noting the use of ship and buoy data for wind and temperature as input. Wind, temperature, and humidity serve for an eddy correlation technique, and rates of molecular kinetic energy dissipation can be assayed using downstream wind velocity, air temperature, and humidity spectra obtained with shipboard instrumentation. Measurements made during the JASIN experiment were used for calibrating the Seasat-A scatterometer, which records wind speeds at the surface because of the sensitivity of microwave backscatter to the amplitude of short gravity waves produced on the sea surface by the wind. Approximately 70% of the daily heat flux has been found to be available for heating the ocean and 75% of the remaining 30% is transferred to the atmosphere as latent heat. Thermodynamic flux variations over the ocean were found to correlate with the sea surface temperature and presence of regions of cold, dry air. Two three-day case studies from the JASIN experiment are discussed. M.S.K.

A83-24280* National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
ROUGHNESS OF THE MARINE GEOID FROM SEASAT ALTIMETRY
R. D. BROWN, W. E. HIMWICH (NASA, Goddard Space Flight Center, Greenbelt, MD; Phoenix Corp., McLean, VA), W. D. KAHN, and D. C. MCADOO (NASA, Goddard Space Flight Center, Greenbelt, MD) Journal of Geophysical Research, vol. 88, Feb. 28, 1983, p. 1531-1540. refs

The geographical variability of short wavelength geoid power spectra (geoid roughness) has been mapped for the world's oceans between latitudes 72 deg N and 72 deg S. A spectral analysis of Seasat altimeter data, reduced to sea surface heights, has been performed at 2-min intervals for 15 consecutive days of the 3-day repeat orbit. The geoid roughness represented by these spectra for wavelengths shorter than about 220 km is separated from the total sea height variance and is displayed in the form of a global contour map. The global average geoid roughness is 32 cm RMS, varying from a high in excess of 2 m RMS near deep ocean trenches to a low of 2 cm RMS in the southeast Pacific near the east Pacific rise. This average value agrees well with previous estimates based on gravimetry and GEOS 3 altimetry. In general, the smoothest areas in the marine geoid overlie relatively young sea floor adjacent mid-ocean spreading centers, where even short wavelength topographic variations tend to be isostatically compensated. (Author)

A83-24282
THE DETERMINATION OF GEOID UNDULATIONS AND GRAVITY ANOMALIES FROM SEASAT ALTIMETER DATA
R. H. RAPP (Ohio State University, Columbus, OH) Journal of Geophysical Research, vol. 88, Feb. 28, 1983, p. 1552-1562. Research supported by the Ohio State University Research Foundation refs
(Contract NOAA-78-4326)

The global Seasat altimeter data set has been edited and adjusted using a crossing arc procedure fixing one long arc to provide control. The average crossover discrepancy was + or - 1.5 m before the adjustment and + or - 28 cm afterwards. The adjusted Seasat sea surface heights were used to predict point values at 1 deg x 1 deg intersections in 10 different geographic areas for comparison with corresponding Geos 3 values. A mean difference of 1.3 + or - 0.67 m was found, caused by different ellipsoid parameters. The adjusted data were also used to determine mean surface heights and gravity anomalies in equal-area blocks, some of these values being on land. The average predicted standard deviation of the 1 deg x 1 deg anomalies was + or - 5.1 mGal, and + or - 2.7 mGal for the 5 deg blocks. Seasat values were compared to the Geos 3 values, finding a difference of + or - 7.8 mGal and + or - 0.87 m for the 1 deg x 1 deg data, and + or - 2.2 mGal and + or - 0.76 m for the 5 deg data. C.D.

A83-24283* Jet Propulsion Lab., California Inst. of Tech., Pasadena.
BATHYMETRIC PREDICTION FROM SEASAT ALTIMETER DATA
T. H. DIXON, M. NARAGHI (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, CA), M. K. MCNUTT (U.S. Geological Survey, Menlo Park, CA), and S. M. SMITH (California, University, Scripps Institution of Oceanography, La Jolla, CA) Journal of Geophysical Research, vol. 88, Feb. 28, 1983, p. 1563-1571. refs

The linear response function technique is used to analyze two 1300 km tracks of Seasat altimeter data and corresponding bathymetry in the Musician Seamounts region north of Hawaii. A predictive filter is developed which can operate on Seasat altimetry in poorly surveyed oceanic regions to indicate the presence of major bathymetric anomalies. Modelling of the bathymetry-geoid correlation in the Musician region is attempted using the elastic plate model. The flexural rigidity of the plate is not well constrained by the data but appears to be in the range 5 x 10 to the 21st N m up to 5 x 10 to the 22nd N m at the time of loading. Since the Musician Seamounts and the crust on which they lie are both Late Cretaceous in age, this value represents the effective flexural rigidity of very young lithosphere that was 'frozen in' at the time of volcanism. The modelling indicates that the general form of a predictive filter will strongly depend on various geologic parameters, especially the effective flexural rigidity. C.D.

A83-24284
APPLICATION OF SEASAT ALTIMETER DATA IN SEISMOTECTONIC STUDIES OF THE SOUTH-CENTRAL PACIFIC
R. V. SAILOR (Analytic Sciences Corp., Reading, MA) and E. A. OKAL (Yale University, New Haven, CT) Journal of Geophysical Research, vol. 88, Feb. 28, 1983, p. 1572-1580. refs
(Contract NOAA-NA-79SAC00785; N00014-79-C-0292)

Seasat data over seismic locations AU5 (Macdonald Volcano) and GB5 (region C) are used to identify long-wavelength bathymetry in these epicentral areas. It is shown that these data can be efficiently used to estimate large-scale bathymetry in uncharted areas of difficult access. Both the signature of the Macdonald seamount and the amplitude of the bulge it creates on the sea surface have been successfully recognized. In the case of region C, a similar exploration fails to reveal any comparable bathymetry, but identifies the presence of an unsuspected fracture zone 70 km south of the epicentral area. This absence of correlation between seismicity and bathymetric features is in agreement with a smaller-scale survey published independently. It is concluded that this seismicity is due to intraplate stresses but is not associated with large-scale volcanism or with an active or fossil fracture zone. C.D.

A83-24285
FIRST SEASAT ALTIMETER DATA ANALYSIS ON THE WESTERN MEDITERRANEAN SEA
J. BERNARD, F. BARLIER (Centre d'Etudes et de Recherches Geodynamiques et Astronomiques, Groupe de Recherches de Geodesie Spatiale, Grasse, Alpes-Maritimes, France), J. P. BETHOUX (Paris VI, Universite, Villefranche-sur-Mer, Alpes-Maritimes, France), and M. SOURIAU (Centre National d'Etudes Spatiales, Groupe de Recherches de Geodesie Spatiale, Toulouse, France) Journal of Geophysical Research, vol. 88, Feb. 28, 1983, p. 1581-1588. Research supported by the Centre National de la Recherche Scientifique, Centre National d'Etudes Spatiales, and Universidade Federal do Parana. refs

For Seasat altimetry of the western Mediterranean Sea, trajectory problems are analyzed and the relations between the sea surface and the atmospheric, marine, and tectonic effects are considered. The effects of atmospheric pressure, wind, tides, and oceanic currents on the sea level and thus on altimetry are discussed. The satellite topography of the Mediterranean Sea surface shows irregularities which are one order of magnitude greater than the expected oceanic effects and so are mainly connected to the earth structure. The accuracy of any previous existing geoid is not better than one or two meters, whereas the Seasat satellite has allowed an accuracy of a few decimeters to be reached for the sea surface topography. Outside the Tyrrhenian zone, the correlation between bathymetry and geoid is best explained by Airy compensation with a depth of compensation of 30 km for the continental margins and of 15 to 20 km for the oceanic areas. C.D.

A83-24286*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
SURFACE ELEVATION CONTOURS OF GREENLAND AND ANTARCTIC ICE SHEETS
H. J. ZWALLY, R. A. BINDSCHADLER (NASA, Goddard Space Flight Center, Laboratory for Atmospheric Sciences, Greenbelt, MD), A. C. BRENNER, T. V. MARTIN (EG & G Washington Analytical Services Center, Inc., Riverdale, MD), and R. H. THOMAS (OAO Corp., Greenbelt, MD) Journal of Geophysical Research, vol. 88, Feb. 28, 1983, p. 1589-1596. NASA-supported research. refs

Preliminary results from Seasat radar altimetry over Antarctica north of 72 deg S and Greenland south of 72 deg N are presented. Surface elevations of the ice sheets, obtained from computer retracking of the radar altimeter waveforms, are contoured at 50-m intervals for Greenland and at 100-m intervals for Antarctica. Elevation differences at orbital crossover points are analyzed to obtain a precision of 1.9 m; this figure is partly determined by radial errors of approximately 1.0 m in orbital determination and partly by noise due to ice surface irregularities. Adjustment of the radial components of the orbits to minimize the differences in elevations at crossovers over a small, relatively flat region reduces the rms difference to 0.25 m, which is indicative of the optimum precision obtainable over the ice sheets. However, the precision degrades as the slope of the surface or amplitude of the undulations increases, yielding an overall precision of + or - 1.6 m. C.D.

A83-24287*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
USE OF SEASAT SYNTHETIC APERTURE RADAR AND LANDSAT MULTISPECTRAL SCANNER SUBSYSTEM DATA FOR ALASKAN GLACIOLOGY STUDIES
D. K. HALL and J. P. ORMSBY (NASA, Goddard Space Flight Center, Hydrological Sciences Branch, Greenbelt, MD) Journal of Geophysical Research, vol. 88, Feb. 28, 1983, p. 1597-1607. refs

Three Seasat synthetic aperture radar (SAR) and three Landsat multispectral scanner subsystem (MSS) scenes of three areas of Alaska were analyzed for hydrological information. The areas were: the Dease Inlet in northern Alaska and its oriented or thaw lakes, the Ruth and Tokositna valley glaciers in south central Alaska, and the Malaspina piedmont glacier on Alaska's southern coast. Results for the first area showed that the location and identification of some older remnant lake basins were more easily determined in the registered data using an MSS/SAR overlay than in either SAR or MSS data alone. Separately, both SAR and MSS data were useful for determination of surging glaciers based on their distinctive medial moraines, and Landsat data were useful for locating the glacier firn zone. For the Malaspina Glacier scenes, the SAR data were useful for locating heavily crevassed ice beneath glacial debris, and Landsat provided data concerning the extent of the debris overlying the glacier. C.D.

A83-24288*# EG & G Washington Analytical Services Center, Inc., Riverdale, Md.
ANALYSIS AND RETRACKING OF CONTINENTAL ICE SHEET RADAR ALTIMETER WAVEFORMS
T. V. MARTIN, A. C. BRENNER (EG & G Washington Analytical Services Center, Inc., Riverdale, MD), H. J. ZWALLY, and R. A. BINDSCHADLER (NASA, Goddard Space Flight Center, Laboratory for Atmospheric Sciences, Greenbelt, MD) Journal of Geophysical Research, vol. 88, Feb. 28, 1983, p. 1608-1616. NASA-supported research. refs

The Seasat-1 radar altimeter data set acquired over both the Antarctic and Greenland continental ice sheets is analyzed to obtain corrected ranges to the ice surface. The radar altimeter functional response over the continental ice sheets is considerably more complex than over the oceans. Causal factors identified in this complicated response include sloping surfaces, undulating ice surfaces with characteristic wavelengths on the same spatial scale as the altimeter beam-limited footprint, off-track reflections, and dynamic lag of the altimeter tracking circuit. Retracking methods using the altimeter return pulse waveforms give range corrections that are typically several meters. The entire set of Seasat-1 altimetry over the continental ice sheets is being retracked by fitting a multi-parameter function to each waveform. Many waveforms have double ramps indicating near-normal reflections from two distinct portions of the ice surface within the altimeter beam. Two independent range measurements differing by less than 25 m are obtained from retracking the double-ramp waveforms. (Author)

A83-24289*# EG & G Washington Analytical Services Center, Inc., Riverdale, Md.
SLOPE-INDUCED ERRORS IN RADAR ALTIMETRY OVER CONTINENTAL ICE SHEETS
A. C. BRENNER (EG & G Washington Analytical Services Center, Inc., Riverdale, MD), R. A. BINDSCHADLER, H. J. ZWALLY (NASA, Goddard Space Flight Center, Laboratory for Atmospheric Sciences, Greenbelt, MD), and R. H. THOMAS (OAO Corp., Greenbelt, MD) Journal of Geophysical Research, vol. 88, Feb. 28, 1983, p. 1617-1623. NASA-supported research. refs

Altimeter measurements of ranges to modelled irregular surfaces are simulated and two correction schemes are used to reconstruct the modelled surfaces from the simulated data. When the cross-track slope is negligible, the problem can be treated as two-dimensional and the relocation method is preferred to the slope correction method. In a two-dimensional test case, 85 percent of the slope-induced rms error was removed by the relocation method. The mean error along profiles of about 75 km or longer is usually reduced more than the rms error. An alternative slope correction scheme, which uses the local slope to calculate the expected error, is less effective in the two-dimensional case. Over a simulated three-dimensional surface, where groundtracks are widely spaced and cross-track slopes are significant, the slope-correction method must be used in at least the cross-track direction. C.D.

A83-24292
AN ANALYSIS OF SEASAT ALTIMETER MEASUREMENTS OVER A COASTAL AREA THE ENGLISH CHANNEL
C. LE PROVOST (Grenoble, Institut de Mecanique, Grenoble, France) Journal of Geophysical Research, vol. 88, Feb. 28, 1983, p. 1647-1654. Research supported by the Centre National de la Recherche Scientifique and Centre National pour l'Exploitation des Oceans. refs

Seasat observations made over the English Channel are analyzed in order to assess the extent to which it is possible to use satellite altimetric measurements over coastal areas. A model of tidal prediction is used to eliminate the large space and time variability of the sea surface elevation caused by tides. A numerical storm surge model is used to remove meteorological effects on sea surface variations. Analysis of six successive flights over the same ground track, during the Bermuda orbit, shows that the tidal and meteorological predictions are accurate and that the main deviations remaining in the altimetric signal result from the large impression in the satellite ephemeris of the order of several meters. An altimetric geoid is established from a detailed study of six other flights over the Channel. As a first approximation it is in good agreement with the more recent geoids produced over this area, but some significant differences can be seen C.D.

A83-24293#
THE SEA STATE CORRECTION FOR GEOS 3 AND SEASAT SATELLITE ALTIMETER DATA
B. C. DOUGLAS and R. W. AGREEN (NOAA, National Ocean Survey, Rockville, MD) Journal of Geophysical Research, vol. 88, Feb. 28, 1983, p. 1655-1661. refs

Discrepancies in the determination of the EM bias in altimetry of the ocean surface are resolved for both Geos and Seasat altimeters by reinterpreting the waveform analysis results of Hayne and Hancock (1982) and making empirical studies using very large data sets to estimate the correction required for the effect of sea state. Empirical estimates of the correction are made by finding a value that minimizes the differences of about 300 repeated pairs of altimetric profiles for each satellite. The total correction obtained is 1.9 percent of significant wave height for Geos 3 and 6.4 percent for Seasat, the latter result consistent with the analysis done at JPL on a smaller data set and the present interpretation of the Hayne and Hancock waveform analysis. C.D.

A83-24297*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
EVALUATION OF SEASAT SMMR WIND SPEED MEASUREMENTS
V. CARDONE (Oceanweather, Inc., White Plains, NY), T. CHESTER, and R. LIPES (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, CA) Journal of Geophysical Research, vol. 88, Feb. 28, 1983, p. 1709-1726. NASA-sponsored research. refs

The Seasat scanning multichannel microwave radiometer (SMMR) is able to measure the wind speed at the ocean surface through the change in ocean surface microwave emissivity caused by the wind. In this paper the SMMR-derived wind speeds are compared to the wind speeds derived from an active microwave scatterometer also aboard the Seasat, the Seasat A scanning scatterometer (SASS). Four orbits that passed over the severe storm that damaged the Queen Elizabeth II are examined in detail. These orbits and five others were used to investigate effects which degrade the SMMR wind retrievals. When the data are filtered for such effects, it is found that the SMMR winds agree with the SASS winds with a scatter (1 sigma) of less than 2 m/s about a bias of 1 to 2 m/s. (Author)

A83-24298* Jet Propulsion Lab., California Inst. of Tech., Pasadena.
L BAND RADAR BACKSCATTER DEPENDENCE UPON SURFACE WIND STRESS - A SUMMARY OF NEW SEASAT-1 AND AIRCRAFT OBSERVATIONS
T. W. THOMPSON (California Institute of Technology, Jet Propulsion Laboratory, Telecommunications Science and Engineering Div.; Science Applications, Inc., Pasadena, CA), D. E. WEISSMAN (Hofstra University, Hempstead, NY), and F. I. GONZALEZ (NOAA, Marine Environment Laboratory, Seattle, WA) Journal of Geophysical Research, vol. 88, Feb. 28, 1983, p. 1727-1735. NASA-NOAA-supported research. refs

The wind-scale relationships for L band radar wavelengths near 25 cm and 20 deg angle of incidence and HH polarization are reviewed using a number of aircraft and Seasat-1 SAR observations. The dependence of the L band backscatter coefficient from the ocean upon surface wind speed and direction is stated. The wind speed coefficient is 0.5 + or - 0.1 for a wide range of wind speeds. The wind direction coefficient is near zero for lower winds and stable marine boundary layers, but may be 0.20 + or - 0.05 for moderate wind speeds and an unstable marine boundary layer. These results are interpreted in terms of existing theoretical models for radar scattering from the ocean. C.D.

A83-24299*# Centre National d'Etudes Spatiales, Toulouse (France).
SOUTHERN OCEAN MEAN MONTHLY WAVES AND SURFACE WINDS FOR WINTER 1978 BY SEASAT RADAR ALTIMETER
N. M. MOGNARD (Centre National d'Etudes Spatiales, Toulouse, France), W. J. CAMPBELL (U.S. Geological Survey, Tacoma, WA), R. E. CHENEY, and J. G. MARSH (NASA, Goddard Space Flight Center, Greenbelt, MD) Journal of Geophysical Research, vol. 88, Feb. 28, 1983, p. 1736-1744. refs

Data acquired by the SEASAT radar altimeter during the 3 month satellite lifetime are analyzed in a study of the sea state of the southern hemisphere oceans. The lifetime of the SEASAT satellite, July 7 to October 10, 1978, corresponds to the Antarctic winter. Mean monthly maps of wind speed, significant wave height, and swell have been generated from the altimeter measurements along the satellite tracks. These maps delineate spatial and temporal differences of these parameters in the Atlantic, Indian, and Pacific oceans. Several features of the Southern Ocean wind and wave fields agree with conventional descriptions. For example, the principle zonal wind regimes established by the Southeast Trades and Westerlies are clearly evident in the monthly averages. Significant wave height and swell also exhibit minima near the Doldrums at low latitudes with steady increases southward to the latitudes of the Westerlies. However, superimposed on these general patterns is significant variability with horizontal scales as small as 1000 km. The maps also document a gradual migration of the region of absolute maximum wind and wave from the Atlantic eastward to the Indian Ocean and finally into the Pacific. (Author)

A83-24300
MONTE CARLO SIMULATIONS FOR STUDYING THE RELATIONSHIP BETWEEN OCEAN WAVE AND SYNTHETIC APERTURE RADAR IMAGE SPECTRA
W. ALPERS (Hamburg, Universitaet; Max-Planck-Institut fuer Meteorologie, Hamburg, West Germany) Journal of Geophysical Research, vol. 88, Feb. 28, 1983, p. 1745-1759. Deutsche Forschungsgemeinschaft refs
(Contract DEG-SFB-94)

The basic features of the ocean wave spectrum-SAR image spectrum relationship are elucidated with a Monte Carlo simulation. The procedure for the model calculations is outlined, and the approximation of the ocean wave field by a superposition of a finite number of harmonic components is described. The formulas used for describing the SAR imaging mechanisms are stated, and the parameters used in the computer runs are given. Some examples of Monte Carlo runs are presented, and the results of the calculations are summarized and discussed. It is found that if the nonlinearity of the images is sufficiently strong, then the peak of the SAR image spectrum is shifted towards lower azimuthal wave numbers. The amount of the azimuthal shift of the spectral peak depends on the average velocity bunching parameter, SAR integration time, and on the width of the ocean wave spectrum. It increases with integration time and spectral width. C.D.

A83-24301* Applied Physics Lab., Johns Hopkins Univ., Laurel, Md.

LARGE- AND SMALL-SCALE SPATIAL EVOLUTION OF DIGITALLY PROCESSED OCEAN WAVE SPECTRA FROM SEASAT SYNTHETIC APERTURE RADAR

R. C. BEAL, D. G. TILLEY, and F. M. MONALDO (Johns Hopkins University, Applied Physics Laboratory, Laurel, MD) Journal of Geophysical Research, vol. 88, Feb. 28, 1983, p. 1761-1778. NOAA-NASA-Navy supported research. refs

The threshold behavior of the azimuth response falloff in Seasat SAR imagery and its implications with respect to existing wave imaging theories is examined. The large-scale spatial evolution of a set of eight SAR image spectra with adjacent spacing of about 100 km, spanning about 700 km along the satellite orbit is considered. The small-scale evolution of a sequence of 23 spectra with adjacent spacing of about 2.2 km, spanning only about 48 km but experiencing depth changes from 200 to 35 m as well as unknown currents in the vicinity of the continental shelf is studied. The large-scale spatial evolution of the spectrum is generally consistent with the location of wave-generating sources, even when multiple wave systems are present. On a more local scale, the nearshore wave number spectrum responds to local depth changes but is too noisy to respond reliably to local current changes. C.D.

A83-24302

SEASAT WAVE HEIGHT MEASUREMENT - A COMPARISON WITH SEA-TRUTH DATA AND A WAVE FORECASTING MODEL - APPLICATION TO THE GEOGRAPHIC DISTRIBUTION OF STRONG SEA STATES IN STORMS

P. QUEFFEULOU (Centre National pour l'Exploitation des Oceans, Centre Oceanologique de Bretagne, Brest, France) Journal of Geophysical Research, vol. 88, Feb. 28, 1983, p. 1779-1788. refs

A83-24304

SCYLLA AND CHARYBDIS OBSERVED FROM SPACE

W. ALPERS (Hamburg, Universitaet; Max-Planck-Institut fuer Meteorologie, Hamburg, West Germany) and E. SALUSTI (Istituto Nazionale di Fisica Nucleare, Rome, Italy) Journal of Geophysical Research, vol. 88, Feb. 28, 1983, p. 1800-1808. refs

Experimental evidence is presented that internal waves are generated at the Strait of Messina. The evidence is taken from Seasat SAR observations made on Sept. 15, 1978 and from subsequent in situ measurements taken from aboard ship in November 1980. The oceanographic conditions in the Strait are described, and the generation mechanism is linked to tidal currents washing over the shallow sill within the strait. The circular wave pattern visible on the Seasat SAR is interpreted in terms of internal solitons, including nonlinear internal wave trains and tidal bores. Finally, the SAR imaging mechanism of internal waves is addressed. C.D.

A83-24305#

SAR IMAGERY AND SURFACE TRUTH COMPARISONS OF INTERNAL WAVES IN GEORGIA STRAIT, BRITISH COLUMBIA, CANADA

B. A. HUGHES (Defence Research Establishment Pacific, Victoria, Canada) and J. F. R. GOWER (Institute of Ocean Sciences, Sidney, British Columbia, Canada) Journal of Geophysical Research, vol. 88, Feb. 28, 1983, p. 1809-1824. refs

The surface roughness patterns caused by internal waves in Georgia Strait on the west coast of Canada were used as an imagery target for the SEASAT synthetic aperture radar (SAR) on July 30, 1978. In these patterns there is strong modulation of short surface waves including the Bragg wavelength for resonant microwave reflection. In the sheltered waters of the strait, the complicating effects of longer waves are greatly reduced. The roughness patterns were also observed with an airborne SAR, by aerial photography, and by shipborne surface roughness and subsurface current measurements. The data show the response of the SAR's to the anisotropic roughness patterns measured by the ship. The SAR signal intensity is shown to be moderately correlated with Bragg wave or total roughness energy, but not with the facet area aligned to give specular reflection. (Author)

A83-24307* Jet Propulsion Lab., California Inst. of Tech., Pasadena.

SOME EXAMPLES OF DETECTION OF OCEANIC MESOSCALE EDDIES BY THE SEASAT SYNTHETIC-APERTURE RADAR

L.-L. FU and B. HOLT (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, CA) Journal of Geophysical Research, vol. 88, Feb. 28, 1983, p. 1844-1852. NASA-supported research. refs

This note presents images of three dynamically different regions in the ocean to demonstrate the variety of mesoscale variabilities detected by the Seasat synthetic-aperture radar (SAR). South of the Grand Banks of Newfoundland, a cold eddy is observed to form as the result of the southward intrusion of Labrador Sea water, perhaps having led to the birth of a Gulf Stream extension ring. Off the northern coast of California, features resulting from the offshore intrusions of cold upwelling water are observed. Two topographically generated eddies are detected near Misteriosa Bank on the Cayman Ridge in the northwestern Caribbean. Comparisons are made with concurrent NOAA-5 infrared images whenever the eddies have thermal signatures. (Author)

A83-24308

OBSERVATIONS OF EDDY FIELDS IN THE NORTHWEST ATLANTIC AND NORTHWEST PACIFIC BY SEASAT ALTIMETER DATA

Y. MENARD (Centre National d'Etudes Spatiales, Groupe de Recherches de Geodesie Spatiale, Toulouse, France) Journal of Geophysical Research, vol. 88, Feb. 28, 1983, p. 1853-1866. Research supported by the Centre National d'Etudes Spatiales; Centre National Pour l'Exploitation des Oceans refs

(Contract CNEXO-79/2058)

Sea level variability, related to the eddy field activity, can be calculated from repeating tracks of altimetric data, such as the Seasat 3-day repeat data (September 13 to October 10, 1978). If the eddy field in geostrophic balance is considered, the geostrophic relation gives the surface eddy velocities. Also, an estimation of the eddy kinetic energy can be deduced under the assumption of quasi-isotropy of the velocity variability. This approach is used in the northwest Atlantic and northwest Pacific through the processing of Seasat data. High variability of sea surface topography (up to 20 cm) and high eddy kinetic energy (800-1600 sq cm/sq sec) are detected in the vicinity of the Gulf Stream and the Kuroshio. Power spectra of the observed sea level fluctuations give wavelengths ranging from 100 to 900 km for time scales between 3 and 25 days. Maps of sea surface topography variability and eddy kinetic energy are presented and discussed. (Author)

A83-24309*# National Oceanic and Atmospheric Administration, Boulder, Colo.

INTERPRETATION OF SYNTHETIC APERTURE RADAR MEASUREMENTS OF OCEAN CURRENTS

C. L. RUFENACH (NOAA, Wave Propagation Laboratory, Boulder, CO), R. A. SHUCHMAN, and D. R. LYZENGA (Michigan, Environmental Research Institute, Ann Arbor, MI) Journal of Geophysical Research, vol. 88, Feb. 28, 1983, p. 1867-1876. refs

(Contract NOAA-MO-A01-78-00-43322; NASA ORDER W-15084)

Synthetic Aperture Radar (SAR) experiments have been performed over the last few years to measure ocean currents inferred from shifts in the Doppler spectral peak. Interpretations of aircraft SAR measurements, when compared with limited surface values, tend to underestimate the currents by about 25%. A theory is developed that modifies the classical Doppler expression showing that the radar measurements are dependent on the radar processor (system) bandwidth and the received signal bandwidth. Measured bandwidths give a correction that increases the inferred current values by about 25%, bringing the measurements into good agreement. This new correction lends credence to the theory and increases the potential for application of SAR systems to future ocean current measurements. SAR measurements should include the determination of processor and signal bandwidths such that this correction can be applied. (Author)

A83-24310
TROPICAL AND MID-LATITUDE NORTH PACIFIC SEA SURFACE TEMPERATURE VARIABILITY FROM THE SEASAT SMMR
R. L. BERNSTEIN (California, University, La Jolla; Poseidon Research, Del Mar, CA) and J. H. MORRIS (Poseidon Research, Del Mar, CA) Journal of Geophysical Research, vol. 88, Feb. 28, 1983, p. 1877-1891. refs
(Contract NOAA-NA-81SAC00755)

Seasat Scanning Multichannel Microwave Radiometer sea surface temperature (SST) data for the midlatitude North Pacific and eastern tropical Pacific have been examined in detail for the entire three-month mission from early July to early October 1978. The dominant systematic errors are examined, and a table of corrections is constructed. The corrections are applied to the data for the North Pacific, extending the earlier Bernstein (1982) results to cover the entire midlatitude region from Japan to North America, with a comparison against ship-based data. The corrections are further applied to create maps of the eastern tropical Pacific. In both the midlatitude and tropical areas, the major variations in SST are described along with some discussion of the physical processes that produce the observed variability. C.D.

A83-24312
TROPICAL PACIFIC SEA SURFACE TEMPERATURES MEASURED BY SEASAT MICROWAVE RADIOMETER AND BY SHIPS
C.-T. LIU (NOAA, Pacific Marine Environmental Laboratory; Washington, University, Seattle, WA) Journal of Geophysical Research, vol. 88, Feb. 28, 1983, p. 1909-1914. NOAA-supported research. refs

Scanning multichannel microwave radiometer (SMMR) sea surface temperature (SST) data from the Seasat satellite are compared with surface measurements in the eastern and central tropical Pacific. SMMR measures microwave radiation emitted at the sea surface in five frequencies and two polarizations. An algorithm has been developed to correct for the atmospheric and sea state effects on the intensity of the radiation received at the sensors. A sea truth SST field was developed from ship, drifter buoy, and aircraft data taken during 1975-1980, and compared with Seasat readings from the same area. The SMMR data is spatially averaged, uniformly distributed, and periodically reviewed, while the ship SST are point measured and concentrated along shipping lanes. Application of the same data screening methods to both data sets yields a 0.8 C bias and a 0.8 C standard deviation for the SMMR data relative to the ship SST figures. The SMMR data carry all the features of the SST soundings, plus provide information on the boundaries of the thermal structures. It is concluded that the two data sets are complementary in the construction of SST fields. D.H.K.

A83-24313* Technische Univ., Graz (Austria).
SEA ICE MOTION MEASUREMENTS FROM SEASAT SAR IMAGES
F. LEBERL, J. RAGGAM (Graz, Technische Universitaet, Graz Research Center, Graz, Austria), C. ELACHI (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, CA), and W. J. CAMPBELL (U.S. Geological Survey, Tacoma, WA) Journal of Geophysical Research, vol. 88, Feb. 28, 1983, p. 1915-1928. Research supported by the Bundesministerium fuer Wissenschaft und Forschung refs
(Contract NAS7-100; BMFWF PROJECT NR, 6931/3-27)

Data from the Seasat synthetic aperture radar (SAR) experiment are analyzed in order to determine the accuracy of this information for mapping the distribution of sea ice and its motion. Data from observations of sea ice in the Beaufort Sea from seven sequential orbits of the satellite were selected to study the capabilities and limitations of spaceborne radar application to sea-ice mapping. Results show that there is no difficulty in identifying homologue ice features on sequential radar images and the accuracy is entirely controlled by the accuracy of the orbit data and the geometric calibration of the sensor. Conventional radargrammetric methods are found to serve well for satellite radar ice mapping, while ground control points can be used to calibrate the ice location and motion measurements in the cases where orbit data and sensor calibration are lacking. The ice motion was determined to be approximately 6.4 + or - 0.5 km/day. In addition, the accuracy of pixel location was found over land areas. The use of one control point in 10,000 sq km produced an accuracy of about + or 150 m, while with a higher density of control points (7 in 1000 sq km) the location accuracy improves to the image resolution of + or - 25 m. This is found to be applicable for both optical and digital data. N.B.

A83-24338
SURVEY OF A GULF STREAM FRONTAL FILAMENT
L. J. PIETRAFESA (North Carolina State University, Raleigh, NC) Geophysical Research Letters, vol. 10, Mar. 1983, p. 203-206. refs
(Contract DE-AS09-78EY-00902)

An assortment of data is used to map and characterize a Gulf Stream filament. During 21-25 April 1980, a filament was captured as it moved through an array of moored current meters on the northeast Florida continental shelf. Current and temperature time series along with satellite VHRR and aircraft ART are used to reconstruct the event. The event is found to consist of an anticyclonically rotating, warm tongue inshore of a cold dome. The rotational scheme of the current in the warm tongue is opposite to previous hypotheses. Upwelling occurs in both the cold dome region and below the warm tongue. (Author)

A83-24556#
REMOTE SENSING OF COASTAL PROCESSES WITH EMPHASIS ON THE NILE DELTA
V. KLEMAS (Delaware, University, Newark, DE) and A. M. F. ABDEL-KADER (Mansoura University, Mansoura, Egypt) In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 1. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 389-415. refs

A83-24557#
SOME RESULTS FROM EXPERIMENTS ON REMOTE SENSING OF WATER QUALITY AND OIL POLLUTION IN THE MEDITERRANEAN SEA
B. MOLLER SORENSEN, B. STURM, and S. TASSAN (Commission of the European Communities, Joint Research Centre, Ispra, Italy) In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 1. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 417-424. refs

A83-24599#
ANALYSIS OF BATHYMETRY AND SUBMARINE TOPOGRAPHY OFF THE COAST OF EAST-CENTRAL TUNISIA WITH LANDSAT MULTISPECTRAL DATA
P. A. DAVIS, M. J. GROLIER, P. T. ELIASON, and P. A. SCHULTEJANN (U.S. Geological Survey, Flagstaff, AZ) In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 2. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 859-876. refs

A83-25146#
SATELLITE SENSORS FOR THE STUDY OF METEO-OCEANIC PARAMETERS [LES CAPTEURS SATELLITAIRES POUR L'ETUDE DES PARAMETRES METEO-OCEANIQUES]
T. PHULPIN (Meteorologie Nationale, Boulogne-Billancourt, Hauts-de-Seine, France) La Meteorologie, Mar. 1982, p. 39-59. In French. refs

The theoretical principles upon which active and passive remote sensing of the earth from space are based are reviewed, and attention is given to meteorological and oceanological parameters available with spaceborne sensors. Passive remote sensing comprises detection of emissions at the surface given off by target scenes, e.g., thermal radiation, or measurement of the sunlight reflected by the surface. Active sensing is performed with either radar or lasers, with the emissions originating from the spacecraft and also received at the spacecraft. Microwave radiometry relies on the spectral bandwidth, the ground resolution, and the thermal (noise) resolution of the measurement to determine the quality of the data. The performance characteristics of the SMMR instrumentation on the Nimbus 7 and Seasat A satellites are detailed, together with the operational factors involved in radar altimetry for imaging, e.g., the sea surface. Scatterometer features are described, together with applications to determine wave height, track ocean currents, sense depth in deep waters, and to detect surface temperature. Additional observations of surface wind speeds, atmospheric pollution, sea ice behavior, plankton concentrations, and water salinity are noted. M.S.K.

