

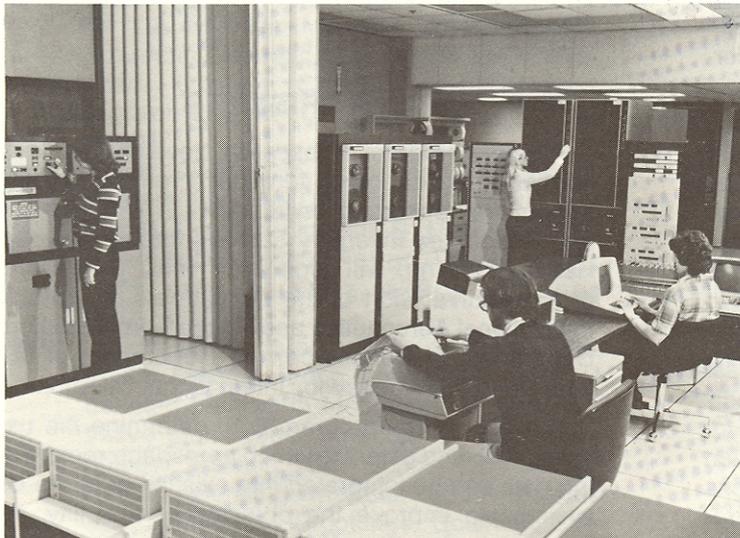
USGS/EROS FIELD OFFICE IN ANCHORAGE

The July issue of the NOTES announced plans by the EROS Data Center to open a field office in Anchorage to expand its programs for transferring remote sensing technology to the Department of the Interior and cooperating government agencies. Congressional approvals obtained in September have enabled the Data Center to begin implementing the field office plan. The primary objectives of the field office are to provide training on manual and automated analysis of remotely sensed data for resource inventory and to make the analysis equipment available to resource managers from Federal, State and local agencies in Alaska.

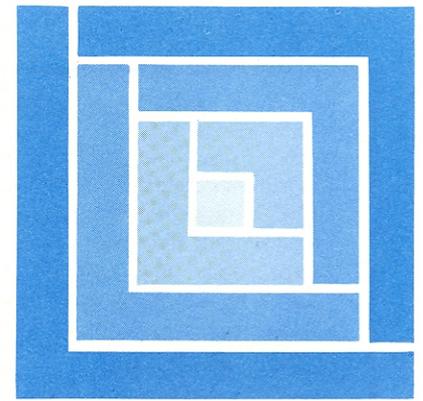
The USGS/EROS Field Office, Anchorage, will be staffed by approximately five full-time scientist/analysts. Personnel will be located in Anchorage by late March 1980 to officially open the field office. An interactive digital image analysis system has been purchased and will be installed in the field office at that time. The system will be used to train resource managers to digitally display, enhance, classify, and manipulate Landsat data, and it will also be available to personnel from government agencies who wish to use the system in conducting inventories in Alaska. Equipment for manual analysis of remote sensing data (both Landsat and aircraft imagery), such as pocket and mirror stereoscopes and light tables, will be available for training courses and for use by government agency personnel. The field office will be linked closely to the EROS Data Center and will utilize personnel, analysis techniques, and software from the Data Center when needed. It is anticipated that the field office will be fully staffed and operational by late 1980.

UPGRADE PLANNED

Earlier this year, the Department of the Interior agreed to a significant upgrading of the existing EROS Data Center digital image processing system (EDIPS). This upgrading will allow EDC to archive Landsat data that have not been resampled.



The EDIPS Operation Center As It Currently Looks.



