PUBLIC MEETINGS ON NOAA'S LANDSAT D DATA COLLECTION PLANS

Final plans are being formulated to implement an interim operational civil land remote sensing satellite system on January 31, 1983, under the management of the National Oceanic and Atmospheric Administration (NOAA) of the Department of Commerce. This system will be based upon the Landsat D and Landsat D' spacecraft now being built by NASA. A new ground processing system under construction at the Goddard Space Flight Center in Greenbelt, Md., will preprocess the data from these satellites. Image and digital data products will be made available from the Earth Resources Observation Systems (EROS) Data Center (EDC), in Sioux Falls, S. Dak., under an arrangement between NOAA and the U.S. Geological Survey.

NOAA recently announced plans for new and improved Landsat data services, and, in addition, announced a series of price increases (about 2.5 times higher than current levels) which will go into effect on October 1, 1982. Administration policy calls for the shifting of responsibility for U.S. satellite land remote sensing activities to the private sector sometime in the 1980's.

NOAA has also announced that it would release its tentative plans regarding both special data acquisitions and routine Basic Data Set acquisitions by the multispectral scanner (MSS) instrument aboard Landsat D by April 1982. Before these plans are finalized, however, response and advice from the user community will be solicited.

Opportunities to comment first-hand on the proposed data collection approach will be offered through a series of public meetings which NOAA will host at several locations around the country. These meetings will begin in Washington, D.C., on April 20 and conclude on the West Coast in mid-June. Announcements in letters, trade journals, and professional society publications will follow.

NOAA officials will be at the following locations on the dates indicated:

April 20	Department of Commerce Auditorium 14th Street and Constitution Avenue, N.W. Washington, D.C.
April 30	William Marsh Rice University Department of Space Physics & Astronomy Sewall Hall, Room 301 Houston, TX
May 4	NASA/MSFC Michoud Assembly Facility (Auditorium) New Orleans, LA
June 3	National Bureau of Standards Auditorium 325 Broadway, Radio Building Boulder, CO
June 8	Presidio of San Francisco Presidio Post Theatre, Building 99 San Francisco, CA

Registration for each meeting will begin at 8:00 a.m. The meetings will start at 8:45 a.m. To ensure appropriate accommodations, please call NOAA's User Affairs Office to inform them of which meeting you will attend. The number is (301) 763-7822.

Landsat Data Users NOTES

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NASA

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

COLUMBIA RIVER TRIBUTARIES PROJECT

A project concerned with analysis of irrigation withdrawals was recently completed as the result of a joint effort by EROS Data Center scientists and the U.S. Army Corps of Engineers, Portland District. The purpose of the project was to evaluate the utility of both Landsat imagery and conventional aerial photography, when used with spatial analysis techniques, for determining the current extent of irrigation and the potential for future irrigation development in two basins within the Columbia River system.

The Umatilla Basin in the State of Oregon was the primary study area. This 6,500-km² (2,500-mi²) area includes extensive regions that were developed for center pivot irrigation in the 1970's. A second, much smaller, study area consisted of three sites (36-mi² townships) in the Yakima Basin in the State of Washington. The Yakima sites served as a control group for crop classification. The areas studied have been intensively irrigated, using flood or towline sprinkler methods, since the early 1900's.

The project was designed to determine:

1. The existing (1979) level of irrigation.
2. The annual rate of irrigation expansion.
3. The growth rate of center pivot irrigation.
4. The types of crops being irrigated.
5. The water and energy requirements for existing irrigated lands.
6. The prime areas for future irrigation development.

The project began with mapping of general land cover categories in the Umatilla Basin. Areas of center pivot irrigation, other irrigation, dryland agriculture, rangeland, forests, water bodies, wetlands, and urban centers were manually interpreted from Landsat false-color composite images. Scenes from 1973, 1975, 1977, and 1979 were used to identify and measure changes in land cover in recent years. Results were supplemented with precise 1979 irrigation acreage estimates obtained from aerial photographs.

