The EROS Data Center

U. S.
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

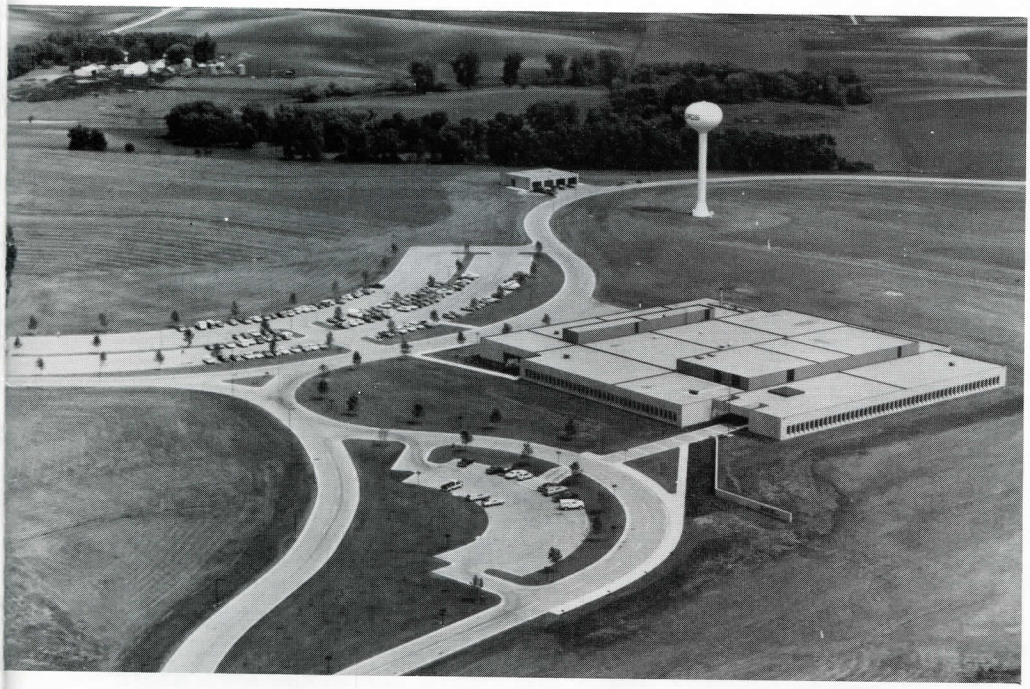
FOR INFORMATION ON

NOTE: In January 1975, the name of the Earth Resources Technology Satellite (ERTS) was changed to Landsat.

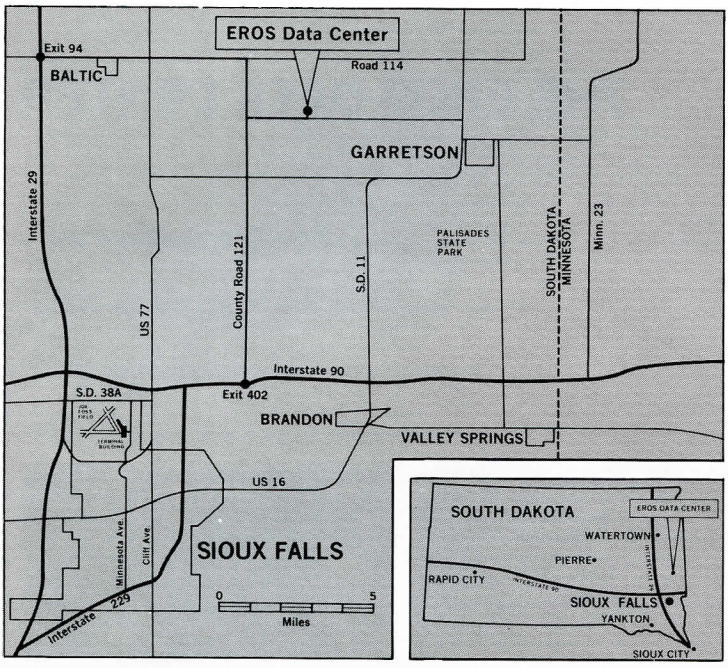
For sale by the Superintendent of Documents, U.S. Government Printing Office
Washington, D.C. 20402 - Price 75 cents

☆ U.S. GOVERNMENT PRINTING OFFICE: 1977 O—240-966/10

THE EROS DATA CENTER



Midwest farmlands surround the U.S. Department of the Interior's EROS Data Center location near Sioux Falls, South Dakota.



The EROS Data Center at Sioux Falls can be reached conveniently by interstate and connecting highway networks.

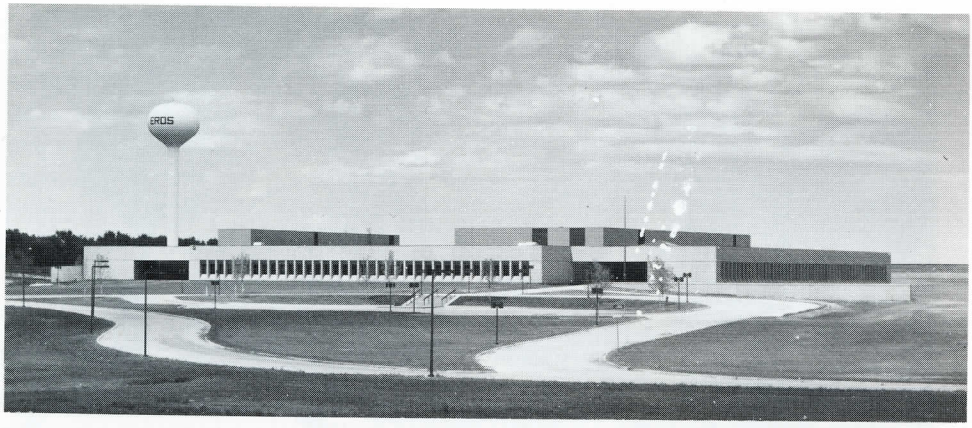
THE EROS PROGRAM

The Earth Resources Observation Systems (EROS) Program of the U.S. Department of the Interior, administered by the Geological Survey, was established in 1966 to apply remote-sensing techniques to the inventory, monitoring, and management of natural resources. To meet its primary objective, the EROS Program includes research and training in the interpretation and application of remotely sensed data and provides remotely sensed data at nominal cost to scientists, resource planners, managers, and the public.

THE EROS DATA CENTER

The EROS Data Center, 16 miles (25 km) northeast of Sioux Falls, South Dakota, is operated by the EROS Program to provide access primarily to NASA's Landsat imagery, aerial photography acquired by the U.S. Department of the Interior, and photography and imagery acquired by the National Aeronautics and Space Administration (NASA) from research aircraft and from Skylab, Apollo, and Gemini spacecraft. The primary functions of the Data Center are data storage and reproduction and user assistance and training.

This publication describes the Data Center operations, data products, services, and procedures for



The principal facility at the Data Center is the 120,000-square-foot (11,200-m²) Karl E. Mundt Federal Building.

The computer provides immediate access to and geographic retrieval of the 6 million frames of imagery and photography.

ordering remotely sensed data. The EROS Data Center and its principal facility, the 120,000-square-foot (11,200-m²) Karl E. Mundt Federal Building, were dedicated August 7, 1973.