A83-25973* Delaware Univ., Newark.
THE EFFECT OF OCEANIC WHITECAPS AND FOAMS ON PULSE-LIMITED RADAR ALTIMETERS
Q. A. ZHENG (Delaware, University, Newark, DE; National Bureau of Oceanography, Qingdao, People's Republic of China), V. KLEMAS (Delaware, University, Newark, DE), G. S. HAYNE, and N. E. HUANG (NASA, Wallops Flight Center, Wallops Island, VA) Journal of Geophysical Research, vol. 88, Mar. 20, 1983, p. 2571-2578. refs

Based on electromagnetic field theory of stratified media, the microwave reflectivity of a sea surface covered by whitecaps and foams at 13.9 GHz was computed. The computed results show that the reflectivity declines with increasing thickness of foams. The reflectivity of the sea surface without any whitecaps or foams is 0.6066 (20 C, S:35 per thousand), but it will be less than 0.15 when the thickness of foam cover is more than 0.3 cm. While gathering the data of whitecap and foam coverage in situ and reviewing whitecapping models, it can be shown that the effect of oceanic whitecaps and foams on the measured results of a pulse-limited radar altimeter working at high frequencies will not be negligible in high sea state conditions. (Author)

A83-25974
HIGH RESOLUTION SPECTRAL ESTIMATION OF SYNTHETIC APERTURE RADAR OCEAN WAVE IMAGERY
P. L. JACKSON (Michigan, University; Michigan, Environmental Research Institute, Ann Arbor, MI) and R. A. SHUCHMAN (Michigan, Environmental Research Institute, Ann Arbor, MI) Journal of Geophysical Research, vol. 88, Mar. 20, 1983, p. 2593-2600. refs
(Contract N00014-76-C-1048)

A new two-dimensional spectral estimation procedure, termed semicausal, is applicable to analysis of ocean gravity waves. Spectral estimates of both reference functions and actual synthetic aperture radar data of ocean waves have been generated using semicausal techniques and compared to fast Fourier transform estimates of identical data sets. The semicausal method can successfully generate spectral estimates of truncated data sets and data sets with two closely spaced frequency components. The semicausal estimate is sensitive to the autoregressive order and exhibits spectral splitting in some cases. Its noise sensitivity is similar to that of the Fourier transform. (Author)

A83-25975#
SEASAT-DERIVED OCEAN SURFACE TOPOGRAPHY - COMPARISON WITH COINCIDENT KUROSHIO HYDROGRAPHIC DATA
H. M. BYRNE and P. E. PULLEN (NOAA, Pacific Marine Environmental Laboratory, Seattle, WA) Journal of Geophysical Research, vol. 88, Mar. 20, 1983, p. 2621-2625. refs

During the SEASAT repeat-orbit period, a CTD and deep (1800 m) XBT hydrographic experiment was conducted across the Kuroshio to obtain contemporaneous surface topography measurements for comparison with the altimeter-derived surface height measurements. The results showed that the altimeter could detect and measure the change in a sea surface topography caused by movement of the Kuroshio and the cold rings that were found in the hydrographic data. After compensation for the small differences in the time of the measurements, the altimeter measured changes in the surface topography that matched those measured by the hydrographic sections with an average difference of 9.6 cm for the 41 comparison points. (Author)

A83-26267
BATHYMETRIC AND OCEANOGRAPHIC APPLICATIONS OF KALMAN FILTERING TECHNIQUES
R. F. BRAMMER, R. P. PASS, and J. V. WHITE (Analytic Sciences Corp., Reading, MA) IEEE Transactions on Automatic Control, vol. AC-28, Mar. 1983, p. 363-371. refs

Ocean currents and seamounts (underwater mountains) can be mapped by analyzing data from satellite radar altimeters. This paper describes the application of Kalman filtering techniques to the analysis of such data acquired during the SEASAT mission. The altimeter data are modeled as samples from autoregressive random processes. Based on these models, matched filters are used to detect the characteristic nonstationarities in the altimeter data caused by seamounts and ocean currents such as the Gulf stream. The geostrophic velocities of detected ocean currents are then estimated using Kalman smoothers. A useful formula is derived, which expresses the error power spectrum of the optimal fix lag smoother as a function of the lag and the error spectra of the optimal filter and the optimal infinite-lag smoother. (Author)

A83-26345*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
NIMBUS 7 SMMR OBSERVATIONS OF THE BERING SEA ICE COVER DURING MARCH 1979
D. J. CAVALIERI, P. GLOERSEN (NASA, Goddard Space Flight Center, Laboratory for Atmospheric Sciences, Greenbelt, MD), and S. MARTIN (Washington, University, Seattle, WA) Journal of Geophysical Research, vol. 88, Mar. 30, 1983, p. 2743-2754. NASA-supported research refs
(Contract NOAA-MO-AO1-78-00-4335)

Sea ice concentration contour maps derived from the 0.81 cm wavelength channels on the Nimbus 7 scanning multichannel microwave radiometer (SMMR) are compared with surface and aircraft data and with sea ice charts derived from the TIROS-N satellite imagery. The regional ice and weather data and the derivation of the TIROS ice charts are discussed, and the Nimbus 7 SMMR data and the physical basis of the algorithm used to retrieve ice concentrations are described. A detailed comparison of the SMMR imagery with all available surface, satellite, and meteorological data for two days in March, 1979 is made. The results show that the ice concentration maps derived from the 0.81 cm wavelength SMMR radiances provide accurate information on both the ice edge position and the location of low and high ice concentration regions within the Bering Sea pack ice. C.D.

A83-26346* National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

ON THE SEASONAL SEA ICE COVER OF THE SEA OF OKHOTSK

C. L. PARKINSON (NASA, Goddard Space Flight Center, Laboratory for Atmospheric Sciences, Greenbelt, MD) and A. J. GRATZ (Princeton University, Princeton, NJ) Journal of Geophysical Research, vol. 88, Mar. 30, 1983, p. 2793-2802. NASA-supported research. refs

Satellite microwave imagery has allowed determination of sea ice conditions in the Sea of Okhotsk over years 1973-1976. Comparisons of the general features of the cycle of sea ice distribution with basic oceanographic factors shows that ice forms first in cold, shallow, low-salinity waters and then seems to drift in a direction approximating the Okhotsk-Kuril current system. The heaviest ice cover occurred in 1973, followed by a much weaker ice cover in 1974. Only the 1972-73 growth season experienced close to monotonic advance. A much greater weakening of the ice cover through polynya formation occurred during the 1976 decay season than in any of the other three years. Two fairly common ice macrostructures in the Sea of Okhotsk were identified as a rectangular structure and a wedge structure; these are strongly correlated with the bathymetry of the region and with the known current system. C.D.

A83-26494

INFLUENCE OF SEA ROUGHNESS AND ATMOSPHERIC INHOMOGENEITIES ON MICROWAVE RADIATION OF THE ATMOSPHERE-OCEAN SYSTEM

S. P. GAGARIN and B. G. KUTUZA (Akademiia Nauk SSSR, Institut Radiotekhniki i Elektroniki, Moscow, USSR) IEEE Journal of Oceanic Engineering, vol. OE-8, Apr. 1983, p. 62-70. refs

A discussion of the influence of sea roughness and spatial atmospheric inhomogeneities on the precision of satellite microwave radiometric measurements of the atmospheric parameters is presented. The two-scale model for microwave radiation of the ruffled sea surface without foam and spray is confirmed by experimental measurements. Investigations of the brightness temperature fluctuations of the clear and cloudy atmosphere are made using aircraft experimental measurements at the wavelengths 0.8 and 1.35 cm. Calculations of the radiation averaged over a satellite antenna footprint are carried out on the basis of these results and of well-known results of optical and infrared measurements. It is shown that sea roughness and the nonuniformity of clouds may result in errors in the integrated atmosphere water vapor and cloud liquid water content determination by satellite two-wavelength (0.8 and 1.35 cm) radiometric measurements up to 30 and 70 percent, respectively. (Author)

A83-26495* Maryland Univ., College Park.

A SEA SURFACE HEIGHT ESTIMATOR USING SYNTHETIC APERTURE RADAR COMPLEX IMAGERY

R. O. HARGER (Maryland, University, College Park, MD) IEEE Journal of Oceanic Engineering, vol. OE-8, Apr. 1983, p. 71-78. Research supported by the University of Maryland and Environmental Research Institute of Michigan refs

(Contract N00014-76-C-1048; N00014-81-C-0692; NAGW-387)

A method is developed for estimating the sea surface height using the complex imagery from synthetic aperture radar (SAR). Algorithms are developed for the envelope and phase demodulation, regression, and filtering of the SAR complex imagery and are applied to simulated and actual satellite radar SEASAT-SAR data. A simulation of a simplified stationary scene is utilized in order to establish tentative sufficient conditions on large-scale SAR and sampling parameters for the accurate estimation of the scale structure's height. It is shown that the algorithm accurately estimated a long wavelength low-amplitude sea height structure present in the SEASAT-SAR data, which was determined to be consistent with observations. N.B.

A83-26497* Environmental Research Inst. of Michigan, Ann Arbor.

SYNTHETIC APERTURE RADAR IMAGING OF OCEAN WAVES DURING THE MARINELAND EXPERIMENT

R. A. SHUCHMAN (Michigan, Environmental Research Institute, Radar Div., Ann Arbor, MI) and O. H. SHEMDIN (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, CA) IEEE Journal of Oceanic Engineering, vol. OE-8, Apr. 1983, p. 83-90. refs

(Contract N00014-76-C-1048; N00014-76-MP-60029; NAS7-100 ; NOAA-04-6-158-44078)

Wave contrast measurements are used to analyze X and L-band simultaneously obtained synthetic aperture radar (SAR) data of ocean gravity waves collected during the Marineland Experiment (1975). The results of the wave contrast measurements show that the ocean waves imaged by a SAR are more discernible using an X-band frequency than an L-band frequency and when the ocean waves are traveling in the range direction. It is determined that ocean waves can be detected by both X and L-band SAR, provided that the radar surface resolution is a small compared to the ocean wavelength. In addition, wave detection using L-band SAR can be improved by adjusting the focal distance and rotation of the cylindrical telescope in the SAR optical processor to account for wave motion. This adjustment is determined to be proportional to a value that is near the wave phase velocity. N.B.

A83-26499

REAL-TIME SEA-STATE SURVEILLANCE WITH SKYWAVE RADAR

T. M. GEORGES, J. P. RILEY (NOAA, Wave Propagation Laboratory, Boulder, CO), J. W. MARESCA, JR., and C. T. CARLSON (SRI International, Menlo Park, CA) IEEE Journal of Oceanic Engineering, vol. OE-8, Apr. 1983, p. 97-103. refs

(Contract NOAA-03-7-022-35111)

A signal processing strategy is developed to extract sea-state information from the ionospherically distorted echoes received by an HF skywave radar which permits real-time decisions about the quality of the incoming data. An on-line array processor is used to quickly compute all the spectra required to display ocean waveheight, as well as several indices of data quality, while the radar maps an ocean cell. Results are presented for a test using an experimental radar that mapped waveheight over a coverage area in the North Pacific Ocean. The coverage efficiency was determined to be 85%, while the radar's waveheight estimates averaged 0.6 m higher than those forecast by a numerical model. It is concluded that this signal processing strategy efficiently processes the radar echo and displays enough information to allow the radar operator to assess incoming data quality and to search for windows of low ionospheric distortion. N.B.

A83-26598

SOFTWARE FOR AUTOMATIC CONTROL OF SPACECRAFT INSTRUMENTS

A. S. JOHNSON (ESA, European Space Operations Centre, Darmstadt, West Germany) In: Control science and technology for the progress of society; Proceedings of the Eighth Triennial World Congress, Kyoto, Japan, August 24-28, 1981. Volume 4. Part B. Oxford, Pergamon Press, 1982, p. 2329-2335.

The ground-based control system of the European Space Operations Center, which operates in a closed loop with the GEOS satellite, adapts particle- and wavefield phenomena-measuring instruments in keeping with the changing space environment. After detailing the design characteristics of this control scheme's data processing system, a discussion is presented of the trends in this field toward distribution of control among the spacecraft instruments. Attention is given to the advantages and disadvantages of the use of microprocessors for distributed intelligence spacecraft systems. O.C.

A83-26644*# Bigelow Lab. for Ocean Sciences, West Boothbay Harbor, Maine.

BASIS FOR SPECTRAL CURVATURE ALGORITHMS IN REMOTE SENSING OF CHLOROPHYLL

J. W. CAMPBELL (Bigelow Laboratory for Ocean Sciences, West Boothbay Harbor, ME) and W. E. ESAIAS (NASA, Washington, DC) Applied Optics, vol. 22, Apr. 1, 1983, p. 1084-1098. refs

A simple, empirically derived algorithm for estimating oceanic chlorophyll concentrations from spectral radiances measured by a low-flying spectroradiometer has proved highly successful in field experiments in 1980-82. The sensor used was the Multichannel Ocean Color Sensor, and the originator of the algorithm was Grew (1981). This paper presents an explanation for the algorithm based on the optical properties of waters containing chlorophyll and other phytoplankton pigments and the radiative transfer equations governing the remotely sensed signal. The effects of varying solar zenith, atmospheric transmittance, and interfering substances in the water on the chlorophyll algorithm are characterized, and applicability of the algorithm is discussed. (Author)

A83-28143

REMOTE SENSING OF THERMAL FRONTS [LA TELEDETECTION DES FRONTS THERMIQUES]

M. CHAMPAGNE-PHILIPPE, L. HARANG, and J. LE VOURCH (Meteorologie Nationale, Centre de Meteorologie Spatiale, Lannion, Cotes-du-Nord, France) Societe Francaise de Photogrammetrie et de Teledetection, Bulletin, no. 86, 1982, p. 5-23. In French.

The capability of the Tiros and NOAA-6 satellites to inventory marine warm fronts is explored. The fronts are detected by means of IR radiometry of areas with large thermal gradients induced on the sea surface. Synoptic views are acquired using the 10.5-11.5 micron band of the Advanced Very High Resolution Radiometer on board the spacecraft, and analyzed by means of the Planck function to obtain the radiometric temperature of the sea surface. Grey levels corresponding to 0.5 C differences are generated, while the thermal fronts are characterized by a 1 C gradient over 5 km distance. Daily maps are generated and combined once a week for distribution. The data is used for meteorology, fishing, pollution monitoring, and climatology. M.S.K.

A83-29562

ON THE INFLUENCE OF ROUGH WATER SURFACES ON POLARIMETRIC INVESTIGATIONS OF AEROSOLS FROM SPACE

T. PROSCH, D. HENNINGS, and E. RASCHKE (Koeln, Universitaet, Cologne, West Germany) (COSPAR, Topical Meeting on Space Observations of Aerosols and Ozone, Ottawa, Canada, May 16-June 2, 1982) Advances in Space Research (ISSN 0273-1177), vol. 2, no. 5, 1982, p. 33-38. refs

It has been found that the measurement of spectral radiance with the aid of satellite-borne systems represents an excellent approach for determining atmospheric parameters and surface characteristics. The quantities determined in this manner on a global scale include temperature profiles, water vapor content, and ozone concentration. There exist, however, often discrepancies regarding the numerical parameter values obtained with different types of instruments. One approach to overcome these difficulties involves the utilization of polarization phenomena. However, satellite data inversion techniques of polarization data concerned with aerosol concentration, refractive index, and size distribution can only be applied effectively if some information regarding the suface characteristics is available. In this connection, model calculations are presented with the objective to display the effect of highly anisotropic polarizing reflectors on polarization measurements from space. Ground-based measurements indicate that the model assumptions are realistic. G.R.

A83-29676

WEATHER SATELLITES: STEREOSCOPY AND SOUNDING; PROCEEDINGS OF THE TOPICAL MEETING, OTTAWA, CANADA, MAY 16-JUNE 2, 1982

H. YATES, ED. (NOAA, National Earth Satellite Service, Washington, DC) and A. F. HASLER (NASA, Goddard Space Flight Center, Greenbelt, MD) Meeting sponsored by COSPAR. Advances in Space Research (ISSN 0273-1177), vol. 2, no. 6, 1982, 185 p.

Attention is given to the validation of meteorological satellite observing systems and to stereoscopic observations from meteorological satellites. Particular papers are presented on such topics as the comparison of cloud top heights measured by airborne lidar and TIROS-N image data, the determination of surface global radiation using Meteosat images and ground-based visibility measurements, multichannel improvements to satellite-derived global sea surface temperatures, validation of the Stratospheric Sounding Unit, and the international comparison of satellite winds. Also considered is tropical storm structure revealed by stereo photographs from Skylab, stereo imaging from polar orbit and synthetic stereo imaging, simultaneous measurements of sea surface temperature by GMS-1 and GMS-2, and real-time spectroscopic applications using the GOES operational satellites. For individual items see A83-29677 to A83-29702 B.J.

A83-29683

SEA SURFACE TEMPERATURE MEASUREMENT FROM SATELLITES VALIDATION AND ACCURACY

A. CHEDIN and N. A. SCOTT (CNRS, Laboratoire de Meteorologie Dynamique, Palaiseau, Essonne, France) (COSPAR, Topical Meeting on Weather Satellites: Stereoscopy and Sounding, Ottawa, Canada, May 16-June 2, 1982) Advances in Space Research (ISSN 0273-1177), vol. 2, no. 6, 1982, p. 35-41. refs

Recent published results on the accuracy of satellite-derived sea surface temperature (SST) estimation are reviewed. Consideration is given to two types of platforms, i.e., orbiting and geosynchronous satellites, and to the accuracy that may now be expected from such systems. Particular emphasis is placed on the improvement in the global mapping of SST achieved through the use of the Advanced Very High Resolution Radiometer (AVHRR) on the NOAA operational polar satellites. Tests of the AVHRR SSTs against a high-reliability data set indicate biases of less than 0.1 C and rms differences of less than 0.75 C. Attention is also given to a method for adding along-track scanning capability to the current multichannel AVHRR technique; this method is demonstrated on the coupling of an orbiting satellite (TIROS-N) and a geosynchronous satellite (Meteosat). B.J.

A83-29684

MULTI-CHANNEL IMPROVEMENTS TO SATELLITE-DERIVED GLOBAL SEA SURFACE TEMPERATURES

E. P. MCCLAIN, W. G. PICHEL, C. C. WALTON (NOAA, National Earth Satellite Service, Washington, DC), Z. AHMAD, and J. SUTTON (Systems and Applied Sciences Corp., Riverdale, MD) (COSPAR, Topical Meeting on Weather Satellites: Stereoscopy and Sounding, Ottawa, Canada, May 16-June 2, 1982) Advances in Space Research (ISSN 0273-1177), vol. 2, no. 6, 1982, p. 43-47. refs

High-quality multispectral measurements from satellites, and the recent development of multiple-window techniques to correct infrared brightness tempertures for atmospheric attenuation, have enabled marked improvements in global mapping of sea surface temperatures. The 4-km resolution data are in two visual bands and three atmospheric windows in the thermal infrared from the advanced Very High Resolution Radiometer (AVHRR) on NOAA's operational polar satellites. Various threshold and/or spatial homogeneity tests are applied to small data arrays to discriminate nominally cloud-free samples for subsequent processing. Tests of the multi-channel equations against independent buoy data gave bias = 0.42C and scatter = 0.62C. Global statistical comparisons with ships indicate significant improvements in accuracy and coverage over previous satellite-derived surface temperatures. Author

A83-29701
SIMULTANEOUS MEASUREMENTS OF SEA SURFACE TEMPERATURE BY GMS-1 AND GMS-2
Y. TAKAYAMA, T. TAKASHIMA, K. MATSUURA, and K. NAITO (Meteorological Research Institute, Tsukuba, Japan) (COSPAR, Topical Meeting on Weather Satellites: Stereoscopy and Sounding, Ottawa, Canada, May 16-June 2, 1982) Advances in Space Research (ISSN 0273-1177), vol. 2, no. 6, 1982, p. 165-172.
In order to obtain accurate measurements of sea surface temperature in the 11-micron window, it is necessary to eliminate the effect of atmospheric absorption. This can be done by the use of two geosynchronous satellites, which observe a common area from two different elevation angles. In order to correct for the atmospheric effects, a comparison was made of infrared data acquired from observations at about the same time (less than one minute apart) on the equator using the GMS-1 and GMS-2 satellites, which had a longitudinal separation of about 20 deg. It was found that if the IR spectral channel of one geosynchronous satellite is chosen to be different from that of the other, it is possible to improve the two-satellite technique for estimating water-vapor content in the tropical atmosphere. B.J.

N83-16595*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
THE SIR-B SCIENCE PLAN
1 Dec. 1982 85 p refs Sponsored by NASA Original contains color illustrations
(NASA-CR-169793; JPL-PUB-82-78; NAS 1.26:169793) Avail: NTIS HC A05/MF A01 CSCL 17I
The Shuttle Imaging Radar-B (SIR-B) will be the third in a series of spaceborne SAR experiments conducted by NASA which began with the 1978 launch of SEASAT and continued with the 1981 launch of SIR-A. Like SEASAT and SIR-A, SIR-B will operate at L-band and will be horizontally polarized. However, SIR-B will allow digitally processed imagery to be acquired at selectable incidence angles between 15 and 60 deg, thereby permitting, for the first time, parametric studies of the effect of illumination geometry on SAR image information extraction. This document presents a science plan for SIR-B and serves as a reference for the types of geoscientific, sensor, and processing experiments which are possible. Author

N83-16829*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
A SEASAT REPORT. VOLUME 1: PROGRAM SUMMARY Final Report
E. POUNDER, ed. 15 Sep. 1980 223 p refs
(NASA-CR-169787; JPL-PUB-80-38-VOL-1; NAS 1.26:169787)
Avail: NTIS HC A10/MF A01 CSCL 22B
The program background and experiment objectives are summarized, and a description of the organization and interfaces of the project are provided. The mission plan and history are also included as well as user activities and a brief description of the data system. A financial and manpower summary and preliminary results of the mission are also included. S.L.

N83-17043# National Geodetic Survey, Rockville, Md.
THE 3.5-YEAR GEOS-3 DATA SET
R. W. AGREEN Jan. 1982 14 p refs
(PB82-258237; NOAA-TM-NOS-NGS-33; NOAA-82072905)
Avail: NTIS HC A02/MF A01 CSCL 08C
A revised GEOS-3 altimeter data set was produced by the National Ocean Survey/National Geodetic Survey (NOS/NGS). The resulting surface heights are smoothed over a shorter time (1 second) than the 'G' tape data set produced by the National Aeronautics and Space Administration (NASA), Wallops Flight Center. It also differs from the 'G' tape by not having a 'unique number' field, while possessing additional fields for the satellite height, Schwidershi ocean-tide height, Cartwright solid-tide height, and automatic gain control. GRA

N83-17571*# National Aeronautics and Space Administration, Washington, D. C.
NIMBUS-7 (-G) POST LAUNCH REPORT: MISSION SUCCESS
B. I. EDELSON 21 Jan. 1983 19 p
(NASA-TM-85209; REPT-E-604-78-08; NAS 1.15:85209) Avail: NTIS HC A02/MF A01 CSCL 22B
Nimbus-7, the last of the Nimbus series satellites, was launched from the Space and Missile Test Center at Vandenberg Air Force Base, California on October 24, 1978. The purpose of the mission was to collect global data of the Earth's atmosphere, oceans and polar ice with a payload of eight interdisciplinary research experiments. These experiments represent both domestic and international, scientific and governmental communities. Author

N83-17992*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
PRECIPITABLE WATER: ITS LINEAR RETRIEVAL USING LEAPS AND BOUNDS PROCEDURE AND ITS GLOBAL DISTRIBUTION FROM SEASAT SMMR DATA
P. C. PANDEY (Space Applications Centre, Ahmedabad, India) 1 Dec. 1982 29 p refs Sponsored by NASA ERTS
(E83-10182; NASA-CR-169786; JPL-PUB-82-96; NAS 1.26:169786) Avail: NTIS HC A03/MF A01 CSCL 04B
Eight subsets using two to five frequencies of the SEASAT scanning multichannel microwave radiometer are examined to determine their potential in the retrieval of atmospheric water vapor content. Analysis indicates that the information concerning the 18 and 21 GHz channels are optimum for water vapor retrieval. A comparison with radiosonde observations gave an rms accuracy of approximately 0.40 g sq cm. The rms accuracy of precipitable water using different subsets was within 10 percent. Global maps of precipitable water over oceans using two and five channel retrieval (average of two and five channel retrieval) are given. Study of these maps reveals the possibility of global moisture distribution associated with oceanic currents and large scale general circulation in the atmosphere. A stable feature of the large scale circulation is noticed. The precipitable water is maximum over the Bay of Bengal and in the North Pacific over the Kuroshio current and shows a general latitudinal pattern. A.R.H.

N83-17999# Research Inst. of National Defence, Stockholm (Sweden).
THE IMPORTANCE OF SATISFACTORY POSITIONING, DIVING AND MAPPING SYSTEMS, SUITABLE FOR EXPLORATION AND TRANSPORTATION IN ICE-COVERED SEA AREAS
R. THOREN 1982 66 p refs Presented at Intern. Soc. for Photogrammetry and Remote Sensing (ISPRS) Intern. Symp., Toulouse, 13-17 Sep. 1982
(FOA-B-60003-M7) Avail: NTIS HC A04/MF A01
The evolution of remote sensing for operations in ice-covered sea areas, especially in the exploration of natural resources, such as oil, gas and minerals, and at surface shipping as well as under-ice navigation is reviewed. Expeditions and interdisciplinary scientific projects of special value for arctic operations are described. Underwater pingoes, offshore permafrost and ground ice are discussed. Hydrooptics, hydroacoustics and navigation FOA-SUB (remote-controlled research vehicle), and diving activities and underwater communication are considered. Offshore activities and Scandinavian underwater technology are examined. A remotely-piloted vehicle employed for ship wreck reconnaissance in the High Arctic is described. Author

N83-19166*# Virginia Inst. of Marine Science, Gloucester Point.
A PROSPECTIVE APPROACH TO COASTAL GEOGRAPHY FROM SATELLITE
J. C. MUNDAY, JR. *In* NASA. Goddard Space Flight Center 2d Eastern Reg. Remote Sensing Appl. Conf. p 243-257 1981 refs Sponsored in part by the Virginia Dept. of Taxation ERTS
(CONTRIB-1000) Avail: NTIS HC A17/MF A01 CSCL 08F
A forecasting protocol termed the 'prospective approach' was used to examine probable futures relative to coastal applications of satellite data. Significant variables include the energy situation, the national economy, national Earth satellite programs, and coastal

zone research, commercial activity, and regulatory activity. Alternative scenarios for the period until 1986 are presented. Possible response by state/local remote sensing centers include operational applications for users, input to geo-base information systems (GIS), development of decision-making algorithms using GIS data, and long term research programs for coastal management using merged satellite and traditional data. M.G.

N83-19175*# Rhode Island Univ., Kingston. Dept. of Ocean Engineering.
REMOTE SENSING IN THE COASTAL ZONE: A PERSPECTIVE
P. CORNILLON *In* NASA. Goddard Space Flight Center 2d Eastern Reg. Remote Sensing Appl. Conf. p 337-344 1981 ERTS
Avail: NTIS HC A17/MF A01 CSCL 08C

The problems involved in satellite remote sensing of coastal zones are examined. The differences between remote sensing of terrestrial regions and remote sensing of open ocean areas are reviewed. The associate ranges of time and spatial scales and spectral and radiometric resolution are considered. It is concluded that, in general remote sensing of the coastal region is more appropriately performed with aircraft. M.G.

N83-19177*# Yale Univ., New Haven, Conn. School of Forestry and Environmental Studies.
PROCEDURES FOR ANALYSIS OF SPATIAL RELATIONSHIPS AMONG SHIP SURVEY DATA AND SEA SURFACE TEMPERATURE
J. K. BERRY and J. K. SAILOR *In* NASA. Goddard Space Flight Center 2d Eastern Reg. Remote Sensing Appl. Conf. p 353-365 1981 refs ERTS
Avail: NTIS HC A17/MF A01 CSCL 08C

The establishment of a limited spatial data base for the U.S. eastern seaboard vicinity is discussed along with the demonstration of computer assisted analysis techniques for investigating spatial patterns and relationships among ship survey data and remotely sensed sea surface temperature. Ship survey variables included concentrations of two zooplankton, two icthyoplankton, and two fish species, in addition to physical data of depth to bottom and surface and bottom water temperatures. Continuous spatial distributions of these data were created by both weighted nearest neighbor and iterative smoothing interpolation techniques. Maps of surface water temperature were created by digitizing GOES satellite images. All mapped data were spatially registered by conversion of latitude and longitude coordinates to rotated Lambert conic conformal rectilinear coordinates and stored in grid format of approximately one hundred square kilometers per cell. The analysis of these data include the generation of statistical summaries and maps describing the joint occurrence among variables. M.G.

N83-19187*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
A STATISTICAL EXAMINATION OF NIMBUS 7 SMMR DATA AND REMOTE SENSING OF SEA SURFACE TEMPERATURE, LIQUID WATER CONTENT IN THE ATMOSPHERE AND SURFACES WIND SPEED
C. PRABHAKARA, I. WANG (Computer Sciences Corp., Silver Spring, Md.), A. T. C. CHANG, and P. GLOERSEN Oct. 1982 54 p refs Submitted for publication
(NASA-TM-84927; NAS 1.15:84927) Avail: NTIS HC A04/MF A01 CSCL 05B

Nimbus 7 Scanning Multichannel Microwave Radiometer (SMMR) brightness temperature measurements over the global oceans have been examined with the help of statistical and empirical techniques. Such analyses show that zonal averages of brightness temperature measured by SMMR, over the oceans, on a large scale are primarily influenced by the water vapor in the atmosphere. Liquid water in the clouds and rain, which has a much smaller spatial and temporal scale, contributes substantially to the variability of the SMMR measurements within the latitudinal zones. The surface wind not only increases the surface emissivity but through its interactions with the atmosphere produces correlations, in the SMMR brightness temperature data, that have significant meteorological implications. It is found that a simple meteorological model can explain the general characteristics of the SMMR data. With the help of this model methods to infer over the global oceans, the surface temperature, liquid water content in the atmosphere, and surface wind speed are developed. Monthly mean estimates of the sea surface temperature and surface winds are compared with the ship measurements. Estimates of liquid water content in the atmosphere are consistent with earlier satellite measurements. Author

N83-19188*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
CALIBRATION OF THE NIMBUS-7 SMMR. 2: POLARIZATION MIXING CORRECTIONS
P. GLOERSEN Jan. 1983 17 p refs
(NASA-TM-84976; NAS 1.15:84976) Avail: NTIS HC A02/MF A01 CSCL 05B

Averaged radiance data obtained over the oceans from the Nimbus-7 Scanning Multichannel Microwave Radiometer (SMMR) are used to produce an empirical correction algorithm for the polarization mixing which is inherent to the SMMR because of its fixed multichannel receiving horn and its scanning antenna dish. The algorithm, developed without the use of an ocean/atmosphere radiance model, also properly accounts for off center and scan independent polarization mixing, which were discovered after launch as a result of analyzing the aforementioned data. The radiance averaging consisted of collecting data for each beam position of each of the ten radiance channels of SMMR (nominal horizontal and vertical polarizations of the five SMMR wavelengths, 0.81, 1.4, 1.7, 2.8, and 4.6 cm) for about 300 orbits, subdividing the global ocean radiance data into 10 deg latitude bands and ascending (daytime) and descending (nighttime) orbits. This served to smooth out atmospheric and ocean surface variations in order to perform the polarization mixing analysis. S.L.

N83-19204# Analytic Sciences Corp., Reading, Mass. 08e
DETERMINATION OF THE RESOLUTION CAPABILITY OF THE SEASAT RADAR ALTIMETER, OBSERVATIONS OF THE GEOID SPECTRUM, AND DETECTION OF SEAMOUNTS Final Report
R. V. SAILOR 15 May 1982 56 p refs
(Contract NA79SA-C-00785; NA81SA-C-00752)
(PB82-253964; TASC-TR-3751; NOAA-82071906) Avail: NTIS HC A04/MF A01 CSCL 08E

The investigations using SEASAT radar altimeter data have included determination of the geoid resolution capability of this data, study of the characteristics of the geoid power spectrum in ocean areas, and development of a matched filtering technique for automatic detection of seamounts. GRA

N83-19400# National Oceanic and Atmospheric Administration, Washington, D. C. National Earth Satellite Service.
SATELLITE ACTIVITIES OF NOAA 1981
May 1982 29 p
(PB82-254103; NOAA-82070206) Avail: NTIS HC A03/MF A01 CSCL 04B

Details on the types of NOAA satellites are given. Data services and their uses in providing information on weather conditions, weather warning systems, oceanographic conditions, agriculture, and the applications to geodesy and geodynamics are discussed. GRA

N83-19409# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
A STUDY OF THE RELATIONSHIP BETWEEN SURFACE TEMPERATURE AND TUNA FISH CATCH DATA IN SOUTH AND SOUTHEAST OF BRAZIL USING OCEANOGRAPHIC AND SATELLITE DATA
M. M. ABDON Nov. 1982 35 p refs Presented at Intern. symp. on Utilization of Coastal Ecosystems: Planning, Pollution and Productivity, Rio Grande, Brazil, 22-27 Nov. 1982
(INPE-2599-PRE/245) Avail: NTIS HC A03/MF A01

The delimitation of favorable zones for the fishing of three tuna species in the waters southeast and south of Brazil with oceanographic and satellite data was studied. Oceanographic data of surface temperature and fish catch (CPUE) data were correlated. Surface temperature intervals corresponding to larger fish catch for each species were determined. The intervals were located by satellite imagery and related to the water masses. It is shown that temperatue only is not the only indicator for the presence of tuna in specified regions. The CPUE data, collected in real time are related to oceanographic and environmental conditions at greater depths, where the studied tuna species are found. E.A.K.