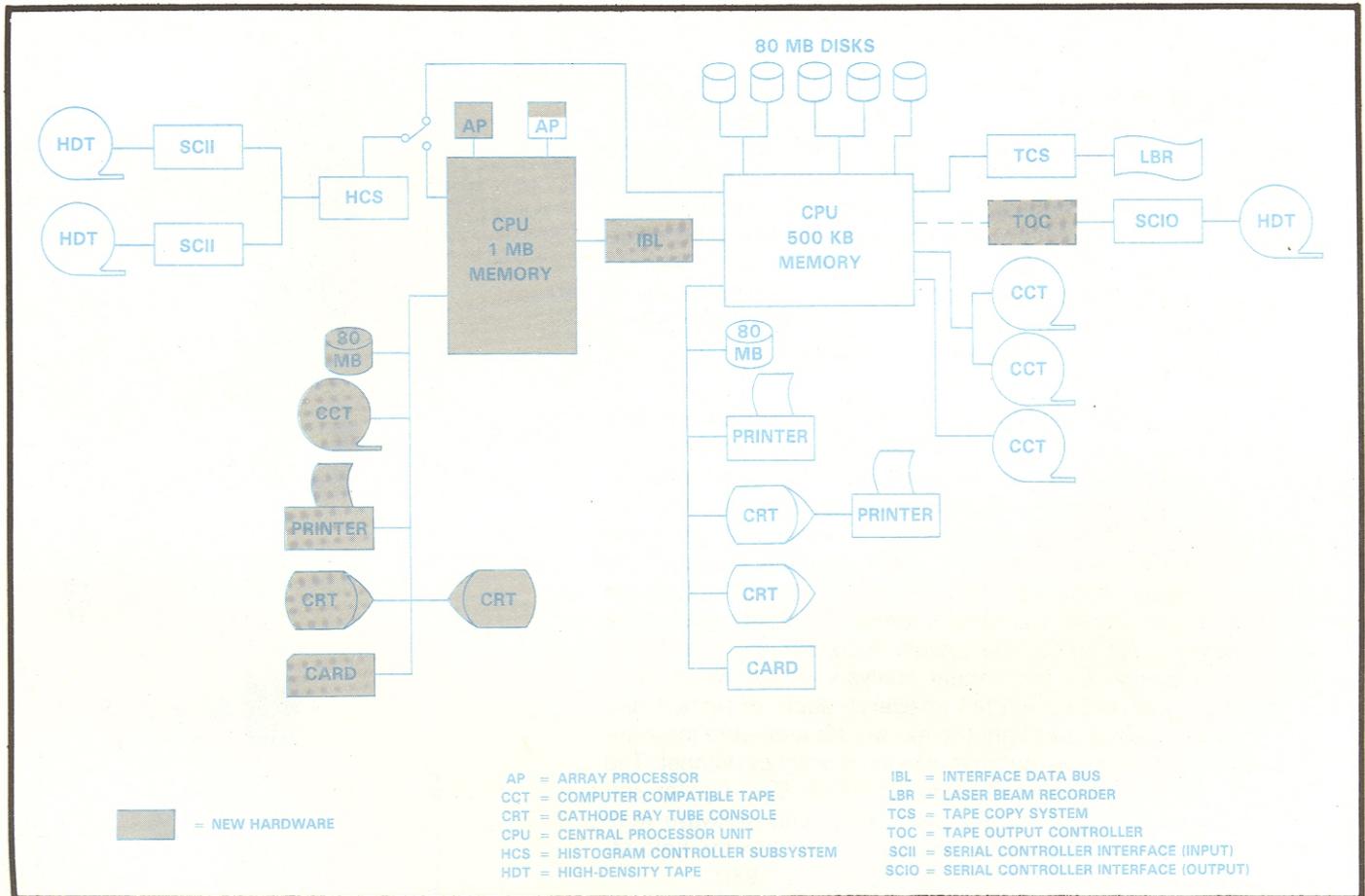
Landsat Data Users NOTES

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NASA

U.S. GEOLOGICAL SURVEY
EROS DATA CENTER
Sioux Falls, S. Dak. 57198



Currently, radiometric and geometric corrections (including resampling) to the data are applied by NASA/Goddard prior to transmission of that data to EDC. This system was established because of the expectation that the majority of customers would request fully corrected data. These data have had both geometric and radiometric corrections applied using the cubic convolution resampling technique. Thus, while the primary archives of Landsat data have been fully corrected and resampled, no recovery of uncorrected raw data has been possible.

To increase flexibility in data use and to establish archives of uncorrected data, the EROS Data Center has awarded a contract to TRW to modify the existing image processing system at EDC to accept data in partially corrected format (radiometric corrections only applied). Although startup of this modified system is not scheduled until January 1981, several improvements in data availability will result.

