NASA SP-7041 (03)

EARTH RESOURCES

A CONTINUING BIBLIOGRAPHY WITH INDEXES

ISSUE 3

MAY 1975

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

PREVIOUS EARTH RESOURCE BIBLIOGRAPHIES

Remote Sensing of Earth Resources (NASA SP-7036)

Remote Sensing of Earth Resources (NASA SP-7036(01))

Earth Resources (NASA SP-7041(01))

Earth Resources (NASA SP-7041(02))

This bibliography was prepared by the NASA Scientific and Technical Information Facility operated for the National Aeronautics and Space Administration by Informatics Information Systems Company.

NASA SP-7041 (03)

EARTH RESOURCES

A Continuing Bibliography
With Indexes
Issue 3

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 July 1974 and September 1974 in:

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

Scientific and Technical Information Office
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
MAY 1975
Washington, D.C.

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 instrumentation on orbiting spacecraft or on aircraft.

This literature survey lists 472 reports, articles, and other documents announced between July and September 1974 in *Scientific and Technical Aerospace Reports (STAR)*, and *International Aerospace Abstracts (IAA)*.

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

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

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

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

IAA entries identified by accession number series A74-10,000 in ascending accession number order.

STAR entries identified by accession number series N74-10,000 in ascending accession number order;

After the abstract section, there are five indexes:

subject, personal author, corporate source, contract number and report/accession number.

AVAILABILITY OF CITED PUBLICATIONS

IAA ACCESSIONS (N74-10000 Series)

Publications announced in *IAA*, that are cited in this publication, are available from the Technical Information Service, American Institute of Aeronautics and Astronautics, Inc. (AIAA) as follows:

Paper copies are available at $5.00 per document up to a maximum of 20 pages. The charge for each additional page is 25 cents. Microfiche [1] are available at the rate of $1.50 per microfiche for documents identified by the "#" symbol following the accession number. A number of publications, because of their special characteristics, are available only for reference in the AIAA Technical Information Service Library. Minimum airmail postage to foreign countries is $1.00. Please refer to the accession number, e.g. A74-10763, when requesting publications.

STAR ACCESSIONS (N74-10000 Series)

Publications announced in *STAR*, that are cited in this publication, are available as indicated by the availability line in the citation. The most commonly indicated sources and their acronyms or abbreviations are listed below. The mailing addresses of these organizations are listed on page vi.

Avail: NTIS. Sold by the National Technical Information Service to U.S. customers at the price shown in the citation following the letters HC (hard, paper, or facsimile copy). Customers outside the U.S. should add $2.50 per copy for handling and postage charges to the price shown. (Prices shown in earlier *STAR* volumes, 1962-1974, have been superseded but may be calculated from the number of pages shown in the citation. The price schedule by page count was given in the last *STAR* issue of 1974 or may be obtained from NTIS.)

Microfiche[1] is available at a standard price of $2.25 (plus $1.50 for non-U.S. customers) regardless of age for those accessions followed by a "#" symbol. Accession numbers followed by a "+" sign are not available as microfiche because of size or reproducibility.

Initially distributed microfiche under the NTIS SRIM (Selected Research in Microfiche) is available at greatly reduced unit prices. For this service and for information concerning subscription to NASA printed reports, consult the NTIS Subscription Unit.

NOTE ON ORDERING DOCUMENTS: When ordering NASA publications (those followed by the "*" symbol), use the N accession number.

NASA patent applications (only the specifications are offered) should be ordered by the US-Patent-Appl-SN number.

Non-NASA publications (no asterisk) should be ordered by the AD, PB, or other *report* number shown on the last line of the citation, not by the N accession number. It is also advisable to cite the title and other bibliographic identification.

Avail: SOD (or GPO). Sold by the Superintendent of Documents, U.S. Government Printing Office, in hard copy. The current price and order number are given following the availability line. (NTIS will fill microfiche requests, at the standard $2.25 price, for those documents identified by a "#" symbol.)

(1) A microfiche is a transparent sheet of film, 105 by 148mm in size containing as many as 60 to 98 pages of information reduced to micro images (Not to exceed 26: 1 reduction).

Avail: NASA Public Document Rooms. Documents so indicated may be examined at or purchased from the National Aeronautics and Space Administration, Public Documents Room (Room 126), 600 Independence Ave., S.W., Washington, D.C. 20546, or public document rooms located at each of the NASA research centers, the NASA Space Technology Laboratories, and the NASA Pasadena Office at the Jet Propulsion Laboratory.

Avail: ERDA Depository Libraries. Organizations in U.S. cities and abroad that maintain collections of Energy Research and Development Administration reports, usually in microfiche form, are listed in *Nuclear Science Abstracts*. Services available from the ERDA and its depositories are described in a booklet, *Science Information Available from the Energy Research and Devopment Administration* (TID-4550), which may be obtained without charge from the ERDA Technical Information Center.

Avail: Univ. Microfilms. Documents so indicated are dissertations selected from *Dissertation Abstracts* and are sold by University Microfilms as xerographic copy (HC) at $10.00 each and microfilm at $4.00 each regardless of the length of the manuscript. Handling and shipping charges are additional. All requests should cite the author and the Order Number as they appear in the citation.

Avail: USGS. Originals of many reports from the U.S. Geological Survey, which may contain color illustrations, or otherwise may not have the quality of illustrations preserved in the microfiche or facsimile reproduction, may be examined by the public at the libraries of the USGS field offices whose addresses are listed in this Introduction. The libraries may be queried concerning the availability of specific documents and the possible utilization of local copying services, such as color reproduction.

Avail: HMSO. Publications of Her Majesty's Stationery Office are sold in the U.S. by Pendragon House, Inc. (PHI), Redwood City, California. The U.S. price (including a service and mailing charge) is given, or a conversion table may be obtained from PHI.

Avail: BLL (formerly NLL): British Library Lending Division, Boston Spa, Wetherby, Yorkshire, England. Photocopies available from this organization at the price shown. (If none is given, inquiry should be addressed to the BLL.)

Avail: ZLDI. Sold by the Zentralstelle für Luftfahrtdokumentation und -Information, Munich, Federal Republic of Germany, at the price shown in deutschmarks (DM).

Avail: Issuing Activity, or Corporate Author, or no indication of availability. Inquiries as to the availability of these documents should be addressed to the organization shown in the citation as the corporate author of the document.

Avail: U.S. Patent Office. Sold by Commissioner of Patents, U.S. Patent Office, at the standard price of 50 cents each, postage free.

Other availabilities: If the publication is available from a source other than the above, the publisher and his address will be displayed entirely on the availability line or in combination with the corporate author line.

ADDRESSES OF ORGANIZATIONS

American Institute of Aeronautics
and Astronautics
Technical Information Service
750 Third Ave.
New York, N.Y. 10017

British Library Lending Division,
Boston Spa, Wetherby, Yorkshire,
England

Commissioner of Patents
U.S. Patent Office
Washington, D.C. 20231

Energy Research and Development
Administration
Technical Information Center
P.O. Box 62
Oak Ridge, Tennessee 37830

ESRO/ELDO Space Documentation Service
European Space Research Organization
114, av. Charles de Gaulle
92200 Neuilly-sur-Seine, France.

Her Majesty's Stationery Office
P.O. Box 569, S.E. 1
London, England

NASA Scientific and Technical Information
Facility
P.O. Box 8757
B.W.I. Airport, Maryland 21240

National Aeronautics and Space
Administration
Scientific and Technical Information
Office (KSI)
Washington, D.C. 20546

National Technical Information Service
Springfield, Virginia 22161

Pendragon House, Inc.
899 Broadway Avenue
Redwood City, California 94063

Superintendent of Documents
U.S. Government Printing Office
Washington, D.C. 20402

University Microfilms
A Xerox Company
300 North Zeeb Road
Ann Arbor, Michigan 48106

University Microfilms, Ltd.
Tylers Green
London, England

U.S. Geological Survey
1033 General Services Administration Bldg.
Washington, D.C. 20242

U.S. Geological Survey
601 E. Cedar Avenue
Flagstaff, Arizona 86002

U.S. Geological Survey
345 Middlefield Road
Menlo Park, California 94025

U.S. Geological Survey
Bldg. 25, Denver Federal Center
Denver, Colorado 80225

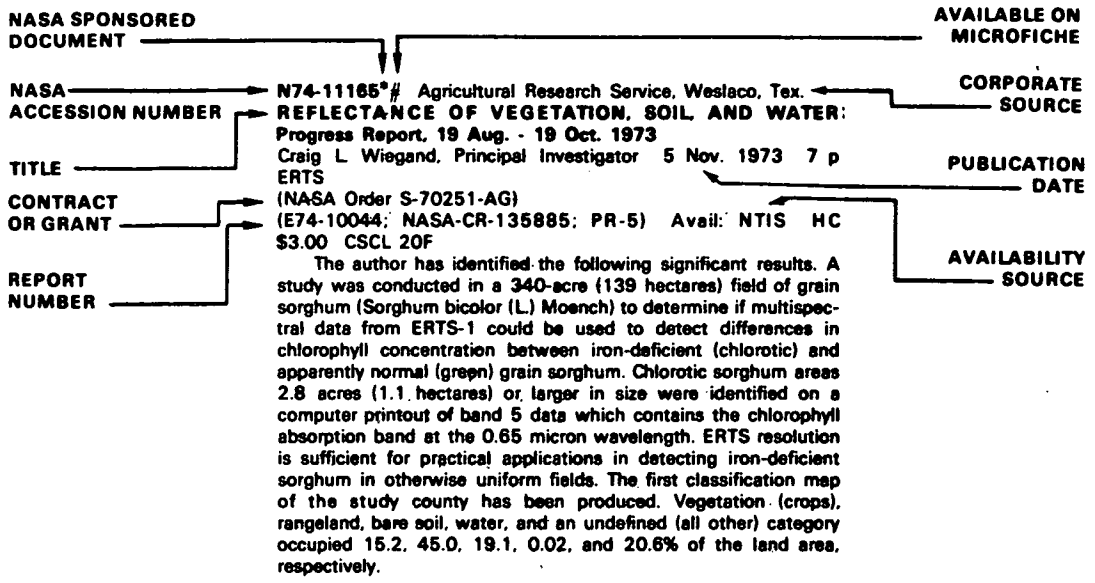
Zentralstelle für Luftfahrtdoku-
mentation und -Information
8 München 86
Postfach 880
Federal Republic of Germany

TABLE OF CONTENTS

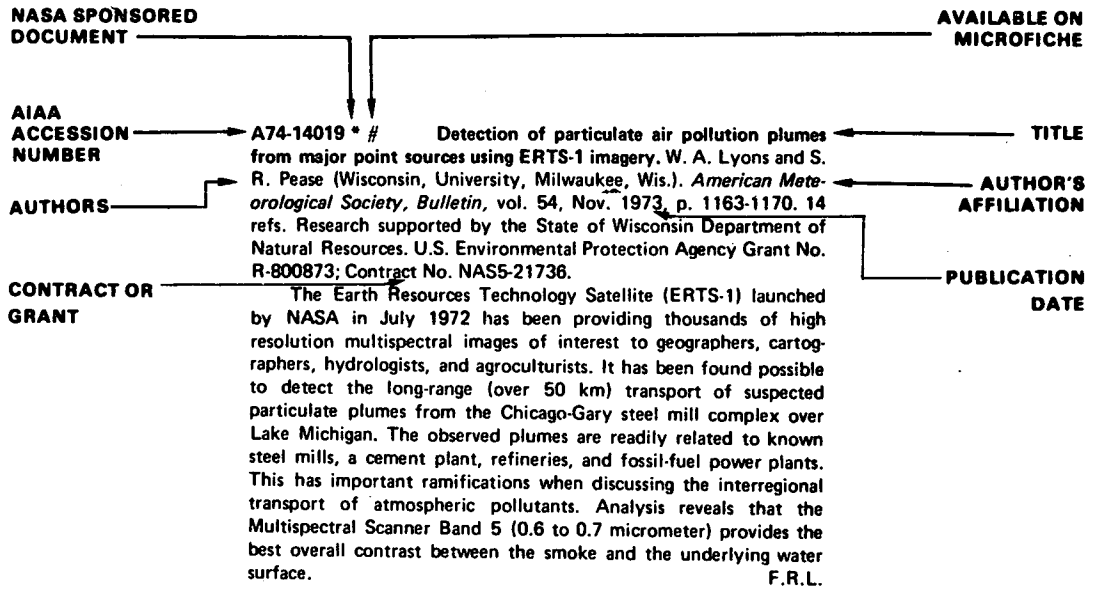
Subject Categories

Abstracts in the bibliography are grouped under the following categories: **page**

TYPICAL CITATION AND ABSTRACT FROM *STAR*



TYPICAL CITATION AND ABSTRACT FROM *IAA*



NASA

EARTH RESOURCES

A Continuing Bibliography (Issue 3)

MAY 1975

01
AGRICULTURE AND FOREST

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

A74-28935 **The radar backscatter from selected agricultural crops.** G. P. de Loor, A. A. Jurriiens, and H. Gravesteijn (Centrale Organisatie TNO, Physisch Laboratorium RVO-TNO, The Hague, Netherlands). *IEEE Transactions on Geoscience Electronics*, vol. GE-12, Apr. 1974, p. 70-77. 8 refs.

To study the possible use of the radar backscatter coefficient for purposes of vegetation inventory a series of measurements was undertaken on radar ground returns. Single vegetation species were studied. Use was made of stable platforms (television towers) with the radar at an altitude of 75 m above the terrain. The influence of weather and season was investigated. It was shown that a single vegetation type behaves as a Rayleigh scatterer. The radar backscatter coefficient as a function of frequency and polarization proves to be the only usable classifier to classify vegetations with the aid of radar. (Author)

A74-29004 # **Remote sensing of biosphere from space.** B. V. Vinogradov. *International Astronautical Federation, International Astronautical Congress, 24th, Baku, Azerbaidzhan SSR, Oct. 7-13, 1973, Paper.* 32 p. 20 refs.

Some findings of applications of space techniques in biospheric studies are discussed as part of a program of comprehensive subsatellite investigations. The studies deal with optical generalization of the earth surface features when forming a super-small-scale space imagery, selection of optimum spectral ranges for multispectral space survey of agricultural lands, and renewal of small scale maps of vegetation of the world physicogeographical atlas. Attention is also given to studies of the farming organization, observation of the composition and status of farming crops, observation of pasture lands and evaluation of plant productivity, and observation of soil moisture. F.R.L.

A74-29046 **Clutter return from vegetated areas.** S. Rosenbaum (Technion - Israel Institute of Technology, Haifa, Israel) and L. W. Bowles (MIT, Lexington, Mass.). *IEEE Transactions on Antennas and Propagation*, vol. AP-22, Mar. 1974, p. 227-236. 9 refs. USAF-supported research.

An analytical stochastic model to predict relevant statistical scattering features of electromagnetic waves propagating within vegetated environments is presented. The propagation phenomena are described by formulating the scattering associated with random permittivity fluctuations superimposed on a lossy deterministic background slab. The distorted-wave Born approximation is employed to determine the backscattered power and its temporal spectrum. (Author)

A74-29050 * **Radar measurement of soil moisture content.** F. T. Ulaby (University of Kansas Center for Research, Inc., Lawrence, Kan.). *IEEE Transactions on Antennas and Propagation*, vol. AP-22, Mar. 1974, p. 257-265. 21 refs. Contract No. NAS9-10261; Grant No. DAAK02-68-C-0089.

The effect of soil moisture on the radar backscattering coefficient was investigated by measuring the 4- to 8-GHz spectral response from two types of bare-soil fields: slightly rough and very rough, in terms of the wavelength. An FM-CW radar system mounted atop a 75-ft truck-mounted boom was used to measure the return at ten frequency points across the 4- to 8-GHz band, at eight different look angles (0 through 70 deg), and for all polarization combinations. A total of 17 sets of data were collected covering the range from 4 to 36% soil moisture content by weight. The results indicate that the radar response to soil moisture content is highly dependent on the surface roughness, microwave frequency, and look angle. The response seems to be linear, however, over the range from 15 to 30% moisture content for all angles, frequencies, polarizations and surface conditions. (Author)

A74-30530 **Comparison of four independent soil surveys by air-photo interpretation, Paphos area /Cyprus/.** S. W. Bie and P. H. T. Beckett (Oxford University, Oxford, England). *Photogrammetria*, vol. 29, Dec. 1973, p. 189-202. 18 refs. Research supported by the Norwegian Agency for International Development.

A74-30795 * **Seasonal canopy reflectance patterns of wheat, sorghum, and soybean.** E. T. Kanemasu (Kansas State University, Manhattan, Kan.). *Remote Sensing of Environment*, vol. 3, no. 1, 1974, p. 43-47. NASA-supported research.

An investigation was conducted of canopy-reflectance patterns as a basis for the determination of surface conditions. Two fields each of wheat, sorghum, and soybeans were selected in a bottom land area. One field contained a dark-colored, silty clay loam and the other a light-colored, silt loam. The study suggests that the reflectance ratio of the 545- to 655-nm-wavelengths may be used as an indicator of crop growth. G.R.

A74-33069 **Forest insect damage from high-altitude color-IR photos.** W. M. Ciesla (U.S. Forest Service, Missoula, Mont.). *Photogrammetric Engineering*, vol. 40, June 1974, p. 683-687, 689. 12 refs.

ERTS-1 underflight photos in color infrared taken from a U-2 were evaluated for their capability to resolve forest insect damage. Defoliation caused by pine butterfly was well detected using this method. The photos were only partially effective in registering stands suffering heavy tree mortality due to bark-beetle infestations and were not capable of registering defoliation of current year's foliage caused by western spruce budworm. Image enhancement or densitometer scanning of infested and uninfested stands may prove effective in detecting and mapping these types of damage. P.T.H.

N74-21971*# Earth Satellite Corp., Berkeley, Calif.
EVALUATION OF USEFULNESS OF SKYLAB EREP S-190 AND S-192 IMAGERY IN MULTISTAGE FOREST SURVEYS Progress Report, 1 Oct. 1973 - 31 Mar. 1974
Philip G. Langley, Principal Investigator 31 Mar. 1974 11 p EREP
(Contract NAS9-13289)
(E74-10446; NASA-CR-137435; PR-6) Avail: NTIS HC $4.00 CSCL 02F

The author has identified the following significant results. The digital timber volume prediction system was tested with another test area in the Trinity Alps. The estimated gain in precision was somewhat lower than the estimate for the first test area (35%). A combined interpretation of the two areas was made, yielding an estimated gain of 44%, with high statistical significance. This interpretation was used to calibrate the system for an interpretation of 43 primary sample units distributed over 1600 square miles. Preliminary results indicate that a gain of 35% can be realized over this large area in northern California.

N74-21998*# Purdue Univ., Lafayette, Ind. Lab. for Applications of Remote Sensing.
EVALUATION AND COMPARISON OF ERTS MEASUREMENTS OF MAJOR CROPS AND SOIL ASSOCIATIONS FOR SELECTED TEST SITES IN THE CENTRAL UNITED STATES Final Report, 1 Jul. 1972 - 19 Feb. 1974
Marion F. Baumgardner, Principal investigator 19 Mar. 1974 174 p refs Original contains imagery. Original photography may be purchased from the EROS Data Center, 10th and Dakota Avenue, Sioux Falls, S. D. 57198 ERTS
(Contract NAS5-21785)
(E74-10474; NASA-CR-136875) Avail: NTIS HC $11.75 CSCL 02C

The author has identified the following significant results. Multispectral scanner data obtained by ERTS-1 over six test sites in the Central United States were analyzed and interpreted. ERTS-1 data for some of the test sites were geometrically corrected and temporally overlayed. Computer-implemented pattern recognition techniques were used in the analysis of all multispectral data. These techniques were used to evaluate ERTS-1 data as a tool for soil survey. Geology maps and land use inventories were prepared by digital analysis of multispectral data. Identification and mapping of crop species and rangelands were achieved throught the analysis of 1972 and 1973 ERTS-1 data. Multiple dates of ERTS-1 data were examined to determine the variation with time of the areal extent of surface water resources on the Southern Great Plain.

N74-22001*# Michigan State Univ., East Lansing.
INVESTIGATION OF SKYLAB DATA Monthly Plans and Progress Report, Mar. 1974
Lester V. Manderscheid, Principal Investigator Mar. 1974 2 p EREP
(Contract NAS9-13332)
(E74-10477; NASA-CR-136878) Avail: NTIS HC $4.00 CSCL 05B

There are no author-identified significant results in this report.

N74-22010*# South Dakota State Univ., Brookings. Remote Sensing Inst.
[DEVELOP TECHNIQUES AND PROCEDURES, USING MULTISPECTRAL SYSTEMS, TO IDENTIFY FROM REMOTELY SENSED DATA THE PHYSICAL AND THERMAL CHARACTERISTICS OF PLANTS AND SOIL] Monthly Report, period ending 1 Apr. 1974
Victor I. Myers, Principal Investigator 1 Apr. 1974 2 p EREP
(Contract NAS9-13337)
(E74-10486; NASA-CR-136887) Avail: NTIS HC $4.00 CSCL 08F

There are no author-identified significant results in this report.

N74-22012*# Bureau of Sport Fisheries and Wildlife, Jamestown, N. Dak. Northern Prairie Wildlife Research Center.
UTILIZATION OF SKYLAB (EREP) SYSTEM FOR APPRAISING CHANGES IN CONTINENTAL MIGRATORY BIRD HABITAT Monthly Progress Report, Apr. 1974
Harvey K. Nelson, Principal Investigators Apr. 1974 2 p EREP
(NASA Order T-4114-B)
(E74-10488; NASA-CR-136889) Avail: NTIS HC $4.00 CSCL 06C

There are no author-identified significant results in this report.

N74-22015*# California Univ., Berkeley. Remote Sensing Research Program.
AGRICULTURAL INTERPRETATION TECHNIQUE DEVELOPMENT Quarterly Progress Report
Robert N. Colwell, Andrew S. Benson, Principal Investigators, Catherine E. Brown, Claire M. Hay, and Nancy A. Jones 28 Feb. 1974 14 p Original contains color illustrations EREP
(Contract NAS2-7567)
(E74-10491; NASA-CR-136892) Avail: NTIS HC $4.00 CSCL 02C

There are no author-identified significant results in this report.

N74-22017*# Wyoming Univ., Laramie. Dept. of Geology.
RANGE VEGETATION TYPE MAPPING AND ABOVE-GROUND GREEN BIOMASS ESTIMATIONS USING MULTISPECTRAL IMAGERY Special Report
Robert S. Houston, Principal Investigator and Robert C. Gordon 20 Apr. 1974 17 p refs Original contains imagery. Original photography may be purchased from the EROS Data Center, 10th and Dakota Avenue, Sioux Falls, S. D. 57198 ERTS
(Contract NAS5-21799)
(E74-10493; NASA-CR-136894) Avail: NTIS HC $4.00 CSCL 08B

The author has identified the following significant results. Range vegetation types have been successfully mapped on a portion of the 68,000 acre study site located west of Baggs, Wyoming, using ERTS-1 imagery. These types have been ascertained from field transects over a five year period. Comparable studies will be made with EREP imagery. Above-ground biomass estimation studies are being conducted utilizing double sampling techniques on two similar study sites. Information obtained will be correlated with percent relative reflectance measurements obtained on the ground which will be related to image brightness levels. This will provide an estimate of above-ground green biomass with multispectral imagery.

N74-22019* California Univ., Berkeley. Space Sciences Lab.
SKYLAB DATA AS AN AID TO RESOURCE MANAGEMENT IN NORTHERN CALIFORNIA
Robert N. Colwell, James D. Nichols, Principal Investigators, Michael J. Gialdini, and Sharon L. Wall *In its* An Integrated

Study of Earth Resources in the State of the Calif. Based on Skylab and Supporting Aircraft Data 28 Feb. 1974 3 p EREP

CSCL 08F

There are no author-identified significant results in this report.

N74-22023*# Department of Agriculture, Washington, D.C. Statistical Reporting Service.

CROP IDENTIFICATION AND ACREAGE MEASUREMENT UTILIZING ERTS IMAGERY Progress Report, 20 Feb. - 19 Apr. 1974

Donald H. VonSteen, Principal Investigator 19 Apr. 1974 36 p ERTS

(NASA Order S-70251-AG-3)

(E74-10500; NASA-CR-136905) Avail: NTIS HC $5.00 CSCL 02C

There are no author-identified significant results in this report.

N74-22024*# California Univ., Riverside. Citrus Research Center/Agricultural Experiment Station.

EVALUATION OF REMOTE SENSING IN CONTROL OF PINK BOLLWORM IN COTTON Final Report, Jul. 1972 - Oct. 1973

Lowell N. Lewis, Principal Investigator, Virginia B. Coleman, and Claude W. Johnson 31 Mar. 1974 42 p refs Original contains color imagery. Original photography may be purchased from the EROS Data Center, 10th and Dakota Avenue, Sioux Falls, S. D. 57198 ERTS

(Contract NAS5-21771)

(E74-10503; NASA-CR-136910) Avail: NTIS HC $5.25 CSCL 02C

The author has identified the following significant results. This investigation is to evaluate the use of a satellite in monitoring the cotton production regulation program of the State of California as an aid in controlling pink bollworm infestation in the southern deserts of California. Color combined images of ERTS-1 multispectral images simulating color infrared are being used for crop identification. The status of each field (crop, bare, harvested, wet, plowed) is mapped from the imagery and is then compared to ground survey information taken at the time of ERTS-1 overflights. A computer analysis has been performed to compare field and satellite data to a crop calendar. Correlation to date has been 97% for field condition. Actual crop identification varies; cotton identification is only 63% due to lack of full season coverage.

N74-22032*# Kansas Univ. Center for Research, Inc., Lawrence. Technology Applications Lab.

THE USE OF HIGH ALTITUDE AERIAL PHOTOGRAPHY TO INVENTORY WILDLIFE HABITAT IN KANSAS: AN INITIAL EVALUATION

James W. Merchant and Bruce H. Waddell (Kansas Forestry, Fish and Game Comm.) Mar. 1974 36 p refs Original contains color illustrations

(Grant NGL-17-004-024)

(TR-2230-14-1) Avail: NTIS HC $5.00 CSCL 02E

The use of aerial photography as a method for determining the wildlife conditions of an area is discussed. Color infrared photography is investigated as the most effective type of remote sensor. The characteristics of the remote sensing systems are described. Examples of the remote sensing operation and the method for reducing the data are presented. Author

N74-22046*# Environmental Research Inst. of Michigan, Ann Arbor. Infrared and Optics Div.

OPTICAL MODELING OF AGRICULTURAL FIELDS AND ROUGH-TEXTURED ROCK AND MINERAL SURFACES

G. H. Suits, R. K. Vincent, H. M. Horwitz, and J. D. Erickson Nov. 1973 46 p refs

(Contract NAS9-9784)

(NASA-CR-134243; ERIM-31650-78-T) Avail: NTIS HC $5.50 CSCL 02C

Review was made of past models for describing the reflectance and/or emittance properties of agricultural/forestry and geological targets in an effort to select the best theoretical models. An extension of the six parameter Allen-Gayle-Richardson model was chosen as the agricultural plant canopy model. The model is used to predict the bidirectional reflectance of a field crop from known laboratory spectra of crop components and approximate plant geometry. The selected geological model is based on Mie theory and radiative transfer equations, and will assess the effect of textural variations of the spectral emittance of natural rock surfaces. Author

N74-22050*# Environmental Research Inst. of Michigan, Ann Arbor.

WHEAT CLASSIFICATION EXERCISE, USING 11 JUNE 1973, ERTS MSS DATA FOR FAYETTE COUNTY, ILLINOIS (FOR CITARS TASK)

William A. Malila, Ross H. Hieber, Daniel P. Rice, and Jane E. Sarno 26 Sep. 1973 20 p refs

(Contract NAS9-9784)

(NASA-CR-134253; TM-190100-21-R) Avail: NTIS HC $4.00 CSCL 02C

The prime emphasis was on classification of pixels in field centers, away from boundary effects. Results were encouraging in both training and test field centers for wheat and other major types of vegetation present. However, the location of fields was found to be a serious problem and it was even more difficult to select field-center pixels for fields of sizes less than 20 acres (or even larger, depending upon field shape) for use in the field-center analysis. The majority of fields in the segment are less than 20 acres in size. ERTS-1 data were received on 12 September 1973. Ground truth information and aerial photography were received on 9 and 15 September. The data were analyzed and processed digitally using the ERIM multispectral software system. Author

N74-22053*# Lockheed Electronics Co., Houston, Tex. Aerospace Systems Div.

QUALITY OF SIGNATURES Final Report

Edwin P. F. Kan Apr. 1974 18 p

(Contract NAS9-12200)

(NASA-CR-134263; LEC-3175) Avail: NTIS HC $4.00 CSCL 05B

Three conclusions are drawn on the usability, inherent variations, and noise aspects of the spectral signatures processed from data collected by the Field Signature Acquisition System (FSAS). Conclusions are based on the spectral data collected from winter wheat of the 1972/73 season, grown at Texas A and M University, College Station, Texas. Author

N74-22770# Earth Satellite Corp., Washington, D.C.

AN ANALYSIS OF THE BENEFITS AND COSTS OF AN IMPROVED CROP ACREAGE FORECASTING SYSTEM UTILIZING EARTH RESOURCES SATELLITE OR AIRCRAFT INFORMATION

William Vogely 16 Nov. 1973 144 p refs

(Contract DI-14-08-001-13519)

(PB-227361/3; USGS-DO-74-002) Avail: NTIS HC $4.75 CSCL 02D

The broad area of agricultural production was selected for the first case study based on the magnitude of potential benefits and the results of early ERTS-1 experiments. Within the area of agricultural production the case study focused on crop acreage

forecasting. Compared to the USDA statistical sampling system, one based on satellite imagery would have a substantially larger number of samples, would permit substitution of cloud covered samples, and would have daily update. In the absence of estimates of overall accuracy of ERS crop acreage estimates, benefits were estimated as a function of error over a range of improvements. Inventory adjustment benefit estimates were made using a previously developed model. Estimated benefits are expected to be more equally distributed across different regions and income classes than is current income. Minimal social and environmental impacts were identified. GRA

N74-22949*# California State Office of Science and Technology, Sacramento.
USE OF ERTS-A, SKYLAB, AND SUPPORTING AIRCRAFT TO ENHANCE RESOURCE MANAGEMENT Final Report
A. Earl Davis, David H. Adams, Barry Brown, Edward D. Ehlers, Gilbert W. Fraga, W. Ward Henderson, John W. Heslep, Gordon F. Snow, and Paul L. Clifton, Principal Investigators 30 Nov. 1973 17 p ERTS
(Contract NAS5-21832)
(E74-10498; NASA-CR-136903) Avail: NTIS HC $4.00 CSCL 08B

There are no author-identified significant results in this report.

N74-22953*# Lockheed Electronics Co., Houston, Tex. Aerospace Systems Div.
SKYLAB S192 DATA EVALUATION: COMPARISONS WITH ERTS-1 RESULTS
C. Y. Chang Jan. 1974 58 p ref Original contains imagery. Original photography may be purchased from the EROS Data Center, 10th and Dakota Avenue, Sioux Falls, S. D. 57198 EREP
(Contract NAS9-12200)
(E74-10506; NASA-CR-134246; LEC-1711) Avail: NTIS HC $6.00 CSCL 05B

The author has identified the following significant results. The Skylab S192 data was evaluated by: (1) comparing the classification results using S192 and ERTS-1 data over the Holt County, Nebraska agricultural study area, and (2) investigating the impact of signal-to-noise ratio on classification accuracies using registered S192 and ERTS-1 data. Results indicate: (1) The classification accuracy obtained on S192 data using its best subset of four bands can be expected to be as high as that on ERTS-1 data. (2) When a subset of four S192 bands that are spectrally similar to the ERTS-1 bands was used for classification, an obvious deterioration in the classification accuracy was observed with respect to the ERTS-1 results. (3) The thermal bands 13 and 14 as well as the near IR bands were found to be relatively important in the classification of agricultural data. Although bands 11 and 12 were highly correlated, both were invariably included in the best subsets of the band sizes, four and beyond, according to the divergence criterion. (4) The differentiation of corn from popcorn was difficult on both S192 and ERTS-1 data acquired at an early summer date. (5) The results on both sets of data indicate that it was relatively easy to differentiate grass from any other class.

N74-22962*# Michigan Univ., Ann Arbor. School of Natural Resources.
REMOTE SENSING OF CHANGES IN MORPHOLOGY AND PHYSIOLOGY OF TREES UNDER STRESS Remote Sensing Applications in Forestry. Final Report, 1 Oct. 1971 - 31 Dec. 1972
Charles F. Olson, Jr. Berkeley, Calif. Calif. Univ. Forestry Remote Sensing Lab. 30 Sep. 1972 42 p refs Prepared for Calif. Univ., Berkeley. Forestry Remote Sensing Lab. in cooperation with Dept. of Agric. Forest Serv.
(NASA Order R-09-038-002)
(NASA-CR-138392) Avail: NTIS HC $5.25 CSCL 02F

Previsual detection of Fomes annosus in pine plantations was studied. Detailed analyses of photographic imagery obtained over the Ann Arbor Test Site during 1969 and 1970 reveal that the Ektachrome Infrared film was superior to Ektachrome Aerographic, Infrared Aerographic, or Plus-X Aerographic films for detecting Fomes annosus damage. Of far more significance in controlling the accuracy of damage detection, however, was the experience of the photo interpreter. Ratio-processing of multispectral scanner data was investigated with data collected in June of 1970 and in June of 1972. Ratioing of the 1.5-1.8 and 1.0-1.4 micrometer channels gave good results at detecting openinggs in the crown canopy and adjacent infected trees. Combined level slicing of the 1.5-1.8 micrometer channel and the 1.5-1.8 to 1.0-1.4 micrometer ratio permitted separation and recognition of forest litter in the openings and stressed trees adjacent ot the openings. Author

N74-22970*# Stanford Univ., Calif. School of Engineering.
WILDLAND FIRE MANAGEMENT. VOLUME 2: WILDLAND FIRE CONTROL 1985-1995 Final Report
David R. Saveker, ed. 1973 193 p refs
(Grant NGT-05-020-409)
(NASA-CR-138400) Avail: NTIS HC $12.75 CSCL 08F

The preliminary design of a satellite plus computer earth resources information system is proposed for potential uses in fire prevention and control in the wildland fire community. Suggested are satellite characteristics, sensor characteristics, discrimination algorithms, data communication techniques, data processing requirements, display characteristics, and costs in achieving the integrated wildland fire information system. Author

N74-23031# Utah State Univ., Logan. Utah Water Research Lab.
INTEGRATED MEASUREMENT OF SOIL MOISTURE BY USE OF RADIO WAVES
Duane G. Chadwick Nov. 1973 98 p refs
(Contract DI-14-31-0001-3657)
(PB-227242/5; PRWG103-1; OWRR-B-062-UTAH(2); W74-03772) Avail: NTIS HC $4.00 CSCL 08M

An integrated value of soil moisture can be determined by measuring the attenuation of vertically-polorarized surface radio waves that are propagated over the ground between a transmitting and receiving antenna. Soil moisture values in the root-zone region were measured over longitudinal distances typically ranging from 50 feet to 600 feet with good results. Integrated soil moisture measurements over greater distances are also possible. The received field strength of propagated radio surface waves closely matches theoretical calculations. Author (GRA)

N74-25838*# Kansas Univ. Center for Research, Inc., Lawrence. Atmospheric Science Lab.
DETECTION OF MOISTURE AND MOISTURE RELATED PHENOMENA FROM SKYLAB Monthly Progress Report, May 1974
Joe R. Eagleman, Ernest C. Pogge, Richard K. Moore, Principal Investigators, Norman Hardy, Wen Lin, and Larry League May 1974 12 p ref EREP
(Contract NAS9-13273)
(E74-10511; NASA-CR-138261) Avail: NTIS HC $4.00 CSCL 08H

There are no author-identified significant results in this report.

N74-25848*# Pacific Southwest Forest and Range Experiment Station, Berkeley, Calif.
INVENTORY OF FOREST AND RANGELAND RESOURCES, INCLUDING FOREST STRESS Bimonthly Progress Report, 16 Mar. - 15 May 1974
Robert C. Heller, Robert C. Aldrich, Frederick P. Weber, and Richard S. Driscoll, Principal Investigators 13 May 1974 3 p EREP
(NASA Order T-4106-B)
(E74-10530; NASA-CR-138279; BMPR-11) Avail: NTIS HC $4.00 CSCL 02F
There are no author-identified significant results in this report.

N74-25857*# Agricultural Research Service, Weslaco, Tex.
REFLECTANCE OF VEGETATION, SOIL, AND WATER Progress Report, 19 Feb. - 19 Apr. 1974
Craig L. Wiegand, Principal Investigator May 1974 11 p ERTS
(NASA Order S-70251-AG)
(E74-10539; NASA-CR-138288; PR-7) Avail: NTIS HC $4.00 CSCL 08M
The author has identified the following significant results. Reflectance of crop residues, that are important in reducing wind and water erosion, was more often different from bare soil in band 4 than in bands 5, 6, or 7. The plant parameters leaf area index, plant population, plant cover, and plant height explained 95.9 percent of the variation in band 7 (reflective infrared) digital counts for cotton and 78.2 percent of the variation in digital counts for the combined crops sorghum and corn; hence, measurable plant parameters explain most of the signal variation recorded for corpland. Leaf area index and plant population are both highly correlated with crop yields; since plant population can be readily measured (or possibly inferred from seeding rates), it is useful measurement for calibrating ERTS-type MSS digital data in terms of yield.

N74-25858*# Kansas Univ. Center for Research, Inc., Lawrence. Atmospheric Science Lab.
DETECTION OF MOISTURE AND MOISTURE RELATED PHENOMENA FROM SKYLAB Monthly Progress Report, Apr. 1974
Joe R. Eagleman, Ernest C. Pogge, Richard K. Moore, Principal Investigators, Norman Hardy, Wen Lin, and Larry League Apr. 1974 17 p EREP
(Contract NAS9-13273)
(E74-10540; NASA-CR-138289) Avail: NTIS HC $4.00 CSCL 08H
There are no author-identified significant results in this report.

N74-25859*# Agricultural Research Service, Weslaco, Tex.
IRRIGATION SCHEDULING, FREEZE WARNING AND SOIL SALINITY DETECTING Monthly Progress Report, Feb. - Apr. 1974
Craig L. Wiegand, Principal Investigator May 1974 2 p EREP
(NASA Order T-4105-B)
(E74-10541; NASA-CR-138290; MPR-6) Avail: NTIS HC $4.00 CSCL 08M
There are no author-identified significant results in this report.

N74-25862*# Alaska Univ., Fairbanks. Inst. of Arctic Biology.
PRELIMINARY VEGETATION MAP OF THE ESPENBERG PENINSULA, ALASKA, BASED ON AN EARTH RESOURCES TECHNOLOGY SATELLITE IMAGE Interim Scientific Report
J. H. Anderson, Principal Investigator, Charles H. Racine (North Carolina State Univ.), and Herbert R. Melchior 8 May 1974 26 p refs ERTS
(Contract NAS5-21833)
(E74-10544; NASA-CR-138293) Avail: NTIS HC $4.50 CSCL 08B
There are no author-identified significant results in this report.

N74-25863*# Alaska Univ., Fairbanks. Inst. of Arctic Biology.
A VEGETATION MAP OF AN AREA NEAR FAIRBANKS, ALASKA, BASED ON AN ERTS IMAGE Interim Scientific Report
J. H. Anderson, Principal Investigator 9 May 1974 17 p refs ERTS
(Contract NAS5-21833)
(E74-10545; NASA-CR-138294) Avail: NTIS HC $4.00 CSCL 08B
There are no author-identified significant results in this report.

N74-25868*# Pacific Southwest Forest and Range Experiment Station, Berkeley, Calif.
INVENTORY OF FOREST AND RANGELAND AND DETECTION OF FOREST STRESS Progress Report, 1 Mar. - 30 Apr. 1974
Robert C. Heller, Robert C. Aldrich, Richard S. Driscoll, and F. P. Weber, Principal Investigators 24 May 1974 29 p refs Original contains imagery. Original photography may be purchased from the EROS Data Center, 10th and Dakota Avenue, Sioux Falls, S. D. 57198 ERTS
(NASA Order S-70251-AG)
(E74-10558; NASA-CR-138448; FS-1-8; PR-8) Avail: NTIS HC $4.50 CSCL 02F
There are no author-identified significant results in this report.

N74-25961# Physics Lab. RVO-TNO, The Hague (Netherlands).
RADAR GROUND RETURNS. PART 3: FURTHER MEASUREMENTS ON THE RADAR BACKSCATTER OF VEGETATION AND SOILS
G. P. DeLoor Mar. 1974 38 p refs
(PhL-1974-05-PT-3; TDCK-64135-PT-3) Avail: NTIS HC $5.00
Measurements of the radar backscatter coefficient gamma of single vegetation species, woods, and bare soils are reported. It is shown that in the measuring set-up used all samples investigated contained sufficient scatterers to give a Rayleigh distribution at the output and that the decorrelation time is sufficiently short to obtain an adequate number of uncorrelated samples in one measurement. In SLAR observations the r.b.c. gamma as a function of frequency and polarization is the only possible classifier for vegetation species. Its total variation, however, is small approximately and requires, as a consequence, a fairly high accuracy in the measurements when variations in r.b.c. gamma are also to be used as an indicator for variations in biomass, plant vigor, moisture content, etc. Author (ESRO)

N74-26866*# Bureau of Sport Fisheries and Wildlife, Jamestown, N. Dak. Northern Prairie Wildlife Research Center.
UTILIZATION OF SKYLAB (EREP) SYSTEM FOR APPRAISING CHANGES IN CONTINENTAL MIGRATORY BIRD HABITAT Monthly Progress Report, May 1974
Harvey K. Nelson, Principal Investigator May 1974 2 p EREP

(NASA Order T-4114-B)
(E74-10557; NASA-CR-138447) Avail: NTIS HC $4.00 CSCL 06C

There are no author-identified significant results in this report.

N74-26868*# Pacific Northwest Forest and Range Experiment Station, Portland, Oreg. Remote Sensing Research Work Unit.
MONITORING FOREST LAND FROM HIGH ALTITUDE AND FROM SPACE Remote Sensing Applications in Forestry. Final Report
Berkeley, Calif. Calif. Univ. Forestry Remote Sensing Lab. 30 Sep. 1972 200 p refs Prepared for Calif. Univ., Berkeley. Forestry Remote Sensing Lab. in cooperation with Dept. of Agric. Forest Serv.
(NASA Order R-09-038-002)
(NASA-CR-138624) Avail: NTIS HC $13.00 CSCL 02F

The significant findings are reported for remote sensing of forest lands conducted during the period October 1, 1965 to December 31, 1972. Forest inventory research included the use of aircraft and space imagery for forest and nonforest land classification, and land use classification by automated procedures, multispectral scanning, and computerized mapping. Forest stress studies involved previsual detection of ponderosa pine under stress from insects and disease, bark bettle infestations in the Black Hills, and root disease impacts on forest stands. Standardization and calibration studies were made to develop a field test of an ERTS-matched four-channel spectrometer. Calibration of focal plane shutters and mathematical modeling of film characteristic curves were also studied. Documents published as a result of all forestry studies funded by NASA for the Earth Resources Survey Program from 1965 through 1972 are listed. A.A.D.

N74-26876*# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Agronomy.
USE OF REMOTE SENSING IN AGRICULTURE Contractor Report, Jul. 1970 - Jun. 1973
David E. Pettry, Norris L. Powell, and Michael E. Newhouse Jan. 1974 151 p refs
(Contract NAS6-1863)
(NASA-CR-62098) Avail: NTIS HC $10.75 CSCL 02C

Remote sensing studies in Virginia and Chesapeake Bay areas to investigate soil and plant conditions via remote sensing technology are reported ant the results given. Remote sensing techniques and interactions are also discussed. Specific studies on the effects of soil moisture and organic matter on energy reflection of extensively occurring Sassafras soils are discussed. Greenhouse and field studies investigating the effects of chlorophyll content of Irish potatoes on infrared reflection are presented. Selected ground truth and environmental monitoring data are shown in summary form. Practical demonstrations of remote sensing technology in agriculture are depicted and future use areas are delineated. Author

N74-26904*# Michigan Univ., Ann Arbor.
THERMAL CONTOURING OF FORESTRY DATA: WALLOPS ISLAND
Fred Thomson 13 Mar. 1972 12 p
(Contract NAS6-2058)
(NASA-CR-137459; Rept-010653-2-L) Avail: NTIS HC $4.00 CSCL 02F

The contouring of 8-13.5 micrometer thermal data collected over a forestry site in Virginia is described. The data were collected at an altitude of 1000 ft above terrain on November 4, 1970. The site was covered on three approximately parallel lines. The purpose of the contouring was to attempt to delineate pine trees attacked by southern pine bark beetle, and to map other important terrain categories. Special processing steps were required to achieve the correct aspect ratio of the thermal data. The reference for the correction procedure was color infrared photography. Data form and quality are given, processing steps are outlined, a brief interpretation of results is given, and conclusion are presented. Author

N74-26928# Reading Univ. (England). Dept. of Geography.
FIRST ESTIMATION OF CROP AREA STATISTICS FOR THE AREA OF ARGENTINA PHOTOGRAPHED BY SKYLARK SL 1181, USING GROUND TRUTH DATA
J. R. Hardy Jun. 1973 9 p
(Contract AT/2035/015)
(UR-RSP-1; S/AI/5E) Avail: NTIS HC $4.00

Preliminary data is given for the identification of crops by ground truth of an area in Argentina photographed from a Skylark SL 1181 rocket. It is hoped that a more detailed analysis of the photographs will enable confidence limits to be calculated. Author (ESRO)

N74-26929# Reading Univ. (England). Dept. of Geography.
PRELIMINARY ASSESSMENTS OF CROP TYPES AND LAND USE IN THE AREA OF ARGENTINA PHOTOGRAPHED BY SKYLARK EARTH RESOURCES ROCKET SL 1181, USING GROUND SURVEY DATA AND ROCKET PHOTOGRAPHY
D. S. H. Drennan Oct. 1973 11 p
(Contract AT/2035/025)
(UR-RSP-2; S/AI/14E) Avail: NTIS HC $4.00

The results of a preliminary study of crop discrimination and land use from the color photography produced by Skylark rockets over Argentina are presented. The methods involved are briefly considered and a comparison of camera systems for color balance is described. Color assessments of crops and land use categories are also discussed. Author (ESRO)

N74-26930# Reading Univ. (England). Dept. of Geography.
DELIMITATION OF THE CULTIVATED AND UNCULTIVATED AREAS OF ARGENTINA PHOTOGRAPHED BY SKYLARK SL 1181, USING ROCKET PHOTOGRAPHY
Natalia Marlenko (Comision Nacl. de Invest. Espaciales and Inst. Nacl. de Technol. Agropecuar.) Oct. 1973 6 p Sponsored in part by Brit. Council
(Contract AT/2035/025)
(UR-RSP-3; S/AI/15E) Avail: NTIS HC $4.00

Photographs taken from Skylark rockets over Argentina have enabled cultivated and uncultivated areas to be distinguished and delimited. The stages of the survey are noted and it is concluded that the boundary between the two areas can be used in the production of maps of land use. Author (ESRO)

N74-27769*# Bureau of Sport Fisheries and Wildlife, Jamestown, N. Dak. Northern Prairie Wildlife Research Center.
UTILIZATION OF SKYLAB (EREP) SYSTEM FOR APPRAISING CHANGES IN CONTINENTAL MIGRATORY BIRD HABITAT Monthly Progress Report, Jun. 1974
Harvey K. Nelson, Principal Investigator Jun. 1974 2 p EREP
(NASA Order T-4114-B)
(E74-10555; NASA-CR-138445) Avail: NTIS HC $4.00 CSCL 06C

There are no author-identified significant results in this report.

N74-27770*# South Dakota State Univ., Brookings. Remote Sensing Inst.
[DEVELOP TECHNIQUES AND PROCEDURES, USING MULTISPECTRAL SYSTEMS, TO IDENTIFY FROM RE-

MOTELY SENSED DATA THE PHYSICAL AND THERMAL CHARACTERISTICS OF PLANTS AND SOIL] Monthly Progress Report, May 1974
Victor I. Myers, Principal Investigator 20 Jun. 1974 2 p EREP
(Contract NAS9-13337)
(E74-10556; NASA-CR-138446) Avail: NTIS HC $4.00 CSCL 05B

There are no author-identified significant results in this report.

N74-27795*# Kansas State Univ., Manhattan. Evapotranspiration Lab.
WHEAT: ITS WATER USE, PRODUCTION AND DISEASE DETECTION AND PREDICTION Completion Report
Edward T. Kanemasu, Principal Investigator, D. Lenhert, C. Niblett, H. Manges, and M. G. Eversmeyer 5 Feb. 1974 238 p refs ERTS
(Contract NAS5-21822)
(E74-10632; NASA-CR-138742; Rept-2263-3) Avail: NTIS HC $15.00 CSCL 02C

The author has identified the following significant results. Discussed in this report are: (1) the effects of wheat disease on water use and yield; and (2) the use of ERTS-1 imagery in the evaluation of wheat growth and in the detection of disease severity. Leaf area index was linearly correlated with ratios MSS4:MSS5 and MSS5:MSS6. In an area of severe wheat streak mosaic virus infected fields, correlations of ERTS-1 digital counts with wheat yields and disease severity levels were significant at the 5% level for MSS bands 4 and 5 and band ratios 4/6 and 4/7. Data collection platforms were used to gather meteorological data for the early prediction of rust severity and economic loss.

