THEMATIC MAPPER "PREVIEW" SCENES AVAILABLE

The Earth Resources Observation Systems Data Center (EDC) has received a limited amount of thematic mapper (TM) that were acquired very soon after the launch of Landsat 4. Released by the National Aeronautics and Space Administration (NASA) to provide users a preview of the kind of data that are being acquired by the TM, these products are available in the form of false-color composite images generated from bands 2, 3, and 4; natural-color composite images generated from bands 1, 2, and 3; or single-band, black-and-white images of data from band 3 and certain other bands. One computer-compatible tape (CCT) containing four bands (1, 2, 3, and 4) of image data in digital form is also available. These first data from the TM sensor were acquired over the following areas:

- Detroit, Mich., and vicinity—data acquired on July 20, 1982, 4 days after launch, and July 25, 1982, 9 days after launch, are available. The July 25 scene is also available in digital form on a CCT. A band 3 black-and-white image generated from the data acquired on July 20 is shown below.
- Rathbun Dam, Iowa, and vicinity—consists of a partial scene acquired on July 21, 1982, 5 days after launch.
- Baltimore, Md., and vicinity—consists of a partial scene acquired on July 29, 1982, 13 days after launch.

Users should contact EDC for specific information on the types of products that are currently available from each of the above.

These data are considered engineering products and were produced in conjunction with post-launch testing conducted by

Thematic mapper image (one-quarter scene) acquired over Detroit, Mich., and vicinity shortly after launch of Landsat 4. Shown is band 3, sensed in the 0.63- to 0.69-μm region of the spectrum.

Landsat Data Users NOTES

ISSUE NO. 24
SEPTEMBER 1982

NASA

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

NASA. Photographic film or paper prints in 9.5-inch (241-mm) format, or enlargements on paper only, are available as standard products and may be ordered by contacting:

Landsat Customer Services
EROS Data Center
Sioux Falls, SD 57198
Telephone: (605) 594-6151

The image shown on the cover is a band 3, one-quarter scene generated from the data acquired over Detroit, Mich., and vicinity on July 20, 1982. Detroit, Mich., and Windsor, Ontario, are on the shores of Lake St. Clair in the upper right portion of the image. Most of the lower right quadrant of the image is taken up by the west end of Lake Erie.

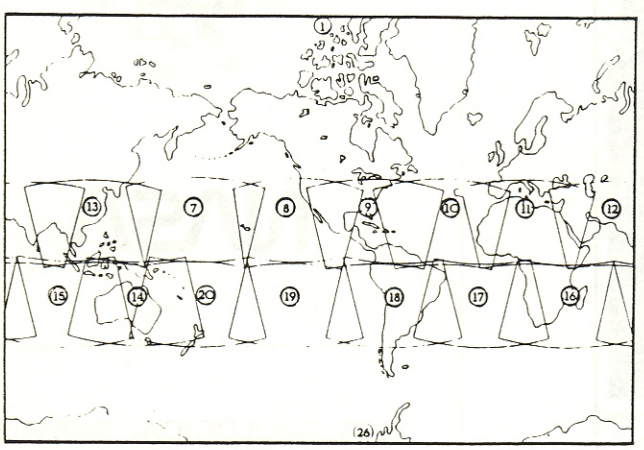
LANDSAT 4 WRS INDEX MAPS EXPECTED SOON

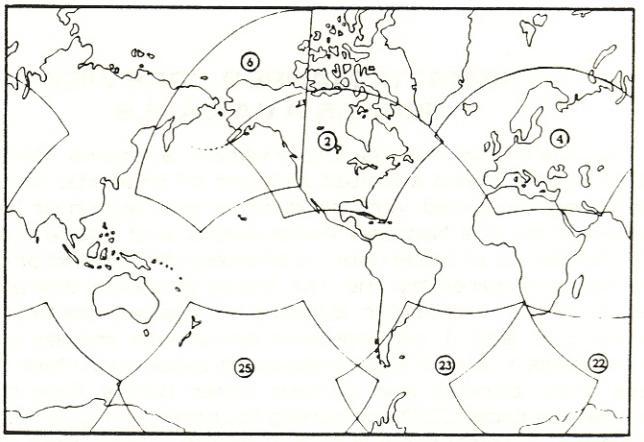
A series of 26 maps depicting the locations of Landsat 4 Worldwide Reference System (WRS) nominal scene centers on every part of the globe will soon be completed. The first 13 of these maps, covering most of the land masses of the world, will be available toward the latter part of this year. The remaining 13 will follow in the first quarter of 1983.

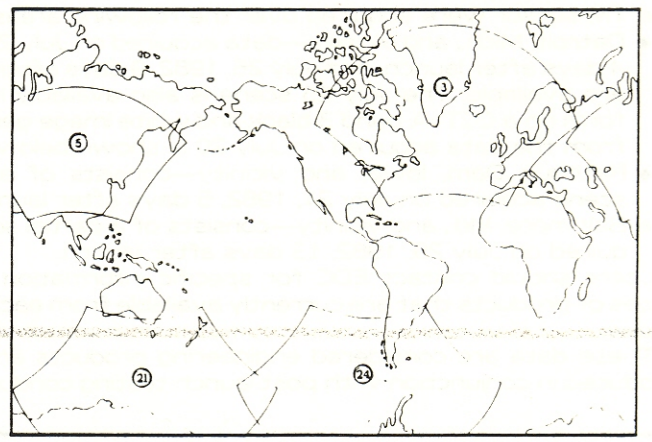
Referring to WRS nominal scene centers is the easiest way for many users to designate a geographic area of interest when ordering Landsat data. The Landsat 4 WRS indexing scheme defines a global network of 233 paths (one for each ground track) and 248 rows (corresponding to lines of latitude). The path and row intersections correspond to the geographic locations over which repetitive Landsat scenes are generally centered.

When reference is made to one of these path-row intersections by identifying a 3-digit path number and a 3-digit row number, all Landsat 4 scenes imaged over that point are immediately identified.

New index maps showing WRS path-row locations were necessary because Landsat 4's orbit traverses 233 paths as opposed to 251 paths for Landsats 1 through 3.







The new map sheets are 1:10,000,000-scale, navigation-type charts on which the path-row information is overprinted. Some relief, drainage, and transportation detail are shown on the land masses, and political boundaries are marked. The reverse side of each map provides a WRS path-row index of the same area for Landsats 1 through 3.

The 26 map sheets are numbered as shown below. The sheet numbers also appear on the three sheet indexes (maps themselves) which accompany this article. The sheet indexes give an indication of the geographic extent of each of the WRS Index Maps listed below.