The specific types of crops under irrigation were then estimated for both the Yakima and Umatilla Basins. The estimates were made by developing statistical data from Landsat computer-compatible tapes (CCT's) and correlating unique data groups (clusters) with field-collected crop-type information. From the small subsets of digital data thus classified, comprehensive classifications of large areas were computed. The result was a digital data base containing crop-type information for one Yakima Basin site and all of the Umatilla Basin. Additional field data and aerial photographs were needed to supplement the Landsat estimates because the classification accuracies were less than desirable (77-percent correct in the Umatilla Basin; 71-percent correct in the Yakima site). The factors contributing to these low accuracies varied. In the Yakima Basin, small fields and great diversity in both crop type and irrigation method made classification difficult. In the Umatilla Basin, which is a much more homogeneous agricultural environment, differences in individual crop growth stages were factors affecting classification accuracy.

The water requirements for irrigated crops were determined next. The Landsat crop acreage estimates were combined with historic crop water requirement statistics developed by the Department of Agriculture to establish the number of acre-feet of water required for irrigation in both basins during 1979. Regional water requirement patterns were also established.

An analysis of energy requirements followed. This involved calculating the number of kilowatt-hours per acre that were used in 1979 to irrigate the Umatilla Basin. Digital topographic data and pumping locations were used to derive the spatial variables needed for the energy equation. Total diversion of water based on the previous acreage estimates, pumping plant efficiency, and other factors were taken from known data. Approximately 292 million kilowatt-hours of energy were estimated to have been used for the 1979 irrigation season in the Umatilla Basin.

At this point, the future irrigation potential in the Umatilla Basin was evaluated using a multivariable compositing procedure. Digital data describing land cover, land ownership, soil irrigability, percent slope, and potential energy requirements were registered to a common map base and overlayed. A composite map depicting the combined impact of both physical and economic factors on irrigation development potential in the northern 4,450 km² in the Umatilla Basin was subsequently produced. From this map, areas having the greatest likelihood for future irrigation development could be identified.

A potential problem with the spatial data model developed in this project is that any such model can only be as valid as the assumptions and data used to create it. However, a distinct advantage of such a model is that once the data are in digital form and can be manipulated using a computer, different weightings or scenarios can be proposed and rapidly displayed and evaluated for planning purposes.

This project therefore offered an ideal test-of-concept for Landsat-based spatial data analysis systems. In arriving at answers to the problems presented, the acquisition and synthesis of a considerable amount of geographically referenced data was required. These data were used to develop a digital data base containing variables representing irrigation-related physical, administrative, and economic conditions. Through the computer-assisted analysis and modeling that was possible as a result, the tasks of resource planning and management by Corps of Engineers personnel were aided.

Furthermore, the data will be available for additional analyses as conditions affecting irrigation in the project study areas continue to change. Additional information on this work can be obtained from the Information Officer, Applications Branch, U.S. Geological Survey, EROS Data Center, Sioux Falls, SD 57198, telephone: (605) 594-6114.

THE NATIONAL CARTOGRAPHIC INFORMATION CENTER

Established by the U.S. Geological Survey in 1974, the National Cartographic Information Center (NCIC), acquires information on cartographic, geographic, and remotely sensed data of the United States, and disseminates this information to users. EDC works closely with NCIC, sharing both program and computer resources.

Common types of cartographic data are maps and charts, digital mapping data, aerial photographs, and geodetic control data. Increasingly, the innumerable applications relating this information to the Earth and its resources are being used to broaden the scope of Landsat investigations.

Other prominent categories of cartographic information being integrated into current investigations include hydrologic reports, census statistics, survey descriptions, governmental publications, and magnetic data. NCIC does not physically obtain all of these cartographic data itself, but it does accumulate and organize comprehensive descriptive information identifying where such data are held and how users may obtain them. That information is made available, on request, through NCIC's 7 offices and 31 State and Federal affiliate offices, where user assistance is provided.