At the heart of the Data Center is a central computer complex which controls a data base of over 6 million images and photographs of the Earth's surface features, performs searches of data on geographic areas of interest, and serves as a management tool for the entire data reproduction process. The computerized data storage and retrieval system is based on a geographic system of latitude and longitude, supplemented by information about image quality, cloud cover, and type of data. A customer's inquiry about availability of remotely sensed data

Assistance is provided in applications of remotely sensed data to agriculture, forestry, geology, hydrology, and other studies of the environment and natural resources.

may be about a geographic point location or a rectangular area specified by latitude and longitude corner coordinates. In conducting a geographic search based on a customer's request, the computer will print out a listing of available imagery and photography from which the requestor can make a final selection. Receipt of a prepaid order initiates processing. To place an order, to inquire about the availability of data, or to establish a standing account order, please contact:

User Services
EROS Data Center
Sioux Falls, South Dakota
57198
Phone: 605-594-6511, ext. 151
FTS: 784-7511

Guidance in the use of remotely sensed data is available at the EROS Data Center in the form of scheduled training courses and workshops. The scientific teaching staff at the Center periodically offers discipline-oriented courses in subjects such as agriculture, forestry, geography, geology, and hydrology.

Visitors to the Data Center will also get assistance in the operation of specialized equipment such as densitometers, additive color viewers, zoom transfer scopes, and stereo viewers, and in the use of computerized multispectral systems to classify specific phenomena.

THE NATIONAL CARTOGRAPHIC INFORMATION CENTER

The National Cartographic Information Center (NCIC) is headquartered in the Geological Survey's National Center in Reston, Virginia. It provides a unique service to those customers requiring information on the availability of cartographic data, including multiuse maps, geodetic control, aerial photography, and space imagery. Qualified personnel in the fields of geodesy, photogrammetry, photography, and cartography are ready to help those with specialized needs.

The EROS Data Center functions as an integral part of the NCIC system for those requesting information about available aircraft or space imagery and for those wanting to place orders for these data. This service is readily available by a direct terminal link to the Data Center's computerized data base. Inquiries and orders for data are transmitted daily from NCIC to the EROS Data Center to provide a timely response to customer needs.

NCIC offices with computer links are located at:

National Cartographic Information Center
U.S. Geological Survey
507 National Center, Room 1C107
Reston, Virginia 22092
Phone:703-860-6045
Hours: 7:45-4:15

Rocky Mountain Mapping Center
U.S. Geological Survey
Box 25046
Federal Center, Building 25
Denver, Colorado 80225
Phone: 303-234-2326
Hours: 7:45-4:15

Mid-Continent Mapping Center
U.S. Geological Survey
1400 Independence Road
Rolla, Missouri 65401
Phone: 314-276-9110
Hours: 8:00-5:00

Western Mapping Center
U.S. Geological Survey
345 Middlefield Road
Menlo Park, California 94025
Phone: 415-323-~~2351~~ 8111 Ext. 2427
Hours: 7:45-4:15

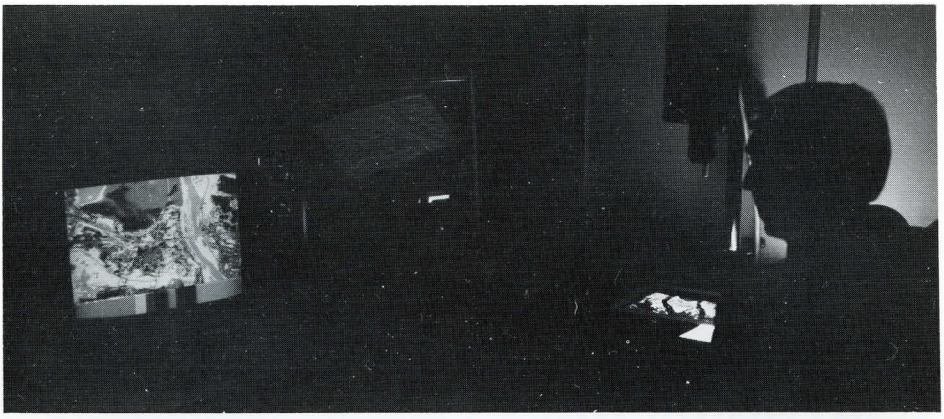
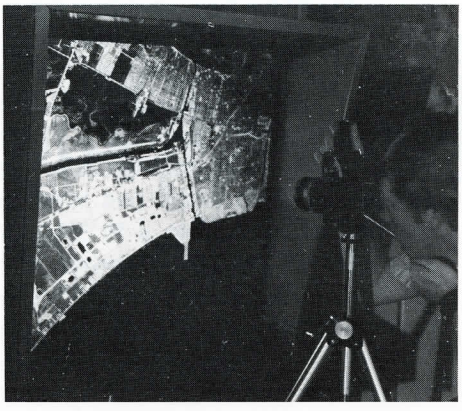


Image analyzer

Microfiche storage and retrieval.



Rear projection viewer.

EROS APPLICATIONS ASSISTANCE FACILITIES

The EROS Data Center also operates several Applications Assistance Facilities which maintain microfilm copies of data archived at the Center and provide computer terminal inquiry and other capability to the Center's computer complex. Scientific personnel are available for

Image interrogation and ordering system.

assistance in applying the data to a variety of resource and environmental problems and for assistance in ordering data from the Center.

It is recommended that Applications Assistance Facilities be contacted by phone or mail in advance so that suitable arrangements can be made for a visit.

The addresses and telephone numbers of the EROS Applications Assistance Facilities can be obtained from:

EROS Data Center
U.S. Geological Survey
Sioux Falls, South Dakota 57198
Phone: 605-594-6511
Hours: 8:00-4:30

and

EROS Program Office
U.S. Geological Survey
1925 Newton Square East
Reston, Virginia 22090
Phone: 703-860-7881
Hours: 7:45-4:15

EROS DATA REFERENCE FILES

EROS Data Reference Files have been established at a number of locations to maintain microfilm copies of the data available from the Data Center and to provide guides to assist the visitor in reviewing and ordering data. This allows the visitor to view microfilm copies of the data before placing an order. Applications assistance by scientists is not provided at EROS Data Reference Files.

Data reference file.

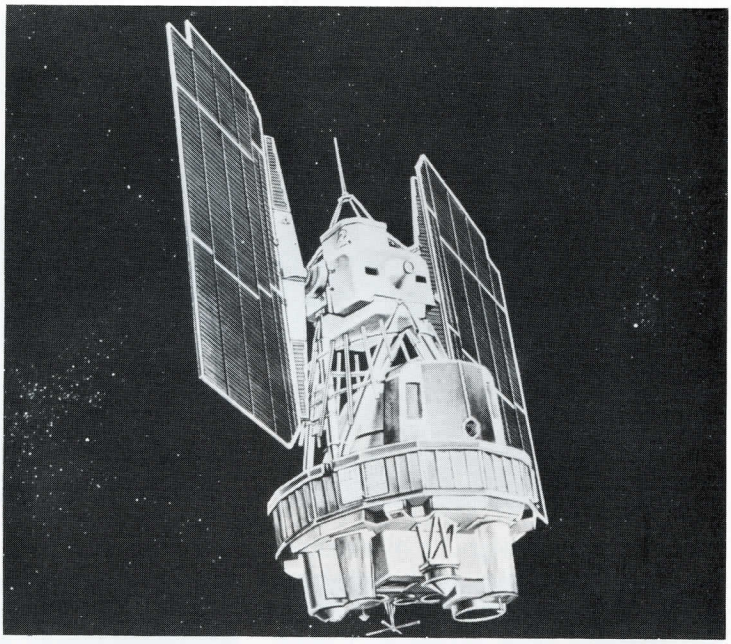
The addresses and telephone numbers of EROS Data Reference Files can be obtained from the EROS Data Center or EROS Program Office listed on page 7.