Sheet No.	Publication Date
1	Early 1983
2	Late 1982
3	Late 1982
4	Late 1982
5	Late 1982
6	Late 1982
7	Early 1983
8	Early 1983
9	Late 1982
10	Early 1983
11	Late 1982
12	Late 1982
13	Late 1982
14	Late 1982
15	Early 1983

16	Late 1982
17	Early 1983
18	Late 1982
19	Early 1983
20	Early 1983
21	Early 1983
22	Early 1983
23	Early 1983
24	Late 1982
25	Early 1983
26	Early 1983

Any of the above, once published, may be obtained free of charge (limit of two per requester) from one of the following:

Distribution Branch
U.S. Geological Survey
Box 25286
Federal Center
Denver, CO 80225
Telephone: (303) 234-3832

Landsat Customer Services
EROS Data Center
Sioux Falls, SD 57198
Telephone: (605) 594-6151

EDC NOW HANDLING MSS ACQUISITION REQUESTS

Concurrent with the launch of Landsat 4 on July 16, 1982, EDC began accepting user requests for special acquisitions by the MSS sensor carried aboard. This request system is provided for those users who have specific requirements for data that may not be obtained through routine acquisition scheduling. Beginning October 1, 1982, requesters will pay a special acquisition fee for data received in return for assurance that the coverage they specify will be obtained.

Several coverage parameters, or scene characteristics, may be specified by the user when making such a request. These include:

- Geographic area of interest.
- Data of coverage.
- Maximum acceptable cloud cover (minimum of 30 percent).
- Data compression mode (linear or compressed).
- Sensor gain (high or low).

Once the acquisition criteria are specified, EDC coordinates the request with others that have been received and forwards a weekly list of scene requirements to NASA's Goddard Space Flight Center. Goddard schedules the acquisitions, transmits commands to the spacecraft, and, if at all possible, the scenes are acquired. EDC handles all associated billing and accounting functions and serves as the customer's point of contact until the requested images are eventually received. Processing and distribution of products take place in the same fashion as with any other Landsat data.

Effective October 1, 1982, the price structure set forth in the table below will apply to these user-specified MSS acquisitions. Prices are determined by the U.S. Department of Commerce's National Oceanic and Atmospheric Administration (NOAA), which will assume managerial responsibility for Landsat product generation and distribution on that date. The prices below were established by NOAA.

SPECIAL ACQUISITION PRODUCT PRICES

(Special acquisitions are Landsat 4 MSS scene data that are not scheduled for routine collection, but which are provided upon user request.)

Product	Price
Delivery of preprocessed digital data to the requester's site via communication satellite; per MSS scene collected at a time and place specified by the requester	$ 790
Delivery to the requester of a frame of standard black-and-white MSS imagery in four spectral bands; per MSS scene collected at a time and place specified by the requester	$ 880
Delivery to the requester of a CCT or high-density digital tape (HDT); per MSS scene collected at a time and place specified by the requester	$1000
Surcharge for delivery of a color composite to the user originally requesting the special acquisition of an MSS scene; per scene	$ 150
Surcharge applied when the requester establishes a maximum allowable cloud cover condition for the collection of an MSS scene; per scene	$ 250

Prospective requesters in need of further information are invited to contact: Landsat Customer Services, EROS Data Center, Sioux Falls, SD 57198, telephone: (605) 594-6151.

LANDSAT 4 MSS COMPUTER-COMPATIBLE TAPES

Users of Landsat 4 MSS computer-compatible tapes (CCT's) should be aware of some differences between these tapes and those produced from MSS data acquired by previous Landsats.

As pointed out in the last issue of the NOTES (No. 23, p. 13), Landsat 4 CCT's will be offered in two formats. One of these is a new format tailored to the specifications of an international standard defined by the Landsat Ground Station Operators Working Group. Referred to as VERSION 1, this format is being offered beginning with the availability of Landsat 4 MSS data and has been described in a separate format document.

A second format, used previously for Landsat 2 and 3 CCT's and referred to as the VERSION 0 format, is also being offered. This format has had to be modified slightly to accommodate the MSS data now being acquired by Landsat 4. These modifica-

tions have not been separately described for the user. The changes affect certain fields having to do with the numbering of MSS spectral bands, the inclusion of supplementary or new information related to the radiometric and geometric corrections performed at Goddard, the quality coding of the MSS image data to be found on the tape, and other areas where differences between Landsat 4 and previous missions have required modification of the VERSION 0 format.

Documentation of the VERSION 0 format changes is provided in a special supplement to the "Manual on Characteristics of Landsat Computer-Compatible Tapes Produced by the EROS Data Center Digital Image Processing System," dated December 1978. The supplemental tables that have recently been issued as an addendum to this manual describe the Landsat 4-related changes in full.

Users interested in obtaining this documentation should contact the EROS Data Center at the address given below. There will be no charge.

Landsat Customer Services
EROS Data Center
Sioux Falls, SD 57198
Telephone: (605) 594-6151

INTERNATIONAL LAND SATELLITE PROGRAMS

Landsat 4 is one of several Earth resources satellites that will be operating in the 1980's. Other nations have, or plan to launch in the near future, remote sensing systems of their own. Some of these programs are described below.

France

The Centre National d'Etudes Spatiales in France is developing an Earth resources satellite known as the Systeme Probatoire d'Observation de la Terre (SPOT). This spacecraft is planned for launch in 1984 by the French-developed Ariane expendable launch vehicle. Mission control and data processing will be at Toulouse, France. The payload will consist of two high-resolution visible (HRV) imaging instruments employing multilinear array technology. An onboard tape recording capability will be provided.

The HRV instruments are designed to operate in either a black-and-white panchromatic mode or a multispectral mode, operating, respectively, with a 10-meter or a 20-meter instantaneous field of view. In the panchromatic mode, data will be acquired in the 0.51- to 0.73-μm band of the spectrum. The multispectral mode will provide data in three discrete spectral bands: 0.50 to 0.59 μm (green), 0.61 to 0.68 μm (red), and 0.79 to 0.89 μm (reflected infrared). The multilinear array sensors of the HRV instrument will sample some 6,000 individual detectors to produce the very-high-resolution fields of view that are planned.

SPOT will be launched into a near-polar, Sun-synchronous orbit at a nominal altitude of 822 km, inclined 98.7° to the equatorial plane. The satellite's orbital repeat period will be 26 days.

A rotating mirror in the SPOT sensor package will permit a given scene of the Earth to be acquired from areas up to 400 km left or right of the spacecraft, in addition to the normal vertical vantage point (from which a 117-km swath will typically be imaged). This "off-nadir" viewing, or pointing capability, has two distinct advantages. First, more frequent looks at high-priority scenes will be possible. Second, the capability for recording stereoscopic pairs of images for a given scene is provided. Stereoscopic capability will permit photogrammetric applications of the data.

A SPOT-2 mission is planned to follow SPOT-1. A series of SPOT satellites thereafter is expected to provide data continuity into the 1990's.

Japan

The Japanese plan to launch their first Earth resources satellite in 1986. Known as the Marine Observation Satellite-1 (MOS-1), this platform is expected to provide data which will help develop fundamental technologies common to both marine and land observation satellites. MOS-1 will be launched by the Japanese H-1 launching vehicle from Tanegashima Space Center. It will assume a Sun-synchronous orbit at an altitude of 913 km and will have an orbital repeat period of 14 days.