N83-20078*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
REMOTE SENSING OF SEDIMENT AND CHLOROPHYLL WITH THE TEST-BED AIRCRAFT MULTISPECTRAL SCANNER
D. E. BOWKER, C. A. HARDESTY, and D. J. JOBSON Mar. 1983 26 p refs
(NASA-TM-84590; L-15572; NAS 1.15:84590) Avail: NTIS HC A03/MF A01 CSCL 14B

An instrument known as the test-bed aircraft multispectral scanner (TBAMS) was used in a research flight over the entrance to the Chesapeake Bay. Upwelled radiances from the TBAMS data were correlated with the water parameters, particularly sediment and chlorophyll a. Several algorithms were demonstrated for monitoring sediment and chlorophyll, with a three-band ratio being the best. The primary advantage of the three-band ratio was found to be its apparent insensitivity to atmospheric and Sun-angle variations. M.G.

N83-20329# *National Academy of Sciences - National Research* Council, Washington, D. C. Ocean Sciences Board.
TWO SPECIAL ISSUES IN SATELLITE OCEANOGRAPHY
1982 40 p refs
(AD-A121442) Avail: NTIS HC A03/MF A01 CSCL 08C

This report highlights two areas, ocean dynamics and biological oceanography, that we believe are ripe for special emphasis. The excitement and potential of the new satellite technology already show in some of the recent oceanographic literature, and they have spurred reports and recommendations by other units of the National Research Council. We add our endorsement to that report from the perspective of the oceanographic community and add our emphasis that such studies will also require in situ measurements. Long lead times are required for the establishment of new satellite programs. Therefore, in order to achieve the enormous and unique potential of this new technology we must take steps now to plan for the new programs and arrange for multiagency support of the needed research and development. We hope that the two reports presented here will help to stimulate this process. GRA

N83-21427*# New Jersey Dept. of Environmental Protection, Trenton. Div. of Coastal Resources.
LANDSAT DATA FOR COASTAL ZONE MANAGEMENT
S. MCKENZIE *In* NASA. Goddard Space Flight Center Eastern Reg. Remote Sensing Appl. Conf. p 77-85 Jan. 1981 refs ERTS
Avail: NTIS HC A11/MF A01 CSCL 08C

The lack of adequate, current data on land and water surface conditions in New Jersey led to the search for better data collections and analysis techniques. Four-channel MSS data of Cape May County and access to the OSER computer interpretation system were provided by NASA. The spectral resolution of the data was tested and a surface cover map was produced by going through the steps of supervised classification. Topics covered include classification; change detection and improvement of spectral and spatial resolution; merging LANDSAT and map data; and potential applications for New Jersey. A.R.H.

N83-21439*# Delaware Univ., Newark. Coll. of Marine Studies.
REMOTE SENSING OF COASTAL PROCESSES AND RESOURCES
V. KLEMAS *In* NASA. Goddard Space Flight Center Eastern Reg. Remote Sensing Appl. Conf. p 139-154 Jan. 1981 refs ERTS
Avail: NTIS HC A11/MF A01 CSCL 08C

The use of remote sensors and multispectral analysis techniques in solving environmental and resource management problems in the coastal zone is illustrated. The specific applications discussed include the analysis of coastal vegetation and productivity, remote sensing of estuarine fronts and their effects on oil dispersion, drift and dispersion of ocean-dumped wastes, and multispectral analysis of water pollutants and suspended sediment concentration. M.G.

N83-21462*# Research Triangle Inst., Research Triangle Park, N.C. Office of Geosciences Programs.
MARINE APPLICATIONS OF HCMM SATELLITE DATA Final Report
F. M. VUKOVICH Oct. 1982 21 p HCMM
(Contract NASA ORDER S-97807-B)
(E83-10221; NASA-CR-170079; NAS 1.26:170079) Avail: NTIS HC A02/MF A01 CSCL 08C

Results of a limited comparison of HCMM sea surface temperature data with in situ data suggest that the HCMM data can provide a rather accurate representation of the sea surface temperature and temperature pattern. In the Nantucket Shoals region, the HCMM analysis provided data on the surface heating and on transport south of Nantucket Island and Nantucket Sound. The analyses also revealed the sea surface temperature structure of an anticyclonic warm ring. Author

N83-21485*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
REMOTE SENSING OF ICE PHENOMENA FROM ORBIT BY SIGNAL CORRELATION OF MULTIPLE RECEIVER RESPONSES
J. M. STACEY and E. J. JOHNSTON 1 Jan. 1983 18 p refs
(NASA-CR-170122; NAS 1.26:170122; JPL-PUBL-83-3) Avail: NTIS HC A02/MF A01 CSCL 08L

The method of signal correlation of microwave responses as applied to the measurement of Earth-surface ice temperatures from orbit is explained and summarized. Ice temperatures are estimated by a correlation function that is derived from the processes of a forward stepwise correlator. Subsets of the post-detected outputs of microwave receiving channels are combined in a multivariate cross-correlation function which operates as a spatial filter and serves to improve the spatial resolution of the thermal gradients in ice structures. The correlator is designed to selectively identify the correlative components among the microwave responses and to strongly suppress or cancel the non-correlative components appearing in the post-detected outputs. Author

N83-21736# Naval Ocean Research and Development Activity, Bay St. Louis, Miss. Ocean Science and Technology Lab.
SEASAT SAR SEA ICE IMAGERY FROM SUMMER MELT TO FALL FREEZE-UP Final Report
R. D. KETCHUM, JR. Nov. 1982 17 p refs
(AD-A122675; NORDA-TN-178) Avail: NTIS HC A02/MF A01 CSCL 08L

Some salient aspects of SEASAT L-band SAR sea ice imagery are presented. High backscatter attributed to water-saturated surface layers reduces the ability to interpret ice conditions. Slush on water areas produces a strong backscatter which could be misinterpreted as rubble, but sequential imagery and floe sizes and shapes can be used to resolve this ambiguity. The slush effect may enhance identification of active zones. Decreasing air temperatures during fall freeze-up reduces background clutter increasing the ability to discern floe sizes and shapes. Higher SAR frequencies being considered for future satellites will show greater backscatter variations for different ice types, but many ambiguities will occur and the ability to discern ridges and floe sizes and shapes will be reduced in the marginal ice zones where interannual weather fluctuations will adversely affect surface scattering properties. Author (GRA)

N83-21952# Marconi Space and Defence Systems Ltd., Portsmouth (England).
OCEAN COLOUR MONITOR (OCM) IMAGE CHANNEL BREADBOARDING Final Report
R. WILLIAMS, P. D. MURPHY, and J. GLEDHILL Paris ESA Apr. 1982 310 p
(Contract ESA-4595/81/NL-PP(SC))
(REPT-3991-00025-TN; ESA-CR(P)-1671) Avail: NTIS HC A14/MF A01

Infrared detector parameters and noise mechanisms were reviewed to determine preamplifier requirements. A modified METEOSAT preamplifier design was analyzed to formulate a noise model. Breadboard testing showed the preamplifier meets requirements of the infrared channel. The thick hybrid visible channel preamplifiers constructed for the ocean color monitor breadboard are described as well as the operation of special electro-optical equipment and the breadboard photodiode sensors used. Test results show that suggested modifications of the package of 16 hybrid preamplifiers would meet requirements set by the discrete component visible channel preamplifier with considerable reduction in size. A.R.H.

N83-22689*# GeoScience Research Corp., Salisbury, Md.
ICE SHEET SURFACE FEATURES IN SOUTHWESTERN GREENLAND FROM SATELLITE RADIO ALTIMETRY
R. L. BROOKS and G. A. NORCROSS May 1982 27 p refs
(Contract NAS6-3232)
(NASA-CR-156887; NAS 1.26:156887) Avail: NTIS HC A03/MF A01 CSCL 08L

Fourteen SEASAT and ten GEOS-3 satellite radar altimeter groundtracks across a 1 deg x 2.5 deg study area in southwestern Greenland have yielded 3,328 ice sheet surface elevations. The surface elevations derived from SEASAT were recalculated based on a waveform retracking algorithm. The elevations have been utilized to develop a surface profile, a three dimensional surface representation, and surface contours. Analysis of the elevations reveals the presence of surface terraces, some greater than 100 km in length; each terrace is at a discrete elevation. Renormalized SEASAT AGC values are shown to be correlated with the surface slope. The ice surface undulations caused frequent altimeter losses-of-lock. Future satellite radar altimeters could significantly contribute to ice sheet mapping in the next decade, particularly if they incorporate tracking systems with more frequent updates. Author

N83-22940# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
MAPPING OF AREAS FAVORABLE TO YELLOWFIN TUNA OFF NORTHERN AND NORTHEASTERN BRAZIL USING REMOTE SENSING AND OCEANOGRAPHIC DATA M.S. Thesis [MAPEAMENTO DE AREAS FAVORAVEIS A OCORRENCIA DE ALBACORA-DE-LAJE NO NORTE E NORDESTE DO BRASIL COM UTILIZACAO DE SENSORIAMENTO REMOTO E DADOS OCEANOGRAFICOS]
L. A. B. DECASTRO Jan. 1983 93 p refs *In* PORTUGUESE; ENGLISH summary Original contains color illustrations
(INPE-2632-TDL/112) Avail: NTIS HC A05/MF A01

One attempt is made to map those oceanic areas where environmental conditons are more favorable to yellowfin tuna (Thunnus albacares), using remotely sensed and historical oceanographic data. The study area is delineated by 20 W and 60 W meridians and by 10 N and 20 S parallels. As direct use of infrared images of SMS/GOES satellite was precluded by the heavy and constant cloud cover, GOSSTCOMP charts were used to map sea surface temperatures. Mathematical correlations between catch and oceanographic data showed the limiting values of some oceanographic parameters, for that species, to be: 26 C lower surface temperature, 28.6 C upper surface temperature, 36.8 higher salinity and 5.7 ml/l higher dissolved oxygen. Maximum values of temperature and salinity did not show up inside the area limited by the lower surface temperatures. As the maximum for dissolved oxygen is not a limiting factor, the best areas for yellowfin tuna (Thunnus albacares), shown on the charts, were discriminated by the lower limits of surface temperature alone. S.L.

N83-22941# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
A MODEL OF FISHING CHARTS FOR TUNA OFF SOUTHEASTERN AND SOUTHERN BRAZIL USING OCEANOGRAPHIC DATA AND REMOTE SENSING M.S. Thesis [UM MODELO DE CARTAS DE PSCA PARA TUNIDEOS DO SUDESTE E SUL DO BRASIL UTILIZANDO DADOS OCEANOGRAFICOS E DE SENSORIAMENTO REMOTO]
M. D. ABDON Jan. 1983 118 p refs *In* PORTUGUESE; ENGLISH summary Original contains color illustrations
(INPE-2627-TDL/110) Avail: NTIS HC A06/MF A01

The delimitation of favorable zones for the fishing of three species (Thunnus albacares, Thunnus alalunga and Thunnus obesus) utilizing oceanographic data and SMS-2 satellite data was studied. The oceanographic and fishery data were worked by monthly mean and by 25 sq deg. Correlations between oceanographic data of surface temperature and fish catch data were made. Surface temperature intervals corresponding to larger fish catch for each species were determined. After that, these intervals were transformed into data corresponding to that registered by the SMS-2 satellite through regression lines constructed with coastal stations (fixed) data and SMS-2 data. These intervals were located in the satellite images and related to the water masses present in the study area. The results showed that temperature cannot be considered by itself as the only indicator of the presence of tuna in specified regions. It is necessary to work with more precise sea surface temperature data, collected in real time, in order to relate to oceanographic and environmental conditions at greater depths, where the studied tuna species are found. S.L.

N83-22943# National Oceanic and Atmospheric Administration, Boulder, Colo. Wave Propagation Lab.
A TECHNIQUE FOR DETERMINING THE LOCATION AND FLOW ALONG THE AXIS OF THE FLORIDA CURRENT
R. S. LYONS, D. E. BARRICK, and A. S. FRISCH Sep. 1982 30 p refs
(PB83-117713; NOAA-TM-ERL-WPL-100) Avail: NTIS HC A03/MF A01 CSCL 08C

A technique to obtain the surface location of the axis and flow around the axis of the Florida Current is described, and the results are compared with CODAR current vector maps. The technique requires radial surface velocities from only a one site HF radar like a CODAR. Over the sea along each radial line extending outward from the site, the radial current velocities are least squares fit to a quadratic polynominal. The maximum velocity and location of that velocity from the radar site for each azimuthal angle over the ocean is estimated from the polynomial coefficients. The location of the Florida Current axis is determined by a cubic polynominal fit to the maximum velocity positions along each radial. 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.

A83-21432* Minnesota Univ., St. Paul.
USE OF LANDSAT DATA TO PREDICT THE TROPHIC STATE OF MINNESOTA LAKES
T. M. LILLESAND, W. L. JOHNSON, R. L. DEUELL, O. M. LINDSTROM, and D. E. MEISNER (Minnesota, University, St. Paul, MN) Photogrammetric Engineering and Remote Sensing, vol. 49, Feb. 1983, p. 219-229. Research supported by the Minnesota Pollution Control Agency and University of Minnesota refs
(Contract NGL-24-005-263)

Near-concurrent Landsat Multispectral Scanner (MSS) and ground data were obtained for 60 lakes distributed in two Landsat scene areas. The ground data included measurement of secchi disk depth, chlorophyll-a, total phosphorous, turbidity, color, and total nitrogen, as well as Carlson Trophic State Index (TSI) values derived from the first three parameters. The Landsat data best correlated with the TSI values. Prediction models were developed to classify some 100 'test' lakes appearing in the two analysis scenes on the basis of TSI estimates. Clouds, wind, poor image data, small lake size, and shallow lake depth caused some problems in lake TSI prediction. Overall, however, the Landsat-predicted TSI estimates were judged to be very reliable for the secchi-derived TSI estimation, moderately reliable for prediction of the chlorophyll-a TSI, and unreliable for the phosphorous value. Numerous Landsat data extraction procedures were compared, and the success of the Landsat TSI prediction models was a strong function of the procedure employed. (Author)

A83-21934
LANDSAT-DATA FOR DISTRIBUTED HYDROLOGICAL MODELS
L. GOTTSCHALK, I. KRASOVSKAIA (Uppsala, Universitet, Uppsala, Sweden), and J. J. TALTS (National Land Survey, Gavle, Sweden) In: International Society for Photogrammetry and Remote Sensing, International Symposium, Toulouse, France, September 13-17, 1982, Transactions. Volume 1. Toulouse, Groupement pour le Developpement de la Teledetection Aerospatiale, 1982, p. 407-412. refs

Landsat data are used in classifying the basin of one of the largest lakes in Sweden. The area classified, 8000 sq km, is situated on two adjacent satellite paths. Digitized map data are used along with the Landsat data. The map data are obtained by using a raster scanner to convert overlays of maps in 1:250,000 into digital form. The Landsat data are then transformed into the map grid system and the two data sets are used together in a maximum-likelihood classification into 34 categories representing water, built-up areas, forest, bogs, and arable land. The demands for new types of spatial data are discussed, as are methods of data acquisition. It is shown that data can be obtained for large areas on a generalized level or on a detailed level for watershed monitoring. C.R.

A83-21948
REMOTE SENSING OF WATER QUALITY IN FLAMING GORGE RESERVOIR WYOMING-UTAH, USA
J. P. VERDIN (U.S. Bureau of Reclamation, Denver, CO) In: International Society for Photogrammetry and Remote Sensing, International Symposium, Toulouse, France, September 13-17, 1982, Transactions. Volume 1. Toulouse, Groupement pour le Developpement de la Teledetection Aerospatiale, 1982, p. 603-610. refs

Bureau of Reclamation water quality specialists surveyed Flaming Gorge Reservoir, Wyoming-Utah, concurrent with two remote sensing missions on September 9, 1981. Landsat 2 and the EPA (Environmental Protection Agency) airborne scanner each acquired multispectral imagery of the reservoir. Analyses of the data were performed in the Bureau's digital image processing laboratory. Useful relationships were found between remotely sensed data and contact measurements of water clarity, chlorophyll a concentration and total phosphorus concentration. These relationships were exploited to make estimates of the water quality variables in unsampled reaches of the reservoir, as well as to produce thematic water quality maps. (Author)

A83-21949
AERIAL SURVEY OF WATER QUALITY - AN INDIAN CASE STUDY
S. THIRUVENGADACHARI, N. G. INAMDAR, S. V. KOTBAGI, H. G. TAMBRALLI, and B. L. DEEKSHATULU (National Remote Sensing Agency, Secunderabad, India) In: International Society for Photogrammetry and Remote Sensing, International Symposium, Toulouse, France, September 13-17, 1982, Transactions. Volume 1. Toulouse, Groupement pour le Developpement de la Teledetection Aerospatiale, 1982, p. 611-620. Research supported by the Indian Space Research Organization and Department of Space and Space Commission. refs

As part of the two-and-half years experimental study on the use of remote sensing techniques for monitoring water quality, aerial surveys employing a eleven channel multispectral scanner supported by a metric camera system were conducted over two test sites. Analysis of airborne scanner data, based on simultaneous ground (water) truth data, resulted in maps of turbidity, chlorophyll, total dissolved solids and chlorides. Specifically the surface distribution of chlorides obtained for the first test site portrayed the dilution of the paper mill effluent in the river waters while the chlorophyll map of the second site indicated the biomass status of the rapidly eutrophying inland lake. (Author)

A83-21959
MICROWAVE SIGNATURES AND MAPPING OF SNOW
E. SCHANDA, C. MATZLER, K. KUENZI, S. PATIL (Bern, Universitaet, Berne, Switzerland, and H. ROTT (Innsbruck, Universitaet, Innsbruck, Austria) In: International Society for Photogrammetry and Remote Sensing, International Symposium, Toulouse, France, September 13-17, 1982, Transactions. Volume 1. Toulouse, Groupement pour le Developpement de la Teledetection Aerospatiale, 1982, p. 801-809. refs

Ground-based and satellite-borne microwave sensors have been used to investigate and utilize the microwave signatures of snow. Typical signatures for dry and wet snow can be used to identify and quantify these types of snow. Also some unusual behavior of the snow cover (e.g., melt-freeze cycles, precipitation) can be identified by remote microwave probing. The feasibility of mapping the global snow cover (extent, water equivalent, onset of snow melt) has been demonstrated with the use of Nimbus-7 SMMR data. (Author)

A83-21969
AUTOMATIC MAPPING OF LAKES FOR SMALL-SCALE MAPS USING DIGITAL LANDSAT IMAGERY
E. A. FLEMING (Department of Energy, Mines, and Resources, Surveys and Mapping Branch, Ottawa, Canada) In: International Society for Photogrammetry and Remote Sensing, International Symposium, Toulouse, France, September 13-17, 1982, Transactions. Volume 1. Toulouse, Groupement pour le Developpement de la Teledetection Aerospatiale, 1982, p. 965-970.

The quality and definition available from aerial and normal topographic mapping of Canadian lakes are compared to that available from using Landsat IR bands 6 and 7. Topographic maps feature either 1:50,000 or 1:250,000 resolution, aeronautical charts have a 1:500,000 resolution, while Landsat maps at 1:1,000,000 resolution, but with good representation of water areas. A digital image correction system has been devised for producing resampled pixels 50 m sq, resulting in imagery that has four times the definition of a 1:50,000 map. Density slicing of the digitally corrected tapes yields a water separation negative with small scale features. Furthermore, hydrologic maps can be generated by overlaying normal cartographic drainage with the Landsat imagery. The Landsat imagery is concluded to be equivalent to 1:250,000 mapping when viewing water features. M.S.K.

A83-23894#
ESTIMATION OF LIQUID WATER AMOUNT IN AN EXTENDED CLOUD BY NIMBUS-5 MICROWAVE DATA
T. TAKEDA and S. NATSUKI (Nagoya University, Nagoya, Japan) Meteorological Society of Japan, Journal, vol. 60, Oct. 1982, p. 1153-1164. refs

An attempt was made to estimate the liquid water content in different types of clouds in the area of the 1974 AMTEX experiment using Nimbus-5 radiometer data at 19.35 GHz. An analytical model was developed to describe the effects of the size distribution of water drops on the estimation of the liquid water amounts in the clouds. A radiative transfer equation for microwaves was defined for atmospheric scatter in terms of the Rayleigh-Jeans approximation. Clouds were characterized by either one homogeneous layer or three layers, i.e., droplets, droplets and raindrops, and raindrops. An error of less than 10% was determined in the estimation of the liquid water content when the content was less than 0.30 gm/sq cm, calculating from satellite data. The AMTEX areal content was calculated to be less than 0.12 gm/sq cm during a cold air outbreak, and only 0.03 gm/sq cm when only low level clouds were considered. The value was 0.05-0.12 gm/sq cm with both low and middle level clouds. The possibility of determining the rate of conversion of cloud water into rain water using satellite data and ground rainfall intensity measurements was discussed. D.H.K.

A83-24121
RAINFALL RATES DERIVED FROM NIMBUS 5 OBSERVATIONS ANALYSED AGAINST GATE RADAR RAINFALL
W. MEDROW (Rheinisch-Westfaelischer Technischer Ueberwachungsverein, Essen, West Germany), E. RASCHKE, and E. RUPRECHT (Koeln, Universitaet, Cologne, West Germany) Meteorologische Rundschau, vol. 36, Feb. 1983, p. 13-20. Deutsche Forschungsgemeinschaft refs
(Contract DFG-RA-195/17; DFG-RA-195/24)

A comparison between the calculated and observed rainfall rates over the GATE area is presented. Rainfall data from Nimbus 5 observations at 19.35 GHz rearranged in a Mercator projection are compared with rainfall rates calculated from rain cloud models. Correction methods are developed which distinguish between shallow, deep, and mixed clouds, as measured simultaneously from SMS-1 in the infrared region. The theoretical and experimental relationships between microwave brightness temperature and rainfall rate for the different cloud models are shown. The results show that the accuracy of calculated rain rates has been drastically improved; they now agree up to 15-20 percent with observations. A further improvement is obtained when 16 basic data fields of dimensions 28 x 28 km are combined to a 1 deg x 1 deg field. C.D.

A83-24314#
TOTAL PRECIPITABLE WATER AND RAINFALL DETERMINATIONS FROM THE SEASAT SCANNING MULTICHANNEL MICROWAVE RADIOMETER
J. C. ALISHOUSE (NOAA, National Earth Satellite Service, Washington, DC) Journal of Geophysical Research, vol. 88, Feb. 28, 1983, p. 1929-1935. refs

Three of the Seasat scanning multichannel microwave radiometer's (SMMR's) five frequencies can be used to determine the total precipitable water in the atmosphere, the liquid water content, and the rainfall rate. In addition, two distinct algorithms were used to derive geophysical parameters from brightness temperature. Comparisons with surface observations from the Gulf of Alaska Seasat Experiment and other selected sources were made for both algorithms. Generally, very good agreement was found between satellite and radiosonde observations of total precipitable water. An estimate of the precision of radiosonde-derived total precipitable water amounts was made. Comparisons of precipitation occurrence as determined from the SMMR and surface observations also were made. In the tropics, very good agreement is found between satellite and surface observations. In the mid-latitudes (Gulf of Alaska) it is found that small cells of precipitation are often missed by the SMMR but larger synoptic scale precipitation is detected. (Author)

A83-24530*# National Aeronautics and Space Administration, Washington, D. C.
APPLICATIONS OF REMOTE SENSING TECHNOLOGY TO U.S. WATER RESOURCE MANAGEMENT
J. D. WEBER (NASA, Washington, DC) In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 1. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 37-50. refs

Applications of Landsat data to assessing the available water supply in the U.S. for agricultural puposes as a program of the NASA Office of Space Science and Applications are described. Snow melt runoff predictions are performed with multitemporal Landsat imagery to measure the extent of mountain snow packs in the Rockies in order to produce stream flow forecast models. The data is used for decisions of which crops to plant, based on irrigation water which will be accessible in eleven western U.S. states. Imagery has tracked the growth of irrigated lands watered from the Ogallala aquifer in the central U.S., and is providing a data base for calculating the aquifer depletion rates. Studies are preceeding in temporally mapping the kinds of vegetation growing in the Suwannee Sound in Florida to monitor the intrusion of salt water, which would reduce the River's usefulness for irrigation. Finally, capabilities of the Thematic Mapper are reviewed. M.S.K.

A83-24553#
SSESSMENT AND MANAGEMENT OF WATER RESOURCES FROM SATELLITE DERIVED DATA - INDIAN EXAMPLE
K. R. RAO (National Remote Sensing Agency, Secunderabad, India) In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 1. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 363-368.

A83-24554#
HYDROLOGIC DATA COLLECTION USING SATELLITE SYSTEMS
J. W. JARMAN, D. M. COTTER (U.S. Army, Corps of Engineers, Fort Belvoir, VA), and H. L. MCKIM (U.S. Army, Cold Regions Research and Engineering Laboratory, Hanover, NH) In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 1. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 369-373.

A summary of operational environmental and meteorological satellites, data-handling systems, and international research groups is presented. Landsat-1 (ERTS-1) was placed in orbit in 1972 to test orbiting sensors for wind speed, precipitation, stream flow, and snow cover, as well as operation of unattended ground radio-relay stations. Space-based hydrologic studies were initiated with the first GOES satellite launched in 1975, and were accompanied by commercial development of ground stations to receive visible and IR radiometer data. Tiros-N carries Argos system equipment to allow space-based relay of data from 4000 earth-based sensor systems. Participation by the WMO, ESA, Japan, the U.S.A., and the U.S.S.R. led to establishment of the GARP experiment and the World Weather Watch. Four satellites, i.e., the eastern and western GOES, the GMS, and Meteosat were providing 48 high resolution visible and IR images each by 1981. Weather Facsimile (WEFAX) data is broadcast at 1691.0 MHz to ground stations which have been priced at $8000 each. D.H.K.

A83-24555#
MONITORING OF WATER QUALITY AND ENVIRONMENTAL CHANGES IN THE ASWAN HIGH DAM RESERVOIR FROM LANDSAT IMAGERY
K. H. MANCY, S. E. SMITH (Michigan, University, Ann Arbor, MI), and A. F. A. LATIF (Academy of Scientific Research and Technology, Cairo, Egypt) In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 1. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 375-387. Research supported by the Academy of Scientific Research and Technology of Egypt, U.S. Environmental Protection Agency, and Ford Foundation. refs

A83-24566#
APPLICATION OF REMOTE SENSING DATA TO HYDROGEOLOGICAL PURPOSES IN THE FEZZAN REGION-LYBIA
A. GIOVACCHINI and A. SPALLACCI (Aquater S.p.A., San Lorenzo in Campo, Italy) In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 1. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 513-521. refs

A83-24578#
FRESH WATER SPRINGS DETECTION AND DISCHARGE EVALUATION USING THERMAL I.R. SURVEYS ALONG SEA SHORES IN AREAS AFFECTED BY POOR PRECIPITATIONS
C. M. MARINO, A. ANNONI (Milano, Universita, Milan, Italy), and A. M. TONELLI (Agostino Rossi e C. Sas di Marco Rossi e C., Milan, Italy) In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 1. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 635-642. refs

A83-24583*# California Univ., Santa Barbara.
THE FEASIBILITY OF THERMAL INERTIA MAPPING FOR DETECTION OF PERCHED WATER TABLES IN SEMI-ARID IRRIGATED LANDS
C. E. EZRA, J. E. ESTES (California, University, Santa Barbara, CA), and F. BONN (Sherbrooke, Universite, Sherbrooke, Quebec, Canada) In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 2. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 697-707. refs
(Contract NSG-7220-S2)

The thermal inertia mapping remote sensing technique is evaluated as a potential method for delineating areas of shallow perched water tables and related salinization problems on a regional basis. This method for detecting shallow water tables is based on the existence of significant differences in soil thermal properties between wet and dry soil profiles. Ground observations were conducted at two different test sites in California along the flight line, with one site located in a perched water table area and the other site in a well drained area. Measurements were taken hourly during a four day period (two days before and two days after the flight) for variables such as radiometric, meteorologic, soil moisture and temperature profiles, and surface characteristics. Results indicate that it is not feasible using present apparent thermal inertia remote sensing techniques to reliably delineate regional patterns of very shallow water tables due to the complex environmental system. However, some features within specific fields which may be directly related to the local presence of shallow water tables, such as differences in evaporative cooling due to soil moisture effects between and within fields, can be detected using the thermal inertia technique. N.B.

A83-24584#
APPLICATION OF LANDSAT IMAGERY IN GROUNDWATER INVESTIGATIONS IN A SEMI-ARID HARD-ROCK REGION OF THE STATE OF GUJARAT /INDIA/
B. SAHAI, R. K. SOOD (Indian Space Research Organization, Space Applications Centre, Ahmedabad, India), and S. C. SHARMA (Gujarat Water Resources Development Corp., Gandhinagar, India) In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 2. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 709-718. refs

A83-24585#
PROCESSING OF REMOTELY SENSED DATA FOR MAPPING THERMAL INERTIA, SOIL MOISTURE AND EVAPOTRANSPIRATION IN SEMI-ARID AREAS
L. BORRIELLO, E. CARLONI, T. CAROPPO (Centro Studi ed Applicazioni in Tecnologie Aranzate, Bari, Italy), G. TASSONE, and F. TOSELLI (Commission of the European Communities, Joint Research Centre, Isra, Italy) In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 2. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 719-726. refs

A83-24586#
ASSESSMENT OF SEDIMENTATION IN THE ASWAN RESERVOIR USING LANDSAT IMAGERY
S. E. SMITH, K. H. MANCY (Michigan, University, Ann Arbor, MI), A. F. A. LATIF (Academy of Scientific Research and Technology, Cairo, Egypt), and E. A. FOSNIGHT (Technicolor Graphic Services, Inc., Moffett Field, CA) In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 2. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 727-736. Research supported by the U.S. Environmental Protection Agency, Ford Foundation, and Academy of Scientific Research and Technology of Egypt. refs

A83-24595#
NATURAL WATER CONTAINMENT SITE IDENTIFICATION IN THE ARID MOUNTAINS OF DJIBOUTI
J. E. GOEBEL (Resources Development Associates, Djibouti) In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 2. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 823-828.

A83-24600#
POST-ASWAN HIGH DAM CHANGES OF THE NILE DELTA COAST, EAST OF RAS EL BAR, INTERPRETED FROM AERIAL PHOTOGRAPHS
Z. M. ZAGHLOUL, F. A. EL-NASHARTY, and I. A. ISA (Mansoura, University, Mansoura, Egypt) In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 2. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 877-883.

A83-24607#
PASSIVE BATHYMETRIC MEASUREMENTS OF INLAND WATERS WITH AN AIRBORNE MULTI-SPECTRAL SCANNER
S. C. JAIN, H. H. ZWICK, W. C. WEIDMARK (Moniteq, Ltd., Concord, Ontario, Canada), and R. A. NEVILLE (Canada Centre for Remote Sensing, Ottawa, Canada) In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 2. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 947-951. refs

A83-24611#
ASSESSMENT AND MANAGEMENT OF LAND AND WATER RESOURCES IN DROUGHT PRONE AREAS FROM SATELLITE DERIVED DATA - AN INDIAN EXAMPLE
A. K. CHAKRABORTY, S. S. KUMAR, and K. R. RAO (National Remote Sensing Agency, Secunderabad, India) In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 2. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 1003-1012. refs

A83-24613#
ANALYSIS ON THE SPATIAL DISTRIBUTION OF WATER QUALITY AND POLLUTION SOURCES OF A SHALLOW LAKE BY DIGITAL IMAGE PROCESSING
L. J. DAVID (State Office for Technical Development, Budapest, Hungary) and J. SZABO (Institute for Co-ordination of Computer Techniques, Budapest, Hungary) In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 2. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 1023-1030. refs

A83-24614#
THE UTILITY OF LANDSAT FOR MONITORING THE EPHEMERAL WATER AND HERBAGE RESOURCES OF ARID LANDS - AN EXAMPLE OF RANGELAND MANAGEMENT IN THE CHANNEL COUNTRY OF AUSTRALIA
R. D. GRAETZ and R. P. PECH (Commonwealth Scientific and Industrial Research Organization, Div. of Land Resources Management, Deniliquin, New South Wales, Australia) In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 2. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 1031-1046. refs

A83-24623#
HYDROLOGICAL ANALYSIS OF THE MACHAR REGION BASED ON LANDSAT SATELLITE PROCESSED DATA
M. H. SALEM and H. T. DORRAH (Cairo University, Giza, Egypt) In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 2. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 1127-1139. Research sponsored by the Cairo University. refs

A hydrographic, geologic, and horticultural analysis is presented of the Machar marshes of Egypt, candidates for development as a water resource in the region of the upper Nile. Landsat imagery was employed to map the drainage and vegetation features on a scale of 1:500,000. Land features were classified as depressions, plains, drainage lines, water bonds, and vegetation boundaries, which also served to identify the water balance of the region. The derived water balance indicated that 2,030,000 million cu m of water drain into the marshes each year, and can be canalized to provide irrigation in the upper Nile region. M.S.K.