N74-27796* Kansas State Univ., Manhattan.
INTRODUCTION
In its Wheat: Its Water Use, Production and Disease Detection and Prediction 5 Feb. 1974 p 1-69 refs ERTS

CSCL 02C

The author has identified the following significant results. The objectives of the investigation were: (1) to evaluate the effect of water stress, disease, and leaf area on the reflectance characteristics of wheat; (2) to evaluate disease losses in terms of yield and water use; and (3) to predict disease severity and economic loss.

N74-27797* Kansas State Univ., Manhattan.
ERTS-1 DATA COLLECTION SYSTEMS USED TO PREDICT WHEAT DISEASE SEVERITIES
E. T. Kanemasu, H. Schimmelpfenning, E. Chin Choy, M. G. Eversmeyer, and D. Lenhert *In its* Wheat: Its Water Use, Production and Disease Detection and Prediction 5 Feb. 1974 13 p refs ERTS
(Contrib-1387; Contrib-595) CSCL 02C

The author has identified the following significant results. The feasibility of using the data collection system on ERTS-1 to predict wheat leaf rust severity and resulting yield loss was tested. Ground-based data collection platforms (DCP'S), placed in two commercial wheat fields in Riley County, Kansas, transmitted to the satellite such meteorological information as maximum and minimum temperature, relative humidity, and hours of free moisture. Meteorological data received from the two DCP'S from April 23 to 29 were used to estimate the diesease progress curve. Values from the curve were used to predict the percentage decrease in wheat yields resulting from leaf rust. Actual decrease in yield was obtained by applying a zinc and maneb spray (5.6 kg/ha) to control leaf rust, then comparing yields of the controlled (healthy) and the noncontrolled (rusted) areas. In each field a 9% decrease in yield was predicted by the DCP-derived data; actual decreases were 12% and 9%.

N74-27798* Kansas State Univ., Manhattan.
SEASONAL CANOPY REFLECTANCE PATTERNS OF WHEAT, SORGHUM AND SOYBEAN
E. T. Kanemasu *In its* Wheat: Its Water Use, Production and Disease Detection and Prediction 5 Feb. 1974 20 p refs ERTS
(Contrib-1385) CSCL 20F

The author has identified the following significant results. Reflectance characteristics of agronomic crops are of major importance in the energy exchanges of a surface. In addition, unique reflectance patterns may be an aid in crop identification by means of remote sensing. This study suggests that the ratio of the reflectances of the 545-nm to to the 655-nm wavebands provides information about the viewed surface, regardless of the crop. The reflectance ratio is less than unity early and late in the growing season. For all crops studied, the ratio closely followed crop growth and development and appeared to be more desirable than the near-infrared reflectance as an index of growth.

N74-27800* Kansas State Univ., Manhattan. Dept. of Agricultural Engineering.
PREDICTING SOIL MOISTURE AND WHEAT VEGETATIVE GROWTH FROM ERTS-1 IMAGERY M.S. Thesis
John Wayne Krupp *In its* Wheat: Its Water Use, Production and Disease Detection and Prediction 5 Feb. 1974 70 p refs ERTS
CSCL 02C

The author has identified the following significant results. Study results indicate: (1) Vegetative growth was best predicted by a linear relationship between leaf area index and the radio of band 4 to band 5. All significant soil moisture effects were growth, measured by leaf area index, was one of the necessary inputs in evaluating the winter wheat crop coefficient from March to maturity.

N74-27804*# Minnesota Univ., Minneapolis. College of Forestry.
REMOTE SENSING APPLICATIONS TO FOREST VEGETATION CLASSIFICATION AND CONIFER VIGOR LOSS DUE TO DWARF MISTLETOE Remote Sensing Applications in Forestry. Final Report
Robert W. Douglass, Merle P. Meyer, and D. W. French Berkeley, Calif. Calif. Univ. Forestry Remote Sensing Lab. 30 Sep. 1972 102 p refs Prepared for Calif. Univ., Berkeley. Forestry Remote Sensing Lab. in cooperation with Dept. of Agric. Forest Serv.
(NASA Order R-09-038-002)
(NASA-CR-138806) Avail: NTIS HC $8.25 CSCL 02F

Criteria was established for practical remote sensing of vegetation stress and mortality caused by dwarf mistletoe infections in black spruce subboreal forest stands. The project was accomplished in two stages: (1) A fixed tower-tramway site in an infected black spruce stand was used for periodic multispectral photo coverage to establish basic film/filter/scale/season/weather parameters; (2) The photographic combinations suggested by the tower-tramway tests were used in low, medium, and high altitude aerial photography. Author

N74-28811*# Agricultural Research Service, Weslaco, Tex.
A STUDY OF EARLY DETECTION OF INSECT INFESTATIONS AND DENSITY/DISTRIBUTION OF HOST PLANTS Progress Report, 1-31 May 1974
William G. Hart, Sammy J. Ingle, and M. R. Davis, Principal Investigators 31 May 1974 2 p EREP
(NASA Order T-4109-B)

(E74-10560; NASA-CR-138635; PR-16) Avail: NTIS HC $4.00 CSCL 08F

There are no author-identified significant results in this report.

N74-28813*# Agricultural Research Service, Weslaco, Tex.
IRRIGATION SCHEDULING, FREEZE WARNING AND SOIL SALINITY DETECTING Monthly Progress Report, May - Jun. 1974
Craig L. Wiegand, Principal Investigator Jul. 1974 2 p EREP
(NASA Order T-4105-B)
(E74-10569; NASA-CR-138644; MPR-7) Avail: NTIS HC $4.00 CSCL 02C

There are no author-identified significant results in this report.

N74-28828*# Tennessee Univ., Knoxville. Remote Sensing Unit.
UTILIZING ERTS IMAGERY TO DETECT PLANT DISEASES AND NUTRIENT DEFICIENCIES, SOIL TYPES AND SOIL MOISTURE LEVELS Final Report, 29 Sep. 1972 - 1 Mar. 1974
W. L. Parks, J. I. Sewell, J. W. Hilty, and J. C. Rennie, Principal Investigators 1 Mar. 1974 53 p refs Original contains imagery. Original photography may be purchased from the EROS Data Center, 10th and Dakota Avenue, Sioux Falls, S. D. 57198 ERTS
(Contract NAS5-21873)
(E74-10585; NASA-CR-138690) Avail: NTIS HC $5.75 CSCL 02C

The author has identified the following significant results. ERTS-1 imagery may be used to delineate soil associations. It does have the capacity to divide soils into groups such that their land use and management would be similar. It offers definite potential for making grass flood-plain, wetland, river shoreline, and land use change surveys. Production of volume strata and forest type from the two usable bands of ERTS-1 imagery were of questionable value. No imagery was received for evaluation during the time of year when maine dwarf mosaic virus and southern corn leaf blight were active.

N74-28829*# Earth Satellite Corp., Washington, D.C.
A COMPARISON OF SKYLAB AND ERTS DATA FOR AGRICULTURAL CROP AND NATURAL VEGETATION INTERPRETATION
Charles Poulton, Principal Investigator, Robert N. Colwell, Lawrence R. Pettinger, and Robin I. Welch 1 Jul. 1974 149 p Original contains imagery. Original photography may be purchased from the EROS Data Center, 10th and Dakota Avenue, Sioux Falls, S. D. 57198 EREP and ERTS
(Contract NAS9-13286)
(E74-10586; NASA-CR-138691) Avail: NTIS HC $10.50 CSCL 08F

There are no author-identified significant results in this report.

N74-28830*# Department of Agriculture, Washington, D.C.
CROP IDENTIFICATION AND ACREAGE MEASUREMENT UTILIZING ERTS IMAGERY Progress Report, 8 Jan. - 19 Jun. 1974
Donald H. VonSteen, Principal Investigator 19 Jun. 1974 9 p ERTS
(NASA Order S-70251-AG-3)
(E74-10587; NASA-CR-138807) Avail: NTIS HC $4.00 CSCL 02C

There are no author-identified significant results in this report.

N74-28834*# Honeywell, Inc., Minneapolis, Minn. Systems and Research Div.
AUTOMATIC PHOTOINTERPRETATION FOR PLANT SPECIES AND STRESS IDENTIFICATION (ERTS-A1) Final Report
G. D. Swanlund, Principal Investigator and L. Kirvida 12 Dec. 1973 73 p refs Original contains color imagery. Original photography may be purchased from the EROS Data Center, 10th and Dakota Avenue, Sioux Falls, S. D. 57198 ERTS
(Contract NAS5-21866)
(E74-10592; NASA-CR-138701) Avail: NTIS HC $6.75 CSCL

N74-28835*# Agricultural Research Service, Weslaco, Tex.
A STUDY OF THE EARLY DETECTION OF INSECT INFESTATIONS AND DENSITY/DISTRIBUTION OF HOST PLANTS Progress Report, 1-31 Jan. 1974
William G. Hart, Sammy J. Ingle, and M. R. Davis, Principal Investigators 31 Jan. 1974 2 p EREP
(NASA Order T-4109-B)
(E74-10600; NASA-CR-138709; PR-12) Avail: NTIS HC $4.00 CSCL 08F

There are no author-identified significant results in this report.

N74-28836*# Agricultural Research Service, Weslaco, Tex.
A STUDY OF EARLY DETECTION OF INSECT INFESTATIONS AND DENSITY/DISTRIBUTION OF HOST PLANTS Progress Report, 1-31 Dec. 1973
William G. Hart, Sammy J. Ingle, and M. R. Davis, Principal Investigators 31 Dec. 1973 2 p EREP
(NASA Order T-4109-B)
(E74-10601; NASA-CR-138710; PR-11) Avail: NTIS HC $4.00 CSCL 08F

There are no author-identified significant results in this report.

N74-28846*# Idaho Univ., Moscow. Coll. of Forestry, Wildlife and Range Sciences.
APPLICATION OF REMOTE SENSING IN THE STUDY OF VEGETATION AND SOILS IN IDAHO Terminal Report, Nov. 1972 - Jan. 1974
E. W. Tisdale, M. Hironaka, and M. A. Fosberg, Principal Investigators Feb. 1974 50 p refs Original contains color imagery. Original photography may be purchased from the EROS Data Center, 10th and Dakota Avenue, Sioux Falls, S. D. 57198 ERTS
(Contract NAS5-21850)
(E74-10618; NASA-CR-138727) Avail: NTIS HC $5.50 CSCL 02C

There are no author-identified significant results in this report.

N74-28855* California Univ., Berkeley.
SEPARATION OF MANMADE AND NATURAL PATTERNS IN HIGH ALTITUDE IMAGERY OF AGRICULTURAL AREAS Special Study No. 2
Robert N. Colwell, Principal Investigator and Alfred S. Samulon *In its* An Integrated Study of Earth Resources in the State of Calif. Using Remote Sensing Tech. 1 May 1974 30 p refs Original contains imagery. Original photography may be purchased from the EROS Data Center, 10th and Dakota Avenue, Sioux Falls, S. D. 57198

CSCL 08H

There are no author-identified significant results in this report.

N74-28865*# Tennessee Univ., Knoxville. Remote Sensing Unit.
UTILIZING ERTS IMAGERY TO DETECT PLANT DISEASES

AND NUTRIENT DEFICIENCIES, SOIL TYPES AND SOIL MOISTURE LEVELS Final Report, Sep. 1972 - Mar. 1974
W. L. Parks, J. I. Sewell, J. W. Hilty, and J. C. Rennie, Principal Investigators 1 Mar. 1974 53 p refs Original contains imagery. Original photography may be purchased from the EROS Data Center, 10th and Dakota Avenue, Sioux Falls, S. D. 57198 ERTS
(Contract NAS5-21873)
(E74-10629; NASA-CR-138739) Avail: NTIS HC $5.75 CSCL 02C

There are no author-identified significant results in this report.

N74-28870*# Alaska Univ., Fairbanks. Alaska Cooperative Wildlife Research Unit.
APPLICATION OF ERTS IMAGERY TO THE STUDY OF CARIBOU MOVEMENTS AND WINTER HABITAT Final Report, Jul. 1972 - Feb. 1974
Peter C. Lent, Principal Investigator and Arthur J. LaPerriere 13 Mar. 1974 50 p refs ERTS
(Contract NAS5-21833)
(E74-10636; NASA-CR-138810) Avail: NTIS HC $5.50 CSCL 06C

There are no author-identified significant results in this report.

N74-28872*# Agricultural Research Service, Weslaco, Tex.
A STUDY OF EARLY DETECTION OF INSECT INFESTATIONS AND DENSITY/DISTRIBUTION OF HOST PLANTS Progress Report, 1-28 Feb. 1974
William G. Hart, Sammy J. Ingle, and M. R. Davis, Principal Investigators 28 Feb. 1974 2 p EREP
(NASA Order T-4109-B)
(E74-10638; NASA-CR-138812; PR-13) Avail: NTIS HC $4.00 CSCL 08F

There are no author-identified significant results in this report.

N74-28873*# Agricultural Research Service, Weslaco, Tex.
A STUDY OF THE EARLY DETECTION OF INSECT INFESTATIONS AND DENSITY/DISTRIBUTION OF HOST PLANTS Progress Report, 1-31 Mar. 1974
William G. Hart, Sammy J. Ingle, and M. R. Davis, Principal Investigators 31 Mar. 1974 2 p EREP
(NASA Order T-4109-B)
(E74-10639; NASA-CR-138813; PR-14) Avail: NTIS HC $4.00 CSCL 08F

There are no author-identified significant results in this report.

N74-28876*# Agricultural Research Service, Weslaco, Tex.
A STUDY OF THE EARLY DETECTION OF INSECT INFESTATIONS AND DENSITY/DISTRIBUTION OF HOST PLANTS Progress Report, 1-30 Apr. 1974
William G. Hart, Sammy J. Ingle, and M. R. Davis, Principal Investigators 30 Apr. 1974 2 p EREP
(NASA Order T-4109-B)
(E74-10642; NASA-CR-138824; PR-15) Avail: NTIS HC $4.00 CSCL 08F

There are no author-identified significant results in this report.

N74-28880*# Agricultural Research Service, Weslaco, Tex.
REFLECTANCE OF VEGETATION, SOIL, AND WATER Progress Report, 19 Dec. 1973 - 19 Jun. 1974
Craig L. Wiegand, Principal Investigator Jul. 1974 43 p refs ERTS
(NASA Order S-70251-AG)
(E74-10647; NASA-CR-138860) Avail: NTIS HC $5.25 CSCL 20F

The author has identified the following significant results. The Kubelka-Munk model, a regression model, and a combination of these models were used to extract plant, soil, and shadow reflectance components of vegetated surfaces. The combination model was superior to the others; it explained 86% of the variation in band 5 reflectance of corn and sorghum, and 90% of the variation in band 6 reflectance of cotton. A fractional shadow term substantially increased the proportion of the digital count sum of squares explained when plant parameters alone explained 85% or less of the variation. Overall recognition of 94 agricultural fields using simultaneously acquired aircraft and spacecraft MSS data was 61.8 and 62.8%, respectively; recognition of vegetable fields larger than 10 acres and taller than 25 cm, rose to 88.9 and 100% for aircraft and spacecraft, respectively. Agriculture and rangeland, were well discriminated for the entire county but level 2 categories of vegetables, citrus, and idle cropland, except for citrus, were not.

N74-28881*# Mississippi State Univ., State College. Inst. for Environmental Studies.
A STUDY OF THE APPLICATION OF SKYLAB EREP DATA TO AGRICULTURE IN THE MISSISSIPPI DELTA ALLUVIAL PLAINS REGION Quarterly Report, 23 Apr. - 23 Jul. 1974
C. W. Bouchillon, Principal Investigator 23 Jul. 1974 8 p EREP
(Contract NAS9-13363)
(E74-10648; NASA-CR-138861) Avail: NTIS HC $4.00 CSCL 02C

There are no author-identified significant results in this report.

N74-28892*# Purdue Univ., Lafayette, Ind. Lab. for Applications of Remote Sensing.
RESEARCH IN REMOTE SENSING OF AGRICULTURE, EARTH RESOURCES, AND MAN'S ENVIRONMENT Final Report, 1 Jun. 1969 - 31 May 1974
David A. Landgrebe 15 Jun. 1974 36 p refs Sponsored in part by USDA
(Grant NGL-15-005-112)
(NASA-CR-138885) Avail: NTIS HC $5.00 CSCL 02C

Research performed on NASA and USDA remote sensing projects are reviewed and include. (1) the 1971 Corn Blight Watch Experiment; (2) crop identification; (3) soil mapping; (4) land use inventories; (5) geologic mapping; and (6) forest and water resources data collection The extent to which ERTS images and airborne data were used is indicated along with computer implementation. A field and laboratory spectroradiometer system is described together with the LARSYS software system, both of which were widely used during the research. Abstracts are included of 160 technical reports published as a result of the work. A.A.D.

02
ENVIRONMENTAL CHANGES AND CULTURAL RESOURCES

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

A74-28550 * Air pollution - Remote detection of several pollutant gases with a laser heterodyne radiometer. R. T. Menzies and M. S. Shumate (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, Calif.). *Science*, vol. 184, May 3, 1974, p. 570-572. 7 refs. Contract No. NAS-100.

An infrared heterodyne radiometer with a spectral resolution of 0.04 reciprocal centimeters has been used to remotely detect samples of ozone, sulfur dioxide, ammonia, and ethylene at room temperature, and samples of nitric oxide at 390 K. Each gas was observed in a background of nitrogen or oxygen at atmospheric pressure. Sensitivities to some of these gases are adequate for detection of ambient concentrations as low as a few parts per billion. (Author)

A74-29021 * # Remote sensing for monitoring a water transportation project - The California Aqueduct. J. E. Estes and L. W. Senger (California, University, Santa Barbara, Calif.). *International Astronautical Federation, International Astronautical Congress, 24th, Baku, Azerbaidzhan SSR, Oct. 7-13, 1973, Paper.* 16 p. Grant No. NGL-05-003-404; Contract No. NAS5-21827.

Land use changes were investigated on the west side of the San Joaquin Valley, California, an arid region presently importing water via the California Aqueduct, utilizing airphoto mosaics (1957), high-altitude photography (1971), and Earth Resources Technology Satellite (ERTS-1) data (1972). Attention was focused on land use characteristics for the three dates, changes which had occurred, and the sequence of land use category change. Research indicated that water importation was contributing to an overall pattern of regional change trending from an oil-producing and grazing area into a cropping region. Furthermore, the general pattern of specific category change was trending in the direction of higher economic intensity land use succession. (Author)

A74-29701 * Joint Conference on Sensing of Environmental Pollutants, 2nd, Washington, D.C., December 10-12, 1973, Proceedings. Conference sponsored by ACS, AIAA, AMS, DOT, EPA, IEEE, ISA, NASA, and NOAA. Pittsburgh, Pa., Instrument Society of America, 1973. 358 p. Members, $30.; nonmembers, $40.

Subjects considered are related to the remote passive sensing of atmosphere pollutants, the extension of laboratory measurement techniques for field use, instrument quality and measurement standardization, the remote active sensing of atmospheric pollutants, stationary source sensing, and air quality standards and measurement accuracy. Aspects of radiological, electromagnetic, and acoustic pollution monitoring are discussed together with new methods in particulate analysis, the measurement of meteorological variables that impact on atmospheric pollutants, and the impact of meteorological parameters on pollution analysis. The in-situ sensing of acoustic chemical and biological pollutants is reported along with global scale pollution monitoring and the remote sensing of water pollutants. G.R.

A74-29702 * Measurement of the abundance of several natural stratospheric trace constituents from high altitude aircraft. C. B. Farmer, P. W. Schaper, O. F. Raper, R. A. Schindler, and R. A. Toth (California Institute of Technology, Jet Propulsion Laboratory, Space Sciences Div., Pasadena, Calif.). In: Joint Conference on Sensing of Environmental Pollutants, 2nd, Washington, D.C., December 10-12, 1973, Proceedings. Pittsburgh, Pa., Instrument Society of America, 1973, p. 9-15. 57 refs. U.S. Department of Transportation Contract No. AS-20094; Contract No. NAS7-100.

A summary report of the initial results obtained from near-infrared observations of the stratosphere from the Anglo-French SST Concorde is presented, together with the most recent results from previous flights aboard an Air Force NC-135. The measurements were made with a fast Fourier interferometer spectrometer operating in the 1.2- to 7.5-micron range of the infrared with a spectral resolution of 0.25 per cm. For the Concorde experiments, flight times and trajectories were selected which allowed the sun to be viewed near the horizon with the relative solar elevation angle held constant throughout the measurements. Results reported include the identification of features due to N2O, NO, NO2, CO, CO2, CH4, H2O and indications of their latitudinal variations. (Author)

A74-29703 * The remote measurement of trace atmospheric species by correlation interferometry. I - Carbon monoxide and methane. H. W. Goldstein, M. H. Bortner, R. N. Grenda, A. M. Karger (General Electric Co., Philadelphia, Pa.), R. Dick, F. David (Barringer Research, Ltd., Toronto, Canada), and P. J. LeBel (NASA, Langley Research Center, Hampton, Va.). In: Joint Conference on Sensing of Environmental Pollutants, 2nd, Washington, D.C., December 10-12, 1973, Proceedings. Pittsburgh, Pa., Instrument Society of America, 1973, p. 17-20. 5 refs. Contract No. NAS1-10139.

A correlation interferometer has been developed for the measurement of carbon monoxide and methane at 2.35 micrometers in the troposphere and in the stratosphere. This instrument has been tested in laboratory tests, solar-looking outdoor tests, and downward-looking airplane-based tests. The aircraft tests were flown on a Falcon fanjet provided by The Canada Centre for Remote Sensing over both polluted and unpolluted regions of North America. The results of these various tests are discussed. Based on the results obtained for carbon monoxide and methane, a study was undertaken to investigate the feasibility of measuring other atmospheric trace species by correlation interferometry. Results of the feasibility study for carbon dioxide, water vapor, ammonia, nitrous oxide, nitric oxide, nitrogen dioxide, sulfur dioxide, and several hydrocarbons are presented. (Author)

A74-29704 Ultra narrow band infrared filter radiometry. A. E. Roche and A. M. Title (Lockheed Research Laboratories, Palo Alto, Calif.). In: Joint Conference on Sensing of Environmental Pollutants, 2nd, Washington, D.C., December 10-12, 1973, Proceedings. Pittsburgh, Pa., Instrument Society of America, 1973, p. 21-24. 6 refs.

Recently developed Fabry-Pérot filters are available which have extremely narrow bandwidths and high transmission. The design and the laboratory-measured performance of several recently fabricated ultranarrow band filters of this type are described. An estimation is made of the sensitivity of a scanning photometer using the 5-micrometer filter for the measurement of stratospheric NO. Measured transmission band profiles are presented in a number of graphs. G.R.

A74-29705 Further developments in correlation spectroscopy for remote sensing air pollution. A. R. Barringer, J. H. Davies, and A. J. Moffat (Barringer Research, Ltd., Rexdale, Ontario, Canada). In: Joint Conference on Sensing of Environmental Pollutants, 2nd, Washington, D.C., December 10-12, 1973, Proceedings. Pittsburgh, Pa., Instrument Society of America, 1973, p. 25-38. 6 refs.

A specific application of correlation spectroscopy is discussed, taking into account the measurement of the total vertical burden of sulfur dioxide and nitrogen dioxide in the atmosphere. Attention is also given to the determination of total gaseous pollutant mass flow. A remote sensing correlation spectrometer is used in the investigation. The sensor is mounted in a vehicle and the zenith sky is used as the source of illumination. Aspects of instrument design are discussed together with questions of sensor calibration. G.R.

A74-29708 Detection of water pollution sources with aerial imaging sensors. C. L. Rudder and C. J. Reinheimer (McDonnell Aircraft Co., St. Louis, Mo.). In: Joint Conference on Sensing of Environmental Pollutants, 2nd, Washington, D.C., December 10-12, 1973, Proceedings. Pittsburgh, Pa., Instrument Society of America, 1973, p. 65-71. U.S. Environmental Protection Agency Contracts No. 68-10-0140; No. 68-01-0178.

The strong potential value of aerial remote sensing for the detection of oil and hazardous materials is shown. Although sensors can collect the necessary data, the actual detection is not accomplished until the data are analyzed and interpreted. The task involved is not simple because the types of pollution are quite varied and can originate in many different kinds of industries. Furthermore, data collected with different types of sensors require different rules for analysis. An interpreter of the data needs guidebooks or keys. The design of such interpretation keys for environmental applications is discussed. G.R.

A74-29709 * Standard methods for analysis and interpretation of Lidar data for environmental monitoring. S. H. Melfi (NASA, Langley Research Center, Hampton, Va.). In: Joint Conference on Sensing of Environmental Pollutants, 2nd, Washington, D.C., December 10-12, 1973, Proceedings. Pittsburgh, Pa., Instrument Society of America, 1973, p. 73-79. 5 refs.

Lidar is similar in principle to microwave radar but uses a pulsed laser as the source and an optical telescope as the receiver. Lidar observations of elastic scattering from aerosols and more recently Raman scattering from molecules have been performed in the atmosphere with favorable results. A description of the Lidar technique is provided. Lidar measurements of remote visibility are discussed together with the measurement of remote visibility and the determination of molecular concentrations. G.R.

A74-29711 A standard method for expressing instrumental performance. R. L. Chapman (Beckman Instruments, Inc., Fullerton, Calif.). In: Joint Conference on Sensing of Environmental Pollutants, 2nd, Washington, D.C., December 10-12, 1973, Proceedings. Pittsburgh, Pa., Instrument Society of America, 1973, p. 91-94. 11 refs.

The desirability of the existence of standard methods for testing instrument performance and expressing it in universally accepted terms is considered. In June of 1971, the International Electrotechnical Commission (IEC) established a Working Group for air and water quality instrumentation. IEC recommendations on instrumentation are discussed. A document circulated to the full IEC parent committee in May of 1973 includes definitions for the most common terms related to functional performance and to conditions of operation, transport, and storage. G.R.

A74-29712 The application of the Correlation Spectrometer to ambient air quality and source emissions. L. Langan (Environmental Instruments, Inc., San Francisco, Calif.) and A. J. Moffat (Barringer Research, Ltd., Rexdale, Ontario, Canada). In: Joint Conference on Sensing of Environmental Pollutants, 2nd, Washington, D.C., December 10-12, 1973, Proceedings. Pittsburgh, Pa., Instrument Society of America, 1973, p. 117-124. 12 refs.

The applications of the Correlation Spectrometer, designed as a remote sensor to measure the content of sulfur dioxide and/or nitrogen dioxide in the open air, have been expanded and compared to other measurement methods for verification of the results. Data accumulated between 1971 and 1973 are used to depict the use of this remote sensor for developing an emission inventory, for describing the distribution of gases and their relationship to ground-level concentrations and as an open-path ambient monitor. (Author)

A74-29714 * Analysis of laser differential absorption remote sensing using diffuse reflection from the earth. R. K. Seals, Jr. and C. H. Bair (NASA, Langley Research Center, Hampton, Va.). In: Joint Conference on Sensing of Environmental Pollutants, 2nd, Washington, D.C., December 10-12, 1973, Proceedings. Pittsburgh, Pa., Instrument Society of America, 1973, p. 131-137. 10 refs.

A computer model analysis of an infrared laser differential absorption remote sensing technique (DARS) is presented. An infrared laser source operating at two or more wavelengths and a heterodyne detection system are considered to be mounted on either an aircraft or satellite platform to monitor the differential absorption between the laser source and the earth surface. The capability of this technique for measuring gas concentrations in the lower 5 kilometers of the atmosphere is emphasized. Numerical results are presented simulating measurements of vertical burdens of CO, NO, CH4, CO2, and O3. These results indicate that measurements of expected concentrations of these gases can be made with greater than 80% accuracy using realistic laser powers and system parameters. (Author)

A74-29715 The application of electro-optical techniques to sensing of stationary source pollutants. W. F. Herget (U.S. Environmental Protection Agency, Chemistry and Physics Laboratory, Research Triangle Park, N.C.). In: Joint Conference on Sensing of Environmental Pollutants, 2nd, Washington, D.C., December 10-12, 1973, Proceedings. Pittsburgh, Pa., Instrument Society of America, 1973, p. 155-160.

Nonextractive electrooptical techniques are considered, giving particular attention to those techniques which are applicable to gaseous pollutant analysis. An infrared telespectrometer system is discussed, taking into account remote emission measurements and long-path absorption measurements. Activities related to the application of electrooptical techniques to the sensing of stationary source emissions are also reported. G.R.

A74-29717 Variations of meteorology, pollutant emissions, and air quality. G. C. Holzworth. In: Joint Conference on Sensing of Environmental Pollutants, 2nd, Washington, D.C., December 10-12, 1973, Proceedings. Pittsburgh, Pa., Instrument Society of America, 1973, p. 247-255. 9 refs.

This paper presents information describing various temporal and spatial variations in pollutant emissions, atmospheric transport/diffusion, and air quality that are broadly applicable to large cities in the United States. The overall impact on air quality of the interplay between diurnal variations in emissions and meteorology is described. It is concluded that complete explanations of air quality values measured continuously at specific locations require detailed emission and meteorological information. (Author)

A74-29719 Remote-sensing the stratospheric aerosols. T. J. Pepin (Wyoming, University, Laramie, Wyo.). In: Joint Conference

on Sensing of Environmental Pollutants, 2nd, Washington, D.C., December 10-12, 1973, Proceedings Pittsburgh, Pa., Instrument Society of America, 1973, p. 333-336.

A description of a remote-sensing experiment to measure the vertical concentration of aerosols in the stratosphere is presented. Data from balloon flight tests of the instrument are discussed and satellite experiments under development are described. (Author)

A74-29720 **Progress report - Detection of dissolved oxygen in water through remote sensing techniques.** A. W. Dybdahl (U.S. Environmental Protection Agency, Office of Enforcement and General Council, Denver, Colo.). In: Joint Conference on Sensing of Environmental Pollutants, 2nd, Washington, D.C., December 10-12, 1973, Proceedings. Pittsburgh, Pa., Instrument Society of America, 1973, p. 337-341. Research supported by the U.S. Environmental Protection Agency.

Description of a technique for the quantitative detection of dissolved oxygen concentrations in water through remote sensing by airborne infrared photography. Densitometric analysis of the exposed film, together with ground truth, is used for generating a calibration curve. This technique has provided an accuracy of better than plus or minus 1 ppm in healthy bay and ocean waters. M.V.E.

A74-29721 **Monitoring coastal water properties and current circulation with spacecraft.** V. Klemas, M. Otley, C. Wethe (Delaware, University, Newark, Del.), and R. Rogers (Bendix Corp., Aerospace Systems Div., Ann Arbor, Mich.). In: Joint Conference on Sensing of Environmental Pollutants, 2nd, Washington, D.C., December 10-12, 1973, Proceedings. Pittsburgh, Pa., Instrument Society of America, 1973, p. 343-354. 15 refs.

Imagery and digital tapes from nine successful ERTS-1 passes over Delaware Bay during different portions of the tidal cycle have been analyzed with special emphasis on turbidity, current circulation, waste disposal plumes and convergent boundaries between different water masses. ERTS-1 image radiance correlated well with Secchi depth and suspended sediment concentration. Circulation patterns observed by ERTS-1 during different parts of the tidal cycle, agreed well with predicted and measured currents throughout Delaware Bay. Convergent shear boundaries between different water masses were observed from ERTS-1. In several ERTS-1 frames, waste disposal plumes have been detected 36 miles off Delaware's Atlantic coast. The ERTS-1 results are being used to extend and verify hydrodynamic models of the bay, developed for predicting oil slick movement and estimating sediment transport. (Author)

A74-29723 **Coast Guard Airborne Remote Sensing System.** B. C. Mills (U.S. Coast Guard, Ocean Engineering Div., Washington, D.C.). In: Joint Conference on Sensing of Environmental Pollutants, 2nd, Washington, D.C., December 10-12, 1973, Proceedings. Pittsburgh, Pa., Instrument Society of America, 1973, p. 363-367.

The Airborne Remote Sensing System is the Coast Guard's initial program to use state-of-the-art technology to assist in their program of coastal zone pollution monitoring. The program has outfitted six U-16E (Grumman Albatross) aircraft with sensors capable of real time detection of petroleum pollutants and a recording system furnishing a permanent record of any pollutants detected. The equipment was designed for daylight operation with one channel usable for night time operation. F.R.L.

A74-29724 * **An airborne laser fluorosensor for the detection of oil on water.** H. H. Kim (NASA, Wallops Station, Wallops Island, Va.) and G. D. Hickman (Sparcom, Inc., Alexandria, Va.). In: Joint Conference on Sensing of Environmental Pollutants, 2nd, Washington, D.C., December 10-12, 1973, Proceedings. Pittsburgh, Pa., Instrument Society of America, 1973, p. 369-371. 8 refs.

The successful operation of an airborne laser fluorosensor system is reported that makes it possible to detect and map surface oil, either of natural-seepage or spill origin, on large bodies of water. Preliminary results indicate that the sensitivity of the instrument exceeds that of conventional passive remote sensors currently available for oil spill detection. M.V.E.

A74-30397 * # **Jet engine soot emission measured at altitude.** J. M. Rosen (Wyoming, University, Laramie, Wyo.) and R. Greegor (Boeing Co., Seattle, Wash.). *Journal of Aircraft*, vol. 11, Apr. 1974, p. 243-245. 5 refs. Grant No. NGR-51-001-028.

The state of knowledge concerning engine design to minimize air pollution is believed to be such that emission products can be reliably predicted while the engine is still on the drawing board. More effort is now being made to measure emission products from engines operating under cruise conditions. The use of an instrumented aircraft to obtain the appropriate data is perhaps a more realistic and less expensive approach. The results of this study taken at face value indicate that the emission index of typical jet engines calculated from the ground level measurements is comparable to the actual in-flight emission index for altitudes up to 30,000 ft. F.R.L.

A74-30685 **Calibrated remote measurement of NO2 using the differential-absorption backscatter technique.** W. B. Grant, R. D. Hake, Jr., E. M. Liston, R. C. Robbins, and E. K. Proctor, Jr. (Stanford Research Institute, Menlo Park, Calif.). *Applied Physics Letters*, vol. 24, June 1, 1974, p. 550-552. 20 refs. NSF Grant No. GI-38986.

A tunable dye laser, operating between 4400 and 4500 A, was used to monitor NO2 concentrations in a sample chamber 365 m away. The atmosphere in front of and behind the chamber acted as a distributed reflector to send laser light back through the chamber to a receiver near the laser. The laser measurements agreed well with in situ measurements. A single pair of laser pulses allowed the determination of NO2 concentrations with an uncertainty equivalent to 0.05 km ppm. (Author)

A74-30794 * **Estimating population from photographically determined residential land use types.** S. P. Kraus, L. W. Senger (Dames and Moore, Santa Barbara, Calif.), and J. M. Ryerson (California State Department of Transportation, San Francisco, Calif.). *Remote Sensing of Environment*, vol. 3, no. 1, 1974, p. 35-42. 13 refs. Grant No. NGL-05-003-404.

The study reported was concerned with the development of a methodology for updating published census data during intercensal periods. The new approach utilizes aerial photographs as a primary data source. The methodology, which was devised for estimating the population size of four cities in California, consisted of a simple function relating the measured area of three dominant residential land use types and the characteristic spatial population densities associated with each. G.R.

A74-30797 **Suspended solids analysis using ERTS-A data.** H. Kritikos, L. Yorinks (Pennsylvania, University, Philadelphia, Pa.), and H. Smith (U.S. Environmental Protection Agency, Philadelphia, Pa.). *Remote Sensing of Environment*, vol. 3, no. 1, 1974, p. 69-78. 19 refs.

The magnetic digital tapes of the imagery obtained by ERTS-A on September 23, 1972, have been analyzed for selected areas of the Potomac River. A statistical analysis of all four bands has been carried out. The results show that band III is useful in determining the water-to-land interface. Data on bands II suggest the existence of three distinct types of water - those having low, medium, and high

reflectivity. From previously published results and ground truth measurements the areas of high reflectivity were identified as containing high concentrations of suspended solids. Areas of low reflectivity were identified as having relatively lower concentrations of suspended solids. A commonly used computer technique with some additional refinements has been used to generate thematic maps which identify the above areas and show their geographical distribution. (Author)

A74-30799 **ERTS-1 views an oil slick.** H. G. Stumpf and A. E. Strong (NOAA, National Environmental Satellite Service, Hillcrest Heights, Md.). *Remote Sensing of Environment*, vol. 3, no. 1, 1974, p. 87-90. 7 refs.

A74-31000 # **Toward a methodical study of the environment (Vers une étude méthodique de l'environnement).** J.-L. Dulemba (Université de Franca, São Paulo, Brazil). *Industries Atomiques et Spatiales*, vol. 18, Mar.-Apr. 1974, p. 49-60. 20 refs. In French.

Technical developments relating to teledetection of natural resources are described, as well as the methodical study of the terrestrial environment, which is carried out by airborne studies as well as use of artificial satellites fitted with modern devices, such as the multispectral scanning system (MSS) embarked on board the ERTS-1 Earth Resources Technology Satellite. Attention is also given to the most important space studies being carried out in Brazil. The article is illustrated by the example of a comparative interpretation of two images of different spectral band, transmitted to the earth by the ERTS-1 satellite, treating the region of the Middle Valley of the river São Francisco (north of the state of Bahía and south of state of Piauí). F.R.L.

A74-31870 * **Measurement of air pollutants from satellites. I - Feasibility considerations.** C. B. Ludwig, M. Griggs, W. Malkmus, and E. R. Bartle (Science Applications, Inc., La Jolla, Calif.). *Applied Optics*, vol. 13, June 1974, p. 1494-1509. 55 refs. Contract No. NAS1-10466.

The feasibility of observing air pollutants from satellite-borne sensors is investigated. Radiative transfer calculations, using both line-by-line and band-model methods, are made to establish the signal changes that originate from the presence of various amounts of pollutants in the atmosphere. The effect of interfering species is considered. (Author)

A74-33071 **Detecting and monitoring oil slicks with aerial photos.** K. N. Vizy (Eastman Kodak Co., Rochester, N.Y.). *Photogrammetric Engineering*, vol. 40, June 1974, p. 697-708. 44 refs.

Quantitative results of tests conducted to determine the feasibility of using aerial photographic techniques for the detection and monitoring of oil slicks are presented. Three petroleum products were selected as being typical of oil pollution: gasoline, Diesel fuel, and spent automotive lubricating oil. Slicks of these products on water from the Genesee River were then photographed in several spectral regions. Significant detection capability was found in the ultraviolet and blue regions of the spectrum, less in the near-infrared, and almost none in the green and red. P.T.H.

A74-35500 **Land use mapping using ERTS multispectral imagery (Landnutzungskartierung nach ERTS-Multispektral-Bildern).** H. Helbig (Deutsche Forschungs- und Versuchsanstalt für Luft- und Raumfahrt, Institut für Satellitenelektronik, Oberpfaffenhofen, West Germany). *Bildmessung und Luftbildwesen*, vol. 42, July 1, 1974, p. 123-125. In German.

ERTS multispectral scanning imagery in three bands (green, red, and infrared) of Munich and its environs was evaluated for its use in constructing land use maps. Lakes and ponds could easily be distinguished, although narrow channels of water did not show up clearly except in those compositions where they are no longer uniquely represented (i.e. settled areas and pine forests show up at same intensity). Pine forest regions were also readily distinguishable. P.T.H.

A74-35906 * # **Application of infrared line models in the detection of atmospheric pollutants.** S. N. Tiwari (Old Dominion University, Newport News, Va.) and H. G. Reichie (NASA, Langley Research Center, Hampton, Va.). *American Institute of Aeronautics and Astronautics and American Society of Mechanical Engineers, Thermophysics and Heat Transfer Conference, Boston, Mass., July 15-17, 1974, AIAA Paper 74-651.* 8 p. 25 refs. Members, $1.50; nonmembers, $2.00.

The total absorptions of the three line profiles, Lorentz, Doppler, and Voight, are compared for a range of intervening parameters. It is found that, for the intermediate path lengths, the use of the combined Lorentz-Doppler (Voight) line profile is essential in calculating the atmospheric transmittance. The line-by-line model transmittance expression is incorporated in the atmospheric radiative flux equation. This equation, in turn, is utilized to determine the pollutant concentration in the atmosphere from the data obtained by the radiation measurement from an aircraft- or satellite-mounted instrument. (Author)

A74-37844 * # **Statistical interpretation of pollution data from satellites.** G. L. Smith, R. N. Green, and G. R. Young (NASA, Langley Research Center, Space Applications and Technology Div., Hampton, Va.). *American Institute of Aeronautics and Astronautics, Mechanics and Control of Flight Conference, Anaheim, Calif., Aug. 5-9, 1974, Paper 74-852.* 11 p. 7 refs. Members, $1.50; nonmembers, $2.00.

The NIMBUS-G environmental monitoring satellite has an instrument (a gas correlation spectrometer) onboard for measuring the mass of a given pollutant within a gas volume. The present paper treats the problem: How can this type measurement be used to estimate the distribution of pollutant levels in a metropolitan area. Estimation methods are used to develop this distribution. The pollution concentration caused by a point source is modeled as a Gaussian plume. The uncertainty in the measurements is used to determine the accuracy of estimating the source strength, the wind velocity, diffusion coefficients and source location. (Author)

N74-21845*# Boulder Area Growth Study Commission, Colo. **EXPLORING OPTIONS FOR THE FUTURE: A STUDY OF GROWTH IN BOULDER COUNTY. VOLUME 3: ENVIRONMENTAL CONSTRAINTS AND OPPORTUNITIES** Final Report
Nov. 1973 388 p refs
(Grant NGL-06-003-200)
(NASA-CR-138177; PB-226265/7GA; CPA-CO-08-00-0111-3)
Avail: NTIS HC $21.50 CSCL 13B

An environmental inventory of Boulder County and land use recommendations derived from the inventory are given. The inventory, which includes data on bedrock and surficial geology, vegetation, climate, soils, mineral and water resources, wildlife, and natural hazards, was compiled from existing data and augmented, where necessary, by information obtained from high altitude aircraft imagery. GRA

N74-21901# Battelle-Northwest, Richland, Wash.
EVALUATION OF A HIGH VOLUME CASCADE PARTICLE IMPACTOR SYSTEM
G. A. Sehmel Sep. 1973 14 p refs Presented at Am. Chem. Soc. 2d Joint Conf. on Sensing of Environ. Pollutants, Washington, D. C., 10 Dec. 1973
(Contract AT(45-1)-1830)
(BNWL-SA-4677; Conf-731205-2) Avail: NTIS HC $3.00

Commercially available 20 cfm cascade impactors were evaluated under field sampling conditions for particle sampling bias caused by interstage losses and by non-wind direction sampler orientation. An integrated sampler using an impactor and a wind direction self-orienting cowl attachment decreased particle sampling bias. Author (NSA)

N74-21967*# American Univ., Washington, D.C.
PRELIMINARY REPORT ON SAND-STREAMING IN AGADEZ AND TAHOUA DEPARTMENTS, REPUBLIC OF NIGER
N. H. MacLeod, Principal Investigator, J. S. Schubert, R. A. Finale, and D. D. Kurtz [1974] 1 p ERTS
(Contract NAS5-21889)
(E74-10442; NASA-CR-137425) Avail: NTIS HC $4.00 CSCL 08M

There are no author-identified significant results in this report.

N74-21969*# Environmental Research Inst. of Michigan, Ann Arbor. Infrared and Optics Div.
STUDY OF RECREATIONAL LAND AND OPEN SPACE USING SKYLAB IMAGERY Monthly Progress Report, Mar. 1974
Irvin J. Sattinger, Principal Investigator 10 Apr. 1974 3 p EREP
(Contract NAS9-13283)
(E74-10444; NASA-CR-137433; ERIM-103300-23-L) Avail: NTIS HC $4.00 CSCL 08B

The author has identified the following significant results. SI90B color photography has adequate resolution to detect or identify many natural and cultural features which are significant for the evaluation of recreational land and open space. The effectiveness of the interpretation could be improved if coverage were obtained at two or three different seasons so that indicators such as seasonal changes in vegetation cover or snow enhancement could aid the interpretation of land use and land cover. The degree of detail which can be observed from SI90B photography makes it useful for the following purposes: (1) Photography can be used to obtain general familiarity with a large regional area, and to study interrelationships of major natural and cultural features within the area. (2) Existing recreational facilities such as golf courses, parks, stadiums, race tracks, and marinas can be detected and identified. (3) The photography can be used for initial selection of recreation sites. (4) It would also indicate trends in population growth, which constitute one type of information needed in estimating the growth of recreation demand. The photography has only limited use for planning individual site planning of parks, golf courses, and other recreation facilities.

N74-21973*# National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, Fla.
PLANNING APPLICATIONS IN EAST CENTRAL FLORIDA Progress Report, 1 Oct. 1973 - 31 Mar. 1974
John W. Hannah, Garland L. Thomas, and Ferd Esparza, Principal Investigators 31 Mar. 1974 27 p refs Prepared in cooperation with Brevard County Planning Dept., Titusville, Fla. Original contains imagery. Original photography may be purchased from the EROS Data Center, 10th and Dakota Avenue, Sioux Falls, S. D. 57198 ERTS
(Contract NAS5-21847)
(E74-10448; NASA-TM-X-70152) Avail: NTIS HC $4.50 CSCL 08B

There are no author-identified significant results in this report.

N74-21975*# Ohio Dept. of Economic and Community Development, Columbus.
[EVALUATE THE POTENTIAL OF SKYLAB PHOTOGRAPHIC AND INFRARED IMAGERY FOR ENVIRONMENTAL QUALITY, AGRICULTURAL AND FORESTRY, AND GEOGRAPHIC APPLICATIONS IN THE STATE OF OHIO] Quarterly Progress Report, Jan. - Mar. 1974
David C. Sweet, Principal Investigator 10 Apr. 1974 18 p EREP
(NASA Order C-21372-C)
(E74-10450; NASA-CR-137439) Avail: NTIS HC $4.00 CSCL 08F

There are no author-identified significant results in this report.

N74-21997*# Geological Survey, Reston, Va. Geographic Applications Program.
URBAN AND REGIONAL LAND USE ANALYSIS: CARETS AND CENSUS CITIES EXPERIMENT PACKAGE Monthly Progress Report, Jan. - Mar. 1974
Robert H. Alexander, Principal Investigator and Valerie A. Milazzo 20 Mar. 1974 6 p EREP
(NASA Order T-5290-B)
(E74-10473; NASA-CR-136874) Avail: NTIS HC $4.00 CSCL 08B

There are no author-identified significant results in this report.

N74-21999*# Mitre Corp., McLean, Va.
INVESTIGATION OF ENVIRONMENTAL INDICES FROM THE EARTH RESOURCES TECHNOLOGY SATELLITE Final Report, Aug. 1972 - Feb. 1974
Richard S. Greeley, Principal Investigator, E. A. Ward, J. C. Elliott, E. J. Friedman, E. L. Riley, and S. Stryker Feb. 1974 393 p refs Original contains color imagery. Original photography may be purchased from the EROS Data Center, 10th and Dakota Avenue, Sioux Falls, S. D. 57198 ERTS
(Contract NAS5-21842)
(E74-10475; NASA-CR-136876; M74-37) Avail: NTIS HC $22.75 CSCL 05B

The author has identified the following significant results. Land use change, water quality, and air quality indices have been calculated from analysis of ERTS-1 multispectral scanning imagery and computer compatible tapes. Specifications have been developed and discussed for an ERTS-1 environmental monitoring system which help to serve the information needs of environmental managers at the Federal, state, regional, and local level. General conclusions of the investigation are that ERTS-1 data is very useful in land use mapping and updating to 10-15 categories, and can provide an overall measure of air and water turbidity; however, more and better ground truth and possibly additional spacecraft sensors will be required if specific air and water pollutants are to be quantified from satellite data.

N74-22007*# Ohio Dept. of Economic and Community Development, Columbus.
RELEVANCE OF ERTS TO THE STATE OF OHIO Progress Report, Jan. - Feb. 1974
David C. Sweet, Principal Investigator Feb. 1974 14 p Prepared for Battelle Columbus Labs. ERTS

(Contracts NAS5-21782; BCL-72-17/G-1793)
(E74-10483; NASA-CR-136879) Avail: NTIS HC $4.00 CSCL 08F

There are no author-identified significant results in this report.

N74-22020* California Univ., Riverside. Dept. of Earth Sciences.
USE OF SKYLAB DATA TO ASSESS AND MONITOR CHANGE IN THE SOUTHERN CALIFORNIA ENVIRONMENT; THE CALIFORNIA DESERT PROGRAM - RESOURCE INVENTORY AND ANALYSIS
Robert N. Colwell, Leonard W. Bowden, and Wes Chambers, Principal Investigators *In its* An Integrated Study of Earth Resources in the State of Calif. Based on Skylab and Supporting Aircraft Data 28 Feb. 1974 4 p Prepared in cooperation with Bureau of Land Management, Riverside, Calif. EREP

CSCL 08F

There are no author-identified significant results in this report.

N74-22022*# Environmental Research Inst. of Michigan, Ann Arbor. Infrared and Optics Div.
[INFRARED, RADAR, AND OPTICAL APPLICATIONS OF ERTS DATA] Bimonthly Report, 1 Jan. - 28 Feb. 1974
F. C. Polcyn, F. J. Thomson, M. Leonard Bryan, I. J. Sattinger, W. A. Malila, R. F. Nalepka, C. T. Wezernak, R. Horvath, and R. K. Vincent, Principal Investigators 26 Mar. 1974 36 p Original contains color imagery. Original photography may be purchased from the EROS Data Center, 10th and Dakota Avenue, Sioux Fall, S. D. 57198 ERTS
(Contract NAS5-21783)
(E74-10497; NASA-CR-136902; ERIM-193300-4-L; BMR-8) Avail: NTIS HC $5.00 CSCL 08B

There are no author-identified significant results in this report.