The satellite will carry three sensor systems designed to measure sea-surface color, sea-surface temperature, and water content of the atmosphere. The first sensor will be a multispectral, electronic, self-scanning radiometer (MESSR) which will collect data in four bands in the visible and near-infrared portions of the spectrum, as follows: 0.51 to 0.59 μm, 0.64 to 0.72 μm, 0.72 to 0.80 μm, and 0.80 to 1.1 μm. The instantaneous field of view will be 50 m by 50 m. The sensor will be of the multilinear array type similar to that of the French SPOT system and will consist of 2,048 detector elements. The ground swath imaged will be approximately 200 km wide.

The second sensor will be a visible and thermal-infrared radiometer (VTIR). The VTIR will collect sea-surface temperature data in four spectral bands: 0.5 to 0.7 μm, 6 to 7 μm, 10.5 to 11.5 μm, and 11.5 to 12.5 μm. The instantaneous field of view will be 90 m by 90 m for the first band and 2,700 m by 2,700 m for the remaining three bands, with a maximum ground swath width of 1,500 km. The VTIR will be a mechanical scanner (as opposed to the push-broom type of scanning employed by the MESSR) and will measure cloud cover and other such features in addition to sea-surface temperature.

The third sensor on MOS-1 will be a microwave scanning radiometer (MSR) which will operate in the 23.8 GHz and 31 GHz ranges with an instantaneous field of view of 40 km and 30 km, respectively. It will measure the content of water vapor in the atmosphere, as well as snow, ice, and sea-surface condition.

The Japanese have also conducted preliminary studies for a Land Observation Satellite (LOS) with a sensor complement designed primarily for land use classification and vegetation analysis. This concept was recently combined with one resulting from a separate effort to design a sensor payload for geologic exploration. The two objectives are to be met by a single Earth Resources Satellite

(ERS-1). ERS-1 will carry a linear array stereoscopic camera with a 30-m instantaneous field of view in four spectral bands between 0.51 and 1.10 μm, and an L-band synthetic aperture radar providing 25-m ground resolution for a 75-km swath. The launch of ERS-1 is planned for sometime in 1989.

European Space Agency

The European Space Agency (ESA) is committed to the development and launch of a European remote sensing satellite. The original proposal was to orbit two Earth observation satellites, one for coastal zone and ocean monitoring and the other for land applications. However, these concepts were later combined into a single spacecraft called the ESA Resource Satellite-1 (ERS-1).[1] ERS-1 will be designed principally for ocean observations. It is planned for launch in 1987 and will be placed into a 650-km, near-polar, Sun-synchronous orbit. The sensor package will consist of:

- A synthetic aperture radar, which will provide 30-m resolution for a 100-km ground swath.
- An ocean color monitor, which will sense data in 10 spectral bands between 0.4 and 11.5 μm.
- An imaging microwave radiometer, operating in six different frequencies.
- A two-frequency scatterometer, for sensing wind direction and velocity.
- A radar altimeter, which will be used for sea state determination.

ERS-1 data transmissions will be handled through ESA's Earthnet receiving station network.

A second-generation spacecraft, the Advanced ESA Resource Satellite (AERS), designed principally for land observations, has also been proposed. It would carry a synthetic aperture radar similar to that on ERS-1, and some other instruments.

A joint venture between ESA and NASA is a payload, called "Spacelab," to be carried aboard the U.S. Space Shuttle. Currently scheduled for launch in September 1983, Spacelab will consist of both manned experimental modules and pallets for other instruments. An ESA-built metric camera experiment, consisting of a standard Zeiss 30/23 aerial camera with a 30-cm focal length and a 23-by 23-cm image format size, will be operated through a window in the manned module. From the anticipated 250-km altitude, these pictures will cover an area of 190 by 190 km on the ground and will have a resolution of approximately 20 m. The metric camera experiment represents only the first phase of a development program that is eventually expected to result in a manned-module camera system with image motion compensation, a longer focal length, and much better resolution.

Spacelab will also include a microwave remote sensing experiment. The instrument will operate as a two-frequency scatterometer to measure ocean wave spectra, as a passive thermal radiometer to measure surface temperature (sensitivity of ± 1 K), or as a synthetic aperture radar providing 25-m resolution over a 9-km swath.

Subsequent Spacelab missions are planned with various objectives such as life science and materials processing. One of these missions has been designated for Earth and atmospheric observations, and a tentative selection of instruments has been proposed. The Earth observation instruments on this Spacelab mission would include the metric camera and microwave remote sensing experiments from Spacelab 1, a multispectral linear array camera operating in the visible wavelengths, an optical-mechanical scanner operating in the near and thermal infrared wavelengths, and a synthetic aperture radar. Launch is currently planned for 1984-85.

U.S.S.R.

The Russian manned spacecraft, Salyut 6, has carried several film camera systems for Earth observation since being placed in orbit in 1977. One is the MKF-6M system,[2] which comprises six separate cameras with dielectric filters to produce multispectral photographs in the range of 0.45 to 0.94 μm. Each camera has a focal length of 125 mm and is capable of producing images with ground resolution in the 15- to 20-m range. A rocking mount is provided for image motion compensation. A second camera system is a Zeiss MRB-9/2323 wide-angle aerial survey camera. It has a focal length of 90 mm and a film format size of 23 by 23 cm. A third camera system aboard Salyut 6 is the KATE-140 mapping camera. Having a focal length of 140 mm, the KATE-140 is probably capable of producing a ground resolution of about 30 m from an altitude of 260 km (the initial Salyut 6 altitude). Each frame would cover an area of about 335 by 335 km.

Certain missions in the Russian Cosmos series have also been designated as Earth resource observation spacecraft. Typically, they are launched into low (220-270 km), near-polar (81°-82° inclination) orbits and are recovered after 15-30 days of operation. Most probably, the primary sensor system used aboard these craft has been an MKF-6 camera system.

In June 1980, the U.S.S.R. launched one of its "Meteor" weather satellites into a 635-km orbit at 98° inclination. An article on this mission can be found in the January 1982 issue of this newsletter (No. 21). Meteor carries three experimental Earth observation sensors. One, the MSU-E, is a solid-state scanner sensing three spectral bands between 0.5 and 1.0 μm and providing a 30-m instantaneous field of view. The other two, the MSU-SK and the "Fragment," are optical-mechanical scanner systems. The MSU-SK senses four spectral bands between 0.5 and 1.0 μm (170-m instantaneous field of view). Fragment gathers data in eight bands between 0.4 and 2.4 μm (80-m instantaneous field of view). The Meteor mission is part of an experimental effort by the U.S.S.R. to develop an operational method for the study of Earth rsources from space.

In general, very few data from any of Russian Earth resources missions have been made available to the international community.

[1] By coincidence, both the Japanese and the ESA Satellites are designated by the same acronym: ERS-1

[2] The designation MKF-6M and some other acronyms used in this article have no known definitions and should be interpreted only as unique mnemonics designating a certain equipment type.

The People's Republic of China

The People's Republic of China has launched several satellites with Earth observation payloads, beginning with Chinasat-1 in July 1975. These satellites were placed in elliptical orbits (perigees ranging from 167 to 185 km, apogees from 464 to 489 km) at relatively low angles of inclination (59°-69°). Images from these missions have not been available to the international community.