A major disadvantage will be that the Landsat archives from that time forward will consist of uncorrected data, allowing immediate access to that data for the customer who wishes to apply his own correction algorithms. Also, data processed to other projections and with other resampling techniques could be produced at EDC without the delays associated with retrospective orders to Goddard. Future problems con-

cerning integrity of the data archives will also be minimized because the strict environmental controls of the EDC tape library are designed to minimize tape stress and degradation. As state-of-the-art mass storage systems become available, the concentration of digital archives, together with the master indexing file, will provide an optimum environment for management of the archives and their conversion to long-life-storage media.

AGRISTARS

A 6-year program of research, development, evaluation, and application of aerospace remote sensing for agricultural resources, called AGRISTARS (Agriculture and Resources Inventory Surveys through Aerospace Remote Sensing), will begin in FY 1980. The program is a cooperative effort of the Department of Agriculture, the National Aeronautics and Space Administration, the Department of Commerce, the Department of the Interior, and the Agency for International Development.

The goal of the program is to determine the usefulness, cost, and extent to which aerospace remote sensing data can be integrated into existing or future USDA systems to improve the objectivity, reliability, timeliness, and adequacy of information required to carry out USDA missions. The overall approach is comprised of

a balanced program of remote sensing research, development, and testing which addresses domestic resource management, as well as foreign commodity production information needs.

Seven specific information requirements are to be addressed:

1. Early warning of change affecting production and quality of commodities and renewable resources.
2. Forecasts of commodity production.
3. Classification and measurement of land use.
4. Inventory and assessment of renewable resources.
5. Estimates of land productivity.
6. Assessment of conservation practices.
7. Detection of pollution and evaluation of impact.

All seven information requirements are of major importance to the Department of Agriculture, but the first two, early warning and commodity production forecasting, will be given the most emphasis because of Agriculture's immediate need for better and more timely information on world crop conditions and projected production.

The primary role of the Department of the Interior will be to disseminate pre-processed Landsat and certain aircraft data to support the research, development, and application activities and to evaluate the utility and applicability of research and development products to USDI missions.

SELECTION STRATEGY FOR PRESERVING HISTORICAL DIGITAL DATA

The EROS Data Center has been in the process of evaluating all pre-November 1976 Landsat data to determine which scenes should be preserved on computer-compatible tapes in the pre-EDIPS "X" format while NASA/Goddard still has the capability to produce X-format CCT's.

The selection criteria being used have resulted from compiling historical data showing which geographic areas have been associated with the highest number of film and CCT orders over the years. For each WRS path-row point falling over these areas, one scene is selected which has optimum image quality and cloud cover characteristics. This selection strategy has to date yielded several hundred candidate scenes, most of them over Australia and Africa. Requests for X-format CCT's of these scenes have been submitted to NASA/Goddard.

Because of a backlog of CCT orders at Goddard, it may be some time before scenes resulting from the generalized selection described above are available.

NASA currently plans to continue production of X-format CCT's until the end of 1980, during which time as many pre-November 1976 scenes as possible will be

produced and archived. After X-format CCT's for the selected scenes over Australia and Africa are made available, path-row points over other locations will be selected and representative scenes will be identified.

CCT STANDARDS MEETING: OTTAWA

EDC personnel attended the recent Landsat Ground Station Operations Working Group (LGSOWG) CCT Change Control Board meeting at Ottawa, Canada. This committee was responsible for development of the worldwide CCT format standard adopted in 1978.

Use of the standard worldwide format enables interchange of data between countries and lowers overall software complexity and cost. Though designed generally for space-acquired data, the format also lends itself to polygon and other resource data types.

The new CCT format will be the standard for Landsat D thematic mapper data and will be made optionally available by most stations for Landsat 2 and 3 (MSS and RBV) at some time in the future.

LANDSAT microIMAGE SYSTEM POSTPONED

The Landsat microIMAGE reference system discussed last March (see issue No. 5) has been discontinued indefinitely because of ongoing problems with the production of Landsat 3 RBV data and delays in the production of MSS data at NASA/Goddard. When the digital processing system is fully operational at Goddard, production of the microIMAGE system will be resumed.