N74-22132# Philco-Ford Corp., Newport Beach, Calif. Aeronutronic Div.
INSTRUMENT TO MONITOR CH4, CO, AND CO2 AUTO EXHAUST Final Report
D. E. Burch and J. D. Pembrook Oct. 1973 47 p refs
(Contract EPA-68-02-0587)
(PB-226438/0GA; EPA-650-2-73-030) Avail: NTIS HC $3.00 CSCL 07D

An infrared analyzer employing gas cell correlation techniques and thermoelectrically cooled photodectors has been designed and constructed to measure the concentrations of methane, carbon monoxide, and carbon dioxide in automotive exhausts. A wide dynamic detection range is made possible by employing two different sample cell lengths for each gas. The concentrations of the three gases are measured simultaneously eand independently. Discrimination against other gases in the automotive exhaust is very good. (Modified author abstract) GRA

N74-22621# Army Engineer Waterways Experiment Station, Vicksburg, Miss.
APPLICATION OF REMOTE SENSORS TO ARMY FACILITY MANAGEMENT Final Report
Lewis E. Link, Jr. and John H. Shamburger Feb. 1974 172 p refs
(DA Proj. 4A6-62707-A-890)
(AD-775407; AEWES-TR-M-74-2) Avail: NTIS CSCL 15/5

A study was conducted to determine the feasibility of applying remote sensing techniques to Army needs for data in environmental monitoring, resource management, and master planning at multipurpose military installations in the continental United States. The environmental data requirements for these purposes were defined, and a general assessment was made of the applicability of current photographic, thermal infrared, and microwave imaging systems to obtain these data. Aerial photographic techniques were found to be the ones most generally applicable to acquisition of data relevant to basic environmental conditions. Prototype products, consisting of maps of basic environmental conditions, cultural features, and land use were produced from aerial photography of Fort Belvoir, Virginia, and a surrounding area. (Modified author abstract) GRA

N74-22973*# Mississippi State Univ., State College.
APPLICATION OF REMOTE SENSING TO STATE AND REGIONAL PROBLEMS Semiannual Progress Report, 1 Nov. 1973 - 30 Apr. 1974
C. W. Bouchillon, W. F. Miller, H. Landphair, and V. L. Zitta 30 Apr. 1974 19 p
(Grant NGL-25-001-054)
(NASA-CR-138394; SAPR-1) Avail: NTIS HC $4.00 CSCL 08B

The use of remote sensing techniques to help the state of Mississippi recognize and solve its environmental, resource, and socio-economic problems through inventory, analysis, and monitoring is suggested. Author

N74-22976*# Louisiana State Univ., Baton Rouge. Div. of Engineering Research.
REMOTE SENSING AS AN AID FOR MARSH MANAGEMENT
James G. Ragan and John H. Green (Nicholls State Univ.) Dec. 1973 33 p refs
(Grant NGL-19-001-105)
(NASA-CR-138256; AOP-4) Avail: NTIS HC $4.75 CSCL 08H

NASA aerial photography, primarily color infrared and color positive transparencies, is used in a study of marsh management practices and in comparing managed and unmanaged marsh areas. Weir locations for tidal control are recommended. Author

N74-23189# Stanford Research Inst., Menlo Park, Calif.
LIDAR STUDIES OF STACK PLUMES IN RURAL AND URBAN ENVIRONMENTS Final Report
Warren B. Johnson, Jr., Robert J. Allen, and William E. Evans Oct. 1973 112 p refs
(Contract CPA-70-49)
(PB-227347/2; EPA-650/4-73-002) Avail: NTIS HC $4.50 CSCL 14B

Experimental results are presented from field studies of smoke plume diffusion and pollution-layer structure in both rural and urban areas, using the Mark 8 mobile lidar (laser radar) system. This system was first applied to study the behavior of smoke plumes from the 250-m stacks of a large coal-burning power plant. Examples from the study of characteristic changes in plume diffusion and low-level aerosol structure resulting from time-varying meteorological conditions are presented in the form of vertical plume cross sections. Helicopter measured SO2 cross sections and the lidar-obtained smoke cross sections are compared on a case-study basis. The mobile lidar observations in urban areas reveal significant variabilities in the pollution-layer structure associated with urban effects, transitional meteorological conditions, and apparent convective influences. GRA

N74-23480*# Louisiana State Univ., New Orleans. Div. of Business and Economic Research.

APPLICATIONS OF SATURN/APOLLO AUTOMATED DATA SYSTEM CAPABILITIES TO PROBLEMS AND ENVIRONMENTAL IMPACTS OF URBAN TRANSPORTATION Final Report, 6 Oct. - 30 Nov. 1973
Gordon A. Saussy 4 Feb. 1974 7 p
(Contract NAS8-28955)
(NASA-CR-120216) Avail: NTIS HC $4.00 CSCL 13F

The work plan to achieve the objectives of this project is presented. Tasks discussed include ground truth, remotely sensed data, and the correlation of ground truth and the remotely sensed data. F.O.S.

N74-25842*# Vermont Univ., Burlington. Dept. of Geography.
ENVIRONMENTAL STUDY OF ERTS-1 IMAGERY: LAKE CHAMPLAIN AND VERMONT Final Report
A. O. Lind, Principal Investigator Apr. 1974 92 p refs Original contains color imagery. Original photography may be purchased from the EROS Data Center, 10th and Dakota Avenue, Sioux Falls, S. D. 57198 ERTS
(Contract NAS5-21753)
(E74-10517; NASA-CR-138267) Avail: NTIS HC $7.75 CSCL 08H

There are no author-identified significant results in this report.

N74-25844*# Tri-State Regional Planning Commission, New York.
INVESTIGATION OF SKYLAB IMAGERY FOR REGIONAL PLANNING Quarterly Progress Report, 22 Aug. - 31 Dec. 1973
William Harting, Principal Investigator 31 Dec. 1973 1 p EREP
(Contract NAS9-13266)
(E74-10522; NASA-CR-138271; QPR-2) Avail: NTIS HC $4.00 CSCL 08B

There are no author-identified significant results in this report.

N74-25847*# Environmental Research Inst. of Michigan, Ann Arbor.
STUDY OF RECREATIONAL LAND AND OPEN SPACE USING SKYLAB IMAGERY Monthly Progress Report, Apr. 1974
Irvin J. Sattinger, Principal Investigator 17 May 1974 2 p EREP
(Contract NAS9-13283)
(E74-10529; NASA-CR-138278; ERIM-103300-25-L) Avail: NTIS HC $4.00 CSCL 08B

There are no author-identified significant results in this report.

N74-25849*# Delaware Univ., Newark. Coll. of Marine Studies.
INVENTORIES OF DELAWARE'S COASTAL VEGETATION AND LAND-USE UTILIZING DIGITAL PROCESSING OF ERTS-1 IMAGERY Report on Significant Results
V. Klemas, Principal Investigator, D. Bartlett, R. Rogers (Bendix Corp., Ann Arbor, Mich.), and L. Reed (Bendix Corp., Ann Arbor, Mich.) 24 May 1974 2 p ERTS
(Contract NAS5-21837)
(E74-10531; NASA-CR-138280) Avail: NTIS HC $4.00 CSCL 08A

There are no author-identified significant results in this report.

N74-25885*# Colorado Univ., Boulder. Inst. of Arctic and Alpine Research.
THE APPLICATION OF SPACE TECHNOLOGY TO PRACTICAL PROBLEMS SUCH AS THOSE CURRENTLY FACING THE MOUNTAIN SECTIONS OF THE STATE OF COLORADO Semiannual Report, 1 Jan. - 30 Jun. 1974
Jack D. Ives 4 Jun. 1974 7 p refs
(Grant NGL-06-003-200)
(NASA-CR-138500) Avail: NTIS HC $4.00 CSCL 08L

Rapid growth in small Colorado mountain communities and dangers posed by development in areas that are potentially dangerous to life and property due to natural processes are studied. Special attention was given to snow avalanche, mudflow, rockfall, landslide and flood, as well as the slow continuous and frequently imperceptible form of soil creep and associated mass movement. Data are also given on the relative reliability of ERTS and Skylab imagery and conventional photography in identifying avalanche paths and run out zones. E.H.W.

N74-26861*# Tri-State Regional Planning Commission, New York.
INVESTIGATION OF SKYLAB IMAGERY FOR REGIONAL PLANNING Quarterly Progress Report, 1 Jan. - 31 Mar. 1974
William Harting, Principal Investigator 31 Mar. 1974 1 p EREP
(Contract NAS9-13266)
(E74-10523; NASA-CR-138272; QPR-3) Avail: NTIS HC $4.00 CSCL 08B

There are no author-identified significant results in this report.

N74-26863*# Cornell Univ., Ithaca, N.Y. New York State Coll. of Agriculture and Life Sciences.
EVALUATION OF SKYLAB IMAGERY AS AN INFORMATION SERVICE FOR INVESTIGATING LAND USE AND NATURAL RESOURCES (SKYLAB) Progress Report, 1-30 Apr. 1974
Ernest E. Hardy, Principal Investigator 30 Apr. 1974 2 p EREP
(Contract NAS9-13364)
(E74-10527; NASA-CR-138276) Avail: NTIS HC $4.00 CSCL 08B

There are no author-identified significant results in this report.

N74-26878*# Mississippi State Univ., State College. Inst. for Environmental Studies.
APPLICATION OF REMOTE SENSING TO STATE AND REGIONAL PROBLEMS Semiannual Progress Report, 1 Nov. 1973 - 30 Apr. 1974
C. W. Bouchillon, W. F. Miller, H. Landphair, and V. L. Zitta 30 Apr. 1974 20 p
(Grant NGL-25-001-054)
(NASA-CR-138618; SAPR-1) Avail: NTIS HC $4.00 CSCL 08B

The state of Mississippi is the task site for the Remote Sensing Applications Program which attempts to recognize and solve the state's environmental, resource, and socio-economic problems through inventory, analysis, and monitoring by appropriate remote sensing systems. Several specific projects are summarized according to objectives, accomplishments, and future plans. A terrain analysis workshop is outlined, and the staff and state agencies participating in the program are listed. A.A.D.

N74-26910*# Louisiana State Univ., Baton Rouge. Div. of Engineering Research.

REMOTE SENSING AS AN AID TO ROUTE EVALUATION FOR RELOCATED LOUISIANA HIGHWAY 1
Robert L. Thoms, Charles A. Whitehurst, and Judith Monte, A. Mar. 1974 35 p refs
(Grants NGL-19-001-097; NGL-19-001-024)
(NASA-CR-138770; DER-RM-1) Avail: NTIS HC $4.75 CSCL 08B

NASA aerial photography in the form of color infrared and color positive transparencies is used as an aid for evaluation of the route proposed for relocated Louisiana Highway 1, between LaRose and Golden Meadow, in South Louisiana. Author

N74-26940# McDonnell Aircraft Co., St. Louis, Mo. Reconnaissance Lab.
ARIAL DETECTION OF SPILL SOURCES
C. L. Rudder, A. G. Wallace, and C. J. Reinheimer Sep. 1973 32 p refs
(Contract EPA-01-0178)
(PB-228105/3; EPA-R2-73-289) Avail: NTIS MF $1.45; SOD HC $0.55 as EP1.23/2:73-289 CSCL 13B

An imagery interpretation key of the petroleum industry was developed for use with an aerial surveillance spill prevention system. Aerial baseline and stereogram photographs as well as aerial multiband, aerial oblique, and ground photographs of oil refineries were obtained for inclusion in the key. Processing systems to convert crude oil to fuel and LPG, gasoline, heavy fuel oils, lubricating oils and asphalt were identified with the help of military oil refinery interpretation keys. Three petrochemical facilities within the the refinery were also located and identified. The identification of potential spill sources as related to processing systems, product storage and disposition of by products and waste was performed. GRA

N74-26942# National Field Investigations Center, Denver, Colo.
REMOTE SENSING REPORT, SAN FRANCISCO BAY AREA, APRIL - JULY 1972. VOLUME 1
Apr. 1973 193 p
(PB-227834/9) Avail: NTIS HC $12.75 CSCL 13B

An aerial remote sensing program, requested by Region 9, was carried out in the San Francisco Bay Area in April and July 1972. The purpose of this aerial reconnaissance program was to fulfill the following objectives: industrial wastes discharges, municipal sewage dispersion and flow patterns. GRA

N74-26943# National Field Investigations Center, Denver, Colo.
REMOTE SENSING REPORT, SAN FRANCISCO BAY AREA, APRIL - JULY 1972, VOLUME 2
Apr. 1973 209 p
(PB-227835/6) Avail: NTIS HC $13.50 CSCL 13B

A series of Geological Survey topographic maps are reported for the location of industrial wastes and sewage discharge in the San Francisco Bay Area. Also included are infrared maps on thermal fields and discharge in the Bay waters. GRA

N74-27391*# Linguistic Systems, Inc., Cambridge, Mass.
ARTIFICIAL EARTH SATELLITES INVESTIGATE THE ENVIRONMENT
Yuri Y. Vasilevich Zonov Washington NASA Apr. 1974 22 p refs Transl. into ENGLISH from Priroda (Moscow), no. 12, Dec. 1973 p 2-9
(Contract NASw-2482)
(NASA-TT-F-15409) Avail: NTIS HC $4.25 CSCL 22B

The uses of artificial satellites for studying the processes in the spread of industrial wastes in nature and for achieving inspections for compliance with legal requirements are discussed. The development of sensors for detecting gaseous emissions from industrial processes is examined. The use of satellite-borne photography for determining the nature of ocean currents and the diffusion processes of turbid waters is examined. Photographic samples of various geographical regions to show pollution detection are included. Author

N74-27768*# Minnesota State Planning Agency, St. Paul.
LAND USE MANAGEMENT IN MINNESOTA Progress Report, 1 Mar. - 30 Apr. 1974
Joseph E. Sizer, Principal Investigator 30 Apr. 1974 3 p ERTS
(Contract NAS5-21801)
(E74-10547; NASA-CR-138296) Avail: NTIS HC $4.00 CSCL 08B

There are no author-identified significant results in this report.

N74-27771*# Environmental Research Inst. of Michigan, Ann Arbor. Infrared and Optics Div.
OIL POLLUTION DETECTION, MONITORING AND LAW ENFORCEMENT Quarterly Progress Report
Robert Horvath, Principal Investigator 19 Jun. 1974 2 p EREP
(Contract NAS9-13281)
(E74-10559; NASA-CR-138634; ERIM-101800-12-P; QPR-5) Avail: NTIS HC $4.00 CSCL 13B

There are no author-identified significant results in this report.

N74-27805*# Louisiana State Univ., Baton Rouge. Div. of Engineering Research.
REMOTE SENSING AS AN AID TO ROUTE EVALUATION
(NASA-CR-138748; AOP-2) Avail: NTIS HC $5.50 CSCL 08B

Aerial photography in the form of color infrared and color positive transparencies was used as an aid for evaluation of the route proposed for relocated Louisiana Highway 1, between LaRose and Golden Meadows, in South Louisiana. Author

N74-28824*# Geological Survey, Reston, Va.
URBAN AND REGIONAL LAND USE ANALYSIS: CARETS AND CENSUS CITIES EXPERIMENT PACKAGE Monthly Progress Report, Apr. 1974
Robert Alexander, Principal Investigator, Harry F. Lins, Jr., and James R. Wray 20 Apr. 1974 4 p EREP
(NASA Order T-5290-B)
(E74-10581; NASA-CR-138686) Avail: NTIS HC $4.00 CSCL 08B

The author has identified the following significant results. A number of likely applications and follow-on analyses are suggested by the census cities evaluation of ERTS-1 and Skylab data. Some of these applications are: (1) estimate water use requirements; (2) define urban expansion; (3) document the pattern of residential development and assess quality of residential environment; (4) project future population densities, and estimate changes in population distribution between censuses; (5) assess environmental impact resulting from gradual as well as catastrophic changes.

N74-28826*# Dartmouth Coll., Hanover, N.H. Dept. of Geography.
LAND USE IN NORTHERN MEGALOPOLIS Progress Report
Robert B. Simpson, Principal Investigator 10 Jun. 1974 3 p ref ERTS

(Contract NAS5-21749)
(E74-10583; NASA-CR-138688; PR-10) Avail: NTIS HC $4.00 CSCL 08B

There are no author-identified significant results in this report.

N74-28832*# Delaware Univ., Newark. Coll. of Marine Studies.
INVENTORIES OF DELAWARE'S COASTAL VEGETATION AND LAND-USE UTILIZING DIGITAL PROCESSING OF ERTS-1 IMAGERY
V. Klemas, Principal Investigator, D. Bartlett, R. Rogers, and L. Reed 19 Apr. 1974 5 p refs Presented at the 9th Intern. Symp. on Remote Sensing of Environ., Ann Arbor, Mich., 15-19 Apr. 1974 Prepared in cooperation with Bendix Corp., Ann Arbor, Mich. ERTS
(Contract NAS5-21837)
(E74-10590; NASA-CR-138699) Avail: NTIS HC $4.00 CSCL 08A

The author has identified the following significant results. Analysis of ERTS-1 color composite images using analogy processing equipment confirmed that all the major wetlands plant species were distinguishable at ERTS-1 scale. Furthermore, human alterations of the coastal zone were easily recognized since such alterations typically involve removal of vegetative cover resulting in a change of spectral signature. The superior spectral resolution of the CCTs as compared with single band or composite imagery has indeed provided good discrimination through digital analysis of the CCTs with the added advantage of rapid production of thematic maps and data.

N74-28866*# Geological Survey, Reston, Va. Geographic Applications Program.
SOME FINDINGS ON THE APPLICATIONS OF ERTS AND SKYLAB IMAGERY FOR METROPOLITAN LAND USE ANALYSIS
Robert H. Alexander, Principal Investigator and Valerie A. Milazzo 4 Jun. 1974 17 p refs Presented at 9th Intern. Symp. on Remote Sensing of Environment, Ann Arbor Mich., 15-19 Apr. 1974 Orginal contains imagery. Orginal photography may be purchased from the EROS Data Center 10th and Dakota Avenue, Sioux Falls, S. D. 57198 ERTS and EREP
(NASA Order T-5290-B)
(E74-10630; NASA-CR-138740) Avail: NTIS HC $4.00 CSCL 08B

The author has identified the following significant results. Work undertaken on a three-sensor land use data evaluation for a portion of the Phoenix area is reported. Analyses between land use data generated from 1970 high altitude photography and that detectable from ERTS and Skylab, especially in terms of changes in land use indicate that ERTS and Skylab imagery can be used effectively to detect and identify areas of post-1970 land use change, especially those documenting urban expansion at the rural-urban fringe. Significant preliminary findings on the utility of ERTS and Skylab data for metropolitan land use analysis, substantiated by evaluation with 1970 and 1972 ground control land use data are reported. Author

N74-28877*# Cornell Univ., Ithaca, N.Y. New York State Coll. of Agriculture and Life Sciences.
EVALUATION OF SKYLAB IMAGERY AS AN INFORMATION SERVICE FOR INVESTIGATING LAND USE AND NATURAL RESOURCES (SKYLAB) Progress Report, 1-31 Jun. 1974
Ernest E. Hardy, Principal Investigator 31 Jun. 1974 3 p EREP
(Contract NAS9-13364)
(E74-10644; NASA-CR-138826) Avail: NTIS HC $4.00 CSCL 08B

There are no author-identified significant results in this report.

N74-28878*# Environmental Research Inst. of Michigan, Ann Arbor.
STUDY OF RECREATIONAL LAND AND OPEN SPACE USING SKYLAB IMAGERY Monthly Progress Report, May 1974
Irvin J. Sattinger, Principal Investigator 1 Jul. 1974 2 p EREP
(Contract NAS9-13283)
(E74-10645; NASA-CR-138827; ERIM-103300-28-L) Avail: NTIS HC $4.00 CSCL 08B

There are no author-identified significant results in this report.

N74-28936*# National Aeronautics and Space Administration. Lewis Research Center, Cleveland, Ohio.
IN SITU MEASUREMENT OF PARTICULATE NUMBER DENSITY AND SIZE DISTRIBUTION FROM AN AIRCRAFT
Daniel Briehl 1974 13 p refs Presented at 2d Intern. Conf. on Environ. Impact of Aerospace Operation in the High Atmosphere, San Diego, 8-10 Jul. 1974; sponsored by Am. Meteorol. Soc. and AIAA
(NASA-TM-X-71577; E-8027) Avail: NTIS HC $3.00 CSCL 14B

Commercial particulate measuring instruments were flown aboard the NASA Convair 990. A condensation nuclei monitor was utilized to measure particles larger than approximately 0.003 micrometers in diameter. A specially designed pressurization system was used with this counter so that the sample could be fed into the monitor at cabin altitude pressure. A near-forward light scattering counter was used to measure the number and size distribution particles in the size range from 0.5 to 5 micrometers and greater in diameter. Author

03
GEODESY AND CARTOGRAPHY

Includes mapping and topography.

A74-31445 # **Establishing an automated system for process control of aerial photogeodesic and cartographic production (O sozdanii avtomatizirovannoi sistemy upravleniia tekhnologicheskimi protsessami aerofotogeodezicheskogo i kartograficheskogo proizvodstva).** A. N. Lobanov and I. G. Zhurkin. *Geodeziia i Kartografiia,* Mar. 1974, p. 37-45. 7 refs. In Russian.

A74-32475 # **Experiments in complex interpretation of aerial photographs (Opyt kompleksnogo deshifrirovaniia aerosnimkov).** L. S. Bogomazov. *Geodeziia i Kartografiia,* Apr. 1974, p. 38-40. In Russian.

Discussion of work in topographic aerial mapping combined with the identification of arable areas and of areas of interest for surveyers, which was undertaken for the production of a revised 1:10,000 map of a densely populated highly developed flat-land intersected by numerous smaller and larger rivers and bordered on by sea coast. It is demonstrated how time and labor can be saved by applying some suitable mapping and interpretation techniques in completing this complex work. V.Z.

A74-33905 # **Cloud shadow calculation for space survey modeling of the earth surface (Raschet tenei oblachnosti pri modelirovanii kosmicheskoi s'emki zemnoi poverkhnosti).** B. V. Vinogradov (Akademiia Nauk SSSR, Institut Geografii, Moscow, USSR) and A. B. Vinogradov (Leningradskii Gosudarstvennyi Universitet, Leningrad, USSR). *Meteorologiia i Gidrologiia,* Apr. 1974, p. 37-42. In Russian.

An analytical formula is derived for the relation between a sporadic cumulus cloud cover, the height of the sun, and the additional earth surface area overcast by the cloud shadow. The formula is used to select optimal cloud and cloud shadow conditions for sun-synchronized earth resources survey satellites. Sun's elevation angles from 40 to 45 deg are found to be optimal for earth resources surveys from sun-synchronized satellites. V.Z.

A74-33906 # **Cloud cover effect during earth surface feature identification by visual and photographic observations from space (Vliianie oblachnosti na raspoznavanie zemnoi poverkhnosti pri vizual'nykh nabliudeniiakh i fotografirovanii iz kosmosa).** B. V. Vinogradov, V. B. Lipatov, and V. I. Sevast'ianov (Akademiia Nauk SSSR, Institut Geografii, Moscow, USSR). *Meteorologiia i Gidrologiia,* Apr. 1974, p. 43-50. In Russian.

Sevastianov's visual observations of the earth surface during Soiuz-9 orbiting from 1 to 19 of June, 1970, are discussed with particular attention to the adverse effects of sporadic clouds and their shadows on his capability to recognize surface features. Photographs of the Sal steppe in the Northern Caucasus are analyzed to show how photograph decoding and interpretation can be impeded by the presence of cloud and their shadows. A procedure for reconstruction of earth surface pictures obscured by clouds and cloud shadows is described. V.Z.

A74-35133 **Synthetic interferometer radar for topographic mapping.** L. C. Graham (Goodyear Aerospace Corp., Litchfied Park, Ariz.). *IEEE, Proceedings,* vol. 62, June 1974, p. 763-768. 7 refs. USAF-Army-supported research.

The production of topographic maps requires two kinds of information. First, the detail to be placed on the map sheet must be identified. Second, the positions of the various objects and features must be measured in three dimensions. Current airborne radar technology provides the means to satisfy both of these requirements in adverse weather and at any time, day or night. Radar used specifically for this purpose employs synthetic-aperture techniques to obtain fine resolution measurement in two dimensions and interferometry to obtain the third measurement. (Author)

A74-35136 * **The S-193 radar altimeter experiment.** J. T. McGoogan (NASA, Wallops Station, Wallops Island, Va.), L. S. Miller, G. S. Brown, and G. S. Hayne (Applied Science Associates, Inc., Apex, N.C.). *IEEE, Proceedings,* vol. 62, June 1974, p. 793-803. 25 refs.

The Skylab S-193 altimeter experiment utilizes a 10- and 100-ns pulse length, 13.9-GHz earth-pointed radar system to obtain earth-surface backscatter measurements from the Skylab spacecraft. Objectives of the experiment are to obtain precision measurements of surface profile for uses in geodesy, oceanography, and earth physics, and to measure radar-signal characteristics from an earth-orbit geometry to provide design information for future radar remote-sensors. The technical approach is that of measuring the power impulse response of the scattering surface. The hardware is designed to operate in five modes: waveform or impulse-response measurement and altitude determination; radar cross-section experiment; signal correlation experiment; 10-nsec pulse-compression evaluation; and nadir-seeker experiment. (Author)

A74-36376 **Photometry of the planet earth from Zond space stations.** N. P. Lavrova and A. B. Sandomirskii (Moskovskii Institut Inzhenerov Geodezii, Aerofotos'emki i Kartografii, Moscow, USSR). *(Geodeziia i Aerofotos'emka,* no. 4, 1972, p. 109-114.) *Geodesy and Aerophotography,* no. 4-6, 1972, p. 258-261. 7 refs. Translation.

A74-36379 **Mathematical analysis of the results of measurements in the orbital method of satellite geodesy.** M. S. Urmaev (Moskovskii Institut Inzhenerov Geodezii, Aerofotos'emki i Kartografii, Moscow, USSR). *(Geodeziia i Aerofotos'emka,* no. 5, 1972, p. 7-15.) *Geodesy and Aerophotography,* no. 4-6, 1972, p. 280-284. 6 refs. Translation.

A74-36382 **Analytic rectification for the compilation of topographic maps and photomaps in a given projection.** A. N. Lobanov and I. G. Zhurkin (Moskovskii Institut Inzhenerov Geodezii, Aerofotos'emki i Kartografii, Moscow, USSR). *(Geodeziia i Aerofotos'emka,* no. 5, 1972, p. 79-88.) *Geodesy and Aerophotography,* no. 4-6, 1972, p. 315-319. 5 refs. Translation.

A74-36384 **Geodesy and space.** L. P. Pellinen (Tsentral'nyi Nauchno-Issledovatel'skii Institut Geodezii, Aerofotos'emki i Kar-

tografii, Moscow, USSR). *(Geodeziia i Aerofotos'emka,* no. 6, 1972, p. 31-38.) *Geodesy and Aerophotography,* no. 4-6, 1972, p. 356-360. 18 refs. Translation.

A74-36385 Development of gravimetry and the theory of the figure of the earth. P. F. Shokin and B. P. Shimbirev (Moskovskii Institut Inzhenerov Geodezii, Aerofotos'emki i Kartografii, Moscow, USSR). *(Geodeziia i Aerofotos'emka,* no. 6, 1972, p. 49-57.) *Geodesy and Aerophotography,* no. 4-6, 1972, p. 365-369. 8 refs. Translation.

A74-36386 Photographic experiments during space flights of several days duration. V. I. Sevast'ianov. *(Geodeziia i Aerofotos'emka,* no. 6, 1972, p. 69-71.) *Geodesy and Aerophotography,* no. 4-6, 1972, p. 374, 375. Translation.

N74-21965*# Bendix Corp., Ann Arbor, Mich. Aerospace Systems Div.
AUTOMATED LAND-USE MAPPING FROM SPACECRAFT DATA Special Report
Phillip E. Chase, Principal Investigator, Robert H. Rogers, and Larry E. Reed Mar. 1974 16 p refs Original contains imagery. Original photography may be purchased from the EROS Data Center, 10th and Dakota Avenue, Sioux Falls, S. D. 57198 ERTS
(Contract NAS5-21810)
(E74-10440; NASA-CR-137423) Avail: NTIS HC $4.00 CSCL 08B

The author has identified the following significant results. In response to the need for a faster, more economical means of producing land use maps, this study evaluated the suitability of using ERTS-1 computer compatible tape (CCT) data as a basis for automatic mapping. Significant findings are: (1) automatic classification accuracy greater than 90% is achieved on categories of deep and shallow water, tended grass, rangeland, extractive (bare earth), urban, forest land, and nonforested wet lands; (2) computer-generated printouts by target class provide a quantitative measure of land use; and (3) the generation of map overlays showing land use from ERTS-1 CCTs offers a significant breakthrough in the rate at which land use maps are generated. Rather than uncorrected classified imagery or computer line printer outputs, the processing results in geometrically-corrected computer-driven pen drawing of land categories, drawn on a transparent material at a scale specified by the operator. These map overlays are economically produced and provide an efficient means of rapidly updating maps showing land use.

N74-21972*# Battelle Columbus Labs., Ohio.
CALIBRATION AND EVALUATION OF SKYLAB ALTIMETRY FOR GEODETIC DETERMINATION OF THE GEOID Progress Report, 1-31 Mar. 1974
A. G. Mourad and D. M. J. Fubara, Principal Investigators 17 Apr. 1974 9 p refs EREP
(Contract NAS9-13276)
(E74-10447; NASA-CR-137436; PR-13) Avail: NTIS HC $4.00 CSCL 08E

There are no author-identified significant results in this report.

N74-21974*# Geological Survey, Reston, Va.
OVERALL EVALUATION OF SKYLAB (EREP) IMAGES FOR CARTOGRAPHIC APPLICATION Quarterly Progress Report, 1 Jan. - 31 Mar. 1974
Alden P. Colvocoresses, Principal Investigator 1 Apr. 1974 13 p refs EREP
(NASA Order S-70243-AG-2)
(E74-10449; NASA-CR-137438) Avail: NTIS HC $4.00 CSCL 08B

The author has identified the following significant results. The importance of photomap products derived from Skylab type imagery for portrayal of previously unmapped (or poorly mapped) areas is recognized as truly significant. Updating of maps of any scale from Skylab type imaging can only be accomplished on a selective basis. Relative positional accuracy commensurate with 1:100,000 scale (SI90A) or even 1:50,000 (S190B) is considered correct. However, many features required on such maps cannot be properly identified or classified from such imagery. The comprehensive updating of larger scale maps requires supplementary photography or ground truth.

N74-21987*# Naval Research Lab., Washington, D.C.
TERRAIN PROPERTIES AND TOPOGRAPHY FROM SKYLAB ALTIMETRY Monthly Progress Report, Feb. 1974
Allan Shapiro, Principal Investigator 2 Apr. 1974 3 p EREP
(NASA Order T-4716-B)
(E74-10462; NASA-CR-137451) Avail: NTIS HC $4.00 CSCL 08E

There are no author-identified significant results in this report.

N74-21995*# Geological Survey, Reston, Va.
THE CARTOGRAPHIC APPLICATION OF ERTS/RBV IMAGERY IN POLAR REGIONS Progress Report, 1 Jan. - 28 Feb. 1974
William R. MacDonald, Principal Investigator 1 Mar. 1974 3 p ERTS
(NASA Order S-70243-AG-2)
(E74-10470; NASA-CR-136871) Avail: NTIS HC $4.00 CSCL 08B

The author has identified the following significant results. Preliminary analysis of the late 1973-74 Antarctic imagery, when compared to 1972-73 imagery and existing map sources, clearly shows changes in the ice fronts, glacier movement, and the existence of possible new geographical features.

N74-22021*# Geological Survey, Reston, Va.
INVESTIGATION OF SKYLAB IMAGERY FOR APPLICATION TO THEMATIC MAPPING Quarterly Progress Report, 1 Jan. - 31 Mar. 1974
Doyle G. Smith, Principal Investigator 15 Apr. 1974 2 p EREP
(NASA Order T-4649-B)
(E74-10496; NASA-CR-136882) Avail: NTIS HC $4.00 CSCL 08B

There are no author-identified significant results in this report.

N74-22058*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
STRATEGIES FOR ESTIMATING THE MARINE GEOID FROM ALTIMETER DATA
P. Argentiero, W. D. Kahn, and R. Garza-Robles Apr. 1974 36 p refs Presented at the Natl. Spring Meeting of the Am. Geophys. Union, Washington, D. C., 8-12 Apr. 1974 Submitted for publication
(NASA-TM-X-70637; X-932-74-90) Avail: NTIS HC $5.00 CSCL 08E

In processing altimeter data from a spacecraft borne altimeter to estimate the fine structure of the marine geoid, a problem is encountered. In order to describe the geoid fine structure, a large number of parameters must be employed and it is not possible to simultaneously estimate all of them. Unless the parameterization exhibits good orthogonality in the data, serious aliasing results. From simulation studies it has been found that amongst several competing parameterizations, the mean free air gravity anomaly model (i.e., Stokes' formula) exhibited promising geoid recovery characteristics. Using covariance analysis techniques, this report provides quantitative measures of the orthogonality properties associated with the above mentioned parameterization. It has been determined that a 5 deg x 5 deg area mean free air gravity anomaly can be estimated with an uncertainty of 1 mgal (40 cm undulation) provided that all free air gravity anomalies within a spherical radius of 10 arc degrees are simultaneously estimated. Author

N74-23032# Federal Highway Administration, Arlington, Va. Research and Development Demonstration Projects Div.
AERIAL ANALYTICAL TRIANGULATION Final Report
David Wolf Dec. 1973 36 p refs
(PB-227276/3; FHWA-RDDP-1-1) Avail: NTIS HC $3.25 CSCL 08B

This project, as part of the FHWA Demonstration Projects Program, was intended to demonstrate to the Arkansas Highway Department the cost savings that accrue when aerial analytical triangulation is used, rather than ground surveys alone, to develop mapping control for an actual Arkansas project. Aerial analytical trangulation is a technique for minimizing the requirement for costly ground surveys associated with the compilation of topographic maps using aerial photography. Aerial analytical triangulation utilizes a complex mathematical analysis of precise x-y coordinate measurements of artificial images, marked in the triple overlap area of a series of three, adjacent, overlapping aerial photographs, combined with a limited network of ground survey data to develop a complete network of control points for use in stereoscopic mapping. (Modified author abstract) GRA

N74-25843*# Service de la Carte de la Vegetation CNRS, Toulouse (France).
MANAGEMENT OF NATURAL RESOURCES THROUGH AUTOMATIC CARTOGRAPHIC INVENTORY Final Report, Aug. 1972 - Jan. 1974
Paul-Augustin Rey, Yves Gourinard, and Francis Cambou, Principal Investigators May 1974 64 p refs Sponsored by NASA Original contains color imagery. Original photography may be purchased from the EROS Data Center, 10th and Dakota Avenue, Sioux Falls, S. D. 57198 ERTS
(E74-10518; NASA-CR-138268; Rept-6) Avail: NTIS HC $6.25 CSCL 08B

The author has identified the following significant results. Significant correspondence codes relating ERTS imagery to ground truth from vegetation and geology maps have been established. The use of color equidensity and color composite methods for selecting zones of equal densitometric value on ERTS imagery was perfected. Primary interest of temporal color composite is stressed. A chain of transfer operations from ERTS imagery to the automatic mapping of natural resources was developed.

N74-25851*# Battelle Columbus Labs., Ohio.
CALIBRATION AND EVALUATION OF SKYLAB ALTIMETRY FOR GEODETIC DETERMINATION OF THE GEOID Progress Report, 1-30 Apr. 1974
A. G. Mourad and D. M. J. Fubara, Principal Investigators 16 May 1974 21 p refs EREP
(Contract NAS9-13276)
(E74-10533; NASA-CR-138282; PR-14) Avail: NTIS HC $4.25 CSCL 08E

The author has identified the following significant results. An analytical method for geodetic computation of the marine geoid (the geoid in the oceans) from satellite altimetry is developed and validated with data from Skylab mission SL-2. The criteria for achieving accurate scale and orientation of satellite altimetry geoid are shown to require marine geodetic control to offset systematic errors in the orbit (orientation is completely orbit dependent) and the altimeter data.

N74-25854*# Geological Survey Dept., Lobatse (Botswana).
TO ASSESS THE VALUE OF SATELLITE PHOTOGRAPHS IN RESOURCE EVALUATION ON A NATIONAL SCALE Final Report, Sep. 1972 - Apr. 1974
J. V. Hepworth, Principal Investigator and S. M. Hutton 26 Apr. 1974 39 p refs Sponsored by NASA ERTS
(E74-10536; NASA-CR-138285) Avail: NTIS HC $5.00 CSCL 08F

The author has identified the following significant results. The limit of resolution on ERTS imagery is normally acknowledged to be about 60 miles although very long features such as roads and railways which are often less than 10 miles long are easily detectable. An example is the north-south road and railway from Lobatse to Francistown. Vegetation growth from winter to summer is readily monitored on false color imagery. The limits of government ranches and special farming areas can be quite accurately ascertained from ERTS imagery. Another aspect to which ERTS imagery lends itself is the location and demarcation of bush fires, many of which were seen on the first imagery which was acquired at the end of the cold, dry season. As a whole, MSS 7 offers maximum reflectance contrast among black and white imagery and is the wavelength used most for interpretation.

N74-25856*# Geological Survey, Reston, Va.
CARTOGRAPHIC EVALUATION OF SKYLAB-A S-192 SCANNER IMAGES Quarterly Progress Report, 1 Feb. - 30 Apr. 1974
John D. McLaurin, Principal Investigator 30 Apr. 1974 3 p EREP
(NASA Order T-4111-B)
(E74-10538; NASA-CR-138287) Avail: NTIS HC $4.00 CSCL 08B

There are no author-identified significant results in this report.

N74-25890*# Kanner (Leo) Associates, Redwood City, Calif.
THE CALCULATION OF CLOUD SHADOWS IN MODELING OF THE EARTH'S SURFACE FROM SPACE SURVEY
B. V. Vinogradov and A. B. Vinogradov Washington NASA Jun. 1974 10 p refs Transl. into ENGLISH from Meteorol. i Gidrol. (Moscow), no. 4, Apr. 1974 p 37-42
(Contract NASw-2481)
(NASA-TT-F-15685) Avail: NTIS HC $4.00 CSCL 04A

An analytical formula is presented which describes the relations between sporadic cumulus cloud coverage of the earth's surface, sun height, and additional coverage by cloud shadows and area which can be inspected. It is found that a sun height of about 40-45 deg is the optimum for surveys of earth resources from a sun synchronous satellite. Author

N74-25902# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
SPACE RESEARCH. INVESTIGATION OF THE GRAVITATIONAL FIELDS AND THE SHAPE OF THE EARTH, OTHER PLANETS AND THE MOON BY OBSERVATIONS FROM SPACE VEHICLES
L. P. Pellinen Jan. 1974 88 p refs Transl. into ENGLISH from Issled Kosmicheskogo Prostranstva (USSR), 1972, p 10-180

(AD-774398; FTD-MT-24-775-73) Avail: NTIS CSCL 08/5

Contents: Artificial satellites employed for determining the figure and the gravitational field of the earth; Methods of precise observations of artificial earth satellites; Geometric satellite plottings; The theory of artificial earth satellites motion in the gravitational field of the earth; Dynamic conclusions from artificial earth satellite; Fundamental geodetic constants; The orbit, gravitat field and figure on the moon; Determining the figures and the gravitational fields of the major planets. GRA

N74-25905# Army Foreign Science and Technology Center, Charlottesville, Va.

COMPLEX OF PROGRAMS FOR COMPUTING CO-ORDINATES OF PHOTOGRAPHIC POINTS ON ELECTRONIC COMPUTERS USING RESULTS OF RADIOGEODESIC MEASUREMENTS

V. N. Balandin 7 Nov. 1973 5 p Transl. into ENGLISH from Geodez. i Kartograf (Moscow), no. 9, 1971 p 47-48

(AD-776104; FSTC-HT-23-1266-72) Avail: NTIS CSCL 08/5

In 1970 the applied research laboratory of Soyuzmarkshtrest jointly with the aeromethod laboratory of the Oceanographic Institute developed a complex of computer programs for the computation of systematic co-ordinates of the photographing reference points from the results of measurement performed with the aid of radiogeodesic systems, acting on the principle of radio range, radio log, and phase probe. The programs are written in ALGOL-60 language and may be used for the electronic computers M-220, BESM-3, BESM-4, BESM-6. GRA

N74-26869*# Ohio State Univ. Research Foundation, Columbus. Dept. of Geodetic Science.

BASIC RESEARCH AND DATA ANALYSIS FOR THE NATIONAL GEODETIC SATELLITE PROGRAM AND FOR THE EARTH AND OCEAN PHYSICS APPLICATION PROGRAM Semiannual Status Report, Jul. - Dec. 1973

Jan. 1974 117 p refs

(Grants NGL-36-008-093; NGL-36-008-204; OSURF Proj. 2514; OSURF Proj. 3820-A1)

(NASA-CR-138671; SASR-13) Avail: NTIS HC $9.00 CSCL 05B

Accomplishments in the continuing programs are reported. The data were obtained in support of the following broad objectives: (1) to provide a precise and accurate geometric description of the earth's surface; (2) to provide a precise and accurate mathematical description of the earth's gravitational field; and (3) to determine time variations of the geometry of the ocean surface, the solid earth, the gravity field, and other geophysical parameters. Author

N74-27362*# Smithsonian Astrophysical Observatory, Cambridge, Mass.

THE 1973 SMITHSONIAN STANDARD EARTH (3)

E. M. Garoschkin, ed. 28 Nov. 1973 405 p refs

(Grant NGR-09-015-002)

(NASA-CR-138586; SAO-Special-Rept-353; SAO-311-002) Avail: NTIS HC $23.25 CSCL 22C

The origins of the satellite geodesy program are described, starting with the International Geophysical Year, continuing through a number of international programs, and culminating with the National Geodetic Satellite Program. The philosophical basis for the Baker-Nunn camera and the laser ranging system, the evolution of international scientific cooperation, and the significance of the results are discussed. Author

N74-27766 Kansas Univ., Lawrence.

SMALL SCALE LAND USE MAPPING WITH RADAR IMAGERY Ph.D. Thesis

Floyd Merl Henderson 1973 176 p

Avail: Univ. Microfilms Order No. 74-12571

The purpose of this study was to investigate the utility of side-looking airborne radar (SLAR) for general land use mapping at small scale (1:250,000 and smaller) and to obtain an idea of the consistency with which certaintype of borders and regions could be delimited from radar imagery by a given technique or methodology. A strip of unclassified radar imagery was selected that covered several heterogeneous land use regions and was accessible for field verification. The strip selected imaged an area approximately 12 miles wide and 1500 miles long from eastern Minnesota to northern Utah. The imagery was examined to ascertain which features visible on the imagery could be used to develop keys for use regionalization. As a result, the following combination of physical and cultural characteristics were selected: (1) surface configuration; (2) vegetation; (3) field pattern; (4) settlement pattern; and (5) road network. Dissert. Abstr.

N74-27778*# Environmental Research Inst. of Michigan, Ann Arbor. Infrared and Optics Div.

[WETLANDS MAPPING OF MICHIGAN FROM ERTS DATA] Bimonthly Report, 1 Mar. - 30 Apr. 1974

F. C. Polcyn, F. J. Thomson, M. Leonard Bryan, I. J. Sattinger, W. A. Malila, R. F. Nalepka, C. T. Wezer, R. Horvath, and R. K. Vincent, Principal Investigators 30 Apr. 1974 4 p ERTS

(Contract NAS5-21783)

(E74-10588; NASA-CR-138693; BMR-9) Avail: NTIS HC $4.00 CSCL 08B

There are no author-identified significant results in this report.

N74-27781*# Kansas Univ. Center for Research, Inc., Lawrence. Remote Sensing Lab.

GROUND PATTERN ANALYSIS IN THE GREAT PLAINS Bimonthly Progress Report, 1 Feb. - 30 Mar. 1974

John C. Davis, Fawwaz T. Ulaby, Principal Investigators, and James L. McNaughton Mar. 1974 9 p refs ERTS

(Contract NAS5-21822)

(E74-10595; NASA-CR-138704; Rept-2266-10) Avail: NTIS HC $4.00 CSCL 08B

The author has identified the following significant results. Spatial frequency analysis of ERTS-1 images appears to be useful in discriminating between large scale ground patterns in Kansas. Using parameters derived from the optical data processing of ERTS-1 images, sample areas from large physiographic categories have been accurately identified.

N74-27783*# Naval Research Lab., Washington, D.C.

TERRAIN PROPERTIES AND TOPOGRAPHY FROM SKYLAB ALTIMETRY Monthly Progress Report, Apr. 1974

Allan Shapiro, Principal Investigator 11 Jun. 1974 1 p EREP

(NASA Order T-4716-B)

(E74-10597; NASA-CR-138706) Avail: NTIS HC $4.00 CSCL 08B

There are no author-identified significant results in this report.

N74-27788*# Battelle Columbus Labs., Ohio.

CALIBRATION AND EVALUATION OF SKYLAB ALTIMETRY FOR GEODETIC DETERMINATION OF THE GEOID Progress Report, 1-31 MAy 1974

A. G. Mourad, D. M. J. Fubara, Principal Investigators, and M. B. Kuhner 17 Jun. 1974 5 p ref EREP

(Contract NAS9-13276)

(E74-10612; NASA-CR-138721; PR-15) Avail: NTIS HC $4.00 CSCL 08E

There are no author-identified significant results in this report.

N74-28821*# Nevada Univ., Reno. Mackay School of Mines.
THE GREAT BASIN INVESTIGATION Monthly Progress Report, Jun. 1974
Jack G. Quade, Principal Investigator Jun. 1974 2 p EREP (Contract NAS9-13274)
(E74-10578; NASA-CR-138683) Avail: NTIS HC $4.00 CSCL 08G

There are no author-identified significant results in this report.

N74-28822*# Battelle Columbus Labs., Ohio.
CALIBRATION AND EVALUATION OF SKYLAB ALTIMETRY FOR GEODETIC DETERMINATION OF THE GEOID Progress Report, 1-30 Jun. 1974
A. G. Mourad, D. M. J. Fubara, Principal Investigator, and M. B. Kuhner 17 Jul. 1974 4 p EREP (Contract NAS9-13276)
(E74-10579; NASA-CR-138684; PR-16) Avail: NTIS HC $4.00 CSCL 08E

There are no author-identified significant results in this report.

N74-28847*# Naval Research Lab., Washington, D.C.
TERRAIN PROPERTIES AND TOPOGRAPHY FROM SKYLAB ALTIMETRY Monthly Progress Report, May 1974
Allan Shapiro, Principal Investigator 8 Jul. 1974 1 p EREP (NASA Order T-4716-B)
(E74-10619; NASA-CR-138692) Avail: NTIS HC $4.00 CSCL 08B

There are no author-identified significant results in this report.

N74-28885*# Houston Univ., Tex. Wave Propagation Lab.
S-193 IMPULSE RESPONSE CROSS CORRELATION Progress Report, Sep. 1973 - Mar. 1974
H. S. Hayre, Principal Investigator 29 Mar. 1974 19 p EREP (Contract NAS9-13462)
(E74-10652; NASA-CR-138864; TR-74-11) Avail: NTIS HC $4.00 CSCL 05B

The author has identified the following significant results. A significant result was the realization that the phase information, normally lost in envelope detection and sampling, could have been preserved if the samples were taken at the peaks of the carrier frequency at intervals equal to a twice or an integral multiple of the integral number of its period. Thus the Skylab S193 Model 1 altimeter data does not contain phase information in accordance with the technical information obtained from NASA and Lockheed technical personnel. Another significant discovery was to learn that the eight return pulse samples don't belong to the same pulse but represent an average over many pulses.