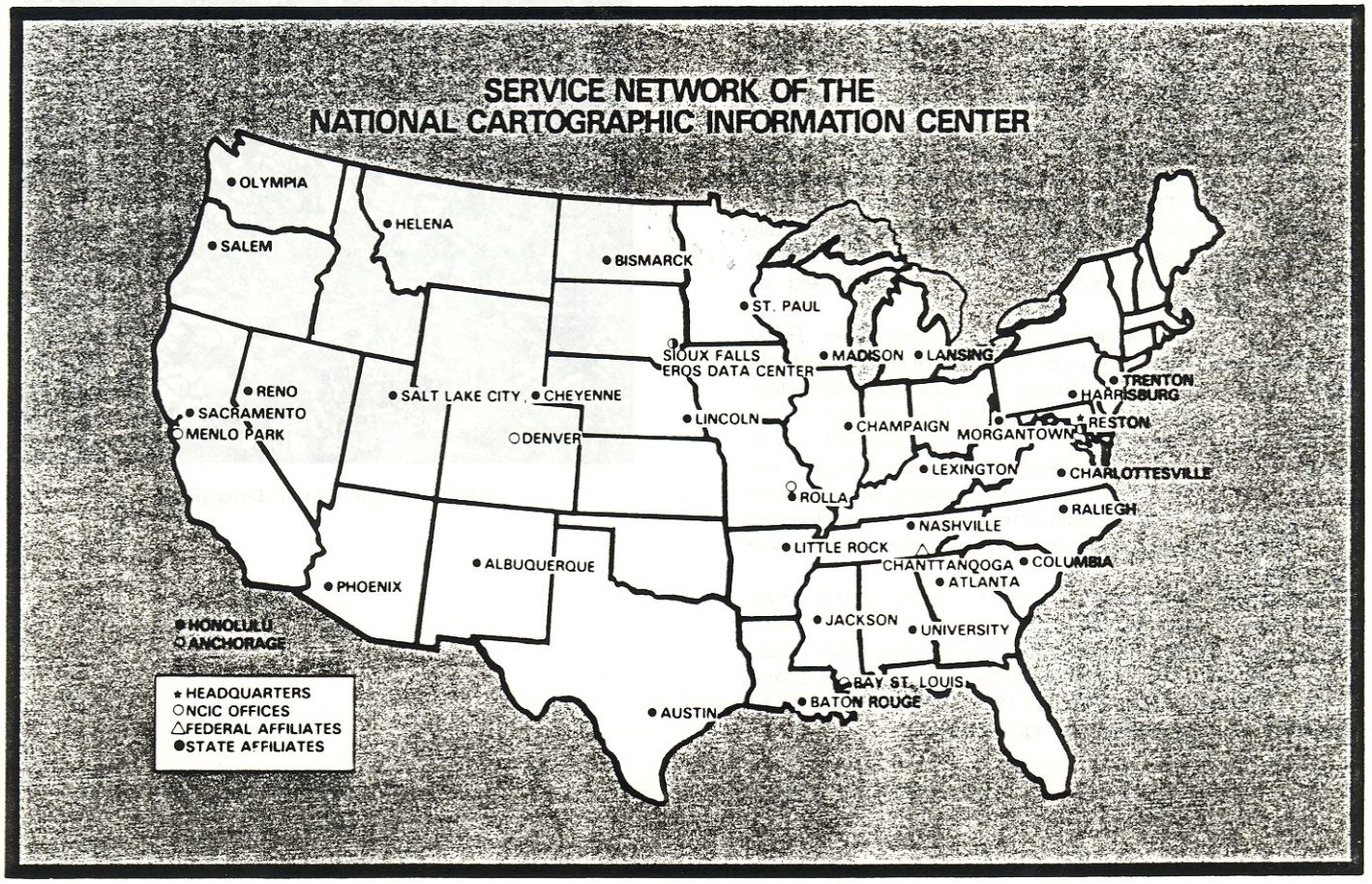
As a user service organization, NCIC uses comprehensive information systems, ranging from micrographic reference aids to computerized data bases, to provide timely answers to inquiries. For example, 17 NCIC and State affiliate offices are tied into the computerized data base at EDC to facilitate on-line access to information on the nearly 6 million frames of aircraft and satellite imagery archived at EDC

NCIC and EDC have created a microfiche reference system, called Accession Aids, which is organized so that the aircraft and satellite data archived at EDC may be geographically researched without computer access to the data base. Records of additional millions of frames of existing and planned aerial photographs are organized in NCIC's Aerial Photography Summary Record System (APSRS).