In the meantime, the former system of providing Landsat reference images on microfilm along with microCATALOG fiche as an index has been renewed. The microfilm is stored on cassettes. A WRS path-row lookup scheme is incorporated into the catalogs. Users who have already subscribed to the microIMAGE system will receive the 16-mm cassette reference aids at no cost until the fiche system can be implemented.

Any questions on this matter can be answered by the User Services Section, U.S. Geological Survey, EROS Data Center, Sioux Falls, South Dakota 57198, phone: (605)594-6511.

LANDSAT GEOLOGIC IMAGERY

A list of Landsat scenes specifically selected for use in geologic studies is maintained and updated on an ongoing basis by the U.S. Geological Survey's Flagstaff Field Center. Scene ID's for the 48 States are listed. To obtain the list, contact the Flagstaff Field Center, U.S. Geological Survey, 2255 N. Gemini Ave., Flagstaff, Arizona 86001.

CCT QUALITY CONTROL

All products produced at the EROS Data Center are subjected to a rigid quality control program. Computer-compatible tapes (CCT's) are no exception. CCT's are available either as 9-track, 1600-bpi, PE tapes or as 9-track, 800 bpi, NRZI tapes. Both types are generated in accordance with American National Standards Institute Document No. ANSI X3.40-1973, a magnetic tape specification accepted as an industry standard.

In addition to conforming to ANSI requirements, EDC takes every precaution to ensure that CCT's are free of parity bit errors and that all tapes pass a format and content verification procedure before being distributed. A thorough physical inspection is conducted to ensure proper physical condition, labeling, and packaging.



CCT's Are Run Through a Tape Certifier Before Being Shipped.

Even with such an extensive quality control program, occasionally a CCT customer encounters problems with a tape, most often because of incompatibility of the customer's tape-reading equipment with the CCT. Users are cautioned to be sure that their equipment meets the requirements of the ANSI specification. If a problem arises, users should contact the Customer Relations Section at EDC. Customer Relations personnel will work with the user to determine the cause of the problem and to reach a satisfactory solution. Problems due to data errors, content, or format of the tape will normally be authenticated on appropriate equipment in EDC's Data Analysis Laboratory. If a valid problem is

found to exist, the CCT will be replaced. Problems resulting from damage during shipment will also be sufficient reason for a tape to be replaced.

The EROS Data Center should be notified within 90 days, if possible, regarding any irregularity. Address inquiries to the Customer Relation Section, EROS Data Center, U.S. Geological Survey, Sioux Falls, South Dakota 57198, phone: (605)594-6511.

EDIPS IMAGE ACCURACY TESTS

A study to determine the geometric accuracy of Landsat MSS imagery produced by the EROS digital image processing system (EDIPS) has been completed.

The study was accomplished with system-corrected MSS data. The center of the image was registered to a 1:24,000 scale USGS 7.5-minute map in the UTM projection. Accuracy was determined by comparing image point measurements with corresponding UTM map values. Taken "as is," Landsat imagery was found to be well within National Map Accuracy standards for 1:1,000,000 scale coverage. A standard error of about 160 meters in each of two dimensions was computed. However, the linear least-square analysis indicated that a linear transformation could remove certain errors in scale, Earth rotation correction, and aspect ratio, thus making it possible to produce photographs meeting National Map Standards for 1:250,000 scale. The standard error in these cases is 50 meters, less than the dimension of a pixel.

Similar measurements will be performed on data corrected by using ground control points (GCP's). A comparison of the geometric accuracy of GCP-corrected and system-corrected imagery will then be made.

The completed study is reported in *EDC Document No. 41*. Readers are welcome to contact the Systems Development Branch, U.S. Geological Survey, EROS Data Center, Sioux Falls, South Dakota 57198, phone: (605)594-6511, ext. 135, to obtain copies.

RBV BACKLOG TO BE CONVERTED TO FILM

As a result of continuing problems in NASA's Landsat data processing system, production of RBV imagery is backlogged to February 1979 at NASA/Goddard. An estimated 6,200 scenes are unavailable.

Since RBV digital production is not scheduled to begin until November 1979 or later, the decision has been made to convert the existing backlog to 70-mm film. The RBV data affected could thus be made available, and when digital production does begin, digitizing operations could commence.