N74-28924# Northrop Corp., Hawthorne, Calif.
HOLOGRAPHIC STEREOGRAM DISPLAY TECHNIQUES FOR THE VIEWING AND MENSURATION OF STEREO PHOTOGRAMMETRIC IMAGERY Final Report, 1 Nov. 1972 - 31 Oct. 1973
J. T. McCrickerd 30 Nov. 1973 59 p refs
(Contract DAAK02-73-C-0037; DA Proj. 4A1-61102-B-52C)
(AD-778790; NRTC-73-51R) Avail: NTIS CSCL 08/2

Holographic stereograms, holograms of stereo-pair aerial-photos, are measured to determine geographical coordinates of terrain features. The holograms are stereoscopically viewed and measured in three dimensions through a conventional binocular-eyepiece microscope. A pair of cross-hair reticles in the eyepieces give the illusion of a floating cursor which, to facilitate mensuration, can be moved throughout the breadth and depth of the 3-D terrain display. Microscope dial readings are interpreted by geometrical formulae to yield coordinates of terrain features. Measurements are made relative to reference points, which appear as a three-dimensional array in the display. Aerial photo distortions are compensated by proper placement of the points.
Author (GRA)

N74-29057 Joint Publications Research Service, Arlington, Va.
CALCULATING CLOUD SHADOWS WHEN SIMULATING A SPACE SURVEY OF THE EARTH'S SURFACE
B. V. Vinogradov and A. B. Vinogradov *In its* Meteorology and Hydrol. no. 4, 1974 (JPRS-62306) 24 Jun. 1974 p 42-48 refs Transl. into ENGLISH from Meteorol. i Gidrol. (Moscow), no. 4, 1974 p 37-42

An analytical formula is derived which describes the relation between the cover of sporadic cumulus clouds, the sun altitude and the additional cover of the earth's surface by the shadow thrown by the clouds. The sun altitude of about 40-45 degrees is optimized for surveying natural resources from sun synchronized artificial earth satellites.
Author

N74-29058 Joint Publications Research Service, Arlington, Va.
EFFECT OF CLOUDS ON RECOGNITION OF THE EARTH'S SURFACE DURING VISUAL OBSERVATIONS AND PHOTOGRAPHY FROM SPACE
B. V. Vinogradov, V. B. Lipatov, and V. I. Sevastyanov *In its* Meteorology and Hydrol. no. 4, 1974 (JPRS-62306) 24 Jun. 1974 p 49-66 refs Transl. into ENGLISH from Meteorol. i Gidrol. (Moscow), no. 4, 1974 p 43-50

Visual observations of the earth's surface by an astronaut are discussed in the presence of scattered clouds and shadows over the surface. In the example of photographing the Sal'skiye steppes, a significant reduction in the decoding possibilities is demonstrated when there are clouds and shadows from the clouds. The effect of the coverage by scattered and solid simulated clouds on the possibilities of reproducing the images of two types of targets in sections masked by the clouds and their shadows is analyzed.
Author

04
GEOLOGY AND MINERAL RESOURCES

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

A74-30710 **Heat flux estimation in geothermal areas based on the heat balance of the ground surface.** M. Sekioka (Defence Academy, Yokosuka, Kanagawa, Japan) and K. Yuhara (National Research Center for Disaster Prevention, Tokyo, Japan). *Journal of Geophysical Research*, vol. 79, May 10, 1974, p. 2053-2058. 12 refs.

A rapid method was developed for estimation of the difference between geothermal fluxes of two adjacent places, from surface temperatures and some meteorological parameters, based on a heat budget equation for simple vegetation-free ground surfaces. As this method requires simultaneous measurements of the surface temperatures at two places, an infrared radiation thermometer is the most suitable apparatus for this purpose. As an example, the distribution of the geothermal flux from a surface temperature field was estimated by scanning the Owakudani geothermal area, Hakone volcano, with the infrared radiation thermometer. The result was compared with the values of geothermal flux formerly determined by snowfall calorimetry, and it was shown that general patterns of the equi-heat-discharge line obtained by the two different methods are similar. (Author)

A74-30798 **Thermal infrared imagery of The Burning Mountain coal fire.** C. D. Ellyett and A. W. Fleming (Newcastle, University, Newcastle, Australia). *Remote Sensing of Environment*, vol. 3, no. 1, 1974, p. 79-86. 10 refs.

A74-35298 # **A superconducting airbourne mineral detection system.** W. Vogen and B. Clawson (California, University, Berkeley, Calif.). In: International Cryogenic Engineering Conference, 5th, Kyoto, Japan, May 7-10, 1974, Preprints. Volume 2. (A74-35287 17-26) Tokyo, H. Nagano, University of Tokyo, 1974, p. L6-1 to L6-5.

The development of a superconducting unicoil electromagnetic geophysical exploration system that will yield a ground conductivity map is described. The unicoil concept employs an ac superconducting coil which induces eddy currents into conductive regions in the ground that give rise to secondary magnetic fields, and at the same time serves as a detector of these fields. The ac losses in the flight coils were predicted by testing small solenoids which had similar fields and current levels. Large electrically nonconducting cryostats were developed to test the coils. The complete system will be towed by a helicopter at a height of 30 m above the ground. V.P.

A74-35499 **Comparison of geological information obtained from satellite and aerial photographs and from ground investigations in the Tibesti Mountains /Chad/ (Vergleich der geologischen Information aus Satelliten- und Luftbildern sowie Geländeuntersuchungen im Tibesti-Gebirge /Tschad/).** F. K. List, D. Helmcke, and N. W. Roland (Institut für angewandte Geologie, Berlin, West Germany). *Bildmessung und Luftbildwesen*, vol. 42, July 1, 1974, p. 116-122. 22 refs. In German.

ERTS-1 multispectral scanning imagery of the Tibesti Mountains was interpreted along with aerial photography of the same region. It was found that certain elements of image interpretation, such as grey tone and texture, play a greater role in the interpretation of satellite pictures than that of aerial photographs. On the basis of some examples, it is shown that satellite imagery may provide a good deal of additional geological information, especially in unfamiliar areas such as the Tibesti Mountains. P.T.H.

A74-36437 * **Geophysical subsurface probing with radio-frequency interferometry.** J. A. Kong, L. Tsang, and G. Simmons (MIT, Cambridge, Mass.). *(International Union of Radio Science, Symposium, Williamsburg, Va., Dec. 15, 1972.) IEEE Transactions on Antennas and Propagation*, vol. AP-22, July 1974, p. 616-620. 20 refs. Contract No. NAS9-11540; Grant No. DAAB07-71-C-0300.

The radio-frequency interferometry method can be used to probe interiors of celestial bodies and terrestrial areas with low conductivity. In order to interpret the interference patterns, a theoretical study is made of the electromagnetic fields due to a dipole antenna on the surface of a horizontally stratified n-layered medium. Three approaches are used to calculate the interference patterns: direct numerical integration, asymptotic evaluation by the saddle point method, and a residue series approach. The asymptotic approach leads to the geometrical-optics interpretation. The residue approach leads to modal analysis. The validity of the formulation is checked by comparisons with analog model tank experiments and actual field data obtained from glaciers. (Author)

N74-21959*# Nevada Univ., Reno. Mackay School of Mines.
THE GREAT BASIN INVESTIGATION Monthly Progress Report, Apr. 1974
Jack G. Quade, Principal Investigator Apr. 1974 2 p EREP
(Contract NAS9-13274)
(E74-10499; NASA-CR-136904) Avail: NTIS HC $4.00 CSCL 08E

There are no author-identified significant results in this report.

N74-21980*# Iowa Univ., Iowa City. Dept. of Geology.
EXPERIMENT TO EVALUATE FEASIBILITY OF UTILIZING SKYLAB-EREP REMOTE SENSING DATA FOR TECTONIC ANALYSIS OF THE BIGHORN MOUNTAINS REGION, WYOMING-MONTANA Quarterly Progress Report, 1 Jan. - 31 Mar. 1974
Richard A. Hoppin, Principal Investigator 15 Apr. 1974 4 p EREP
(Contract NAS9-13313)
(E74-10455; NASA-CR-137444) Avail: NTIS HC $4.00 CSCL 08F

The author has identified the following significant results. Analysis of SL-3, S-190A, and S-190B color frames indicates two sets of linears obliquely cutting across the east-west trending Owl Creek-Bridger uplifts. A northwest set of faults and folds has been mapped previously but the imagery indicates some changes and addition of detail can be made. A less pronounced east-northeast set of linear alignments (drainage segments, lithologic contacts, possible faults) extends into the southeast part of the Big Horn Basin.

N74-21989*# South Carolina State Development Board, Columbia.
APPLICATION OF MULTISPECTRAL PHOTOGRAPHY TO MINERAL AND LAND RESOURCES OF SOUTH CAROLINA Quarterly Progress Report

Norman K. Olson, Principal Investigator 5 Apr. 1974 18 p EREP
(Contract NAS8-29617)
(E74-10464; NASA-CR-137453; QPR-3) Avail: NTIS HC $4.00 CSCL 08G
There are no author-identified significant results in this report.

N74-21990*# Wolf Research and Development Corp., Pocomoke City, Md.
APPLICABILITY OF SKYLAB REMOTE SENSING FOR DETECTION AND MONITORING OF SURFACE MINING ACTIVITIES Quarterly Progress Report, 1 Jan. - 31 Mar. 1974
R. L. Brooks, Principal Investigator and J. D. Pennewell Apr. 1974 7 p EREP
(Contract NAS9-13310)
(E74-10465; NASA-CR-136866; QPR-4) Avail: NTIS HC $4.00 CSCL 08I
There are no author-identified significant results in this report.

N74-21992*# Geological Survey, Reston, Va.
SATELLITE GEOLOGICAL AND GEOPHYSICAL REMOTE SENSING OF ICELAND Progress Report, 1 Sep. 1973 - 28 Feb. 1974
Richard S. Williams, Jr., Principal Investigator 1 Mar. 1974 49 p refs ERTS
(NASA Order S-70243-AG)
(E74-10467; NASA-CR-136868) Avail: NTIS HC $5.50 CSCL 08G
The author has identified the following significant results. ERTS-1 imagery provides sufficient resolution to discern two effects of geothermal activity at the Namafjall geothermal area: snowmelt anomalies and delineation of altered ground. The fallout pattern of tephra from Hekla's 1970 volcanic eruption can be mapped where sufficient depth of deposition destroyed the vegetation. Lava flows from the volcanic eruptions at Askja and Hekla can be delineated. Low sun-angle imagery of snow-covered terrain has permitted the mapping of new structural and volcanic features beneath the icecaps. Coastline changes on the islands of Surtsey and Heimaey can be mapped. Variations of sediment plumes from glacial rivers on the south coast give a qualitative indication of seasonal changes in melting rates of glaciers. ERTS-1 imagery has been shown to be especially amenable to portrayal of changing glaciological phenomena: surging glaciers, collapse features in icecaps caused by subglacial volcanic (?) and geothermal activity and resulting jokulhlaups, and variations in size of glacier-margin lakes. A fifth vegetation class has now been added: lichen-covered bedrock. The high latitude permits more precise analysis of landforms, vegetation distribution, occurrence of snow cover, glaciers, and geologic structure.

N74-22004*# Geological Survey, Denver, Colo.
REMOTE SENSING GEOPHYSICS FROM SKYLAB Monthly Report, Jan. 1974
Kenneth Watson, Principal Investigator Jan. 1974 3 p EREP
(NASA Order T-6555-B)
(E74-10480; NASA-CR-136883) Avail: NTIS HC $4.00 CSCL 08E
There are no author-identified significant results in this report.

N74-22005*# Geological Survey, Denver, Colo.
REMOTE SENSING GEOPHYSICS FROM SKYLAB Monthly Report, Mar. 1974
Kenneth Watson, Principal Investigator Mar. 1974 2 p EREP
(NASA Order T-6555-B)
(E74-10481; NASA-CR-136884) Avail: NTIS HC $4.00 CSCL 05B
There are no author-identified significant results in this report.

N74-22006*# Geological Survey, Denver, Colo.
REMOTE SENSING GEOPHYSICS FROM SKYLAB Monthly Report, Feb. 1974
Kenneth Watson, Principal Investigator Feb. 1974 2 p EREP
(NASA Order T-6555-B)
(E74-10482; NASA-CR-136885) Avail: NTIS HC $4.00 CSCL 05B
There are no author-identified significant results in this report.

N74-22011*# Colorado School of Mines, Golden. Dept. of Geology.
GEOLOGIC AND MINERAL AND WATER RESOURCES INVESTIGATIONS IN WESTERN COLORADO, USING SKYLAB EREP DATA Monthly Progress Report, Mar. 1974
Kennan Lee, Principal Investigator 20 Apr. 1974 5 p refs EREP
(Contract NAS9-13394)
(E74-10487; NASA-CR-136888) Avail: NTIS HC $4.00 CSCL 08G
There are no author-identified significant results in this report.

N74-22014*# Bendix Corp., Ann Arbor, Mich. Aerospace Systems Div.
AUTOMATED STRIP-MINE AND RECLAMATION MAPPING FROM ERTS Special Report
Robert H. Rogers, Principal Investigator, Larry E. Reed (Ohio State Univ.), and Wayne A. Pettyjohn Apr. 1974 15 p Original contains imagery. Original photography may be purchased from the EROS DATA Center, 10th and Dakota Avenue, Sioux Falls, S. D. 57198 ERTS
(Contract NAS5-21762)
(E74-10490; NASA-CR-136891) Avail: NTIS HC $4.00 CSCL 08I
The author has identified the following significant results. Computer processing techniques were applied to ERTS-1 computer-compatible tape (CCT) data acquired in August 1972 on the Ohio Power Company's coal mining operation in Muskingum County, Ohio. Processing results succeeded in automatically classifying, with an accuracy greater than 90%: (1) stripped earth and major sources of erosion; (2) partially reclaimed areas and minor sources of erosion; (3) water with sedimentation; (4) water without sedimentation; and (5) vegetation. Computer-generated tables listing the area in acres and square kilometers were produced for each target category. Processing results also included geometrically corrected map overlays, one for each target category, drawn on a transparent material by a pen under computer control. Each target category is assigned a distinctive color on the overlay to facilitate interpretation. The overlays, drawn at a scale of 1:250,000 when placed over an AMS map of the same area, immediately provided map locations for each target. These mapping products were generated at a tenth of the cost of conventional mapping techniques.

N74-22479*# Smithsonian Astrophysical Observatory, Cambridge, Mass.
SKYLAB SHORT-LIVED EVENT ALERT PROGRAM Final Report
Robert A. Citron Feb. 1974 30 p
(Contract NAS9-13474)
(NASA-CR-134262) Avail: NTIS HC $4.50 CSCL 22C
During the three manned Skylab missions, the Center for Short-Lived Phenomena (CSLP) reported a total of 39 significant events to the Johnson Space Center (JSC) as part of the Skylab Short-Lived Event Alert Program. The telegraphed daily status reports included the names and locations of the events, the track number and revolution number during which the event could be observed, the time (GMT) to within plus or minus 2 sec when Skylab was closest to the event area, and the light

condition (daylight or darkness) at that time and place. The messages sent to JSC during the Skylab 4 mission also included information pertaining to ground-truth studies and observations being conducted on the events. Photographic priorities were assigned for each event. Author

N74-22954*# Colorado School of Mines, Golden. Dept. of Geology.
GEOLOGIC INFORMATION FROM SATELLITE IMAGES
Keenan Lee, Daniel H. Knepper, Principal Investigators, and Don L. Sawatzky 27 Mar. 1974 39 p refs Presented at the 3d Ann. Remote Sensing of Earth Resources Conf., Tullahoma, Tenn., 26 Mar. 1974 Original contains imagery. Original photography may be purchased from the EROS Data Center, 10th and Dakota Avenue, Sioux Falls, S. D. 57198 ERTS and EREP
(Contracts NAS9-13394; NAS5-21778; Grant NGL-06-001-015)
(E74-10507; NASA-CR-138230; Rept-74-3) Avail: NTIS HC $5.00 CSCL 08G

The author has identified the following significant results. Extracting geologic information from ERTS and Skylab/EREP images is best done by a geologist trained in photointerpretation. The information is at a regional scale, and three basic types are available: rock and soil, geologic structures, and landforms. Discrimination between alluvium and sedimentary or crystalline bedrock, and between units in thick sedimentary sequences is best, primarily because of topographic expression and vegetation differences. Discrimination between crystalline rock types is poor. Folds and fractures are the best displayed geologic features. They are recognizable by topographic expression, drainage patterns, and rock or vegetation tonal patterns. Landforms are easily discriminated by their familar shapes and patterns. It is possible to optimize the scale, format, spectral bands, conditions of acquisition, and sensor systems for best geologic interpretation. Several examples demonstrate the applicability of satellite images to tectonic analysis and petroleum and mineral exploration

N74-22955*# Colorado School of Mines, Golden. Dept. of Geology.
APPLICABILITY OF REMOTE SENSOR DATA TO GEOLOGIC ANALYSIS OF THE BONANZA TEST SITE COLORADO Semiannual Progress Report, 1 Oct. 1973 - 31 Mar. 1974
Daniel H. Knepper, Keenan Lee, Principal Investigators, R. W. Butler, J. C. Fisher, and D. Huntley May 1974 30 p refs ERTS
(Grant NGL-06-001-015)
(E74-10508; NASA-CR-138231; Rept-74-1) Avail: NTIS HC $4.50 CSCL 08G

There are no author-identified significant results in this report.

N74-22957*# Colorado School of Mines, Golden. Dept. of Geology.
AN EVALUATION OF MULTIBAND PHOTOGRAPHY FOR ROCK DISCRIMINATION
Keenan Lee, Principal Investigator and Gary L. Raines 27 Mar. 1974 38 p refs Presented at the 3d Ann. Remote Sensing of Earth Resources Conf., Tullahoma, Tenn., 26 Mar. 1974 ERTS
(Grants NGL-06-001-015; DA-ARO(D)-31-124-71-G101; DA-ARO(D)-31-124-73-G88)
(E74-10510; NASA-CR-138233; Rept-74-4) Avail: NTIS HC $5.00 CSCL 14E

The author has identified the following significant results. With the advent of ERTS and Skylab satellites, multiband imagery and photography have become readily available to geologists. The ability of multiband photography to discriminate sedimentary rocks was examined. More than 8600 in situ measurements of band reflectance of the sedimentary rocks of the Front Range, Colorado, were acquired. Statistical analysis of these measurements showed that: (1) measurements from one site can be used at another site 100 miles away; (2) there is basically only one spectral reflectance curve for these rocks, with constant amplitude differences between the curves; and (3) the natural variation is so large that at least 150 measurements per formation are required to select best filters. These conclusions are supported by subjective tests with aerial multiband photography. The designed multiband photography concept for rock discrimination is not a practical method of improving sedimentary rock discrimination capabilities.

N74-22965*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
CRYSTAL MOTION MEASUREMENT BY MEANS OF SATELLITE TECHNIQUES
Joseph W. Siry May 1973 38 p refs Presented at the Am. Geophys. Union 3d GEOP Res. Conf., Columbus, Ohio, 31 May - 1 Jun. 1973
(NASA-TM-X-70632; X-590-73-273) Avail: NTIS HC $5.00 CSCL 08E

A system for monitoring precursory crustal motions is presented. It involves a set of automated corner reflector stations tracked by means of a laser operating in the Geopause satellite. It is possible to range some three times during every Geopause pass to each of the sites in such an ensemble, weather permitting. One centimeter range data gathered during a quarter of a year can yield position component accuracies of the order of a couple of centimeters. A laser beam of a tenth of a milliradian in diameter would, illuminate a single station in such an array. A broader beam would generate reflections from several sites, yielding overlapping data. A chain or pattern of such overlapping regions can strengthen the solution for site positions. Pressure, temperature and humidity gauges can provide refraction correction data. Turnaround transponders interrogated by the Geopause radio tracking system can furnish corresponding data in excessively cloudy regions. Author

N74-25845*# Utah Univ., Salt Lake City. Dept. of Geology and Geophysics.
STUDY OF ARCUATE STRUCTURAL TRENDS IN UTAH AND NEVADA USING ERTS-1 IMAGERY Final Report
Mead LeRoy Jensen, Principal Investigator and Martha Ryder Smith 15 Jan. 1974 37 p refs Original contains imagery. Original photography may be purchased from the EROS Data Center, 10th and Dakota Avenue, Sioux Falls, S. D. 57198 ERTS
(Contract NAS5-21883)
(E74-10526; NASA-CR-138275) Avail: NTIS HC $5.00 CSCL 08G

There are no author-identified significant results in this report.

N74-25846*# California Earth Science Corp., Santa Monica.
FAULT TECTONICS AND EARTHQUAKE HAZARDS IN THE PENINSULAR RANGES, SOUTHERN CALIFORNIA Monthly Progress Report, Apr. 1974
Paul M. Merifield, Principal Investigator 6 May 1974 2 p EREP
(Contract NAS2-7698)
(E74-10528; NASA-CR-138277; MPR-11) Avail: NTIS HC $4.00 CSCL 08G

There are no author-identified significant results in this report.

N74-26859*# Rockwell International Science Center, Thousand Oaks, Calif.
IDENTIFICATION AND INTERPRETATION OF TECTONIC FEATURES FROM ERTS-1 IMAGERY Progress Report,

1 Apr. - 31 May 1974
Monem Abdel-Gawad, Principal Investigator 4 Jun. 1974 2 p ERTS
(Contract NAS5-21767)
(E74-10520; NASA-CR-138269; SC543.12PR) Avail: NTIS HC $4.00 CSCL 08G

The author has identified the following significant results. The transverse faults observed in the central Coast Ranges of California are believed to represent the remnants of a major system of shear faults older than the San Andreas system. The transverse shear system is believed to have developed in the Mesozoic when the Pacific Plate was advancing under the North American Plate. Shear faults thus developed due to unequal rates of underthrusting. This tectonic model indicates that the intrusive belt of the proto-Sierra Nevada and the belt of eugeosynclinal sedimentary belt (Franciscan group) which lay to the west were both subjected to regional left-handed shear. Later development of the San Andreas system as transform faults of the East Pacific Rise changes the tectonic style to right-lateral tangential. The model explains the peculiar distribution of the Franciscan rocks in the Diablo Range east of the San Andreas fault and in Santa Lucia Range west of Nacimiento fault and the presence of Sierra Nevada type granitic blocks in between the two faults in the Salinia block. This model is also consistent with an analysis of the Texas and Parras shears which indicates that the southwestern part of North America has been subjected to a major left-lateral regional shear before the development of the San Andreas fault system.

N74-26860*# Geological Survey, Denver, Colo.
REMOTE SENSING GEOPHYSICS FROM SKYLAB Monthly Report, May 1974
Kenneth Watson, Principal Investigator and H. A. Pohn May 1974 2 p EREP
(NASA Order T-6555-B)
(E74-10521; NASA-CR-138270) Avail: NTIS HC $4.00 CSCL 08G

There are no author-identified significant results in this report.

N74-26907*# Alaska Univ., College.
GROUND MAGNETOMETER SURVEY IN THE VALLEY OF TEN THOUSAND SMOKES, ALASKA M.S. Thesis
Marla Cave Trible May 1972 210 p refs
(Grant NGL-02-001-063)
(NASA-CR-138779) Avail: NTIS HC $13.50

A reconnaissance magnetometer survey was conducted with both total- and vertical-field magnetometers. The large, sharp, narrow total magnetic anomalies observed over a zone of relict fumaroles in Broken Mountain Valley showed spectacular agreement with the surficial geology. Such a correlation is a strong indication that accumulations of magnetic minerals have been preserved along these fissure vents at shallow depths. Since large magnetic anomalies were measured near fumarolic markings along all of the traverses, it is proposed that the retention of sublimates along fumarolic vents is common throughout the Valley. The generally concentric contours of the vertical magnetic anomaly at the head of the Valley suggest that the dome of Novarupta is merely the surficial expression of a very massive conical-shaped intrusive centered just northeast of the dome. The magnetometer survey indicates that the pyroclastics in the Valley may be over 150 meters thick. Such an estimate is compatible with the volume of eruptive material needed to compensate for the subsidence surrounding Novarupta as well as a sizable amount of other regional subsidence. Author

N74-27772*# Nevada Univ., Reno. Mackay School of Mines.
THE GREAT BASIN INVESTIGATION Monthly Progress Report, May 1974
Jack G. Quade, Principal Investigator May 1974 2 p EREP
(Contract NAS9-13274)
(E74-10561; NASA-CR-138636) Avail: NTIS HC $4.00 CSCL 08G

There are no author-indentified significant results in this report.

N74-27776*# California Earth Science Corp., Santa Monica.
FAULT TECTONICS AND EARTHQUAKE HAZARDS IN THE PENINSULAR RANGES, SOUTHERN CALIFORNIA Monthly Progress Report, May 1974
Paul M. Merifield and Donald L. Lamar, Principal Investigators 10 Jun. 1974 2 p EREP
(Contract NAS2-7698)
(E74-10565; NASA-CR-138640; MPR-12) Avail: NTIS HC $4.00 CSCL 08G

There are no author-identified significant results in this report.

N74-27782*# Environmental Research Inst. of Michigan, Ann Arbor.
MAPPING EXPOSED SILICATE ROCK TYPES AND EXPOSED FERRIC AND FERROUS COMPOUNDS FROM A SPACE PLATFORM Quarterly Report, 8 Dec. 1973 - 8 Mar. 1974
Robert K. Vincent, Principal Investigator 14 Jun. 1974 2 p EREP
(Contract NAS9-13317)
(E74-10596; NASA-CR-138705; ERIM-102000-21-L; QR-4) Avail: NTIS HC $4.00 CSCL 08G

There are no author-identified significant results in this report.

N74-27789*# Geological Survey, Denver, Colo.
EVALUATION OF ERTS-1 IMAGERY FOR MAPPING QUATERNARY DEPOSITS AND LANDFORMS IN THE GREAT PLAINS AND MIDWEST Progress Report, 1 Jul. - 31 Oct. 1973
Roger B. Morrison, Principal Investigator and George R. Hallberg (Iowa Geol. Survey, Iowa City) 1 Nov. 1973 8 p refs ERTS
(NASA Order S-70243-AG-1)
(E74-10614; NASA-CR-138723) Avail: NTIS HC $4.00 CSCL 08B

The author has identified the following significant results. Maps at 1:1 million scale exemplifying the first phase of the investigation (which consists of the identification and mapping of landform and land use characteristics and surficial geologic materials directly from the ERTS-1 images without use of additional data) were prepared. For areas that have not been mapped at 1:500,000 or larger scales, maps will provide the first moderately detailed information on landform features and surficial materials. Much of the information mapped is significant for exploration and development of ground (and, locally, petroleum) and for applications in engineering and environmental geology, including land use planning. Analysis of drainage patterns, stream-divide relations and land use patterns has revealed several possible moraine-controlled divices of middle and early Pleistocene age. One is an extension of the Cedar Bluffs moraine of southeastern Nebraska. Another of these divides may correspond to the terminus of Nebraska drift in the Kansas City study area. The trends of parts of various ancient filled valleys also have been identified by analysis of charges in width of the present stream valleys. The alinements of certain segments of stream valleys in Kansas and Missouri appear to be controlled by regional faults or other structural features.

N74-27790*# Geological Survey, Reston, Va.
IRON-ABSORPTION BAND ANALYSIS FOR THE DISCRIMINATION OF IRON-RICH ZONES Progress Report, 1 Jan. - 28 Feb. 1974

Lawrence C. Rowan, Principal Investigator 27 Mar. 1974 4 p ERTS
(NASA Order S-70243-AG-4)
(E74-10615; NASA-CR-138724) Avail: NTIS HC $4.00 CSCL 08G

There are no author-identified significant results in this report.

N74-27793*# Consiglio Nazionale delle Ricerche, Milan (Italy). Lab. per la Geofisica della Litosfera.
[VOLCANOLOGY, GEOLOGY, AND VEGETATION OF SICILY AND ITALY] Progress Report, period ending 31 Mar. 1974
R. Cassinis, G. M. Lechi, C. M. Marino, and A. M. Tonelli, Principal Investigators 8 May 1974 3 p Sponsored by NASA ERTS
(E74-10626; NASA-CR-138736; PR-1) Avail: NTIS HC $4.00 CSCL 08F

There are no author-identified significant results in this report.

N74-28814*# California Earth Science Corp., Santa Monica.
FAULT TECTONICS AND EARTHQUAKE HAZARDS IN THE PENINSULAR RANGES, SOUTHERN CALIFORNIA Monthly Progress Report, Jun. 1974
Paul M. Merifield, Principal Investigator 10 Jul. 1974 2 p ref EREP
(Contract NAS2-7698)
(E74-10570; NASA-CR-138645; MPR-13) Avail: NTIS HC $4.00 CSCL 08E

There are no author-identified significant results in this report.

N74-28816*# Wolf Research and Development Corp., Pocomoke City, Md.
APPLICABILITY OF SKYLAB REMOTE SENSING FOR DETECTION AND MONITORING OF SURFACE MINING ACTIVITIES Quarterly Progress Report, 1 Apr. - 30 Jun. 1974
R. L. Brooks, Principal Investigator and J. D. Pennewell Jul. 1974 4 p EREP
(Contract NAS9-13310)
(E74-10572; NASA-CR-138647; QPR-5) Avail: NTIS HC $4.00 CSCL 08I

There are no author-identified significant results in this report.

N74-28818*# Alaska Univ., Fairbanks. Geophysical Inst.
EVALUATION OF FEASIBILITY OF MAPPING SEISMICALLY ACTIVE FAULTS IN ALASKA Final Report, Jul. 1972 - Jan. 1974
Larry D. Gedney, Principal Investigator and James D. VanWormer 30 Apr. 1974 41 p refs Original contains imagery. Original photography may be purchased from the EROS Data Center, 10th and Dakota Avenue, Sioux Falls, S. D. 57198 ERTS
(Contract NAS5-21833)
(E74-10574; NASA-CR-138679) Avail: NTIS HC $5.25 CSCL 08B

There are no author-identified significant results in this report.

N74-28841*# Earth Satellite Corp., Berkeley, Calif.
MINERAL EXPLORATION POTENTIAL OF ERTS-1 DATA Final Report
W. A. Brewer, Principal Investigator, M. C. Erskine, Jr., R. O. Prindle, and W. T. Haenggi 4 Jun. 1974 94 p refs ERTS
(Contract NAS5-21745)
(E74-10608; NASA-CR-138717) Avail: NTIS HC $7.75 CSCL 08G

The author has identified the following significant results. ERTS-1 imagery of an area approximately 15,000 square miles in Arizona was interpreted for regional structure and tectonic units. Eight fault systems were identified by trend, of which two, northeast and northwest, are considered to be related to porphyry copper mineralization. Nine tectonic units can be identified on the imagery as distinct geological identities. The boundaries between these units can be correlated with theoretical shear directions related to the San Andreas stress system. Fourier analysis of the N 50 W fault trend indicates a fundamental spacing between Fourier energy maxima that can be related to distances between copper deposits.

N74-28842*# Geological Survey, Reston, Va.
EVALUATION OF ERTS-1 DATA APPLICATIONS TO GEOLOGIC MAPPING, STRUCTURAL ANALYSIS AND MINERAL RESOURCE INVENTORY OF SOUTH AMERICA WITH SPECIAL EMPHASIS ON THE ANDES MOUNTAIN REGION Progress Report, 1 Mar. - 30 Apr. 1974
William D. Carter, Principal Investigator 20 May 1974 6 p refs Sponsored by NASA ERTS
(E74-10609; NASA-CR-138718) Avail: NTIS HC $4.00 CSCL 08G

The author has identified the following significant results. The La Paz Mosaic and its attendant overlays serve as a model for geologic studies elsewhere in the world. The P.I. and two geologists are mapping the conterminous states at scales of 1:5000,000 and 1:1,000,000. The 1:5 million band 5 mosaic was completed in two days of analysis. The 1:1 million band sheets are being completed at the rate of one per day. Comparison of the preliminary results of the three investigators shows a high correlation of linear and curvilinear features. Comparison with magnetic and gravity data indicates that many features being mapped are deep seated structures that have been active through long periods of geologic time, perhaps dating back to the Precambrian period. A detailed analysis of the El Salvador mining district has been completed. The interpretation is extremely detailed showing a complex pattern of linear features and bedrock outcrop patterns. This is the first product from ERTS-1 to be provided by Chile and shows a high degree of expertise in image interpretation. The Chileans are enthusiastic about their results and are anxious to map the entire country using ERTS.

N74-28844*# Colorado School of Mines, Golden. Dept. of Geology.
GEOLOGIC AND MINERAL AND WATER RESOURCES INVESTIGATIONS IN WESTERN COLORADO, USING SKYLAB EREP DATA Monthly Progress Reports, Apr., May, Jun. 1974
Keenan Lee, Principal Investigator, R. M. Hutchinson, G. L. Prost, D. L. Sawatzky, R. W. Spoelhof, and J. B. Thigpen 1 Jul. 1974 63 p refs EREP
(Contract NAS9-13394)
(E74-10613; NASA-CR-138722; Rept-74-6) Avail: NTIS HC $6.25 CSCL 08F

The author has identified the following significant results. Discovery of three major north-trending, throughgoing faults in the Front Range, previously mapped only as isolated segments, demonstrates the utility of space photography and may lead to reinterpretation of the Front Range tectonic style. Faulting and alteration appear to be the most useful indicators of mineralization in central Colorado. These phenomena appear on Skylab photography as tonal lineaments and color anomalies. Twenty-three lineaments have been mapped in the San Juan Mountains, the longest of which is 156 km long. Twelve lineaments intersect or are tangent to calderas. Intrusive domes are aligned along lineaments, but calderas appear to occur at the intersections of major lineaments. Lineaments can be recognized on some EREP passes but not on other passes over the same area. The difference is attributed to solar elevation effects. Bedding attitudes can be photogeologically estimated down to surprisingly low dips, on

the order of + or - 1-2 deg, and attitudes can be subdivided easily into quantitative groups. The primary application of Skylab photography to geologic mapping in montane areas is clearly limited to regional mapping at scales smaller than 1:24,000.

N74-28848*# Consiglio Nazionale delle Ricerche, Milan (Italy). Lab. per la Geofisica della Litosfera.
[VOLCANOLOGY, GEOLOGY, AND VEGETATION OF ITALY AND SICILY] Progress Report
Roberto Cassinis, Principal Investigator 6 Jun. 1974 9 p Sponsored by NASA Original contains imagery. Original photography may be purchased from the EROS Data Center, 10th and Dakota Avenue, Sioux Falls, S. D. 57198 EREP
(E74-10620; NASA-CR-138730; PR-2) Avail: NTIS HC $4.00 CSCL 08F

There are no author-identified significant results in this report.

N74-28864*# Wyoming Univ., Laramie. Remote Sensing Lab.
SOME ILLUSTRATIONS OF THE ADVANTAGES OF IMPROVED RESOLUTION IN GEOLOGIC STUDIES
Robert S. Houston, Principal Investigator, Ronald W. Marrs, and Barbara J. Tomes 14 Jun. 1974 83 p refs Original contains color imagery. Original photography may be purchased from the EROS Data Center, 10th and Dakota Avenue, Sioux Falls, S. D. 57198 ERTS and EREP
(Contracts NAS5-21799; NAS9-13298)
(E74-10628; NASA-CR-138738) Avail: NTIS HC $7.25 CSCL 08G

There are no author-identified significant results in this report.

N74-28898# Geological Survey, Washington, D.C.
THE UNITED STATES GEOLOGICAL SURVEY
Jan. 1974 26 p Original contains color illustrations
(USGS-INF-74-2) Avail: NTIS HC $4.50

Research and management activities at this Federal fact finding agency are briefly outlined. Information acquisition and processing work centers on land surface mapping, environment maintenance, appraisal of natural resources, and supervision of oil, gas, and mineral-leases. G.G.

N74-28919# Bureau of Mines, Pittsburgh, Pa. Pittsburgh Mining and Safety Research Center.
GEOLOGIC STRUCTURE ANALYSIS USING RADAR IMAGERY OF THE COAL MINING AREA OF BUCHANAN COUNTY, VA.
C. H. Elder, P. W. Jeran, and D. A. Keck Jan. 1974 35 p refs
(PB-228689/6; BM-RI-7869) Avail: NTIS HC $3.25 CSCL 08I

An analysis of the geologic structure of an area of Buchanan County, Va., was made by the Bureau of Mines using imagery from an airborne AN/APO-97 side-looking radar system to evaluate that mapping technique for delineating structural features which may cause mining problems. Side-looking radar (SLAR) was found to be a useful remote sensing tool for geologic structural analysis. Fault and joint systems identified by lineaments and linear patterns in the imagery were verified by surface and in-mine observations. SLAR imagery accurately delineated structural features that are known to affect gas migration and accumulation and that weakened the rock forming the immediate roof to mine workings, causing mining problems. (Modified author abstract) GRA

05
OCEANOGRAPHY AND MARINE RESOURCES

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

A74-29022 # **Application of remote sensing data to coastal fish stock surveys.** H. R. Bullis and W. H. Stevenson (NOAA, Washington, D.C.). *International Astronautical Federation, International Astronautical Congress, 24th, Baku, Azerbaidzhan SSR, Oct. 7-13, 1973, Paper.* 6 p.

A study has been conducted to investigate the possible application of remote sensing data to coastal fish stock surveys. Sensor systems aboard aircraft provided data similar to that obtained by the satellite sensors of the ERTS-1. The aircraft sensors also provided supplemental remote sensing information not obtained by ERTS sensors, such as temperature and salinity. The investigation was conducted in the Gulf of Mexico and focused on the adult Gulf menhaden. The analysis shows that four parameters have a particular significance in defining fish distribution patterns. G.R.

A74-34506 **Radar observations of convection in the region of the intertropical convergence zone over the equatorial Atlantic Ocean (Radarbeobachtungen der Konvektionsgebiete im Bereich der innertropischen Konvergenzzone über dem äquatorialen Atlantischen Ozean).** E. Ruprecht, L. Breuer, K. Bucher, E. Scheidtmann, and W. Zäck (Bonn, Universität, Bonn, West Germany). *Meteor-Forschungsergebnisse, Reihe B - Meteorologie und Aeronomie,* May 1974, p. 11-23. In German. Research supported by the Deutsche Forschungsgemeinschaft.

A74-35124 **Sea backscatter at HF - Interpretation and utilization of the echo.** D. E. Barrick (NOAA, Wave Propagation Laboratory, Boulder, Colo.), J. M. Headrick, R. W. Bogle (U.S. Navy, Naval Research Laboratory, Washington, D.C.), and D. D. Crombie (NOAA, Institute for Telecommunication Sciences, Boulder, Colo.). *IEEE, Proceedings,* vol. 62, June 1974, p. 673-680. 12 refs.

Theories and concepts for utilization of HF sea echo are compared and tested against surface-wave measurements made from San Clemente Island in the Pacific in a joint NRL/ITS/NOAA experiment. The use of first-order sea echo as a reference target for calibration of HF over-the-horizon radars is established. Features of the higher order Doppler spectrum can be employed to deduce the principal parameters of the wave-height directional spectrum (i.e., sea state); and it is shown that significant wave height can be read from the spectral records. Finally, it is shown that surface currents and current (depth) gradients can be inferred from the same Doppler sea-echo records. (Author)

A74-35125 **Tests of remote skywave measurement of ocean surface conditions.** J. L. Ahearn, J. M. Headrick, D. B. Trizna (U.S. Navy, Naval Research Laboratory, Washington, D.C.), and S. R. Curley (U.S. Navy, Office of Naval Research, Boston, Mass.). *IEEE, Proceedings,* vol. 62, June 1974, p. 681-687. 6 refs.

A pulse-Doppler backscatter radar operating in the HF band was used to test the feasibility to measure ocean surface motions in the North Atlantic Ocean under a variety of environmental conditions. Using the ionosphere as a part of the propagation path, data were collected at ranges from 600 to 2200 n mi. Environmental conditions included a relatively small hurricane, a large storm, and a relatively calm ocean. The Doppler data were converted to wind vectors and compared with weather data taken at the same times and places. Preliminary results indicate that there is, in general, good agreement between wind directions as determined from the radar data and this is indicated on the weather chart at all ranges and under all of the environmental conditions encountered. (Author)

A74-37395 * **Microwave radiometer measurements of the Cape Cod Canal.** C. T. Swift (NASA, Langley Research Center, Hampton, Va.). *Radio Science,* vol. 9, July 1974, p. 641-653. 12 refs.

Microwave radiometer measurements were conducted from a railroad bridge which spans the Cape Cod Canal in Massachusetts. Data were collected as a function of viewing angle and polarization at frequencies of 1.4, 4.0, and 7.5 GHz. The results compare differences in the microwave emmissivity of a smooth vs rough water surface. Results are also given which show the effects of roughness on the bistatic scattering of sunlight. (Author)

N74-21864 Helsinki Univ. of Technology, Otaniemi (Finland). **ANALYSIS OF DIELECTRIC PROPERTIES AND NOISE TEMPERATURE OF SEA ICE FOR MICROWAVE REMOTE SENSING APPLICATIONS** **c13**
M. Hallikainen *In its* European Microwave Conf. 1973 1973 4 p refs

The dielectric properties of sea ice were studied with regard to microwave radiometry, taking into consideration the effects of temperature, salinity, and frequency. The results obtained were used for calculating the noise temperature of sea ice. Calculations were based on experimental salinity profiles measured along the Finnish coast. The dielectric loss of sea ice depended strongly on frequency, salinity, and temperature above -10 C. Hence the passive method for mapping the characteristics of sea ice can be applied at low salinities if the local variations of the salinity profile are approximately known. ESRO

N74-21962*# Delaware Univ., Newark. Coll. of Marine Studies.
SKYLAB/EREP APPLICATION TO ECOLOGICAL, GEOLOGICAL AND OCEANOGRAPHIC INVESTIGATIONS OF DELAWARE BAY Bimonthly Technical Letter Progress Report, Feb. - Mar. 1974
V. Klemas, Principal Investigator 13 Mar. 1974 7 p refs EREP
(Contract NAS1-12304)
(E74-10437; NASA-CR-137416) Avail: NTIS HC $4.00 CSCL 08C

The author has identified the following significant results NASA's ERTS-1 satellite and Skylab-EREP have both provided imagery suitable for investigating coastal vegetation, land use, current circulation, water turbidity, waste disposal, and sea state. Based on high contrast targets, such as piers and breakwaters, the ERTS-1 MSS seems to have a resolution of 70-100 meters, Skylab's S190A about 30-70 meters, and its S190B about 10-30 meters. Important coastal land use details can be more readily mapped using Skylab's imagery. On the other hand, the regular eighteen day cycle of ERTS-1 allows observation of important man-made and natural changes, and facilitates collection of ground truth. The Skylab/EREP multispectral scanner offers 13 spectral bands as compared to 4 bands on ERTS-1. However, EREP scanner tapes require special filtering to remove several types of noise and their conical line scan pattern must be linearized before small targets can be identified based on spatial features.

N74-21968*# National Oceanic and Atmospheric Administration, Miami, Fla. Atlantic Oceanographic and Meteorological Labs.
REMOTE SENSING OF OCEAN CURRENT BOUNDARY LAYER Monthly Report, Mar. 1974
George A. Maul, Principal Investigator Mar. 1974 3 p EREP
(NASA Order T-4713-B)
(E74-10443; NASA-CR-137426; MR-9) Avail: NTIS HC $4.00 CSCL 08C

There are no author-identified significant results in this report.

N74-21979*# City Coll. of the City of New York. Univ. Inst. of Oceanography.
A JOINT METEOROLOGICAL, OCEANOGRAPHIC AND SENSOR EVALUATION PROGRAM FOR EXPERIMENT S193 ON SKYLAB Monthly Plans and Progress Report, period ending 18 Apr. 1974
Willard J. Pierson, R. K. Moore, and E. P. McClain, Principal Investigators 18 Apr. 1974 2 p EREP
(Contract NAS9-13642)
(E74-10454; NASA-CR-137443) Avail: NTIS HC $4.00 CSCL 14B

There are no author-identified significant results in this report.

N74-21986*# National Marine Fisheries Service, Bay Saint Louis, Miss.
APPLICATION OF REMOTE SENSING FOR FISHERY RESOURCE ASSESSMENT AND MONITORING Monthly Progress Report, 10 Mar. - 10 Apr. 1974
K. J. Savastano, Principal Investigator 12 Apr. 1974 3 p EREP
(NASA Order T-8217-B)
(E74-10461; NASA-CR-137450; MPR-11) Avail: NTIS HC $4.00 CSCL 08A

There are no author-identified significant results in this report.

N74-22003*# National Aeronautics and Space Administration. Mississippi Test Facility, Bay Saint Louis.
PRELIMINARY RESULTS OF FISHERIES INVESTIGATION ASSOCIATED WITH SKYLAB-3
K. J. Savastano, Principal Investigator, E. Pastula, Jr., G. Woods, and K. Faller 15 Apr. 1974 31 p refs Prepared in cooperation with Natl. Marine Fisheries Serv., Bay Saint Louis, Miss. EREP
(NASA Order T-8217-B)
(E74-10479; NASA-TM-X-70009) Avail: NTIS HC $4.75 CSCL 08A

The author has identified the following significant results. This investigation is to establish the feasibility of utilizing remotely sensed data acquired from aircraft and satellite platforms to provide information concerning the distribution and abundance of oceanic gamefish. Data from the test area in the northeastern Gulf of Mexico has made possible the identification of fisheries significant environmental parameters for white marlin. Predictive models based on catch data and surface truth information have been developed and have demonstrated potential for reducing search significantly by identifying areas which have a high probability of being productive. Three of the parameters utilized by the model, chlorophyll-a, sea surface temperature, and turbidity have been inferred from aircraft sensor data. Cloud cover and delayed receipt have inhibited the use of Skylab data. The first step toward establishing the feasibility of utilizing remotely sensed data to assess amd monitor the distribution of ocean gamefish has been taken with the successful identification of fisheries significant oceanographic parameters and the demonstration of the capability of measuring most of these parameters remotely.

N74-22059*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
ESTIMATION OF SUNLIGHT PENETRATION IN THE SEA FOR REMOTE SENSING
W. R. McCluney Apr. 1974 31 p refs
(NASA-TM-X-70643; X-913-74-113) Avail: NTIS HC $4.75 CSCL 08J

There is a need for a simple theoretical approach to the calculation of sunlight penetration depths suitable for passive multispectral remote sensing of water resources. An earlier paper presented an approach which is readily adapted to this calculation and which provides reasonably good agreement with more accurate but time-consuming radiative transfer models. The needed modifications are described and the model is used to calculate the penetration of sunlight into clear ocean water at several wavelengths throughout the visible portion of the spectrum. Calculations for both clear and turbid water are carried out for the two visible channels of the multispectral scanner on NASA's ERTS-1 satellite. The effect of a reflective bottom on the upwelling light field is discussed. Measurement parameters needed for the passive remote determination of water depths are identified and the use of submerged reflective panels for surface truth measurements is discussed. Author

N74-22951*# Environmental Research and Technology, Inc., Lexington, Mass.
THE APPLICATION OF ERTS IMAGERY TO MONITORING ARCTIC SEA ICE Final Report, 28 Jun. 1972 - 31 Dec. 1973
James C. Barnes, Principal Investigator and Clinton J. Bowley Feb. 1974 103 p refs Original contains imagery. Original photography may be purchased from the EROS Data Center, 10th and Dakota Avenue, Sioux Falls, S. D. 57198 ERTS
(Contract NAS5-21802)
(E74-10502; NASA-CR-136907; ERT-P-408-F) Avail: NTIS HC $8.25 CSCL 08L

The author has identified the following significant results. Because of the effect of sea ice on the heat balance of the Arctic and because of the expanding economic interest in arctic oil and minerals, extensive monitoring and further study of sea ice is required. The application of ERTS data for mapping ice is evaluated for several arctic areas, including the Bering Sea, the eastern Beaufort Sea, parts of the Canadian Archipelago, and the Greenland Sea. Interpretive techniques are discussed, and the scales and types of ice features that can be detected are described. For the Bering Sea, a sample of ERTS-1 imagery is compared with visual ice reports and aerial photography from the NASA CV-990 aircraft. The results of the investigation demonstrate that ERTS-1 imagery has substantial practical application for monitoring arctic sea ice. Ice features as small as 80-100 m in width can be detected, and the combined use of the visible and near-IR imagery is a powerful tool for identifying ice types. Sequential ERTS-1 observations at high latitudes enable ice deformations and movements to be mapped. Ice conditions in the Bering Sea during early March depicted in ERTS-1 images are in close agreement with aerial ice observations and photographs.

N74-22952*# Earth Satellite Corp., Washington, D.C.
APPLICATION OF ERTS-1 DATA TO THE HARVEST MODEL OF THE US MENHADEN FISHERY Final Report
Paul M. Maughan, Principal Investigator and Allan D. Marmelstein Mar. 1974 56 p refs Original contains imagery. Original photography may be purchased from the EROS Data Center, 10th and Dakota Avenue, Sioux Falls, S. D. 57198 ERTS
(Contract NAS5-21743)
(E74-10504; NASA-CR-138090) Avail: NTIS HC $6.00 CSCL 08A

The author has identified the following significant results. The project was conducted in Mississippi Sound in the north-central Gulf of Mexico. It utilized conventional surface data, obtained from fishing and other vessels, as well as aircraft and

spacecraft remote data. A relationship was established between surface measured water transparency, temperature and salinity, and commercial fish-stock availability. Numerical models of the relationships were derived. A multiple regression was performed relating ERTS-1 MSS Band 5 image density to measured transparency and water depth. It is concluded that remotely acquired data can play a role in harvest decisions of commercial fisheries.

N74-23020# Army Cold Regions Research and Engineering Lab., Hanover, N.H.
INVESTIGATIONS PERFORMED ON THE ARCTIC ICE DYNAMICS JOINT EXPERIMENT, MARCH 1971
S. F. Ackley, W. D. Hibler, III, A. Kovacs, W. F. Weeks, and A. Hartwell Dec. 1973 68 p refs
(ARPA Order 1615)
(AD-775381; CRREL-RR-315) Avail: NTIS CSCL 08/12

Contents: Mesoscale strain measurements on the Beaufort Sea pack ice; Structure of a multiyear pressure ridge; Top and bottom roughness of a multiyear ice floe; Airphoto analysis of ice deformation in the Beaufort Sea; Data on morphological and physical characteristics of sea ice in the Beaufort Sea. GRA

N74-25839*# Army Coastal Engineering Research Center, Washington, D.C.
AN ERTS-1 STUDY OF COASTAL FEATURES ON THE NORTH CAROLINA COAST Final Report
Dennis W. Berg, Principal Investigator and George H. Miller Oct. 1973 51 p refs Original contains imagery. Original photography may be purchased from the EROS Data Center, 10th and Dakota Avenue, Sioux Falls, S. D. 57198 ERTS
(NASA Order S-70260-AG)
(E74-10513; NASA-CR-138263) Avail: NTIS HC $5.75 CSCL 08C

There are no author-identified significant results in this report.