A micrographics-based Map and Chart Information System (MCIS) contains information on domestic maps and charts, both current and historical. NCIC offices use this data base to respond to customer requests for information on map availability.

With the aid of these systems and others, NCIC is a valuable source of information to those who work with remotely sensed data. Readers interested in obtaining more information about the services and data available through NCIC are encouraged to contact:

National Cartographic Information Center
U.S. Geological Survey
507 National Center
Reston, VA 22092
telephone: (703) 860-6045
FTS: 928-6045



RBV DODGED PRINTS

Photographically enhanced return beam vidicon (RBV) images are being produced by EDC as one means of compensating for the vidicon-related "shading" problem.

Shading is an artifact in Landsat 3 RBV data which has been of concern since these data started being processed in a production mode in September 1980. Essentially, it is a manifestation of differences in response to scene brightness across each camera lens (see issue no. 16). The effect in photographic prints produced from these data is an undesirable distribution of densities over the dynamic range of the film. Dark and light areas are accentuated, and ground details at either end of the range become difficult to discern.

The most successful attempts at compensating for this effect have employed digital processing. One technique involves averaging several scenes of uniform contrast and then digitally subtracting the result from a shaded image, pixel by pixel. Such a bias correction was discussed in these columns last September (issue no. 20).

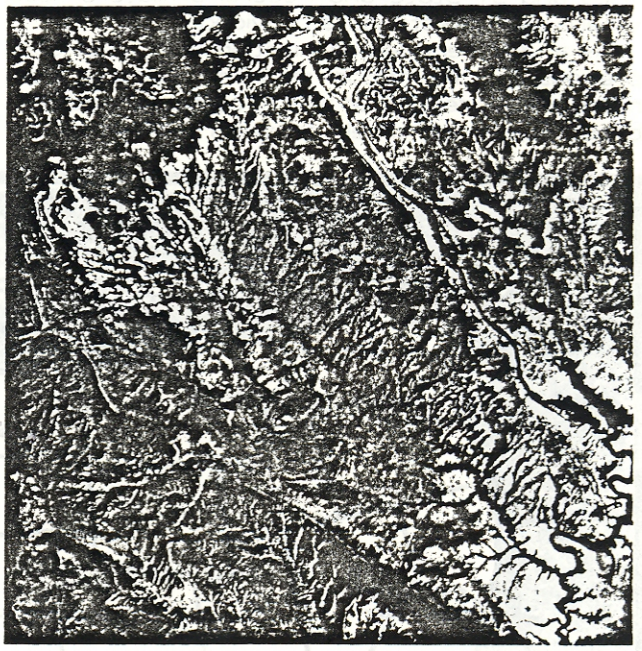
A simpler, more cost-effective way of averaging high and low densities in a photographic image is to "dodge" the image. Dodging is a photographic technique whereby the light source used during the printing process is modulated according to the density of the master image. Darks areas on a photographic negative, for example, can be given more light to bring out low densities on the positive print. Conversely, areas of high density can be toned down. Specialized dodging printers can do this electronically, sensing changes in the density of the negative and varying the exposure allowed over corresponding areas in the positive. A very high-contrast scene can thus be adjusted photographically to be of more uniform contrast.

As long as the shading is non-linear, dodging does result in a visible improvement in the appearance of the image. This has been found to aid interpretation for some applications because details formerly obscured at high and low densities often become easier to discern when reproduced at medium densities.

EDC is now dodging all contact-size RBV photographic products as a standard procedure. Customers may still obtain undodged reproductions, but a special instruction to this effect must be included on the order form. Enlarged RBV products are not being dodged unless specifically requested by the customer; with orders for dodged enlargements, a $12 surcharge will be added to the product price to cover the cost of the required internegative.

These services apply only to RBV data that have been processed in digital mode since September 1980. Please contact the User Services Section, U.S. Geological Survey, EROS Data Center, Sioux Falls, SD 57198, telephone: (605) 594-6151, if you have any questions.