A83-24624#
AUTOMATIC CLASSIFICATION OF LAKE QARUN WATER BY DIGITAL PROCESSING OF LANDSAT MSS DATA
M. A. ABDEL HADY, A. S. AYOUB (Academy of Scientific Research and Technology, Remote Sensing Center, Cairo, Egypt), and I. A. EL KASSAS (Nuclear Materials Corp., Cairo, Egypt) In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 2. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 1143-1165. refs

A83-25642* California Univ., Davis.
A NONINTERACTIVE PROCEDURE FOR LAND-USE DETERMINATION
G. E. FORD, V. R. ALGAZI, and D. I. MEYER (California, University, Davis, CA) Remote Sensing of Environment, vol. 13, Mar. 1983, p. 1-16. refs
(Contract NSG-5092)

A complete operational procedure designed for use by the U.S. Army Corps of Engineers for the determination of land-use information for hydrologic planning purposes is reported. The procedure combines photo interpretation techniques and the batch-mode computer analysis of Landsat digital data. Since the operational constraints preclude the use of dedicated, interactive image processing facilities, several novel approaches to geometric correction, classification, and data input/output were developed. The procedure is summarized, and examples of the application of the procedure to urban watersheds are described. In spite of the constraints, the procedure provides results comparable in accuracy and lower in cost than those provided by commercial services using interactive techniques. (Author)

A83-29916
CLASSIFICATION OF LANDSAT DATA FOR HYDROLOGIC APPLICATION, EVERGLADES NATIONAL PARK
P. W. ROSE and P. C. ROSENDAHL (U.S. National Park Service, South Florida, Research Center, Homestead, FL) Photogrammetric Engineering and Remote Sensing (ISSN 0099-1112), vol. 49, April 1983, p. 505-511. refs

The hydrologic balance of Everglades National Park has been altered by water modification and control projects. The ability to monitor the spatial and temporal areas of inundation in the Shark River Slough, the main artery for surface water movement, is mandatory for ecosystem maintenance and preservation. Digital image processing techniques were used to analyze Landsat data of the Shark River Slough. Landsat analysis resulted in multispectral classification and mapping of the expansion and contraction of the slough's margins throughout wet and dry seasons in south Florida. These investigations will assist in the formulation of a sound water management program for everglades national park. Author

N83-16754# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Abt. Lasertechnik.
AIRBORNE LIDAR FOR OCEANOGRAPHY AND HYDROLOGY (FLOH)
C. WERNER and H. HERRMANN Jun. 1982 58 p refs In GERMAN; ENGLISH summary Original will also be announced as translation (ESA-TT-799)
(DFVLR-FB-82-14) Avail: NTIS HC A04/MF A01; DFVLR, Cologne DM 18,10

The development program of an airborne lidar for the parameters water depth, hydrosol distribution and temperature distribution is outlined. A lidar was proposed for two lasers (neodymium-yag and dye) taking into account the boundary conditions of the aircraft and of the air, water, and air-water interface. The expected signals are calculated using water layer models. Author (ESA)

N83-16810*# California Univ., Santa Barbara. Dept. of Geography.
LANDSAT-D INVESTIGATIONS IN SNOW HYDROLOGY Quarterly Progress Report, 17 Nov. - 31 Dec. 1982
J. DOZIER, Principal Investigator 31 Dec. 1982 4 p refs ERTS
(Contract NAS5-27463)
(E83-10131; NASA-CR-169759; NAS 1.26:169759) Avail: NTIS HC A02/MF A01 CSCL 08H

The sample LANDSAT-4 TM tape (7 bands) of NE Arkansas/Tennessee area was received and displayed. Snow reflectance in all 6 TM reflective bands, i.e. 1, 2, 3, 4, 5, and 7 was simulated, using Wiscombe and Warren's (1980) delta-Eddington model. Snow reflectance in bands 4, 5, and 7 appear sensitive to grain size. One of the objectives is to interpret surface optical grain size of snow, for spectral extension of albedo. While TM data of the study area are not received, simulation results are encouraging. It also appears that the TM filters resemble a 'square-wave' closely enough to permit assuming a square-wave in calculations. Integrated band reflectance over the actual response functions was simulated, using sensor data supplied by Santa Barbara Research Center. Differences between integrating over the actual response functions and the equivalent square wave were negligible. A.R.H.

N83-16817*# Maryland Univ., College Park. Remote Sensing Systems Lab.
A MODEL FOR ESTIMATING TIME-VARIANT RAINFALL INFILTRATION AS A FUNCTION OF ANTECEDENT SURFACE MOISTURE AND HYDROLOGIC SOIL TYPE
H. A. WILKENING and R. M. RAGAN Oct. 1982 86 p refs
Sponsored by NASA, USDA, Dept. of Commerce, Dept. of the Interior, and Agency for International Development ERTS
(Contract PROJ. AGRISTARS)
(E83-10142; NASA-CR-169776; CP-52-04372; NAS 1.26:169776)
Avail: NTIS HC A05/MF A01 CSCL 02C

Recent research indicates that the use of remote sensing techniques for the measurement of near surface soil moisture could be practical in the not too distant future. Other research shows that infiltration rates, especially for average or frequent rainfall events, are extremely sensitive to the proper definition and consideration of the role of the soil moisture at the beginning of the rainfall. Thus, it is important that an easy to use, but theoretically sound, rainfall infiltration model be available if the anticipated remotely sensed soil moisture data is to be optimally utilized for hydrologic simulation. A series of numerical experiments with the Richards' equation for an array of conditions anticipated in watershed hydrology were used to develop functional relationships that describe temporal infiltration rates as a function of soil type and initial moisture conditions. Author

N83-16849# Cornell Univ., Ithaca, N. Y. School of Civil and Environmental Engineering.
OPTIMIZING THE EVALUATION OF LAKE WATER QUALITY THROUGH ANALYSIS OF EXISTING REMOTELY SENSED DATA Technical Completion Report, Oct. 1980 - Sep. 1981
W. R. PHILIPSON, K. KOZAI, and E. L. MILLS Dec. 1981 37 p refs
(Contract DI-14-34-0001-1134)
(PB82-256637; W82-06370; OWRT-A-091-NY(1)) Avail: NTIS HC A03/MF A01 CSCL 08H

A methodology development was undertaken for use in selecting optimum sampling locations for water quality assessment in a large eutrophic New York State lake (Oneida Lake). The methodology approach was based on the premises that LANDSAT satellite image densities can be modeled, and that homogeneous water quality areas could be thereby predicted. Patterns of Lake density on 24 LANDSAT band-5 images (0.6-0.7 microns) were traced from a density-slicer screen, following standardization of the color assignments with dark- and a light-toned feature. Cell density levels were then used as the dependent variable in correlations and multiple regressions with degree days, and resultant wind speed and direction. Further, equation-predicted density levels in selected cells were correlated with measured values of chlorophyll-a, chlorophyll-a plus pheophytin, and Secchi disk transparency. Author (GRA)

N83-17922*# Kentron International, Inc., Hampton, Va.
KERR RESERVOIR LANDSAT EXPERIMENT ANALYSIS FOR MARCH 1981
S. R. LECROY, Principal Investigator Hampton, Va. NASA. Langley Research Center Jul. 1982 55 p refs ERTS
(Contract NAS1-16000)
(E83-10155; NASA-CR-165959; NAS 1.26:165959) Avail: NTIS HC A04/MF A01 CSCL 08H

LANDSAT radiance data were used in an experiment conducted on the waters of Kerr Reservoir to determine if reliable algorithms could be developed that relate water quality parameters to remotely sensed data. A mix of different types of algorithms using the LANDSAT bands was generated to provide a thorough understanding of the relationships among the data involved. Except for secchi depth, the study demonstrated that for the ranges measured, the algorithms that satisfactorily represented the data encompass a mix of linear and nonlinear forms using only one LANDSAT band. Ratioing techniques did not improve the results since the initial design of the experiment minimized the errors against which this procedure is effective. Good correlations were found for total suspended solids, iron, turbidity, and secchi depth. Marginal correlations were discovered for nitrate and tannin + lignin. Quantification maps of Kerr Reservoir are presented for many of the water quality parameters using the developed algorithms. A.R.H.

N83-17924*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
OFF-NADIR ANTENNA BIAS CORRECTION USING AMAZON RAIN FOREST SIGMA DEG DATA
I. J. BIRRER, E. M. BRACALENTE, G. J. DOME (Bell Labs., Holmdel, N.J.), J. SWEET, G. BERTHOLD, and R. K. MOORE, Principal Investigators Oct. 1981 69 p refs Prepared in cooperation with Kansas Univ. Center for Research, Inc., Lawrence ERTS
(Contract NSG-1397)
(E83-10158; NASA-TM-85217; NAS 1.15:85217; RSL-TR-343-6)
Avail: NTIS HC A04/MF A01 CSCL 02F

The radar response from the Amazon rain forest was studied to determine the suitability of this region for use as a standard target to calibrate a scatterometer like that proposed for the National Ocean Satellite System (NOSS). Backscattering observations made by the SEASAT-1 scatterometer system show the Amazon rain forest to be a homogeneous, azimuthally-isotropic, radar target which is insensitive to polarization. The variation with angle of incidence may be adequately modeled as sigma deg (dB) = alpha theta + beta with typical values for the incidence-angle coefficient from 0.07 dB deg to 0.15 dB/deg. A small diurnal effect occurs, with measurements at sunrise being 0.5 dB to 1 dB higher than the rest of the day. Maximum likelihood estimation algorithms are presented which permit determination of relative bias and true pointing angle for each beam. Specific implementation of these algorithms for the proposed NOSS scatterometer system is also discussed. Author

N83-17930*# Florida Univ., Gainesville. Inst. of Food and Agricultural Sciences.
DISTRICT WIDE WATER RESOURCES INVESTIGATION AND MANAGEMENT USING LANDSAT DATA. PHASE 1: LAKE VOLUME Final Report
S. F. SHIH, Principal Investigator Mar. 1982 94 p refs
Sponsored by NASA and St. Johns River Water Management District Original contains color imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls, S.D. 57198 ERTS
(E83-10166; NASA-CR-166828; NAS 1.26:166828; DSR-8-1006CG-1) Avail: NTIS HC A05/MF A01 CSCL 08H

A technique for estimating available water storage volume using LANDSAT data was developed and applied to Lake Washington and Lake Harris in central Florida. The technique can be applied two ways. First, where the historical stage records are available, the historical LANDSAT data can be used to establish the relationship between lake volume and lake stage. In the second case, where the historical stage records are not available, the historical LANDSAT data can be used to estimate the historical lake stage after the lake volume and stage information become available in the future. M.G.

N83-19159*# Soil Conservation Service, Salisbury, Md.
APPLICATION OF REMOTE SENSING TO LAND AND WATER RESOURCE PLANNING: THE POCOMOKE RIVER BASIN, MARYLAND
S. E. WILDESEN and E. P. PHILLIPS (Pocomoke River Advisory Committee, Berlin, Md.) *In* NASA. Goddard Space Flight Center 2nd Eastern Reg. Remote Sensing Appl. Conf. p 157-166 1981 refs ERTS
Avail: NTIS HC A17/MF A01 CSCL 05B

Because of the size of the Pocomoke River Basin, the inaccessibility of certain areas, and study time constraints, several remote sensing techniques were used to collect base information on the river corridor, (a 23.2 km channel) and on a 1.2 km wooded floodplain. This information provided an adequate understanding of the environment and its resources, thus enabling effective management options to be designed. The remote sensing techniques used for assessment included manual analysis of high altitude color-infrared photography, computer-assisted analysis of LANDSAT-2 imagery, and the application of airborne oceanographic Lidar for topographic mapping. Results show that each techniques was valuable in providing the needed base data necessary for resource planning. A.R.H.

N83-19163*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
THE USE OF LANDSAT BY THE STATES FOR WATER QUALITY ASSESSMENT
E. M. MIDDLETON *In its* 2d Eastern Reg. Remote Sensing Appl. Conf. p 211-218 1981 refs ERTS
Avail: NTIS HC A17/MF A01 CSCL 13B

The use of LANDSAT for water resources applications in U.S. state demonstration projects is reviewed. The most common single application undertaken between 1976 and 1981 was found to be water condition assessment. The majority of projects, however, fell into the general category of watershed hydrology. Some of the states are attempting to use LANDSAT data in an operational mode for water quality assessment. Two of these state projects from Vermont and Wisconsin are described in brief. The basic information requirements of Section 314 of the U.S. Pollution Control Act are given with the type of input LANDSAT data could potentially provide toward those requirements. Surveys were performed to determine: (1) how its states were responding in 1980 to 1981 to the federal and state water quality laws; and (2) the status of LANDSAT analysis capabilities of each state. M.G.

N83-19164*# Wisconsin Dept. of Natural Resources, Madison.
STATEWIDE LAKE CLASSIFICATION UTILIZING LANDSAT IMAGERY FOR THE STATE OF WISCONSIN
R. H. MARTIN and R. W. MERIDETH, JR. (Wisconsin Univ., Madison) *In* NASA. Goddard Space Flight Center 2d Eastern Reg. Remote Sensing Appl. Conf. p 219-236 1981 refs Original contains imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls, S.D. 57198 ERTS
Avail: NTIS HC A17/MF A01 CSCL 08H

A cooperative program between the Wisconsin Department of Natural Resources and the University of Wisconsin-Madison resulted in the assessment of the trophic condition of approximately 3,000 significant inland lakes in Wisconsin. The feasibility of using both photographic and digital representations of LANDSAT multispectral scanner data for lake classification was investigated. The result was the development of a nearly automated system which, with minimal human interaction, locates and extracts the lake data, then corrects the data for atmospheric effects, and finally classifies all the significant lakes in the state as to trophic condition. M.G.

N83-19165*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
GROUND WATER USE INVENTORY IN MINNESOTA USING LANDSAT DATA
D. R. BEISSEL (Minnesota Dept. of Natural Resources) and A. KERBER *In its* 2d Eastern Reg. Remote Sensing Appl. Conf. p 237-242 1981 ERTS
Avail: NTIS HC A17/MF A01 CSCL 08H

An irrigation ground water use inventory in Sherburne County, Minnesota, was attempted by indirectly locating irrigation wells by determining the location of irrigated lands. Digital classification of LANDSAT MSS imagery was employed using the IDIMS at Goddard Space Flight Center. Single-date classification proved moderately successful after accurate ground truth data were obtained. A combination of supervised and unsupervised classification was used. Multitemporal analysis using August 10 and May 21, 1978 imagery was also attempted. This unsupervised classification proved most successful in identifying crops and irrigated fields. M.G.

N83-19167*# Department of Natural Resources and Environmental Control, Dover, Del.
MONITORING WETLANDS CHANGE USING LANDSAT DATA
D. L. HARDIN *In* NASA. Goddard Space Flight Center 2d Eastern Reg. Remote Sensing Appl. Conf. p 259-267 1981 refs ERTS
Avail: NTIS HC A17/MF A01 CSCL 08H

A wetlands monitoring study was initiated as part of Delaware's LANDSAT applications demonstration project. Classifications of digital data are conducted in an effort to determine the location and acreage of wetlands loss or gain, species conversion, and application for the inventory and typing of freshwater wetlands. A multi-seasonal approach is employed to compare data from two different years. Unsupervised classifications were conducted for two of the four dates examined. Initial results indicate the multi-seasonal approach allows much better separation of wetland types for both tidal and non-tidal wetlands than either season alone. Change detection is possible but generally misses the small acreages now impacted by man. M.G.

N83-19176*# Vermont Dept. of Water Resources, Montpelier.
LAKE CLASSIFICATION IN VERMONT
V. GARRISON and N. BRYANT *In* NASA. Goddard Space Flight Center 2d Eastern Reg. Remote Sensing Appl. Conf. p 345-351 1981 refs ERTS
Avail: NTIS HC A17/MF A01 CSCL 08H

In order to comply with the Federal Clean Water Act and, in so doing, develop a procedure to periodically update the classification, the State of Vermont evaluated the ability of LANDSAT to detect general water quality and specific water quality parameters in Vermont lakes. Unsupervised and supervised classifications as well as regression analyses were used to examine LANDSAT data from Lake Champlain and from four small nearby lakes. Unsupervised and supervised classifications were found to be of somewhat limited value. Regression analyses revealed a good correlation between depth-integrated total phosphorus concentrations and LANDSAT band 4 data ($r2= 0.92$) and between Secchi disk transparencies and LANDSAT band 4 data ($r2$ - 0.85). No correlation was found between depth-integrated chlorophyll-a samples and LANDSAT data. Vermont is expanding this LANDSAT evaluation to include the remaining lakes in the state greater than twenty acres and steps are being taken to incorporate LANDSAT into the state's ongoing water quality monitoring programs. M.G.

N83-20315*# Lockheed Engineering and Management Services Co., Inc., Houston, Tex.
USE OF NOAA-N SATELLITES FOR LAND/WATER DISCRIMINATION AND FLOOD MONITORING
G. TAPPAN, N. C. HORVATH, P. C. DORAISWAMY, T. ENGMAN (Dept. of Agriculture, Houston, Tex.), and D. W. GOSS, Principal Investigators (Dept. of Agriculture, Houston, Tex.) Jan. 1983 37 p Sponsored by NASA, USDA, Dept. of Commerce, Dept. of Interior, and Agency for International Development ERTS
(Contract PROJ. AGRISTARS; NAS9-15800)
(E83-10193; NASA-CR-167812; EW-L3-04394; JSC-18594; NAS 1.26:167812; LEMSCO-19032) Avail: NTIS HC A03/MF A01 CSCL 02C

A tool for monitoring the extent of major floods was developed using data collected by the NOAA-6 advanced very high resolution radiometer (AVHRR). A basic understanding of the spectral returns in AVHRR channels 1 and 2 for water, soil, and vegetation was reached using a large number of NOAA-6 scenes from different seasons and geographic locations. A look-up table classifier was developed based on analysis of the reflective channel relationships for each surface feature. The classifier automatically separated land from water and produced classification maps which were registered for a number of acquisitions, including coverage of a major flood on the Parana River of Argentina. M.G.

N83-20336# Stanford Univ., Calif. Dept. of Operations Research.
MODELING WATER SUPPLY FOR THE ENERGY SECTOR Final Report
N. BURAS Feb. 1982 199 p refs Sponsored by DOE and EPRI
Avail: NTIS HC A09/MF A01

The construction of the WATER-EPM (W-EPM) model which is the energy policy Model (EPM) enlarged to include quantitative descriptions of water availabilites is summarized. To maintain the original structure of EPM, water supply functions are estimated on the basis of information available for the investment required to build storage facilities which can yield the next increment of flow available. A second important feature of the linkage of water and energy submodels in W-EPM is the estimation of a water transportation matrix. The W-EPM includes projections of nonenergy water uses, as a surrogate for water demand functions. Computer test with W-EPM indicat that in the Lower Colorado, Upper Colorado, Great Basin, and Platte-Lower Missouri regions shortages of water may occur as early as the current decade. California, Rio Grande, Texas-Gulf, and Upper Missouri regions may experience water shortages before the end of this century. Early in the next century, the Great Lakes-Ohio, Upper Mississippi, Pacific Northwest, and Arkansas-Lower-Mississippi regions may develop water shortages. DOE

N83-20340# Guam Univ., Agana. Water and Energy Research Inst. of the Western Pacific.
REMOTE SENSING OF WATER RESOURCES ON PACIFIC ISLANDS
D. N. CONTRACTOR Jun. 1982 23 p refs
(Contract DI-14-34-0001-1112)
(PB83-108019; W83-00262; OWRT-A-023-GUAM(2)) Avail: NTIS HC A02/MF A01 CSCL 13B

The value of the LANDSAT data base for locating additional fresh water resources on remote Pacific Islands was assessed, with specific attention given to a classification of land and water resources for Palau. Analysis of the neighboring islands, Peleliu, and Anguar. The promenent land cover features were identified and their areas obtained. Areas having potential value as additional fresh water sources were identified. The larger water resources included the water supply reservoir, the major rivers feeding into Karamado Bay, the Anguar phosphate mines, and the marine lakes in the rock islands. LANDSAT data obtained over Pacific islands was deemed very useful for locating additional water resources. GRA

N83-21435*# Wisconsin Univ., Madison. Inst. for Environmental Studies.
LAKE TROPHIC APPLICATIONS: WISCONSIN
F. SCARPACE *In* NASA. Goddard Space Flight Center Eastern Reg. Remote Sensing Appl. Conf. p 123-125 Jan. 1981 ERTS
Avail: NTIS HC A11/MF A01 CSCL 08H

Efforts to classify the water quality characteristics of lakes using LANDSAT imagery are reported. Image processing and registration techniques are described. A lake classification scheme which involves the assignment of a trophic class number was used in the data analysis. The resulting values were compared to the corresponding rank assignment derived from field measurements. M.G.

N83-21447*# Hydex Corp., Fairfax, Va.
CREATING A BRIDGE BETWEEN REMOTE SENSING AND HYDROLOGIC MODELS Final Report
E. L. PECK, E. R. JOHNSON, and T. N. KEEFER 31 Jan. 1983 121 p refs ERTS
(Contract NAS5-27272)
(E83-10203; NASA-CR-170517; NAS 1.26:170517) Avail: NTIS HC A06/MF A01 CSCL 08H

The development of methods for using remotely sensed measurements with hydrologic models to ensure that simulated results are consistent with observed conditions (model updating) is discussed. Heuristic and full probabilistic approaches are described. The National Weather Service River Forecast System rainfall/runoff and snowmelt models are used in demonstrating the updating procedures. M.G.

N83-21448*# Hydex Corp., Fairfax, Va.
COMBINING REMOTELY SENSED AND OTHER MEASUREMENTS FOR HYDROLOGIC AREAL AVERAGES Interim Report, May - Oct. 1982
E. R. JOHNSON, E. L. PECK, and T. N. KEEFER Greenbelt, Md. NASA. Goddard Space Flight Center 31 Oct. 1982 164 p refs ERTS
(Contract NAS5-27272)
(E83-10204; NASA-CR-170457; NAS 1.26:170457) Avail: NTIS HC A08/MF A01 CSCL 08H

A method is described for combining measurements of hydrologic variables of various sampling geometries and measurement accuracies to produce an estimated mean areal value over a watershed and a measure of the accuracy of the mean areal value. The method provides a means to integrate measurements from conventional hydrological networks and remote sensing. The resulting areal averages can be used to enhance a wide variety of hydrological applications including basin modeling. The correlation area method assigns weights to each available measurement (point, line, or areal) based on the area of the basin most accurately represented by the measurement. The statistical characteristics of the accuracy of the various measurement technologies and of the random fields of the hydrologic variables used in the study (water equivalent of the snow cover and soil moisture) required to implement the method are discussed. Author

N83-21450*# California Univ., Santa Barbara. Dept. of Geography.
LANDSAT-D INVESTIGATIONS IN SNOW HYDROLOGY Quarterly Progress Report, 17 Nov. - 31 Dec. 1982
J. DOZIER, Principal Investigator 31 Dec. 1982 4 p refs ERTS
(Contract NAS5-27463)
(E83-10207; NASA-CR-170053; NAS 1.26:170053) Avail: NTIS HC A02/MF A01 CSCL 08L

Snow reflectance in all 6 TM reflective bands, i.e., 1, 2, 3, 4, 5, and 7 was simulated using a delta-Eddington model. Snow reflectance in bands 4, 5, and 7 appear sensitive to grain size. It appears that the TM filters resemble a "square-wave" closely enough that a square-wave can be assumed in calculations. Integrated band reflectance over the actual response functions was calculated using sensor data supplied by Santa Barbara Research Center. Differences between integating over the actual response functions and the equivalent square wave were negligible. Tables are given which show (1) sensor saturation radiance as a percentage of the solar constant, integrated through the band response function; (2) comparisons of integrations through the sensor response function with integrations over the equivalent square wave; and (3) calculations of integrated reflectance for snow over all reflective TM bands, and water and ice clouds with thickness of 1 mm water equivalent over TM bands 5 and 7. These calculations look encouraging for snow/cloud discrimination with TM bands 5 and 7. A.R.H.

07

DATA PROCESSING AND DISTRIBUTION SYSTEMS

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

A83-19697

CAPACITY AND CODING IN THE PRESENCE OF FADING AND JAMMING

W. E. STARK and R. J. MCELIECE (Illinois, University, Urbana, IL) In: NTC '81; National Telecommunications Conference, New Orleans, LA, November 29-December 3, 1981, Record. Volume 1. New York, Institute of Electrical and Electronics Engineers, Inc., 1981, p. B7.4.1-B7.4.5. refs

(Contract N00014-79-C-0424)

The capacity of noncoherent FSK in the presence of fading and partial band jamming is presented. It is observed that for both partial band jamming and fading there is an optimal nonzero code rate that minimizes the energy per bit required to achieve reliable communication. For low enough code rates uniform jamming is the best strategy that the jammer can adopt. We also give results for Reed-Solomon codes on the partial-band jamming channel. (Author)

A83-20147

THE USE OF CONTEXTUAL INFORMATION IN THE CLASSIFICATION OF REMOTELY SENSED DATA

C. M. GURNEY (Systems and Applied Sciences Corp., Hyattsville, MD) and J. R. G. TOWNSHEND (Reading, University, Reading, Berks., England) Photogrammetric Engineering and Remote Sensing, vol. 49, Jan. 1983, p. 55-64. Research supported by the Atomic Energy Research Establishment. refs

A typology of contextual information as used in the classification of remotely sensed data is proposed. Procedures which use contextual information in the classification of remotely sensed data are defined as those where the spectral values or classes of pixels are used to assist classification of some other pixel or group of pixels. Procedures can be categorized according to whether they are applied to raw or classified data, by whether they apply to individual pixels or to groups of similarly classified pixels and objects, and by the form of spatial relationships between the pixels. Examples of applications of each type of procedure are given with reference to classification using Landsat data. (Author)

A83-20148* Jet Propulsion Lab., California Inst. of Tech., Pasadena.

SHUTTLE IMAGING RADAR-A INFORMATION AND DATA AVAILABILITY

A. L. HOLMES (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, CA) Photogrammetric Engineering and Remote Sensing, vol. 49, Jan. 1983, p. 65-67.

The performance characteristics of the Shuttle Imaging Radar (SIR-A), carried aloft on the STS-2 flight, are described and the results of its initial use are evaluated. The SIR-A is an SAR system operated at 1278 MHz (L-band), i.e., a wavelength of 23 cm. A seven panel antenna 9.4 m long was used, and scans were performed at a 50 deg angle of incidence to the center of a 50 km swath. Resolution is 40 m, and imagery is generated on a scale of 1:500,000. Sample images of a Brasilian island and the California coast are provided. Comparisons of the SIR-A imagery with Seasat SAR composite imagery demonstrate that the SIR-A is more sensitive to local roughness and only slightly dependent on terrain slope. M.S.K.

A83-20149

REMOTE SENSING BRIGHTNESS MAPS

J. R. JENSEN and M. E. HODGSON (South Carolina, University, Columbia, SC) Photogrammetric Engineering and Remote Sensing, vol. 49, Jan. 1983, p. 93-102. refs

Various remote sensing brightness maps are described, together with algorithms implementable with an electrostatic printer-plotter for producing continuous tone output. Attention is given to Landsat-4 MSS data, wherein digitized brightnesses scanned by channels 4, 5, and 6 are recorded on computer compatible tapes according to a 7-bit scale, yielding 127 brightness levels; band 7 is recorded on a six-bit scale to provide 63 levels. Reflectance maps produced by high resolution B/W CRTs or film writers are discussed, noting their significant expense. Attention is given to density sliced maps and their generation using statistically determined boundaries between shaded areas which are best delineated by gradients. Plotter-produced brightness maps are described, including the use of scale subroutines to overlay the maps onto planimetric or other maps. Crossed-line shading is discussed, and involves the use of parallel constant thickness lines with variable spacings in order to portray gray levels. Finally, techniques for contrast enhancement are outlined. M.S.K.

A83-21069#

RECEPTION, PREPARATION, AND GEOMETRIC PROCESSING OF IMAGERY OF METEOROLOGICAL SATELLITES [EMPFANG, AUFBEREITUNG UND GEOMETRISCHE VERARBEITUNG VON BILDDATEN METEOROLOGISCHER SATELLITEN]

H. OFFNER Stuttgart, Universitaet, Fakultaet Elektrotechnik, Dr.-Ing. Dissertation, 1981. 144 p. In German. refs

A description is presented of the acquisition of data with the aid of remote sensing devices on board of satellites, giving particular attention to the scanning radiometer with several channels. The design of a receiving station for satellite signals in the 1.7 GHz band with an antenna system employing a 2-m parabolic reflector is discussed together with aspects of signal processing and the representation of the signals as images. Attention is given to aspects of digitizing, the digital preprocessing of data, and the rectification of disturbed image elements. In connection with a description of the geometric processing of imagery, a survey of the employed processing methods is provided and the factors which affect the image geometry are examined. The coarse rectification of imagery is discussed along with the calculation of map projections, the fine rectification with a digital computer, and a processor which performs time-consuming image element operations in connection with the geometric rectification of images. G.R.

A83-21433

LANDSAT MULTITEMPORAL COLOR COMPOSITES

J. R. EYTON (Pennsylvania State University, University Park, PA) Photogrammetric Engineering and Remote Sensing, vol. 49, Feb. 1983, p. 231-235. Research supported by the South Carolina Budget and Control Board.

Landsat MSS and RBV images can be photographically color composited using scenes of the same spectral band obtained at three different dates. The resulting composite exhibits temporal information only, with areas of change displayed as various hues and areas of no change displayed as black and white tones. Anniversary date images from three different years and images acquired at three different periods within the same year were used to construct several examples of a multitemporal color composite. All of the composites displayed a wide range of colors containing a considerable amount of temporal information. This technique is particularly useful when applied to the single band, high resolution Landsat-3 RBV scenes. (Author)

A83-21901
INTERNATIONAL SOCIETY FOR PHOTOGRAMMETRY AND REMOTE SENSING, INTERNATIONAL SYMPOSIUM, TOULOUSE, FRANCE, SEPTEMBER 13-17, 1982, TRANSACTIONS. VOLUME 1 [SOCIETE INTERNATIONALE DE PHOTOGRAMMETRIE ET TELEDETECTION, SYMPOSIUM INTERNATIONAL, TOULOUSE, FRANCE, SEPTEMBER 13-17, 1982, ACTES. VOLUME 1]
L. LAIDET, (ED.) (Groupement pour le Developpement de la Teledetection Aerospatiale, Toulouse, France) Toulouse, Groupement pour le Developpement de la Teledetection Aerospatiale (International Society for Photogrammetry and Remote Sensing, International Archives, Volume 24-VII/1), 1982. 1065 p. In French and English.

Topics discussed include methodology for the enhancement and thematic classification of visible and infrared data, enhancement and classification methodology for microwave data, the study of spectral signatures, and investigations of renewable (e.g., vegetation, agriculture, forest, water) and nonrenewable resources. Consideration is also given to environmental (land and water) monitoring, oceanographic and coastal-zone studies, investigations of ice and snow, land use and land cover, remote sensing in engineering projects and industrial processes, and vegetation damage in agriculture and forestry. B.J.

A83-21902
PHOTOINTERPRETATION - UNSUPERVISED OR SUPERVISED CLASSIFICATION
F. QUIEL (Karlsruhe, Universitaet, Karlsruhe, West Germany) In: International Society for Photogrammetry and Remote Sensing, International Symposium, Toulouse, France, September 13-17, 1982, Transactions. Volume 1. Toulouse, Groupement pour le Developpement de la Teledetection Aerospatiale, 1982, p. 5-12.

Different sets of requirements for the evaluation of remote sensing data are discussed, and examples in geology and land use (Landsat) mapping are used to demonstrate the possibilities and limitations of photointerpretation, and unsupervised and supervised classification. It is noted that common problems in photointerpretation and classification are feature selection, the determination of characteristic values for classes, the need for ground information, and the incorporation of additional information. Classifications are mainly restricted to spectral and/or textural classes. The additional utilization of size, shape, and pattern would extend the application of classification techniques to other problems and data. B.J.

A83-21903
METHODOLOGY FOR THEMATIC IMAGE PROCESSING USING THEMATIC AND TOPOGRAPHIC DATA BASES AND BASE-INTEGRATED MULTI-SENSOR IMAGERY
W. GOEPFERT (Institut fuer Angewandte Geodaesie, Frankfurt am Main, West Germany) In: International Society for Photogrammetry and Remote Sensing, International Symposium, Toulouse, France, September 13-17, 1982, Transactions. Volume 1. Toulouse, Groupement pour le Developpement de la Teledetection Aerospatiale, 1982, p. 13-19. refs

Multisensor imagery, supplemented by thematic and topographic data bases, can be meaningfully used as input data for the purpose of thematic data processing. A method to derive such thematic data bases from existing maps by digital image processing is presented; the approach allows for arbitrary input projections of the map and arbitrary output projections for the derived data base. On account of different sensor modeling functions, different sensor platform attitudes at the times of exposure, and topographic relief, any imagery will always be distorted with respect to data base locations. The method proposed here differentially corrects the multisensor imagery into the data base system using a rubber-stretch-type rectification algorithm, i.e., the multiquadratic approach. Applications are discussed and examples (including those relating to Landsat imagery) are shown. B.J.

A83-21905
PICTURE CLASSIFICATION AND SEGMENTATION BY FEATURE COMBINATION IN MULTISPECTRAL DATA
E. MAUER and R. SCHAERF (Forschungsinstitut fuer Informationsverarbeitung und Mustererkennung, Karlsruhe, West Germany) In: International Society for Photogrammetry and Remote Sensing, International Symposium, Toulouse, France, September 13-17, 1982, Transactions. Volume 1. Toulouse, Groupement pour le Developpement de la Teledetection Aerospatiale, 1982, p. 35-43. Bundesministerium fuer Forschung und Technologie refs
(Contract BMFT-01-QS-099-ZA/WF/WEO-2754)

The advantages and disadvantages of multispectral analysis and texture analysis are described. It is shown that multispectral image processing is able to support the texture analysis, and a combination of these methods is proposed. In order to simplify such a combination, the training areas for the multispectral analysis are detected automatically, without a priori knowledge. The complementary properties of a contrast-extraction algorithm and a region-growing algorithm are exploited. A complex processing system exploiting the aforementioned properties and combining the complementary methods is proposed. A possible application is the generation of thematic maps for planning and ecological purposes. B.J.

A83-21906
MULTISPECTRAL IMAGE CLASSIFICATION BY THE SEPARATING HYPERPLANES METHOD - A COMPUTER PROGRAM
S. L. EKENOBI (Lagos, University, Lagos, Nigeria) In: International Society for Photogrammetry and Remote Sensing, International Symposium, Toulouse, France, September 13-17, 1982, Transactions. Volume 1. Toulouse, Groupement pour le Developpement de la Teledetection Aerospatiale, 1982, p. 55-70. refs

The separating-hyperplanes (SH) classifier is described, which in some cases is more effective than the maximum likelihood algorithm for the purpose of digital multispectral image classification. Unlike the maximum likelihood algorithm, the SH classifier breaks up the whole feature space into 'boxes', each of which encloses a class. However, the most important advantage of the SH method over the maximum likelihood method is that it is not affected by the statistical properties of the classification data. The advantages of the SH algorithm over the maximum likelihood method are illustrated with respect to Landsat data for an area near Hannover, Germany and an area near Jos, Nigeria. B.J.

A83-21912
SIMULATION OF PANCHROMATIC SPOT-DATA AT THE NATIONAL LAND SURVEY OF SWEDEN
M. WALLIN (National Land Survey, Gavle, Sweden) In: International Society for Photogrammetry and Remote Sensing, International Symposium, Toulouse, France, September 13-17, 1982, Transactions. Volume 1. Toulouse, Groupement pour le Developpement de la Teledetection Aerospatiale, 1982, p. 165-172.