N74-25850*# Delaware Univ., Newark. Coll. of Marine Studies.
CORRELATION OF COASTAL WATER TURBIDITY AND CIRCULATION WITH ERTS-1 AND SKYLAB IMAGERY Report on Significant Results
V. Klemas, Principal Investigator, M. Otley, and R. Rogers (Bendix Corp., Ann Arbor, Mich.) 28 May 1974 2 p ERTS
(Contract NAS5-21837)
(E74-10532; NASA-CR-138281) Avail: NTIS HC $4.00 CSCL 08C

There are no author-identified significant results in this report.

N74-25852*# National Marine Fisheries Service, Bay Saint Louis, Miss.
APPLICATION OF REMOTE SENSING FOR FISHERY RESOURCE ASSESSMENT AND MONITORING Monthly Progress Report, 10 Apr. - 10 May 1974
Kenneth J. Savastano, Principal Investigator 10 May 1974 3 p EREP
(NASA Order T-8217-B)
(E74-10534; NASA-CR-138283; MPR-12) Avail: NTIS HC $4.00 CSCL 08A

The author has identified the following significant results. A plot was drawn of the dolphin catch and the water discontinuities observed in the aerial photography. This plot was similar in format to the one made earlier on the white marlin catch relative to the water rips. Neither plot substantiates (as far as white marlin and dolphin are concerned) an opinion held by fishermen that better fishing may be found in the vicinity of the rips. Remotely inferred values for sea surface temperature, chlorophyll-a and turbidity were substituted for sea truth measurements in prediction models developed in previous analysis. Model performance, using the new values, was disappointing.

N74-25853*# National Oceanic and Atmospheric Administration, Miami, Fla. Atlantic Oceanographic and Meteorological Labs.
REMOTE SENSING OF OCEAN CURRENT BOUNDARY LAYER Monthly Report, Apr. 1974
George A. Maul, Principal Investigator Apr. 1974 2 p EREP
(NASA Order T-4713-B)
(E74-10535; NASA-CR-138284; MR-10) Avail: NTIS HC $4.00 CSCL 08J

There are no author-identified significant results in this report.

N74-25870# National Environmental Satellite Service, Washington, D.C. Environmental Sciences Group.
AN EVALUATION OF MAY 1971 SATELLITE-DERIVED SEA SURFACE TEMPERATURES FOR THE SOUTHERN HEMISPHERE
P. Krishna Rao Apr. 1974 16 p refs
(NOAA-TR-NESS-69) Avail: SOD HC $0.55

These observations were obtained from the NOAA 1 satellite. The temperatures were subjected to an analysis program, and daily sea surface temperature charts were generated. Examples of a daily and a monthly mean sea surface temperatures chart are shown. Satellite-derived brightness values and sea surface temperature changes were used to construct time-longitude sections over the eastern part of the South Pacific for May 1971 to study the variations in these two parameters. The sea surface temperatures derived from NOAA 1 data showed good agreement with conventional ship data of the National Marine Fisheries Service. Author

N74-25884*# Alaska Univ., Fairbanks. Geophysical Inst.
APPLICATIONS OF REMOTE SENSING DATA TO THE ALASKAN ENVIRONMENT Annual Report, 1 Jul. 1972 - 30 Jun. 1973
A. E. Belon and J. M. iller 30 Jun. 1973 68 p
(Grant NGL-02-001-092)
(NASA-CR-138512) Avail: NTIS HC $6.50 CSCL 08F

The ERTS program provides a means to overcome the formidable logistic and economic costs of preparing environmental surveys of the vast and relatively unexplored regions of Alaska. There is an excellent potential in satellite remote sensing to benefit Federal, state, local, and private agencies, by providing a new synoptic data base which is necessary for the preparation of the needed surveys and the search for solutions to environmental management problems. One approach in coupling satellite data to Alaskan problems is a major program initiated by the University of Alaska and funded by NASA's Goddard Space Flight Center. This included 12 projects whose aims were to study the feasibility of applying ERTS data to the disciplines of ecology, agriculture, hydrology, wildlife management, oceanography, geology, glaciology, volcanology, and archaeology. Author

N74-25888*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
ESTIMATION OF SEA SURFACE TEMPERATURE FROM REMOTE SENSING IN THE 11-13 MICRON WINDOW REGION
C. Prabhakara, G. Dalu, and V. G. Kunde Feb. 1974 30 p refs Submitted for publication
(NASA-TM-X-70649; X-911-74-60) Avail: NTIS HC $4.50 CSCL 08J

The Nimbus 3 and 4 IRIS spectral data in the 11-13 micron water vapor window region are analyzed to determine the sea surface temperature (SST). The high spectral resolution data of IRIS are averaged over approximately 1 micron wide intervals

to simulate channels of a radiometer to measure the SST. Three channels are utilized to measure SST over cloud-free oceans. However, two of these channels are sufficient in routine SST determination. The differential absorption properties of water vapor in the two channels enable one to determine the water vapor absorption correction without detailed knowledge of the vertical profiles of temperature and water vapor. The feasibility of determining the SST is demonstrated globally with Nimbus 3 data where cloud-free areas can be selected with the help of albedo data from the MRIR experiment on board the same satellite. Author

N74-26864*# National Environmental Satellite Service, Hillcrest Heights, Md.
EVALUATION OF ERTS DATA FOR CERTAIN OCEANOGRAPHIC USES Bimonthly Report, Jan. - Apr. 1974
Alan E. Strong, Principal Investigator Apr. 1974 4 p refs ERTS
(NASA Order S-70246-AG)
(E74-10546; NASA-CR-138295; BMR-11; BMR-12) Avail: NTIS HC $4.00 CSCL 08C

The author has indentified the following significant results. According to Lake Michigan records, the pH levels have been steadily increasing as the lake becomes more eutrophic. Numerous upwellings during the summer of 1973, beginning with the late July event, appear to be triggering a chemical precipitation of calcium carbonate. The upwelling provides abundant carbon dioxide into the surface water and results in massive blooms of phytoplankton. As the CO2 is utilized by these microscopic plants the pH is increased (acidity decreases) and CaCO3 no longer is able to remain in solution. The precipitation takes place where the phytoplankton are living, near depths of 10 meters. Therefore, the whiting observed by ERTS-1 is only seen in the green band, as red cannot penetrate but a few meters. With these whitings, secci disc readings lower in July from 10-15 meters to 3-5 meters and green, milky water is observed by research vessels. It appears that whitings have been becoming more frequent since the middle 60's but until ERTS-1 the extent had never been realized. Calcium levels are too low, presently, for a similar precipitate in Lakes Huron or Superior. However, whitings have been seen by ERTS-1 in Lakes Erie and Ontario where the calcium ion and pH levels are more like those found in Lake Michigan.

N74-26901# Joint Publications Research Service, Arlington, Va.
METHODOLOGICAL PLAN FOR AERIAL SEISMIC STUDIES AT SEA AND IN THE OPEN OCEAN
S. V. Potapyev, G. G. Beletskiy, and I. I. Levin 23 May 1974 11 p refs Transl. into ENGLISH from Geol. Geofiz. (USSR), no. 11, 1973 p 102-107
(JPRS-62075) Avail: NTIS HC $4.00 CSCL 08C

A plan for aerial observations by the registry of oscillations by means of marine telemetric autonomous radio buoys outfitted with aircraft guidance and detection instrumentation is presented. Author

N74-26918*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
GRAVIMETRIC GEODESY AND SEA SURFACE TOPOGRAPHY STUDIES BY MEANS OF SATELLITE-TO-SATELLITE TRACKING AND SATELLITE ALTIMETRY
Joseph W. Siry Aug. 1972 143 p refs Presented at the 9th Intern. Symp. on Geophys. Theory and Computers, Banff, Canada, Aug. 1972; sponsored by the Comm. for Math. Geophys. of the Intern. Union of Geodesy and Geophys.
(NASA-TM-X-70670; X-590-73-251) Avail: NTIS HC $10.25 CSCL 08E

A satellite-to-satellite tracking experiment is planned between ATS-F and GEOS-C with a range accuracy of 2-meters and a range rate accuracy of 0.035 centimeters per second for a 10-second integration time. This experiment is planned for 1974. It is anticipated that it will improve the spatial resolution of the satellite geoid by half an order of magnitude to about 6 degrees. Longer integration times should also permit a modest increase in the acceleration resolution. Satellite altimeter data will also be obtained by means of GEOS-C. An overall accuracy of 5-meters in altitude is the goal. The altimeter, per se, is expected to have an instrumental precision of about 2 meters, and an additional capability to observe with a precision of about 0.2 meters for limited periods. Author

N74-26952# National Oceanic and Atmospheric Administration, Boulder, Colo.
A FEASIBILITY STUDY FOR THE REMOTE MEASUREMENT OF UNDERWATER CURRENTS USING ACOUSTIC DOPPLER TECHNIQUES
C. B. Emmanuel and P. A. Mandics Aug. 1973 39 p refs
(NOAA-TR-ERL-278-WPL-25) Avail: SOD HC $0.65

The remote measurement of underwater currents in the estuarine, coastal, and open ocean environments was studied using a technique of Doppler shift measurement of acoustic waves scattered by irregularities embedded in the water. The scattering cross section for some typical scatteres was estimated based on available information on their concentration and size distribution. The scattering characteristics of suspended particulate and organic matter, gas bubbles, and temperature and current velocity fluctuations were examined. The effects of transmission losses and ambient noise on the signal-to-noise ratio of the returned signal were evaluated, and the results were used to ascertain the feasibility of acoustic Doppler techniques to measure water currents for ranges of up to 1000 m with a varying pulse length resolution of 0.3 to 3 m. This resolution and additional noise consideration necessitate the use of frequencies of the order of several hundred kHz. It is shown that a pulse Doppler current measuring system is feasible. Author

N74-27777*# Delaware Univ., Newark. Coll. of Marine Studies.
MONITORING PHYSICAL AND CHEMICAL PARAMETERS OF DELAWARE BAY WATERS WITH AN ERTS-1 DATA COLLECTION PLATFORM Report on Significant Results
V. Klemas, Principal Investigator, C. A. Wethe, and A. S. Hanby 10 Jun. 1974 4 p ERTS
(Contract NAS5-21837)
(E74-10566; NASA-CR-138641) Avail: NTIS HC $4.00 CSCL 08J

The author has identified the following significant results. Evaluation of the probe performances during the initial phase indicates that the dissolved oxygen sensor available as part of the package is not sufficiently reliable for long term operation. The turbidity probe requires frequent visits to the site to maintain it in proper operating condition. The cost of these visits would have to be weighed against the information obtained. The conductivity/salinity, temperature, pH, and depth indicators have worked extremely well over the course of the study. Monthly cleanings would maintain all these probes in top operating condition. Currently the accuracy of each measurement returned via satellite is being compared to the accuracy of the probe reading and water samples analyzed in the laboratory.

N74-27784*# National Marine Fisheries Service, Bay Saint Louis, Miss.
APPLICATION OF REMOTE SENSING FOR FISHERY RESOURCE ASSESSMENT AND MONITORING Monthly Progress Report, 10 May - 10 Jun. 1974
K. J. Savastano, Principal Investigator 10 Jun. 1974 3 p EREP
(NASA Order T-8217-B)
(E74-10598; NASA-CR-138707; MPR-13) Avail: NTIS

HC $4.00 CSCL 08A

There are no author-identified significant results in this report.

N74-27785*# National Oceanic and Atmospheric Administration, Miami, Fla. Sea-Air Interaction Lab.

REMOTE DETECTION OF OCEAN FEATURES IN THE LESSER ANTILLES USING ERTS-1 DATA Final Report, Oct. 1972 - Apr. 1973

Kirby J. Hanson, Principal Investigator Apr. 1974 21 p refs Original contains imagery. Original photography may be purchased from the EROS Data Center, 10th and Dakota Avenue, Sioux Falls, S. D. 57198 ERTS

(NASA Order S-70246-AG)

(E74-10602; NASA-CR-138711) Avail: NTIS HC $4.25 CSCL 08J

The author has identified the following significant results. Photographic data received from the ERTS-1 satellite over the Lesser Antilles Islands show distinct ocean features on the leeward side of each island. Attempts to relate these features to ocean eddy formations with the aid of ground truth data proved unsuccessful. However, surface and upper air wind data indicate a good correlation with the size, shape, and downwind extent of the ocean features. Studies to date indicate strongly that these features result from horizontal differences in sea surface roughness due to the wind shadow effect of the islands. The results suggest that horizontal variations in the reflectance of the sea surface will make remote sensing of the ocean mixed layer more difficult than previously anticipated. The surface reflection seems to be large enough to mask the smaller horizontal variations in backscattered energy from the mixed layer.

N74-27801*# National Oceanic and Atmospheric Administration, Miami, Fla. Atlantic Oceanographic and Meteorological Labs.

REMOTE SENSING OF OCEAN CURRENT BOUNDARY LAYER Monthly Report, May 1974

George A. Maul, Principal Investigator May 1974 2 p ref EREP

(NASA Order T-4713-B)

(E74-10633; NASA-CR-138743; MR-11) Avail: NTIS HC $4.00 CSCL 08J

There are no author-identified significant results in this report.

N74-27837# Naval Intelligence Support Center, Washington, D.C. Translation Div.

DETERMINING THE GEOMETRIC CHARACTERISTICS OF A SEA SURFACE BY THE SIGNAL SCATTERED FROM IT

A. M. Nedelyaev, V. P. Prakhov, and T. A. Osetrova 13 Dec. 1973 9 p refs Transl. into ENGLISH from Tr. Energ. Inst. (Moscow), no. 119, 1972 p 80-83

(AD-777436; NISC-Trans-3481) Avail: NTIS CSCL 08/3

Attempts were made to determine the geometric parameters of the sea surface which could be used in a model composed of two types of roughness: major waves and the ripple which covers them. The problem of scattering of electromagnetic waves impinging on a complex surface is solved either by a Kirchhoff approximation or by the Kirchhoff method in combination with the perturbation theory. E.H.W.

N74-28072*# National Aeronautics and Space Administration, Goddard Space Flight Center, Greenbelt, Md.

SATELLITE IMAGERY AND WEATHER FOR THE BESEX AREA, 15 FEBRUARY - 10 MARCH 1973

Per Gloersen and Paul E. LaViolette (Naval Oceanographic Office) Jun. 1974 90 p Sponsored in part by NOAA

(NASA-TM-X-70692; X-910-74-186; NOOTR-245) Avail: NTIS HC $7.50 CSCL 04B

The Bering Sea Experiment (BESEX) was conducted in February and March 1973 to study ice cover, sea state and zones of precipitation by means of airborne microwave radiometers over the Bering Sea. The images were computer processed from satellite data tapes. In processing the tapes, compensation was made for satellite attitude and altitude variations, as well as for image rectification. Visual imagery was taken in the 0.4 to 1.1-u range, and infrared imagery in the 8.0 to 13.0-u range. Author

N74-28819*# Alaska Univ., Fairbanks. Inst. of Marine Science.

THE CIRCULATION OF PRINCE WILLIAM SOUND Final Report, Jul. 1972 - Jan. 1974

Robin D. Muench, Principal Investigator 13 Mar. 1974 24 p refs Original contains imagery. Original photography may be purchased from the EROS Data Center, 10th and Dakota Avenue, Sioux Falls, S. D. 57198 ERTS

(Contract NAS5-21833)

(E74-10575; NASA-CR-138680) Avail: NTIS HC $4.25 CSCL 08C

There are no author-identified significant results in this report.

N74-28820*# Naval Research Lab., Washington, D.C.

DETERMINATION OF SEA SURFACE CONDITIONS USING SKYLAB L-BAND AND RADSCAT PASSIVE MICROWAVE RADIOMETERS Progress Report, 28 Aug. 1973 - 30 Jun. 1974

James P. Hollinger, Principal Investigator 12 Jul. 1974 4 p EREP

(NASA Order T-4126-B)

(E74-10577; NASA-CR-138682) Avail: NTIS HC $4.00 CSCL 08J

There are no author-identified significant results in this report.

N74-28833*# Delaware Univ., Newark. Coll. of Marine Studies.

THE APPLICATION OF LARGE NUMBERS OF PLEASURE BOATS TO COLLECT SYNOPTIC SEA-TRUTH FOR ERTS-1 OVERPASSES Report on Significant Results

V. Klemas, Principal Investigator, G. Davis, and W. Philpot 15 Jul. 1974 2 p ERTS

(Contract NAS5-21837)

(E74-10591; NASA-CR-138700) Avail: NTIS HC $4.00 CSCL 08J

The author has identified the following significant results. In order to interpret and annotate current circulation and suspended sediment concentration maps derived from ERTS-1 digital tapes, the University of Delaware has been collecting water samples and other data from boats and helicopters. In order to increase the number of samples at the exact time of the ERTS-1 pass over Delaware Bay, pleasure craft were organized to obtain samples of the entire test site. On the ERTS-1 pass of July second, scientists were stationed at three public boat launches along the Bay to hand out sampling packets to interested boaters. The packets contained two litre sampling bottles, a map, data card, and a pen. The boaters were asked to fill the two bottles between 11 and 11:15 a.m., mark their location on the map, and fill out the data card. Forty-nine packets were handed out of which 40 were returned (82%). Only four of the 40 were not in the alloted time range. This gave 36 real time data points covering approximately 30 nautical miles. The samples are being analyzed for sediment concentration, particle size, and salinity. Participating boaters will receive a copy of an ERTS image of the Delaware Bay and a summary report of the project. Because of the success of the project, future use of pleasure boaters is being planned.

N74-28884*# National Imaging Systems, Mountain View, Calif.

OCEAN WATER COLOR ASSESSMENT FROM ERTS-1 RBV AND MSS IMAGERY Final Report, Sep. 1972 - Oct. 1973

Donald S. Ross, Principal Investigator 24 Oct. 1973 52 p refs Original contains imagery. Original Photography may be purchased from the EROS Data Center, 10th and Dakota Avenue, Sioux Falls, S. D. 57198 ERTS

(Contract NAS5-21862)

(E74-10651; NASA-CR-139028; TR-C200-4) Avail: NTIS HC $5.75 CSCL 08J

There are no author-identified significant results in this report.

N74-28886*# Bureau of Reclamation, Denver, Colo. Engineering and Research Center.

CURRENT MEASUREMENTS IN THE SALTON SEA USING ERTS MULTISPECTRAL IMAGERY

Ralph A. Morrill Apr. 1973 44 p refs Sponsored by NASA Original contains color illustrations. Original contains color imagery. Original photography may be purchased from the EROS Data Center, 10th and Dakota Avenue, Sioux Falls, S. D. 57198 ERTS

(E74-10653; NASA-CR-138865) Avail: NTIS HC $5.25 CSCL 08H

There are no author-identified significant results in this report.

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.

A74-30796 * **Limnological studies and remote sensing of the Upper Truckee River sediment plume in Lake Tahoe, California-Nevada.** C. R. Goldman, R. C. Richard, H. W. Paerl (California, University, Davis, Calif.), R. C. Wrigley, V. R. Oberbeck, and W. L. Quaide (NASA, Ames Research Center, Space Sciences Div., Moffett Field, Calif.). *Remote Sensing of Environment,* vol. 3, no. 1, 1974, p. 49-67. 17 refs. U.S. Environmental Protection Agency Grant No. DBU-16010; NSF Grant No. GI-22.

A74-33957 * **New dimensions in satellite hydrology.** A. Rango, V. V. Salomonson (NASA, Goddard Space Flight Center, Greenbelt, Md.), D. F. McGinnis, and D. R. Wiesnet (NOAA, National Environmental Satellite Service, Washington, D.C.). *EOS (U.S. IHD Bulletin,* no. 30), vol. 55, July 1974, p. 703-711. 39 refs.

Consideration of the use of remote sensing technology applied from satellites to obtain information for the rapid and continuing assessment of the hydrologic cycle. A detailed account is given of the hydrological information made available through the activities of the ERTS-1 satellite, an experimental satellite entirely devoted to earth resources observations, and the NOAA-2 satellite, a high-resolution operational environmental satellite. Following a description of the satellites and their payloads, it is shown how with their aid information can be obtained regarding atmospheric moisture, surface water and snow cover, glaciers, potential flood situations, and subsurface water fluctuations. In addition, the use of the ERTS-1 and NOAA-2 satellites in watershed characterization and modeling and in monitoring water quality is discussed. A.B.K.

A74-37045 * **Remote sensing and lake eutrophication.** R. C. Wrigley (NASA, Ames Research Center, Space Sciences Div., Moffett Field, Calif.) and A. J. Horne (California, University, Berkeley, Calif.). *Nature,* vol. 250, July 19, 1974, p. 213, 214. 8 refs.

An infrared photograph of part of Clear Lake, Cal., shows complex patterns of blue-green algal blooms which were not observed by conventional limnological techniques. Repeated observations of patterns such as these can be used to chart the surface movement of these buoyant algae and can also be used to help control algal scums in eutrophic lakes. Although it is believed that most of the observed patterns resulted from Aphanizomenon (a few were also observed which resulted from suspended sediment), spectral signatures of the algal patterns varied. F.R.L.

N74-21978*# Corps of Engineers, Waltham, Mass.
ERTS-1 DATA USER INVESTIGATION OF THE USE OF ERTS IMAGERY IN RESERVOIR MANAGEMENT AND OPERATION Progress Report, 14 Dec. 1973 - 14 Feb. 1974
Saul Cooper and Paul Bock, Principal Investigators 22 Apr. 1974 3 p ERTS
(NASA Order S-70256-AG)
(E74-10453; NASA-CR-137442) Avail: NTIS HC $4.00 CSCL 08H

There are no author-identified significant results in this report.

N74-21981*# Kansas Univ. Center for Research, Inc., Lawrence. Remote Sensing Lab.
OPTICAL DATA PROCESSING ANALYSIS OF STREAM PATTERNS EXHIBITED ON ERTS-1 IMAGERY
Fawwaz T. Ulaby, Principal Investigator, John C. Davis, Dwight D. Egbert, James R. McCauley, and James L. McNaughton 23 Apr. 1974 18 p refs Presented at 9th Intern. Symp. on Remote Sensing of Environ., Ann Arbor, Mich., 15-19 Apr. 1974 Original contains imagery. Original photography may be purchased from the EROS Data Center, 10th and Dakota Avenue, Sioux Falls, S. D. 57198 ERTS
(Contract NAS5-21822)
(E74-10456; NASA-CR-137445) Avail: NTIS HC $4.00 CSCL 08H

There are no author-identified significant results in this report.

N74-21983*# Corps of Engineers, Champaign, Ill.
EFFECTS OF CONSTRUCTION AND STAGED FILLING OF RESERVOIRS ON THE ENVIRONMENT AND ECOLOGY Progress Report, 9 Feb. - 8 Apr. 1974
Ravinder K. Jain, Principal Investigator 8 Apr. 1974 1 p ERTS
(NASA Order S-70255-AG)
(E74-10458; NASA-CR-137447) Avail: NTIS HC $4.00 CSCL 08H

There are no author-identified significant results in this report.

N74-21986*# Geological Survey, Bay Saint Louis, Miss.
THE HYDROLOGIC SIGNIFICANCE OF FAULTS IN THE GREAT SMOKY MOUNTAINS NATIONAL PARK Quarterly Progress Report, 1 Dec. 1973 - 28 Feb. 1974
Gerald K. Moore and Este F. Hollyday, Principal Investigators 28 Feb. 1974 4 p EREP
(NASA Order H-2810-B)
(E74-10460; NASA-CR-137449) Avail: NTIS HC $4.00 CSCL 08H

There are no author-identified significant results in this report.

N74-21991*# Kansas Univ. Center for Research, Inc., Lawrence.
SKYLAB STUDY OF WATER QUALITY Progress Report, Dec. 1973 - Feb. 1974
Harold L. Yarger, Principal Investigator and James R. McCauley Feb. 1974 11 p EREP
(Contract NAS9-13271)
(E74-10466; NASA-CR-136867) Avail: NTIS HC $4.00 CSCL 08H

There are no author-identified significant results in this report.

N74-21993*# Bureau of Reclamation, Denver, Colo.
MONITOR WEATHER CONDITIONS FOR CLOUD SEEDING CONTROL Progress Report, 1 Jan. - 28 Feb. 1974
Archie M. Kahan, Principal Investigator 1 Mar. 1974 6 p refs ERTS
(NASA Order S-70243-AG-8)
(E74-10468; NASA-CR-136869) Avail: NTIS HC $4.00 CSCL 04B

There are no author-identified significant results in this report.

N74-21994*# Geological Survey, Tacoma, Wash.
EVALUATE ERTS IMAGERY FOR MAPPING AND DETECTION OF CHANGES OF SNOWCOVER ON LAND AND ON GLACIERS Progress Report, 1 Jan. - 28 Feb. 1974
Mark F. Meier, Principal Investigator 28 Feb. 1974 4 p ERTS
(NASA Order S-70243-AG-2)
(E74-10469; NASA-CR-136870) Avail: NTIS HC $4.00 CSCL 08L

The author has identified the following significant results. The area of snowcover on 10 individual drainage basins in the North Cascades, Washington, has been determined by use of a semi-automatic radiance threshold technique. The result is a unique record of the changing water storage as snow in these important hydrologic units, the runoff of which is utilized for hydroelectric power, dilution of wastes and heat, support of salmon migration, and irrigation. These data allow a new type of hydrologic modelling to proceed which should permit more accurate forecasts of streamflow. A new technique has been developed for measuring snow-covered area or snowline altitude semi-automatically. This variable contour overlay method permits the snowcover to be matched efficiently to the best fit contour of altitude. The motion of the Yentna Glacier during the concluding phase of its surge was successfully measured by a flicker technique using images of two dates. It appears that displacements as small as 100 to 200 m can be measured. Motion of the Tweedsmuir Glacier in Alaska was measured using ERTS-1 images enlarged to 1:50,000. Changes detected included a shock wave moving down the glacier, the margin expanding, the moraine pattern deforming, and the marginal valley deepening.

N74-21996*# Purdue Univ., Lafayette, Ind. Lab. for Applications of Remote Sensing.
[SPECTRORADIOMETRIC MEASUREMENTS OF LAKE MONROE, INDIANA] Monthly Report, Jun. 1973
LeRoy F. Silva, Principal Investigator Jun. 1973 2 p EREP
(Contract NAS9-13301)
(E74-10472; NASA-CR-136873) Avail: NTIS HC $4.00 CSCL 08H

There are no author-identified significant results in this report.

N74-22000*# Environmental Research and Technology, Inc., Lexington, Mass.
STUDY TO DEVELOP IMPROVED SPACECRAFT SNOW SURVEY METHODS USING SKYLAB/EREP DATA Quarterly Progress Report, 15 Dec. 1973 - 15 Mar. 1974
James C. Barnes, Principal Investigator May 1974 9 p EREP
(Contract NAS9-13305)
(E74-10476; NASA-CR-136877; ERT-P-412-6; QPR-4) Avail: NTIS HC $4.00 CSCL 08L

The author has identified the following significant results. A segment of the interim S192 film product from the SL-2 mission has been examined. The film covers the White Mountains area near the California-Nevada border and contains useable data for spectral bands: band 3, band 7, band 9, and band 11. Whereas the snow surface exhibits wide variations in reflectance, no significant change in the reflectance of the clouds occurs over the spectral range of these four bands. In band 11 the clouds appear white and snow appears black; in the band 3 data, both the clouds and the snow appear white. Two potential applications are possible, based on these results. First, because the reflectance of the snow surface in the band 9 data is much lower at the lower elevation terrain of the White Mountains, it appears that the drop in reflectance in the near-IR portion of the spectrum may be related to the wetness of the snow surface. Secondly, the complete reversal in reflectance that is observed in band 11 data indicates that in this portion of the spectrum snow surfaces have a low reflectance regardless of the condition of the snow. Because clouds do not exhibit a similar drop in reflectance, measurements in this spectral band have potential use for automatically distinguishing snow from clouds.

N74-22009*# Corps of Engineers, Waltham, Mass.
THE USE OF ERTS IMAGERY IN RESERVOIR MANAGEMENT AND OPERATION Interim Report, Jul. - Dec. 1973
Saul Cooper, Principal Investigator Jan. 1974 30 p ERTS
(NASA Order S-70256-AG)
(E74-10485; NASA-CR-136886) Avail: NTIS HC $4.00 CSCL 08H

There are no author-identified significant results in this report.

N74-22016*# Department of the Environment, Ottawa (Ontario). Applied Hydrology Div.
WATER SURVEY OF CANADA: APPLICATION FOR USE OF ERTS-A FOR RETRANSMISSION OF WATER RESOURCES DATA Progress Report, Oct. 1973 - Mar. 1974
R. A. Halliday, Principal Investigator and I. A. Reid Apr. 1974 7 p Sponsored by NASA ERTS
(E74-10492; NASA-CR-136893; SR-9629) Avail: NTIS HC $4.00 CSCL 08H

There are no author-identified significant results in this report.

N74-22944 Wisconsin Univ., Madison.
USE OF AERIAL PHOTOGRAPHY TO QUANTITATIVELY ESTIMATE WATER QUALITY PARAMETERS IN SURFACE WATER MIXING ZONES Ph.D. Thesis
Thomas Martin Lillesand 1973 135 p
Avail: Univ. Microfilms Order No. 73-30329

The extent, site dependence and temporal dynamics of mixing zones have made it impractical to monitor them solely on the basis of conventionally collected field data. A method has been developed to quantitatively delineate waste concentrations throughout the mixing zone on the basis of densitometric measurements extracted from aerial photography. Simultaneously-acquired color infrared photography and suspended solids water samples have been used to quantitatively delineate the mixing zone resulting from the discharge of a paper mill effluent at the Kimberly-Clark Paper Mill located on the lower Fox River at Kemberly, Wisconsin. The results and experiences have indicated that photographic photometry, when predicated on a limited amount of ground sampling, can be used to measure and delineate mixing zone waste distributions as reliably and in more detail than conventional surface measuring techniques.
Dissert. Abstr.

N74-22948*# Kansas Univ. Center for Research, Inc., Lawrence. Atmospheric Science Lab.
DETECTION OF MOISTURE AND MOISTURE RELATED PHENOMENA FROM SKYLAB Monthly Progress Report, Mar. 1974
Joe R. Eagleman, Ernest C. Pogge, Richard K. Moore, Principal Investigators, Norman Hardy, Wen Lin, and Larry League Mar. 1974 16 p refs Original contains imagery. Original photography may be purchased from the EROS Data Center, 10th and Dakota Avenue, Sioux Falls, S. D. 57198 EREP
(Contract NAS9-13273)
(E74-10471; NASA-CR-136872) Avail: NTIS HC $4.00 CSCL 08H

The author had identified the following significant results. Soil moisture and precipitation variations were not detectable as tonal variations on the S190A IR B and W photography. Some light tonal areas contained high precipitation .83 inches and high moisture content 21.1% while other light tonal areas contained only .02 inches precipitation and as little as 0.7% moisture. Similar variations were observed in dark tonal areas. This inconsistancy may be caused by a lapse of 3 to 4 days from the time precipitation occurred until the photographs were taken and the fact that in the first inch of soil the measured soil moisture was generally less than 5.0%. For overall tonal contrast, the aerial color, color IR and aerial B and W appear

to be the best. Cities stand out from the landscape best in the aerial color and color IR, however, to see major street patterns a combination of the two aerial B and W bands and the two IR B and W bands may be desirable. For mapping roads it is best use all 6 bands. For lake detection, the IR B and W bands would be the best but for streams the aerial B and W band would be better. The aerial color, color IR, and the two IR B and W bands are best for distinguishing cultivated and non-cultivated areas, whereas the two aerial B and W bands are better for seeing local relief. Clouds may be best seen in the aerial color and color IR bands.

N74-22972*# Geological Survey, Reston, Va.
REMOTE-SENSING STUDIES OF HYDROLOGIC ENVIRONMENTS IN THE LOWER RARITAN RIVER SYSTEM, NEW JERSEY
Peter W. Anderson and Seymour Subitzky 1973 16 p refs Sponsored by NASA Original contains color illustrations
(NASA-CR-138398) Avail: NTIS HC $4.00 CSCL 08H

A series of remote sensing experiments were conducted in January and November 1968. The airborne multisensor missions included photographic and thermal-infrared sensors operated over a single site at a time when streamflow and water temperature observations were being made on the ground. Remote sensing data show: (1) effect of thermal waste water discharges on stream temperatures, (2) cross-channel variations in thermal characteristics due to waste water discharge, channel characteristics, and tidal currents, (3) influence of flow rates on dispersion, (4) patterns and distribution of ice cover, and (5) movement of sediment loads. Author

N74-23030# Montana State Univ., Bozeman. Water Resources Research Center.
FLOODPLAIN MAPPING AND PLANNING FOR THE 50 AND 100 YEAR INTERVAL FLOOD ZONES OF THE BITTERROOT VALLEY, MONTANA
K. Michael Nolan Oct. 1973 103 p refs
(PB-226082/6; OWRR-A-064-MONT(1)) Avail: NTIS HC $4.25 CSCL 13B

Flood hazard maps, delineating 50-year and 100-year flood plain areas, were prepared for an 80-mile reach of the Bitterroot River in Western Montana. Discharge rates corresponding to 50-year and 100-year recurrence frequency were obtained for six stations on the river using graphical methods suggested by the U.S. Geological Survey. River stage was monitored at 15 locations in the reach for a 14-day period during the June 1972 snowmelt runoff season to develop simulated rating curves. Aerial photographs of the reach were taken on June 1, 1972 when the river was in flood stage but before the snowmelt peak had occurred. The photographs were used in conjunction with the ground control sites to establish flood boundaries corresponding to 50 and 100-year floods. GRA

N74-25841*# Department of the Environment, Ottawa (Ontario). Applied Hydrology Div.
RETRANSMISSION OF WATER RESOURCES DATA USING THE ERTS-1 DATA COLLECTION SYSTEM
R. A. Halliday, Principal Investigator, I. A. Reid, and E. F. Chapman 14 Dec. 1973 15 p refs Presented at the ERTS Principal Investigator's Symp., Washington, D. C., 10-14 Dec. 1973 ERTS
(E74-10516; NASA-CR-138266) Avail: NTIS HC $4.00 CSCL 08H

There are no author-identified significant results in this report.

N74-25860*# Corps of Engineers, Waltham, Mass.
ERTS-1 DATA USER INVESTIGATION OF THE USE OF ERTS IMAGERY IN RESERVOIR MANAGEMENT AND OPERATION Progress Report, 14 Feb. - 14 Apr. 1974
Saul Cooper and Paul Bock, Principal Investigators 9 May 1974 4 p ERTS
(NASA Order S-70256-AG)
(E74-10542; NASA-CR-138291) Avail: NTIS HC $4.00 CSCL 08H

There are no author-identified significant results in this report.

N74-25867*# Corps of Engineers, Waltham, Mass.
NEW ENGLAND RESERVOIR MANAGEMENT Quarterly Progress Report, 23 Jan. - 23 Apr. 1974
Saul Cooper and Duwayne Anderson, Principal Investigators (CRREL) 23 Apr. 1974 4 p EREP
(NASA Order T-4646-B)
(E74-10551; NASA-CR-138300) Avail: NTIS HC $4.00 CSCL 08H

There are no author-identified significant results in this report.

N74-25871# Joint Publications Research Service, Arlington, Va.
SELECTED TRANSLATIONS FROM BULLETIN OF THE SOVIET ANTARCTIC EXPEDITION
17 May 1974 31 p refs Transl. into ENGLISH from Inform. Byul. Sov. Antarkt. Ekspeditsii (Leningrad), no. 87, 1973 21 p
(JPRS-62019) Avail: NTIS HC $4.75

Results of investigations conducted by the sixteenth Soviet Antarctic expedition are presented. Data are also given on investigations of the Southern Hemisphere atmosphere by means of contrast level balloons and the tie-in of gravimetric points Mirnyy-Vostok.

N74-25877# National Environmental Satellite Service, Washington, D.C.
DETECTING MELTING SNOW AND ICE BY VISIBLE AND NEAR-INFRARED MEASUREMENTS FROM SATELLITES
David F. McGinnis [1974] 11 p refs
Avail: NTIS HC $4.00

Use of near-infrared data in conjunction with reflected visible radiation appears to allow detection of melting snow and ice. Comparison of simultaneous visible and near-infrared imagery from the Nimbus III satellite provides a method for monitoring the melting of snow and ice that may be applied to snowpack-runoff prediction, flood forecasting, and lake navigation. Several examples (Lake Winnipeg, the Alps, and northwest Canada) are provided to illustrate the use of this spectral difference. Author

N74-25889*# Kanner (Leo) Associates, Redwood City, Calif.
HYDROLOGICAL BASIS FOR FORECASTING AND CALCULATING RUNOFF BY SPACE IMAGES OF THE EARTH'S SURFACE
G. P. Kalinin Washington NASA May 1974 43 p refs Transl. into ENGLISH from the book "Gidrologicheskiye Osnovy Prognoza i Rascheta Stoka po Aerokosmicheskim Snimkam Zemnoy Poverkhnosti" Moscow, Akad. Nauk SSSR, 1974 53 p
(Contract NASw-2481)
(NASA-TT-F-15665) Avail: NTIS HC $5.25 CSCL 08H

The determination and prediction of surface runoff by remote methods are considered, using the following factors as a basis: (1) images of stream network and basin surface flooded areas, (2) area of coverage of the surface of a basin with water, (3) analysis of the dynamics of coverage of the basin with water and soil moisture content. D.L.G.

N74-26865*# Stanford Research Inst., Menlo Park, Calif.
STUDY OF TIME LAPSE DATA PROCESSING FOR DYNAMIC HYDROLOGIC CONDITIONS Progress Report, 6 Mar. - 6 May 1974
Sidney M. Serebreny, Principal Investigator 16 May 1974 5 p ERTS
(Contract NAS5-21841)
(E74-10552; NASA-CR-138442) Avail: NTIS HC $4.00 CSCL 08H

There are no author-identified significant results in this report.

N74-26911*# Louisiana State Univ., Baton Rouge. Div. of Engineering Research.
SEDIMENT TRANSPORT AND EROSION IN THE FOURCHON AREA OF LAFOURCHE PARISH
Charles A. Whitehurst and R. P. Self (Nicholls State Univ., Thibodaux, Louisiana) May 1974 28 p refs
(Grants NGL-19-001-097; NGL-19-001-024)
(NASA-CR-138776; DER-RM-3) Avail: NTIS HC $4.50 CSCL 08H

NASA aerial photography in the form of color infrared and color positive transparencies is used as an aid in evaluating the rate and effect of erosion and sediment transport in Bay Champagne Louisiana. Author

N74-26912*# Louisiana State Univ., Baton Rouge. Div. of Engineering Research.
REMOTE SENSING AS AN AID FOR MARSH MANAGEMENT: LAFOUCHE PARISH, LOUISIANA
James G. Ragan (Nicholls State Univ., Thibodaux, Louisiana), John H. Green (Nicholls State Univ., Thibodaux, Louisiana), and C. A. Whitehurst May 1974 30 p refs
(Grants NGL-19-001-097; NGL-19-001-024)
(NASA-CR-138775; DER-RM-2) Avail: NTIS HC $4.50 CSCL 08H

NASA aerial photography, primarily color infrared and color positive transparencies, was used in a study of marsh management practices and in comparing managed and unmanaged marsh areas. Weir locations for tidal control are recommended. Author

N74-26941# Tennessee Univ., Knoxville. Water Resources Research Center.
REMOTE SENSING IN SAMPLING SITE LOCATION IN LAKES AND STREAMS Research Report, 1 Jul. 1971 - 31 Oct. 1972
James D. Womack Jan. 1974 13 p
(Contract DI-14-31-0001-3843)
(PB-227846/3; OWRR-A-025-TENN(1)) Avail: NTIS HC $4.00 CSCL 13B

This project was intended to investigate the use of remote sensing techniques in the design of sampling programs on large lakes and streams. The wide overview of aerial photography and infrared thermal mapping scanners provide means of visualizing and measuring variations in water characteristics which might require compensation for representative sampling. Several sites on Fort Loudoun Lake were samples to determine whether persistent patterns of water quality variations existed. The parameters measured were temperature, measured with a Barnes radiometer, turbidity and color. Persistent patterns were found in the vicinity of tributary inflows and it was concluded that aerial techniques would be useful in mapping the extent and shape. (Modified author abstract) GRA

N74-27773*# Environmental Research and Technology, Inc., Lexington, Mass.
STUDY TO DEVELOP IMPROVED SPACECRAFT SNOW SURVEY METHODS USING SKYLAB/EREP DATA Quarterly Progress Report, 15 Mar. - 15 Jun. 1974
James C. Barnes, Principal Investigator Jun. 1974 4 p ref EREP
(Contract NAS9-13305)
(E74-10562; NASA-CR-138637; ERT-P-412-8; QPR-5) Avail: NTIS HC $4.00 CSCL 08L

There are no author-identified significant results in this report.

N74-27779*# Calspan Corp., Buffalo, N.Y.
S190 INTERPRETATION TECHNIQUES DEVELOPMENT AND APPLICATION TO NEW YORK STATE WATER RESOURCES Quarterly Report, 1 Mar. - 31 May 1974
Kenneth R. Piech, Principal Investigator 31 May 1974 3 p ref EREP
(Contract NAS9-13336)
(E74-10593; NASA-CR-138702; QR-5) Avail: NTIS HC $4.00 CSCL 08H

There are no author-identified significant results in this report.

N74-27811*# International Business Machines Corp., Huntsville, Ala. Electronics Systems Center.
APPLICATION OF REMOTE SENSING TO HYDROLOGY Final Report
Reuben Ambaruch and John W. Simmons Sep. 1973 114 p refs
(Contract NAS8-14000)
(NASA-CR-120278; IBM-73W-00387) Avail: NTIS HC $8.75 CSCL 08H

Streamflow forecasting and hydrologic modelling are considered in a feasibility assessment of using the data produced by remote observation from space and/or aircraft to reduce the time and expense normally involved in achieving the ability to predict the hydrological behavior of an ungaged watershed. Existing watershed models are described, and both stochastic and parametric techniques are discussed towards the selection of a suitable simulation model. Technical progress and applications are reported and recommendations are made for additional research. A.A.D.

N74-27813*# International Business Machines Corp., Huntsville, Ala.
A STUDY OF REMOTE SENSING AS APPLIED TO REGIONAL AND SMALL WATERSHEDS. VOLUME 1: SUMMARY REPORT Final Report
Jun. 1974 46 p refs
(Contract NAS5-21942)
(NASA-CR-139031; IBM-74W-00175) Avail: NTIS HC $5.50 CSCL 08H

The accuracy of remotely sensed measurements to provide inputs to hydrologic models of watersheds is studied. A series of sensitivity analyses on continuous simulation models of three watersheds determined: (1)Optimal values and permissible tolerances of inputs to achieve accurate simulation of streamflow from the watersheds; (2) Which model inputs can be quantified from remote sensing, directly, indirectly or by inference; and (3) How accurate remotely sensed measurements (from spacecraft or aircraft) must be to provide a basis for quantifying model inputs within permissible tolerances. Author

N74-27830*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
FLOOD HAZARDS STUDIES IN THE MISSISSIPPI RIVER BASIN USING REMOTE SENSING
Albert Rango and Arthur T. Anderson Apr. 1974 44 p refs Submitted for publication

(NASA-TM-X-70682; X-913-74-125) Avail: NTIS HC $5.25 CSCL 08H

The Spring 1973 Mississippi River flood was investigated using remotely sensed data from ERTS-1. Both manual and automatic analyses of the data indicated that ERTS-1 is extremely useful as a regional tool for flood mamagement. Quantitative estimates of area flooded were made in St. Charles County, Missouri and Arkansas. Flood hazard mapping was conducted in three study areas along the Mississippi River using pre-flood ERTS-1 imagery enlarged to 1:250,000 and 1:100,000 scale. Initial results indicate that ERTS-1 digital mapping of flood prone areas can be performed at 1:62,500 which is comparable to some conventional flood hazard map scales. Author

N74-28810*# Ecosystems International, Inc., Gambrills, Md.
SYNTHESIS AND ANALYSIS OF ERTS PROGRAM. WATER RESOURCES: SIGNIFICANCE, USER REQUIREMENTS, REMOTE SENSING APPLICATIONS Midterm Report
Peter A. Castruccio and Harry L. Loats 15 Nov. 1973 291 p refs ERTS
(Contract NASw-2488)
(E74-10554; NASA-CR-138444) Avail: NTIS HC $17.75 CSCL 08H

There are no author-identified significant results in this report.

N74-28823*# Bendix Corp., Ann Arbor, Mich. Aerospace Systems Div.
AUTOMATIC CLASSIFICATION OF EUTROPHICATION OF INLAND LAKES FROM SPACECRAFT DATA Special Report
Robert H. Rogers, Principal Investigator, Larry E. Reed, Navin J. Shah, and V. Elliot Smith May 1974 15 p refs Presented at the 9th Intern. Symp. on Remote Sensing of Environ., Ann Arbor, Mich., 15-19 Apr. 1974 ERTS
(Contract NAS5-21810)
(E74-10580; NASA-CR-138685) Avail: NTIS HC $4.00 CSCL 08H

The author has identified the following significant results. Spacecraft data and computer techniques can be used to rapidly map and store onto digital tapes watershed land use information. Software is now available by which this land use information can be rapidly and economically extracted from the tapes and related to coliform counts and other lake contaminants (e.g. phosphorus). These tools are basic elements for determining those land use factors and sources of nutrients that accelerate eutrophication in lakes and reservoirs.

N74-28825*# Environmental Research and Technology, Inc., Lexington, Mass.
A STUDY TO DEVELOP IMPROVED SPACECRAFT SHOW SURVEY METHODS USING SKYLAB/EREP DATA: DEMONSTRATION OF THE UTILITY OF THE S190 AND S192 DATA Interim Report
James C. Barnes, Principal Investigator, Clinton J. Bowley, and Michael D. Smallwood Jun. 1974 55 p refs Original contains color imagery. Original photography may be purchased from the EROS Data Center 10th and Dakota Avenue Sioux Falls, S. D. 57198 EREP
(Contract NAS9-13305)
(E74-10582; NASA-CR-138687 ; ERT-P-412-7) Avail: NTIS HC $5.75 CSCL 05B

The author has identified the following significant results. This interim report provides a demonstration of the ulitity of spacecraft acquired Skylab S190A and S190B photography and S192 imagery for mapping areal extent of snow cover in western United States test site areas. The data sample is from the SL-2 mission flown in June 1973. Results of the investigation indicate that areal snow cover extent can be mapped more accurately from the S190A and S190B photography than from any other spacecraft system, including ERTS. The results of a qualitative analysis of the S192 imagery indicate considerable potential for the utility of multispectral snow cover analysis; the potential for distinguishing snow from clouds automatically is particularly significant.

N74-28831*# Delaware Univ., Newark. Coll. of Marine Studies.
CORRELATION OF COASTAL WATER TURBIDITY AND CIRCULATION WITH ERTS-1 AND SKYLAB IMAGERY
V. Klemas, Principal Investigator, M. Otley, W. Philpot, C. Wethe, and R. Rogers (Bendix Corp., Ann Arbor, Mich.) 19 Apr. 1974 4 p Presented at the 9th Intern. Symp. on Remote Sensing of Environ., Ann Arbor, Mich., 15-19 Apr. 1974 ERTS
(Contract NAS5-21837)
(E74-10589; NASA-CR-138698) Avail: NTIS HC $4.00 CSCL 08J

There are no author-identified significant results in this report.

N74-28838*# Calspan Corp., Buffalo, N.Y.
S190 INTERPRETATION TECHNIQUES DEVELOPMENT AND APPLICATION TO NEW YORK STATE WATER RESOURCES Interim Report
Kenneth R. Piech, Principal Investigator, John R. Schott, and Kenton M. Stewart (State Univ. of New York, Buffalo) 15 Jun. 1974 27 p refs Original contains color imagery. Original photography may be purchased from the EROS Data Center, 10th and Dakota Avenue, Sioux Falls, S. D. 57198 EREP
(Contract NAS9-13336)
(E74-10605; NASA-CR-138714; Calspan-YB-5298-M-1) Avail: NTIS HC $4.50 CSCL 05B

There are no author-identified significant results in this report.

N74-28839*# Geological Survey, Tacoma, Wash.
EVALUATE ERTS IMAGERY FOR MAPPING AND DETECTION OF CHANGES OF SNOWCOVER ON LAND AND ON GLACIERS Progress Report, 1 Mar. - 30 Apr. 1974
Mark F. Meier, Principal Investigator 30 Apr. 1974 4 p refs ERTS
(NASA Order S-70243-AG-2)
(E74-10606; NASA-CR-138715) Avail: NTIS HC $4.00 CSCL 08L

The author has identified the following significant results. Snowlines on a small drainage basin were accurately identified on bulk ERTS-1 images without use of digital processing, and results checked with high altitude and ground-based photography. The area and approximate shape of snow patches as small as 20,000 sq m could be correctly identified with a magnifying scanning densitometer. The resolution of ERTS is more than ample for most snow mapping needs. Mount Baker, Washington, has a large crater south of the summit and an area north of the summit which emit considerable geothermal heat in the form of fumaroles and hot ground. Temperatures are being monitored using an ERTS DCS. Debris flows are occassionally released from the crater due to water saturation at the base of a heavy snowpack lying on hydrothermally altered hot ground. These debris flows present a possible hazard to life and property, as they are discharged down the Boulder Glacier toward Baker Lake, the upper of two major hydroelectric power reservoirs which are situated above the populated Skagit River Valley. ERTS-1 images show that the most recent debris flow (20-21 August 1973) can be clearly discerned and mapped. ERTS images provide another important tool for monitoring this potential hazard.