RBV Image Before Dodging



RBV Image After Dodging

STATUS: LANDSAT 2 AND 3

On February 25, 1982, **Landsat 2** was removed from operational service. Following a series of yaw control problems that began in mid-January, the yaw-axis flywheel stopped functioning. Efforts by NASA to restart the wheel have been unsuccessful so far, and the prognosis is not good.

Aside from the obvious effect of degraded attitude control on any data obtained, spacecraft motion in the yaw-axis results in insufficient solar array power, causing power management problems aboard the satellite. Low power conditions were responsible for frequent breaks in service during February, and command and communications were impossible to establish at times.

The same flywheel stopped once before, in November 1979, but it restarted in June 1980. Landsat 2 provided no data during that 7-month period, but has been the prime data collection platform ever since. It has far exceeded its expected design life, having provided almost continuous service since its launch in January 1975.

Landsat 3 is also having serious problems. The end-of-scan pulse on MSS light source "B" began deteriorating last fall, and by December a switch to light source "A" had to be made. This has worked so far, but eventual degradation of the source "A" pulse must be expected. Neither source "A" nor source "B" has provided a start-of-scan pulse for quite some time; this function is being handled by a pseudopulse generated in the MSS multiplexer.

Along with the end-of-scan pulse problem, recent evaluation of Landsat 3 data has shown that a jitter problem in the MSS mirror system has been worsening in the last few months. Variations in mirror position relative to the pseudopulse generated by the MSS multiplexer are increasing. In the potential absence of an end-of-scan pulse, these variations will be too great to permit accurate data processing or subsequent registration of images. Variations of three to seven pixels have already been observed in uncorrected data.

The problem is compounded by the fact that the multiplexer onboard Landsat 3 has failed in the past (later recovering inexplicably) and could fail again at any time.

The chances of resolving these problems are considered minimal. At present, the duty cycle of the Landsat 3 spacecraft is being limited as much as possible in an effort to prolong its useful life, at least until Landsat D is operational.

BAND NUMBERING TO CHANGE WITH LANDSAT D

Among the many changes to take effect after the launch of Landsat D will be the numbering system used to designate the different bands of multispectral scanner (MSS) data. Bands 4, 5, 6, and 7, which have been associated with the MSS on Landsats in the past, will be known as bands 1, 2, 3, and 4, respectively, on Landsat D.

The Landsat D MSS will be similar to the MSS instruments that have been flown on previous Landsats. It will sense data in the same four spectral bands, achieving similar radiometric sensitivity and ground resolution.[1] Only the band numbering will change.

The revised MSS numbering scheme is given in the chart below. Also shown is the numbering system that will be used to designate the thematic mapper (TM) bands. Users should note that these designations apply to Landsat D data only. MSS data from Landsats 1, 2, and 3 will be identified by the same band numbers they have always had (4, 5, 6, and 7) and should be ordered and otherwise designated accordingly.

LANDSAT D SPECTRAL BAND DESIGNATION

Band No.	Multispectral Scanner (MSS)	Thematic Mapper (TM)
1	0.5-0.6 μm	0.45- 0.52 μm
2	0.6-0.7 μm	0.52- 0.60 μm
3	0.7-0.8 μm	0.63- 0.69 μm
4	0.8-1.1 μm	0.76- 0.90 μm
5		1.55- 1.75 μm
6		10.40-12.50 μm
7		2.08- 2.35 μm

LANDSAT D PRODUCT GENERATION GOALS

Full production and operational output of Landsat D MSS data are expected within 6 months after launch. At that time, the Landsat D Image Generation Facility (IGF) at the NASA Goddard Space Flight Center (GSFC) will be operated to produce up to 133 MSS scenes per day. These data will be formatted as partially processed archival high-density tapes (HDT-A's) from which other user products such as photographic images or computer-compatible tapes (CCT's) can be made. The planned turnaround time from receipt of raw data at GSFC to generation of HDT A's is 48 hours. The HDT data will be transmitted from GSFC via communications satellite to the EROS Data Center where geometric corrections will be applied and film will be created for archival and user product generation.