Conversion to film will begin with the most recent complete month of RBV data, with successive earlier months of data converted as workload permits. Conversion efforts are scheduled to begin in mid-October 1979. The first data to be converted will be that for September 1979.

SYMPOSIA

6th ANNUAL PECORA SYMPOSIUM

The theme of the 6th Annual Pecora Symposium will be "Integration of Remote Sensing with the Exploration Process." This symposium will convene next April 13-17 and is being sponsored by the Society of Exploration Geophysicists in cooperation with the U.S. Geological Survey, the American Association of Petroleum Geologists, the Geosat Committee, and the National Aeronautics and Space Administration. Contact the Society of Exploration Geophysicists, P.O. Box 3098, Tulsa, Oklahoma 74101 for further information.

MACHINE PROCESSING OF REMOTELY SENSED DATA in conjunction with INTERNATIONAL SYMPOSIUM ON SOIL INFORMATION AND REMOTE SENSING

Purdue University and the International Soil Science Society are co-sponsoring this joint event to be held next June 2-6. The theory, implementation, and novel applications of machine processing of remotely sensed data will be stressed with special emphasis given to applications in soils. Special sessions will cover "Soil Information Systems" and "Remote Sensing and Soil Survey." Following the Symposium, a short course on "Soil Applications of Digital Analysis of Multispectral Data" will be offered from June 9-13. Details about either the Symposium or the special short course can be obtained from Professor Marion F. Baumgardner, Laboratory for Applications in Remote Sensing (LARS), Purdue University, 1220 Potter Drive, West Lafayette, Indiana 47906.

PHOTOGRAMMETRISTS, SURVEYORS, MEET IN SIOUX FALLS

More than 750 people attended the 1979 Fall Convention of the American Society of Photogrammetry and the American Congress on Surveying and Mapping at Sioux Falls, South Dakota, September 17-21.

Sixty technical papers were presented in ten general sessions and two poster sessions, all based on the theme, "Observing and Measuring the Planet Earth." Innovations at this convention included poster sessions and as few concurrent sessions as possible, thereby permitting more exchange of information between members of both societies.



The Exhibit Area at the ASP-ACSM Convention Drew Healthy Crowds All Week.

The convention exhibit area, with 50 commercial and 13 non-commercial exhibits, drew about 500 visitors each day. Approximately 400 persons toured the U.S. Geological Survey's EROS Data Center during the convention.

TRAINING IN REMOTE SENSING OFFERED IN FOREIGN COUNTRIES

During the past several years, the staff of the EROS Data Center has conducted a number of training courses for foreign scientists in the host country. For example, one or more courses of varying length have been taught in Mexico, Argentina, Iran, Saudi Arabia, the People's Republic of China, and Somalia.

Most of the courses have been conducted in English, although several have been accompanied by simultaneous translation with good results. Most of the courses have been similar in duration and content to the regularly scheduled International Workshops taught in Sioux Falls, although changes in course outlines and image examples are made to meet the particular sponsor's or host country's needs. For some courses, the costs have been borne entirely by the host country, while for others, external sources of funding such as USAID, UN-FAO, or the Inter-American Development Bank have subsidized at least part of the costs. Some

courses have been exclusively for citizens of a single country and others have been regional in participant nationality. Usually the costs of conducting a course outside the United States are considerably lower than the costs of sending a number of participants to training courses in the States.



A Class Portrait of the 13th International Remote Sensing Workshop. Pictured at the Far Left and Far Right, Respectively, Are Ronald Beck and William Draeger, Instructors.

Citizens or officials interested in investigating the possibilities of arranging a remote sensing training course outside the United States should contact the Chief, Training and Assistance, EROS Data Center, Sioux Falls, South Dakota 57198, USA.

EDC TRAINING SCHEDULE

The EROS Data Center's Applications Branch staff will conduct or participate in several training courses and workshops in the coming months.