N74-28843*# Army Construction Engineering Research Lab., Champaign, Ill.
EFFECT OF CONSTRUCTION AND STAGED FILLING OF RESERVOIRS ON THE ENVIRONMENT AND ECOLOGY

Progress Report, 9 Dec. 1973 - 8 Jun. 1974
Ravinder K. Jain, Principal Investigator 10 Jun. 1974 5 p ERTS
(NASA Order S-70255-AG)
(E74-10610; NASA-CR-138719) Avail: NTIS HC $4.00 CSCL 08H

There are no author-identified significant results in this report.

N74-28845*# Geological Survey, Tacoma, Wash.
A LAKE AND SEA ICE EXPERIMENT WITH SKYLAB MICROWAVE RADIOMETRY Progress Report, Mar. 1974
William J. Campbell, Principal Investigator 24 May 1974 2 p EREP
(NASA Order T-4112-B)
(E74-10616; NASA-CR-138725) Avail: NTIS HC $4.00 CSCL 08L

There are no author-identified significant results in this report.

N74-28850* California Univ., Berkeley.
INTRODUCTION
Robert N. Colwell, Principal Investigator *In its* An Integrated Study of Earth Resources in the State of Calif. Using Remote Sensing Tech. 1 May 1974 7 p ERTS

CSCL 08H

There are no author-identified significant results in this report.

N74-28851* California Univ., Davis.
WATER SUPPLY STUDIES
Robert N. Colwell, Robert H. Burgy, Vidal R. Algazi, William C. Draeger, Principal Investigators, Randall W. Thomas, Donald T. Lauer, Paul F. Krumpe, James D. Nichols, and Michael J. Gialdini *In its* An Integrated Study of Earth Resources in the State of Calif. Using Remote Sensing Tech. 1 May 1974 113 p refs Original contains color imagery. Original photography may be purchased from the EROS Data Center, 10th and Dakota Avenue, Sioux Falls, S. D. 57198 ERTS

CSCL 08H

There are no author-identified significant results in this report.

N74-28852* California Univ., Santa Barbara.
WATER DEMAND STUDIES IN CENTRAL CALIFORNIA
Robert N. Colwell, John E. Estes, Principal Investigators, L. Tinney, R. Thaman, K. Thaman, S. Lytle, E. Lytle, F. Evanisko, G. Lapman, and B. Wood *In its* An Integrated Study of Earth Resources in the State of Calif. Using Remote Sensing Tech. 1 May 1974 48 p Original contains color imagery. Original photography may be purchased from the EROS Data Center, 10th and Dakota Avenue, Sioux Falls, S. D. 57198 EREP

CSCL 08H

There are no author-identified significant results in this report.

N74-28853* California Univ., Riverside.
WATER DEMAND STUDIES IN SOUTHERN CALIFORNIA
Robert N. Colwell, Leonard W. Bowden, Principal Investigators, C. W. Johnson, J. R. Huning, K. Rozelle, D. Nichols, J. Jones, G. Washburn, and J. Drake *In its* An Integrated Study of Earth Resources in the State of Calif. Using Remote Sensing Tech. 1 May 1974 41 p refs ERTS

CSCL 08H

There are no author-identified significant results in this report.

N74-28859* California Univ., Los Angeles. Dept. of Planetary and Space Sciences.
POWER LAW TIME DEPENDENCE OF RIVER FLOOD DECAY AND ITS RELATIONSHIP TO LONG TERM DISCHARGE FREQUENCY DISTRIBUTION Special Study No. 6
Robert N. Colwell, Principal Investigator, G. Schubert, and R. E. Lingenfelter *In its* An Integrated Study of Earth Resources in the State of Calif. Using Remote Sensing Techn. 1 May 1974 11 p refs ERTS
CSCL 08H

There are no author-identified significant results in this report.

N74-28861*# Wolf Research and Development Corp., Riverdale, Md.
THE INTERDEPENDENCE OF LAKE ICE AND CLIMATE IN CENTRAL NORTH AMERICA Interim Report, Dec. 1973 May 1974
Allan J. Jelacic, Principal Investigator Jun. 1974 52 p refs ERTS
(Contract NAS5-21761)
(E74-10622; NASA-CR-138732) Avail: NTIS HC $5.75 CSCL 04B

There are no author-identified significant results in this report.

N74-28874*# Geological Survey, Bay Saint Louis, Miss.
HYDROLOGIC SIGNIFICANCE OF LINEAMENTS IN CENTRAL TENNESSEE (FORMERLY HYDROLOGIC SIGNIFICANCE OF FAULTS IN THE GREAT SMOKY MOUNTAINS NATIONAL PARK) Quarterly Progress Report, 1 Mar. 31 May 1974
Gerald K. Moore and Este F. Hollyday, Principal Investigators 30 May 1974 5 p EREP
(NASA Order H-2810-B)
(E74-10640; NASA-CR-138814) Avail: NTIS HC $4.00 CSCL 08H

There are no author-identified significant results in this report.

N74-29051# Joint Publications Research Service, Arlington, Va.
METEOROLOGY AND HYDROLOGY NO. 4, 1974
V. A. Bugayev, ed. 24 Jun. 1974 178 p refs Transl. into ENGLISH of Meteorol. i Gidrol. (Moscow), no. 4, 1974 p 1-118
(JPRS-62306) Avail: NTIS HC $12.00

Meteorological and hydrological parameters in weather forecasting, climatology and agriculture are considered.

07
DATA PROCESSING AND DISTRIBUTION SYSTEMS

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

A74-29025 * # **Machine processing methods for earth observational data.** D. A. Landgrebe (Purdue University, West Lafayette, Ind.), F. C. Billingsley (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, Calif.), and J. D. Nichols (California, University, Berkeley, Calif.). *International Astronautical Federation, International Astronautical Congress, 24th, Baku, Azerbaidzhan SSR, Oct. 7-13, 1973, Paper.* 10 p. 9 refs.

A brief review of the development over the last decade of earth resource information systems is presented. Machine data preprocessing and analysis methods are surveyed and illustrated. These include preprocessing steps intended to modify geometric and radiometric aspects of earth observational image data to enhance the ability of either human interpreters or machine algorithms to extract information from the data. Illustrations of processed and analyzed images from spaceborne sensors including the Earth Resources Technology Satellite are discussed. (Author)

A74-30791 * **Combined spectral and spatial processing of ERTS imagery data.** R. M. Haralick and K. S. Shanmugam (University of Kansas Center for Research, Inc., Lawrence, Kan.). *Remote Sensing of Environment,* vol. 3, no. 1, 1974, p. 3-13. 19 refs. Contract No. NAS5-21822.

A general procedure is presented for extracting textural properties of blocks of image data. These features are calculated in the spatial domain, taking into account the statistical nature of texture. The procedure is based on the assumption that the texture information in an image is contained in the overall or 'average' spatial relationship which the gray tones in the image have to one another. The spatial gray-tone dependence matrix is discussed together with the spectral features used in the study and the land use classification studies conducted. The results of the study show the usefulness of using both spectral and textural characteristics of ERTS multispectral scanner data for developing classification procedures. G.R.

A74-30793 **A comparison of black-and-white, color and infrared photographs for geological interpretation at Witvlei, South West Africa.** A. R. Newton (Cape Town, University, Rondebosch, Republic of South Africa). *Remote Sensing of Environment,* vol. 3, no. 1, 1974, p. 29-34. 5 refs.

A study was made of photographs from an area north of Witvlei, South West Africa. Four sets of photographs were taken, namely black-and-white, infrared, and two sets of color. The infrared and one set of color were taken soon after rain had fallen. The four sets of photographs were compared for their effectiveness for photogeological interpretation, and the following conclusions were reached: (1) color photographs are only marginally better than black-and-white, and then only if taken soon after rain; (2) infrared offers little advantage over black-and-white; (3) color and infrared offer slight advantages for study of superficial deposits; (4) even under relatively unfavorable conditions, normal black-and-white photography can be of great value, particularly in the early stages of mapping an unknown area. (Author)

A74-33068 **Marking ERTS images with a small mirror reflector.** W. E. Evans (Stanford Research Institute, Menlo Park, Calif.). *Photogrammetric Engineering,* vol. 40, June 1974, p. 665-671.

A simple experiment demonstrates the feasibility of generating identifiable artificial landmarks on imagery provided by the Earth Resources Satellite, ERTS-1. The completely passive marking device is a small (56-cm diameter) mirror carefully positioned to reflect the sun's energy into the satellite's optical sensors at the time of an overpass. Calculations show that a somewhat larger, but still easily transportable, mirror system should be capable of marking the images with near 100-percent probability of success on cloud-free days. No orbital information is needed beyond that normally available to the general public through the government's EROS program. Possible applications of the technique include providing site identification and geodetic control in remote regions of the earth, and providing atmospheric transmission data coincident with other ERTS experiments. (Author)

A74-33072 * **A catalog system for remote-sensing data.** R. S. Singh and J. P. Scherz (Wisconsin, University, Madison, Wis.). *Photogrammetric Engineering,* vol. 40, June 1974, p. 709-720. 8 refs. Grant No. NGL-50-002-127.

The Practical System for Cataloging, Indexing, and Retrieval of Remote Sensing Data developed by the Interdisciplinary Remote Sensing Group at the University of Wisconsin consists of a card catalog, a site-index-map, a site-index-file, an industry-index-file, and a project-index-file. The system is designed for retrieval of remote-sensing data which include imagery, magnetic tapes, flight logs, maps, ground-truth reports, and research reports containing raw data. It can be operated by conventional library methods, but provision has been made for digitizing the system for computer retrieval. P.T.H.

A74-34005 **The development of ground truth for correlation with remotely sensed data.** W. H. Tranter, J. L. Sandvos, J. C. Jennett, and E. Bolter (Missouri, University, Rolla, Mo.). In: National Electronics Conference, 29th, Chicago, Ill., October 8-10, 1973, Proceedings. Volume 28. Oak Brook, Ill., National Electronics Conference, Inc., 1973, p. 151-156. 8 refs.

The environmental impact of the current large-scale lead mining operations in southeastern Missouri is being studied on the basis of information about vegetation destruction patterns obtained by remote sensing with spectral techniques and ground truth data collected by soil analysis teams. To correlate the two sets of data, investigators used computer-generated two-dimensional data displays derived from a ground matrix of the area. The resulting format allows quick and accurate comparison of ground truth data with data obtained from remote sensing devices. J.K.K.

A74-34438 * **Comparison of some classification techniques.** P. L. Odell (Texas, University, Dallas, Tex.) and B. S. Duran (Texas Tech University, Lubbock, Tex.). *IEEE Transactions on Computers,* vol. C-23, June 1974, p. 591-596. 22 refs. Contracts No. NAS9-11925; No. NAS9-12775.

The so-called table look-up classification procedure and a modification of it are discussed. These and several other classification techniques are evaluated and simulation results comparing some of the techniques are displayed. Indications are that the table look-up technique is quite useful in classifying large sets of data, such as in remote sensing data analysis. (Author)

A74-35492 **Extraction of the difference between two images (Extraction de la différence entre deux images).** S. Debrus, M.

Françon, and P. Koulev (Paris VI, Université, Paris, France). *Nouvelle Revue d'Optique,* vol. 5, May-June 1974, p. 153-168. 9 refs. In French. Direction des Recherches et Moyens d'Essais Contract No. 11265.

In the method proposed, the two photographs compared are modulated by a high spatial frequency diffuser, and are recorded successively on a photographic plate, slightly shifting the diffuser between the two exposures. After conventional linear processing, the negative is illuminated by a coherent light beam. The spectrum observed at the lens focus is modulated by rectilinear parallel fringes. By placing a simple slit in the Fourier plane, the light from identical regions on the photographs is eliminated while the light from unlike regions is transmitted, the difference appearing in the image on the negative. Since the fringes in the Fourier spectrum are quite wide (of the order of 2 cm), a broad source can be employed. This provides high-quality images. V.P.

A74-36109 **Milwaukee Symposium on Automatic Control, Milwaukee, Wis., March 28-30, 1974, Proceedings.** Symposium sponsored by the Institute of Electrical and Electronics Engineers. Milwaukee, University of Wisconsin, 1974. 379 p. $10.00.

A psudo-Kalman filtering approach to beam contour tracing is first discussed, followed by consideration of a clustering algorithm based on a discretized data space. Attention is given to digital restoration of blurred, array-sampled images, steady-state decoupling and design of linear multivariable systems, optimal interpolation of a two-dimensional signal, and pattern recognition for nonlinear system identification. Extracting 3-D information from 2-D images using a multicamera system is studied, and a practical obstacle detection system for the Mars Rover is described. F.R.L.

A74-36112 **Digital restoration of blurred, array-sampled images.** A. Y. Hung (TRW Systems Group, Redondo Beach, Calif.). In: Milwaukee Symposium on Automatic Control, Milwaukee, Wis., March 28-30, 1974, Proceedings. Milwaukee, University of Wisconsin, 1974, p. 88-92. 7 refs.

Digital restoration of images is discussed in this paper. Distortions arise by motion blur, optical imperfection, sampling degradation and noise. A mathematical model for image-forming system is formulated. Both space-domain and spatial frequency domain restorations are considered. Samples are included to illustrate the methods discussed. (Author)

A74-36113 **Optimal interpolation of two dimensional signal.** C. S. Chen (Akron, University, Akron, Ohio). In: Milwaukee Symposium on Automatic Control, Milwaukee, Wis., March 28-30, 1974, Proceedings. Milwaukee, University of Wisconsin, 1974, p. 209-214. 8 refs.

In the considered problem a scanner represented by a sample aperture function is used to scan an analog image. This process can be considered as two-dimensional sampling. The output of the scanning process is a digital image. A least mean-square error criterion is presented. An investigation shows that the least mean-square error picture interpolation depends on the correlation functions of the original and the sampled images. G.R.

N74-21963*# Boeing Co., Kent, Wash.
QUANTITATIVE DETERMINATION OF STRATOSPHERIC AEROSOL CHARACTERISTICS Monthly Report, Mar. 1974
David L. Tingey, Principal Investigator Mar. 1974 1 p EREP (Contract NAS9-13303)
(E74-10438; NASA-CR-137421) Avail: NTIS HC $4.00 CSCL 04A

There are no author-identified significant results in this report.

N74-21964*# Purdue Univ., Lafayette, Ind. Lab. for Applications of Remote Sensing.
AN INTERDISCIPLINARY ANALYSIS OF MULTISPECTRAL SATELLITE DATA FOR SELECTED COVER TYPES IN THE COLORADO MOUNTAINS, USING AUTOMATIC DATA PROCESSING TECHNIQUES Monthly Progress Report, Mar. 1974
Roger M. Hoffer, Principal Investigator Mar. 1974 6 p EREP (Contract NAS9-13380)
(E74-10439; NASA-CR-137422) Avail: NTIS HC $4.00 CSCL 08F

There are no author-identified significant results in this report.

N74-21970*# Environmental Research Inst. of Michigan, Ann Arbor. Infrared and Optics Div.
DEVELOPING PROCESSING TECHNIQUES FOR SKYLAB DATA Monthly Progress Report, Mar. 1974
Richard F. Nalepka and William A. Malila, Principal Investigators 10 Apr. 1974 3 p EREP
(Contract NAS9-13280)
(E74-10445; NASA-CR-137434; ERIM-101900-28-L; MPR-13) Avail: NTIS HC $4.00 CSCL 05B

There are no author-identified significant results in this report.

N74-21977*# Science Applications, Inc., La Jolla, Calif.
DETERMINATION OF AEROSOL CONTENT IN THE ATMOSPHERE FROM ERTS-1 DATA Final Report, 7 Sep. 1972 - 6 Oct. 1973
M. Griggs, C. B. Ludwig, and W. Malkmus, Principal Investigators 23 Oct. 1973 55 p refs Original contains imagery. Original photography may be purchased from the EROS Data Center, 10th and Dakota Avenue, Sioux Falls, S. D. 57198 ERTS (Contract NAS5-21860)
(E74-10452; NASA-CR-137441; SAI-73-625-LJ) Avail: NTIS HC $5.75 CSCL 04A

The author has identified the following significant results. Significant results, relating the radiance over water surfaces to the atmospheric aerosol content, have been obtained. The results indicate that the MSS channels 4, 5, and 6 centered at 0.55, 0.65, and 0.75 microns have comparable sensitivity, and that the aerosol content can be determined within + or - 10% with the assumed measurement errors of the MSS. The fourth channel, MSS 7, is not useful for aerosol determination due to the water radiance values from this channel generally being less than the instrument noise. The accuracy of the aerosol content measurement could be increased by using an instrument specifically designed for this purpose. This radiance-aerosol content relationship can possibly provide a basis for monitoring the atmospheric aerosol content on a global basis, allowing a base-line value of aerosols to be established. The contrast-aerosol content investigation shows useful linear relationships in MSS channels 4 and 5, allowing the aerosol content to be determined within + or - 10%. MSS 7 is not useful due to the low accuracy in the water radiance, and MSS 6 is found to be too insensitive. These results rely on several assumptions due to the lack of ground truth data, but do serve to indicate which channels are most useful.

N74-21982*# Kansas Univ. Center for Research, Inc., Lawrence. Remote Sensing Lab.
GROUND PATTERN ANALYSIS IN THE GREAT PLAINS

Semiannual Progress Report, 1 Aug. 1973 - 31 Jan. 1974
Fawwaz T. Ulaby, John C. Davis, Principal Investigators, James L. McNaughton, Dwight D. Egbert, and James R. McCauley Jan. 1974 44 p refs ERTS
(Contract NAS5-21822)
(E74-10457; NASA-CR-137446; Rept-2266-9) Avail: NTIS HC $5.25 CSCL 08E

There are no author-identified significant results in this report.

N74-22002*# Environmental Research Inst. of Michigan, Ann Arbor. Infrared and Optics Div.
DETERMINATION OF THE EARTH'S AEROSOL ALBEDO USING SKYLAB DATA Quarterly Progress Report
Robert E. Turner, Principal Investigator 11 Apr. 1974 2 p EREP
(Contract NAS9-13279)
(E74-10478; NASA-CR-136881; ERIM-102200-9-L; QPR-4) Avail: NTIS HC $4.00 CSCL 04A

There are no author-identified significant results in this report.

N74-22013*# Bendix Corp., Ann Arbor, Mich. Aerospace Systems Div.
A TECHNIQUE FOR CORRECTING ERTS DATA FOR SOLAR AND ATMOSPHERIC EFFECTS Special Report
Robert H. Rogers, Principal Investigator, Keith Peacock, and Navinchandra J. Shah Apr. 1974 21 p refs ERTS
(Contract NAS5-21863)
(E74-10489; NASA-CR-136890) Avail: NTIS HC $4.25 CSCL 05B

The author has identified the following significant results. Based on processing ERTS CCTs and ground truth measurements collected on Michigan test site for January through June 1973 the following results are reported: (1) atmospheric transmittance varies from: 70 to 85% in band 4, 77 to 90% in band 5, 80 to 94% in band 6, and 84 to 97% in band 7 for one air mass; (2) a simple technique was established to determine atmospheric scattering seen by ERTS-1 from ground-based measurements of sky radiance. For March this scattering was found to be equivalent to that produced by a target having a reflectance of 11% in band 4, 5% in band 5, 3% in band 6, and 1% in band 7; (3) computer ability to classify targets under various atmospheric conditions was determined. Classification accuracy on some targets (i.e. bare soil, tended grass, etc.) hold up even under the most severe atmospheres encountered, while performance on other targets (trees, urban, rangeland, etc.) degrades rapidly when atmospheric conditions change by the smallest amount.

N74-22025*# Environmental Research Inst. of Michigan, Ann Arbor. Infrared and Optics Div.
STUDY OF ATMOSPHERIC EFFECTS IN SKYLAB DATA Quarterly Progress Report, 1 Dec. 1973 - 28 Feb. 1974
Frederick J. Thomson, Principal Investigator 3 May 1974 3 p EREP
(Contract NAS9-13272)
(E74-10505; NASA-CR-138091; ERIM-101700-13-L; QPR-4) Avail: NTIS HC $4.00 CSCL 05B

There are no author-identified significant results in this report.

N74-22049*# Environmental Research Inst. of Michigan, Ann Arbor. Infrared and Optics Div.
IMPROVEMENTS IN ESTIMATING PROPORTIONS OF OBJECTS FROM MULTISPECTRAL DATA Technical Report, 1 Feb. 1973 - 31 Jan. 1974
H. M. Horwitz, P. D. Hyde, and W. Richardson Apr. 1974 76 p refs
(Contract NAS9-9784)
(NASA-CR-134252; ERIM-190100-25-T) Avail: NTIS HC $7.00 CSCL 05B

Methods for estimating proportions of objects and materials imaged within the instantaneous field of view of a multispectral sensor were developed further. Improvements in the basic proportion estimation algorithm were devised as well as improved alien object detection procedures. Also, a simplified signature set analysis scheme was introduced for determining the adequacy of signature set geometry for satisfactory proportion estimation. Averaging procedures used in conjunction with the mixtures algorithm were examined theoretically and applied to artificially generated multispectral data. A computationally simpler estimator was considered and found unsatisfactory. Experiments conducted to find a suitable procedure for setting the alien object threshold yielded little definitive result. Mixtures procedures were used on a limited amount of ERTS data to estimate wheat proportion in selected areas. Results were unsatisfactory, partly because of the ill-conditioned nature of the pure signature set. Author

N74-22051*# Environmental Research Inst. of Michigan, Ann Arbor. Infrared and Oprics Div.
THE NASA EARTH RESOURCES SPECTRAL INFORMATION SYSTEM: A DATA COMPILATION, SECOND SUPPLEMENT
R. K. Vincent Apr. 1973 140 p refs
(Contract NAS9-9784)
(NASA-CR-134267; ERIM-31650-156-T) Avail: NTIS HC $10.00 CSCL 05B

The NASA Earth Resources Spectral Information System (ERSIS) and the information contained therein are described. It is intended for use as a second supplement to the NASA Earth Resources Spectral Information System: A Data Compilation, NASA CR-31650-24-T, May 1971. The current supplement includes approximately 100 rock and mineral, and 375 vegetation directional reflectance spectral curves in the optical region from 0.2 to 22.0 microns. The data were categorized by subject and each curve plotted on a single graph. Each graph is fully titled to indicate curve source and indexed by subject to facilitate user retrieval from ERSIS magnetic tape records. Author

N74-22061# Telespazio, S.p.A., Rome (Italy).
DESIGN STUDY FOR THE ERAF DATA PROCESSING FACILITY
G. Bressanin, F. Capozza, L. A. CiavoliCortello, J. Erickson, L. Fusco, A. Marconi, B. Ratti, and C. Valzecchi Nov. 1973 128 p refs
(Contract ESTEC-1761/72-PP)
(ESRO-CR(P)-352) Avail: NTIS HC $9.50

The most significant preprocessing requirements for data gathered by European Earth Resources Aircraft Facility (ERAF) are examined. The data processing facilities required to accept ERAF generated data and transform the images and tapes into formats acceptable to the earth scientists are discussed. ESRO

N74-22085# California Univ., Riverside. Dept. of Geography.
CORRELATION OF REMOTE SENSING IMAGERY OF THE

COAST OF SOUTHERN AND BAJA CALIFORNIA WITH TERRAIN ANALYSIS Final Report
Leonard W. Bowden Oct. 1973 62 p refs
(Contract N00014-69-A-0200-5003; NR Proj. 387-045)
(AD-773598; TR-0-73-3) Avail: NTIS CSCL 08/6

The research emphasizes the use and application of remote sensing techniques to coastal environment research of Baja and southern California. Ten technical reports, and numerous professional papers resulted, ranging over topics such as coastal vegetation, landforms, and use, tectonics and human activities. The research topics are summarized in an informal style and described in chronological order. (Modified author abstract) GRA

N74-22608*# Environmental Research Inst. of Michigan, Ann Arbor. Infrared and Optics Div.
SIGNATURE EXTENSION: AN APPROACH TO OPERATIONAL MULTISPECTRAL SURVEYS
R. F. Nalepka and J. P. Morgenstern Mar. 1973 75 p refs
(Contract NAS9-9784)
(NASA-CR-134254; ERIN-31650-152-T) Avail: NTIS HC $6.75 CSCL 05B

Two data processing techniques were suggested as applicable to the large area survey problem. One approach was to use unsupervised classification (clustering) techniques. Investigation of this method showed that since the method did nothing to reduce the signal variability, the use of this method would be very time consuming and possibly inacurrate as well. The conclusion is that unsupervised classification techniques of themselves are not a solution to the large area survey problem. The other method investigated was the use of signature extension techniques. Such techniques function by normalizing the data to some reference condition. Thus signatures from an isolated area could be used to process large quantities of data. In this manner, ground information requirements and computer training are minimized. Several signature extension techniques were tested. The best of these allowed signatures to be extended between data sets collected four days and 80 miles apart with an average accuracy of better than 90%. Author

N74-22609*# Environmental Research Inst. of Michigan, Ann Arbor. Infrared and Optics Div.
EXTENSION OF ERIM MULTISPECTRAL DATA PROCESSING CAPABILITIES THROUGH IMPROVED DATA HANDLING TECHNIQUES Technical Report, 1 Nov. 1971 - 31 Jan. 1973
F. J. Kriegler Jun. 1973 28 p refs
(Contract NAS9-9784)
(NASA-CR-134268; ERIM-31650-158-T) Avail: NTIS HC $4.50 CSCL 05B

The improvement and extension of the capabilities of the Environmental Research Institute of Michigan processing facility in handling multispectral data are discussed. Improvements consisted of implementing hardware modifications which permitted more rapid access to the recorded data through improved numbering and indexing of such data. In addition, techniques are discussed for handling data from sources other than the ERIM M-5 and M-7 scanner systems. Author

N74-22956*# Colorado School of Mines, Golden. Dept. of Geology.

NEW USES OF SHADOW ENHANCEMENT
Keenan Lee, Principal Investigator and Don L. Sawatzky 27 Mar. 1974 22 p ref Presented at the 3d Ann. Remote Sensing of Earth Resources Conf., Tullahoma, Tenn., 25 Mar. 1974 Original contains imagery. Original photography may be purchased from the EROS Data Center, 10th and Dakota Avenue, Sioux Falls, S. D. 57198 EREP
(Contract NAS9-13394; Grant NGL-06-001-015)
(E74-10509; NASA-CR-138232; Rept-74-5) Avail: NTIS HC $4.25 CSCL 14E

The author has identified the following significant results. Shadow enhancement of topographic linears in photographic or scanner images is a valuable tool for interpretation of geologic structures. Whether linears will be enhanced or subdued depends on sun angle and azimuth. The relationship of the sun's attitude to topographic slopes determines which trends are available for interpretation in existing imagery, and it can be used to select the time of day, surface properties, and film and filter characteristics in planning aircraft flights or satellite orbital passes. The technique of selective shadow enhancement can be applied to all photographic or imaging experiments, but its best for snow-covered scenes, side-looking radar images, and painted relief models.

N74-25837*# National Physical Research Lab., Pretoria (South Africa).
TO ASSESS THE VALUE OF SATELLITE IMAGERY IN RESOURCE EVALUATION ON A NATIONAL SCALE Final Report, Jul. 1972 - Nov. 1973
O. G. Malan, Principal Investigator Nov. 1973 149 p refs Sponsored by NASA Original contains imagery. Original photography may be purchased from the EROS Data Center, 10th and Dakota Avenue, Sioux Falls, S. D. 57198 ERTS
(E74-10494; NASA-CR-136898; CSIR-FIS-50) Avail: NTIS HC $10.50 CSCL 08F

The author has identified the following significant results. It has been shown that ERTS imagery, particularly in the form of 1:500,000 scale false color photolithographic prints, can contribute very significantly towards facilitating and accelerating (dramatically, in the case of vegetation) resource surveys and geologic mapping. Fire mapping on a national scale becomes a feasibility, numerous new geologic features, particularly lineaments, have been discovered, land use can be mapped efficiently on a regional scale and degraded areas identified. The first detailed tectonic and geomorphological maps of the Republic of South Africa will be published in the near future mainly owing to the availability of ERTS-1 imagery.

N74-25840*# Environmental Research Inst. of Michigan, Ann Arbor.
RECENT ADVANCEMENTS IN INFORMATION EXTRACTION METHODOLOGY AND HARDWARE FOR EARTH RESOURCES SURVEY SYSTEMS
F. J. Thomson, Principal Investigator and J. D. Erickson [1974] 8 p refs ERTS
(Contracts NAS5-21783; NAS1-11979; NAS9-9784; Grant NGR-23-005-552; Contract DAAK02-73-C-0438)
(E74-10515; NASA-CR-138265; ERIM-193300-46-S) Avail: NTIS HC $4.00 CSCL 05B

There are no author-identified significant results in this report.

N74-25855*# North Carolina State Univ., Raleigh. Dept. of Geosciences.

UTILIZATION OF ERTS-A DATA IN GEOLOGICAL EVALUATION, REGIONAL PLANNING, FOREST MANAGEMENT, AND WATER MANAGEMENT IN NORTH CAROLINA
Charles Welby, Principal Investigator 8 May 1974 2 p Presented at the 25th Ann. Highway Geol. Symp., Raleigh, N. C., 24 May 1974 ERT3
(Contract NAS5-21732)
(E74-10537; NASA-CR-138286) Avail: NTIS HC $4.00 CSCL 08G

There are no author-identified significant results in this report.

N74-25865*# Michigan State Univ., East Lansing.
INVESTIGATION OF SKYLAB DATA Monthly Plans and Progress Report, Apr. 1974
Lester V. Manderscheid, Principal Investigator Apr. 1974 4 p ref EREP
(Contract NAS9-13332)
(E74-10549; NASA-CR-138298) Avail: NTIS HC $4.00 CSCL 05B

There are no author-identified significant results in this report.

N74-26713*# TRW Systems Group, Houston, Tex.
ASTEP USER'S GUIDE AND SOFTWARE DOCUMENTATION
A. S. Gliniewicz, H. M. Lachowski, W. H. Pace, Jr., and P. Salvato, Jr. 15 May 1974 280 p refs
(Contract NAS9-13834)
(NASA-CR-134303; TRW-25990-H028-RO-00; TRW-Note-74-FMT-939) Avail: NTIS HC $19.50 CSCL 05B

The Algorithm Simulation Test and Evaluation Program (ASTEP) is a modular computer program developed for the purpose of testing and evaluating methods of processing remotely sensed multispectral scanner earth resources data. ASTEP is written in FORTRAND V on the UNIVAC 1110 under the EXEC 8 operating system and may be operated in either a batch or interactive mode. The program currently contains over one hundred subroutines consisting of data classification and display algorithms, statistical analysis algorithms, utility support routines, and feature selection capability. The current program can accept data in LARSC1, LARSC2, ERTS, and Universal formats, and can output processed image or data tapes in Universal format. Author

N74-26856*# Environmental Research Inst. of Michigan, Ann Arbor.
DEVELOPING PROCESSING TECHNIQUES FOR SKYLAB DATA Monthly Progress Report, Apr. 1974
Richard F. Nalepka and William A. Malila, Principal Investigators 24 May 1974 2 p EREP
(Contract NAS9-13280)
(E74-10512; NASA-CR-138262; ERIM-101900-30-L; MPR-14) Avail: NTIS HC $4.00 CSCL 05B

There are no author-identified significant results in this report.

N74-26858*# North Carolina State Univ., Raleigh. Dept. of Geosciences.
UTILIZATION OF ERTS-A DATA IN GEOLOGICAL EVALUATION, REGIONAL PLANNING, FOREST MANAGEMENT, AND WATER MANAGEMENT IN NORTH CAROLINA Progress Report, Apr. - May 1974
Charles W. Welby, Principal Investigator 6 Jun. 1974 1 p ERTS
(Contract NAS5-21732)
(E74-10519; NASA-CR-138253) Avail: NTIS HC $4.00 CSCL 08G

There are no author-identified significant results in this report.

N74-26862*# Purdue Univ., Lafayette, Ind. Lab. for Applications of Remote Sensing.
AN INTERDISCIPLINARY ANALYSIS OF MULTISPECTRAL SATELLITE DATA FOR SELECTED COVER TYPES IN THE COLORADO MOUNTAINS, USING AUTOMATIC DATA PROCESSING TECHNIQUES Monthly Progress Report, Apr. 1974
Roger M. Hoffer, Principal Investigator Apr. 1974 12 p EREP
(Contract NAS9-13380)
(E74-10524; NASA-CR-138273) Avail: NTIS HC $4.00 CSCL 08F

There are no author-identified significant results in this report.

N74-26899*# Michigan Univ., Ann Arbor. Infrared and Optics Lab.
POST-ANALYSIS REPORT ON CHESAPEAKE BAY DATA PROCESSING Informal Final Report
F. Thomson Apr. 1972 49 p refs
(Contract NAS6-2058)
(NASA-CR-137461; WRL-10653-4-F) Avail: NTIS HC $5.50 CSCL 05B

The additional processing performed on data collected over the Rhode River Test Site and Forestry Site in November 1970 is reported. The techniques and procedures used to obtain the processed results are described. Thermal data collected over three approximately parallel lines of the site were contoured, and the results color coded, for the purpose of delineating important scene constituents and to identify trees attacked by pine bark beetles. Contouring work and histogram preparation are reviewed and the important conclusions from the spectral analysis and recognition computer (SPARC) signature extension work are summarized. The SPARC setup and processing records are presented and recommendations are made for future data collection over the site. A.A.D.

N74-26931# Reading Univ. (England). Dept. of Geography.
THE INTERPRETATION AND USE OF FALSE-COLOUR INFRARED AND TRUE COLOUR PHOTOGRAPHY OF PART OF ARGENTINA OBTAINED BY SKYLARK EARTH RESOURCES ROCKETS
D. S. H. Drennan, J. R. Hardy, R. A. G. Savigear, and J. R. G. Townshend Oct. 1973 5 p
(Contract AT/2035/015)
(UR-RSP-4; S/AI/16E) Avail: NTIS HC $4.00

The use of color film for crop discrimination in Argentina is discussed. The photography was made from Skylark rockets using both false color infrared and true color. It was found that the false color (Kodak 2443) gave best results. Further projects such as resources mapping, land use, and communications networks mapping are under consideration. Author (ESRO)

N74-26955# Reading Univ. (England). Dept. of Geography.
KEY TO LOCATION OF ROCKET IMAGERY, AIRCRAFT

TRAVERSES, GROUND TRUTH AND AVAILABLE MAPS FOR THE ARGENTINIAN SKYLARKS
C. O. Justice and J. R. G. Townshend Sep. 1973 16 p
(Contract AT/2035/015)
(UR-RSR-1; S/AI/7E) Avail: NTIS HC $4.00

A key to the existing reference data available at Reading concerning the Skylark Argentina project is provided. Ground truth data, aircraft traverses, and areas covered by the Hasselblad 150 mm camera imagery for the major camera positions are given. A list of the photography held is appended together with a list of the number of copies of maps of the study area.
Author (ESRO)

N74-26956# Reading Univ. (England). Dept. of Geography.
KEY TO CODING OF IMAGERY AND GROUND TRUTH OF THE ARGENTINIAN SKYLARKS (1181 AND 1182)
J. R. G. Townshend and C. O. Justice Sep. 1973 8 p
(Contract AT/2035/015)
(UR-RSR-2; S/AI/8E) Avail: NTIS HC $4.00

The coding systems for photographs, ground truth, and maps which are used in the interpretation of Skylark imagery from Argentina are described. Author (ESRO)

N74-27774*# Environmental Research Inst. of Michigan, Ann Arbor.
DEVELOPING PROCESSING TECHNIQUES FOR SKYLAB DATA Monthly Progress Report, May 1974
Richard F. Nalepka and William A. Malila, Principal Investigators 24 Jun. 1974 2 p EREP
(Contract NAS9-13280)
(E74-10563; NASA-CR-138638; ERIM-101900-32-L; MPR-15) Avail: NTIS HC $4.00 CSCL 05B

There are no author-identified significant results in this report.

N74-27775*# Cornell Univ., Ithaca, N.Y. New York State Coll. of Agriculture and Life Sciences.
EVALUATION OF SKYLAB IMAGERY AS AN INFORMATION SERVICE FOR INVESTIGATING LAND USE AND NATURAL RESOURCES (SKYLAB) Progress Report, 1-31 May 1974
Ernest E. Hardy, Principal Investigator 31 May 1974 4 p EREP
(Contract NAS9-13364)
(E74-10564; NASA-CR-138639) Avail: NTIS HC $4.00 CSCL 08B

There are no author-identified significant results in this report.

N74-27780*# Michigan State Univ., East Lansing.
INVESTIGATION OF SKYLAB DATA Monthly Plans and Progress Report, May 1974
Lester V. Manderscheid, Principal Investigator May 1974 4 p EREP
(Contract NAS9-13332)
(E74-10594; NASA-CR-138703) Avail: NTIS HC $4.00 CSCL 05B

There are no author-identified significant results in this report.

N74-27792*# Stanford Univ., Calif. Remote Sensing Lab.
MULTISPECTRAL SIGNATURES IN RELATION TO GROUND CONTROL SIGNATURE USING NESTED SAMPLING APPROACH Progress Report, 3 Mar. - 3 May 1974
R. J. P. Lyon and F. R. Honey, Principal Investigators 3 May 1974 33 p refs Original contains imagery. Original photography may be purchased from the EROS Data Center, 10th and Dakota Avenue, Sioux Falls, S. D. 57198 ERTS
(Contract NAS5-21884)
(E74-10625; NASA-CR-138735) Avail: NTIS HC $4.75 CSCL 05B

There are no author-identified significant results in this report.

N74-27794*# TRW Systems Group, Redondo Beach, Calif.
ERTS IMAGE DATA COMPRESSION TECHNIQUE EVALUATION Final Report
Donald J. Spencer, Principal Investigator and C. L. May Apr. 1974 205 p refs Original contains imagery. Original photography may be purchased from the EROS Data Center, 10th and Dakota Avenue, Sioux Falls, S. D. 57198 ERTS
(Contract NAS5-21746)
(E74-10627; NASA-CR-138737) Avail: NTIS HC $13.25 CSCL 05B

There are no author-identified significant results in this report.

N74-27814# Joint Publications Research Service, Arlington, Va.
STATISTICAL METHODS OF STUDYING NATURAL OBJECTS
G. A. Sergeyev and D. A. Yanutsh 17 Jun. 1974 118 p refs Transl. into ENGLISH of the book "Statisticheskiye Metody Issledovaniya Prirodnykh Obyektov" Leningrad, Gidrometeoizdat, 1973 300 p
(JPRS-62251) Avail: NTIS HC $9.00

An examination of methods of statistical analysis of natural phenomena based on the theory of stochastic processes is reported. Author

N74-28817*# Pennsylvania State Univ., University Park. Office for Remote Sensing of Earth Resources (ORSER).
THE PENN STATE ORSER SYSTEM FOR PROCESSING AND ANALYZING ERTS AND OTHER MSS DATA Interim Report
George J. McMurtry, Gary W. Petersen, Principal Investigators, F. Y. Borden, and H. A. Weeden Jun. 1974 86 p refs Presented at the 30 Ann. Remote Sensing of Earth Resources Conf., Tullahoma, Tenn., 25-27 Mar. 1974 Original contains imagery. Original photography may be purchased from the EROS Data Center, 10th and Dakota Avenue, Sioux Falls, S. D. 57198 ERTS
(Contract NAS5-23133)
(E74-10573; NASA-CR-138678; ORSER-SSEL-TR-9-74) Avail: NTIS HC $7.50 CSCL 05B

The author has identified the following significant results. The office for Remote Sensing of Earth Resources (ORSER) of the Space Science and Engineering Laboratory at the Pennsylvania State University has developed an extensive operational system for processing and analyzing ERTS-1 and similar multispectral data. The ORSER system was developed for use by a wide variety of researchers working in remote sensing. Both photointerpretive techniques and automatic computer porcessing methods have been developed and used, separately and in a combined approach. A remote Job Entry system permits use of an IBM 370/168 computer from any compatible remote terminal, including equipment tied in by long distance telephone connections. An elementary cost analysis has been prepared for the processing of ERTS data.

N74-28837*# Purdue Univ., Lafayette, Ind. Lab. for Applications of Remote Sensing.
AN INTERDISCIPLINARY ANALYSIS OF MULTISPECTRAL SATELLITE DATA FOR SELECTED COVER TYPES IN THE COLORADO MOUNTAINS, USING AUTOMATIC DATA PROCESSING TECHNIQUES Monthly Progress Report, May 1974

Roger M. Hoffer, Principal Investigator May 1974 2 p EREP
(Contract NAS9-13380)
(E74-10604; NASA-CR-138713) Avail: NTIS HC $4.00 CSCL 05B

There are no author-identified significant results in this report.

N74-28854* California Univ., Davis. Dept. of Electrical Engineering.
MULTISPECTRAL COMBINATION AND DISPLAY OF ERTS-1 DATA Special Study No. 1
Robert N. Colwell, Principal Investigator and Vidal Raphael Algazi *In its* An Integrated Study of Earth Resources in the State of Calif. Using Remote Sensing Tech. 1 May 1974 9 p refs Original contains color imagery. Original photography may be purchased from the EROS Data Center, 10th and Dakota Avenue, Sioux Falls, S. D. 57198 ERTS

CSCL 08H

There are no author-identified significant results in this report.

N74-28858* California Univ., Davis. Dept. of Agricultural Engineering.
INVESTIGATION OF ATMOSPHERIC EFFECTS IN IMAGE TRANSFER Special Study No. 5
Robert N. Colwell, Principal Investigator, K. L. Coulson, and R. L. Walraven *In its* An Integrated Study of Earth Resources in the State of Calif. Using Remote Sensing Tech. 1 May 1974 33 p refs ERTS
CSCL 08H

There are no author-identified significant results in this report.

N74-28871*# International Business Machines Corp., Gaithersburg, Md.
ALL-DIGITAL PRECISION PROCESSING OF ERTS IMAGES Progress Report, period ending 31 May 1974
Ralph Bernstein, Principal Investigator 7 Jun. 1974 1 p ERTS
(Contract NAS5-21716)
(E74-10637; NASA-CR-138811) Avail: NTIS HC $4.00 CSCL 05B

There are no author-identified significant results in this report.

N74-28879*# Purdue Univ., Lafayette, Ind. Lab. for Applications of Remote Sensing.
AN INTERDISCIPLINARY ANALYSIS OF MULTISPECTRAL SATELLITE DATA FOR SELECTED COVER TYPES IN THE COLORADO MOUNTAINS, USING AUTOMATIC DATA PROCESSING TECHNIQUES Monthly Progress Report, Jun. 1974
Roger M. Hoffer, Principal Investigator Jun. 1974 2 p EREP
(Contract NAS9-13380)
(E74-10646; NASA-CR-138859) Avail: NTIS HC $4.00 CSCL 08F

There are no author-identified significant results in this report.

N74-28896*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
EXTRACTING LAND USE INFORMATION FROM THE EARTH RESOURCES TECHNOLOGY SATELLITE DATA BY CONVENTIONAL INTERPRETATION METHODS
Paul L. Vegas Washington Jul. 1974 61 p refs
(NASA-TN-D-7730; JSC-S-395) Avail: NTIS HC $3.75 CSCL 08B

A procedure for obtaining land use data from satellite imagery by the use of conventional interpretation methods is presented. The satellite is described briefly, and the advantages of various scales and multispectral scanner bands are discussed. Methods for obtaining satellite imagery and the sources of this imagery are given. Equipment used in the study is described, and samples of land use maps derived from satellite imagery are included together with the land use classification system used. Accuracy percentages are cited and are compared to those of a previous experiment using small scale aerial photography. Author

08
INSTRUMENTATION AND SENSORS

Includes data acquisition and camera systems and remote sensors.

A74-28592 * **Partial performance degradation of a remote sensor in a space environment, and some probable causes.** J. J. Horan, D. S. Schwartz (GE Valley Forge Space Center, Philadelphia, Pa.), and J. D. Love (Hughes Aircraft Corp., El Segundo, Calif.). *Applied Optics*, vol. 13, May 1974, p. 1230-1237. Contract No. NAS5-11320.

The Multispectral Scanner (MSS) was launched on the Earth Resources Technology Satellite (ERTS-1) on July 23, 1972. The MSS has two calibration systems, one internal and one external. Both calibration systems have shown strong, spectrally dependent performance degradation since launch. This paper presents details on the optical system of the MSS and data on the performance degradation as a function of both spectral interval and time in orbit. The history of the MSS during tests is traced, and it is shown that hydrocarbons from an external source may have been deposited on optical surfaces in the instrument. It is postulated that these contaminant coatings may have polymerized as a result of the exposure to UV light from the sun, increasing their blue absorption and accounting for the observed performance degradation. (Author)

A74-29001 # **A critique - Applications of non-satellite remote sensing of the earth's resources.** J. A. Howard (United Nations, Food and Agriculture Organization, Rome, Italy). *International Astronautical Federation, International Astronautical Congress, 24th, Baku, Azerbaidzhan SSR, Oct. 7-13, 1973, Paper.* 14 p. 26 refs.

An attempt is made to identify major limitations of remote sensing in evaluating the earth's resources. Spectral limitations are connected with the distribution of thermal energy and with the existence of several strong water absorption bands and two carbon dioxide absorption bands which greatly restrict the transmission 'windows' of the atmosphere. Limitations of aerial photographic systems are considered. Other systems examined include TV systems and optical mechanical scanners. Details concerning remote-sensing applications are discussed, taking into account the sensing of the oceans and the identification of vegetation in the terrestrial environment. G.R.

A74-29856 **Statistical properties of the background noise for the atmospheric windows in the intermediate infrared region.** Y. Itakura, S. Tsutsumi, and T. Takagi (Kyoto Technical University, Kyoto, Japan). *Infrared Physics*, vol. 14, Feb. 1974, p. 17-29. 8 refs.

The statistical properties of the sky-, forest-, and cities-background noise for the four atmospheric windows in the intermediate infrared spectral region (2-14 micron) were analyzed. There are two kinds of spectral regions where the statistical properties of the amplitude distribution of the background radiation are quite different. One is the 2-3 micron region, dominated by scattering sunlight; the other is the 8-14 micron region, where the thermal radiation from the background is predominant. In the latter, the background noise is well described by a statistical model consisting of a random set of two-dimensional pulses whose amplitudes and widths obey the Gaussian and Poisson distribution rule, respectively. In the former, both the amplitude and the width of the random pulse follow the Poisson statistics. The unified statistical model for the background noise, including the whole intermediate infrared spectral region, is derived. Its validity is demonstrated by some experimental results. (Author)

A74-30792 **Results of spectrophotometric measurements of natural formations from the spacecraft 'Soyuz-9' and investigations of environment from space.** K. Ia. Kondrat'ev, A. A. Buznikov, O. B. Vasil'ev, and V. I. Sevastianov (Leningradskii Gosudarstvennyi Universitet, Leningrad, USSR). *Remote Sensing of Environment*, vol. 3, no. 1, 1974, p. 15-27. 15 refs.

During the 'Soyuz-9' flight, the reflection spectra of various natural formations have been obtained by means of the handheld spectrograph RSS-2. Making use of the literature data on the surface reflection spectra for sand and water, the parameters of the atmospheric transfer operator were computed. The spectra obtained from the high altitude observations was corrected to spectral reflectance values at the earth's surface and compared with the curves for spectral radiance coefficients of different types of natural formations according to E. L. Krinov's classification. Using the parameters of the atmospheric transfer operator, the curves for spectral radiance coefficients of different types of natural formations as expected from space observations (Krinov's classification) have been computed. (Author)

A74-31869 **Field spectroscopy for multispectral remote sensing - An analytical approach.** T. G. Longshaw (Spectral Africa /Pty./, Ltd., Randfontein, Republic of South Africa). *Applied Optics*, vol. 13, June 1974, p. 1487-1493. 17 refs.

The present work discusses application problems associated with some of the existing reflectance data and points out the geometrical considerations necessary for field spectroscopy. Definitions of reflectance emanating from the quadravariate reflectance distribution function are described, and attention is drawn to the compromise between measurement complexity and application limitations. In this context, a field spectroradiometric system is described, and results from an application of the system to remote sensing of rock types are presented. (Author)

A74-32731 **The ITOS weather satellite.** *Spaceflight*, vol. 16, June 1974, p. 202-205.

The ITOS spacecraft are destined to enter a sun-synchronous orbit with a nominal altitude of 942 miles. The primary operational sensors aboard the spacecraft are the very high resolution radiometer, the vertical temperature profile radiometer, and the scanning radiometer. The spacecraft also carries a solar proton monitor which continuously measures proton and electron flux at orbit altitude. Basic spacecraft subsystems are also discussed, giving attention to the power supply subsystem, the attitude control system, and the thermal-control subsystem. G.R.

A74-33306 **Determination of aerosol parameters of the atmosphere by laser sounding from space.** V. E. Zuev, G. M. Krekov, and I. E. Naats (Akademiia Nauk SSSR, Institut Optiki Atmosfery, Tomsk, USSR). *Acta Astronautica*, vol. 1, Jan.-Feb. 1974, p. 93-103. 10 refs.

Some theoretical aspects of the problem of laser sounding of an aerosol atmosphere from a spacecraft are considered. The results of a numerical experiment carried out by the Monte-Carlo technique for a certain possible scheme of lidar sounding of the atmosphere and earth's surface from an altitude of 300 km are reviewed. The time scannings of a reflected signal at wavelengths of 0.6943 and 2.36 microns with various parameters of a hypothetical receiving system are presented. A possibility of optical prediction of aerosol density

variations in the upper atmosphere and of the albedo of the underlying surface is shown. A numerical experiment procedure developed by the authors to investigate the possibility of solving inverse problems of upper atmosphere aerosol sounding is analyzed. The first problem is the detection of the scattering aerosol component against a background of Rayleigh scattering of the atmosphere. In the second problem the multifrequency lidar sounding of noctilucent clouds from a spacecraft was used to determine their microstructure parameters. (Author)

A74-33307 **Application of lasers in atmospheric probing.** C. P. Wang (California, University, La Jolla, Calif.). *Acta Astronautica,* vol. 1, Jan.-Feb. 1974, p. 105-123. 77 refs. Grant No. DAHC04-72-C-0037.