Landsat D thematic mapper (TM) data products will not be generally available until much later. Current plans are to achieve a research and development (R&D) output capability of 12 scenes per day about 1 year after launch, and an operational production output capability of 50 scenes per day by January 1985. The standard data product sent to EDC for archival and product generation will be fully corrected film. A 48-hour turnaround at GSFC is

[1]The MSS on Landsat 3 was designed to gather data from a fifth, thermal-infrared band. Very few data were obtained, however, and for practical reasons "band 8" is considered never to have existed.

planned, just as with MSS products. Digital TM data in the form of CCT's will be shipped to EDC for reproduction based on user demand.

The longer lead time needed for operational output of TM data is influenced primarily by two factors: (1) the TM Image Processing System within the IGF will not achieve a significant fraction of the eventual operational requirement until approximately 1 year after launch, and (2) algorithms to compensate for possible "jitter" effects (from the TM mirror) on band-to-band registration and geometric correction can not be finalized until after the satellite is launched and the magnitude of the high frequency vibrations is quantified.

These projected production goals apply to U.S.-acquired data only. The Landsat D spacecraft itself will be capable of supporting real-time acquisitions of many more scenes of data by both U.S. and non-U.S. stations. A maximum of 660 scenes per day of MSS data and 250 scenes per day of TM data could potentially be acquired on a worldwide basis.

On or about January 1983, when full capability for MSS data production is proven, the National Oceanic and Atmospheric Administration (NOAA) will assume operational responsibility for the MSS segment of the Landsat D mission. A similar transition of responsibility is expected in January 1985 when the capability for producing TM data products has been established.

MSS ACQUISITION REQUESTS TO BE HANDLED BY EDC

When the Landsat D MSS becomes operational, acquisitions by the MSS sensor will be scheduled in large part in response to user requests. These requests will be received by EDC, who will consolidate all requirements for specific MSS scenes, handle the associated billing and accounting functions, and forward the acquisition requirements to the Goddard Space Flight Center for scheduling.

Implementation of this system will represent a significant change in acquisition philosophy in that it will give first priority to those users who have specific scene requirements and are willing to bear the cost of acquiring these scenes. Past acquisition policies have included routine collection of data over many areas where user demand has not justified acquisition costs. For a special-acquisition fee, users will now be able to request specific dates and areas of coverage, as well as specify such parameters as maximum acceptable cloud cover, compression mode, gain, and others.

Any remaining MSS acquisition capacity will be used as much as possible to collect additional data which, although not specifically ordered in advance, would constitute a Basic Data Set of scenes deemed likely to be purchased at some future time.

EDC's User Services Section is currently designing a system for handling these customer-specified acquisition requests. Details on how the system will work, and what options will be available to Landsat users upon its implementation will be covered in the next issue of this

CCT VERIFICATION PRINTS DISCONTINUED

Effective May 1, 1982, CCT verification imagery will no longer be provided by EDC with CCT orders.

CCT customers in the past have received, in addition to their magnetic tape, a photographic print of the area represented on the tape. A band 5 image was included with orders for MSS CCT's; a print of the applicable subscene accompanied RBV CCT's. These prints will no longer be provided automatically.

Customers desiring verification imagery with their CCT's after May 1, 1982, are advised that all such photographic prints (film or paper) must be requested as a separate order and that standard product prices will apply.

LATE PAYMENT POLICY

As directed by the Department of the Interior, the U.S. Geological Survey is required to charge interest on customer accounts not paid within 30 days of the billing date. Interest rates are determined by the U.S. Department of the Treasury on a quarterly basis.

This policy will go into effect on April 1, 1982. The annual rate for the period of April 1, 1982, through June 30, 1982, has been set at 13.22 percent.

EDC customers should be aware of this if they are currently carrying a delinquent bill for any products purchased. Questions can be directed to the User Services Section, U.S. Geological Survey, EROS Data Center, Sioux Falls, SD 57198, telephone: (605) 594-6509.