LANDSAT DATA

The first Earth Resources Technology Satellite, ERTS-1 (later renamed Landsat-1), was launched July 23, 1972. Landsat-2 was launched on January 22, 1975. Each Landsat flies in a circular orbit 570 miles (920 km) above the Earth's surface and circles the Earth every 103 minutes, or roughly 14 times per day. Each daytime orbital pass is from north to south. From such a vantage point, each Landsat can cover the entire globe, except for the poles, with repetitive coverage every 18 days. A unique feature of each of the satellites, because of the orbit, is that it views the Earth at the same local time, roughly 9:30 a.m. at the Equator, on each pass. The sensors on board the spacecraft transmit data to NASA receiving stations in Alaska, California, and Maryland either directly or from tape recorders. The data are converted from electronic signals to photographic images and computer compatible tapes at NASA's Goddard Space Flight Center in Greenbelt, Maryland. Master reproducible copies are flown to the EROS Data Center in Sioux Falls, South Dakota, where images are placed on file and where requests for reproductions are filled for the scientific community, industry, and the public at large. Because of the experimental nature of the satellites and the limited capabilities of NASA ground processing equipment at Greenbelt, approximately 30 days are required from the time the signals are first received on the ground to the time that the data are available to the public at the EROS Data Center.

Each Landsat presently carries three data acquisition systems: (1) a multispectral scanner (four spectral bands), (2) a return beam vidicon (RBV) or television system, and (3) a data collection system (DCS) to relay environmental data from ground-based data collection platforms (DCP's). The multispectral scanner, or MSS, is the primary sensor system and acquires images of 115 miles (185 km) per side in four spectral bands in the visible and near-infrared portions of the

Landsat (ERTS).



electromagnetic spectrum. These four bands are:

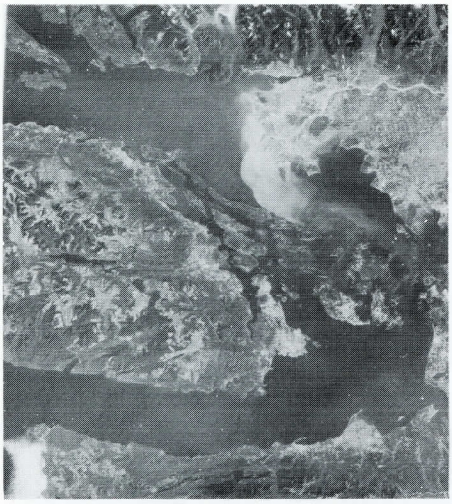
Band 4, the green band, 0.5 to 0.6 micrometers emphasizes movement of sediment-laden water and delineates areas of shallow water, such as shoals, reefs, etc.;

Band 5, the red band, 0.6 to 0.7 micrometers emphasizes cultural features, such as metropolitan areas;

Band 6, the near-infrared band, 0.7 to 0.8 micrometers emphasizes vegetation, the boundary between land and water, and landforms; and

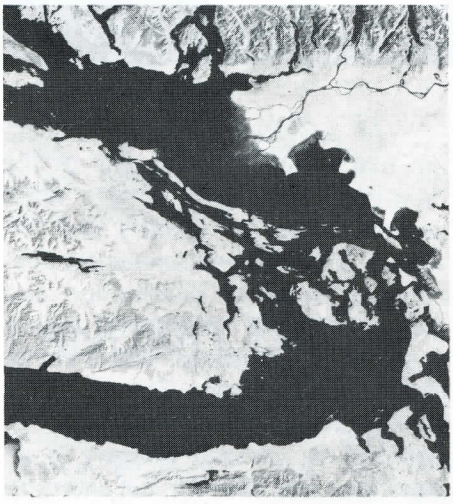
Band 7, the second near-infrared band, 0.8 to 1.1 micrometers provides the best penetration of atmospheric haze and also emphasizes vegetation, the boundary between land and water, and landforms.

An analysis of the four individual black and white images or the false-color composite images often permits users to identify and inventory different environmental phenomena, such as distribution and general type of vegetation, regional geologic structures, and areal extent of surface water. The repetitive (9 or 18 days) and seasonal coverage provided by Landsat imagery is an important new tool for the interpretation of dynamic phenomena. It should be noted that because of the Earth's rotation and the fact that the image is created by an optical-mechanical scanner, Landsat MSS images are parallelograms, not squares. The sides are parallel to the orbital track of the satellite on the Earth's surface. RBV images have a square format, because the image is acquired instantaneously.



Band 4

Band 5



Band 6

Band 7

Each recorded spectral band of Landsat MSS imagery is shown in this view of the Straits of Juan de Fuca (8138518365).

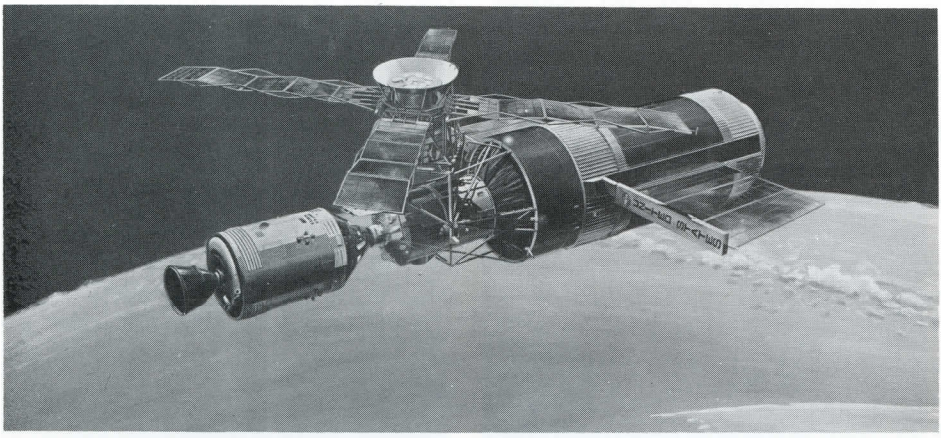
The arbitrary forward overlap between consecutive Landsat images is approximately 10 percent. The sidelap between adjacent orbits ranges from 14 percent at the Equator to 85 percent at the 80° parallels of latitude.

Latitude and longitude tick marks are depicted at 30-minute intervals outside the image edge. These geographic reference marks are annotated in degrees, minutes, and compass direction. A 15-step gray-scale tablet is exposed on every frame of Landsat imagery as it is produced. This scale is used to monitor and control printing and processing functions and to provide a reference for analysis related to a particular image. The annotation block directly over the gray scale contains data that reflect the unique image identification, the geographic location of the scene, and data relative to the existing parameters at the time the data were obtained.

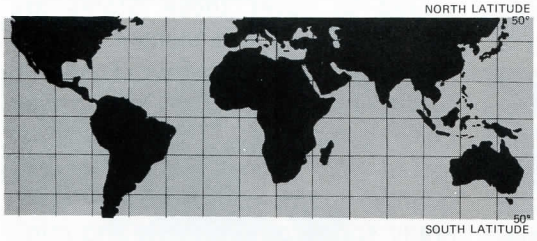
When ordering a single black and white image, it is best to order band 5. This band usually gives the best general-purpose view of the Earth's surface. A complete set of black and white images from all four bands displays the differences in the appearance of the same area when filtered to green, red, and near-infrared wavelengths. MSS false-color composites are available as standard products. An MSS false-color composite image is generally created by exposing three of the four black and white bands through different color filters onto color film. On these false-color images, healthy vegetation appears bright red, rather than green; clear water appears black; sediment-laden water is powder blue; and urban centers often appear blue or blue-gray. MSS false-color composite images which have not already been prepared can be ordered from the Data Center but carry a one-time initial preparation charge, not including the cost of any products ordered from the resulting composite.

A set of Landsat images has been prepared for the conterminous United States. The 470 scenes required to cover these States are available in a single black and white band (band 5), all four bands of black and white, or high-quality color composites. The scenes selected were chosen on the basis of quality, optimum time of year (generally spring or summer), and minimum cloud cover.