The Swedish National Land Survey simulation of SPOT data has been made by using orthophotos, a digital terrain model, and a scanner. Orthophotos have been put together and reduced to an image which has been digitized in a scanner. The scale and the aperture have been chosen in such a way that the size of the pixels corresponds to 10 x 10 m on the ground. With the pixel size and the orthophotos, the simulation will correspond to the future SPOT data in panchromatic mode. Three images have been produced, one with the track of the satellite over the center of the orthophoto, one 274 km to the east, and one 108 km to the west of the center. From the central image, a number of alternative products have been developed by copying the images with forestry maps at different scales. B.J.

A83-21913

CREATION OF NEW CHANNELS BY PHOTOGRAPHIC METHODS [CREATION DE NOUVEAUX CANAUX PAR METHODES PHOTOGRAPHIQUES]

B. LORTIC (Office de la Recherche Scientifique et Technique d'Outre Mer, Bureau de Teledetection, Bondy, Seine-Saint-Denis, France) In: International Society for Photogrammetry and Remote Sensing, International Symposium, Toulouse, France, September 13-17, 1982, Transactions. Volume 1. Toulouse, Groupement pour le Developpement de la Teledetection Aerospatiale, 1982, p. 173-184. In French.

The paper considers an investigation whose aim is to improve the visual analysis of remote sensing imagery, i.e., SPOT simulation and Landsat data. Two techniques are described: (1) the creation of new channels by adding and subtracting the densities of existing channels; and (2) the establishment of new 'weighted' channels by adapting the contrast of one of them. Three examples illustrating the use of these techniques are discussed. The first example, which illustrates the use of SPOT simulation in the Oursi region (Upper Volta), shows the advantage of creating a new channel. The second example, involving the same image, shows the advantage of weighting. The third example involves a Landsat image of Cameroon, with reference to an agricultural application. B.J.

A83-21915

MULTIDENSITY AND ITS APPLICATION TO LANDSAT IMAGERY

J.-P. ROGALA (IBM France, S.A., Paris, France) In: International Society for Photogrammetry and Remote Sensing, International Symposium, Toulouse, France, September 13-17, 1982, Transactions. Volume 1. Toulouse, Groupement pour le Developpement de la Teledetection Aerospatiale, 1982, p. 195-204.

The paper presents the main results of a study of automated regional analysis of Landsat imagery begun in 1979. The basic algorithm ICAR (Interpretation Cartographique Assistee Regionale), which is a computation of density vectors in a scanning window, is defined. This algorithm, which involves the spatial analysis of an image after each pixel has been classified by traditional methods, makes it possible to map 'landscapes' and classify regions instead of individual pixels. The ICAR technique has been applied mainly in soil and geological mapping in Africa (Upper Volta, Mali), Asia (Thailand), and France (Vesoul, Tours-Saumur, Caen). Some of these test results are presented, and compared with traditional manual and visual interpretation. The place of such a study in a survey process and the relationship between window size and final-map scale are examined with reference to eight test areas chosen on different Landsat images. B.J.

A83-21916

COMPOSITE SEASAT-LANDSAT IMAGES FROM THE POINT OF VIEW OF THEMATIC INTERPRETATION [APPORT DES IMAGES COMPOSITES SEASAT-LANDSAT POUR L'INTERPRETATION THEMATIQUE]

M. GUY, C. LALLEMAND, G. LEGENDRE, A. MARIE (Institut Francais du Petrole, Rueil-Malmaison, Hauts-de-Seine, France), and J. RIOM (Institut National de la Recherche Agronomique, Bordeaux, France) In: International Society for Photogrammetry and Remote Sensing, International Symposium, Toulouse, France, September 13-17, 1982, Transactions. Volume 1. Toulouse, Groupement pour le Developpement de la Teledetection Aerospatiale, 1982, p. 215-230. In French. refs

The paper discusses the improvement achieved by merging Seasat SAR data with Landsat data obtained for the Charentes region of France. The merged image is obtained digitally after geometric rectification of the two scenes. A speckle filtering method is proposed for improving the interpretation of Seasat images, and the use of principal-components analysis to study the Seasat and Landsat multispectral data is examined. Finally, each type of image is considered from the point of view of thematic interpretation, with reference to geology and forestry applications. B.J.

A83-21920* Jet Propulsion Lab., California Inst. of Tech., Pasadena.

ANALYSIS OF A MULTISENSOR IMAGE DATA SET OF SOUTH SAN RAFAEL SWELL, UTAH

D. L. EVANS (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, CA) In: International Society for Photogrammetry and Remote Sensing, International Symposium, Toulouse, France, September 13-17, 1982, Transactions. Volume 1. Toulouse, Groupement pour le Developpement de la Teledetection Aerospatiale, 1982, p. 255-259. refs
(Contract NAS7-100)

A Shuttle Imaging Radar (SIR-A) image of the southern portion of the San Rafael Swell in Utah has been digitized and registered to coregistered Landsat, Seasat, and HCMM thermal inertia images. The addition of the SIR-A image to the registered data set improves rock type discrimination in both qualitative and quantitative analyses. Sedimentary units can be separated in a combined SIR-A/Seasat image that cannot be seen in either image alone. Discriminant Analyses show that the classification accuracy is improved with addition of the SIR-A image to Landsat images. Classification accuracy is further improved when texture information from the Seasat and SIR-A images is included. (Author)

A83-21922* Jet Propulsion Lab., California Inst. of Tech., Pasadena.

SEASAT/SIR-A DIGITAL REGISTRATION OVER ALGERIA

P. REBILLARD, C. ELACHI, M. NARAGHI, J. SOHA, and W. STROMBERG (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, CA) In: International Society for Photogrammetry and Remote Sensing, International Symposium, Toulouse, France, September 13-17, 1982, Transactions. Volume 1. Toulouse, Groupement pour le Developpement de la Teledetection Aerospatiale, 1982, p. 271-276. refs
(Contract NAS7-100)

Seasat Synthetic Aperture Radar (SAR) and Shuttle Imaging Radar (SIR-A) data over northeastern Algeria have been studied using digital registration. Preliminary results of this work show that: (1) both radars delineate in the same way the same features on the ground, (2) the Seasat image shows a strong difference between the Chott Melrhir and its environment, not seen in the same way by SIR-A, and (3) SIR-A data enhance more details on the floor of the Chotts, presumably due to the look angle or due to flooding conditions which may have occurred prior to the SIR-A experiment (November 12-14, 1981). (Author)

A83-22082

SATELLITE SYSTEMS FOR THE ACQUISITION AND PROCESSING OF GEOMAGNETIC DATA [SPUTNIKOVYE SISTEMY SBORA I OBRABOTKI GEOMAGNITNYKH DANNYKH]

A. N. ZAITSEV Geomagnitnye Issledovaniia, no. 30, 1982, p. 60-64. In Russian. refs

The basic stages of the development of satellite systems for the acquisition and processing of geomagnetic data are briefly described. The effectiveness of using geostationary communication satellites for this purpose is shown using the example of tests performed with an unmanned Antarctic observatory and an experiment with the ATS-6. In addition, basic information is presented on the SELDAD geomagnetic data collection system. The use of an Intercosmos satellite system for the collection of geophysical data is also considered. The block diagram is presented of a ground platform which can serve as the basis of a satellite system for the acquisition of geomagnetic data. B.J.

A83-22525* Jet Propulsion Lab., California Inst. of Tech., Pasadena.
GEOLOGY AND IMAGE PROCESSING
M. DAILY (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, CA) In: Design of digital image processing systems; Proceedings of the Meeting, San Diego, CA, August 27, 28, 1981. Bellingham, WA, SPIE - The International Society for Optical Engineering, 1982, p. 9-12. NASA-supported research.

Digital image processing for geological applications will be integrated with geographic information systems and data base management systems. While multiband data sets from radar and multispectral scanners will make extreme demands on memory, bus and processor architectures, it is expected that array processors and VLSI/VHSIC dedicated function chips will allow the use of fast Fourier transform and classification algorithms. It is anticipted that, as processor power increases, the weakest link of a processing system will become the analyst who uses it. Human engineering of systems is therefore recommended for the most effective utilization of remotely sensed geologic data. O.C.

A83-22539
LARGE SCALE MULTIPURPOSE INTERACTIVE IMAGE PROCESSING FACILITY AT ETH-ZURICH
L. BESSE, K. SEIDEL, and O. KUEBLER (Zuerich, Eidgenoessische Technische Hochschule, Zurich, Switzerland) In: Design of digital image processing systems; Proceedings of the Meeting, San Diego, CA, August 27, 28, 1981. Bellingham, WA, SPIE - The International Society for Optical Engineering, 1982, p. 154-161. refs

A83-24535#
LANDSAT DATA IN THE SAHEL - THEIR USE AND ACCURACY FOR SMALL-SCALE SOIL SURVEYS AND THEIR TIME AND COST EFFICIENCY
L. A. VAN SLEEN (International Institute for Aerial Survey and Earth Sciences, Enschede, Netherlands) In: Remote Sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 1. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 91-109. refs

Aeolian, alluvial, plateau, and pediment landscapes imaged by Landsat sensors over Mali, Mauritania, and Senegal are studied, together with coastal features, deltas, and estuaries. The data were studied on a scale of 1:200;000, and compared with existing aerial photography on bases of accuracy, the time necessary for procurement and handling, and data costs. The Landsat imagery was satisfactory for basins, levees, splays, pointbars, sloughs, dunes, interdunes, and sandsheets, as well as identification of soil types. Data processing for the Landsat imagery took about 1/2 the time necessary for processing aerial photographs, while the soil survey process was cut by $250,000, or about 29.5% of the total cost expected if only aerial photography were used. M.S.K.

A83-24536#
MAPPING CONTROL FOR REMOTELY SENSED DATA
F. J. DOYLE (U.S. Geological Survey, Reston, VA) In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 1. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 111-120. refs

Mapping from remote sensing records requires information content and geographic referencing which are related to the scale of the map. The extraction of cultural planimetric detail requires a ground resolution of about 3m/lp or 1.5 m/pixel regardless of the scale of the final map. These requirements are not met by the current Landsat series nor will they be addressed by the future Landsat-D. The Metric Camera experiment on Spacelab-1, and the Large Format Camera currently planned for STS-15 will both provide recovered film data suitable for mapping at 1:50,000 scale. An electro-optical data transmission system called MAPSAT has been proposed by the U.S. Geological Survey to meet the same requirements. (Author)

A83-24547#
THE DEVELOPMENT OF A LAND IMAGE-BASED RESOURCE INFORMATION SYSTEM /LIBRIS/ AND ITS APPLICATION TO THE ASSESSMENT AND MONITORING OF AUSTRALIAN ARID RANGELANDS
R. D. GRAETZ, M. R. GENTLE, R. P. PECH (Commonwealth Scientific and Industrial Research Organization, Div. of Land Resources Management, Deniliquin, New South Wales, Australia), and J. F. OCALLAGHAN (Commonwealth Scientific and Industrial Research Organization, Div. of Computing Research, Canberra, Australia) In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 1. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 257-275. refs

A83-24565#
ON ATTAINING SEMI-ARIDITY OF NORTH-BENGAL IN BANGLADESH AS VIEWED THROUGH THE LANDSAT IMAGERIES
M. I. CHOWDHURY and A. F. M. KAMALUDDIN (Jahangirnagar University, Dacca, Bangladesh) In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 1. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 503-512. refs

A83-24576#
APPLICATION OF THE IHS COLOR TRANSFORM TO THE PROCESSING OF MULTISENSOR DATA AND IMAGE ENHANCEMENT
R. HAYDN, G. W. DALKE, J. HENKEL (Muenchen, Technische Universitaet, Munich, West Germany), and J. E. BARE (SATLAB, Inc., Lawrence, KS) In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 1. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 599-616.

Satellite remote sensing data have become indispensable tools for earth resource investigations in arid areas. Photointerpretation of remote sensing images, however, requires an optimum presentation of the data in order to utilize fully the information offered. With respect to the various earth observation platforms available and planned, image processing techniques will become increasingly important, especially when considering the wide range of sensor systems which will produce spatially and spectrally incompatible image data. This paper discusses several remote sensing applications of the IHS transform, an algorithm which describes color in terms of intensity (I), hue (H), and saturation (S) and provides a superior tool for merging such incompatible data sets. Examples discussed here include the merging of Landsat MSS with RBV data, Landsat MSS with HCMM data and band ratio/IHS enhancements for test sites in Egypt, Morocco and the Gulf of Suez region. (Author)

A83-24580#
THE IMPERIAL COLLEGE MULTI-CHANNEL ELECTRONIC IMAGE CLASSIFIER AND ITS APPLICATIONS TO THE CLASSIFICATION OF SURFACE TYPES BY MULTI-SPECTRAL ANALYSIS
A. C. BIRD, T. H. WILLIAMS, M. E. BARNETT (Imperial College of Science and Technology, London, England), T. J. MUNDAY, and J. TOWNSHEND (Reading University, Reading, England) In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 2. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 665-674. Research supported by the Programmed Neuro Cybernetics, Ltd. refs

Landsat images have been obtained for the Chott Djerid area of Southern Tunisia. This includes areas of thick salt crust, salt mud, salt-clay flats, sandy regions and oases. Classification of surface types has been carried out using the Imperial College multichannel analysis which employs box classification and ratioing with feature space manipulation and display. The results are compared with the detailed local information available. (Author)

A83-24631#

ESTIMATES OF REGIONAL EVAPOTRANSPIRATION IN SOUTH-EASTERN FRANCE USING THERMAL AND ALBEDO DATA FROM THE HEAT CAPACITY MAPPING MISSION SATELLITE

P. REINIGER, J. HUYGEN, J. MEGIER (Commission of the European Communities, Joint Research Centre, Ispra, Italy), and B. SEGUIN (Institut National de la Recherche Argonomique, Avignon, France) In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 2. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 1231-1238. refs

A83-25969* Jet Propulsion Lab., California Inst. of Tech., Pasadena.

HUE-SATURATION-INTENSITY SPLIT-SPECTRUM PROCESSING OF SEASAT RADAR IMAGERY

M. DAILY (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, CA) Photogrammetric Engineering and Remote Sensing, vol. 49, Mar. 1983, p. 349-355. refs
(Contract NAS7-100)

Characteristics of terrain features in orbital radar imagery are investigated on the basis of radar physics and the human visual system. Signal scattering, the dominant factor in radar imagery, is caused by look angle and relief displacement. Power spectra characteristics are explored, noting that surface scattering dominates the low frequencies and slope significantly affects the high frequency tone variations. The maximum human visual response has been identified for achromatic scenes as 7 cycles per degree, whereas in radar imagery the low frequency half-power point occurs near 2.5 cycles/deg. Image feature size at a scale of 1:500,000 has been calculated for the maximum human response at 1.25 km. A hue-saturation-intensity transformation is presented for displaying two or three data sets on the same image and is demonstrated for Seasat SAR imagery. The transformation is shown to restore low spatial frequencies to the SAR imagery in order to identify terrain features which would otherwise not be visually discernible. M.S.K.

A83-26824

THEMATIC MAPPING ON THE BASIS OF THE APPLICATION OF SPACE INFORMATION [TEMATICHESKOE KARTOGRAFIROVANIE NA OSNOVE ISPOL'ZOVANIIA KOSMICHESKOI INFORMATSII]

IU. G. KELNER Geodeziia i Kartografiia, Feb. 1983, p. 34-38. In Russian.

Activities at the Priroda center during 1978-1981 pertaining to the use of remote-sensing data to generate series of coupled medium-scale thematic maps for various regions of the USSR are reviewed. A block diagram illustrating the sequence of operations involved in the cartographic processing of space remote-sensing data is presented. B.J.

A83-28145

ANALYSIS OF MULTITEMPORAL LANDSAT 2 IMAGERY OF THE ANNABA ZONE OF ALGERIA - APRIL 28, 1977 AND FEBRUARY 28, 1978 /EARTHNET 20 834/ [L'ANALYSE DIACHRONIQUE DES DONNEES LANDSAT 2 DE LA ZONE D'ANNABA /ALGERIE/ LES 28 AVRIL 1977 ET 28 FEVRIER 1978 /EARTHNET 20 834/]

C. BARDINET (Paris, Ecole Normale Superieure, Paris, France) (Universite de Picardie, Colloque sur la Teledetection et l'Amenagement Regional, Amiens, France, Oct. 26, 27, 1981.) Societe Francaise de Photogrammetrie et de Teledetection, Bulletin, no. 87, 1982, p. 5-15. In French. refs

Landsat 2 multispectral imagery of 1100 sq km of the Annaba zone of Algeria were obtained during two passes separated by 10 mos. Attention is given to the analysis techniques to compensate for geometric distortions, selection of the polygons for the imagery, spectral classification with the maximum likelihood technique, and classifications based on taxonomy of the region. The Bayes theorem was tested on a multitemporal and multispectral index of 500 x 500 pixels covering 4 MSS channels for each date. Methods for selecting cut-offs for the spectral values are described for mapping land use patterns, agricultural zones, forests, industrial zones, and urban areas. Superposition of the indices and subtraction of cut-offs of one channel from another were shown to identify areas with heavy vegetation, provide a biomass index, and using multiple channels, characterize mountainous terrain by shadows. M.S.K.

A83-28188

REMOTE SENSING - CORRECTIONS AND DATA ENHANCEMENT. I [TELEDETECTION - CORRECTIONS ET AMELIORATION DES DONNEES]

R. BARIOU and D. LECAMUS (Rennes II, Universite, Rennes, France) Photo Interpretation, vol. 20, Mar.-Apr. 1981. 16 p. In French. refs

A bibliographic review of the published research on data acquisition and processing of remote sensing data for photointerpretation practices is presented. Material significant to conversion of raw data to corrected data is noted, with attention given to geometric and radiometric deformations corrections. Preprocessing and processing steps are considered in terms of image quality and parameters such as the spectral and spatial signature and stereoscopy techniques. Attention is devoted to the choice of sensor and selective processing as examples of investigative methods. Filtering edge sharpening, contrast improvement, equidensity calculations, and combinatorial practices are mentioned. M.S.K.

A83-28189

REMOTE SENSING - CORRECTIONS AND DATA ENHANCEMENT. II [TELEDETECTION - CORRECTIONS ET AMELIORATION DES DONNEES. II]

R. BARIOU and D. LECAMUS (Rennes II, Universite, Rennes, France) Photo Interpretation, vol. 20, May-June 1981. 20 p. In French.

Error correction techniques for remotely sensed data are reviewed, together with pretreatment and treatment procedures and the selection of sensors for investigations. The sources of geometric errors, e.g., SLAR viewing, sensor limitations, terrain relief, and atmospheric refraction are considered, and corrections are defined. Radiometric distortions are examined with particular note made of atmospheric effects. Criteria for determining the level of image quality are discussed and image parameters are qualified, using examples from the Landsat, Skylab, and SMS 1 and 2 spacecraft imagery. The data available from different wavelengths, narrow or broadbands, polarization, and view angle are outlined, and the procedures for selective treatment through filtering, contour reinforcement, contrast enhancement, equidensity plotting, and data combining are explored. M.S.K.

A83-28190

REMOTE SENSING - METHODS AND UNCERTAINTY IN INTERPRETATION. II [TELEDETECTION - METHODES ET PROBLEMATIQUE DE L'INTERPRETATION]

R. BARIOU and D. LECAMUS (Rennes II, Universite, Rennes, France) Photo Interpretation, vol. 20, Sept.-Oct. 1981. 18 p. In French.

The basis of remote sensing data interpretation resides in criteria involving tint, color, the scale, altitude, form, shading, texture, correlations, the scene, and the image structure. Analyses are adapted for UV, visible, IR, thermal IR, and microwave data. Control of the generated maps through available scales and the interpretation mode is examined. Multispectral scanning, image stratification, and multitemporal viewing are considered, along with stereoscopy, multispatial imagery, and image correlation techniques. Data interpretation for visible, near-IR, and thermographic information is discussed. Automated classification of numerical imagery and data is described, and an example is provided of three classification schemes for geological mapping. The main algorithms employed to treat data are enumerated, including statistical formulations, and several methods of treating Landsat data are reviewed. M.S.K.

A83-29146* National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
LABORATORY SYSTEM FOR DEMONSTRATING SPACECRAFT PROCESSING OF MULTISPECTRAL IMAGE DATA
B. D. MEREDITH (NASA, Langley Research Center, Hampton, VA), P. C. CARNEY, and R. J. LABAUGH (Martin Marietta Aerospace, Denver, CO) Optical Engineering (ISSN 0091-3286), vol. 22, Mar.-Apr. 1983, p. 260-266. refs

The various elements of the Information Adaptive System (IAS) program are discussed along with the design features, approaches, and algorithms employed within the system. This program was initiated by NASA in order to develop an adaptable data processing system which will accommodate high speed multispectral image data in the real-time spacecraft environment. The development of this system is examined, including the test and support equipment required to evaluate and demonstrate the operational performance of the system in terms of the applicability of the design to high speed onboard processing. In addition to a high throughput rate capability, this system will be flexible, programmable, and capable of adapting its operation to external commands and characteristics of the data stream. N.B.

N83-16812*# National Aeronautics and Space Administration. Earth Resources Labs., Bay St. Louis, Miss.
AN-A46: LANDSAT SCENE-TO-SCENE REGISTRATION ASSESSMENT
J. E. ANDERSON, Principal Investigator 21 Jan. 1983 2 p ERTS
(E83-10137; NASA-TM-85198; NAS 1.15:85198) Avail: NTIS HC A02/MF A01 CSCL 05B

LANDSAT-4 MSS data and TM data for the 16 September 1982 scene were received. MSS data were reformatted and scene to scene registration, with previous MSS data is nearing completion. LANDSAT-2 to LANDSAT-2 MSS registration was completed. The results obtained serve as a baseline against which to compare the registrations containing LANDSAT-4 MSS. The TM data set as originally processed for the Orleans area had excessive yaw which exaggerated the forward/reverse scan pixal alignment, GSFC software was subsequently modified to minimize the problem. A detector stitching problem most pronounced in bodies of water was noted for TM channel 3 (0.63 micrometer to 0.69 micrometer). A.R.H.

N83-17411*# OAO Corp., Greenbelt, Md.
RESULTS OF THE SPATIAL RESOLUTION SIMULATION FOR MULTISPECTRAL DATA (RESOLUTION BROCHURES) Final Report
19 Feb. 1982 50 p
(Contract NASW-3358)
(NASA-CR-169803; NAS 1.26:169803) Avail: NTIS HC A03/MF A01 CSCL 05B

The variable information content of Earth Resource products at different levels of spatial resolution and in different spectral bands is addressed. A low-cost brochure that scientists and laymen could use to visualize the effects of increasing the spatial resolution of multispectral scanner images was produced. Author

N83-17927*# Technicolor Government Services, Inc., Moffett Field, Calif.
ANALYSIS OF THE TANANA RIVER BASIN USING LANDSAT DATA
L. A. MORRISSEY, V. G. AMBROSIA, and C. CARSON-HENRY Apr. 1981 50 p Prepared in cooperation with Alaska Dept. of Natural Resources, Anchorage Original contains color imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls, S.D. 57198 ERTS
(Contract NAS2-11101)
(E83-10163; NASA-CR-166393; NAS 1.26:166393) Avail: NTIS HC A03/MF A01 CSCL 08H

Digital image classification techniques were used to classify land cover/resource information in the Tanana River Basin of Alaska. Portions of four scenes of LANDSAT digital data were analyzed using computer systems at Ames Research Center in an unsupervised approach to derive cluster statistics. The spectral classes were identified using the IDIMS display and color infrared photography. Classification errors were corrected using stratification procedures. The classification scheme resulted in the following eleven categories; sedimented/shallow water, clear/deep water, coniferous forest, mixed forest, deciduous forest, shrub and grass, bog, alpine tundra, barrens, snow and ice, and cultural features. Color coded maps and acreage summaries of the major land cover categories were generated for selected USGS quadrangles (1:250,000) which lie within the drainage basin. The project was completed within six months. Author

N83-17929*# OAO Corp., Beltsville, Md.
HEAD CAPACITY MAPPING MISSION (HCMM) NOTIFICATION EFFORTS Final Report
30 Oct. 1980 72 p Original contains imagery. Original imagery may be purchased from NASA Goddard Space Flight Center, (code 601), Greenbelt, Md. 20770. 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
(Contract NASW-3358)
(E83-10165; NASA-CR-169771; NAS 1.26:169771; OAO-TR/80/0072) Avail: NTIS HC A04/MF A01 CSCL 08B

To encourage wide use of the Heat Capacity Mapping Mission (HCMM) data, especially among the scientific community, special notifications were prepared to inform them about the data's availability, its form, and the procedures for obtaining them. To achieve the widest distribution to the primary audiences of interest, mailings were made to scientists associated with the OSTA Resource Observation Division programs and to scientific and professional societies and journals. Accompanying the notifications to the societies and journals were samples of the HCMM imagery and a description of the image's predominant characteristics. A follow-up survey was completed to determine the effectiveness of the HCMM notifications. M.G.

N83-17931*# OAO Corp., Greenbelt, Md.
ASSESSMENT OF THE AVAILABILITY OF THE TRACKING AND DATA RELAY SATELLITE SYSTEM FOR LANDSAT MISSIONS
Apr. 1982 90 p ERTS
(Contract NASW-3358)
(E83-10167; NASA-CR-169777; NAS 1.26:169777; OAO/TR-82/0027) Avail: NTIS HC A05/MF A01 CSCL 22B

The telecommunications availability that can realistically be provided by the tracking and data relay satellite system (TDRSS) for LANDSAT D type missions. Although the assessment focusses on the telecommunications requirements of the near Earth orbit missions of the 1985 - 1989 time frame, it emphasizes LANDSAT D and its competing demand for wideband, real-time RF link services from TDRSS. Limitations in availability of communications services are identified, including systematic TDRSS restrictions, conflicting telecommunication requirements and loading problems of all users (missions) which are to be supported by TDRSS. Several telecommunications alternatives for LANDSAT D utilization independent of TDRSS services are discussed. A.R.H.

N83-17932*# Geogroup, Berkeley, Calif.
OPERATIONAL ALTERNATIVES FOR LANDSAT IN CALIFORNIA Annual Report
P. WILSON and M. J. GIALDINI Jul. 1981 80 p refs ERTS
(Contract NAS2-11099)
(E83-10168; NASA-CR-166353; NAS 1.26:166353) Avail: NTIS HC A05/MF A01 CSCL 08B

Data integration is defined and examined as the means of promoting data sharing among the various governmental and private geobased information systems in California. Elements of vertical integration considered included technical factors (such as resolution and classification) and institutional factors (such as organizational control, and legal and political barriers). Attempts are made to fit the theoretical elements of vertical integration into a meaningful structure for looking at the problem from a statewide focus. Both manual (mapped) and machine readable data systems are included. Special attention is given to LANDSAT imagery because of its strong potential for integrated use and its primary in the California Integrated Remote Sensing System program. A.R.H.

N83-17935*# California Univ., Santa Barbara. Geography Remote Sensing Unit.
USE OF COLLATERAL INFORMATION TO IMPROVE LANDSAT CLASSIFICATION ACCURACIES Final Report, 1 Apr. 1979 - 31 Mar. 1981
A. H. STRAHLER, Principal Investigator 31 Mar. 1981 197 p refs Original contains imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls, S.D. 57198 ERTS
(Contract NSG-2377)
(E83-10171; NASA-CR-169779; NAS 1.26:169779) Avail: NTIS HC A09/MF A01 CSCL 05B

Methods to improve LANDSAT classification accuracies were investigated including: (1) the use of prior probabilities in maximum likelihood classification as a methodology to integrate discrete collateral data with continuously measured image density variables; (2) the use of the logit classifier as an alternative to multivariate normal classification that permits mixing both continuous and categorical variables in a single model and fits empirical distributions of observations more closely than the multivariate normal density function; and (3) the use of collateral data in a geographic information system as exercised to model a desired output information layer as a function of input layers of raster format collateral and image data base layers. M.G.

N83-17939*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
SUMMARY OF RESEARCH ADDRESSING THE POTENTIAL UTILITY OF THEMATIC MAPPER DATA FOR RENEWABLE RESOURCE APPLICATIONS
J. R. IRONS Jul. 1982 47 p refs Submitted for publication ERTS
(E83-10176; NASA-TM-83965; NAS 1.15:83965) Avail: NTIS HC A03/MF A01 CSCL 05B

LANDSAT-D, scheduled for launch in July 1982, will carry a multispectral scanner subsystem (MSS) similar to that flown on earlier missions, as well as a new multispectral scanner called the thematic mapper (TM). The TM will offer improvements over the MSS with respect to spectral, spatial, and radiometric characteristics. In preparation for the delivery of actual TM data, extensive research was conducted using simulated TM data. From a review of this research, it is concluded that: TM's improved radiometric resolution is a valuable sensor attribute; the availability of spectral bands from each portion of the reflective spectrum (visible, near-infrared, middle-infrared) is very useful; and TM's finer spatial resolution enables the identification of smaller spatial features. Research to develop improved classifiers which take full advantage of finer spatial resolution data is needed. The collective effect of the TM's improvements is an increase in the content and utility of information extracted from TM data when compared to information derived from MSS data. Author

N83-17940*# Kansas Univ. Center for Research, Inc., Lawrence. Remote Sensing Lab.
ADAPTIVE FILTERING OF RADAR IMAGES FOR AUTOFOCUS APPLICATIONS Final Report
J. A. STILES, V. S. FROST, J. S. GARDNER, D. R. ELAND, K. S. SHANMUGAM, and J. C. HOLTZMAN Jun. 1981 39 p Sponsored by NASA Prepared for JPL, Pasadena, Calif. Original contains imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls, S.D. 57198 ERTS
(Contract JPL-955851)
(E83-10177; NASA-CR-169784; NAS 1.26:169784; RSL-TR-489-1) Avail: NTIS HC A03/MF A01 CSCL 17I

Autofocus techniques are being designed at the Jet Propulsion Laboratory to automatically choose the filter parameters (i.e., the focus) for the digital synthetic aperture radar correlator; currently, processing relies upon interaction with a human operator who uses his subjective assessment of the quality of the processed SAR data. Algorithms were devised applying image cross-correlation to aid in the choice of filter parameters, but this method also has its drawbacks in that the cross-correlation result may not be readily interpretable. Enhanced performance of the cross-correlation techniques of JPL was hypothesized given that the images to be cross-correlated were first filtered to improve the signal-to-noise ratio for the pair of scenes. The results of experiments are described and images are shown. Author

N83-17941*# New South Wales Univ., Kensington (Australia).
A COMPUTER ANALYSIS OF ERTS DATA OF THE LAKE GREGORY AREA OF SOUTH AUSTRALIA WITH PARTICULAR EMPHASIS ON ITS ROLE IN TERRAIN CLASSIFICATION FOR ENGINEERING M.S. Thesis
G. D. LODWICK, Principal Investigator 1976 278 p refs Sponsored by NASA Original contains imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls, S.D. 57198 ERTS
(E83-10178; NASA-CR-169785; NAS 1.26:169785) Avail: NTIS HC A13/MF A01 CSCL 05B

A digital computer and multivariate statistical techniques were used to analyze 4-band multispectral data. A representation of the original data for each of the four bands allows a certain degree of terrain interpretation; however, variations in appearance of sites within and between bands, without additional criteria for deciding which representation should be preferred, create difficulties for classification. Investigation of the video data groups produced by principal components analysis and cluster analysis techniques shows that effective correlations with classifications of terrain produced by conventional methods could be carried out. The analyses also highlighted underlying relationships between the various elements. The approach used allows large areas (185 cm by 185 cm) to be classified into fundamental units within a matter of hours and can be applied to those parts of the Earth where facilities for conventional studies are poor or lacking. A.R.H.

N83-17996*# Earth Satellite Corp., Washington, D. C.
STUDY OF LANDSAT-D THEMATIC MAPPER PERFORMANCE AS APPLIED TO HYDROCARBON EXPLORATION Quarterly Progress Report, 7 Oct. 1982 - 7 Jan. 1983
7 Jan. 1983 5 p ERTS
(Contract NAS5-27384)
(E83-10186; NASA-CR-169840; NAS 1.26:169840; QPR-1) Avail: NTIS HC A02/MF A01 CSCL 08B

Analysis of the tapes of the Detroit, Michigan scene, which were received in fully processed format with geometric and radiometric correction, shows evidence of an along line data slip every sixteenth line in TM channel 2. Very large scale products were therefore generated in false color using channels 1, 3, and 4. Subjective evaluation of these enhanced scenes indicates that they are acceptable for interpretation at scales up to 1:50,000 and should be useful for change mapping probably up to 1:24,000 scale. The significant striping visible in water bodies for both the natural color and false color products indicates that the detector calibration is probably performing below the preflight specification. Variance-covariance matrices were computed and principal component analysis were performed for a set of 512 x 512 windows within the Arkansas scene. Initial analysis shows the shortwave infrared channels (TM 5 and 6) are a highly significant data source. The thermal channel (TM 7) shows negative correlation with TM 1 through 4. A.R.H.

N83-18977*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
SPACE SHUTTLE COLUMBIA VIEWS THE WORLD WITH IMAGING RADAR: THE SIR-A EXPERIMENT
J. P. FORD, J. B. CIMINO, and C. ELACHI 1 Jan. 1983 89 p refs Sponsored by NASA Original contains color illustrations
(NASA-CR-169932; JPL-PUB-82-95; NAS 1.26:169932) Avail: NTIS HC A05/MF A01 CSCL 17I

Images acquired by the Shuttle Imaging Radar (SIR-A) in November 1981, demonstrate the capability of this microwave remote sensor system to perceive and map a wide range of different surface features around the Earth. A selection of 60 scenes displays this capability with respect to Earth resources - geology, hydrology, agriculture, forest cover, ocean surface features, and prominent man-made structures. The combined area covered by the scenes presented amounts to about 3% of the total acquired. Most of the SIR-A images are accompanied by a LANDSAT multispectral scanner (MSS) or SEASAT synthetic-aperture radar (SAR) image of the same scene for comparison. Differences between the SIR-A image and its companion LANDSAT or SEASAT image at each scene are related to the characteristics of the respective imaging systems, and to seasonal or other changes that occurred in the time interval between acquisition of the images. Author

N83-19142*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
THE HEAT CAPACITY MAPPING MISSION
N. M. SHORT *In its* 2nd Eastern Reg. Remote Sensing Appl. Conf. p 1-5 1981 Original contains imagery. Original imagery may be purchased from NASA Goddard Space Flight Center, (code 601), Greenbelt, Md. 20770. 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
Avail: NTIS HC A17/MF A01 CSCL 08B

The first in a series of low cost Atmospheric Explorer Satellites, the Heat Capacity Mapping Mission (HCMM) was designed to evaluate the utility of thermal inertial and other thermal and reflectance data for: (1) discriminating bedrock and unconsolidated regolith types; (2) mapping soil moisture; (3) measuring plant canopy temperatures; (4) examining thermal circulation in large bodies of water; and (5) monitoring urban heat islands. Final reports from the HCMM investigator's program are beginning to define the utility of day/the night thermal data. Under favorable circumstances, some major rock types can be identified, soil moisture in extensive agricultural and alluvial terrains can be detected and at least semiqualitatively assessed; and circulation of currents in large bodies of water can be followed by noting thermal patterns. A.R.H.