Future Earth observation missions planned by The People's Republic of China include Chinasat-10, to be launched within the next year or two and to carry a two-channel, visible and infrared band, meteorological radiometer. Another observatory, Chinasat-12, is proposed for launch into a 700-km polar orbit in 1985. This spacecraft will carry an Earth resources sensor with an 80-m instantaneous field of view. China also recently announced plans to proceed with the development of its own 11-band multispectral scanner, linear array sensor, and synthetic aperture radar.

India

The Indian Space Research Organization has been gathering Earth resources satellite data since launch of the Bhaskara-1 satellite in June 1979. Bhaskara-1 carried two television cameras providing 1-km resolution in two spectral bands for land observation. Also aboard were three microwave radiometers for ocean survey purposes. An identical spacecraft, Bhaskara-2, was launched into the same 550-km-high, 51°-inclination orbit in November 1981. The Indians have announced their intention of develop a second-generation resources satellite, as well.

The Netherlands

The Netherlands Agency for Aerospace Programs has initiated study of a remote sensing satellite which would carry a Dutch-built multispectral linear array sensor in a near-equatorial orbit. This project is being planned in cooperation with Indonesia, where the ground data reception station will be located. The sensor parameters will be specifically selected for the weather conditions and vegetation types in the equatorial regions of the Earth.

Canada

The Canada Centre for Remote Sensing (CCRS) has completed a study aimed at determining the applicability of NASA Seasat data for monitoring ice conditions in the polar seas. The study concludes that a desirable sensor device would use a synthetic aperture radar capable of producing 25- to 30-m resolution for a swath width of approximately 100 km. Beginning in 1980, CCRS undertook a 2-year program to develop the operational parameters for a C-band radar which would meet these requirements. Sensor and orbit parameters, as well as ground processing capabilities, are also being studied. The eventual program might entail two or three satellites in orbit simultaneously to provide the necessary coverage for adequate monitoring of the arctic seas and coastlines.

Brazil

The Space Research Institute of Brazil has announced its intention to develop a national remote sensing satellite which may be launched as early as 1985 or 1986. The sensors would include a multispectral linear array and a high-resolution panchromatic camera, but few details have been released.

HCMM DATA PROCESSING COMPLETED

Digital reduction of remote sensing data acquired by the Heat Capacity Mapping Mission (HCMM), an experimental remote sensing satellite launched by NASA in 1978, will be officially terminated on September 30, 1982. HCMM performed diurnal thermal infrared surveys over the United States and other areas from April 26, 1978, to September 30, 1980. From the 26,500 frames of imagery that were collected, about 38,000 standard image products and 1,400 scenes in CCT form have been archived by the National Space Science Data Center (NSSDC) in Greenbelt, Md.

Large parts of North America, Europe, and Australia were imaged by HCMM. The accompanying maps give an approximate idea of those areas for which CCT's have been produced for both nighttime and daytime passes. A complete inventory of all HCMM data, digital and otherwise, is contained in the following three catalogs which are available free of charge from NSSDC.

Image Microfiche Catalog

A complete listing of all usable imagery is contained in a 493-page catalog that has been reproduced on microfiche. The scenes are listed by geographic coordinates. For each entry an order identification number is given together with an indication of the scene's cloud cover and processing quality. The products referenced include day-visible, day-infrared, and night-infrared images available in the form of 241-mm black-and-white transparencies or paper prints. Coverage was obtained over the contiguous United States, Alaska, southern and western Canada, Mexico, western Europe, northwest Africa, and eastern Australia. Delivery schedules require 4 weeks for processing after receipt of an order by NSSDC. Prices are described in the "HCMM User's Guide," also available from NSSDC.

Magnetic Tape Catalog

Some 1,400 standard image scenes on 9-track, 800- or 1600-bpi CCT's are listed in the 14-page "Magnetic Tape Catalog." These CCT's have been previously ordered by HCMM users and principal investigators. They contain some of the best HCMM data available. The approximate coverage areas represented on these digital tapes are shown on the maps that appear with this article.

Day/Night Registered Pairs Catalog

Approximately 115 registered day/night data sets, in both digital and photographic form, are available. Each registered data set consists of five images which include synoptic day-visible and day-infrared, rotated night-infrared, temperature difference, and thermal inertia data. The same set of five images is available in digital format on a three-reel CCT.

Data products, copies of these catalogs, and the

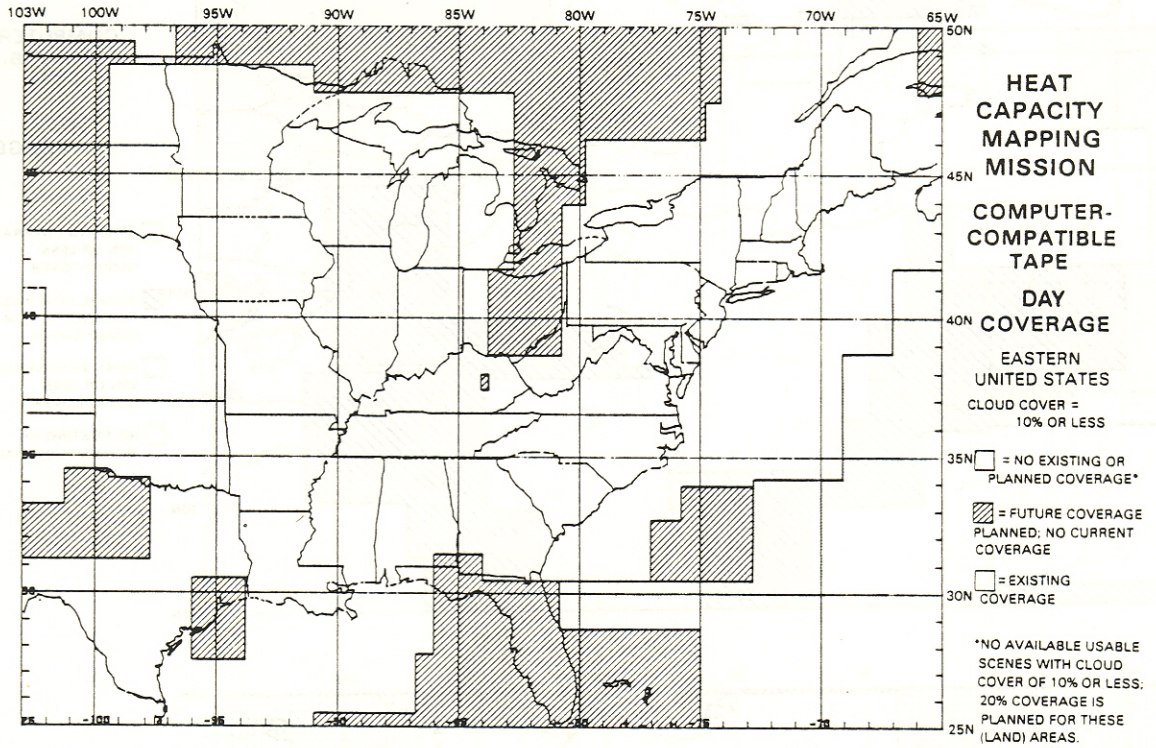
HCMM User's Guide are all available from one of the following:

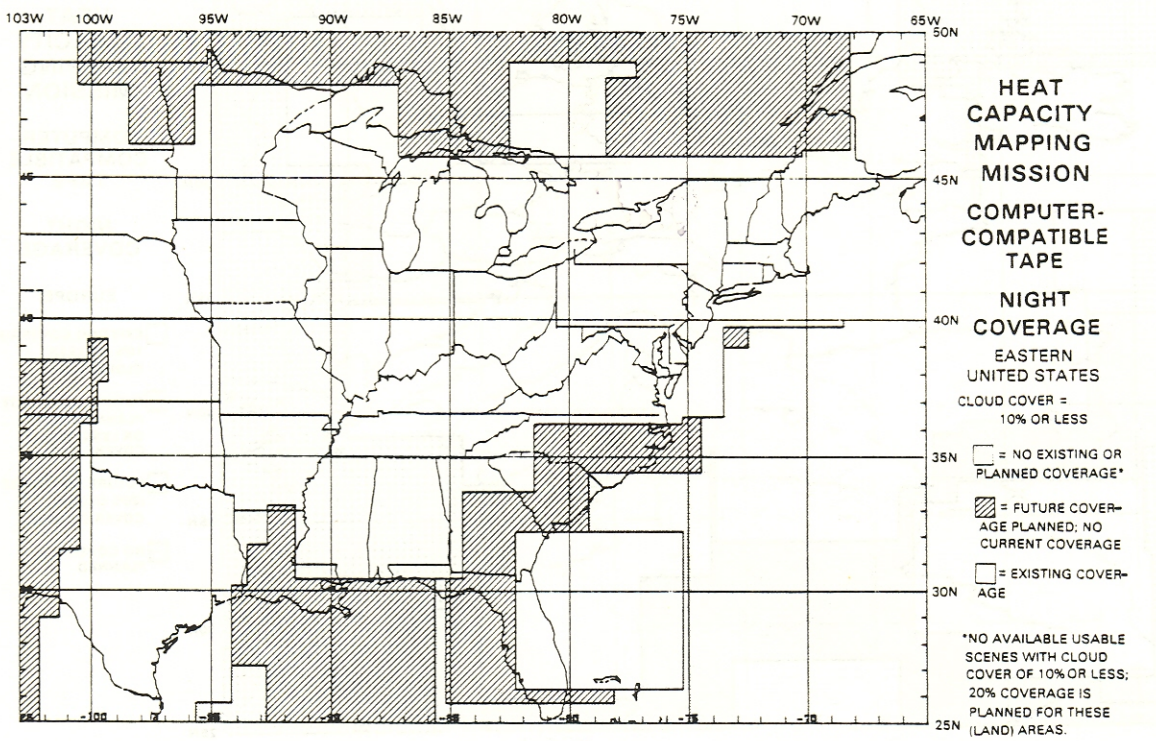
Domestic orders:

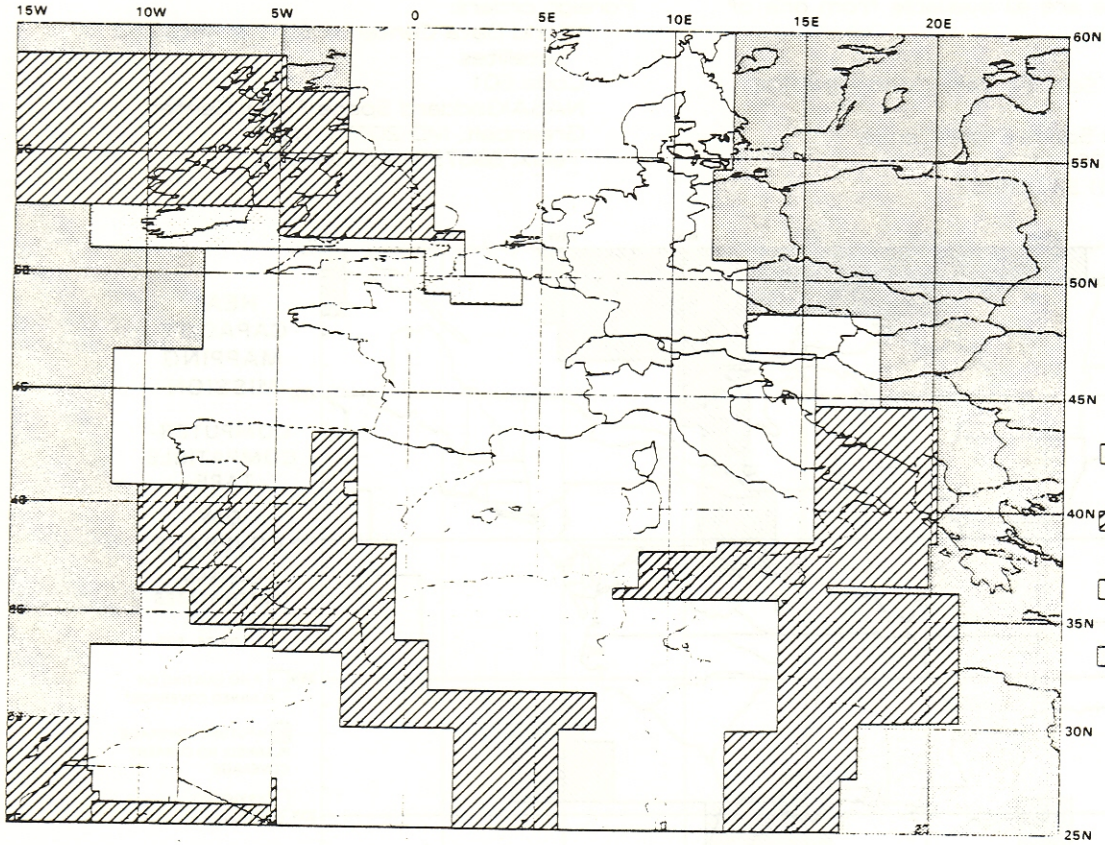
National Space Science Data Center (NSSDC)
Code 601
NASA/Goddard Space Flight Center
Greenbelt, MD 20771
Telephone: (301) 344-6695

Foreign orders:

World Data Center A for Rockets and Satellites
Code 601
NASA/Goddard Space Flight Center
Greenbelt, MD 20771, U.S.A.
Telex: 89675 NASCOM GBLT