- Jan 14 - Jan 18, 1980 *Remote Sensing for Wetlands Analysis* (NSTL, Bay St. Louis, Mississippi). Also to be held May 12-16, 1980. Open to U.S. Fish and Wildlife Service personnel only. Contact: Dr. Allan Marmelstein, Office of Biological Services, U.S. Fish and Wildlife Service, Washington, D.C.
- Jan 21 - Jan 25, 1980 *Digital Analysis Workshop* (Sioux Falls, South Dakota). Open to Bureau of Land Management personnel only. Contact: William Bonner, BLM Scientific Systems Development, Denver Service Center, Bldg. 50, Code D-140, Denver, Colorado 80225.
- Mar 10 - Mar 14, 1980 *Basic Geology Workshop* (Sioux Falls, South Dakota). Open enrollment, preference given to U.S. Federal agency personnel. Contact: Branch of Applications, EROS Data Center, Sioux Falls, South Dakota 57198, phone: (605)594-6511 ext. 114.

- Mar 17 - Mar 21, 1980 *Workshop in Digital Analysis in Geology* (Sioux Falls, South Dakota). Open enrollment, preference given to U.S. Federal agency personnel, Contact Branch of Applications, EROS Data Center, Sioux Falls, South Dakota 57198, phone: (605)594-6511, ext. 114.
- Mar 24 - Mar 28, 1980 *Water Resources Remote Sensing Workshop* (Sioux Falls, South Dakota). Also to be held Nov. 3-7, 1980. Open enrollment, preference given to U.S. Federal agency personnel. Contact: Branch of Applications, EROS Data Center, Sioux Falls, South Dakota 57198, phone: (605)594-6511 ext. 114.
- May 5 - May 30, 1980 *International Remote Sensing Workshop* (Sioux Falls, South Dakota). Open to non-U.S. scientists. Contact: Office of International Geology, U.S. Geological Survey, National Center (917), Reston, Virginia 22092.
- Jun 16 - Jun 20, 1980 *Forest and Rangeland Inventory Methods*, (Berkeley, California). Contact: S. Arce, Letters and Sciences, U.C. Extension, 2223 Fulton St., Berkeley, California 94720, phone: (415)642-1061.
- Jun 23 - Jun 27, 1980 *Terrain Analysis: Interpretation of Aerial Photographs and Images* (Sioux Falls, South Dakota). Contact: Lisa Underkoffler, Graduate School of Design, Gund Hall L-37, Harvard University, Cambridge, Massachusetts 02138, phone: (617)495-2578.
- Sep 8 - Oct 3, 1980 *International Remote Sensing Workshop* (Sioux Falls, South Dakota). Open to non-U.S. scientists. Contact: Office of International Geology, U.S. Geological Survey, National Center (917), Reston, Virginia 22092.

ADDITIONAL TRAINING IN REMOTE SENSING

- Jan 7 - Jan 11, 1980 *Airphoto Interpretation for Terrain Evaluation* (Madison, Wisconsin). Contact: Robert Madding, Department of Engineering and Applied Science, University of Wisconsin Extension, 432 N. Lake St., Madison, Wisconsin 53706, phone: (608)262-2061.
- Jan 9 - Jan 11, 1980 *Extraction of Information from Remotely Sensed Data* (Ft. Collins, Colorado). Contact: Office of Conferences and Institutes, Rockwell Residential Center, Colorado State University, Ft. Collins, Colorado 80523.
- Feb 11 - Mar 7, 1980 *Advanced Training in Digital Image Processing* (Flagstaff, Arizona). Contact: Office of International Geology, U.S. Geological Survey, National Center (917), Reston, Virginia 22092.