A survey is made of laser techniques for direct measurement of atmospheric parameters. Light interactions which include Mie, Rayleigh, resonance-fluorescence, and Raman scattering, and light absorption, have been used for the laser probing of atmospheric constituents, temperature profiles, and aerosol distributions. Some basic parameters of the laser radar system - namely, laser light source, photodetector system, atmospheric transmittance, and sky radiation - are discussed. The performance and capability of some existing laser radar systems and some possible future systems are also discussed. (Author)

A74-33903 # **Application of space-oriented equipment in earth resources studies and in environmental control - An aircraft experiment (Ispol'zovanie kosmicheskikh sredstv dlia izucheniia zemnykh resursov i kontrolia okruzhaiushchei sredy - Samoletnyi eksperiment).** Iu. K. Khodarev, G. A. Avanesov, B. S. Dunaev, Ia. L. Ziman, and Iu. M. Chesnokov (Akademiia Nauk SSSR, Institut Kosmicheskikh Issledovanii, Moscow, USSR). *Meteorologiia i Gidrologiia,* Apr. 1974, p. 25-29. In Russian.

Description of spacecraft equipment designed for remote sounding of earth resources in the visual and IR spectral regions. The equipment was tested in aircraft experiments conducted in 1973 over some typical agricultural, forested and barren areas in the Soviet Union. The IR radiometer, the scanning multispectrum TV photometer, the survey camera, the spectrophotometer, the multiplex camera and other components of the equipment are described. V.Z.

A74-33904 # **Scanning multispectrum system in an aircraft experiment in earth resources studies (Mnogospektral'naia skaniruiushchaia sistema v samoletnom eksperimente po issledovaniiu zemnykh resursov).** G. A. Avanesov, I. V. Barinov, and V. D. Glazkov (Akademiia Nauk SSSR, Institut Kosmicheskikh Issledovanii, Moscow, USSR). *Meteorologiia i Gidrologiia,* Apr. 1974, p. 30-36. In Russian.

Airborne and ground equipment designed for video information collecting and processing in earth resources survey is described. The equipment includes a scanning multispectrum system providing earth surface images in eight spectral sections simultaneously, at wavelengths ranging from 0.35 to 1.1 micron; an onboard digital video recording system for tape recording in four selected spectral regions; a video data processing system for computer input; and a data readout system for color and black-and-white image synthesis. V.Z.

A74-34636 **The spectral reflectance of a vegetated surface. II - An eight-channel-radiometer for measurements of the reflected radiation field (Das spektrale Reflexionsvermögen einer bewachsenen Oberfläche. II - Ein Achtkanal-Radiometer zur Messung des reflektierten Strahlungsfeldes).** K. T. Kriebel (München, Universität, Munich, West Germany). *Beiträge zur Physik der Atmosphäre,* vol. 47, no. 2, 1974, p. 119-128. In German. Research supported by the Bundesministerium für Bildung und Wissenschaft and Deutsche Forschungsgemeinschaft.

The spectral radiometer described will measure, from an aircraft, the reflected spectral radiance as a function of the angle. Measurements are made simultaneously in eight narrow spectral regions. The device is an eight-channel step-scan spectral radiometer mounted in a streamlined travel pod. A cross-sectional view of the radiometer is given and discussed, along with the transmission curves of the eight interference filters, and the block diagram of the signal processing electronics. V.P.

A74-34769 **Applied solid state science: Advances in materials and device research. Volume 4.** Edited by R. Wolfe (Bell Telephone Laboratories, Inc., Murray Hill, N.J.). New York, Academic Press, Inc., 1974. 354 p. $28.50.

Narrow gap semiconductors are considered along with solid state batteries and heterostructure junction lasers. Electrooptic ceramics are discussed, giving attention to the optical behavior of ferroelectric ceramics, the composition and preparation of lead lanthanum zirconate titanate (PLZT) ceramics, the properties of PLZT ceramics, and the applications of electrooptic ceramics.

Individual items are announced in this issue. G.R.

A74-34770 **Narrow gap semiconductors.** T. C. Harman and I. Melngailis (MIT, Lexington, Mass.). In: Applied solid state science: Advances in materials and device research. Volume 4. New York, Academic Press, Inc., 1974, p. 1-94. 233 refs. USAF-sponsored research.

Attention is given to those aspects of narrow gap semiconductors which are of primary importance in device development. The current state of the art of infrared detectors and emitters is examined, taking into account photovoltaic devices for use as thermal sensors and as wide-band receivers in laser systems. Other subjects considered include recent advances in tunable lasers and their users in high-resolution spectroscopy and air pollution measurements. G.R.

A74-35287 **International Cryogenic Engineering Conference, 5th, Kyoto, Japan, May 7-10, 1974, Preprints. Volumes 1 & 2.** Conference sponsored by the Cryogenic Association of Japan. Tokyo, H. Nagano, University of Tokyo, 1974. Vol. 1, 216 p.; vol. 2, 358 p.

Recent theoretical and experimental studies of superconductivity, its technology and applications, are presented in a number of papers. Some of the topics covered include superconducting levitated transport systems, superconducting power transmission, macroscopic derivation of maximum Josephson tunneling current density, ac losses of a superconducting wire in a longitudinal magnetic field, a high speed superconducting generator, superconducting magnet and fusion reactor, development of high voltage cryoresistive cable, a millikelvin dilution refrigerator with plastic exchangers, and indications for the future of superconducting technology.

Individual items are announced in this issue. P.T.H.

A74-36675 **Use of radiometric measurements in the microwave band for spectral investigations of the earth's upper atmosphere.** L. M. Mitnik (Akademiia Nauk SSSR, Institut Radiotekhniki i Elektroniki, Moscow, USSR). *(Akademiia Nauk SSSR, Izvestiia, Fizika Atmosfery i Okeana,* vol. 9, Oct. 1973, p. 1092-1096.) *Academy of Sciences, USSR, Izvestiya, Atmospheric and Oceanic Physics,* vol. 9, Oct. 1973, p. 618-621. 19 refs. Translation.

A74-37021 # **The information content of remote measurements of atmospheric temperature by satellite infra-red radiometry and optimum radiometer configurations.** G. Peckham (Heriot-Watt University, Edinburgh, Scotland). *Royal Meteorological Society, Quarterly Journal*, vol. 100, July 1974, p. 406-419. 19 refs.

Infrared radiometry from an earth satellite is becoming an important technique for the determination of the three-dimensional temperature structure of the atmosphere on a global scale. A quantitative expression for the information content of the data from a temperature sounding radiometer is derived. A simple model for the 15-micron CO2 absorption band is used to find radiometer configurations which give maximum information. The spectral bandwidths corresponding to these optimum configurations are considerably broader than those specified in the past for radiometers of this type. The technique of selective chopping in which the radiometer contains absorbing cells filled with CO2 is shown to make a significant increase in the information content. (Author)

A74-37295 **Target image frequency spectrum in Doppler radars.** S. A. Hovanessian (Hughes Aircraft Co., Canoga Park, Calif.). *IEEE Transactions on Aerospace and Electronic Systems*, vol. AES-10, July 1974, p. 497-503. 5 refs.

A mathematical model to study target image return frequency spectrums in Doppler radars is described. The model includes the effects of eclipsing, sea surface slope distribution, and surface reflectivity characteristics. The procedure of calculations has been computerized and the analytical results are compared to flight-test values obtained from flight over the ocean. The calculated values of amplitude-frequency spectrums of target image returns correspond reasonably well with the respective recorded flight-test data. (Author)

A74-37476 * # **Remote atmospheric sensing with an airborne laser absorption spectrometer.** R. T. Menzies and M. T. Chahine (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, Calif.). *Optical Society of America, Spring Meeting, Washington, D.C., Apr. 21-25, 1974, Paper.* 41 p. 29 refs.

A laser absorption spectrometer, using an infrared laser transmitter and a heterodyne radiometer, can be used from an aircraft or spacecraft to measure altitude profiles of air pollutants and other atmospheric constituents. The technique involves measurement of differential absorption at several wavelengths, using the diffusely reflecting earth's surface to provide a return signal. The pressure broadening of absorption lines allows one to discriminate between high and low altitude absorbers. Application of the technique to measurements of ozone, nitric oxide, and water vapor are presented. CO2 and CO lasers are considered as transmitters. The discussion includes altitude resolution limitations, atmospheric temperature dependence, and frequency stability requirements of the instrument. (Author)

A74-37509 **Equipment for space research: Data coding and compression (Apparatura dlia kosmicheskikh issledovanii: Kodirovanie, szhatie dannykh).** Edited by Iu. K. Khodarev. Moscow, Izdatel'stvo Nauka, 1973. 120 p. In Russian.

Questions concerning the theoretical calculation and the realization of spacecraft equipment for the collection, processing, and transmission of data are examined in a number of papers. Some of the topics covered include: sequence length coding with no a priori knowledge, multipurpose systems of data collection and processing, the construction of spacecraft antenna systems, analysis of multiple band-pass filters, and the selection of cutoff frequencies for intermediate frequency amplifiers in a superheterodyne radiometer. P.T.H.

A74-37520 # **Selection of boundary frequencies for an intermediate-frequency amplifier in a superheterodyne radiometer in the millimeter and centimeter wavelength range (O vybore granichnykh chastot usilitelia promezhutochnoi chastoty v supergeterodinnom radiometre millimetrovogo i santimetrovogo diapazonov voln).** Iu. A. Nemlikher, I. A. Strukov, and L. N. Iudina. In: Equipment for space research: Data coding and compression. Moscow, Izdatel'stvo Nauka, 1973, p. 82-87. 7 refs. In Russian.

A74-37858 # **Instrumentation techniques for advanced fine-pointing mechanisms in a passive seismic environment.** D. H. Wine (Martin Marietta Aerospace, Denver, Colo.). *American Institute of Aeronautics and Astronautics, Mechanics and Control of Flight Conference, Anaheim, Calif., Aug. 5-9, 1974, Paper 74-872.* 5 p. Members, $1.50; nonmembers, $2.00.

Description of a technique which uses a Linear Variable Differential Transformer and a Hewlett-Packard laser interferometer to measure linear displacements, and an interferometer-autocollimator to measure angular rotation, in the detection and measurement of angular deviations less than 0.1 milliarcsec in a passive seismic environment. Displacement of interference fringes is detected and measured by a photoelectric detector whose output is proportional to fringe displacement. The detector designs are described and their use in an air-bearing motion simulator is discussed in the measurements of angles in inertial reference-component applications and other aerospace applications. V.Z.

N74-21966*# National Environmental Satellite Service, Washington, D.C.
A CLOUD PHYSICS INVESTIGATION UTILIZING SKYLAB DATA Quarterly Progress Report, Jan. - Mar. 1974
John Alishouse, Herbert Jacobowitz, and David Wark, Principal Investigators Mar. 1974 4 p EREP
(NASA Order T-4715-B)
(E74-10441; NASA-CR-137424; QPR-4) Avail: NTIS HC $4.00 CSCL 04A

There are no author-identified significant results in this report.

N74-21984*# National Ocean Survey, Rockville, Md. Photogrammetric Research Branch.
SKYLAB A PROPOSAL AEROTRIANGULATION WITH VERY SMALL SCALE PHOTOGRAPHY Quarterly Report, 15 Jan. - 15 Apr. 1974
Morton Keller, Principal Investigator 15 Apr. 1974 1 p EREP
(NASA Order T-4110-B)
(E74-10459; NASA-CR-137448) Avail: NTIS HC $4.00 CSCL 08B

There are no author-identified significant results in this report.

N74-22008*# Arizona Univ., Tucson.
EVALUATION OF ERTS-1 IMAGE SENSOR SPATIAL RESOLUTION IN PHOTOGRAPHIC FORM Progress Report, 1 Jan. - 1 Mar. 1974
P. N. Slater, Principal Investigator, R. L. Antos, and R. A. Schowengerdt Apr. 1974 19 p ERTS
(Contract NAS5-21849)
(E74-10484; NASA-CR-136880; PR-9) Avail: NTIS HC $4.00 CSCL 14E

There are no author-identified significant results in this report.

N74-22115*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

A MULTI-SENSOR ANALYSIS OF NIMBUS 5 DATA ON 22 JANUARY 1973
L. J. Allison, E. B. Rodgers (Environ. Res. and Technol., Inc., Lexington, Mass.), T. T. Wilheit, and R. Wexler Jan. 1973 58 p refs
(NASA-TM-X-70633; X-910-74-20) Avail: NTIS HC $6.00 CSCL 14B

The Nimbus 5 meteorological satellite carried aloft a full complement of radiation sensors, the data from which were analyzed and intercompared during orbits 569-570 on 22 January 1973. The electrically scanning microwave radiometer (ESMR) which sensed passive microwave radiation in the 19.35 GHz region, delineated rain areas over the ocean off the U.S. east coast, in good agreement with WSR-57 and FPS-77 radar imagery and permitted the estimation of rainfall rates in this region. Residual ground water in the lower Mississippi Valley, which resulted from abnormal rainfall in previous months, was indicated under clear sky conditions by soil brightness temperature values in the Nimbus 5 ESMR and U.S. Air Force Data Acquisition and Processing Program (DAPP) IR data. The temperature-humidity infrared radiometer showed the height and spatial configuration of frontal clouds along the east coast and outlined the confluence of a polar jet stream with a broad sub-tropical jet stream along the U.S. Gulf Coast. Temperature profiles from three vertical temperature sounders, the infrared temperature profile radiometer (ITPR), the Nimbus E microwave spectrometer (NEMS) and the selective chopper radiometer (SCR) were found to be in good agreement with related radiosonde ascents along orbit 569 from the sub-tropics to the Arctic Circle. Author

N74-22950*# Geological Survey, Denver, Colo.
REMOTE SENSING GEOPHYSICS FROM SKYLAB Monthly Report, Apr. 1974
Kenneth Watson, Principal Investigator and H. A. Pohn Apr. 1974 2 p ref EREP
(NASA Order T-6555-B)
(E74-10501; NASA-CR-136906) Avail: NTIS HC $4.00 CSCL 08E

There are no author-identified significant results in this report.

N74-25668 Tennessee Univ., Knoxville.
CIRCULAR SCAN SYNTHETIC APERTURE RADAR Ph.D. Thesis
Harold Irvin Brock 1973 148 p
Avail: Univ. Microfilms Order No. 74-11233

Terrain imaging obtained by using a microwave radar mounted upon a spinning vehicle is studied. The resolution necessary to produce accurate radar maps is obtained without the need for a large bulky antenna. This method, which is called circular scan synthetic aperture radar, is similar to linear synthetic aperture radar (SAR). A brief review of the side-looking SAR principle is given and the optimum resolutions are derived. The circular scan SAR case is presented. The impulse response of the system is determined, and the equations for the optimum resolution are derived. The effects of phase errors are also included. The return signal is sinusoidal frequency modulated, and the matched filter response for this signal is derived. The problem of imaging a distributed target is studied, and the limitations upon obtaining an image are stated. The effects of the spatial frequencies of the target upon the resolution and the sampling rate are identified. Dissert. Abstr.

N74-25861*# Environmental Research and Technology, Inc., Lexington, Mass.
EXPERIMENTAL EVALUATION OF ATMOSPHERIC EFFECTS ON RADIOMETRIC MEASUREMENTS USING THE EREP OF SKYLAB Quarterly Progress Report, 7 Feb. - 7 May 1974
David T. Chang, Principal Investigator 10 May 1974 5 p ref EREP
(Contract NAS9-13343)
(E74-10543; NASA-CR-138292; QPR-4) Avail: NTIS HC $4.00 CSCL 04A

There are no author-identified significant results in this report.

N74-25866*# Boeing Co., Kent, Wash.
QUANTITATIVE DETERMINATION OF STRATOSPHERIC AEROSOL CHARACTERISTICS Monthly Report, Apr. 1974
David L. Tingey, Principal Investigator Apr. 1974 2 p EREP
(Contract NAS9-13303)
(E74-10550; NASA-CR-138299) Avail: NTIS HC $4.00 CSCL 04A

There are no author-identified significant results in this report.

N74-25878*# South Alabama Univ., Mobile. Dept. of Mechanical Engineering.
ATMOSPHERIC EFFECTS ON REMOTE SENSING OF NON-UNIFORM TEMPERATURE SOURCES Final Report, Mar. 1973 - Apr. 1974
William A. McNeill and Barry P. Dixon 1 May 1974 44 p refs
(Contract NAS8-28722)
(NASA-CR-129028) Avail: NTIS HC $5.25 CSCL 04A

The effects are considered of an absorbing, emitting, and scattering atmosphere upon the remote sensing of surface areas having non-uniform intensity. These atmospheric effects may be significant in determination, by remote sensing, of non-uniform surface temperature distributions, and the results of the investigation are applicable in such cases. Analytical methods and a digital computational program are presented, expressing the results in terms of contrast and contrast transmittance between two adjacent emitting areas having unequal intensities, in the presence of a additional disturbing emitters. In the computational procedure, emitting areas are replaced by point-source emitters, each assigned and effective intensity based upon the intensity of the area it replaces. Absorbing, emitting, and scattering behavior of the atmosphere may be specified in the computational procedure either by means of analytical atmospheric models or by means of calibrating ground level emitters. Author

N74-25891*# Kanner (Leo) Associates, Redwood City, Calif.
THE ACCURACY OF SATELLITE TEMPERATURE SOUNDING OF THE ATMOSPHERE
V. P. Tarakanova Washington NASA Jun. 1974 7 p refs Transl. into ENGLISH from Meteorol. i Gidrol. (Moscow), no. 4, Apr. 1974 p 76-78
(Contract NASw-2481)
(NASA-TT-F-15690) Avail: NTIS HC $4.00 CSCL 04A

Data are presented on the statistical structure of the errors of indirect satellite soundings at various levels in the atmosphere. Standard aerological sounding data are used. Comparison of the correlations at various levels demonstrates the lowest correlation at the 200 mb level. Data are presented on correlation of errors at various levels at the same point, in which case the correlations are below the significance level. This apparently is connected with the method of processing the indirect sounding data.
Author

N74-25913# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.
INFRARED RADIOMETER FOR GEOLOGICAL MAPPING
V. A. Verbitskii, A. G. Grammakov, B. M. Kolomytsev, and G. S. Smirnov 11 Mar. 1974 8 p refs Transl. into ENGLISH from Izv. Vyssh. Ucheb. Zaved. Priborostr. (Leningrad), v. 15, no. 3, 1972 p 110-111
(AD-776888; FTD-HT-23-912-74) Avail: NTIS CSCL 08/7

In the article the operating principle and operation of an infrared radiometer with a constant field of vision angle, which was designed for geological mapping from the natural infrared radiation of the earth, are described. A block-diagram is provided and the basic parameters of the instrument, obtained during laboratory and field tests of the radiometer, are presented. GRA

N74-26857*# City Coll. of the City of New York. University Inst. of Oceanography.
A JOINT METEOROLOGICAL, OCEANOGRAPHIC AND SENSOR EVALUATION PROGRAM FOR EXPERIMENT S193 ON SKYLAB Monthly Plans and Progress Report, period ending 13 Mar. 1974
Willard J. Pierson, R. K. Moore, and E. P. McClain, Principal Investigators 13 Mar. 1974 3 p EREP
(Contract NAS9-13642)
(E74-10514; NASA-CR-138264) Avail: NTIS HC $4.00 CSCL 14B

There are no author-identified significant results in this report.

N74-27786*# Kansas Univ. Center for Research, Inc., Lawrence. Remote Sensing Lab.
DESIGN DATA COLLECTION WITH SKYLAB/EREP MICROWAVE INSTRUMENT S-193 Monthly Progress Report, Apr. 1974
Richard K. Moore, Fawwaz T. Ulaby, Principal Investigators, Cheng King, John Barr, Bruce Short, and Saad Ulaby Apr. 1974 4 p EREP
(Contract NAS9-13331)
(E74-10603; NASA-CR-138712) Avail: NTIS HC $4.00 CSCL 05B

There are no author-identified significant results in this report.

N74-27799* Kansas State Univ., Manhattan.
FLEXIBLE DCP INTERFACE
E. T. Kanemasu and H. Schimmelpfenning *In its* Wheat: Its Water Use, Production and Disease Detection and Prediction 5 Feb. 1974 24 p ERTS

(Contrib-1397) CSCL 05B

The author has identified the following significant results. A user of an ERTS data collection system (DCS) must supply the sensors and signal-conditioning interface. The electronic interface must be compatible with the NASA-furnished data collection platform. A universal signal-conditioning system for use with a wide range of environmental sensors is described. The interface is environmentally and electronically compatible with the DCP and has operated satisfactorily for a complete winter wheat growing season in Kansas.

N74-27825# Geological Survey, Reston, Va.
REMOTE SENSING PLATFORMS
Alden P. Colvocoresses 1974 81 p refs
(USGS-Circ-693) Avail: NTIS HC $7.25; free on application to the US Geological Survey, Reston, Va. 22092 CSCL 14E

Typical vehicles which carry remote sensors into the atmosphere or beyond into space are described and illustrated. Airborne platforms and spacecraft are selected from vehicles which have demonstrated acceptance and capability, or have been defined for future remote sensing missions. Except for an unique British kite balloon, only American platforms are covered. Remote sensing of the Earth is the prime consideration, but sensing of other planets and moons is also considered. Author

N74-27891# Atomic Energy Commission, Oak Ridge, Tenn. Technical Information Center.
RADIOMETRIC GAGES: A BIBLIOGRAPHY
W. Hugh Kinser, comp. Jan. 1974 125 p refs
(TID-3338) Avail: NTIS HC $5.45

Approximately 794 references to reports and published literature on the design, operation, and uses of radiometric gages in industry, hydrology, civil engineering, and in the laboratory are presented. Abstracts of the papers are presented; and corporate author, report number, personal author, and subject indexes are included. NSA

N74-27896# California Univ., Los Angeles. Inst. of Geophysics and Planetary Physics.
A DIGITAL OFFSET FLUXGATE MAGNETOMETER FOR USE IN REMOTE GEOMAGNETIC OBSERVATORIES
James J. Power 20 Sep. 1973 93 p refs
(Contract F19628-72-C-0175; AF Proj. 8601)
(AD-777885; IGPP-1247-37; SR-1; AFCRL-TR-73-0603) Avail: NTIS CSCL 17/6

The circuit design of a completely automatic fluxgate magnetometer is presented. The instrument is designed to measure the magnitude and direction of the local field vector at the observatory over a dynamic range of plus or minus 65,500 gamma with a resolution of 0.1 gamma. Design goals for the uncertainty in the zero offset of the sensor and noise level of the sensor are less than 1 gamma and 0.1 gamma peak to peak, respectively. The ring core fluxgate sensors are constructed using commercially available nickel alloy magnetic cones. The electronics of each axis contain two null feedback circuits. The fine feedback system with a dynamic range of plus or minus 64 gamma establishes the fundamental resolution and frequency response of the instrument. A digital offset feedback system maintains the ambient field along the sensor axis within the dynamic range of the fine system by automatic application of an appropriate number of discrete steps of 64 gamma. (Modified author abstract) GRA

N74-28812*# National Oceanic and Atmospheric Administration, Washington, D.C. National Environmental Satellite Service.
A CLOUD PHYSICS INVESTIGATION UTILIZING SKYLAB DATA Quarterly Progress Report, Apr. - Jun. 1974
John Alishouse, Herbert Jacobowitz, and David Wark, Principal Investigators Jun. 1974 3 p refs EREP
(NASA Order T-4715-B)
(E74-10567; NASA-CR-138642; QPR-5) Avail: NTIS HC $4.00 CSCL 04A

There are no author-identified significant results in this report.

N74-28815*# Purdue Univ., Lafayette, Ind. Lab. for Applications of Remote Sensing.
A MULTILEVEL, MULTISPECTRAL DATA SET ANALYSIS IN THE VISIBLE AND INFRARED WAVELENGTH REGIONS
L. F. Silva, Principal Investigator and L. L. Biehl 15 Jul. 1974 45 p refs Original contains imagery. Original photography may be purchased from the EROS Data Center, 10th and Dakota Avenue, Sioux Falls, S. D. 57198 EREP
(Contract NAS9-13301)
(E74-10571; NASA-CR-138646) Avail: NTIS HC $5.25 CSCL 05B

There are no author-identified significant results in this report.

N74-28827*# Kansas Univ. Center for Research, Inc., Lawrence. Remote Sensing Lab.
DESIGNED DATA COLLECTION WITH SKYLAB/EREP

MICROWAVE INSTRUMENT S-193 Monthly Progress Report, Mar. 1974
Richard K. Moore, Fawwaz T. Ulaby, Principal Investigators, Cheng King, John Barr, Bruce Short, and Saad Ulaby Mar. 1974 4 p EREP
(Contract NAS9-13331)
(E74-10584; NASA-CR-138689) Avail: NTIS HC $4.00 CSCL 14B

There are no author-identified significant results in this report.

N74-28840*# Boeing Co., Kent, Wash.
QUANTITATIVE DETERMINATION OF STRATOSPHERIC AEROSOL CHARACTERISTICS Monthly Report, May 1974
David L. Tingey, Principal Investigator May 1974 1 p EREP
(Contract NAS9-13303)
(E74-10607; NASA-CR-138716) Avail: NTIS HC $4.00 CSCL 04A

There are no author-identified significant results in this report.

N74-28868*# Kansas Univ. Center for Research, Inc., Lawrence. Remote Sensing Lab.
A SURVEY OF TERRAIN RADAR BACKSCATTER COEFFICIENT MEASUREMENT PROGRAMS Advance Report of Significant Results
Richard K. Moore, Principal Investigator and C. King Dec. 1973 87 p refs EREP
(Contract NAS9-13331)
(E74-10634; NASA-CR-138808; CRES-TR-243-2) Avail: NTIS HC $7.50 CSCL 17I

There are no author-identified significant results in this report.

N74-28869*# Radio Corp. of America, Princeton, N.J. Astro-Electronics Div.
METEOROLOGICAL UTILITY OF HIGH RESOLUTION MULTI-SPECTRAL DATA Final Report
John M. Danko, Principal Investigator 31 May 1974 68 p Original contains imagery. Orginal photography may be purchased from the EROS Data Center, 10th and Dakota Avenue, Sioux Falls, S. D. 57198 ERTS
(Contract NAS5-21741)
(E74-10635; NASA-CR-138809; AED-R-4011) Avail: NTIS HC $6.50 CSCL 04B

There are no author-identified significant results in this report.

N74-28882*# Kansas Univ. Center for Research, Inc., Lawrence. Remote Sensing Lab.
DESIGN DATA COLLECTION WITH SKYLAB/EREP MICROWAVE INSTRUMENT S-193 Monthly Letter Progress Report No. 10, 1-30 Jun. 1974
Richard K. Moore, Fawwaz T. Ulaby, Principal Investigators, Arun Sobti, Cheng King, John Barr, Bruce Short, and Saad Ulaby Jun. 1974 11 p EREP
(Contract NAS9-13331)
(E74-10649; NASA-CR-138862) Avail: NTIS HC $4.00 CSCL 05B

There are no author-identified significant results in this report.

N74-28883*# Kansas Univ. Center for Research, Inc., Lawrence. Remote Sensing Lab.
DESIGN DATA COLLECTION WITH SKYLAB/EREP MICROWAVE INSTRUMENT S-193 Monthly Letter Progress Report No. 9, 1-31 May 1974
Richard K. Moore, Fawwaz T. Ulaby, Principal Investigators, Arun Sobti, Cheng King, John Barr, Bruce Short, and Saad Ulaby May 1974 19 p ref EREP
(Contract NAS9-13331)
(E74-10650; NASA-CR-138863) Avail: NTIS HC $4.00 CSCL 05B

There are no author-identified significant results in this report.

N74-28887*# Massachusetts Inst. of Tech., Cambridge. Center for Space Research.
APPENDIX TO THEORY OF RADIO-FREQUENCY INTERFEROMETRY IN GEOPHYSICAL SUBSURFACE PROBING, NUMERICAL RESULTS
J. A. Kong and L. Tsang [1974] 427 p
(Contract NAS9-11540)
(NASA-CR-134333; CSR-TR-74-2) Avail: NTIS HC $24.50 CSCL 08M

A series of interference and radiation patterns are presented for radio interferometry in subsurface probing. The interference patterns are due both to a vertical magnetic dipole and to a horizontal electric dipole. Mode solutions are also presented for layer thickness equal to 1 wavelength, as well as for thin layers. J.A.M.

N74-29055 Joint Publications Research Service, Arlington, Va.
USE OF BASE TECHNIQUES FOR ENVIRONMENTAL RESOURCE STUDIES. AN AIRCRAFT EXPERIMENT
Yu. K. Khodarev, G. A. Avanesov, B. S. Dunayev, Ya. L. Ziman, and Yu. M. Chesnokov *In its* Meteorology and Hydrol. no. 4, 1974 (JPRS-62306) 24 Jun. 1974 p 27-32 refs Transl. into ENGLISH from Meteorol. i Gidrol. (Moscow), no. 4, 1974 p 25-29

An aircraft experiment on the topic of environmental resource studies by space techniques is described. The basic principles are presented on the basis of which a set of onboard scientific equipment was assembled, and the experimental program was laid out. There is a brief description of the multispectral scientific equipment onboard the laboratory aircraft and the principles on which the spectral zones were selected for it. The basic regions covered by the photographs are listed. Author

N74-29056 Joint Publications Research Service, Arlington, Va.
MULTISPECTRAL SCANNING SYSTEM IN AN AIRCRAFT EXPERIMENT TO STUDY THE EARTH'S RESOURCES
G. A. Avanesov, I. V. Barinov, and V. D. Glazkov *In its* Meteorology and Hydrol. no. 4, 1974 (JPRS-62306) 24 Jun. 1974 p 33-41 Transl. into ENGLISH from Meteorol. i Gidrol. (Moscow), no. 4, 1974 p 30-36

Descriptions are presented of systems making up the preliminary model of the experimental set of video information gathering and processing devices, some preliminary experimental results are included. Author

09
GENERAL

Includes economic analysis.

A74-29008 # Practical use of space vehicles in the light of the principle of state sovereignty over natural resources. V. D. Bordunov. *International Astronautical Federation, International Astronautical Congress, 24th, Baku, Azerbaidzhan SSR, Oct. 7-13, 1973, Paper.* 6 p. 6 refs.

The use of space vehicles for the evaluation and research of resources gives the opportunity of obtaining information about the natural resources of foreign states. The natural resources are not only components of the territory; they are the material basis of the existence of states. It is evident that information about natural resources has a great value for the economic policies of any country. That is why the right of a country to obtain and use this information means that questions on obtaining, disseminating, and making use of its natural resources should be settled by the state itself. F.R.L.

A74-29031 * # Skylab systems flight performance - An interim report. L. F. Belew (NASA, Marshall Space Flight Center, Huntsville, Ala.). *International Astronautical Federation, International Astronautical Congress, 24th, Baku, Azerbaidzhan SSR, Oct. 7-13, 1973, Paper.* 15 p.

An unmanned Skylab space station was launched on May 14, 1973. The space station was inserted into a near-circular earth orbit of approximately 435 kilometers altitude. Initial difficulties with Skylab are reported together with the steps taken to overcome these difficulties. The first crew made its rendezvous with Skylab on May 25. A Skylab description is given and a systems overview is presented. Skylab attitude requirements are discussed together with details of attitude control, the communications network, scientific investigations, student experiments, earth resources studies, weather studies, solar observations, biomedical investigations, technology investigations, crew mobility and effectiveness investigations, habitability assessments, and a comet observation. G.R.

A74-29288 Mendonça's dream of Brazil in space. B. Maddox. *New Scientist,* vol. 62, Apr. 18, 1974, p. 114, 115.

The services which communications satellites could provide for Brasil are connected with the characteristics of the Brasilian geographic situation in which the points to be connected are scattered, separated by vast distances, and yet share a common language. A civilian space research institute and a commission on space activities are exploring approaches for implementing a space program. The major applications projects are dependent on the NASA satellites ERTS-1 and ATS-F. G.R.

A74-29451 * # Widening ERTS applications. E. P. Mercanti (NASA, Goddard Space Flight Center, Office of Mission Utilization, Greenbelt, Md.). *Astronautics and Aeronautics,* vol. 12, May 1974, p. 28-39.

In less than two years of operation ERTS-1 is shown to have successfully completed its experimental mission and to be delivering an ever-increasing roster of benefits. The widening ERTS applications reviewed include air quality and weather modification, aid to oil exploration, ore-deposit exploration, short-lived event observation, flood area assessment and flood-plain mapping, land and water quality assessment, soil association mapping, crop production measurements, wildlife resources, drought and desertification studies, ground-water exploration, watershed surveys, snow and ice monitoring, surface water mapping, and iceberg surveys. Future projects and developments are also briefly reviewed. M.V.E.

A74-33070 Education and training in remote sensing. R. G. Reeves (U.S. Geological Survey, EROS Data Center, Sioux Falls, S. Dak.). *Photogrammetric Engineering,* vol. 40, June 1974, p. 691-696.

The present work describes generally the education and training programs conducted by the Earth Resources Observation Systems Program (EROS Program), designed to educate user specialists and managers in the technology of extraction of information from remote-sensor data and in the application of remote sensing to resources and environmental problems. Training courses at the EROS Data Center emphasize the interpretation of data and minimize theoretical aspects of remote sensing. Two levels of courses are planned: technique-transfer courses and courses aimed at a particular discipline or several closely related disciplines. P.T.H.

A74-33598 Colloquium on the Law of Outer Space, 15th, Vienna, Austria, October 8-15, 1972, Proceedings. Colloquium sponsored by the International Astronautical Federation. Edited by M. D. Schwartz (California, University, Davis, Calif.). Davis, Calif., University of California; South Hackensack, N.J., Fred B. Rothman and Co., 1973. 288 p. In English, French, and Spanish. $20.

Legal problems of space technology are discussed, covering those of earth resources survey satellites, those of communications satellites and their international implications. The provisions of international conventions and legislations on the subjects are interpreted and assessed. Attention is given to arbitration procedures and compensation of damage. The need for a revision and augmentation of the existing international space legislation is stressed. Suggestions are given as to how the deficiencies of present laws and regulations could be alleviated. V.Z.

A74-33599 # Detection of earth resources by remote sensors /Systems and Problems/. S. Estradé. In: Colloquium on the Law of Outer Space, 15th, Vienna, Austria, October 8-15, 1972, Proceedings. Davis, Calif., University of California; South Hackensack, N.J., Fred B. Rothman and Co., 1973, p. 4-16.

The influence of space technology on the development of earth resources is discussed, covering space photography, magnetometric and gravimetric detection, IR photography, spectrometry, and the ERTS and other U.S. and foreign earth resources satellites. Emphasis is made on the international legal aspects of this technology concerning the right of a nation to acquire data on its resources collected by other nations. Publicity, public information, national development plans, espionage, and international economy are also considered as points requiring legal stipulations and clarifications. The need for a new space treaty settling these questions is pointed out. V.Z.

A74-33600 # International legal aspects of earth resources satellites. S. Gorove. In: Colloquium on the Law of Outer Space, 15th, Vienna, Austria, October 8-15, 1972, Proceedings. Davis, Calif., University of California; South Hackensack, N.J., Fred B. Rothman and Co., 1973, p. 30-32. 8 refs.

The applicability of the provisions of the Outer Space Treaty of 1967 is questioned, with specific references to Articles I, III, VIII and IX of the Treaty. Article XI, on the other hand, is singled out as one which is more relevant to the use of earth resources survey satellites. It is felt that a continuing exploration of possible bilateral and multilateral approaches to international cooperation should be a circumspect policy for the United States to pursue. V.Z.

A74-33601 # Legal aspects of estimating, conserving, and developing earth resources by means of spacecraft (Aspects juri-

diques de l'estimation, conservation, et développement des ressources de la terre au moyen d'objets spatiaux). G. Meloni. In: Colloquium on the Law of Outer Space, 15th, Vienna, Austria, October 8-15, 1972, Proceedings. Davis, Calif., University of California; South Hackensack, N.J., Fred B. Rothman and Co., 1973, p. 38-44. 26 refs. In French.

The harmonization of the national interest of individual nations with the common interest of mankind as a whole in the utilization of space for such peaceful purposes as the survey, conservation, and development of earth resources is discussed. Special attention is given to the possibilities and limitations of international control of such space activities by United Nations organs. M.V.E.

A74-33612 # **Space law and international action.** E. Brooks. In: Colloquium on the Law of Outer Space, 15th, Vienna, Austria, October 8-15, 1972, Proceedings. Davis, Calif., University of California; South Hackensack, N.J., Fred B. Rothman and Co., 1973, p. 188-196. 24 refs.

Some written agreements which outline the political contours of space are reviewed for the models they set for future international space activities. Particular attention is given to the Intelsat agreement and to bilateral agreements between the USSR and the United States, such as the agreements on cooperation in the field of environmental protection, in the exploration and use of outer space for peaceful purposes, and in the fields of medical science and public health and of science and technology. It is submitted that, although the monopoly of space technology of U.S. and USSR leads to the line of least diplomatic resistance, which is bilateralism, the larger significance of planetary exploration and near-space scientific studies and environmental monitoring requires a multilateral approach. V.P.

A74-35982 **Earth Resources Technology Satellite 1 - Space research object earth (Earth Resources Technology Satellite 1 - Raumforschungsobjekt Erde).** U. Ladnorg. *Flug Revue/Flugwelt International*, July 1974, p. 41-43. In German.

The ERTS-1 was launched on July 23, 1972. The objective of this satellite was to explore the possibilities regarding the use of satellites for the observation and the registration of earth resources, vegetation, and surface conditions. Details concerning the observational equipment of the satellite are discussed along with the spectral regions available for the observations, the wide-band video tape recorders, the data collection system, aspects of spacecraft design, operational questions, and the employment of the ERTS results. G.R.

A74-36226 * **Utilization of space technology for terrestrial solar power applications.** R. K. Yasui (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, Calif.) and R. E. Patterson (TRW Systems Group, Redondo Beach, Calif.). In: Photovoltaic Specialists Conference, 10th, Palo Alto, Calif., November 13-15, 1973, Conference Record. Conference sponsored by the Institute of Electrical and Electronics Engineers. New York, Institute of Electrical and Electronics Engineers, Inc., 1974, p. 239-253. 10 refs. Contract No. NAS7-100.

A description is given of the evolution of photovoltaic power systems designed and built for terrestrial applications, giving attention to problem areas which are currently impeding the further development of such systems. The rooftop testing of surplus solar panels is considered along with solar powered seismic observatories, solar powered portable radio sets, and design considerations identified from past experience. Present activities discussed are related to a solar powered on-shore beacon flasher system, a solar powered buoy, and a solar powered beacon flasher buoy. G.R.

N74-21976*# Environmental Research Inst. of Michigan, Ann Arbor.
SKYLAB SUPPORT Progress Report, Apr. 1973 - Feb. 1974
Lester V. Manderscheid, Jon D. Erickson, Principal Investigators, and Richard F. Nalepka 18 Mar. 1974 2 p Prepared in cooperation with Mich. State Univ. EREP
(Contract NAS9-13332)
(E74-10451; NASA-CR-137440; ERIM-104600-10-L) Avail: NTIS HC $4.00 CSCL 05A

There are no author-identified significant results in this report.

N74-21988*# North Carolina State Univ., Raleigh. Dept. of Geosciences.
UTILIZATION OF EREP DATA IN GEOLOGICAL EVALUATION, REGIONAL PLANNING, FOREST MANAGEMENT, AND WATER MANAGEMENT IN NORTH CAROLINA Quarterly Progress Report, Dec. 1973 - Feb. 1974
Charles W. Welby, Principal Investigator 8 Apr. 1974 2 p EREP
(Contract NAS9-13321)
(E74-10463; NASA-CR-137452) Avail: NTIS HC $4.00 CSCL 0ºB

There are no author-identified significant results in this report.

N74-22018*# California Univ., Berkeley. Space Sciences Lab.
AN INTEGRATED STUDY OF EARTH RESOURCES IN THE STATE OF CALIFORNIA BASED ON SKYLAB AND SUPPORTING AIRCRAFT DATA Quarterly Progress Report
Robert N. Colwell, Principal Investigator 28 Feb. 1974 9 p EREP
(Contract NAS2-7562)
(E74-10495; NASA-CR-136899) Avail: NTIS HC $4.00 CSCL 08F

Skylab data has been used: (1) as an aid to resource management in Northern California; (2) to assess and monitor change in the Southern California environment; and (3) for resource inventory and analysis of The California Desert Program.

N74-22026*# Cornell Univ., Ithaca, N.Y.
REMOTE SENSING PROGRAM Semiannual Status Report, 1 Jun. - 30 Nov. 1973
Ta Liang 27 Dec. 1973 150 p refs
(Grant NGL-33-010-171)
(NASA-CR-138135) Avail: NTIS HC $10.50 CSCL 08F

Research projects concerning the development and application of remote sensors are discussed. Some of the research projects conducted are as follows: (1) aerial photographic inventory of natural resources, (2) detection of buried river channels, (3) delineation of interconnected waterways, (4) plant indicators of atmospheric pollution, and (5) techniques for data transfer from photographs to base maps. On-going projects involving earth resources analyses are described. Author

N74-22047*# Kansas Univ. Center for Research, Inc., Lawrence. Space Technology Center.
RESEARCH ON THE APPLICATION OF SATELLITE REMOTE SENSING TO LOCAL, STATE, REGIONAL AND NATIONAL PROGRAMS INVOLVED WITH RESOURCE MANAGEMENT AND ENVIRONMENTAL QUALITY Annual Report, 1 Apr. 1972 - 30 Mar. 1974
B. G. Barr Apr. 1974 98 p
(Grant NGL-17-004-024)
(NASA-CR-138173) Avail: NTIS HC $8.00 CSCL 08B

A program designed to involve state, regional and local agency personnel in the application of remote sensing is reported. During this period fifteen applications projects were initiated in support of twenty-five separate state, county and municipal agencies or entities. Eight of the projects were completed with positive results

which aided the agencies involved. These results included information which contributed to decisions on: (1) selection of a route for a scenic parkway, (2) policy development on open land use, (3) policy related to urban development, (4) a major reservoir project by a governor's staff, (5) control tactics and damage assessment during flooding conditions on the Kansas and Missouri rivers, and (6) initiating a program of habitat inventory by remote sensing by the Kansas Forestry, Fish and Game Commission. Author

N74-22070# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Abteilung Extraterrestrische Sensortechnik.
STUDY FOR A GEOSCIENTIFIC AIRCRAFT MEASUREMENT PROGRAM [STUDIE FUER EIN ERDWISSENSCHAFTLICHES FLUGZEUG-MESSPROGRAMM]
A. Rossbach and M. Schroeder Feb. 1973 125 p In GERMAN
Avail: NTIS HC $9.25

A German program for geoscientific aircraft measurements, including oceanography, geophysics, water pollution, sediment transport, meteorology, vegetation and ecology, is proposed. The scientific program and the areas to be surveyed are discussed. The choice of remote sensors and the requirements for processing the data measured are considered. The choice of the measuring aircraft and the flight plans are explained. Remote sensing projects in other European countries are discussed briefly, and project management considerations are given. ESRO

N74-22890*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
NASA DIRECTORY OF OBSERVATION STATION LOCATIONS, VOLUME 1
Nov. 1973 258 p refs Prepared by Computer Science Corp., Falls Church, Va.
(NASA-TM-X-69902-VOL-1) Avail: NTIS HC $16.00 CSCL 14B

Geodetic information for NASA tracking stations and for observation stations cooperating in NASA geodetic satellite programs is presented. A Geodetic Data Sheet is provided for each station, giving the position of the station and describing briefly how it was established. Geodetic positions and geocentric coordinates of these stations are tabulated on local or major geodetic datums and on selected world geodetic systems. The principal tracking facilities used by NASA, including the Spaceflight Tracking and Data Network, the Deep Space Network, and several large radio telescopes are discussed. Positions of these facilities are tabulated on their local or national datums, the Mercury Spheroid 1960, the Modified Mercury Datum 1968, and the Spaceflight Tracking and Data Network System. Observation stations in the NASA Geodetic Satellites Program are included along with stations participating in the National Geodetic Satellite Program. Positions of these facilities are given on local or preferred major datums, and on the Modified Mercury Datum 1968. Author

N74-22891*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
NASA DIRECTORY OF OBSERVATION STATION LOCATIONS, VOLUME 2
Nov. 1973 443 p refs Prepared by Computer Sciences Corp., Falls Church, Va.
(NASA-TM-X-69902-VOL-2) Avail: NTIS HC $25.25 CSCL 14B

N74-22961*# Martin Marietta Corp., Denver, Colo.
SKYLAB EARTH RESOURCE EXPERIMENT PACKAGE CRITICAL DESIGN REVIEW
[1973] 136 p Sponsored by NASA
(NASA-CR-138380) Avail: NTIS HC $10.00 CSCL 14B

An outline of the conference for reviewing the design of the EREP is presented. Systems design for review include: tape recorder, support equipment, view finder/tracking, support hardware, and control and display panel. F.O.S.

N74-23502# Committee on Science and Astronautics (U. S. House).
NASA AUTHORIZATION, 1975, PART 3
Washington GPO 1974 698 p Hearings on H.R 12689 (superseded by H.R. 13998) before Comm. on Sci. and Astronaut., 93d Congr., 2d Sess., no. 25, 26-28 Feb. and 5-7, 12-14 and 19 Mar. 1974
(GPO-31-032) Avail: Subcomm. on Space Science and Applications

The hearings concerning the NASA program of applications are reported. Earth Resources Technology Satellites, Skylab, Nimbus, Tiros, and SEASAT are discussed along with pollution monitoring, earth resources surveys, crystal growth, comet Kohoutek, Pioneer Venus programs, and astronomical discoveries. F.O.S

N74-25836+ Wetenschappelijk en Technisch Documentatie- en Informatiecentrum voor de Krijgsmacht, The Hague (Netherlands).
PHOTOGRAMMETRY, REMOTE SENSING, CARTOGRAPHY, MAPPING: A SELECTED BIBLIOGRAPHY ON LITERATURE AVAILABLE AT THE TDCK
Feb. 1973 26 p refs Partly in ENGLISH; partly in FRENCH; partly in GERMAN; and partly in DUTCH
Avail: NTIS HC $4.50

A selective bibliography has been compiled of literature in the fields of photogrammetry, remote sensing, and mapping. The period covered is 1968 to 1972. ESRO

N74-25864*# Environmental Research Inst. of Michigan, Ann Arbor.
SKYLAB SUPPORT Progress Report, Mar. 1974
Lester V. Manderschied, Jon D. Erickson, Principal Investigators, and Richard F. Nalepka 10 Apr. 1974 2 p Prepared for Michigan State Univ. EREP
(Contract NAS9-13332)
(E74-10548; NASA-CR-138297; ERIM-104600-12-L) Avail: NTIS HC $4.00 CSCL 08B

There are no author-identified significant results in this report.

N74-25898# National Environmental Satellite Center, Washington, D.C.
CATALOG OF OPERATIONAL SATELLITE PRODUCTS
Eugene R. Hoppe and Abraham L. Ruiz Mar. 1974 100 p refs
(NOAA-TM-NESS-53) Avail: NTIS HC $8.00 CSCL 05B

The catalog is designed to acquaint the user community with the products generated from data acquired by sensors carried on environmental satellites controlled by the National Environmental Satellite Service. A brief description of the system is given; more detailed information can be found in the literature. The emphasis is on operations. A product is defined as any item routinely produced for applications within the environmental services. These range from the basic photographic image through a variety of manually produced and computer produced interpretative products. These products take the form of facsimile transmissions, photographic images, alphanumeric messages, and digital magnetic tapes. Author

N74-26406# Committee on Science and Astronautics (U. S. House).

ANNUAL REPORT ON THE NATION'S PROGRESS IN AERONAUTICS AND SPACE ACTIVITIES, 1973 Message from the President of the United States, Apr. 1974
Washington GPO 1974 136 p Presented to Comm. on Sci. and Astronaut., 93d Congr., 2d Sess., 8 Apr. 1974
(H-Doc-93-283; GPO-31-543) Avail: US Capitol, House Document Room

Activities in the space and aeronautic programs are summarized for 1973. Programs discussed include: technology application, research and development, international cooperation, air traffic control, environmental protection, and earth resources management. F.O.S.

N74-26875*# Nebraska Univ., Lincoln.
APPLICATIONS OF REMOTE SENSING IN RESOURCE MANAGEMENT IN NEBRASKA Semiannual Progress Report, Jan. - Jun. 1974
James V. Drew Jun. 1974 28 p refs
(Grant NGL-28-004-020)
(NASA-CR-138602) Avail: NTIS HC $4.50 CSCL 08F

The project is reported for studying the application of remote sensing in land use classification and delineation of major tectonic lineaments in Nebraska. Other research reported include the use of aircraft and ERTS-1 satellite imagery in detecting and estimating the acreage of irrigated land, and the application of remote sensing in estimating evapotranspiration in the Platte River Basin. F.O.S.