N83-19146*# Resources Northwest, Inc., Boise, Idaho.
THE PACIFIC NORTHWEST REMOTE SENSING PROJECT
W. E. HEDRICK *In* NASA. Goddard Space Flight Center 2nd Eastern Reg. Remote Sensing Appl. Conf. p 43-46 1981 ERTS
Avail: NTIS HC A17/MF A01 CSCL 05B

The history of a 3-year effort in Idaho, Oregon, and Washington to establish operational capabilities to analyze LANDSAT digital data and apply the results to natural resources management programs is related. Currently a number of agencies are conduct operational applications projects utilizing the data analysis facilities available and LANDSAT-derived data are being used by these agencies in their day-to-day operations. The image analysis systems and software used in each state are described and the participating state and local agencies are listed. A.R.H.

N83-19162*# Pennsylvania State Univ., University Park. Office for Remote Sensing of Earth Resources.
RECENT DEVELOPMENTS WITH THE ORSER SYSTEM
G. M. BAUMER, B. J. TURNER, and W. L. MYERS *In* NASA. Goddard Space Flight Center 2nd Eastern Reg. Remote Sensing Appl. Conf. p 201-210 1981 refs ERTS
Avail: NTIS HC A17/MF A01 CSCL 05B

Additions to the ORSER remote sensing data processing package are described. The ORSER package consists of about 35 individual programs that are grouped into preprocessing, data analysis, and display subsystems. Additional data formats and data management, data transformation, and geometric correlation programs were supplemented to the preprocessing subsystem. Enhancements to the data analysis techniques include a maximum likelihood classifier (MAXCLASS) and a new version of the STATS program which makes delineation of training areas easier and allows for detection of outlier points. Ongoing developments are also described. M.G.

N83-19179*# Vermont Univ., Burlington. School of Natural Resources.
THE UNIVERSITY OF VERMONT REMOTE SENSING CENTER
G. S. SMITH *In* NASA. Goddard Space Flight Center 2d Eastern Reg. Remote Sensing Appl. Conf. p 373-376 1981 ERTS
Avail: NTIS HC A17/MF A01 CSCL 05B

The University of Vermont's remote sensing applications program is described. System capabilities include digital image processing and conventional photographic interpretation. Its expressed purpose is the identification of practical applications of remotely sensed data and its encouraged use in Earth resource management. M.G.

N83-19186*# General Electric Co., Philadelphia, Pa. Space Systems Div.
EXPERIMENTAL LAND OBSERVING DATA SYSTEM FEASIBILITY STUDY Final Report, Apr. - Sep. 1982
J. L. BUCKLEY and H. KRAIMAN 30 Sep. 1982 218 p
(Contract NAS5-26779)
(NASA-CR-170490; NAS 1.26:170490; DOC-82SDS4225) Avail: NTIS HC A10/MF A01 CSCL 08B

An end-to-end data system to support a Shuttle-based Multispectral Linear Array (MLA) mission in the mid-1980's was defined. The experimental Land Observing System (ELOS) is discussed. A ground system that exploits extensive assets from the LANDSAT-D Program to effectively meet the objectives of the ELOS Mission was defined. The goal of 10 meter pixel precision, the variety of data acquisition capabilities, and the use of Shuttle are key to the mission requirements, Ground mission management functions are met through the use of GSFC's Multi-Satellite Operations Control Center (MSOCC). The MLA Image Generation Facility (MIGF) combines major hardware elements from the Applications Development Data System (ADDS) facility and LANDSAT Assessment System (LAS) with a special purpose MLA interface unit. LANDSAT-D image processing techniques, adapted to MLA characteristics, form the basis for the use of existing software and the definition of new software required. Author

N83-19191# Technische Univ., Vienna (Austria).
DATABANK OF LAND ELEVATIONS AND FLIGHT VIEW DATA IN THE SERVICE OF FAR RECONNAISSANCE [GELAENDEHOEHENDATENBANK UND BILDFLUGDATEI IM DIENSTE DER FERNERKUNDUNG]
K. KRAUS *In* Deut. Ges. Fuer Photogrammetrie und Fernerkundung e.V. High Altitude Reconnaissance: Obtention of Data and Machines Involved 13 p Jul. 1982 refs In GERMAN
Avail: NTIS HC A04/MF A01

Photogrammetry and remote sensing techniques were defined. The two techniques are often confused. Photogrammetry is the scanning of location and the recording in photographic images of geometric object forms. The remote recording of images are obtained by electromagnetic radiation. Remote sensing collects information about the Earth obtained by onboard scanners which are then returned to Earth. The following areas are treated: orthophoto and stereoorthophotography; data bases on terrain elevations; geometric rectification of scanning recordings; information channels on terrain elevations data bases; and data base management systems. Transl. by E.A.K.

N83-19214# Virginia Polytechnic Inst. and State Univ., Blacksburg. School of Forestry and Wildlife Resources.
ACCURACY OF REMOTELY SENSED DATA: SAMPLING AND ANALYSIS PROCEDURES
R. G. CONGALTON, R. G. ODERWALD, and R. A. MEAD Jan. 1982 94 p refs Sponsored in part by NASA, NOAA, Agency for International Development and the Department of the Interior
(PB82-250432; NFAP-276; REMOTE-SENSING-RR-82-1) Avail: NTIS HC A05/MF A01 CSCL 02F

A review and update of the discrete multivariate analysis techniques used for accuracy assessment is given. A listing of the computer program written to implement these techniques is given. New work on evaluating accuracy assessment using Monte Carlo simulation with different sampling schemes is given. The results of matrices from the mapping effort of the San Juan National Forest is given. A method for estimating the sample size requirements for implementing the accuracy assessment procedures is given. A proposed method for determining the reliability of change detection between two maps of the same area produced at different times is given. GRA

N83-19363# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
MAPPING OF IONOSPHERIC F-REGION PARAMETERS FROM ATOMIC OXYGEN AIRGLOW EMISSIONS
J. A. BITTENCOURT, N. R. TEIXEIRA, Y. SAHAI, and H. TAKAHASI Dec. 1982 16 p refs Submitted for publication
(INPE-2602-PRE/248) Avail: NTIS HC A02/MF A01

Simultaneous North-South scanning observations of the OI 7774 A and 6300 A nightglow emissions were carried out at Cachoeira Paulista, Brazil, to study the tropical F-region dynamics under spread-F and no spread-F conditions. From the observed emission intensities the ionospheric F-region peak electron densities and peak heights can be determined with a good spatial coverage both in latitude and longitude. Results are presented in the form of computer generated gray level shade maps showing the variations of the column intensities of the 7774 A emission (J7774) and of the 6300 A emission (J6300), as well as the variations of square root of (J7774) (related to F-region peak electron density) and of the ratio square root of (J7774)/J6300 (related to F-region peak height), as a function of zenith distance (latitude) and local time. Significant features of these observations are discussed. This technique is useful to study dynamic processes and large scale plasma irregularities in the nighttime tropical ionosphere. Author

N83-21431*# Indiana State Univ., Terre Haute. Dept. of Geography and Geology.
A PROPOSED MODEL FOR APPLIED REMOTE SENSING IN INDIANA
P. W. MAUSEL *In* NASA. Goddard Space Flight Center Eastern Reg. Remote Sensing Appl. Conf. p 105-109 Jan. 1981 ERTS
Avail: NTIS HC A11/MF A01 CSCL 08B

A model for the effective interaction of user, technical and consultant groups in incorporating remote sensing into applied research conducted by local, regional, and state agencies is outlined. M.G.

N83-21436*# Minnesota State Planning Agency, St. Paul.
MINNESOTA LAND MANAGEMENT INFORMATION CENTER
E. NORDSTRAND *In* NASA. Goddard Space Flight Center Eastern Reg. Remote Sensing Appl. Conf. p 129-133 Jan. 1981 ERTS
Avail: NTIS HC A11/MF A01 CSCL 05B

A brief history of the Minnesota Land Management Information Center is given and the present operational status and plans for future development are described. The incorporation of LANDSAT data into the system, hardware and software capabilities, and funding are addressed. M.G.

N83-21437*# Vermont Univ., Burlington. School of Natural Resources.
THE VERMONT OPERATIONAL LANDSAT DATA ANALYSIS SYSTEM
G. SMITH and R. WHITMORE *In* NASA. Goddard Space Flight Center Eastern Reg. Remote Sensing Appl. Conf. p 135 Jan. 1981 ERTS
Avail: NTIS HC A11/MF A01 CSCL 05B

The implementation of the Office of Remote Sensing of Earth Resources (ORSER) software package from Pennsylvania State University onto the University of Vermont's IBM model 3031 computer is discussed. This version of ORSER was found to be much more user-friendly than remote access to the Penn State ORSER package. M.G.

N83-21438*# Massachusetts Univ., Amherst. Remote Sensing Center.
MASSACHUSETTS: THE ESTABLISHMENT OF A REMOTE SENSING CENTER
M. A. WEINBERG *In* NASA. Goddard Space Flight Center Eastern Reg. Remote Sensing Appl. Conf. p 137-138 Jan. 1981 ERTS
Avail: NTIS HC A11/MF A01 CSCL 05B

The objectives of the remote sensing center at the University of Massachusetts are described. These include research, facilities development, applications, education, and regional cooperation. M.G.

N83-21445*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
DATA ACQUISITION AND PROJECTED APPLICATIONS OF THE OBSERVATIONS FROM LANDSAT-D
D. L. WILLIAMS and V. V. SALOMONSON *In its* Eastern Reg. Remote Sensing Appl. Conf. p 217-230 Jan. 1981 refs ERTS
Avail: NTIS HC A11/MF A01 CSCL 05B

The capabilities of the multispectral scanner and thematic mapper aboard LANDSAT-D are reviewed in terms of spectral, spatial, and radiometric resolution. The applications made possible by increased sensor sensitivity are discussed. Communication relay systems and the ground segment are also described. M.G.

N83-21449*# Purdue Univ., Lafayette, Ind. Lab. for Applications of Remote Sensing.
LANDSAT-4 IMAGE DATA QUALITY ANALYSIS Quarterly Progress Report, 10 Nov. 1982 - 8 Feb. 1983
P. E. ANUTA, Principal Investigator Feb. 1983 27 p ERTS
(Contract NAS5-26859)
(E83-10205; NASA-CR-170051; NAS 1.26:170051; LARS-021083)
Avail: NTIS HC A03/MF A01 CSCL 05B

Analysis during the quarter was carried out on geometric, radiometric, and information content aspects of both MSS and thematic mapper (TM) data. Test sites in Webster County, Iowa and Chicago, IL., and near Joliet, IL were studied. Band to band registration was evaluated and TM Bands 5 and 7 were found to be approximately 0.5 pixel out of registration with 1,2,3,4, and the thermal was found to be misregistered by 4 30 m pixels to the east and 1 pixel south. Certain MSS bands indicated nominally .25 pixel misregistration. Radiometrically, some striping was observed in TM bands and significant oscillatory noise patterns exist in MSS data which is possibly due to jitter. Information content was compared before and after cubic convolution resampling and no differences were observed in statistics or separability of basic scene classes. M.G.

N83-21453*# Geological Survey, Flagstaff, Ariz.
GEOMETRIC AND RADIOMETRIC CHARACTERIZATION OF LANDSAT-D THEMATIC MAPPER AND MULTISPECTRAL SCANNER DATA Status Report
H. KIEFFER, Principal Investigator 18 Feb. 1983 6 p ERTS
(E83-10212; NASA-CR-170058; NAS 1.26:170058) Avail: NTIS HC A02/MF A01 CSCL 05B

A geometrically raw image of Washington, D.C. was acquired and radiometrically corrected. The data show little of the detector stripping common in earlier MSS images. The radiometrically corrected data have uniform means and standard deviations for the detectors in each band; however, the data for different detectord utilize a different pattern of DN levels, resulting in ubiquitous stripping of 1 DN amplitude. Band-to-band registration was assessed using color composites and small area correlation techniques. The spectral equivalency of the first four bands of the thematic mapper with the four bands of the MSS is being examined. Geometric analysis of the Washington, D.C. scene have started and a generalized routine for examining the contents of the label files and nonvideo data files was implemented. Several discrepancies from the documentation are described. Night scenes and daytime ocean scenes required for radiometric purposes were identified and the data ordered. A.R.H.

N83-21454*# Agricultural Research Center, Beltsville, Md. Hydrology Lab.
INFORMATION CONTENT OF DATA FROM THE LANDSAT-4 THEMATIC MAPPER (TM) AND MULTISPECTRAL SCANNER (MSS) Progress Report
J. C. PRICE 1983 5 p ERTS
(Contract NASA ORDER S-10772-C)
(E83-10213; NASA-CR-170072; NAS 1.26:170072; PR-1) Avail: NTIS HC A02/MF A01 CSCL 05B

Software was constructed to reformat data to band interlevel format and analysis software was developed in an effort to quantify the increased information content (statistical variability within a data set) of thematic mapper data as compared to that from the LANDSAT 4 multispectral band scanner. Computer runs were carried out for several subareas from a data set acquired simultaneously by TM and MSS over a test area in northeast Arkansas, one of the most agriculturally diverse sea areas in the country. The 6 visible-near IR channels of the TM provide more information than the 4 channels of the MSS. A rough estimate of 20 bits per pixel for TM, and 10 bits per pixel for the MSS was computed for these subareas. These numbers are to be revised downward when allowance is made for noise in the data. A.R.H.

N83-21459*# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
A PROCEDURE FOR TESTING THE QUALITY OF LANDSAT ATMOSPHERIC CORRECTION ALGORITHMS
N. D. J. PARADA, Principal Investigator, L. A. V. DIAS, N. L. VIJAYKUMAR, and G. C. NETO Nov. 1982 10 p refs Presented at the Remote Sensing Symp., Liverpool ERTS
(E83-10218; NASA-CR-17077; NAS 1.26:17077; INPE-2563-PRE/213) Avail: NTIS HC A02/MF A01 CSCL 05B

There are two basic methods for testing the quality of an algorithm to minimize atmospheric effects on LANDSAT imagery: (1) test the results a posteriori, using ground truth or control points; (2) use a method based on image data plus estimation of additional ground and/or atmospheric parameters. A procedure based on the second method is described. In order to select the parameters, initially the image contrast is examined for a series of parameter combinations. The contrast improves for better corrections. In addition the correlation coefficient between two subimages, taken at different times, of the same scene is used for parameter's selection. The regions to be correlated should not have changed considerably in time. A few examples using this proposed procedure are presented. M.G.

N83-21461*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
EVALUATION OF LANDSAT-4 TM AND MSS GROUND SEGMENT GEOMETRY PERFORMANCE WITHOUT GROUND CONTROL Quarterly Progress Report
9 Mar. 1983 3 p ERTS
(E83-10220; NASA-CR-170078; NAS 1.26:170078) Avail: NTIS HC A02/MF A01 CSCL 05B

The along-line one dimensional FFT algorithm was successfully used to test band-to-band, swath-to-swath, and inter-swath registration of a Washington, D.C. scene. Analysis of the tabulated and plotted results of the MSS and TM P-data shows that a slow spacecraft roll condition of under one hertz exists in this scene. Characteristics of the data for both instruments are listed. A.R.H.

N83-21465*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
SCROUNGE DATA PROCESSING FILM PRODUCTS FOR THE THEMATIC MAPPER
1983 8 p ERTS
(E83-10224; NASA-TM-85263; NAS 1.15:85263) Avail: NTIS HC A02/MF A01 CSCL 05B

Information on the format of the film product and type of film used for the LANDSAT-4 scrounge processed thematic mapper data is presented. Image gray scale, annotation field, and general layout are described. M.G.

N83-21466*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
LGSOWG CCT FORMAT CCB DOCUMENT: THE STANDARD CCT FAMILY OF TAPE FORMATS
28 Aug. 1979 91 p ERTS
(E83-10225; NASA-TM-85264; NAS 1.15:85264; CCB-CCT-0002D) Avail: NTIS HC A05/MF A01 CSCL 05B

The tape format standardization approach recommended by the committee on CCT standardization is described and defined. All rules and conventions required to employ the superstructure approach to the CCT family of tape formats are presented for users of remote sensing data and producer of user tapes and the superstructure records are specified. The standard for future tape format design is presented as a guide to designing data records of a particular tape format. An example is provided showing how to incorporate the superstructure into an already established tape format. A.R.H.

N83-21467*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
LANDSAT-4 MULTISPECTRAL SCANNER (MSS) SUBSYSTEM RADIOMETRIC CHARACTERIZATION
W. ALFORD, ed., J. BARKER, ed., B. P. CLARK, and R. DASGUPTA Feb. 1983 77 p ERTS
(E83-10226; NASA-TM-85265; REPT-435-D-404; NAS 1.15:85265) Avail: NTIS HC A05/MF A01 CSCL 14B

The multispectral band scanner (mass) and its spectral characteristics are described and methods are given for relating video digital levels on computer compatible tapes to radiance into the sensor. Topics covered include prelaunch calibration procedures and postlaunch radiometric processng. Examples of current data resident on the MSS image processing system are included. The MSS on LANDSAT 4 is compared with the scanners on earlier LANDSAT satellites. A.R.H.

N83-21468*# EROS Data Center, Sioux Falls, S. Dak.
LANDSAT MULTISPECTRAL SCANNER COMPUTER-COMPATIBLE TAPE FORMAT, VERSION 1.0
1982 151 p ERTS
(E83-10227; NASA-CR-170082; NAS 1.26:170082) Avail: NTIS HC A08/MF A01 CSCL 05B

Unlike previous LANDSAT computer compatible tape (CCT) formats, the standard format of CCT's now includes a comprehensive field location and data description information superstructure composed of four records. The volume descriptor record, the text record, and the file pointer record reside in a volume directory file, which generally describes the data configuration and provides pointers to each data file. The file descriptor record for each data file describes the data structure within the file and provides pointers to certain fields within the file. These superstructure records primarily supply information about the data on the CCT as opposed to carrying the data themselves. The EROS Data Center's LANDSAT CCT version 1.0 product is presented which conforms to the concepts of the standard format as much as is possible with existing EDC systems. A.R.H.

N83-21469*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
APPLICATIONS NOTICE FOR PARTICIPATION IN THE LANDSAT-D IMAGE DATA QUALITY ANALYSIS PROGRAM
23 Oct. 1981 57 p ERTS
(E83-10228; NASA-TM-85266; NAS 1.15:85266) Avail: NTIS HC A04/MF A01 CSCL 05B

The applications notice for the LANDSAT 4 image data quality analysis program is presented. The objectives of the program are to qualify LANDSAT 4 sensor and systems performance from a user applications point of view, and to identify any malfunctions that may impact data applications. Guidelines for preparing proposals and background information are provided. M.G.

N83-21470*# National Aeronautics and Space Administration, Washington, D. C.
LANDSAT-D ASSESSMENT SYSTEM LIBRARY COMPUTER COMPATIBLE TAPE (LASLIB-CCT/LAS-CCT)
Jun. 1982 54 p refs ERTS
(E83-10229; NASA-TM-85267; NAS 1.15:85267) Avail: NTIS HC A04/MF A01 CSCL 05B

The format for computer compatible tapes containing thematic mapper archival data and product data generated by the LANDSAT-D Assessment System (LAS). These data tapes are engineering products developed primarily for LAS internal use to assist in the early evaluation of thematic mapper data quality and ground data processing algorithms during the limited period of one year following the launch of LANDSAT-D. M.G.

N83-21471*# National Aeronautics and Space Administration, Washington, D. C.
LANDSAT-D PROJECT ADDS/LAS. SCROUNGE INTERFACE CONTROL DOCUMENT
8 Feb. 1982 20 p ERTS
(E83-10230; NASA-TM-85268; NAS 1.15:85268) Avail: NTIS HC A02/MF A01 CSCL 05B

The content and format of all data to be exchanged between the Applications Developmental data System (ADDS) and the LANDSAT-D Assessment System (LAS) for satisfaction of early access thematic mapper product generation requirements is specified. The ADDS provides partially processed TM data tapes on CCT's. The LANDSAT-D Assessment System processes the TM data to fully processed data tapes on 6250 bpi computer compatible tapes and provides required film data products. M.G.

N83-21472*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
LANDSAT 4 TO GROUND STATION INTERFACE DESCRIPTION
Aug. 1982 160 p Revised ERTS
(E83-10213; NASA-TM-85269; NAS 1.15:85269) Avail: NTIS HC A08/MF A01 CSCL 12B

The radiometric requirements, internal calibration, sensor output format, geometric characteristics, and data processing constants for the LANDSAT 4 multispectral scanner and thematic mapper are described. In addition, telemetry format, onboard computer reports, and LANDSAT 4 communications are discussed. M.G.

N83-21475*# General Electric Co., Lanham, Md. Space Div.
LANDSAT-D ACCELERATED PAYLOAD CORRECTION SUBSYSTEM OUTPUT COMPUTER COMPATIBLE TAPE FORMAT
17 Feb. 1982 68 p ERTS
(Contract NAS5-15300)
(E83-10234; NASA-CR-170085; NAS 1.26:170085; PIR-U-1T80-LSD-MMF-124-REV-A) Avail: NTIS HC A04/MF A01 CSCL 05B

The NASA GSFC LANDSAT-D Ground Segment (GS) is developing an Accelerated Payload Correction Subsystem (APCS) to provide Thematic Mapper (TM) image correction data to be used outside the GS. This correction data is computed from a subset of the TM Payload Correction Data (PCD), which is downlinked from the spacecraft in a 32 Kbps data stream, and mirror scan correction data (MSCD), which is extracted from the wideband video data. This correction data is generated in the GS Thematic Mapper Mission Management Facility (MMF-T), and is recorded on a 9-track 1600 bit per inch computer compatible tape (CCT). This CCT is known as a APCS Output CCT (AOT). The AOT follows standardized corrections with respect to data formats, record construction and record identification. Applicable documents are delineated; common conventions which are used in further defining the structure, format and content of the AOT are defined; and the structure and content of the AOT are described. A.R.H.

N83-21476*# Earth Satellite Corp., Chevy Chase, Md.
STUDY OF LANDSAT-D THEMATIC MAPPER PERFORMANCE AS APPLIED TO HYDROCARBON EXPLORATION Quarterly Progress Report, 7 Oct. 1982 - 7 Jan. 1983
J. R. EVERETT, Principal Investigator 7 Jan. 1983 5 p ERTS
(Contract NAS5-17384)
(E83-10235; NASA-CR-170086; NAS 1.26:170086; QR-1) Avail: NTIS HC A02/MF A01 CSCL 05B

Two fully processed test tapes were enhanced and evaluated at scales up to 1:10,000, using both hardcopy output and interactive screen display. A large scale, the Detroit, Michigan scene shows evidence of an along line data slip every sixteenth line in TM channel 2. Very large scale products generated in false color using channels 1,3, and 4 should be very acceptable for interpretation at scales up to 1:50,000 and useful for change mapping probably up to scale 1:24,000. Striping visible in water bodies for both natural and color products indicates that the detector calibration is probably performing below preflight specification. For a set of 512 x 512 windows within the NE Arkansas scene, the variance-covariance matrices were computed and principal component analyses performed. Initial analysis suggests that the shortwave infrared TM 5 and 6 channels are a highly significant data source. The thermal channel (TM 7) shows negative correlation with TM 1 and 4. A.R.H.

N83-21477*# General Electric Co., Lanham, Md. Space Div.
LANDSAT-D DATA FORMAT CONTROL BOOK. VOLUME 6, APPENDIX A: PARTIALLY PROCESSED THEMATIC MAPPER HIGH DENSITY TAPE (HDT-AT)
A. JAI 11 Jun. 1982 148 p ERTS
(Contract NAS5-25300)
(E83-10236; NASA-CR-170087; NAS 1.26:170087; GES-10033-VOL-6-APP-A-REV-B) Avail: NTIS HC A07/MF A01 CSCL 05B

One of the outputs of the data management system being developed to provide a variety of standard image products from the thematic mapper and the multispectral band scanners on LANDSAT 4, is the partially processed TM data (radiometric corrections applied and geometric correction matrices for two projections appended) which is recorded on a 28-track high density tape. Specifications are presented for the format of the recorded data as well as for the time code and the major and minor frames of the tape. Major frame types, formats, and field definitions are included. A.R.H.

N83-21478*# General Electric Co., Lanham, Md. Space Div.
LANDSAT-D DATA FORMAT CONTROL BOOK. VOLUME 6, APPENDIX D: THEMATIC MAPPER COMPUTER COMPATIBLE TAPE (CCT-AT/PT)
H. AHMED 21 Oct. 1981 163 p ERTS
(Contract NAS5-25300)
(E83-10237; NASA-CR-170088; NAS 1.26:170088; GES-10490)
Avail: NTIS HC A08/MF A01 CSCL 05B

The format of computer compatible tapes which contain LANDSAT 4 and D Prime thematic mapper data is defined. A complete specification of the CCT-AT (radiometric corrections applied and geometric matrices appended) and the CCT-PT (radiometric and geometric corrections) data formats is provided. M.G.

N83-21479*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
LANDSAT-4 WORLD REFERENCE SYSTEM (WRS) USERS GUIDE
Oct. 1982 293 p refs ERTS
(E83-10238; NASA-TM-85284; NAS 1.15::85284) Avail: NTIS HC A13/MF A01 CSCL 05B

A functional description of the new LANDSAT-4 World Reference System (WRS) with an overview of the main orbital parameters and instrument coverages is presented to provide the data user with the primary information required to understand LANDSAT-4 orbital characteristics, to effectively use the WRS indexing scheme, and to request specific geographic coverage on the desired observation dates. A.R.H.

N83-21480*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
INTERFACE CONTROL DOCUMENT BETWEEN THE NASA GODDARD SPACE FLIGHT CENTER (GSFC) AND DEPARTMENT OF INTERIOR EROS DATA CENTER (EDC) FOR LANDSAT-D. THEMATIC MAPPER HIGH RESOLUTION 241 MM FILM
4 Jan. 1982 33 p ERTS
(E83-10239; NASA-TM-85272; LSD-ICD-801; NAS 1.15:85272)
Avail: NTIS HC A03/MF A01 CSCL 05B

The 241 mm photographic product produced by the Goddard Space Flight Center Data Management System for LANDSAT-D is described. Film type and format, image dimensions, frame ID, gray scale, resolution patterns, registration marks, etc. are addressed. M.G.

N83-21481*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
INTERFACE CONTROL DOCUMENT BETWEEN THE NASA GODDARD SPACE FLIGHT CENTER (GSFC) AND DEPARTMENT OF INTERIOR EROS DATA CENTER (EDC) FOR LANDSAT-D. PARTIALLY PROCESSED MULTISPECTRAL SCANNER HIGH DENSITY TAPE (HDT-AM)
4 Jan. 1982 84 p ERTS
(E83-10240; NASA-TM-85273; LSD-ICD-201; NAS 1.15:85273)
Avail: NTIS HC A05/MF A01 CSCL 05B

The format of the HDT-AM product which contains partially processed LANDSAT D and D Prime multispectral scanner image data is defined. Recorded-data formats, tape format, and major frame types are described. M.G.

N83-21482*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
LANDSAT-D INVESTIGATIONS WORKSHOP
1982 266 p Workshop held at Goddard Space Flight Center, Greenbelt, Md., 13-14 May 1982 ERTS
(E83-10241; NASA-TM-85274; NAS 1.15:85274) Avail: NTIS HC A12/MF A01 CSCL 05A

Viewgraphs are presented which highlight LANDSAT-D project status and ground segment; early access TM processing; LANDSAT-D data acquisition and availability; LANDSAT-D performance characterization; MSS pre-NOAA characterization; MSS radiometric sensor performance (spectral information, absolute calibration, and ground processing); MSS geometric sensor performance; and MSS geometric processing and calibration. A.R.H.

N83-21483*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
LANDSAT-D INVESTIGATIONS WORKSHOP
1982 265 p Workshop held at Goddard Space Flight Center, Greenbelt, Md., 13-14 May 1982 ERTS
(E83-10242; NASA-TM-85275; NAS 1.15:85275) Avail: NTIS HC A12/MF A01 CSCL 05A

The objectives and methods used to determine the performance of the LANDSAT-D thematic mapper radiometric and geometric sensors are depicted in graphs and charts. Other aspects illustrated include ground and flight segment TM geometric processing and early access TM processing. A.R.H.

N83-21488*# Geogroup, Berkeley, Calif.
OPERATIONAL ALTERNATIVES FOR LANDSAT IN CALIFORNIA Annual Report
P. WILSON and M. J. GIALDINI Jul. 1981 80 p refs
(Contract NAS2-11099)
(NASA-CR-166353; NAS 1.26:166353) Avail: NTIS HC A05/MF A01 CSCL 08B

A number of methods were developed which use the computer as a tool for the compilation and analysis of resource data. These systems typically include storage of mapped data in a form usable by the computer, a way of performing analytical operations on the data, and a way of translating results into human-readable form. Many organizations with responsibility for the planning of management of a defined geographic area have developed this kind of system. S.L.

N83-21497# Los Alamos Scientific Lab., N. Mex.
EVALUATION OF INTEGRATED DATA SETS. FOUR EXAMPLES
S. L. BOLIVAR, S. B. FREEMAN, and T. A. WEAVER 1982 21 p refs Presented at the Math. Geol. US Symp., Golden, Colo., 27 Jan. 1982
(Contract W-7405-ENG-36)
(DE82-012131; LA-UR-82-859; CONF-820146-1) Avail: NTIS HC A02/MF A01

Several large data sets have been integrated and utilized for rapid evaluation on a reconnaissance scale for the Montrose 1 deg x 2 deg quadrangle, Colorado. The data sets include LANDSAT imagery, hydrogeochemical and stream sediment analyses, airborne geophysical data, known mineral occurrences, and a geologic map. All data sets were registered to a 179 x 199 rectangular grid and projected onto Universal Transverse Mercator coordinates. A grid resolution of 1 km was used. All possible combinations of three, for most data sets, were examined for general geologic correlations by utilizing a color microfilm output. In addition, gray level pictures of statistical output, e.g., factor analysis, have been employed to aid evaluations. Examples for the data sets dysprosium calcium, lead copper zinc, and equivalent uranium-uranium in water-uranium in sediment are described with respect to geologic applications, base metal regimes, and geochemical associations. DOE

N83-22700# Midwest Research Inst., Golden, Colo. Solar Energy Research Inst.
REMOTE SENSING AS A BIOMASS AND INSOLATION ASSESSMENT TOOL
E. L. MAXWELL, C. RIORDAN, and G. FOLGER Sep. 1982 86 p refs
(Contract DE-AC02-77CH-00178; EG-77-C-01-4042)
(DE83-003347; SERI/PR-215-1678) Avail: NTIS HC A05/MF A01

The fundamentals supporting the use of remote sensing to assess natural resources are briefly reviewed. The extraction of information from images is developed from basic principles and related specifically to assessment of insolation and biomass energy resources. Both insolation and biomass resource assessments are shown to be currently inadequate. The number (density) of ground measurements falls short of that desired and may be almost totally lacking in developing countries and remote locations. Furthermore, most biomass data have been collected for other purposes (timber industry and agriculture) and do not provide an assessment of that biomass available for energy use. Weather satellites (e.g., GOES) can provide cloud-cover data for computer models that can improve mesoscale estimates of solar radiation. LANDSAT multispectral data can be used to estimate total green, standing crop biomass and primary production of biomass using a simple computer information extraction process. DOE

N83-23072*# Texas A&M Univ., College Station.
FUNDAMENTAL RESEARCH DATA BASE
In its Proc. of the NASA/MPRIA Workshop: MATH/STAT p 173-191 1983
Avail: NTIS HC A09/MF A01 CSCL 09B

A fundamental research data base was created on a single 9-track 1600 BPI tape containing ground truth, image, and Badhwar profile feature data for 17 North Dakota, South Dakota, and Minnesota agricultural sites. Each site is 5x6 nm in area. Image data has been provided for a minimum of four acquisition dates for each site. All four images have been registered to one another. A list of the order of the files on tape and the dates of acquisition is provided. Author

N83-23082*# Texas A&M Univ., College Station.
FUNDAMENTAL RESEARCH DATA BASE
In its Proc. of the NASA/MPRIA Workshop: Pattern Recognition p 225-243 1983
Avail: NTIS HC A11/MF A01 CSCL 09B

A fundamental research data base containing ground truth, image, and Badhwar profile feature data for 17 North Dakota, South Dakota, and Minnesota agricultural sites is described. Image data was provided for a minimum of four acquisition dates for each site and all four images were registered to one another. L.F.M.

08

INSTRUMENTATION AND SENSORS

Includes data acquisition and camera systems and remote sensors.

A83-21904
ANALYSIS OF A LINEAR ARRAY TAKING INTO ACCOUNT SATELLITE-SENSOR PERFORMANCES AND A DIGITAL TERRAIN MODEL
S. VETRELLA and A. MOCCIA (Napoli, Universita, Naples, Italy) In: International Society for Photogrammetry and Remote Sensing, International Symposium, Toulouse, France, September 13-17, 1982, Transactions. Volume 1. Toulouse, Groupement pour le Developpement de la Teledetection Aerospatiale, 1982, p. 23-32. refs

The paper briefly describes a methodology intended for use in future SPOT and Thematic Mapper simulation programs for the analysis of geometric and radiometric characteristics of the remote sensing mission. Various aspects of the procedure are considered, with emphasis on two essential tasks: the simulation of a future space platform and the geometric and radiometric preprocessing of raw data. Preliminary considerations relating to the SPOT satellite are examined. B.J.