- Mar 17 - Mar 21, 1980 *The Application of Remote Sensing Techniques to Environmental Resource Problems* (Terre Haute, Indiana). Also to be held Jun 16-20, 1980, and Aug 18-22, 1980. Contact: Dr. Paul M. Mausel, Dept. of Geography and Geology, Indiana State University, Terre Haute, Indiana 47809.
- Apr 7 - Apr 25, 1980 *Introduction to Remote Sensing* (Panama). Also to be held Sep 8-26, 1980. Instruction in Spanish. Sponsored by the Defense Mapping Agency, Inter-American Geodetic Survey, and EROS Program. Contact: Chief, DMA-IAGS Cartographic School, APO Miami, Florida 34004.
- Apr 14 - Apr 16, 1980 *Mapping from Space - Techniques and Applications* (Washington, D.C.). Contact: Continuing Engineering Education, George Washington University, Washington, D.C. 20052, phone: (202)676-6106.
- Apr 28 - May 2, 1980 *Manipulation of Computer-Compatible Tapes* (Panama). Also to be held Sep 22-26, 1980. Instruction in Spanish. Sponsored by the Defense Mapping Agency, Inter-American Geodetic Survey, and EROS Program. Contact: Chief, DMA-IAGS Cartographic School, APO Miami, Florida 34004.
- Jun 9 - Jun 13, 1980 *Soil Applications of Digital Analysis of Multispectral Data* (West Lafayette, Indiana). Contact: Douglas B. Morrison, Purdue/LARS, West Lafayette, Indiana 47906, phone: (317)749-2052.
- Jul 21 - Jul 25, 1980 *International Conference on Soil Conservation* (Bedford, England). Contact: Mrs. P. M. King, National College of Agricultural Engineering, Silsoe, Bedford, England MK 45 4DT.
- Sep 29 - Oct 17, 1980 *Landsat Mosaic Workshop* (Panama). Instruction in Spanish. Sponsored by the Defense Mapping Agency, Inter-American Geodetic Survey, and EROS Program. Contact: Chief, DMA-IAGS Cartographic School, APO Miami, Florida 34004.
- Monthly: *Short Course on Numerical Analysis of Remote Sensing Data* (West Lafayette, Indiana). Contact: Douglas B. Morrison, Purdue/LARS, 1220 Potter Drive, West Lafayette, Indiana 47906, phone: (317)749-2052.
- Continuing: *Training in Remote Sensing* (Brookings, South Dakota). Long-term (3-12 months) detailed training in technical and administrative techniques of remote sensing technology. Contact: Dr. Donald G. Moore, Remote Sensing Institute, South Dakota State University, Brookings, South Dakota 57006.

NEW PUBLICATIONS

A new quarterly called the *International Journal of Remote Sensing* will begin publication in January. It will be the official journal of the Remote Sensing Society -- a society with international membership interested in the sciences of remote sensing and image processing.

Annual subscriptions will be about £25 to those who are not members of the society. Queries can be addressed to the publisher, Taylor & Francis Ltd., Rankine Road, Basingstoke, Hants RG24 OPR, England.

The New York State Department of Transportation has recently issued a revised *Inventory of Aerial Photography and Other Remotely Sensed Imagery of New York State*. The price of the book is \$7.50, and it is available from the Map Information Unit, New York State Department of Transportation, State Campus, Albany, New York 12232.

PECORA IV PROCEEDINGS AVAILABLE

The proceedings of the Pecora IV Symposium, "Application of Remote Sensing Data to Wildlife Management," held in Sioux Falls in October 1978, has been published by the National Wildlife Federation. The proceedings contains over 50 technical papers (397 pages), covering such topics as habitat analysis, animal census and population dynamics, and integrated resources planning and analysis. Orders (\$10 per copy) should be sent to the National Wildlife Federation, 1412 16th Street N.W., Washington, D.C. 20036.

The Landsat Data Users NOTES is published bi-monthly in order to present information of interest to the user community regarding Landsat products, systems, and related remote sensing developments. There is no subscription charge; individuals and organizations wishing to receive the NOTES should contact the User Services Section, U.S. Geological Survey, EROS Data Center, Sioux Falls, South Dakota 57198, U.S.A., telephone: (605)594-6511.

Comments, corrections, and other inquiries should be directed:

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U.S. Geological Survey
EROS Data Center
Sioux Falls, South Dakota 57198

**IMAGE ANALYSIS EQUIPMENT
AND SERVICES**

The list of sources offering image analysis equipment and services that was printed in Issue No. 3 of the *Landsat Data Users Notes* is maintained at the EROS Data Center and is revised and expanded as new information is made available to EDC. Organizations requesting changes in their listings, or wishing to receive copies of the most current list, should direct their inquiries to:

User Services Section
U.S. Geological Survey
EROS Data Center
Sioux Falls, South Dakota 57198
(605)594-6511

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