Landsat data in digital form are available as Computer Compatible Tapes (CCT). The tapes are standard ½-inch-wide (12.7-mm) magnetic tapes and may be requested in either seven- or nine-track format at 800 or 1,600 bpi. The number of CCT's required (one to four) for the digital data corresponding to one Landsat scene is dependent on the format requested. The data for the four MSS bands are interleaved among the tape(s), thereby necessitating all tapes to complete a set.



Skylab spacecraft.



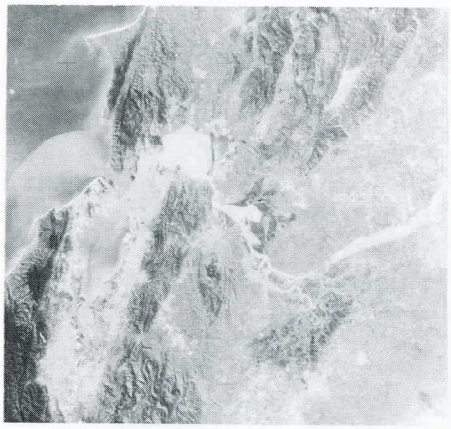
Skylab imagery and photography are available over limited test sites from latitudes 50° N. to 50° S.

SKYLAB DATA

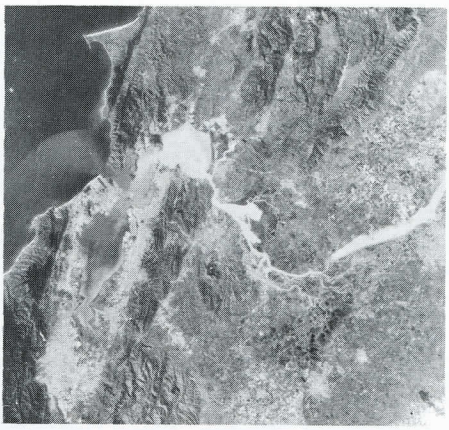
The NASA Skylab Program consisted of one unmanned and three manned missions. The unmanned space vehicle was placed in orbit in May 1973. The manned missions to the space vehicle were Skylab 2, launched on May 5, 1973, and recovered on June 22, 1973; Skylab 3, in orbit from July 28 to September 25, 1973; and Skylab 4, launched on November 16, 1973, and recovered on February 8, 1974.

The spacecraft traveled in orbits 270 miles (430 km) above the Earth and acquired photography, imagery, and other data of selected areas between latitudes 50° N. and 50° S. The data cover a number of scattered test sites selected to support Earth resources experiments. The photography, however, does not provide complete, cloud-free, and systematic coverage of the Earth's surface.

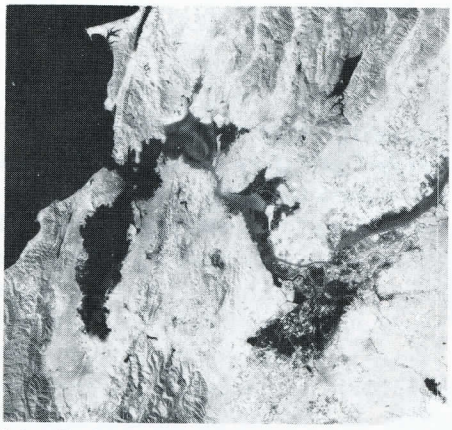
Multispectral photography on the Skylab S190–A provides the basis for a wide range of user-oriented studies as reflected in this scene over the San Francisco area (right).



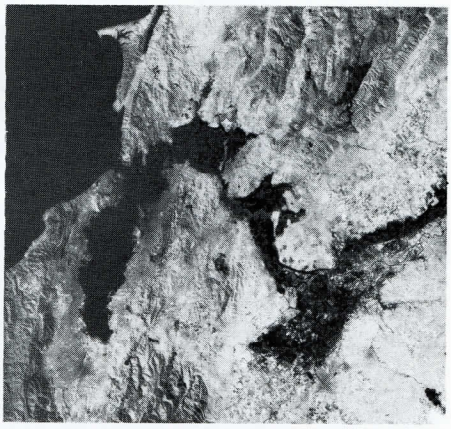
(a) .5 to .6 μm Black and White G40A078071000



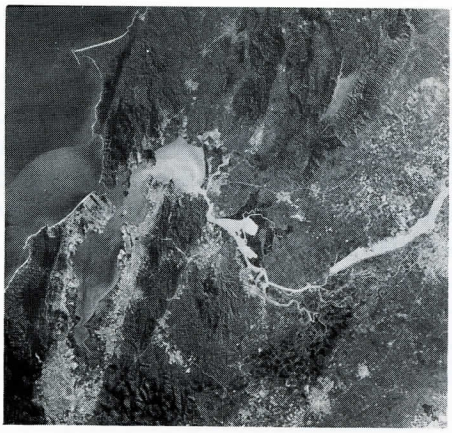
(b) .6 to .7 μm Black and White G40A077071000



(c) .7 to .8 μm Black and White IR G40A073071000



(d) .8 to .9 μm Black and White IR G40A074071000



(e) .4 to .7 μm Color G40A076071000

(f) .5 to .88 μm Color IR G40A075071-000

The Skylab Earth Resources Experiment Package (EREP) consisted of six remote-sensing systems and was designed by the scientific community as a spaceborne facility. The systems were:

S190-A—Multispectral Photographic Cameras. A six-camera array was designed to provide high-quality photography of a wide variety of phenomena on the Earth's surface. Each 6-inch (152-mm) focal length lens used 70-mm film. The films used were filtered black and white, color, and false-color infrared. The area covered by each image of this system is 100 x 100 miles (160 x 160 km).

S190-B—Earth Terrain Camera. A single, high-resolution Earth terrain camera was selected to provide high-resolution photography for scientific study. The 18-inch focal length lens used 5-inch (127-mm) film. Various black and white, color, and false-color infrared films were used in the camera. The area covered by each frame of this system was 70 x 70 miles (110 x 110 km).

S191—Infrared Spectrometer. Nonimaging.

S192—Multispectral Scanner. Imaging, 13 spectral bands, including 1 thermal infrared band, between 0.4 and 12.5 micrometers.

S193—Microwave Radiometer/Scatterometer and Altimeter. Nonimaging.

S194—L-Band Radiometer. Nonimaging.

Photographic data from the S190-A and S190-B experiments are available from the Data Center. Data from the other systems are also available from the Data Center but must be individually requested from NASA by the Data Center for duplication and sale in response to an order.

NASA AERIAL PHOTOGRAPHY

NASA aerial photography is the product of aerial surveys carried out by the NASA Earth Resources Aircraft Program. The program is directed primarily at testing a variety of remote-sensing instruments and techniques in aerial flights generally over certain preselected test sites within the continental United States.

Aerial photography is available in a wide variety of formats from flights at altitudes of a few thousand feet (1,000 m) up to U-2 and RB-57F flights at altitudes above 60,000 feet (18,000 m). The high-altitude photography is generally available on a 9- x 9-inch (23- x 23-cm) film format at approximate scales of 1:120,000 and 1:60,000. In general, each high-altitude frame of 9-inch (23-cm) film format photography at 1:120,000 scale shows an area approximately 17 miles (27 km) on a side.

Cultural detail is easily identified in NASA aerial photography of Boston, Massachusetts (6128D0210ROLL Frame 31).

Aerial photography is available in black and white, color, or false-color infrared, and clearly shows easily identifiable ground features such as roads, farms, and cities. Cloud cover is present in some photographs, and NASA aerial photographic coverage is not available for all areas.

NASA high-altitude U-2 aircraft.

A typical aerial mapping photograph is shown in this photograph over a portion of Pittsburgh, Pennsylvania (IVBZB000-00006, Frame 192).

AERIAL MAPPING PHOTOGRAPHY

Aerial photography during the past 25 years was acquired by the U.S. Geological Survey and other Federal Government agencies for mapping of the United States. The photography is black and white and has less than 5 percent cloud cover.