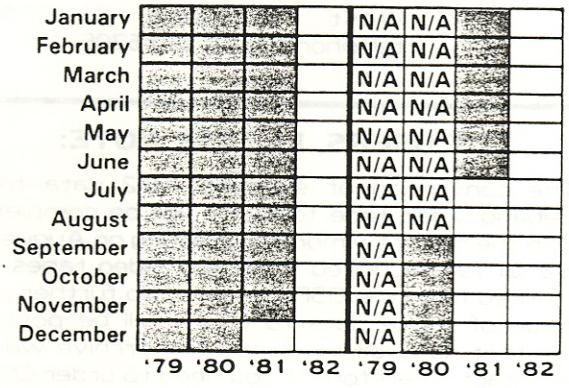
Notice of any changes in the interest rate will be published in this newsletter.

STATUS OF GSFC DIGITAL PROCESSING

Because of various ground system problems that occurred after the commencement of digital operations between GSFC and EDC in 1979, the flow of Landsat data to EDC was frequently interrupted even though acquisitions by the satellites were continuing. This situation resulted in a large backlog of data waiting to be processed at GSFC, and it was not until recently that any substantial progress could be made toward eliminating it.

In the past year, this backlog of Landsat digital processing has been significantly reduced, and certain monthly increments of data have been "closed out." The progress is shown by the shaded areas in the chart below. When a month is closed out, it means that all processable Landsat MSS and RBV scenes acquired during that month have been proccessed and sent to EDC. The chart was current as of March 1, 1982. It should be noted that digital processing of RBV data did not start until September 1980.

LANDSAT DIGITAL PROCESSING STATUS AT GSFC (RADIOMETRICALLY CORRECTED DATA ONLY)



NA = Prior to digital operations; no backlog incurred.
▒ = Digital processing backlog closed out; all scenes at EDC.

PROCEEDINGS OF PECORA VII

The Proceedings of the Pecora VII Symposium, held in Sioux Falls, S. Dak., October 18-21, 1981, are now available from the American Society of Photogrammetry. The 632-page volume includes papers on a variety of topics dealing with the symposium's theme: "Remote Sensing: An Input to Geographic Information Systems in the 1980's." Interested parties should place their order with Mrs. Engel, American Society of Photogrammetry, 105 N. Virginia Ave., Falls Church, VA 22046. The price is $27.50. A $1 handling charge for U.S. orders and a $3 handling charge for non-U.S. orders should be included with your remittance.

DIGITAL ANALYSIS COURSE TO BE HELD

The EROS Data Center will offer a "Digital Land Cover Classification Techniques" training course at EDC on June 7-11, 1982. This specialized course, emphasizing both conventional and advanced digital classification procedures, is designed for resource and remote sensing specialists. An understanding of the fundamentals of remote sensing and the digital analysis process is requisite. For further information, contact the Chief, Training and Assistance, U.S. Geological Survey, EROS Data Center, Sioux Falls, SD 57198.

WORKSHOP SERIES ON GEOGRAPHIC INFORMATION ANALYSIS

Yale University has announced a series of four 2-day workshops that will be held this spring on the subject of geographic information analysis. Each workshop will have the same basic content and structure but will be held at a different location. The schedule and host organization are as follows:

March 13-14	Colorado State University College of Forestry and Natural Resources Fort Collins, CO 80523
June 1-2	Yale University School of Forestry and Environmental Studies New Haven, CT 06511
June 23-24	Oregon State University Department of Resource Recreation Management Corvallis, OR 97331
July 10-11	Purdue University Continuing Education Administration West Lafayette, IN 47907

The workshops will focus on the fundamental operations, advantages, and constraints of computer-aided map analysis. The curriculum will be limited. Interested parties should apply to the "Geographic Information Analysis Coordinator" at one of the addresses given above for further information and/or enrollment materials.

EDC TRAINING SCHEDULE

June 7-11 **Digital Land Cover Classification Techniques** (Sioux Falls, S.Dak.) Open enrollment. Advanced course; see separate notice elsewhere in these pages. Contact: Chief, Training and Assistance, Branch of Applications, U.S. Geological Survey, EROS Data Center, Sioux Falls, SD 57198, telephone: (605) 594-6114.

June 21-25 **Terrain Analysis: Interpretation of Aerial Photographs and Images** (Sioux Falls, S. Dak.) Contact: Coordinator, Continuing Education Program, Harvard Graduate School of Design, Gund Hall, L-37, Harvard University, Cambridge, MA 02138, telephone: (617) 495-2578.