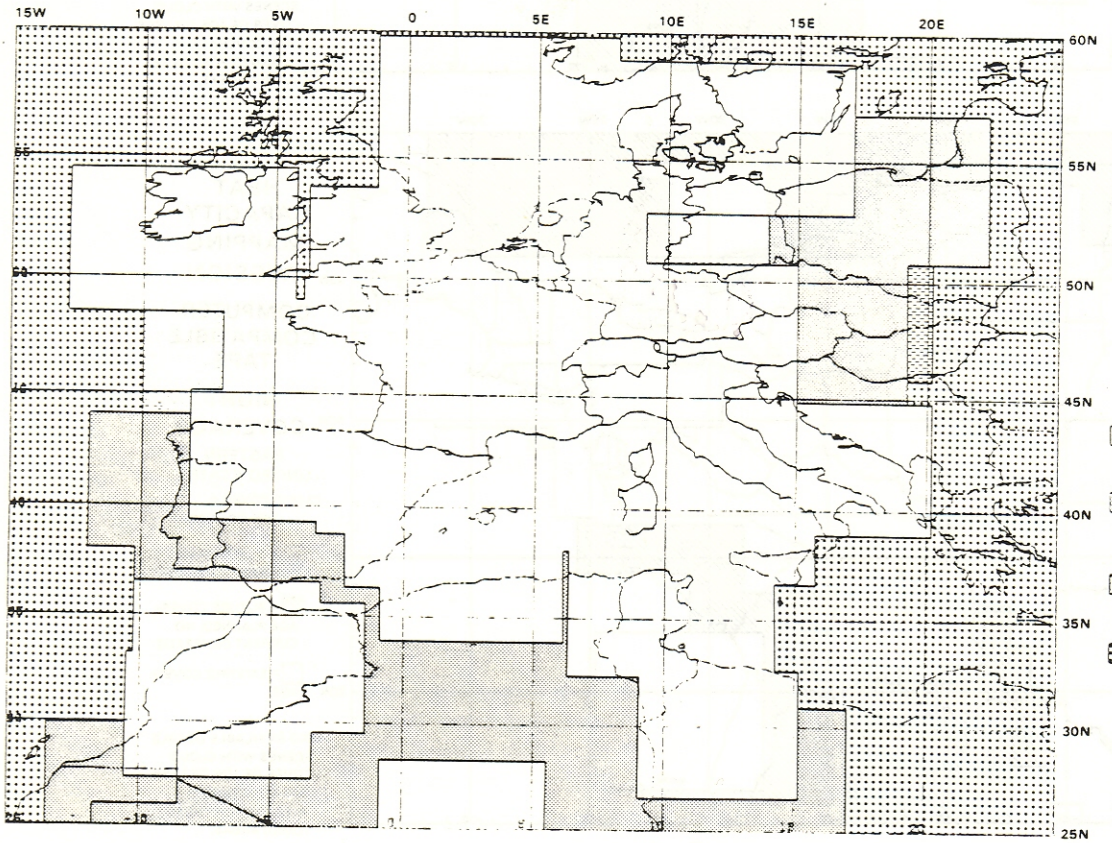
HEAT CAPACITY MAPPING MISSION

COMPUTER-COMPATIBLE TAPE

DAY COVERAGE

EUROPE

- EXISTING COVERAGE: 10% OR LESS CLOUD COVER
- FUTURE COVERAGE PLANNED: 10% OR LESS CLOUD COVER
- EXISTING COVERAGE: 20% OR LESS CLOUD COVER
- NO EXISTING OR PLANNED COVERAGE



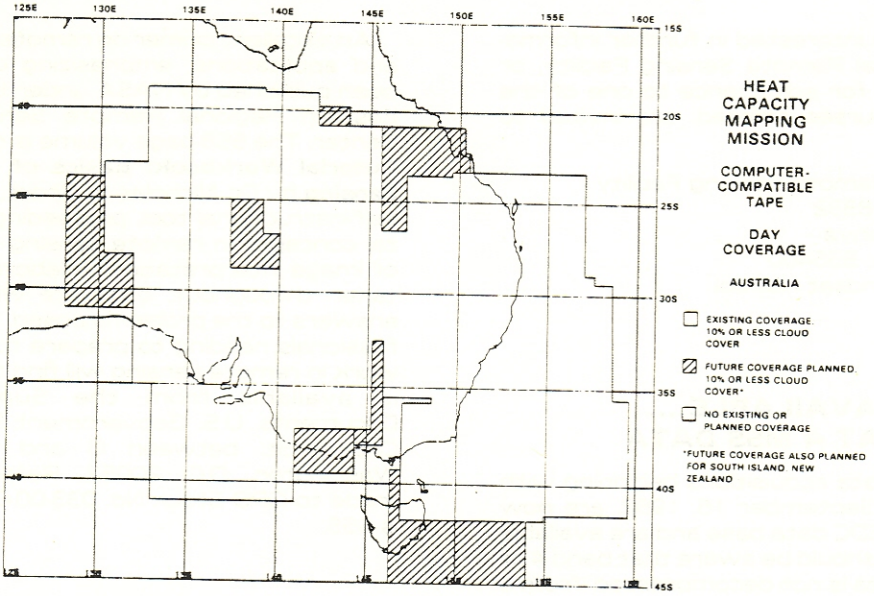
HEAT CAPACITY MAPPING MISSION

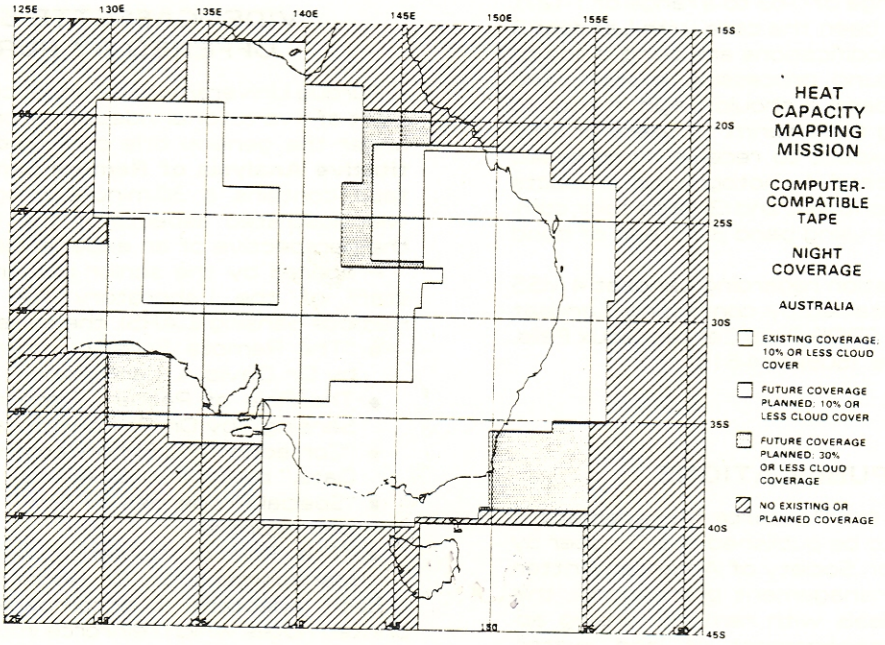
COMPUTER-COMPATIBLE TAPE

NIGHT COVERAGE

EUROPE

- EXISTING COVERAGE, 10% OR LESS CLOUD COVER
- FUTURE COVERAGE PLANNED (10% OR LESS CLOUD COVER)
- FUTURE COVERAGE (20% CLOUD COVER OR LESS)
- NO COVERAGE PLANNED





REMOTE SENSING IN EAST AFRICA

Remote sensing training, user services, and project work support are available through the Regional Remote Sensing Facility, located in Nairobi, Kenya. The Facility is a division of the Regional Centre for Services in Surveying and Mapping, which was established in 1975 by several East African countries under the auspices of the United Nations Economic Commission for Africa.