Depending on the planned use of the photographs, the aerial-survey altitude ranged from 2,000 feet (600 m) to 40,000 feet (12,000 m). The basic film format is 9 x 9 inches (23 x 23 cm) and shows areas from 3 to 9 miles (4.8 to 14.4 km) on a side depending on the scale of the photograph.

Because of the large number of aerial photographs needed to show any specific region on the ground, the photographs have been indexed by mounting series of consecutive and adjacent overlapping photographs to create mosaics of photographs of specified areas. These aerial photographic mosaics are referred to as "photo indexes" and allow for rapid identification of photographic coverage of a specific area. Presently, some 50,000 photo indexes are available at the Data Center. When ordering aerial photography from the Data Center, it is necessary first to order a photo index of the area of interest to determine the specific aerial photography needed.

A striking panorama is obtained in this Gemini IV photograph of the Nile Delta (S 65-34776 Roll 7; original in color).

GEMINI-APOLLO PHOTOGRAPHY

Photographic coverage over limited areas of the Earth acquired by the Gemini and Apollo missions is available from the Data Center. The photographs from the Gemini missions were acquired by hand-held 70-mm cameras.

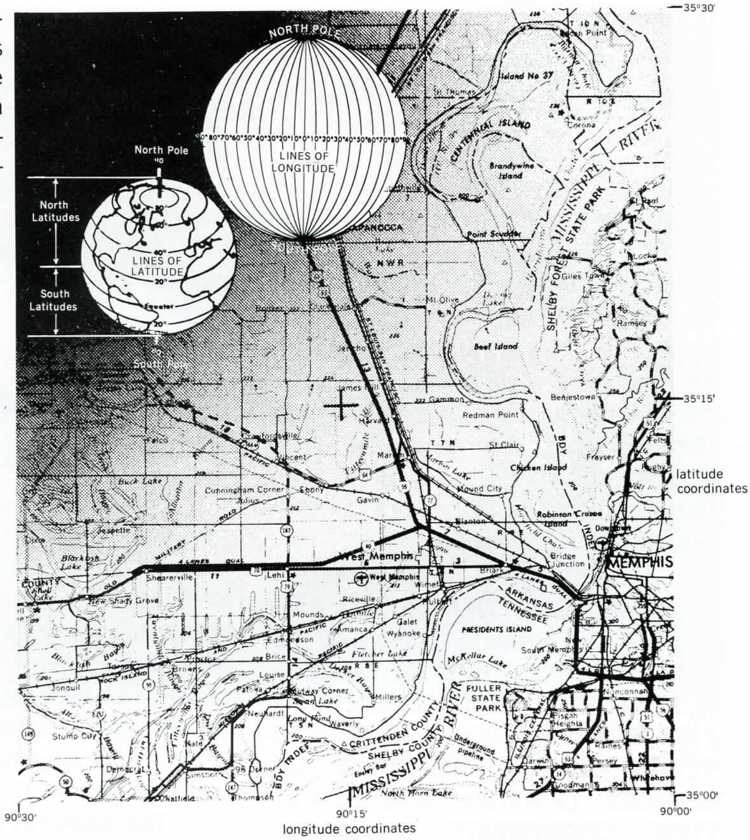
A special photographic experiment, designated S-065, was conducted on Apollo 9 in March 1969. This experiment used four 70-mm cameras to acquire three types of filtered black and white and one type of false-color infrared photographs. The S-065 photography is available from the Data Center; each picture shows an area approximately 100 x 100 miles (160 x 160 km).

GEMINI/APOLLO PHOTOGRAPHIC DATA

MISSION	LAUNCH	RECOVERY	PHOTOGRAPHIC COVERAGE
Gemini III	March 23, 1965	March 23, 1965	25 color photographs of the Earth.
Gemini IV	June 3, 1965	June 6, 1965	219 color photographs of the Earth, including extensive coverage of the Southwestern United States.
Gemini V	August 21, 1965	August 29, 1965	250 color photographs of the Earth.
Gemini VI	December 4, 1965	December 16, 1965	192 black and white and color photographs, primarily of Africa.
Gemini VII	December 4, 1965	December 18, 1965	429 varied black and white and color photographs.
Gemini VIII	March 16, 1966	March 16, 1966	19 black and white and color photographs, mainly of the Agena launch missile.
Gemini IX	June 3, 1966	June 6, 1966	362 black and white and color photographs of the Southwestern United States, west-central South America, and Africa.
Gemini X	July 18, 1966	July 21, 1966	371 varied black and white and color photographs, which include some coverage of China, Central America, and the Straits of Gibraltar.
Gemini XI	September 12, 1966	September 15, 1966	238 black and white and color photographs of the Earth including the Middle East, North Africa, and Australia.
Gemini XII	November 11, 1966	November 15, 1966	403 assorted black and white and color photographs, covering many areas of the globe.
Apollo 6	April 4, 1968	Unmanned	370 varied Earth-looking color photographs taken by a stationary camera.
Apollo 9	March 3, 1969	March 13, 1969	912 varied Earth-looking color photographs of selected test areas.

NOTE: Approximately 1,000 of the above photographs have been evaluated as acceptable Earth-looking images and are presently available in the geographic inquiry system.

The use of geographic coordinates from an available source will aid in initiating an inquiry for information.



THE GEOGRAPHIC SEARCH AND INQUIRY SYSTEM

Requests for information about imagery of a specific area will initiate a computerized geographic search. The search can be initiated by mail, visit, or phone to either the EROS Data Center, one of the EROS Applications Assistance Facilities, or one of the NCIC offices. A geographic search may be requested by any of the three following options:

1. Point search–all images or photographs with any portion falling over the point will be included.
2. Area rectangle–any area of interest defined by four corner coordinates of latitudes and longitudes. All images or photographs with any coverage of the area will be listed. The area must not exceed 200 1-degree squares (for example, latitude of 10° by longitude of 20°).
3. The point or area may be indicated on a map.

When requesting a geographic search from the Data Center be sure to provide all relevant information. This should include acceptable dates and seasons; type of imagery preferred; color, false-color infrared, or black and white; cloud cover; and quality. Cloud cover is given only in percentage, hence no assurance can be given as to where clouds will appear on the resulting photographs or images. A description of an intended application and use of the data will assist the researcher at the Data Center who initiates the search, thereby resulting in a more concise response to an inquiry.

GEOGRAPHIC AREAS MUST BE CLEARLY IDENTIFIED AND SHOULD BE LIMITED IN SIZE AS MUCH AS POSSIBLE TO AVOID A POTENTIALLY LONG COMPUTER LISTING AND THE NEED TO REVIEW LARGE NUMBERS OF CHOICES. LATITUDE AND LONGITUDE COORDINATE SPECIFICATION IS PREFERRED SINCE THIS IS THE METHOD REQUIRED FOR THE COMPUTER GEOGRAPHIC SEARCH.

Specification in degrees and minutes normally provides sufficient location accuracy. (Each degree of latitude or longitude is divided into 60 minutes, and each minute into 60 seconds. One minute of latitude is roughly 1 mile.) Coordinates can be found for an area of interest on maps in a library or atlas, or on many State road maps. The alternate method is to enclose a map with the area specifically outlined.

A contact number will be assigned to each inquiry. The number is used for order processing and control. This number should be retained and used in all future correspondence concerning that inquiry.