A83-21914
DIRECTION DEPENDANT CLASSIFICATION OF AIRBORNE MULTISPECTRAL SCANNER DATA
B. PFEIFFER (Karlsruhe, Universitaet, Karlsruhe, West Germany) In: International Society for Photogrammetry and Remote Sensing International Symposium, Toulouse, France, September 13-17 1982, Transactions. Volume 1. Toulouse, Groupement pour le Developpement de la Teledetection Aerospatiale, 1982, p 185-193.

The classification of aerial MSS data over the entire scan angle yields misclassifications mainly near the edges, due to nonrepresentative statistical values. This suggests that the direction-dependent radiance of objects must be considered in the classification of aerial data. The possibility of a direction-dependent classification is evaluated using scanner data acquired at a height of 4000 m in the framework of the German Airborne Sensing Program. The maximum likelihood algorithm requires statistical values representative for the actual scan position. In order to achieve this, training fields regularly distributed over the strip were used to determine first or second order polynomials for means and covariance matrices for each class and wavelength. Using these polynomials, values for every scan position were calculated, and applied during classification. It is shown that direction-dependent classification yields a marked improvement with homogeneous classification over the entire strip, without errors near the edges. B.J.

A83-22524
DESIGN OF DIGITAL IMAGE PROCESSING SYSTEMS; PROCEEDINGS OF THE MEETING, SAN DIEGO, CA, AUGUST 27, 28, 1981
J. L. MANNOS, (ED.) (ESL, Inc., Sunnyvale, CA) Meeting sponsored by SPIE - The International Society for Optical Engineering. Bellingham, WA, SPIE - The International Society for Optical Engineering (SPIE Proceedings. Volume 301), 1982. 197 p
$40

The present conference on digital image processing system design considers the application of remote sensing data image processing to geology and cartography, education, and tactical image exploitation, and assesses recent developments in real time image computer configuration, advanced architectures for computer graphics and image processing, programmable image processing elements, and processing display system architectures. Also covered are digital reconnaissance image processing, on-line processing of meteorological satellite high resolution imagery, the transportability of image processing system architectures, the interactive enhancement of tone scales, a minicomputer-based interactive image processing systems, and the hardware systems design of an airborne video bandwidth compressor. O.C.

A83-22557* Georgia Inst. of Tech., Atlanta.
MOISTURE SOUNDING AT MILLIMETER WAVELENGTHS /94/183 GHZ/ AT HIGH ALTITUDES
J. A. GAGLIANO, J. M. SCHUCHARDT (Georgia Institute of Technology, Atlanta, GA), T. T. WILHEIT, and J. L. KING (NASA, Goddard Space Flight Center, Greenbelt, MD) In: Atmospheric effects on electro-optical, infrared, and millimeter wave systems performance; Proceedings of the Meeting, San Diego, CA, August 27, 28, 1981. Bellingham, WA, SPIE - The International Society for Optical Engineering, 1981, p. 232-237. refs
(Contract NAS5-23710; NAS5-26220; NAS5-26528; NSG-5012)

A moisture sounding radiometer at millimeter wavelengths has been developed for high altitude measurements onboard NASA's WB-57F aircraft. Three channels about the 183.3 GHz water vapor line permit measurement of the atmospheric water vapor profile. A single window channel at 94 GHz provides correction for clouds over the ocean and for surface emissivity variations over land. The instrument is an imaging radiometer operating under microprocessor control throughout each data flight. The system is contained within two packages integrated into the WB-57F pallet. A ground support system was used to perform a quick-look analysis of the data collected immediately following each flight. (Author)

A83-22721* Kansas Univ. Center for Research, Inc., Lawrence.
ERRORS IN SCATTEROMETER-RADIOMETER WIND MEASUREMENT DUE TO RAIN
R. K. MOORE, A. H. CHAUDHRY (University of Kansas Center for Research, Inc., Lawrence, KS), and I. J. BIRRER IEEE Journal of Oceanic Engineering, vol. OE-8, Jan. 1983, p. 37-49. refs
(Contract NSG-1397)
The behavior of radiometer corrections for the scatterometer is investigated by simulating simple situations using footprint sizes comparable with those used in the SEASAT-1 experiment and also actual footprints and rain rates from a hurricane observed by the SEASAT-1 system. The effects on correction due to attenuation and wind speed gradients are examined independently and jointly. It is shown that the error in the wind-speed estimate can be as large as 200% at higher wind speeds. The worst error occurs when the scatterometer footprint overlaps two or more radiometer footprints and the attenuation in the scatterometer footprint differs greatly from those in parts of the radiometer footprints. This problem could be overcome by using a true radiometer-scatterometer system having identical coincident footprints comparable in size with typical rain cells. V.L.

A83-22841* Honeywell, Inc., Lexington, Mass.
THERMAL INFRARED PUSHBROOM IMAGERY ACQUISITION AND PROCESSING
T. J. BROWN, F. J. CORBETT, T. J. SPERA, and T. ANDRADA (Honeywell, Inc., Defense Electronics Div., Lexington, MA) In: Modern utilization of infrared technology VII; Proceedings of the Seventh Annual Seminar, San Diego, CA, August 27, 28, 1981. Bellingham, WA, SPIE - The International Society for Optical Engineering, 1982, p. 37-56. refs
(Contract NAS5-24323; NAS5-25662)
A 9-element focal plane detector array and signal processing electronics was developed and delivered in December 1977. It was integrated into a thermal infrared imaging system using LSI microprocessor image processing and CRT display. After three years of laboratory operation, the focal plane has demonstrated high reliability and performance. On the basis of the 9-channel breadboard, the 90-element Aircraft Pushbroom IR/CCD Focal Plane Development Program was funded in October 1977. A follow-on program was awarded in July 1979, for the construction of a field test instrument and image processing facility. The objective of this project was to demonstrate thermal infrared pushbroom hard-copy imagery. It is pointed out that the successful development of the 9-element and 90-element thermal infrared hybrid imaging systems using photoconductive (Hg,Cd)Te has verified the operational concept of 8 to 14 micrometer pushbroom scanners. G.R.

A83-22843
RECENT MEASUREMENTS OF EARTH BACKGROUND SPATIAL RADIANCE VARIATIONS
E. M. WINTER (IBM Corp., Westlake Village, CA) In: Modern utilization of infrared technology VII; Proceedings of the Seventh Annual Seminar, San Diego, CA, August 27, 28, 1981. Bellingham, WA, SPIE - The International Society for Optical Engineering, 1982, p. 64-69.
(Contract F04701-77-C-0172)
It is pointed out that the application of staring infrared focal planes to short-term change detection has led to an increased interest in the form and structure of the earth background. Background variations which result in false reports or increased system noise are called clutter. The resultant clutter is a product of the background, the platform motion, the sensor system, and the motion detection algorithm. The present investigation is concerned with the background aspects of clutter. The Daedalus Multi-Spectral Scanner (MSS) was used to help quantify background spatial radiance variations. With this sensor a wide area survey of clutter sources is possible, allowing future scheduling of other sensors for detailed study at high resolution and in specific bands. The Daedalus is currently deployed on a NASA U-2 aircraft. High values of radiance transition in spatial scales of approximately 500 meters or less were found. G.R.

A83-22849
RADIATIVE TRANSFER AND 4.3 MICRON ATMOSPHERIC CLUTTER OBSERVATIONS
C. M. RANDALL and L. T. GREENBERG (Aerospace Corp., Laboratory Operations, El Segundo, CA) In: Modern utilization of infrared technology VII; Proceedings of the Seventh Annual Seminar, San Diego, CA, August 27, 28, 1981. Bellingham, WA, SPIE - The International Society for Optical Engineering, 1982, p. 126-133. refs
(Contract F04701-80-C-0081)
In connection with the design of any remote sensing system, attention must be given to the response of the system to variations in incident radiation arising from sources other than the objects of interest within the sensor's field of view. Schemes for rejecting unwanted radiation variations, or clutter, from the sensor response are important. The 4.3-micron band of CO_2 is often selected to reject clutter from the earth's surface because it is a highly absorbing region. An investigation is conducted regarding the radiation transport in the 4.3-micron region through the atmosphere. It is found that clutter radiation in the center of the 4.3-micron CO_2 band arising from tropospheric sources below a balloon-borne sensor and reaching space can be adequately sampled by sensors at 30 or 45 km. A significant fraction of the total radiation reaching space in the center of the 4.3-micron band originates above 45 km, and variations in this radiation could present a significant source of clutter. G.R.

A83-23794* Jet Propulsion Lab., California Inst. of Tech., Pasadena.
SELECTION OF OPTIMUM FREQUENCIES FOR ATMOSPHERIC ELECTRIC PATH LENGTH MEASUREMENT BY SATELLITE-BORNE MICROWAVE RADIOMETERS
P. C. PANDEY and R. K. KAKAR (California Institute of Technology, Jet Propulsion Laboratory, Earth and Space Sciences Div., Pasadena, CA) IEEE Transactions on Antennas and Propagation, vol. AP-31, Jan. 1983, p. 136-140. Research supported by the National Academy of Sciences refs
(Contract NAS7-100)
Numerical experiments using regressions by leaps and bounds have been performed to determine the optimum frequencies for satellite-borne microwave radiometers to estimate atmospheric electrical path length over the sea. The frequency range 5-40 GHz was searched. The effect of surface wind speed, sea surface temperature, and clouds was considered in the optimum frequency selection. The analysis indicates that approximately 0.6-cm rms accuracy is possible for one-way path length measurement using a proper pair of frequencies. The best two-channel subset selected by the leaps and bounds techniques is (16.0, 21.0) GHz. (Author)

A83-23895#
CHARACTERISTICS OF THE DETECTORS OF MULTI SPECTRAL SCANNER /MSS/ OF LANDSAT IN SPACE ENVIRONMENT
K. TSUCHIYA (Chiba University, Chiba, Japan), R. ITO, and C. ISHIDA (National Space Development Agency of Japan, Tokyo, Japan) Meteorological Society of Japan, Journal, vol. 60, Oct. 1982, p. 1165-1174. refs
An analysis was performed on the in-flight calibration data for the Landsat multispectral scanner to characterize the temporal variations in the responsivity of the detectors in a space environment. The responsivity is measured as the sensor output from a given input radiance. Gain and offset values were calculated for each detector in the Landsats 1 and 2 scanners. A similar variance in gain was detected among bands 4, 5, and 6, while the band 7 detector, a silicon diode, was stable. The short term variation was examined by calculating the gains of 14 successive scenes. Within-scene variation was also studied, and an after-effect, proportional to the image brightness, was detected and amounted to 5%. A dependence on the ambient temperature was found to produce a gain variation of up to 14%. Further studies are recommended for characterizing the mechanisms of the gain variations D.H.K.

A83-24294* Washington Univ., Seattle.
ON A SATELLITE SCATTEROMETER AS AN ANEMOMETER
R. A. BROWN (Washington, University, Seattle, WA) Journal of Geophysical Research, vol. 88, Feb. 28, 1983, p. 1663-1673. refs
(Contract NAG1-149)

The Seasat-A satellite scatterometer (SASS) wind-algorithm was tested against surface wind fields. Three classes of surface wind fields were used; point measurements, an isotach field over an intensively measured triangle with 200 km sides, and synoptic scale winds determined from pressure and temperature fields and a planetary boundary layer model. These comparisons can verify optimal capabilities of SASS at accuracies of + or - 2 m/s and + or - 20 deg. SASS ability to locate fronts accurately is also established. Complications in nonsteady, highly variable fields indicate problems exist in unqualified application of the SASS algorithm to all conditions. (Author)

A83-24647
MICROWAVE SYSTEMS FOR SATELLITE REMOTE SENSING
W. KEYDEL (Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Institut fuer Hochfrequenztechnik, Wessling, West Germany) Zeitschrift fuer Flugwissenschaften und Weltraumforschung, vol. 7, Jan.-Feb. 1983, p. 21-28.

The present state of the art of radar and microwave radiometry with respect to satellite applications is discussed, and the advantages and disadvantages of these remote sensing methods in comparison with methods in the optical range are indicated. The radar altimeter, radar scatterometer, and imaging radar are discussed in terms of their special uses and their important parameters, such as working frequency, transmitter power, pulse width, and pulse repetition frequency. The advantages and disadvantages of microwave radiometry are addressed, showing temperature profiles and distributions. Characteristics of active and passive microwaves and optics are compared including penetration, range, angular resolution, velocity, integration time, and others. Data are presented for various satellite scatterometers, radiometers, and microwave sensors. C.D.

A83-25646* Texas A&I Univ., Kingsville.
VEGETATION CLASSIFICATION BASED ON ADVANCED VERY HIGH RESOLUTION RADIOMETER /AVHRR/ SATELLITE IMAGERY
J. NORWINE (Texas A & I University, Kingsville, TX) and D. H. GREEGOR (Nebraska Wesleyan University, Lincoln, NE) Remote Sensing of Environment, vol. 13, Mar. 1983, p. 69-87. Research supported by the Winship Foundation, Association of American Geographers, Texas A & I University, Alaska Pacific University, and NASA. refs

Data from the NOAA-6 spacecraft Advanced Very High Resolution Radiometer (AVHRR) were tested for effectiveness for vegetation classification. Vegetation, climatological, and meteorological data were gathered for three days over 12 locations, and the normalized differences between the AVHRR bands 1 and 2 were determined. A vegetative greenness index was compared with a hydrologic factor and vegetation characteristics as measured by ground truth. A multivariate vegetation gradient model was formulated, incorporating AVHRR and climatological data. The hydrologic factor was calculated in terms of the precipitation, evaporation, maximum and minimum temperatures, and the hydrologic capacity. The observations were taken over Texas, which has a wide range of climates. A high correlation was found in the vegetation-HF index. The AVHRR data are concluded to be an effective tool for analysis of vegetation/climate relationships. M.S.K.

A83-26813
OPTIMIZATION OF THE SPECTRAL SENSITIVITY OF SURVEY SYSTEMS FOR THE REMOTE SENSING OF THE EARTH [OPTIMIZATSIIA SPEKTRAL'NOI CHUVSTVITEL'NOSTI S'EMOCHNYKH SISTEM PRI DISTANTSIONNOM ISSLEDOVANIIZEMLI]
G. A. SAVIN (Gosudarstvennyi Nauchno-Issledovatel'skii i Proizvodstvennyi Tsentr Priroda, USSR) Issledovanie Zemli iz Kosmosa, Jan.-Feb. 1983, p. 88-92. In Russian. refs

An approach to the optimization of the spectral sensitivity of satellite-borne photographic remote-sensing systems has been developed with the aim of achieving the best possible recognition of extended objects on the earth's surface on the basis of measurements of negative densities. The optimal solution is obtained in the region of application of photographic systems with a set of discrete bands of maximum sensitivity in each channel with different band widths. B.J.

A83-27018
SIMULTANEOUS OBSERVATION OF PRECIPITATION BY THE AIRBORNE MICROWAVE RAIN-SCATTEROMETER/RADIOMETER AND THE GROUND-BASED WEATHER RADAR SYSTEM
S. YOSHIKADO, K. OKAMOTO, H. MASUKO, N. FUGONO (Ministry of Posts and Telecommunications, Radio Research Laboratories, Koganei, Tokyo, Japan), K. NAKAMURA, J. AWAKA, and H. INOMATA (Ministry of Posts and Telecommunications, Radio Research Laboratories, Ibaraki, Japan) In: Conference on Radar Meteorology, 20th, Boston, MA, November 30-December 3, 1981, Preprints. Boston, MA, American Meteorological Society, 1981, p. 287-294.

A83-27050* National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
THE OUTLOOK FOR PRECIPITATION MEASUREMENTS FROM SPACE
D. ATLAS, J. ECKERMAN, R. MENEGHINI (NASA, Goddard Space Flight Center, Laboratory for Atmospheric Sciences, Greenbelt, MD), and R. K. MOORE (Kansas, University, Lawrence, KS) In: Conference on Radar Meteorology, 20th, Boston, MA, November 30-December 3, 1981, Preprints. Boston, MA, American Meteorological Society, 1981, p. 484-489. refs
(Previously announced in STAR as N81-31746)

A83-28165
AN ORBITING MICRO-WAVE IMAGER
C. R. FRANCIS (British Aerospace, Space and Communications Div., Stevenage, Herts., England) Aerospace Dynamics, June 1981, p. 20-24.

The Imaging Microwave Radiometer (IMR) Phase A study results presented draw attention to this instrument's technical feasibility. Although similar to the Scanning Multichannel Microwave Radiometer aboard Nimbus 7, and the Large Aperture Multichannel Microwave Radiometer which is currently under consideration (whose 4 m antenna offers excellent spatial resolution), the IMR promises radiometric resolution superior to those of these systems. The IMR is able to measure the intensity of radiation in the microwave band at a number of specific frequencies. By means of a complex data retrieval process, underlying surface characteristics may be extracted from these measurements. The parameters made accessible in this way include sea surface temperature, surface wind speed, sea ice cover, land snow cover, cloud liquid water content, and rain rate. O.C.

A83-28901
SOLAR MESOSPHERE EXPLORER - SCIENTIFIC OBJECTIVES AND RESULTS
C. A. BARTH, D. W. RUSCH, R. J. THOMAS, G. H. MOUNT, G. J. ROTTMAN, G. E. THOMAS, R. W. SANDERS, and G. M. LAWRENCE (Colorado, University, Boulder, CO) Geophysical Research Letters (ISSN 0094-8276), vol. 10, April 1983, p. 237-240. refs

Instruments on the Solar Mesosphere Explorer simultaneously measure ozone density, temperature, and solar ultraviolet flux. Results from six months of observations show that ozone density in the mesosphere changes from day-to-day and with the seasons and that the principal cause of these changes is the variation in atmospheric temperature. The dependence between ozone density and temperature is inverse, with a decrease in temperature producing an increase in ozone density. This dependence is observable in the seasonal patterns and also in orbit-to-orbit observations during dramatic atmosphere changes such as stratospheric warmings. Author

A83-28902
OZONE DENSITIES IN THE LOWER MESOSPHERE MEASURED BY A LIMB SCANNING ULTRAVIOLET SPECTROMETER
D. W. RUSCH, G. H. MOUNT, C. A. BARTH, G. J. ROTTMAN, R. J. THOMAS, G. E. THOMAS, R. W. SANDERS, G. M. LAWRENCE, and R. S. ECKMAN (Colorado, University, Boulder, CO) Geophysical Research Letters (ISSN 0094-8276), vol. 10, April 1983, p. 241-244. refs

The ozone content of the earth's atmosphere between 1 mb and 0.08 mb has been measured as a function of latitude and season by an ultraviolet spectrometer on the Solar Mesosphere Explorer spacecraft. The ozone mixing ratio is found to be highly variable in time and space during the winter of 1982 with maxima occurring in the winter hemisphere during January and February at all pressure levels. The latitude gradients near spring equinox are relatively small. A relative maximum occurs at latitudes between 15 and 30 deg in January and February. Author

A83-28903
OZONE DENSITY DISTRIBUTION IN THE MESOSPHERE /50-90 KM/ MEASURED BY THE SME LIMB SCANNING NEAR INFRARED SPECTROMETER
R. J. THOMAS, C. A. BARTH, G. J. ROTTMAN, D. W. RUSCH, G. H. MOUNT, G. M. LAWRENCE, R. W. SANDERS, G. E. THOMAS, and L. E. CLEMENS (Colorado, University, Boulder, CO) Geophysical Research Letters (ISSN 0094-8276), vol. 10, April 1983, p. 245-248. refs

The ozone densities between 50 and 90 km are deduced from 1.27-micron airglow measured on the Solar Mesosphere Explorer satellite. The derived densities agree well with those made simultaneously from SME by the ultraviolet spectrometer. The data set extends from pole to pole at about 3 pm, for most sunlit latitudes. At low altitudes, in the mesosphere, there are larger variations in ozone density in the winter latitudes than in the summer. Above the mesopause the day-to-day variation in ozone density is a factor of two at most latitudes and times. Author

A83-28950
DETECTION OF EDGES USING RANGE INFORMATION
A. MITICHE (Institut National de la Recherche Scientifique, Verdun, Quebec, Canada) and J. K. AGGARWAL (Texas, University, Austin, TX) IEEE Transactions on Pattern Analysis and Machine Intelligence (ISSN 0162-8828), vol. PAMI-5, March 1983, p. 174-178. refs
(Contract AF-AFOSR-77-3190)

Range data provide an important source of 3-D shape information. This information can be used to extract jump boundaries which correspond to occluding boundaries of objects in a scene and 'edges' which correspond to points lying between significantly different regions on the surface of objects. We are mainly interested in range data obtained from sensors such as lasers. The main problem with this type of range finder is the fact that the accuracy of the measurements depends on the power of the signal that reaches the receiver. This study describes how a range edge detection procedure can be designed that has low sensitivity to noise and imbeds all the knowledge available on the range measurement accuracy. Author

A83-29685
VALIDATION OF SATELLITE-DERIVED ATMOSPHERIC TEMPERATURE AND WATER VAPOR CONCENTRATION USING RADIOSONDE AND ROCKETSONDE MEASUREMENTS
D. Q. WARK (NOAA, National Earth Satellite Service, Washington, DC) (COSPAR, Topical Meeting on Weather Satellites: Stereoscopy and Sounding, Ottawa, Canada, May 16-June 2, 1982) Advances in Space Research (ISSN 0273-1177), vol. 2, no. 6, 1982, p. 49-58. refs

Measurements of the spatial radiance of the earth's atmosphere from satellites can be related to the vertical structures of temperature and humidity. Derived profiles of these quantities are compared with radiosonde and rocketsonde observations, as well as with horizontal and vertical cross-sections of the atmosphere. In some regions of the atmosphere, particularly where large gradients are found, significant differences occur. A method for overcoming these by use of Typical Shape Functions is discussed. Transmittances computed from theory require modifications which are not well defined, and radiances measured from some satellite instruments disagree with computed values in ways which suggest calibration or instrument problems. Author

N83-16809*# Rochester Inst. of Tech., N. Y. School of Photographic Arts and Sciences.
LANDSAT-D BAND 6 DATA EVALUATION Quarterly Report
15 Dec. 1982 2 p ERTS
(Contract NAS5-27323)
(E83-10130; NASA-CR-169758; NAS 1.26:169758; QR-1) Avail: NTIS HC A02/MF A01 CSCL 05B

A filter, fabricated to match the spectral response of the LANDSAT band 6 sensors, was received and the combined system response function computed. The half power points for the aircraft system are 10.5 micrometer and 11.55 micrometer compared to the 10.4 and 11.6 micrometer values for the satellite. These discrepancies are considered acceptable; their effect on the apparent temperature observed at the satellite is being evaluated. The filter was installed in the infrared line scanner and the line scanner was installed in the aircraft and field checked. A daytime underflight of the satellite is scheduled for the next clear overpass and the feasibility of a nightime overpass is being discussed with NASA. The LOWTRAN 5 computer code was obtained from the Air Force Geophysical Laboratory and is being implemented for use on this effort. A.R.H.

N83-16814*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
PROGRAM TO COMPUTE THE POSITIONS OF THE AIRCRAFT AND OF THE AIRCRAFT SENSOR FOOTPRINTS
J. F. PARIS, Principal Investigator Sep. 1982 20 p Sponsored by NASA, USDA, Dept. of Commerce, Dept. of the Interior, and Agency for International Development ERTS
(Contract PROJ. AGRISTARS)
(E83-10139; NASA-TM-85199; SR-J2-04360; JSC-18574; NAS 1.15:85199) Avail: NTIS HC A02/MF A01 CSCL 02C

The positions of the ground track of the aircraft and of the aircraft sensor footprints, in particular the metric camera and the radar scatterometer on the C-130 aircraft, are estimated by a program called ACTRK. The program uses the altitude, speed, and attitude informaton contained in the radar scatterometer data files to calculate the positions. The ACTRK program is documented. Author

N83-16831*# National Aeronautics and Space Administration, Washington, D. C.
SPACE FRAGMENT IN STUDIES OF THE EARTH
G. A. AVANESOV and Y. L. ZIMAN Oct. 1982 17 p Transl. into ENGLISH from Zemlya i Vselennaya (Moscow), no. 4, Jul. - Aug. 1982 p 6-12 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASW-3541)
(NASA-TM-77155; NAS 1.15:77155) Avail: NTIS HC A02/MF A01 CSCL 14B

The fragment apparatus, mounted on board the artificial earth satellite Meteor, was created for the operational study of the natural resources of the Earth in the optical range of electromagnetic waves. The orbit of the satellite at an altitude of about 650 km makes it possible to observe the same sectors of the Earth's surface at the same time of day with a periodicity of 15 days. Author

N83-16834# Florida Inst. of Tech., Melbourne. Space Technology Program.
ADVANCED THERMAL-SENSOR-SYSTEM DEVELOPMENT VIA SHUTTLE SORTIE MISSIONS
J. A. ANGELO, JR. and I. W. GINSBERG (Edgerton, Germeshausen and Grier, Inc., Las Vegas, Nev.) 1981 31 p refs Presented at the 4th Intern. Conf. on Alternative Energy Sources, Miami Beach, Fla., 14 dec. 1981
(Contract DE-AC08-76NV-01183)
(DE82-004932; EGG-1183-1785; CONF-811212-4) Avail: NTIS HC A03/MF A01

The use of the space shuttle in various sortie mission modes to evaluate advanced thermal sensor system concepts, prior to a design commitment for automated spacecraft application, is described. Selected terrestrial energy sources of civilian and/or military interest are examined with respect to: (1) thermal source location and characterization and (2) temperature and emissivity measurements. Of particular interest is the application of on orbit sensor testing to demonstrate the location and characterization of potential geothermal energy resources. The role of the payload specialist in thermal source location, sensor operation and real time evaluation of mission performance is discussed. DOE

N83-16980# Research Inst. of National Defence, Linkoeping (Sweden).
ACQUISITION OF ENVIRONMENTAL DATA OF THE HYDROSPHERE
S. PALMGREN Jul. 1982 57 p refs In ENGLISH; SWEDISH summary
(FOA-C-30284-E) Avail: NTIS HC A04/MF A01

Development and tests of methods for acquisition of environmental data, including active remote sensing and in situ methods are reviewed. Remote sensing of sea ice with IR thermography; lidar techniques; laser induced fluorescence from algae; laser bathymetry; optical properties of sea water; and smoke plume measurements are discussed. Author (ESA)

N83-17916*# Environmental Research Inst. of Michigan, Ann Arbor.
STUDY ON RADIOMETRIC CONSISTENCY OF LANDSAT-4 MULTISPECTRAL SCANNER Quarterly Status and Technical Progress Report, 22 Oct. 1982 - 21 Jan. 1983
W. A. MALILA, Principal Investigator 21 Jan. 1983 42 p ERTS
(Contract NAS5-27254)
(E83-10099; NASA-CR-169676; NAS 1.26:169676; ERIM-163200-2-L; QSTPR-2) Avail: NTIS HC A03/MF A01 CSCL 14B

Two full frames of radiometrically corrected LANDSAT-4 MSS data were examined to determine a number of radiometric properties. It was found that LANDSAT-4 MSS produces data of good quality with dynamic ranges and target responses qualitatively similar to those of previous MSS sensors. Banding appears to be quite well corrected, with a residual rms error of about 0.3 digital counts being measured; the histogram equalization algorithm appears to be working as advertised. A low level coherent noise effect was found in all bands, appearing in uniform areas as a diagonal striping pattern. The principle component of this noise was found by Fourier analysis to be a highly consistent wavelength of 3.6 pixels along a scan line (28 KHz). The magnitude of this effect ranged from about 0.75 of one count in the worst band (Band 1) to only about 0.25 counts in the best band (Band 4). Preparations were made for establishing a relative radiometric calibration from MSS 4 data with respect to MSS 3. Author

N83-17923*# MacDonald, Dettwiler and Associates Ltd., Richmond (British Columbia).
SEASAT SAR PERFORMANCE EVALUATION STUDY Final Report
Jun. 1982 65 p refs Prepared for JPL, Pasadena, Calif. Original contains imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls, S.D. 57198 ERTS
(Contract NAS7-100; JPL-9566104)
(E83-10157; NASA-CR-169768; JPL-9950-699; NAS 1.26:169768; REPT-00-0676-D00) Avail: NTIS HC A04/MF A01 CSCL 05B

The performance of the SEASAT synthetic aperture radar (SAR) sensor was evaluated using data processed by the MDA digital processor. Two particular aspects are considered the location accuracy of image data, and the calibration of the measured backscatter amplitude of a set of corner reflectors. The image location accuracy was assessed by selecting identifiable targets in several scenes, converting their image location to UTM coordinates, and comparing the results to map sheets. The error standard deviation is measured to be approximately 30 meters. The amplitude was calibrated by measuring the responses of the Goldstone corner reflector array and comparing the results to theoretical values. A linear regression of the measured against theoretical values results in a slope of 0.954 with a correlation coefficient of 0.970. A.R.H.

N83-17936*# Oceanweather, Inc., White Plains, N.Y.
EVALUATION OF SEASAT-A SMMR DERIVED WIND SPEED MEASUREMENTS Final Report
Jan. 1982 41 p refs Sponsored by NASA Prepared for JPL, Pasadena Original contains imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls, S.D. 57198 ERTS
(Contract JPL-955583)
(E83-10172; NASA-CR-169782; JPL-9950-666; NAS 1.26:169782) Avail: NTIS HC A03/MF A01 CSCL 04B

Wind speeds derived from versions of the least-squares and regression algorithms developed after the JASIN Workshop were evaluated. The accuracy of scanning multichannel microwave radiometer (SMMR) wind retrievals was determined in terms of the intrinsic accuracy of a baseline surface truth data set in favorable conditions. Effects which degrade the wind retrievals or introduce biases were indentified and assessed. The performance of the SMMR in storms was ascertained with particular emphasis on the effects of rain. A.R.H.

N83-17938*# General Software Corp., Landover, Md.
THE CONICAL SCANNER EVALUATION SYSTEM DESIGN
K. E. CUMELLA, S. BILANOW, and I. B. KULIKOV May 1982 187 p refs ERTS
(Contract NAS5-26205)
(E83-10175; NASA-CR-170439; NAS 1.26:170439; GSC-TR8206) Avail: NTIS HC A09/MF A01 CSCL 14B

The software design for the conical scanner evaluation system is presented. The purpose of this system is to support the performance analysis of the LANDSAT-D conical scanners, which are infrared horizon detection attitude sensors designed for improved accuracy. The system consists of six functionally independent subsystems and five interface data bases. The system structure and interfaces of each of the subsystems is described and the content, format, and file structure of each of the data bases is specified. For each subsystem, the functional logic, the control parameters, the baseline structure, and each of the subroutines are described. The subroutine descriptions include a procedure definition and the input and output parameters. M.G.

N83-19182*# Martin Marietta Aerospace, Denver, Colo.
STUDY AND SIMULATION RESULTS FOR VIDEO LANDMARK ACQUISITION AND TRACKING TECHNOLOGY (VILAT-2) Final Report
J. W. LOWRIE, J. C. TIETZ, H. M. THOMAS, K. D. GREMBAN, C. HUGHES, and C. Y. CHANG Feb. 1983 75 p refs
(Contract NAS1-15602)
(NASA-CR-166066; NAS 1.26:166066) Avail: NTIS HC A04/MF A01 CSCL 05B

The results of several investigations and hardware developments which supported new technology for Earth feature recognition and classification are described. Data analysis techniques and procedures were developed for processing the Feature Identification and Location Experiment (FILE) data. This experiment was flown in November 1981, on the second Shuttle flight and a second instrument, designed for aircraft flights, was flown over the United States in 1981. Ground tests were performed to provide the basis for designing a more advanced version (four spectral bands) of the FILE which would be capable of classifying clouds and snow (and possibly ice) as distinct features, in addition to the features classified in the Shuttle experiment (two spectral bands). The Shuttle instrument classifies water, bare land, vegetation, and clouds/snow/ice (grouped). Author

N83-19185# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
REMOTE SENSING TECHNIQUES USED TO MONITOR THERMAL DISCHARGE FROM A COASTAL POWER PLANT
M. R. STEVENSON and INOSTROZA V. HECTOR M. Nov. 1982 28 p refs Presented at Intern. Symp. on Utilization of Coastal Ecosystems: Planning, Pollution and Productivity, Rio Grande, Brazil, 22-27 Nov. 1982
(INPE-2597-PRE/243) Avail: NTIS HC A03/MF A01

A surface temperature field study of the region of Angra dos Reis in the state of Rio de Janeiro, using a Precision Radiation Thermometer (Barnes PRT5) from an aircraft and corresponding temperature measurements (sea truth) from a surface boat is presented. The influence of the warm discharge of a coastal power plant on the surface thermal structure of the nearby coastal bays was evaluated. Methods of acquisition, processing and analysis of thermal data obtained simultaneously with the airborne PRT5 and surface temperature measurements are presented. Temperature charts of corrected data are discussed. Effects of atmospheric absorption of infrared thermal radiation due to the presence of water vapor are considered using both radiosonde and aircraft sounding data. ANGRA 02 results show small scale features not easily seen in bulk measurements from the boat. Statistical evaluation of the radiometric data suggests that the airborne PRT5 is capable of providing considerable thermal sensitivity and spatial resolution. B.G.

N83-19189*# National Aeronautics and Space Administration, Washington, D. C.
IMPLEMENTATION OF SPACE SATELLITE REMOTE SENSING PROGRAMS IN DEVELOPING COUNTRIES (ECUADOR)
A. SEGOVIA May 1982 21 p refs Transl. into ENGLISH of conf. paper "Implementacion de Programa de Teledeteccion en Paises in Vias de Desarrollo (Ecuador)" presented at the United Nations' Seminar on Space Appl. for the 2nd United Nations Conf. on the Exploration and Utilization of Outer Space for Peaceful Purposes, (Ecuador), 1982 p 1-17 Conf. held in Quito, 19-23 Apr. 1982
(Contract NASW-3542)
(NASA-TM-76890; NAS 1.15:76890) Avail: NTIS HC A02/MF A01 CSCL 05B

The current state of space satellite remote sensing programs in developing countries is discussed. Sensors being utilized and results obtained are described. Requirements are presented for the research of resources in developing countries. It is recommended that a work procedure be developed for the use of satellite remote sensing data tailored to the necessities of the different countries. Author

N83-20311*# Operations Research, Inc., Silver Spring, Md.
MRS PROOF-OF-CONCEPT ON ATMOSPHERIC CORRECTIONS. ATMOSPHERIC CORRECTIONS USING AN ORBITAL POINTABLE IMAGING SYSTEM Final Report, 15 May 1979 - 15 Jan. 1980
P. N. SLATER, Principal Investigator Jan. 1980 88 p refs ERTS
(Contract NAS5-25606)
(E83-10173; NASA-CR-170488; NAS 1.26:170488; ORI-TR-1653) Avail: NTIS HC A05/MF A01 CSCL 04A

The feasibility of using a pointable imager to determine atmospheric parameters was studied. In particular the determination of the atmospheric extinction coefficient and the path radiance, the two quantities that have to be known in order to correct spectral signatures for atmospheric effects, was simulated. The study included the consideration of the geometry of ground irradiance and observation conditions for a pointable imager in a LANDSAT orbit as a function of time of year. A simulation study was conducted on the sensitivity of scene classification accuracy to changes in atmospheric condition. A two wavelength and a nonlinear regression method for determining the required atmospheric parameters were investigated. The results indicate the feasibility of using a pointable imaging system (1) for the determination of the atmospheric parameters required to improve classification accuracies in urban-rural transition zones and to apply in studies of bi-directional reflectance distribution function data and polarization effects; and (2) for the determination of the spectral reflectances of ground features. M.G.