The Facility offers short courses of about 3 weeks' duration as a service to the East African region. These courses are designed to introduce remote sensing techniques to professional staff in government departments, universities, and resource organizations. Extended courses, lasting several months, are also available. These generally involve 2 weeks of instruction on the Facility's premises, followed by an extended period of project work conducted by individual students in their home countries. All training emphasizes the analysis of Landsat data and is discipline-specific in its approach.

The Facility maintains an extensive reference file of Landsat data that have been acquired over the region, and it supports a variety of image interpretation equipment as well as a photographic laboratory.

Included in the region served by the Facility are Sudan, Ethiopia, Somalia, Uganda, Kenya, Seychelles, Rwanda, Burundi, Tanzania, Zambia, Malawi, Mozambique, Malagasy, Comoro, Mauritius, Zimbabwe, Botswana, Swaziland, and Lesotho.

Readers who are interested in further information on the Regional Remote Sensing Facility, or who wish to apply for admittance to one of the several training courses offered, are invited to write:

Regional Remote Sensing Facility
P.O. Box 18332
Nairobi, Kenya
Telephone: 556400
Cables: Landsat Nairobi

NOW AVAILABLE.... LANDSAT 4 MSS DATA

Landsat 4 MSS data acquisitions beginning with those acquired on September 16, 1982, are now being placed in the EDC data base and are available to the public. Users should be aware that band 4 of these early MSS data is not decompressed (from a brightness value range of 0-63 to a range of 1-127), similar to what has been the case with Landsat 3 MSS band 7 data. Modifications are being made to the Landsat 4 ground processing system, and decompression of band 4 should begin in mid- to late-October. During the interim: (1) users of MSS digital data must expect to receive compressed data in band 4, (2) band 4 photographic products will be of very low contrast, and (3) false-color composites will be made using band 3 instead of band 4.

Additional information regarding Landsat 4 MSS products can be obtained by contacting: Landsat Customer Services, EROS Data Center, Sioux Falls, SD 57198, telephone: (605) 594-6151.

NEW PUBLICATIONS

Remote Sensing for Resource Management is the title of a book to be published this October by the Soil Conservation Society of America. Written for the resource management professional, this 688-page volume deals with remote sensing applications in the management of land, water, vegetation, soil, and mineral resources. The text takes a "how-to-do-it" approach and stresses procedures and methodologies, making it a good reference source for both the practitioner and students. Orders for this book may be placed with the Soil Conservation Society of America, 7515 N.E. Ankeny Road, Ankeny, IA 50021. The price is $45.

The American Society of Photogrammetry is now taking advance orders for the Second Edition of the **Manual of Remote Sensing.** Publication is scheduled for early 1983. The two-volume set contains nearly 2,400 pages and presents the contributions of over 300 experts in the field. Much of the material is new and covers many recent developments in remote sensing, such as Landsat 4 and SPOT. To reserve a copy, contact the American Society of Photogrammetry, 210 Little Falls St., Falls Church, VA 22046. The price is $99.

An excellent primer on remote sensing principles and applications, emphasizing Landsat, has just been published by NASA under the auspices of its Eastern Regional Remote Sensing Applications Center. The 558-page volume is titled **The Landsat Tutorial Workbook: Basics of Satellite Remote Sensing** by Dr. Nicholas M. Short. It is intended as a self-instructional tool, proceeding from fundamental concepts in remote sensing to the mechanics of image interpretation. A laboratory approach is taken throughout, complete with exercises and answers to the problems posed. Students and professionals needing to prepare for more advanced work in remote sensing will find this book useful. It is available from the Superintendent of Documents, U.S. Geovernment Printing Office, N. Capitol St. between G and H Streets N.W., Washington, D.C. 20052. Reference should be made to GPO Stock No. 033-00-00845-7. The price is $55.

VIDEOCASSETTE SERIES OFFERED BY PURDUE

Purdue University has announced the release of a set of five tutorial videotapes on remote sensing under the general title of **Introduction to Quantitative Analysis of Remote Sensing Data.** Each tape contains a 30-minute program presenting well illustrated aspects of the technology from the perspective of an experienced scientist.

Prepared by the senior research and teaching staff of the Laboratory for Applications of Remote Sensing (LARS), the series includes:

- "The Remote Sensing Information System," by Dr. David A. Landgrebe.
- The Role of Pattern Recognition in Remote Sensing," by Dr. Phillip H. Swain.
- "Correction and Enhancement of Digital Image Data," by Dr. Paul E. Anuta.
- "Special Properties of Soils," by Dr. Marion F. Baumgardner.
- "The Role of Numerical Analysis in Forest Management," by Dr. Roger M. Hoffer.

Each videotape is accompanied by a set of printed notes which reinforce important concepts and provide self-administered tests on the subject being addressed.

Although the level and complexity of these programs are most appropriate for those already familiar with remote sensing concepts and terminology, a mathematical background is not required. They are intended as a follow-on course of instruction for anyone wishing to pursue the field further after an introduction to fundamentals.

The tapes are available in all popular formats: ¾-inch U-matic, ½-inch VHS, or ½-inch Beta I. Non-U.S. video standards—PAL or SECAM—are available by special order.[3] The price of each tape is $250.

An 8-page brochure describing the tapes, or a

[3] U-matic, VHS, Beta 1, PAL, and SECAM are internationally accepted designations referring to the formatting and/or time code emplacement characteristic of certain commercial-grade videotape recordings.

10-minute preview tape which may be borrowed, are also available.

For any of these materials, contact Mr. G.W. O'Brien, Continuing Education Administration, 116 Stewart Center, Purdue University, West Lafayette, IN 47907, telephone: (317) 494-7231.

EDC COURSE ANNOUNCEMENT

From December 6-10, 1982, the EROS Data Center will be offering a training course entitled **The Role of Remote Sensing in a Geographic Information System.** This specialized course will emphasize the contributions of remotely sensed and other kinds of spatial data (including terrain models) to geographic information systems, as well as the types of spatial analyses commonly used for natural resource applications. The course is designed for remote sensing analysts and resource specialists and assumes an understanding of the fundamentals of remote sensing. For more information, contact the Chief, Training and Assistance, Branch of Applications, U.S. Geological Survey, EROS Data Center, Sioux Falls, SD 57198.

SYMPOSIA

The Rolla Region Chapters of the American Congress on Surveying and Mapping and the American Society of Photogrammetry have joined forces to co-sponsor a symposium entitled **The Utilization of Automated and Conventional Methods in Surveying, Mapping, and Map Data Applications,** to be held October 13-15, 1982, in Rolla, Mo. The program will include concurrent seminars and demonstration workshops in the areas of surveying, photogrammetry, remote sensing, and automated cartographic applications. For further information, contact Mr. Gary McKeown, Coordinator, ASCM-ASP Symposium, 1400 Independence Road (Mail Stop 601), Rolla, MO 65401, telephone: (314) 341-0928.