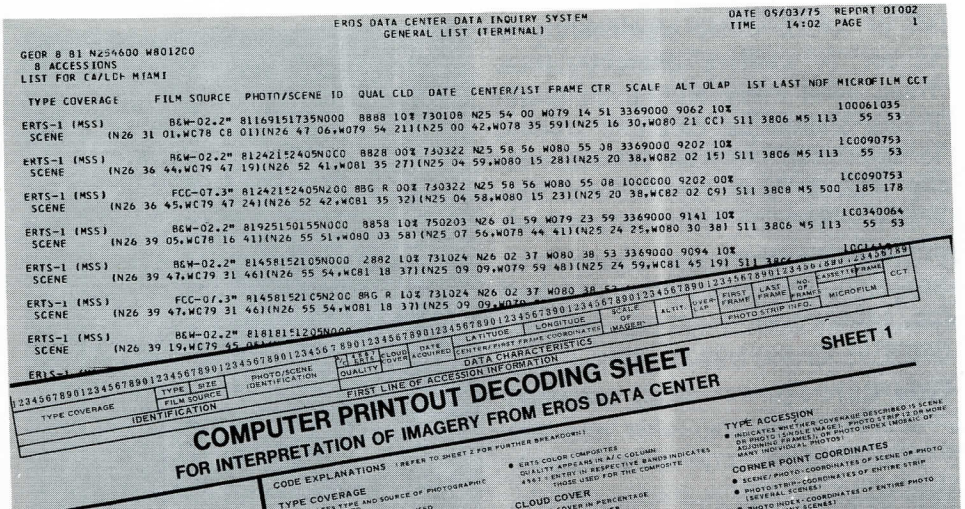
The computerized geographic search is made free of charge.

Landsat Worldwide Reference System (WRS)

The WRS is a global indexing system used to retrieve Landsat data. It is keyed to nominal scene centers and enables the user to acquire computer listings of all imagery available in the vicinity of a given center. Scenes provided are those which have actual centers lying within any specified radius of the nominal center.

The nominal scene centers are defined by what are called path and row lines.

The path lines are the orbital paths of the satellite, of which there are 251 every 18 days. Each path is very nearly repetitive and is considered the vertical center line (nominal) of all scenes framed over that portion of the path. There are 119 scenes along each path running north to south. Row 1 starts at latitude 80° N.



As a result of an inquiry, the requester will receive a computer listing of available imagery and photography and a decoding template for interpretation of the printed information.

Each intersection of a path and row line is the nominal scene center of all scenes framed over that point. When a user wishes to inquire about imagery over any one of these points, a point-radius search is initiated. The user can then select the specific scene he desires from the listing received.

The user may request coverage for an entire country or continent through the WRS. Also the listings may be photographed on 16-mm microfilm and indexed by WRS point to provide an easy-to-access catalog.

Understanding the Computer Listing

The computer listing will contain all images and photographs available over or close to an area of interest. Two printed lines on the computer listing describe in detail the characteristics of each image or photograph. A number of entries may be listed, depending upon the size of the area selected and the restrictions of the supplemental data. Imagery or photography may be available from more than one source—Landsat, Skylab, NASA aircraft, Geological Survey or other agencies' or organizations' aircraft—

all of which differ significantly in sensor or camera characteristics. Thus, each entry on the computer listing should be carefully studied to determine the best selection for the interest and applications. The first line of each entry on the computer listing gives data characteristics, along with information required for subsequent ordering. Specific items to be considered are:

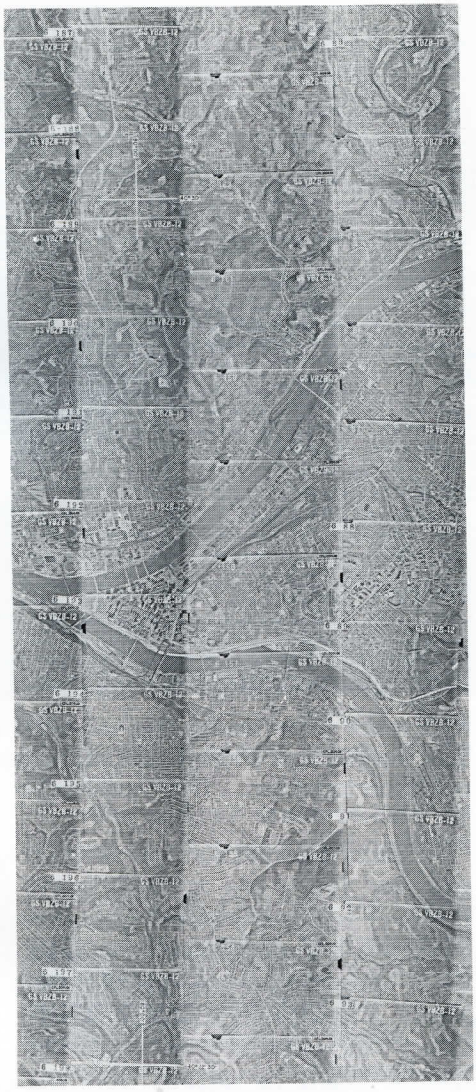
Type Coverage—Indicates type and sources of photographic coverage and the order form to be used.

Film Source—Indicates type and size of master reproducible film on file at the Data Center. Refer to the tables on the order form to determine the standard products available.

B & W—Black and White
COL—Color
CIR—Color Infrared
FCC—Landsat False Color Composite
SIZE—Size of Film Source
Size A—10″ x 12″
Size B—Larger than 10″ x 12″

Photo/Scene Identification — Indicates a 15-character unique order number to be transferred to the order form when placing an order.

Quality—Indicates the quality of the master film on the following scale: 0, not printable; 1-2, very poor; 2-4, poor; 5-6, fair; 7-9, good to excellent; M, image not present on the roll of film; C, image to be used for calibration purposes.



Aerial photographic coverage is keyed initially to a photo index (IVBZB00-270592).

Cloud Cover—Indicates the approximate cloud cover in percentage, that is, 10, 40, 80 percent, and so on.

Date Acquired—Gives the date the exposure was made. Read as year, month, day; for example, 740318 indicates March 18, 1974.

Center Point—Gives the latitude and longitude coordinates of the center point of the scene in degrees, minutes, and seconds.

For all aircraft photographic accessions these items are also noted:

First Frame-Last Frame—Indicates, for all strip accessions, the first and last frames of the strip. If the same number is listed, a single photograph is described.

Number of Frames—Lists the number of frames in the strip between the first and last frames.

The remaining information on the first line of the computer listing is included primarily for technical use or internal use by the Data Center. The second line of each entry contains the corner coordinates in latitude and longitude which may be plotted to determine the exact ground coverage of either individual frames, strips, or photo indexes.

The image size of the master reproducible is shown (in millimeters) at the end of the second line and may be needed to order some types of aircraft data. A template is provided for decoding the computer listing. When a choice of the most suitable data has been made, place an order using the appropriate order form.

Landsat and Skylab imagery and photography are indexed and listed by individual frame. Thus each entry on the computer listing describes a single image or photograph which can be ordered directly by the unique identification number.

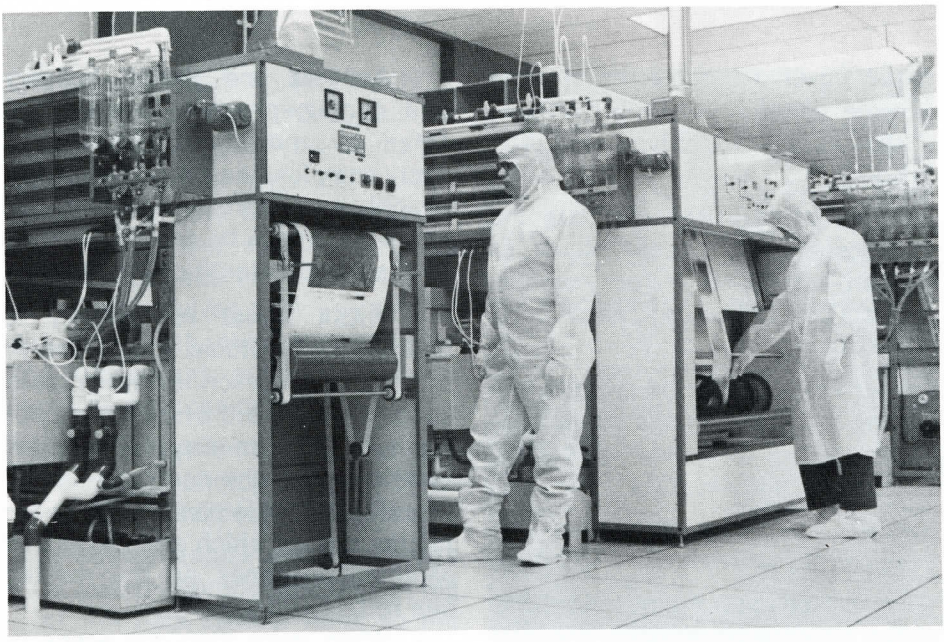
NASA Aerial Photography is indexed by individual photograph or by strip which describes two or more successive forward overlapping photographs along an aircraft flight line. Each entry on the computer listing describes a single photograph or adjoining scenes which are successive photograph frames on the master film roll.