Aug. 30-Oct. 1 **International Remote Sensing Workshop: Applications in Vegetation Assessment and Land Use Planning** (Sioux Falls, S. Dak.) Open to non-U.S. scientists. Contact: Office of International Geology, U.S. Geological Survey, National Center, Mail Stop 917, Reston, VA 22092, telephone: (703) 860-6418.

ADDITIONAL TRAINING IN REMOTE SENSING

May 24-28 **Synthetic Aperture Radar with Remote Sensing Applications** (Washington, D.C.) Contact: Continuing Engineering Education, George Washington University, Washington, D.C. 20052, telephone: (202) 676-6106.

June 7-11 **Applied Remote Sensing for Terrain Analysis** (Washington, D.C.) Contact: Continuing Engineering Education, George Washington University, Washington, D.C. 20052, telephone: (202) 676-6106.

June 27-July 2 **5th Annual Vegetation Remote Sensing Workshop** (Glen Arbor, Mich.) Contact: Dr. C. E. Olson, Jr., School of Natural Resources, University of Michigan, Ann Arbor, MI 48109, telephone: (313) 764-1413

July 5-9 **Remote Sensing and Aerospace Technology for Teachers** (Edmonton, Alberta) Contact: Dr. Joe Kirman, Project Omega, Faculty of Education, University of Alberta, Edmonton, Alberta T6G 2G5, Canada, telephone: (403) 432-4273.

July 12-16 **Short Course in Numerical Analysis of Remote Sensing Data: Crop Inventory** (West Lafayette, Ind.) Contact: D. B. Morrison, Laboratory for Applications of Remote Sensing (LARS), Purdue University, 1220 Potter Drive, West Lafayette, IN 47906, telephone: (317) 494-6305.

CCT USERS, PLEASE NOTE:

The conversion of selected 1972 data from wideband video tape to CCT's will be completed within the next few months. Starting on August 1, 1982, all 1972-acquired wideband video tapes will be retired from the GSFC archive. No further conversion of those data to CCT's will be possible after that date, although the film archive will remain intact. Therefore, if you need to order CCT's of any of these 1972 data, your order must be placed with EDC before July 1, 1982.

EDC LANDSAT PRODUCTION STATISTICS

	Aug. '81 MSS	Aug. '81 RBV	Sept. '81 MSS	Sept. '81 RBV	Oct. '81 MSS	Oct. '81 RBV	Nov. '81 MSS	Nov. '81 RBV	Dec. '81 MSS	Dec. '81 RBV	Jan. '82 MSS	Jan. '82 RBV	6-Month Total MSS	6-Month Total RBV
Landsat scenes acquired (satellite acquisitions)*	3,311	504	2,764	898	2,585	534	2,186	170	1,464	411	1,191	406	13,501	2,923
Landsat MSS scenes/RBV subscenes received at EDC	3,519	2,672	4,036	1,132	3,486	2,403	3,620	1,081	2,464	2,735	1,500	3,650	18,625	13,673
Average time in days from EDC receipt to archive availability	19.8	21.9	20.6	18.1	9.3	35.4	32.6	13.9	22.8	14.0	31.1	9.6	–	–
Average delivery time from receipt of order at EDC to shipment:														
Standard photographic products	12		13		17		20		20		17		–	
Standard digital products**	8		9		15		14		14		9		–	
Landsat photographic frames sold	10,187		7,654		16,678		7,991		8,258		7,117		57,885	
Landsat digital scenes sold	430		363		940		542		351		208		2,834	
TOTAL LANDSAT DOLLAR VOLUME	$219,857		$160,268		$374,922		$224,486		$221,788		$182,828		$1,384,149	

*Figures are revised periodically to reflect updated information received from NASA.
**Standard digital products average 3 days in production – balance of turnaround is for 9-in. prints shipped with the tapes.

The Landsat Data Users NOTES is published bimonthly 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, SD 57198, U.S.A., telephone: (605)594-6151.

Comments, corrections, and other inquiries should be directed to:

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Sioux Falls, SD 57198

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