The **International Symposium on Remote Sensing of Environment—Second Thematic Conference: Remote Sensing for Exploration Geology** will be held December 6-10, 1982, in Fort Worth, Tex. This symposium is sponsored by the Environmental Research Institute of Michigan and Texas Christian University. Further information is available from Donald R. Morris-Jones, Environmental Research Institute of Michigan, P.O. Box 8618, Ann Arbor, MI 48107, telephone: (313) 944-1200.

The **17th International Symposium on Remote Sensing of Environment,** to be held May 9-13, 1983, in Ann Arbor, Mich., will address state-of-the-art capabilities and techniques leading to a better understanding of remote sensing technology and its effective application. Sponsored by the Environmental Research Institute of Michigan, both conventional sessions and multidisciplinary poster sessions will be offered at this meeting. The call for papers solicits recent research results on ultraviolet, infrared, microwave, acoustic, seismic, and other types of sensors, either singly or in combination. The submission deadline is November 1, 1982. Contributors and other persons interested in attending this meeting may contact the Remote Sensing Center, Environmental Research Institute of Michigan, P.O. Box 8618, Ann Arbor, MI 48107, telephone: (313) 994-1300.

A special emphasis on resource evaluation will be the theme at the **9th International Symposium on Machine Processing of Remotely Sensed Data,** to be held June 21-23, 1983, in West Lafayette, Ind. The meeting is one of a series that has been sponsored every year by Purdue University's Laboratory for Applications of Remote Sensing (LARS). The call for papers solicits research results in such topical areas as scene simulation and modeling, geometric and radiometric preprocessing of data, stratification and sampling, classification algorithms, and digital geographic information systems. Deadline for abstracts is December 17, 1982. Potential contributors and those wishing to attend are invited to contact Mr. D.B. Morrison, Symposium Coordinator, Purdue University/LARS, 1220 Potter Drive, West Lafayette, IN 47906, telephone: (317) 494-6305. Inquiries regarding the technical content of the symposium can be directed to the Symposium Chariman, Dr. Richard A. Weismiller, at the same address.

Hamburg, Federal Republic of Germany, will be the site for an **International Symposium on Hydrological Applications of Remote Sensing and Remote Data Transmission,** to be held August 15-27, 1983. The symposium is sponsored by the International Association of Hydrological Sciences and is co-sponsored by the World Meteorological Organization. It will be one of a number of symposia to be convened as part of the XVIII General Assembly of the International Union of Geodesy and Geophysics. The sessions will cover such topics as precipitation, snow and ice, surface water, soil moisture, ground water, hydrogeology, water quality, coastal and wetlands hydrology, and water resource planning and management. Requests for further information on this meeting may be sent to A. Ivan Johnson, President, International Committee on Remote Sensing and Data Transmission, Woodward-Clyde Consultants, Harlequin Plaza-North, 7600 East Orchard Rd., Englewood, CO 80111.

EDC TRAINING SCHEDULE

Oct. 25-29 **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.

Nov. 1-5 **Hydrology Information Workshop** (Sioux Falls, S. Dak.) Open enrollment. Contact: Chief, Training and Assistance, Branch of Applications, U.S. Geological Survey, EROS Data Center, Sioux Falls, SD 57198, telephone: (605) 594-6114.

Nov. 15-19 **Advanced Geological Workshop** (Sioux Falls, S. Dak.) Open enrollment. Contact: Chief, Training and Assistance, Branch of Applications, U.S. Geological Survey, EROS Data Center, Sioux Falls, SD 57198, telephone: (605) 594-6114.

Dec. 6-10 **Role of Remote Sensing in a Geographic Information System** (Sioux Falls, S. Dak.) Open enrollment. Contact: Chief, Training and Assistance, Branch of Applications, U.S. Geological Survey, EROS Data Center, Sioux Falls, SD 57198, telephone: (605) 594-6114.

ADDITIONAL TRAINING IN REMOTE SENSING

Sept. 15-Dec. 8 **Remote sensing of Coastal Environment and Marine Resources** (Newark, Del.) Contact: Dr. Vic Klemas, Director, Center for Remote Sensing, University of Delaware, Newark, DE 19711, telephone: (302) 738-2336.

Oct. 4-8 **The Application and Processing of Landsat Data** (Murray, Ky.) Contact: Dr. Neil V. Weber, Director, Mid-American Remote Sensing Center, Murray State University, Murray, KY 42071, telephone: (502) 762-2148.

Oct. 18-22 **Remote Sensing for Global Resource Applications** (Washington, D.C.) Contact: Continuing Engineering Education, George Washington University, Washington, DC 20052, telephone: (202) 676-6106.

Oct. 25-29 **Digital Image Processing of Earth Observation Sensor Data** (Washington, D.C.) Contact: Continuing Engineering Education, George Washington University, Washington, DC 20052, telephone: (202) 676-6106.

Nov. 15-18 **Mapping from Space: Techniques and Applications** (Washington, D.C.) Contact: Continuing Engineering Education, George Washington University, Washington, DC 20052, telephone: (202) 676-6106.

Nov. 15-19 **Synthetic Aperture Radar with Remote Sensing Applications** (Washington, D.C.) Contact: Continuing Engineering Education, George Washington University, Washington, DC 20052, telephone: (202) 676-6106.

Dec. 7-9 **Advanced Geological Remote Sensing** (Washington, D.C) Contact: Continuing Engineering Education, George Washington University, Washington, DC 20052, telephone: (202) 676-6106.

EDC LANDSAT PRODUCTION STATISTICS

	Feb. '82		Mar. '82		Apr. '82		May '82		June '82		July '82		6-Month Total	
	MSS	RBV	MSS	RBV	MSS	RBV	MSS	RBV	MSS	RBV	MSS	RBV	MSS	RBV
Landsat scenes acquired (satellite acquisitions)*	839	260	1,263	465	2,504	626	2,158	544	1,980	391	3,094	463	11,838	2,749
Landsat MSS scenes/RBV subscenes received at EDC	1,147	3,362	945	3,222	1,847	1,744	1,562	1,711	2,540	2,147	3,138	2,009	11,179	14,195
Average time in days from EDC receipt to archive availability	9.7	15.4	4.3	5.9	9.7	6.9	8.0	8.6	18.6	30.9	16.1	26.1	–	–
Average delivery time in days from receipt of order at EDC to shipment:														
Standard photographic products	9		10		13		13		15		19		–	
Standard digital products	6		6		12		7		5		7		–	
Landsat photographic frames sold	8,078		5,860		9,076		7,385		6,118		13,637		50,154	
Landsat digital scenes sold	263		280		181		497		421		369		2,011	
TOTAL LANDSAT DOLLAR VOLUME	$224,076		$185,240		$213,641		$262,242		$236,221		$381,674		$1,503,094	

*Figures are revised periodically to reflect updated information received from NASA.

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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