When more than one scene is described, it is necessary to plot and interpolate along the strip to determine the exact photograph to order. More explicit instruction can be found in the **Placing An Order** section of this publication.

Aerial Mapping Photography is listed on photo indexes, which contain many overlapping photos and from which individual photographs can be ordered.

Photo indexes can be ordered directly by supplying geographic coordinates or by ordering from a computer listing of a geographic search.

Individual aerial photographs are not geographically accessible. Therefore, they will not appear on the computer search listing and can only be ordered from a photo index or if the individual photo number is already known.



Precision photographic processing is performed in a dust-free environment for all photographic reproductions.

PLACING AN ORDER

Orders for reproductions of data from the EROS Data Center are accepted from individuals, governmental organizations, universities, and industries in the United States and foreign countries. Orders can be placed by personal visit, telephone, or mail to the Data Center. Orders may also be placed at any of the EROS Applications Assistance Facilities or NCIC offices.

All orders must be accompanied by check, money order, purchase order, or standing account identification; processing cannot be initiated until valid and accurate payment is received. A check or money order must be made payable to the U.S. Geological Survey.

Standing accounts may be established by repetitive users. To open a standing account, a check must be remitted for the amount to be deposited. An account number wiil be assigned, and future orders can be placed using this standing account number. The balance can be added to or a refund of the unused portion can be obtained at any time. A $100 minimum is required to establish a standing account.

Quality of reproduction cannot exceed that of the master film available at the Data Center. Every product leaving the Data Center undergoes a rigid inspection to insure that internal quality standards are met.

Occasionally, a product may have certain defects, such as small scratches, pinholes, or stains, or the color balance or density of the reproduction may not be exactly as expected. But each image is inspected against the quality of the original reproducible and everything is done to produce as good a product as possible. As with any large production facility, however, substandard products sometimes do reach the user. Such products should be returned to the Data Center for reprocessing or a refund. The policy is to provide high quality products to all users and to make certain that data users are satisfied with all products.

All shipments are prepaid, and no postage charges are made. With each outgoing order, a prepaid postage card is included soliciting comments by return mail. The comments are used to improve service and quality.

A minimum of 3 weeks for delivery of all orders should be allowed. A longer time may be required for the production of computer compatible tapes or the completion of very large or complex orders.

Should there be any difficulty in placing an inquiry or order, or any questions regarding an order or additional services, write or call:

Customer Relations
EROS Data Center
Sioux Falls, South Dakota 57198
Phone: 605-594-6511, ext. 151
FTS: 784-7511

Information on the order forms for each type of data is given below:

Landsat Data

Landsat data should be ordered with the Landsat order form. Landsat images are indexed by a unique scene number. To order from a computer listing, transfer the scene identification number of the selected image from the computer list to the Landsat order blank and complete the order form as indicated on the reverse side. If ordering from other references, please be sure that the scene identification number is included on the order form.

When interested only in obtaining a Landsat image over a point or an area within the conterminous United States, request the LANDSAT (ERTS) SINGLE COVERAGE packet. This packet contains information and a map reflecting 470 nominal geographic centers. A unique summer coverage scene over each of the points is available in black and white and false infrared color. Each map point reflects a unique Worldwide Reference System (WRS) number and instructions for ordering are contained within the packet.

Placing a Standing Order for Landsat Data

Two basic options are available for placing standing orders for either data or information from the EROS Data Center:

1. The user may specify an area for which any new Landsat imagery will be automatically printed and shipped, or
2. The user may specify an area for which the Data Center will send notification of any new imagery and the order can subsequently be placed.

A standing order for new data (option 1) requires that the user accept all data for the geographic area if it meets his specifications for cloud cover, quality, and type of remotely sensed data. Any image having any part within the geographic location defined will be shipped. Prepayment must also be established with the EROS Data Center by placing money on deposit in a standing account or by issuing a blanket purchase order or valid account number for monthly billing. If option 2 is selected, the minimum requirement is that some data be ordered once every 120 days; otherwise the standing order will automatically be cancelled.

Skylab Data

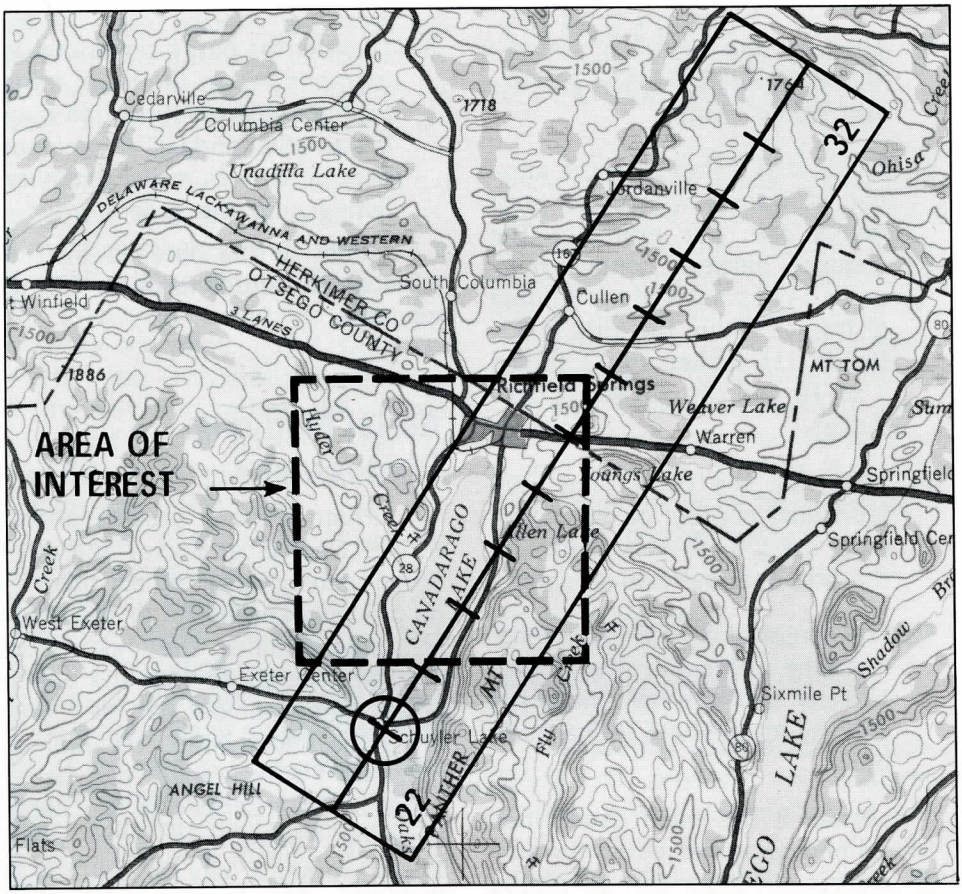
Skylab photography or imagery should be ordered with the Skylab order form. Each photograph is indexed by scene number; each entry and scene identification number on the computer listing describes a single photograph.