N83-20324*# National Aeronautics and Space Administration. Pasadena Office, Calif.
METHOD AND APPARATUS FOR CONTOUR MAPPING USING SYNTHETIC APERTURE RADAR Patent Application
R. M. GOLDSTEIN (JPL, California Inst. of Tech., Pasadena), E. R. CARO (JPL, California Inst. of Tech., Pasadena), and C. WU, inventors (to NASA) (JPL, (California Inst. of Tech., Pasadena) 10 Feb. 1983 17 p
(Contract NAS7-100)
(NASA-CASE-NPO-15939-1; US-PATENT-APPL-SN-465365) Avail: NTIS HC A02/MF A01 CSCL 08B

By using two SAR antennae spaced a known distance and oriented at substantially the same look angle to illuminate the same target area, pixel data from the two antennae are compared in phase to determine a difference from which a slant angle is determined for each pixel point. The height of each pixel point from the aircraft is determined, and from the known altitude of the aircraft above sea level, the altitude (elevation) of each point is determined. NASA

N83-20942# British Aerospace Dynamics Group, Bristol (England). Space and Communications Div.
RADAR ALTIMETER TEST AND CALIBRATION STUDY, VOLUME 1 Final Report
C. R. FRANCIS, comp. and R. J. ORME, comp. Paris ESA Jul. 1982 362 p refs
(Contract ESA-4926/81/F-DD(SC))
(ESS/SS-1077; ESA-CR(P)-1685) Avail: NTIS HC A16/MF A01

The radar altimeter proposed for the ERS-1 satellite is a pulse width limited instrument, in which the shape of the leading edge of the return enables the ocean wave height to be measured. The altimeter has a performance specification similar to the highly successful SEASAT altimeter. Tests to determine whether these specifications are met and methods for calibrating the instrument are described. Overall error sources discussed include altitude, significant wave height, and backscatter coefficient. Characteristics of the signal backscatter from the sea, testing of the processor and the microwave subsystems, in-orbit calibration, errors occurring in the instrument due to rf effects, and the development of a returned signal simulator are covered. A.R.H.

N83-21213*# Purdue Univ., Lafayette, Ind.
THE RELATIONSHIP OF SENSOR PARAMETERS TO APPLICATIONS DATA ANALYSIS Final Report, May 1981 - Aug. 1982
D. A. LANDGREBE and E. R. MALARET 1982 80 p refs
(Contract NSG-5414)
(NASA-CR-170120; NAS 1.26:170120) Avail: NTIS HC A05/MF A01 CSCL 20N

A stochastic model for the data acquisition system in a multispectral scanner system, like the one utilized by the LANDSAT satellites, is presented. A list of noise sources which are known or presumed to have a significant effect in the information extraction process was constructed. Since the shot noise introduced by the photodetectors in the sensor system is signal level dependent, an atmospheric model was adopted which could adequately describe the amount of radiation that gets into the sensors based on the atmospheric transmittance. An analysis was carried out to find the output spectral statistics in terms of the input signal statistics and the system parameters. This was integrated into a set of FORTRAN programs that when supplied with, the class statistics, the noise levels introduced by the sensor system, the atmospheric transmittance, and the atmospheric path radiance, can be used to estimate the classification performance. In order to show the benefits of this model a series of runs were performed in which the Thematic Mapper multispectral scanner was the system under consideration. S.L.

N83-21315*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
ATMOSPHERIC SIMULATOR AND CALIBRATION SYSTEM FOR REMOTE SENSING RADIOMETERS
J. A. HOLLAND Mar. 1983 13 p refs
(NASA-TM-84607; L-15568; NAS 1.15:84607) Avail: NTIS HC A02/MF A01 CSCL 14B

A system for calibrating the MAPS (measurement of air pollution from satellites) instruments was developed. The design of the system provides a capability for simulating a broad range of radiant energy source temperatures and a broad range of atmospheric pressures, temperatures, and pollutant concentrations for a single slab atmosphere. The system design and the system operation are described. S.L.

N83-21444*# State Univ. of New York, Albany. Dept. of Geography.
SEASAT SYNTHETIC APERATURE RADAR DATA
F. M. HENDERSON *In* NASA. Goddard Space Flight Center Eastern Reg. Remote Sensing Appl. Conf. p 209-215 Jan. 1981 Original contains imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls, S.D. 57198 ERTS
Avail: NTIS HC A11/MF A01 CSCL 17I

The potential of radar imagery from space altitudes is discussed and the advantages of radar over passive sensor systems are outlined. Specific reference is made to the SEASAT synthetic aperture radar. Possible applications include oil spill monitoring, snow and ice reconnaissance, mineral exploration, and monitoring phenomena in the urban environment. M.G.

N83-21493# High Life Helicopters, Inc., Puyallup, Wash.
AIRBORNE GAMMA-RAY SPECTROMETER AND MAGNETOMETER SURVEY: BUCKSHOT, TEXAS Final Report
1982 536 p 2 Vol.
(Contract DE-AC13-79GJ-01692)
(DE83-002724; GJBX-196-82-VOL-2D) Avail: NTIS HC A23/MF A01

Radiometric contour maps, magnetic contour maps, and multi-variant analysis maps for an airborne gamma ray spectrometer and magnetometer survey of an area of Texas are given. DOE

N83-21495# Sandia Labs., Albuquerque, N. Mex.
MODULAR AIRBORNE REMOTE SAMPLING AND SENSING SYSTEM (MARSSS)
R. O. WOODS Apr. 1982 20 p Presented at the APCA Specialty Conf., San Diego, Calif., 18-21 Jan. 1982
(Contract DE-AC04-76DP-00789)
(DE82-014657; SAND-81-1522) Avail: NTIS HC A02/MF A01

Sandia is developing a modular airborne instrumentation system for the Environmental Protection Agency. This system will allow flexibility in the choice of instruments by standardizing mountings, power supplies and sampling modes. The objective is to make it possible to perform aerial surveys from chartered aircraft that have not been adapted in a more than superficial manner. It will also allow the experimenter to tailor his choice of instruments to the specific problem. Since the equipment will have a stand alone capability, it can be applied to other problems such as long term unattended use at remote locations or in toxic or otherwise hazardous environments. DOE

N83-21680# Universite Catholique de Louvain (Belgium). Lab. de Telecommunications et d'Hyperfrequences.
INFLUENCE OF THE ATMOSPHERE ON THE PERFORMANCE OF SPACEBORNE IMAGING MICROWAVE RADIOMETERS (IMR 2). DISTANCE MEASUREMENTS CORRECTION. VOLUME 1: SUMMARY, CONCLUSIONS AND PROPOSALS Final Report
A. GUISSARD and M. DECOSTER Paris ESA Mar. 1982 95 p refs 2 Vol.
(Contract ESTEC-4702/81/NL-PP(SC))
(ESA-CR(P)-1643-VOL-1) Avail: NTIS HC A05/MF A01

The problem of correcting atmospheric range error from radiometric measurements is addressed. It forms part of preliminary work for ERS-1. One part of the payload will be a high-accuracy altimeter, one of whose missions will be to perform precise determinations of the geoid and of sea-surface irregularities less than 1 m in height. The altimeter should also be able to measure the surface wind speed with an accuracy of about 2 m/s. For such a mission, the position of the satellite must be known with similar accuracy. It must therefore be tracked continuously by a large set of ground based ranging instruments. In this study, corrections to both ground-based and space-based measurements are dealt with. Author

N83-21681# Universite Catholique de Louvain (Belgium). Lab. de Telecommunications et d'Hyperfrequences.
INFLUENCE OF THE ATMOSPHERE ON THE PERFORMANCE OF SPACEBORNE IMAGING MICROWAVE RADIOMETERS (IMR 2). DISTANCE MEASUREMENTS CORRECTION. VOLUME 2: COMPLEMENTS Final Report
A. GUISSARD and M. DECOSTER Paris ESA Mar. 1982 184 p refs 2 Vol.
(Contract ESTEC-4702/81/NL-PP(SC))
(ESA-CR(P)-1643-VOL-2) Avail: NTIS HC A09/MF A01

Range errors from the ionosphere and troposphere, radiometric measurement of atmospheric water vapor and liquid water, atmospheric attenuation, parameter estimation from noisy measurements, and performance analysis of radiometers are discussed. Author

N83-21710*# Jet Propulsion Lab., California Inst. of Tech., Pasadena.
LINEAR RETRIEVAL AND GLOBAL MEASUREMENTS OF WIND SPEED FROM THE SEASAT SMMR
P. C. PANDEY 1 Mar. 1983 31 p refs
(NASA-CR-170115; JPL-PUB-83-5; NAS 1.26:170115) Avail: NTIS HC A03/MF A01 CSCL 04B

Retrievals of wind speed (WS) from Seasat Scanning Multichannel Microwave Radiometer (SMMR) were performed using a two-step statistical technique. Nine subsets of two to five SMMR channels were examined for wind speed retrieval. These subsets were derived by using a leaps and bound procedure based on the coefficient of determination selection criteria to a statistical data base of brightness temperatures and geophysical parameters. Analysis of Monsoon Experiment and ocean station PAPA data showed a strong correlation between sea surface temperature and water vapor. This relation was used in generating the statistical data base. Global maps of WS were produced for one and three month periods. Author

N83-21730*# National Aeronautics and Space Administration. Langley Research Center, Hampton, Va.
GREENLAND 1979 MICROWAVE REMOTE SENSING DATA CATALOG REPORT, 14-15 OCTOBER 1979
H. F. HENNIGAR (Deepsea Ventures, Inc., Gloucester Point, Va.), W. S. HIRSTEIN (Bionetics Corp., Hampton, Va.), S. K. SCHAFFNER (OAO Corp., Hampton, Va.), V. E. DELNORE (Kentron International, Inc., Hampton, Va.), and W. L. GRANTHAM Mar. 1983 64 p refs
(NASA-TM-84571; L-15529; NAS 1.15:84571) Avail: NTIS HC A04/MF A01 CSCL 08C
Microwave remote sensing measurements were cataloged for active and passive instruments in support of the 1979 Greenland Remote Sensing Experiment. Instruments used in this field experiment include the stepped frequency microwave radiometer (4 to 8 GHz) and the airborne microwave scatterometer (14.6 GHz). The microwave signature data are inventoried and cataloged in a user friendly format and are available on 9 track computer compatible tapes upon request. Author

N83-22043# Mullard Radio Astronomy Observatory, Cambridge (England).
STATUS REPORT ON THE UK-NL 15-METRE TELESCOPE
R. HILLS *In* ESA The Sci. Importance of Submillimeter Observations p 51-52 Aug. 1982
Avail: NTIS HC A11/MF A01
The key features of the telescope are its homologous structure, designed to minimize the effects of gravitational deformations, the use of an enclosure to reduce wind forces and thermal disturbances, the fabrication of the panels by replication from highly accurate moulds and the setting of the surface using a laser measuring machine. The continuing experimental and analytical work in all of these areas has provided a high degree of confidence that the specified surface accuracy of 50 microns rms will be achieved under all observing conditions and that the goal of 35 microns rms will be reached in favourable circumstances. Author

N83-22047# Turin Univ. (Italy). Ist. di Fisica Generale.
A PROJECT FOR A MILLIMETRE WAVE INTERFEROMETER NEAR MATTERHORN
G. SILVERSTRO *In* ESA The Sci. Importance of Submillimetre Observations p 63-64 Aug. 1982 refs
Avail: NTIS HC A11/MF A01
A project for an interferometer involving the Alpine stations at Testa Grigia and Gornergrat is described. Millimeter wave astronomy has poor angular resolution compared with both optical and radio astronomy. Many fundamental problems of galactic astronomy require greatly increased resolution in the mm wave band, which is obtained by an interferometric system. The project makes it possible to obtain very high resolution observations of compact millimeter sources. The system expected performance is estimated. E.A.K.

N83-22091*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
SIMULATION OF A WEATHER RADAR DISPLAY FOR OVER-WATER AIRBORNE RADAR APPROACHES
G. R. CLARY Feb. 1983 29 p refs
(NASA-TM-84315; A-9185; NAS 1.15:84315) Avail: NTIS HC A03/MF A01 CSCL 17I
Airborne radar approach (ARA) concepts are being investigated as a part of NASA's Rotorcraft All-Weather Operations Research Program on advanced guidance and navigation methods. This research is being conducted using both piloted simulations and flight test evaluations. For the piloted simulations, a mathematical model of the airborne radar was developed for over-water ARAs to offshore platforms. This simulated flight scenario requires radar simulation of point targets, such as oil rigs and ships, distributed sea clutter, and transponder beacon replies. Radar theory, weather radar characteristics, and empirical data derived from in-flight radar photographs are combined to model a civil weather/mapping radar typical of those used in offshore rotorcraft operations. The resulting radar simulation is realistic and provides the needed simulation capability for ongoing ARA research. Author

N83-22286*# OAO Corp., Greenbelt, Md.
SPACE TRANSPORTATION SYSTEM FLIGHT 2 OSTA-1 SCIENTIFIC PAYLOAD DATA MANAGEMENT PLAN
25 Sep. 1981 264 p refs
(Contract NASW-3358)
(NASA-CR-169826; NAS 1.26:169826; OTA/TR-81/0052) Avail: NTIS HC A12/MF A01 CSCL 22A
The Shuttle Imaging Radar-A (SIR-A), Shuttle Multispectral Infrared Radiometer (SMIRR), Future Identification and Location Experiment (FILE), Measurement of Air Pollution from Satellites (MAPS), Ocean Color Experiment (OCE), the Night/Day Optical Survey of Lightning (NOSL), and the Heflex Bioengineering Test (HBT) experiments are described. N.W.

N83-22686*# General Electric Co., Philadelphia, Pa. Space Center.
AN OVERVIEW OF THE THEMATIC MAPPER GEOMETRIC CORRECTION SYSTEM
E. P. BEYER 1983 89 p ERTS
(Contract NAS5-25300)
(E83-10206; NASA-CR-170052; NAS 1.26:170052) Avail: NTIS HC A05/MF A01 CSCL 08B
Geometric accuracy specifications for LANDSAT 4 are reviewed and the processing concepts which form the basis of NASA's thematic mapper geometric correction system are summarized for both the flight and ground segments. The flight segment includes the thematic mapper instrument, attitude measurement devices, attitude control, and ephemeris processing. For geometric correction the ground segment uses mirror scan correction data, payload correction data, and control point information to determine where TM detector samples fall on output map projection systems. Then the raw imagery is reformatted and resampled to produce image samples on a selected output projection grid system. A.R.H.

09

GENERAL

Includes economic analysis.

A83-21070#
SPACE RESEARCH ACTIVITIES IN CZECHOSLOVAKIA IN 1981
Prague, Czechoslovak National Committee of COSPAR, 1982. 20 p. refs
The results of space-based and ground-based space experiments performed by Czechoslovakian researchers are summarized. The satellite 1978-099C, launched with the Interkosmos 18 spacecraft, measured the characteristics of VLF waves and verified the occurrence of conical scattering of the waves in the ionosphere. The Monitor instrument on the Prognoz 8 satellite measured the solar wind plasma in the energy range 300 eV-12 keV. Slowly drifting emission was observed with the AKR-2 radio receiver, and the DOK instrument assayed the intensity and anisotropy of low-energy electrons and protons. An X ray photometer on the Prognoz 8 collected solar X ray flux data. Additional participation with the Interkosmos 14 and 19 satellite programs is described, together with the biological experiments on the Kosmos 1129 satellite. Other work, such as verification of geopotential models, of an atmospheric lift force acting on satellites, and modeling of the solar wind interaction with the earth's

magnetosphere and the structure of the interplanetary magnetic field are discussed. M.S.K.

A83-21908

AN EXPERIMENTAL SUPPORT CENTER FOR OPERATIONAL USE OF REMOTELY SENSED DATA

G. REMETEY-FULOPP and P. WINKLER (Institute of Geodesy and Cartography, Budapest, Hungary) In: International Society for Photogrammetry and Remote Sensing, International Symposium, Toulouse, France, September 13-17, 1982, Transactions. Volume 1. Toulouse, Groupement pour le Developpement de la Teledetection Aerospatiale, 1982, p. 95-103. refs

The paper examines the development of a nationwide support center for applied remote sensing (to be fully operational in 1985) within the framework of the Remote Sensing Department of the Hungarian Institute of Geodesy and Cartography. The scope and functions of the Department are discussed from four points of view: user services, extension efforts, public relations, and research and development. B.J.

A83-24528#

REMOTE SENSING ACTIVITIES IN INDIA

B. SAHAI (Indian Space Research Organization, Space Applications Centre, Ahmedabad, India) In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 1. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 23-32.

Remote sensing activities in India are described, emphasizing operations connected with the Bhaskara 2 satellite. Centers have been established to develop spacecraft, test components, operate a nationwide tracking and data-relay system, plan and develop launch vehicles, perform R&D on applications of space technology, and produce remote sensing techniques. The remote sensing program comprises manpower training, demonstrations of the conversion of raw data into bases for decision making, development of a remote sensing based resources management information system, aid to users of remotely sensed data. Program aspects such as aerial surveys, ground truth/spectral signatures characterizations, sensor development, interpretation aids, and data applications are explored. The launch of two Bhaskara satellites verified the technology necessary to move toward operational implementation of space-based remote sensing. M.S.K.

A83-24531#

JOINT U.S.-MEXICAN ACTIVITIES IN ARID LAND MANAGEMENT AND DESERTIFICATION CONTROL

J. E. SABADELL In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 1. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 51-60.

Details of an agreement to shar science and technologies of common concern to the U.S. and Mexico are presented, together with a review of actions resulting from the agreement. A mixed commission was established in 1972 and a Memorandum of Understanding was signed in 1977, in concert with consultations regarding arid lands and desertification. Cooperation between the two countries has concentrated on irrigated and nonirrigated zones, rangelands, forests, and the production of equipment for mechanized farming, forestry, and rangeland management, as well as watershed management, utilization of native flora, identification of desertification indicators, and the passage of legislation to protect the natural resources. A formal agreement to improve the management of arid and semiarid lands of both countries was signed in 1979. Although Landsat data is not yet in operational status, use is being made of high altitude photography and cartographic surveys. M.S.K.

A83-24532#

SPOT AND REMOTE SENSING APPLICATIONS FOR ARID AND SEMI-ARID LANDS

C. VEILLAS (Centre National d'Etudes Spatiales, Paris, France) In: Remote sensing of arid and semi-arid lands; Proceedings of the International Symposium on Remote Sensing of Environment, Cairo, Egypt, January 19-25, 1982. Volume 1. Ann Arbor, MI, Environmental Research Institute of Michigan, 1982, p. 63-72.

The capabilities, intended applications, and operational systems for utilizing the data from the French SPOT satellite, to be launched in 1984, are discussed. The SPOT sensors will provide 20 m ground feature resolution in the trichromatic mode and 10 m in the panchromatic mode. Spectral bands are being chosen for optimized monitoring of specific vegetation and mineral species, using a green 50-59 microns band, a red 61-68 microns band, and a near-IR 79-89 microns band, together with a 51-73 microns panchromatic band. Other capabilities include stereoscopy and revisit potentials. Application can take the form of desertification, overgrazing, and erosion monitoring. Simulations are being developed for distribution to various countries which can make use of the SPOT data. Details of the marketing process and products are provided. M.S.K.

A83-29915

ISSUES SURROUNDING THE COMMERCIALIZATION OF CIVIL LAND REMOTE SENSING FROM SPACE

T. M. LILLESAND (Wisconsin, University, Madison, WI) Photogrammetric Engineering and Remote Sensing (ISSN 0099-1112), vol. 49, April 1983, p. 495-504. refs

Factors impinging on the possible transfer of ownership and operation of the Landsat and weather satellites to private control are examined. Attention is given to continuing the technical development of remote sensing apparatus, to maintaining defense priority usage, and to increasing foreign competition in the remote sensing data market, which is still in its infancy. A Cabinet-level advisory council has concluded that weather satellites are predominantly oriented to government operations, while land remote sensing control, if transferred to the commercial sector, should be constrained to raw data processing alone. A commitment by the U.S. government to continue operations and development of remote sensing capabilities is recommended, whether or not the raw data analysis is performed by commercial groups. M.S.K.

N83-16815*# Environmental Research Inst. of Michigan, Ann Arbor. Applications Div.

LANDSAT TECHNOLOGY TRANSFER TO THE PRIVATE AND PUBLIC SECTORS THROUGH COMMUNITY COLLEGES AND OTHER LOCALLY AVAILABLE INSTITUTIONS, PHASE 2 PROGRAM Final Report, 6 Mar. 1981 - 6 Mar. 1982

R. H. ROGERS, Principal Investigator Mar. 1982 90 p Original contains color imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls, S.D. 57198 ERTS (Contract NAS5-26393)
(E83-10140; NASA-CR-170466; NAS 1.26:170466; ERIM-154700-1-F) Avail: NTIS HC A05/MF A01 CSCL 05A

A program established by NASA with the Environmental Research Institute of Michigan (ERIM) applies a network where the major participants are NASA, universities or research institutes, community colleges, and local private and public organizations. Local users are given an opportunity to obtain 'hands on' training in LANDSAT data analysis and Geographic Information System (GIS) techniques using a desk top, interactive remote analysis station (RAS). The RAS communicates with a central computing facility via telephone line, and provides for generation of land use and land suitability maps and other data products via remote command. During the period from 22 September 1980 - 6 March 1982, 15 workshops and other training activities were successfully conducted throughout Michigan providing hands on training on the RAS terminals for 250 or more people and user awareness activities such as exhibits and demontrations for 2,000 or more participants. A.R.H.

N83-17934*# OAO Corp., Greenbelt, Md.
ANALYSIS AND FIFTEEN-YEAR PROJECTION OF THE MARKET FOR LANDSAT DATA
18 Sep. 1981 24 p refs ERTS
(Contract NASW-3358)
(E83-10170; NASA-CR-169778; NAS 1.26:169778; OAO/TR-81/0057) Avail: NTIS HC A02/MF A01 CSCL 05B

The potential market for LANDSAT products through the 1990's was determined. Results are presented in a matrix format. Improved resolution is a major factor in the marketability of LANDSAT data, the 10 meter resolution (projected for 1995) having a significant impact on the federal, private, and international users, and on the agricultural, minerals, and national defense applications. Data delivery time and competition from the French remote sensing system are considered. M.G.

N83-17942*# Purdue Univ., Lafayette, Ind. Lab. for Applications of Remote Sensing.
CORSE-81: THE 1981 CONFERENCE ON REMOTE SENSING EDUCATION
S. M. DAVIS, comp. 1981 375 p refs Conf. held in Lafayette, Ind., 18-22 May 1981 Sponsored by NASA and NOAA Origninal contains imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls, S.D. 57198 ERTS
(E83-10179; NASA-CP-2197; NAS 1.55:2197) Avail: NTIS HC A16/MF A01 CSCL 05I

Summaries of the presentations and tutorial workshops addressing various strategies in remote sensing education are presented. Course design from different discipline perspectives, equipment requirements for image interpretation and processing, and the role of universities, private industry, and government agencies in the education process are covered.

N83-17990*# OAO Corp., Greenbelt, Md.
EVALUATION OF THE USER REQUIREMENTS PROCESSES FOR NASA TERRESTRIAL APPLICATIONS PROGRAMS
31 Jan. 1982 87 p ERTS
(Contract NASW-3358)
(E83-10180; NASA-CR-169835; NAS 1.26:169835) Avail: NTIS HC A05/MF A01 CSCL 05B

To support the evolution of increasingly sound user requirements definition processes that would meet the broad range of NASA's terrestrial applications planning and management needs during the 1980's, the user requirements processes as they function in the real world at the senior and middle management levels were evaluated. Special attention was given to geologic mapping and domestic crop reporting to provide insight into problems associated with the development and management of user established conventional practices and data sources. An attempt was made to identify alternative NASA user interfaces that sustain strengths, alleviate weaknesses, maximize application to multiple problems, and simplify management cognizance. Some of the alternatives are outlined and evaluated. It is recommended that NASA have an identified organizational point of focus for consolidation and oversight of the user processes. A.R.H.

N83-17991*# OAO Corp., Greenbelt, Md.
ANALYSIS OF THE PRIVATE MARKET FOR LANDSAT PRODUCTS AND APPLICATIONS Final Report
31 Mar. 1981 131 p ERTS
(Contract NASW-3358)
(E83-10181; NASA-CR-169836; NAS 1.26:169836; OAO/TR-81/0023) Avail: NTIS HC A07/MF A01 CSCL 05B

The private sector was examined and evaluated to develop base line strategies and mechanisms for its increased utilization of LANDSAT (and future satellite) technologies as both consumer and producer of products and services. Methodologies used to assess the digital analysis service and national mapping industries are described. Private sector users in business and industry are identified and the potential U.S. industry role in the foreign LANDSAT market is considered. A.R.H.

N83-18615# Centre National d'Etudes Spatiales, Toulouse (France).
FRENCH SPACE PROGRAMS [PROGRAMME SPATIAL FRANCAIS]
1982 220 p refs in FRENCH; ENGISH summary Presented at 24th COSPAR Plenary Meeting, Ottawa 17 May - 2 Jun. 1982 Prepared in cooperation with Comite National Francais de Recherche dans l'Espace
Avail: NTIS HC A10/MF A01

Various activities of French space programs are discussed. Astronomy, solar physics, Earth resources, geodesy, Earth atmosphere, and the solar system are among the topics discussed. R.J.F.

N83-19141*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
SECOND EASTERN REGIONAL REMOTE SENSING APPLICATIONS CONFERENCE
M. L. IMHOFF, ed., R. G. WITT, ed., and D. KUGELMANN, ed. 1981 398 p refs Conf. held in Danvers, Mass., 9-11 Mar. 1981 Original contains imagery. Original photography may be purchased from the EROS Data Center, Sioux Falls, S.D. 57198. ERTS
(E83-10189; NASA-CP-2198; NAS 1.55:2198) Avail: NTIS HC A17/MF A01 CSCL 05B

Participants from state and local governments share experiences in remote sensing applications with one another and with users in the Federal government, universities, and the private sector during technical sessions and forums covering agriculture and forestry; land cover analysis and planning; surface mining and energy; data processing; water quality and the coastal zone; geographic information systems; and user development programs.

N83-19144*# National Conference of State Legislatures, Denver, Colo.
STATE INVOLVEMENT IN AND USE OF LANDSAT TECHNOLOGY
P. A. TESSAR *In* NASA. Goddard Space Flight Center 2nd Eastern Reg. Remote Sensing Appl. Conf. p 13-42 1981 ERTS
Avail: NTIS HC A17/MF A01 CSCL 05B

The background of state involvement in LANDSAT systems planning and the status of state LANDSAT use are reviewed. Major recommendations on data continuity; frequency and pattern of observation; state representation in program management; pointable sensors for a fully operational system; data processing systems; data pricing; data copyright; data archival; and technology transfer are highlighted. Plans of the government regarding the LANDSAT system are reflected in the FY-1982 budget process are examined. A.R.H.

N83-19184# Instituto de Pesquisas Espaciais, Sao Jose dos Campos (Brazil).
A BRIEF DESCRIPTION OF THE CURRENT STATUS AND FUTURE PLANS OF THE BRAZILIAN APPLICATION SATELLITE PROGRAM
N. D. PARADA Feb. 1983 19 p Presented at the 1st Intergovt. Meeting of Space Technol. Experts, New York, 4-5 Feb. 1983
(INPE-2636-PRE/260) Avail: NTIS HC A02/MF A01

The application satellite programs (remote sensing, meteorology and communications) their status and plans are analyzed. Based on the gained experience and on the available information, some aspects which are of great importance for the user countries, are discussed. S.L.

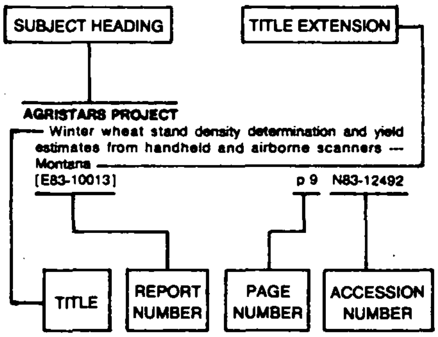
N83-19192# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany).
STATE OF DEVELOPMENT OF TERRESTRIAL RECONNAISSANCE SATELLITES AND SHUTTLE SYSTEM [STAND DER ENTWICKLUNGEN VON ERDERKUNDUNGSSATELLITEN UND SHUTTLE-SYSTEMEN]
M. SCHROEDER *In* Deut. Ges. fuer Photogrammetrie und Fernerkundung e.V. High altitude Reconnaissance: Obtention of Data and Machines Involved 46 p Jul. 1982 refs In GERMAN
Avail: NTIS HC A04/MF A01
Progress in the development of satellite and space shuttles is reported. History and background of satellite remote sensing is presented. The use of satellites in weather forecasting, night remote sensing, topographic and thematic mapping is outlined. Satellite information reception stations on all continents which are all connected by distribution networks are mentioned. The designated elements in remote sensing for the near future are outlined: outfitting of LANDSAT-D with optical recording systems, outfitting of SPOT satellites with optical equipment, and at the end of the decade installation of radar payloads on ERS-1 satellites. Short term missions by Shuttle and spacelab to test new technologies and demonstrate new application possibilities are considered.
Transl. by E.A.K.

N83-21443*# National Aeronautics and Space Administration, Washington, D. C.
NASA'S EARTH RESOURCES PROGRAM: FUTURE OUTLOOK
W. L. PIOTROWSKI *In* NASA. Goddard Space Flight Center Eastern Reg. Remote Sensing Appl. Conf. p 197-208 Jan. 1981 ERTS
Avail: NTIS HC A11/MF A01 CSCL 05A
NASA's research and development strategies for future Earth resources systems are outlined. The development of the multilinear array sensor technology, STEREOSAT, future satellites in the LANDSAT series, the Shuttle Imaging Radar, the Operational Earth Resources System, and Spacelab payloads are addressed. M.G.

N83-21473*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
LANDSAT-D MISSION OPERATIONS REVIEW (MOR)
1982 276 p Review held at Goddard Space Flight Center, Greenbelt, Md., 6-7 Apr. 1982 ERTS
(E83-10232; NASA-TM-85270; NAS 1.15:85270) Avail: NTIS HC A13/MF A01 CSCL 05A
The integrated LANDSAT-D systems operation plan is presented and discussed with respect to functional elements, personnel, and procedures. Specifically, a review of the LANDSAT-D program, mission requirements and management, and flight operations is given. M.G.

N83-21474*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
LANDSAT-D MISSION OPERATIONS REVIEW (MOR)
1982 254 p Review held at Goddard Space Flight Center, Greenbelt, Md., 6-7 Apr. 1982 ERTS
(E83-10233; NASA-TM-85271; NAS 1.15:85271) Avail: NTIS HC A12/MF A01 CSCL 05A
Portions of the LANDSAT-D systems operation plan are presented. An overview of the data processing operations, logistics and other operations support, prelaunch and post-launch activities, thematic mapper operations during the scrounge period, and LANDSAT-D performance evaluation is given. M.G.

Typical Subject Index Listing



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S U B J E C T

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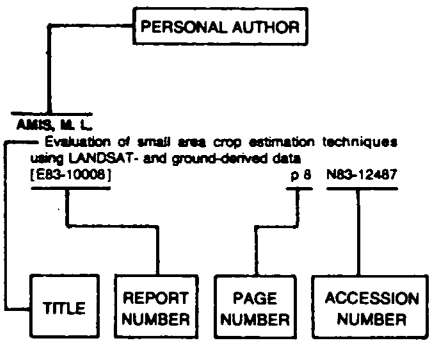

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A

AUTHOR

B

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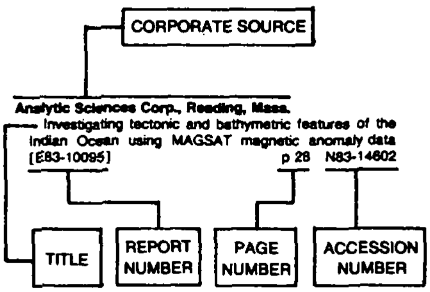
Typical Corporate Source Index Listing



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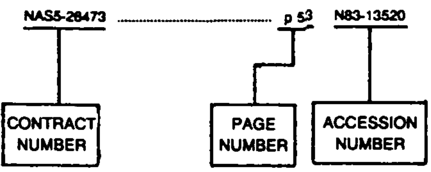
CONTRACT NUMBER INDEX

Typical Contract Number Index Listing



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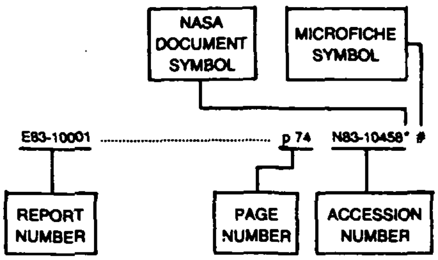
Typical Report/Accession Number Index Listing



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REPORT

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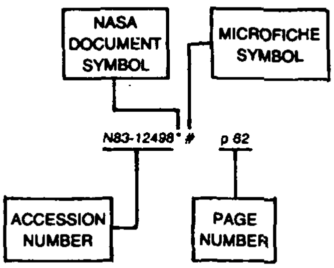

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16. Abstract

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