N74-26932# Reading Univ. (England). Dept. of Geography.
PRELIMINARY RESULTS FROM SKYLARK EARTH RESOURCES ROCKET EXPERIMENT IN ARGENTINA
D. D. Clark (Dept. of Trade and Ind.), J. R. Hardy, A. J. Parsons, R. B. Ridgway, R. A. G. Savigear, and J. R. G. Townshend Jul. 1973 8 p Submitted for publication
(Contract AT/2035/015)
(UR-RSP-5; S/AI/73) Avail: NTIS HC $4.00

Preliminary results are presented from photographs of an area in Argentina taken by means of cameras carried aloft Skylark rockets. The purpose was to obtain an inventory of crops and land use and to carry out a resources survey of the central region of Argentina. The interpretation of land use, cultural features, and natural resources is discussed. Author (ESRO)

N74-26933# Reading Univ. (England). Dept. of Geography.
A REPORT ON CURRENT ACTIVITIES AND FACILITIES IN THE FIELD OF REMOTE SENSING OF EARTH RESOURCES
J. R. Hardy, comp. Jan. 1974 11 p
(UR-RSR-3; S/AI/27E) Avail: NTIS HC $4.00

Present investigations include an evaluation of photography obtained from Skylark rockets, comparison of ERTS-1 and Skylark imagery, and mapping of landforms. Future projects cover geomorphological research, soil erosion, and transport possibilities. The facilities and equipment available and planned are summarized. Author (ESRO)

N74-27787*# North Carolina State Univ., Raleigh. Dept. of Geosciences.
UTILIZATION OF EREP DATA IN GEOLOGICAL EVALUATION, REGIONAL PLANNING, FOREST MANAGEMENT, AND WATER MANAGEMENT IN NORTH CAROLINA Quarterly Progress Report, Mar. - May 1974
Charles W. Welby, Principal Investigator 14 Jun. 1974 5 p EREP
(Contract NAS9-13321)
(E74-10611; NASA-CR-138720) Avail: NTIS HC $4.00 CSCL 08B

There are no author-identified significant results in this report.

N74-27791*# Alaska Univ., Fairbanks. Dept. of Geology.
ERTS-A DATA AS A TEACHING AND RESEARCH TOOL IN THE DEPARTMENT OF GEOLOGY Final Report, Jul. 1972 - Mar. 1974
Donald Grybeck, Principal Investigator 11 Mar. 1974 20 p ERTS
(Contract NAS5-21833)
(E74-10617; NASA-CR-138726) Avail: NTIS HC $4.00 CSCL 08G

The author has identified the following significant results. The project was an attempt to integrate ERTS-1 data into teaching introductory, specialized, and graduate courses in the Department of Geology, University of Alaska. This data was to be utilized principally through a specially selected, high quality collection of black and white, and color 9.5 mosaics of the State of Alaska. In completing these tasks, the data accumulated has proved highly useful in a variety of ways including: (1) discussions of the uses and availability of ERTS imagery; (2) as a medium for talking about and showing various areas of Alaska; (3) in discussing geology in general; and (4) as an aid in doing research and as possible research topics themselves. Use of ERTS-1 imagery in geology proved highly successful and its use is now an integral part of many courses.

N74-27806*# Cornell Univ., Ithaca, N.Y.
CORNELL UNIVERSITY REMOTE SENSING PROGRAM Semiannual Status Report, 1 Dec. 1973 - 31 May 1974
Ta Liang, Donald J. Belcher, and Arthur J. McNair Jun. 1974 115 p refs
(Contract NGL-33-010-171)
(NASA-CR-138749) Avail: NTIS HC $8.75 CSCL 05B

The major activities of the program staff from December 1, 1973 to May 31, 1974 are reported and include: (1) communication and instruction; (2) data and facilities; (3) research completed; (4) research in progress; (5) selected correspondence; (6) grant sponsored travel; and (7) seminars and newsletters. Detailed information and maps are given for the following selected projects: (1) ERTS mapping of waterways in the Tug Hill region of New York State; (2) photo-archeological investigation of Great Gully, New York; and (3) evaluation of selected highway impacts using aerial photography. A.A.D.

N74-27849# Earth Satellite Corp., Washington, D.C.
THE ERS SATELLITE COST BENEFIT STUDY Quarterly Progress Report, Aug. - Oct. 1973
16 Nov. 1973 42 p refs
(Contract DI-14-08-0001-13519)
(PB-226777/1; USGS-DO-74-001; QPR-3) Avail: NTIS HC $4.25 CSCL 08F

A study on agricultural crop acreage estimation was completed. Others on water resources: streamflow forecasting with improved snow area measurement: rangeland management; and land use planning and environmental management are in progress. Case study candidates are being evaluated in areas of: forest inventory and monitoring; expansion of agricultural production; marine resource management; environmental monitoring; and disaster monitoring and control. GRA

N74-27870*# Techtran Corp., Glen Burnie, Md.
APPLICATION OF SPACE TECHNIQUES TO NATURAL RESOURCES STUDY AND ENVIRONMENTAL MONITORING: AN AIRCRAFT EXPERIMENT
Yu. K. Khodarev, G. A. Avanesov, B. S. Dunayev, Ya. L. Ziman, and Yu. M. Chesnokov Washington NASA Jun. 1974 10 p refs Transl. into ENGLISH from Meteorol. Gidrol. (USSR), no. 4, Apr. 1974 p 25-29
(Contract NASw-2485)
(NASA-TT-F-15683) Avail: NTIS HC $4.00 CSCL 14B

Aircraft and space research designed to better identify ground objects from aerial photographic and spectral acquisition is described. Author

N74-28343*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
EARTH OBSERVATORY SATELLITE (EOS) DEFINITION PHASE REPORT, VOLUME 1
Aug. 1971 374 p refs
(NASA-TM-X-69910; X-401-72-332-Vol-1) Avail: NTIS HC $21.75 CSCL 22B

System definition studies were conducted of the Earth Observatory Satellite (EOS). The studies show that the concept of an Earth Observatory Satellite in a near-earth, sun-synchronous orbit would make a unique contribution to the goals of a coordinated program for acquisition of data for environmental research with applications to earth resource inventory and management. The technical details for the proposed development of sensors, spacecraft, and a ground data processing system are presented. Author

N74-28800* National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
EARTH RESOURCES TECHNOLOGY SATELLITE: CUMULATIVE US STANDARD CATALOG, 23 JULY 1972 - 23 JULY 1973. VOLUME 1: OBSERVATION ID LISTING
23 Jul. 1973 421 p 2 Vol.
(NASA-TM-X-70127) HC $24.25 CSCL 05B

Observation identification and coordinate listing are given for ERTS 1 images collected over the continental United States, Alabama, and Hawaii from July 23, 1972 to July 23, 1973. Data format includes the following: (1) the date of catalog listing; (2) the time frame during which the imagery was processed; (3) an assigned observation number; (4) microfilm role and image position on roll; (5) date of observation; (6) longitude and latitude in degrees and minutes at observation center; (7) estimated percent of cloud cover; (8) orbit number; (9) sun elevation and azimuth at observation center; and (10) image quality for both the return beam vidicon and the multispectral band scanner. Availability information for microfilm copies of ERTS imagery is included. A.A.D.

N74-28801* National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
EARTH RESOURCES TECHNOLOGY SATELLITE: CUMULATIVE US STANDARD CATALOG, 23 JULY 1972 - 23 JULY 1973. VOLUME 2: COORDINATE LISTING
23 Jul. 1973 430 p 2 Vol.
(NASA-TM-X-70128) Avail: NTIS HC $24.50; EROS Data Center, Sioux Falls, S.D., 57198 HC $1.25 CSCL 05B

N74-28802*+ National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
EARTH RESOURCES TECHNOLOGY SATELLITE. CUMULATIVE NON-US STANDARD CATALOG, 23 JULY 1972 - 23 JULY 1973. VOLUME 1: OBSERVATION ID
23 Jul. 1973 502 p
(NASA-TM-X-70134) Avail: NTIS HC $28.25; EROS Data Center, Sioux Falls, S. D., 57198 HC $1.25 CSCL 05B

A catalog cantaining data pertaining to the imagery acquired by the Earth Resources Technology Satellite (ERTS) from its date of launch, July 23, 1972 through the first year of activity is presented. The catalog supersedes the previous catalog which supplied data available through May 1973. Two listings of the imagery are included: (1) an observation identifications listing and (2) a listing of the imagery based on geographical location, the coordinate listing. Author

N74-28803*+ National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
EARTH RESOURCES TECHNOLOGY SATELLITE. CUMULATIVE NON-US STANDARD CATALOG, 23 JULY 1972 - 23 JULY 1973. VOLUME 2: OSERVATION ID
23 Jul. 1973 501 p
(NASA-TM-X-70133) Avail: NTIS HC $28.25; EROS Data Center, Sioux Falls, S. D. 57198 HC $1.25 CSCL 05B

N74-28804*+ National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
EARTH RESOURCES TECHNOLOGY SATELLITE. CUMULATIVE NON-US STANDARD CATALOG, 23 JULY 1972 - 23 JULY 1973. VOLUME 3: COORDINATE LISTING, REVISION
23 Jul. 1973 516 p
(NASA-TM-X-70132) Avail: NTIS HC $29.00; EROS Data Center, Sioux Falls, S.D., 57198 HC $1.25 CSCL 05B

N74-28805*+ National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
EARTH RESOURCES TECHNOLOGY SATELLITE. CUMULATIVE NON-US STANDARD CATALOG, 23 JULY 1972 - 23 JULY 1973. VOLUME 4: COORDINATE LISTING, REVISION
23 Jul. 1973 515 p
(NASA-TM-X-70136) Avail: NTIS HC $28.75; EROS Data Center, Sioux Falls, S.D. 57198 HC $1.25 CSCL 05B

N74-28806*+ National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
EARTH RESOURCES TECHNOLOGY SATELLITE: NON-US STANDARD CATALOG NO. N-14
31 Oct. 1973 84 p
(NASA-TM-X-70123) Avail: NTIS HC $7.25; EROS Data Center, Sioux Falls, S.D., 57198 HC $1.25 CSCL 05B

N74-28807*+ National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
EARTH RESOURCES TECHNOLOGY SATELLITE: US STANDARD CATALOG NO. U-18
28 Feb. 1974 81 p
(NASA-TM-X-70126) Avail: NTIS HC $7.25; EROS Data Center, Sioux Falls, S.D., 57198 HC $1.25 CSCL 05B

N74-28809*# Ohio Dept. of Economic and Community Development, Columbus.
RELEVANCE OF ERTS TO THE STATE OF OHIO Progress Report, Mar. - Apr. 1974
David C. Sweet, Principal Investigator Apr. 1974 23 p refs Original contains imagery. Original photography may be purchased from the EROS Data Center, 10th and Dakota Avenue, Sioux Falls, S. D. 57198 ERTS
(Contract NAS5-21782)
(E74-10553; NASA-CR-138443) Avail: NTIS HC $4.25 CSCL 08F

There are no author-identified significant results in this report.

N74-28849*# California Univ., Berkeley. Space Sciences Lab.
AN INTEGRATED STUDY OF EARTH RESOURCES IN THE STATE OF CALIFORNIA USING REMOTE SENSING TECHNIQUES Annual Progress Report
Robert N. Colwell, Robert H. Burgy, Vidal R. Algazi, William C. Draeger, John E. Estes, and Leonard W. Bowden, Principal Investigators 1 May 1974 398 p refs Original contains color imagery. Original photography may be purchased from the EROS Data Center, 10th and Dakota Avenue, Sioux Falls, S. D. 57198 ERTS and EREP
(Grant NGL-05-003-404)
(E74-10621; NASA-CR-138731) Avail: NTIS HC $23.00 CSCL 08B

The author has identified the following significant results. The supply, demand, and impact relationships of California's

water resources as exemplified by the Feather River project and other aspects of the California Water Plan are discussed.

N74-28856* California Univ., Berkeley. Dept. of Business Administration.
ON THE FEASIBILITY OF BENEFIT-COST ANALYSIS APPLIED TO REMOTE SENSING PROJECTS Special Study No. 3
Robert N. Colwell, Principal Investigator and Leonard Merewitz *In its* An Integrated Study of Earth Resources in the State of Calif. Using Remote Sensing Tech. 1 May 1974 7 p refs ERTS
CSCL 08H
There are no author-identified significant results in this report.

N74-28857* California Univ., Berkeley.
ACTIVITIES OF THE SOCIAL SCIENCES GROUP, BERKELEY CAMPUS Special Study No. 4
Robert N. Colwell, Principal Investigator and Ida Hoos *In its* An Integrated Study of Earth Resources in the State of Calif. Using Remote Sensing Tech. 1 May 1974 74 p refs ERTS
CSCL 08H
There are no author-identified significant results in this report.

N74-28860* California Univ., Berkeley.
SUMMARY
Robert N. Colwell, Principal Investigator *In its* An Integrated Study of Earth Resources in the State of Calif. Using Remote Sensing Tech. 1 May 1974 20 p ERTS
CSCL 08H
There are no author-identified significant results in this report.

N74-28862*# National Aeronautics and Space Administration. John F. Kennedy Space Center, Cocoa Beach, Fla.
PLANNING APPLICATIONS IN EAST CENTRAL FLORIDA Quarterly Progress Report, 1 Feb. - 30 Apr. 1974
John W. Hannah, Garland L. Thomas, and Fernando Esparza, Principal Investigators 30 Apr. 1974 17 p refs Prepared in cooperation with Brevard County Planning Dept., Titusville, Fla. Original contains imagery. Original photography may be purchased from the EROS Data Center, 10th and Dakota Avenue, Sioux Falls, S. D. 57198 EREP
(NASA Order CC-30281-A)
(E74-10623; NASA-TM-X-70206) Avail: NTIS HC $4.00 CSCL 08B
There are no author-identified significant results in this report.

N74-28863*# Wyoming Univ., Laramie. Remote Sensing Lab.
MULTIDISCIPLINARY STUDY OF WYOMING TEST SITES Progress Report, Oct. 1973 - Mar. 1974
Robert S. Houston, Principal Investigator, Ronald W. Marrs, S. S. Agard, K. G. Downing, J. L. Earle, N. L. Froman, R. Gordon, K. E. Kolm, B. Tomes, and J. Vietti Apr. 1974 37 p refs Original contains color imagery. Original photography may be purchased from the EROS Data Center, 10th and Dakota Avenue, Sioux Falls, S. D. 57198 EREP
(Contract NAS9-13298)
(E74-10624; NASA-CR-138734; EREP-1-74A; PR-3) Avail: NTIS HC $5.00 CSCL 08B
The author has identified the following significant results. Investigation of a variety of applications of EREP photographic data demonstrated that EREP S-190 data offer a unique combination of synoptic coverage and image detail. The broad coverage is ideal for regional geologic mapping and tectonic analysis while the detail is adequate for mapping of crops, mines, urban areas, and other relatively small features. The investigative team at the University of Wyoming has applied the EREP S-190 data to: (1) analysis of photolinear elements of the Powder River Basin, southern Montana, and the Wind River Mountains; (2) drainage analysis of the Powder River Basin and Beartooth Mountains; (3) lithologic and geologic mapping in the Powder River Basin, Black Hills, Green River Basin, Bighorn Basin and Southern Bighorn Mountains; (4) location of possible mineralization in the Absaroka Range; and (5) land use mapping near Riverton and Gillette. All of these applications were successful to some degree. Image enhancement procedures were useful in some efforts requiring distinction of small objects or subtle contrasts.

N74-28867*# National Research Council, Bangkok (Thailand).
THAILAND NATIONAL PROGRAMME OF THE EARTH RESOURCES TECHNOLOGY SATELLITE Final Report, Nov. 1972 - Mar. 1974
Pradisth Cheosakul, Principal Investigator and Sanga Sabhasri May 1974 59 p ref Sponsored by NASA Original contains color illustrations. Original contains imagery. Original photography may be purchased from the EROS Data Center, 10th and Dakota Avenue, Sioux Falls, S. D. 57198 ERTS
(E74-10631; NASA-CR-138741) Avail: NTIS HC $6.00 CSCL 05B
The author has identified the following significant results. Intensive interpretation of ERTS-1 scenes covering agricultural regions near Bangkok, backed up by ground surveys and low altitude reconnaissance flights, has established that the major agricultural crops of Thailand can be positively differentiated, and in most cases identified, after some experience has been gained, by examination of ERTS-1 imagery. A country-wide survey of remaining forest cover will be completed during 1974. MSS band 5 and band 7 and white positive transparencies were found to be the most desirable medium for identification of geological structure. The Royal Irrigation Department conducted a pilot study to examine the possibility of determining water reservoir capacity from surface area measurements derived from ERTS-1 images.

N74-28875*# Ohio Dept. of Economic and Community Development, Columbus.
RELEVANCE OF ERTS-1 TO THE STATE OF OHIO Semiannual Progress Report, Jan. - Jun. 1974
David C. Sweet, Paul G. Pincura, and George E. Wukelic, Principal Investigators 5 Jul. 1974 21 p refs Prepared in cooperation with Battelle Columbus Labs., Ohio Original contains imagery. Original photography may be purchased from the EROS Data Center, 10th and Dakota Avenue, Sioux Falls, S. D. 57198 ERTS
(Contracts NAS5-21782; BCL-72-17/G-1793)
(E74-10641; NASA-CR-138823; SAPR-4) Avail: NTIS HC $4.25 CSCL 08B
The author has identified the following significant results. During the first year of project effort the ability of ERTS-1 imagery to be used for mapping and inventorying strip-mined areas in southeastern Ohio, the potential of using ERTS-1 imagery in water quality and coastal zone management in the Lake Erie region, and the extent that ERTS-1 imagery could contribute to localized (metropolitan/urban), multicounty, and overall state land use needs were experimentally demonstrated and reported as significant project results.

N74-28899*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
EARTH RESOURCES TECHNOLOGY SATELLITE: NON-US STANDARD CATALOG NO. N-13
30 Sep. 1973 82 p
(NASA-TM-X-70122) Avail: NTIS HC $7.25; EROS Data

Center, Sioux Falls, S.D., 57198 HC $1.25 CSCL 05B

To provide dissemination of information regarding the availability of Earth Resources Technology Satellite (ERTS) imagery, a Non-U.S. Standard Catalog is published on a monthly schedule. The catalogs identify imagery which has been processed and input to the data files during the preceding month. The Non-U.S. Standard Catalog includes imagery covering all areas except that of the United States, Hawaii, and Alaska. Imagery adjacent to the Continental U.S. and Alaska borders will normally appear in the U.S. Standard Catalog. As a supplement to these catalogs, an inventory of ERTS imagery on 16 millimeter microfilm is available. The catalogs consist of four parts: (1) annotated maps which graphically depict the geographic areas covered by the imagery listed in the current catalog, (2) a computer-generated listing organized by observation identification number (ID) with pertinent information for each image, (3) a computer listing of observations organized by longitude and latitude, and (4) observations which have had changes made in their catalog information since the original entry in the data base. Author

N74-28900* + National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
EARTH RESOURCES TECHNOLOGY SATELLITE: NON-US STANDARD CATALOG NO. N-15, SUPPLEMENT
30 Nov. 1973 150 p
(NASA-TM-X-70124) Avail: NTIS HC $10.50; EROS Data Center, Sioux Falls, S.D., 57198 HC $1.25 CSCL 05B

N74-28901* + National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
EARTH RESOURCES TECHNOLOGY SATELLITE: NON-US STANDARD CATALOG NO. N-16
31 Dec. 1973 84 p
(NASA-TM-X-70125) Avail: NTIS HC $7.25; EROS Data Center, Sioux Falls, S.D., 57198 HC $1.25 CSCL 05B

N74-28902* + National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
EARTH RESOURCES TECHNOLOGY SATELLITE: NON-US STANDARD CATALOG NO. N-17
31 Jan. 1974 95 p
(NASA-TM-X-70121) Avail: NTIS HC $7.75; EROS Data Center, Sioux Falls, S.D., 57198 HC $1.25 CSCL 05B

N74-28903* + National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
EARTH RESOURCES TECHNOLOGY SATELLITE: NON-US STANDARD CATALOG NO. N-18
28 Feb. 1974 118 p
(NASA-TM-X-70107) Avail: NTIS HC $9.00; EROS Data Center, Sioux Falls, S.D., 57198 HC $1.25 CSCL 05B

N74-28904* + National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
EARTH RESOURCES TECHNOLOGY SATELLITE: NON-US STANDARD CATALOG NO. N-19
31 Mar. 1974 45 p
(NASA-TM-X-70108) Avail: NTIS HC $5.25; EROS Data Center, Sioux Falls, S.D., 57198 HC $1.25 CSCL 05B

N74-28905* + National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
EARTH RESOURCES TECHNOLOGY SATELLITE: NON-US STANDARD CATALOG NO. N-20
30 Apr. 1974 135 p
(NASA-TM-X-70129) Avail: NTIS HC $9.75; EROS Data Center, Sioux Falls, S.D., 57198 HC $1.25 CSCL 05B

N74-28906* National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
EARTH RESOURCES TECHNOLOGY SATELLITE: US STANDARD CATALOG NO. U-12
31 Aug. 1973 70 p
(NASA-TM-X-70109) Avail: NTIS HC $6.50; EROS Data Center, Sioux Falls, S.D., 57198 HC $1.25 CSCL 05B

To provide dissemination of information regarding the availability of Earth Resources Technology Satellite (ERTS) imagery, a U.S. Standard Catalog is published on a monthly schedule. The catalogs identify imagery which has been processed and input to the data files during the preceding month. The U.S. Standard Catalog includes imagery covering the Continental United States, Alaska, and Hawaii. As a supplement to these catalogs, an inventory of ERTS imagery on 16 millimeter microfilm is available. The catalogs consist of four parts: (1) annotated maps which graphically depict the geographic areas covered by the imagery listed in the current catalog, (2) a computer-generated listing organized by observation identification number (D) with pertinent information on each image, (3) a computer listing of observations organized by longitude and latitude, and (4) observations which have had changes made in their catalog information since the original entry in the data base. Author

N74-28907* + National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
EARTH RESOURCES TECHNOLOGY SATELLITE: US STANDARD CATALOG NO. U-13
30 Sep. 1973 69 p
(NASA-TM-X-70111) Avail: NTIS HC $6.50; EROS Data Center, Sioux Falls, S.D., 57198 HC $1.25 CSCL 05B

N74-28908*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
EARTH RESOURCES TECHNOLOGY SATELLITE: US STANDARD CATALOG NO. U-15
30 Nov. 1973 112 p
(NASA-TM-X-70110) Avail: NTIS HC $8.75; EROS Data Center, Sioux Falls, S.D., 57198 HC $1.25 CSCL 05B

N74-28909*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
EARTH RESOURCES TECHNOLOGY SATELLITE: US STANDARD CATALOG NO. U-17
31 Jan. 1974 60 p
(NASA-TM-X-70112) Avail: NTIS HC $6.00; EROS Data Center, Sioux Falls, S.D., 57198 HC $1.25 CSCL 05B

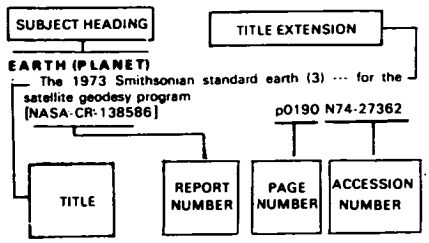
N74-28910* + National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.
EARTH RESOURCES TECHNOLOGY SATELLITE: US STANDARD CATALOG NO. U-19
31 Mar. 1973 43 p
(NASA-TM-X-70120) Avail: NTIS HC $5.25; EROS Data Center, Sioux Falls S.D., 57198 HC $1.25 CSCL 05B

N74-29338* National Aeronautics and Space Administration, Washington, D.C.
SPACE AND MAN'S ENVIRONMENT
James C. Fletcher 1973 16 p Presented at Natl. Wildlife Federation Spec. Sess., Washington, D. C., 17 Mar. 1973
(NASA-TM-X-70138) Avail: NASA Office of Public Affairs, Washington, D. C. 20546 CSCL 03C

The text of a prepared statement is presented which describes the role and advantages provided by the space program in environmental affairs. Topics covered include marine life studies of the Chesapeake Bay oyster, blue crab, and California gray whale. Water and land resources management, global weather forecasting, and wildlife radiolocation are also discussed. The role of ERTS 1 imagery is emphasized and examples of its

applications are given which include chlorophyll content water mapping, oil slick and sewage outfall detection, watershed management, water resource monitoring of drainage patterns and sediment streaming, geological and mineral surveys, and crop identification and blight detection. The wildlife refuge at the Kennedy Space Center in Florida is described as another NASA initiated program in ecological wise management. A.A.D.

Typical Subject Index Listing



The subject heading is a key to the subject content of the document. The title is used to provide a description of the subject matter. When the title is insufficiently descriptive of the document content, the title extension is added, separated from the title by three hyphens. The (NASA or AIAA) accession number and the page number are included in each entry to assist the user in locating the abstract in the abstract section (of this supplement). If applicable, a report number is also included as an aid in identifying the document. Under any one subject heading, the accession numbers are arranged in sequence with the AIAA accession numbers appearing first.

A

B

C

D

E

F

G

H

I

J

K

L

M

N

O

P

Q

R

S

T

U

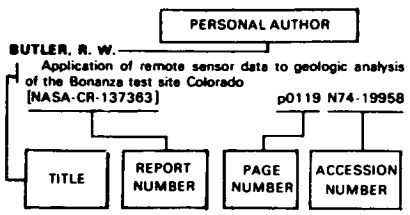
V

W

Z

PERSONAL AUTHOR INDEX

Typical Personal Author Index Listing



Listings in this index are arranged alphabetically by personal author. The title of the document provides the user with a brief description of the subject matter. The report number helps to indicate the type of document listed (e.g., NASA report, translation, NASA contractor report). The page and accession numbers are located beneath and to the right of the title, e.g., p 0119 N74-19958. Under any one author's name the accession numbers are arranged in sequence with the AIAA accession numbers appearing first.

A

ABDEL-GAWAD, M.
Identification and interpretation of tectonic features from ERTS-1 imagery
[E74-10520] p0195 N74-26859

ACKLEY, S. F.
Investigations performed on the Arctic ice dynamics joint experiment, March 1971
[AD-775381] p0201 N74-23020

ADAMS, D. H.
Use of ERTS-A, Skylab, and supporting aircraft to enhance resource management
[E74-10498] p0170 N74-22949

AGARD, S. S.
Multidisciplinary study of Wyoming test sites
[E74-10624] p0230 N74-28863

AHEARN, J. L.
Tests of remote skywave measurement of ocean surface conditions p0199 A74-35125

ALDRICH, R. C.
Inventory of forest and rangeland resources, including forest stress
[E74-10530] p0171 N74-25848
Inventory of forest and rangeland and detection of forest stress
[E74-10558] p0171 N74-25868

ALEXANDER, R.
Urban and regional land use analysis: CARETS and Census Cities experiment package
[E74-10581] p0184 N74-28824

ALEXANDER, R. H.
Urban and regional land use analysis: CARETS and Census Cities experiment package
[E74-10473] p0181 N74-21997
Some findings on the applications of ERTS and Skylab imagery for metropolitan land use analysis
[E74-10630] p0185 N74-28866

ALGAZI, V. R.
An integrated study of earth resources in the State of California using remote sensing techniques
[E74-10621] p0229 N74-28849
Water supply studies p0210 N74-28851
Multispectral combination and display of ERTS-1 data p0217 N74-28854

ALISHOUSE, J.
A cloud physics investigation utilizing Skylab data
[E74-10441] p0221 N74-21966
A cloud physics investigation utilizing Skylab data
[E74-10567] p0223 N74-28812

ALLEN, R. J.
Lidar studies of stack plumes in rural and urban environments
[PB-227347/2] p0182 N74-23189

ALLISON, L. J.
A multi-sensor analysis of Nimbus 5 data on 22 January 1973
[NASA-TM-X-70633] p0221 N74-22115

AMBARUCH, R.
Application of remote sensing to hydrology
[NASA-CR-120278] p0208 N74-27811

ANDERSON, A. T.
Flood hazards studies in the Mississippi River basin using remote sensing
[NASA-TM-X-70682] p0208 N74-27830

ANDERSON, D.
New England reservoir management
[E74-10551] p0207 N74-25867

ANDERSON, J. H.
Preliminary vegetation map of the Espenberg Peninsula, Alaska, based on an Earth Resources Technology Satellite image
[E74-10544] p0171 N74-25862
A vegetation map of an area near Fairbanks, Alaska, based on an ERTS image
[E74-10545] p0171 N74-25863

ANDERSON, P. W.
Remote-sensing studies of hydrologic environments in the lower Raritan River System, New Jersey
[NASA-CR-138398] p0207 N74-22972

ANTOS, R. L.
Evaluation of ERTS-1 image sensor spatial resolution in photographic form
[E74-10484] p0221 N74-22008

ARGENTIERO, P.
Strategies for estimating the marine geoid from altimeter data
[NASA-TM-X-70637] p0188 N74-22058

AVANESOV, G. A.
Application of space-oriented equipment in earth resources studies and in environmental control - An aircraft experiment p0220 A74-33903
Scanning multispectrum system in an aircraft experiment in earth resources studies p0220 A74-33904
Application of space techniques to natural resources study and environmental monitoring: An aircraft experiment
[NASA-TT-F-15683] p0228 N74-27870
Use of base techniques for environmental resource studies. An aircraft experiment p0224 N74-29055
Multispectral scanning system in an aircraft experiment to study the earth's resources p0224 N74-29056

B

BAIR, C. H.
Analysis of laser differential absorption remote sensing using diffuse reflection from the earth p0178 A74-29714

BALANDIN, V. N.
Complex of programs for computing co-ordinates of photographic points on electronic computers using results of radiogeodesic measurements
[AD-776104] p0190 N74-25905

BARINOV, I. V.
Scanning multispectrum system in an aircraft experiment in earth resources studies p0220 A74-33904
Multispectral scanning system in an aircraft experiment to study the earth's resources p0224 N74-29056

BARNES, J. C.
Study to develop improved spacecraft snow survey methods using Skylab/EREP data
[E74-10476] p0206 N74-22000
The application of ERTS imagery to monitoring Arctic sea ice
[E74-10502] p0200 N74-22951
Study to develop improved spacecraft snow survey methods using Skylab/EREP data
[E74-10562] p0208 N74-27773
A study to develop improved spacecraft show survey methods using Skylab/EREP data: Demonstration of the utility of the S190 and S192 data
[E74-10582] p0209 N74-28825

BARR, B. G.
Research on the application of satellite remote sensing to local, state, regional and national programs involved with resource management and environmental quality
[NASA-CR-138173] p0226 N74-22047

BARR, J.
Design data collection with Skylab/EREP microwave instrument S-193
[E74-10603] p0223 N74-27786
Design data collection with skylab/EREP microwave instrument S-193
[E74-10584] p0223 N74-28827
Design data collection with Skylab/EREP microwave instrument S-193
[E74-10649] p0224 N74-28882
Design data collection with Skylab/EREP microwave instrument S-193
[E74-10650] p0224 N74-28883

BARRICK, D. E.
Sea backscatter at HF - Interpretation and utilization of the echo p0199 A74-35124

BARRINGER, A. R.
Further developments in correlation spectroscopy for remote sensing air pollution p0177 A74-29705

BARTLE, E. R.
Measurement of air pollutants from satellites. I - Feasibility considerations p0180 A74-31870

BARTLETT, D.
Inventories of Delaware's coastal vegetation and land-use utilizing digital processing of ERTS-1 imagery
[E74-10531] p0183 N74-25849
Inventories of Delaware's coastal vegetation and land-use utilizing digital processing of ERTS-1 imagery
[E74-10590] p0185 N74-28832

BAUMGARDNER, M. F.
Evaluation and comparison of ERTS measurements of major crops and soil associations for selected test sites in the central United States
[E74-10474] p0168 N74-21998

BECKETT, P. H. T.
Comparison of four independent soil surveys by air-photo interpretation, Paphos area /Cyprus/ p0167 A74-30530

BELCHER, D. J.
Cornell University remote sensing program
[NASA-CR-138749] p0228 N74-27806

BELETSKIY, G. G.
Methodological plan for aerial seismic studies at sea and in the open ocean
[JPRS-62075] p0202 N74-26901

BELEW, L. F.
Skylab systems flight performance - An interim report p0225 A74-29031

BELON, A. E.
Applications of remote sensing data to the Alaskan environment
[NASA-CR-138512] p0201 N74-25884

BENSON, A. S.
Agricultural interpretation technique development
[E74-10491] p0168 N74-22015

BERG, D. W.
An ERTS-1 study of coastal features on the North Carolina coast
[E74-10513] p0201 N74-25839

BERNSTEIN, R.
All-Digital precision processing of ERTS images
[E74-10637] p0217 N74-28871

BIE, S. W.
Comparison of four independent soil surveys by air-photo interpretation, Paphos area /Cyprus/ p0167 A74-30530

BIEHL, L. L.
A multilevel, multispectral data set analysis in the visible and infrared wavelength regions
[E74-10571] p0223 N74-28815

BILLINGSLEY, F. C.
Machine processing methods for earth observational data p0211 A74-29025

BOCK, P.
ERTS-1 data user investigation of the use of ERTS imagery in reservoir management and operation
[E74-10453] p0205 N74-21978
ERTS-1 data user investigation of the use of ERTS imagery in reservoir management and operation
[E74-10542] p0207 N74-25860

BOGLE, R. W.
Sea backscatter at HF - Interpretation and utilization of the echo p0199 A74-35124

BOGOMAZOV, L. S.
Experiments in complex interpretation of aerial photographs p0187 A74-32475

BOLTER, E.
The development of ground truth for correlation with remotely sensed data p0211 A74-34005

BORDEN, F. Y.
The Penn State ORSER system for processing and analyzing ERTS and other MSS data
[E74-10573] p0216 N74-28817

C

D

E

F

G

H

I

J

K

L

M

N

O

P

Q

R

S

T

U

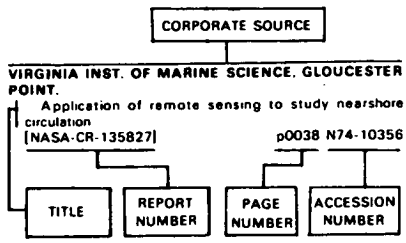
V

W

Y

Z

Typical Corporate Source Index Listing



The title of the document is used to provide a brief description of the subject matter. The page number and the accession number are included in each entry to assist the user in locating the abstract in the abstract section. If applicable, a report number is also included as an aid in identifying the document.

A

AGRICULTURAL RESEARCH SERVICE, WESLACO, TEX.
Reflectance of vegetation, soil, and water
[E74-10539] p0171 N74-25857
Irrigation scheduling, freeze warning and soil salinity detecting
[E74-10541] p0171 N74-25859
A study of early detection of insect infestations and density/distribution of host plants
[E74-10560] p0173 N74-28811
Irrigation scheduling, freeze warning and soil salinity detecting
[E74-10569] p0174 N74-28813
A study of the early detection of insect infestations and density/distribution of host plants
[E74-10600] p0174 N74-28835
A study of early detection of insect infestations and density/distribution of host plants
[E74-10601] p0174 N74-28836
A study of early detection of insect infestations and density/distribution of host plants
[E74-10638] p0175 N74-28872
A study of the early detection of insect infestations and density/distribution of host plants
[E74-10639] p0175 N74-28873
A study of the early detection of insect infestations and density/distribution of host plants
[E74-10642] p0175 N74-28876
Reflectance of vegetation, soil, and water
[E74-10647] p0175 N74-28880

AGRICULTURE DEPT., BERKELEY, CALIF.
Remote sensing of changes in morphology and physiology of trees under stress
[NASA-CR-138392] p0170 N74-22962
Monitoring forest land from high altitude and from space
[NASA-CR-138624] p0172 N74-26868
Remote sensing applications to forest vegetation classification and conifer vigor loss due to dwarf mistletoe
[NASA-CR-138806] p0173 N74-27804

AIR FORCE SYSTEMS COMMAND, WRIGHT-PATTERSON AFB, OHIO.
Space research. Investigation of the gravitational fields and the shape of the earth, other planets and the moon by observations from space vehicles
[AD-774398] p0189 N74-25902
Infrared radiometer for geological mapping
[AD-776888] p0222 N74-25913

ALASKA UNIV., COLLEGE.
Ground magnetometer survey in the Valley of Ten Thousand Smokes, Alaska
[NASA-CR-138779] p0196 N74-26907

ALASKA UNIV., FAIRBANKS.
Preliminary vegetation map of the Espenberg Peninsula, Alaska, based on an Earth Resources Technology Satellite image
[E74-10544] p0171 N74-25862
A vegetation map of an area near Fairbanks, Alaska, based on an ERTS image
[E74-10545] p0171 N74-25863
Applications of remote sensing data to the Alaskan environment
[NASA-CR-138512] p0201 N74-25884
ERTS-A data as a teaching and research tool in the Department of Geology
[E74-10617] p0228 N74-27791
Evaluation of feasibility of mapping seismically active faults in Alaska
[E74-10574] p0197 N74-28818
The circulation of Prince William Sound
[E74-10575] p0203 N74-28819
Application of ERTS imagery to the study of caribou movements and winter habitat
[E74-10636] p0175 N74-28870

AMERICAN UNIV., WASHINGTON, D.C.
Preliminary report on sand-streaming in Agadez and Tahoua Departments, Republic of Niger
[E74-10442] p0181 N74-21967

ARIZONA UNIV., TUCSON.
Evaluation of ERTS-1 image sensor spatial resolution in photographic form
[E74-10484] p0221 N74-22008

ARMY COASTAL ENGINEERING RESEARCH CENTER, WASHINGTON, D.C.
An ERTS-1 study of coastal features on the North Carolina coast
[E74-10513] p0201 N74-25839

ARMY COLD REGIONS RESEARCH AND ENGINEERING LAB., HANOVER, N.H.
Investigations performed on the Arctic ice dynamics joint experiment, March 1971
[AD-775381] p0201 N74-23020

ARMY CONSTRUCTION ENGINEERING RESEARCH LAB., CHAMPAIGN, ILL.
Effect of construction and staged filling of reservoirs on the environment and ecology
[E74-10610] p0209 N74-28843

ARMY ENGINEER WATERWAYS EXPERIMENT STATION, VICKSBURG, MISS.
Application of remote sensors to army facility management
[AD-775407] p0182 N74-22621

ARMY FOREIGN SCIENCE AND TECHNOLOGY CENTER, CHARLOTTESVILLE, VA.
Complex of programs for computing co-ordinates of photographic points on electronic computers using results of radiogeodesic measurements
[AD-776104] p0190 N74-25905

ATOMIC ENERGY COMMISSION, OAK RIDGE, TENN.
Radiometric gages: A bibliography
[TID-3338] p0223 N74-27891

B

BATTELLE COLUMBUS LABS., OHIO.
Calibration and evaluation of Skylab altimetry for geodetic determination of the geoid
[E74-10447] p0188 N74-21972
Relevance of ERTS to the State of Ohio
[E74-10483] p0181 N74-22007
Calibration and evaluation of Skylab altimetry for geodetic determination of the geoid
[E74-10533] p0189 N74-25851
Calibration and evaluation of Skylab altimetry for geodetic determination of the geoid
[E74-10612] p0190 N74-27788
Calibration and evaluation of Skylab altimetry for geodetic determination of the geoid
[E74-10579] p0191 N74-28822
Relevance of ERTS-1 to the State of Ohio
[E74-10641] p0230 N74-28875

BATTELLE-NORTHWEST, RICHLAND, WASH.
Evaluation of a high volume cascade particle impactor system
[BNWL-SA-4677] p0181 N74-21901

BENDIX CORP., ANN ARBOR, MICH.
Automated land-use mapping from spacecraft data
[E74-10440] p0188 N74-21965
A technique for correcting ERTS data for solar and atmospheric effects
[E74-10489] p0213 N74-22013
Automated strip-mine and reclamation mapping from ERTS
[E74-10490] p0194 N74-22014
Automatic classification of eutrophication of inland lakes from spacecraft data
[E74-10580] p0209 N74-28823
Inventories of Delaware's coastal vegetation and land-use utilizing digital processing of ERTS-1 imagery
[E74-10590] p0185 N74-28832

BOEING CO., KENT, WASH.
Quantitative determination of stratospheric aerosol characteristics
[E74-10438] p0212 N74-21963
Quantitative determination of stratospheric aerosol characteristics
[E74-10550] p0222 N74-25866
Quantitative determination of stratospheric aerosol characteristics
[E74-10607] p0224 N74-28840

BOULDER AREA GROWTH STUDY COMMISSION, COLO.
Exploring options for the future: A study of growth in Boulder county. Volume 3: Environmental constraints and opportunities
[NASA-CR-138177] p0180 N74-21845

BREVARD COUNTY PLANNING DEPT., TITUSVILLE, FLA.
Planning applications in east central Florida
[E74-10448] p0181 N74-21973
Planning applications in east central Florida
[E74-10623] p0230 N74-28862

BUREAU OF LAND MANAGEMENT, RIVERSIDE, CALIF.
Use of Skylab data to assess and monitor change in the southern California environment; the California desert program - resource inventory and analysis
p0182 N74-22020

BUREAU OF MINES, PITTSBURGH, PA.
Geologic structure analysis using radar imagery of the coal mining area of Buchanan County, Va.
[PB-228689/6] p0198 N74-28919

BUREAU OF RECLAMATION, DENVER, COLO.
Monitor weather conditions for cloud seeding control
[E74-10468] p0205 N74-21993
Current measurements in the Salton Sea using ERTS multispectral imagery
[E74-10653] p0204 N74-28886

BUREAU OF SPORT FISHERIES AND WILDLIFE, JAMESTOWN, N. DAK.
Utilization of Skylab (EREP) system for appraising changes in continental migratory bird habitat
[E74-10488] p0168 N74-22012
Utilization of Skylab (EREP) system for appraising changes in continental migratory bird habitat
[E74-10557] p0171 N74-26866
Utilization of Skylab (EREP) system for appraising changes in continental migratory bird habitat
[E74-10555] p0172 N74-27769

C

CALIFORNIA EARTH SCIENCE CORP., SANTA MONICA.
Fault tectonics and earthquake hazards in the Peninsular Ranges, southern California
[E74-10528] p0195 N74-25846
Fault tectonics and earthquake hazards in the Peninsular Ranges, southern California
[E74-10565] p0196 N74-27776
Fault tectonics and earthquake hazards in the Peninsular Ranges, southern California
[E74-10570] p0197 N74-28814

CALIFORNIA STATE OFFICE OF SCIENCE AND TECHNOLOGY, SACRAMENTO.
Use of ERTS-A, Skylab, and supporting aircraft to enhance resource management
[E74-10498] p0170 N74-22949

CALIFORNIA UNIV., BERKELEY.
Agricultural interpretation technique development
[E74-10491] p0168 N74-22015
An integrated study of earth resources in the State of California based on Skylab and supporting aircraft data
[E74-10495] p0226 N74-22018
Skylab data as an aid to resource management in northern California p0168 N74-22019

D

E

F

G

H

I

J

K

L

M

N

O

P

R

S

T

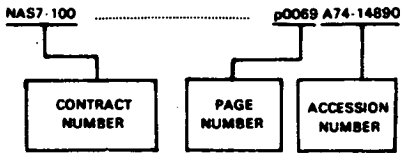
U

V

W

CONTRACT NUMBER INDEX

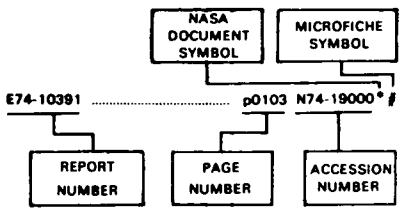
Typical Contract Number Index Listing



Listings in this index are arranged alphanumerically by contract number. Under each contract number, the accession numbers denoting documents that have been produced as a result of research done under that contract are arranged in ascending order with the AIAA accession numbers appearing first. The accession number denotes the number by which the citation is identified in the abstract section. Preceding the accession number is the page number on which the citation may be found.

REPORT/ACCESSION NUMBER INDEX

Typical Report / Accession Number Index Listing



Listings in this index are arranged alphanumerically by report number. The page number indicates the page on which the citation is located. The accession number denotes the number by which the citation is identified. An asterisk (*) indicates that the item is a NASA report. A pound sign (#) indicates that the item is available on microfiche. A plus sign (+) indicates a document that cannot be microfiched but for which one-to-one facsimile is available.

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
NASA SP-7041 (03)		

4. Title and Subtitle	5. Report Date
EARTH RESOURCES: A Continuing Bibliography With Indexes (Issue 03)	May 1975
	6. Performing Organization Code
7. Author(s)	8. Performing Organization Report No.
	10. Work Unit No.
9. Performing Organization Name and Address	11. Contract or Grant No.
National Aeronautics and Space Administration Washington, DC 20546	13. Type of Report and Period Covered
12. Sponsoring Agency Name and Address	14. Sponsoring Agency Code

15. Supplementary Notes

16. Abstract

This bibliography lists 472 reports, articles, and other documents introduced into the NASA scientific and technical information system between July 1974 and September 1974. Emphasis is placed on the use of remote sensing and geophysical instrumentation in spacecraft and aircraft to survey and inventory, natural resources and urban areas. Subject matter is grouped according to agriculture and forestry, environmental changes and cultural resources, geodesy and cartography, geology and mineral resources, oceanography and marine resources, hydrology and water management, data processing, and distribution systems, instrumentation and sensors, and economic analysis.

17. Key Words (Suggested by Author(s))	18. Distribution Statement
Bibliographies Earth Resources Program Remote Sensors	Unclassified - Unlimited

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price*
Unclassified	Unclassified	128	$4.00

*For sale by the National Technical Information Service, Springfield, Virginia 22161

*U.S. GOVERNMENT PRINTING OFFICE: 1975 - 635-275/19

PUBLIC COLLECTIONS OF NASA DOCUMENTS

DOMESTIC

NASA distributes its technical documents and bibliographic tools to ten special libraries located in the organizations listed below. Each library is prepared to furnish the public such services as reference assistance, interlibrary loans, photocopy service, and assistance in obtaining copies of NASA documents for retention.

CALIFORNIA
University of California, Berkeley
COLORADO
University of Colorado, Boulder
DISTRICT OF COLUMBIA
Library of Congress
GEORGIA
Georgia Institute of Technology, Atlanta
ILLINOIS
The John Crerar Library, Chicago
MASSACHUSETTS
Massachusetts Institute of Technology, Cambridge
MISSOURI
Linda Hall Library, Kansas City
NEW YORK
Columbia University, New York
PENNSYLVANIA
Carnegie Library of Pittsburgh
WASHINGTON
University of Washington, Seattle

NASA publications (those indicated by an "*" following the accession number) are also received by the following public and free libraries:

CALIFORNIA
Los Angeles Public Library
San Diego Public Library
COLORADO
Denver Public Library
CONNECTICUT
Hartford Public Library
MARYLAND
Enoch Pratt Free Library, Baltimore
MASSACHUSETTS
Boston Public Library
MICHIGAN
Detroit Public Library
MINNESOTA
Minneapolis Public Library
MISSOURI
Kansas City Public Library
St. Louis Public Library
NEW JERSEY
Trenton Public Library
NEW YORK
Brooklyn Public Library
Buffalo and Erie County Public Library
Rochester Public Library
New York Public Library
OHIO
Akron Public Library
Cincinnati Public Library
Cleveland Public Library
Dayton Public Library
Toledo Public Library
OKLAHOMA
Oklahoma County Libraries, Oklahoma City
TENNESSEE
Memphis Public Library
TEXAS
Dallas Public Library
Fort Worth Public Library
WASHINGTON
Seattle Public Library
WISCONSIN
Milwaukee Public Library

An extensive collection of NASA and NASA-sponsored documents and aerospace publications available to the public for reference purposes is maintained by the American Institute of Aeronautics and Astronautics, Technical Information Service, 750 Third Avenue, New York, New York, 10017.

EUROPEAN

An extensive collection of NASA and NASA-sponsored publications is maintained by the British Library Lending Division, Boston Spa, Wetherby, Yorkshire, England. By virtue of arrangements other than with NASA, the British Library Lending Division also has available many of the non-NASA publications cited in *STAR*. European requesters may purchase facsimile copy of microfiche of NASA and NASA-sponsored documents, those identified by both the symbols "#" and "*", from: ESRO/ELDO Space Documentation Service, European Space Research Organization, 114, av. Charles de Gaulle, 92200 Neuilly-sur-Seine, France.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
WASHINGTON, D.C. 20546

OFFICIAL BUSINESS
PENALTY FOR PRIVATE USE $300

SPECIAL FOURTH CLASS MAIL
Book

POSTAGE AND FEES PAID
NATIONAL AERONAUTICS AND
SPACE ADMINISTRATION
NASA-451

U.S.MAIL

POSTMASTER: If Undeliverable (Section 158 Postal Manual) Do Not Return

NASA CONTINUING BIBLIOGRAPHY SERIES

NUMBER	TITLE	FREQUENCY
NASA SP-7011	AEROSPACE MEDICINE AND BIOLOGY Aviation medicine, space medicine, and space biology	Monthly
NASA SP-7037	AERONAUTICAL ENGINEERING Engineering, design, and operation of aircraft and aircraft components	Monthly
NASA SP-7039	NASA PATENT ABSTRACTS BIBLIOGRAPHY NASA patents and applications for patent	Semiannually
NASA SP-7041	EARTH RESOURCES Remote sensing of earth resources by aircraft and spacecraft	Quarterly
NASA SP-7043	ENERGY Energy sources, solar energy, energy conversion, transport, and storage	Quarterly
NASA SP-7500	MANAGEMENT Program, contract, and personnel management, and management techniques	Annually

Details on the availability of these publications may be obtained from:

SCIENTIFIC AND TECHNICAL INFORMATION OFFICE

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

Washington, D.C. 20546

GPO 944-370