NASA Aerial Photography

NASA aerial photography should be ordered with the NASA Aircraft (Aerial) Photography order form. A careful study should be made of the geographic search computer listing. In most cases, NASA aerial photography is accessed from the first and last frame numbers and the number of frames on the computer listing. However, if the geographic search is made on a geographic point, the computer will interpolate the strip and identify that photograph within the strip that best satisfies the request.

When more than one frame of photography is identified and there is an interest in a geographic area larger than a specific point, the user must interpolate the strip. It is possible to identify the photographs that fall over the area of interest by the following procedure.

1. Plot the four corner coordinates located on the second line of the accession on a map. This will indicate coverage of that strip.
2. Plot this area of interest on the map. This will graphically show the amount of coverage.



NASA aerial photography may be listed by film strip in the computer listing, when the inquiry covers more than a geographic point. The circle in the strip identifies the center of frame 22.

3. Plot the center coordinates identified on the first line of the accession to find the location of the first frame of photography in that strip.
4. Annotate the first frame with the frame number identified in the listing.
5. Draw a straight line down the center of the strip that divides the strip in half and also intersects the center coordinates of the first frame.
6. Measure the distance between the start of the strip and the center coordinates of the first frame.
7. Transfer that measurement to the end of the strip and along the center line. This is the center location of the last frame of the strip.
8. Annotate that last frame with the frame number identified on the listing.

9. Measure the distance between the first frame center and the last frame center.

10. Divide that distance by the number of frames within the strip minus one. For example: The distance between centers measures 1½ inches and the number of frames within the strip is 11. Divide 1½ inches by 11 minus 1 or 10 and the answer is 0.15 inches.

11. Subdivide the center line into individual centers by plotting a point every 0.15 inches between the first and last frame centers.

12. The center of each frame of photography within the strip is now located and can be annotated with its appropriate frame numbers.

When it has been determined which photograph(s) cover an area of interest, an order can be placed by one of the following options:

1. When only one frame of photography is identified on the computer listing, transfer the scene identification and frame number directly onto the order form.

2. When ordering an exact frame or frames within a strip, transfer the scene identification number directly and record the frame number(s) directly onto the order form.

3. To order the entire series of photographs within the strip, transfer the scene identification number and first and last frame numbers directly from the computer listing onto the order form.

Refer to the detailed instructions on the order form for further guidance.

Aerial Mapping Photography

Photo indexes provide access to U.S. Geological Survey and other aerial photography. When there is no previous knowledge of the photo or frame number, the index must first be ordered so that the appropriate frame number can be found. From the photo index, the project, roll, and frame number can be located and transcribed to the Aerial Mapping Photography order form. Thus, two steps may be required in ordering:

1. Order the photo index for the geographic area of interest, and

2. From the photo index, select and order the individual frames of interest.

Photo indexes can be ordered by using the Aerial Mapping Photography order form or by supplying the geographic location. Indexes also appear on and can be ordered from a computer listing. Individual aerial photographs are not indexed geographically and will not appear on the computer listing. To order a

photo index, identify the exact latitude and longitude of all corner coordinates or provide a map with the area outlined. Photo indexes are available in one or two sizes: size A which is 10 x 12 inches (25.4 x 30.5 cm) and size B which is any size larger than size A. The size is normally dependent on the scale of the photography and the area covered by the photo index. Once the photo index is received and the area of interest is identified, the project, roll, and frame numbers can be transferred to the Aerial Mapping Photography order form.

Aerial photography is usually forward overlapped at least 60 percent and sidelapped at least 30 percent for stereo viewing. (Forward overlap is defined as the area of coverage common to successive photographs along a flight line; sidelap is the area of coverage common to photographs from adjacent flight lines.) Alternate photographs can be ordered within a flight line to provide complete ground coverage. Nine- by nine-inch (23- x 23-cm) paper and film products are automatically dodged when printed. Users desiring undodged products should so state when ordering.

Note: Dodging is a means of controlling the negative's overall exposure to light during the process of printing. By doing this, areas normally dark may be lightened and vice versa to show more detail.

U.S. Geological Survey aerial photography is available only in black and white and has less than 5 percent cloud cover.

CUSTOM PROCESSING

Custom processing to unique scale and image format is also available from the Data Center. These products normally require longer periods of time for completion. Pricing is based on three times the standard price or, for intermediate enlargements, three times that of the next larger size standard product. When custom processing is required, indicate CUSTOM under REMARKS on the order form and remit triple the standard price.

PRIORITY SERVICES

A priority system for rapid delivery of products is available whereby orders will be shipped within 5 working days of receipt. For providing this service, triple the standard price is charged. Priority processing will only be accepted when imagery is specifically identified and standard products are ordered.

If for any reason shipment is not made within the 5 days, the cost for each product reverts to standard price and a refund or credit is made. To receive this service, indicate PRIORITY under REMARKS on the order form and remit triple the standard price.

FOREIGN ORDERS

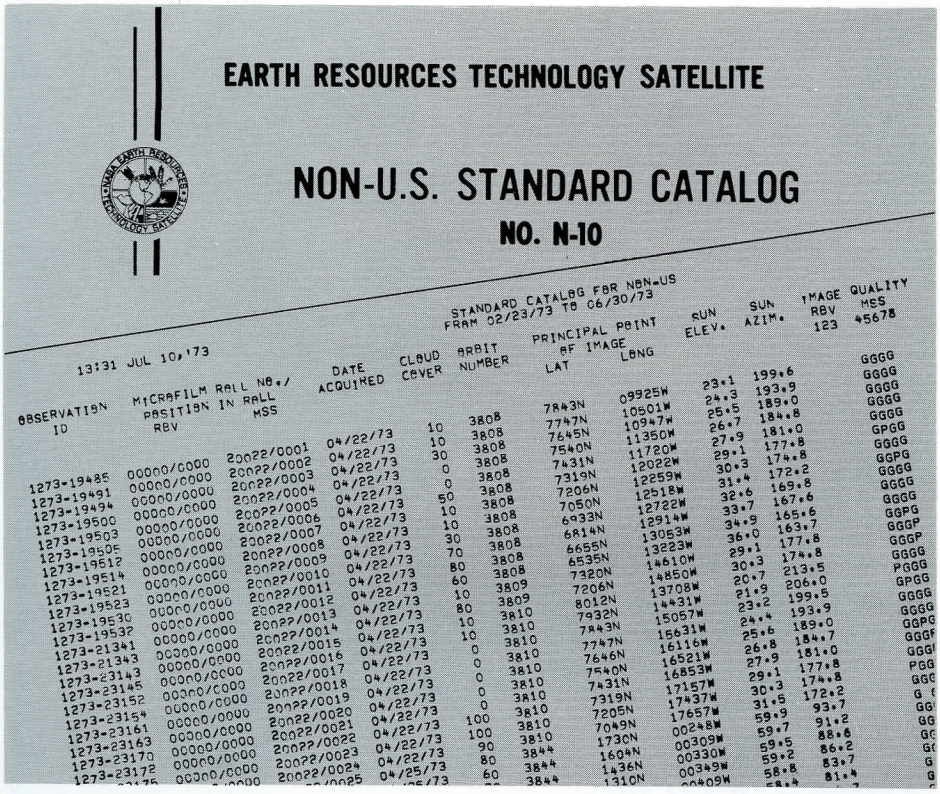
Copies of all remotely sensed data held in the archives at the EROS Data Center are available to individuals from all nations of the world. In preparing payment, checks or money orders must be made out in U.S. dollars and cents, and payment must accompany the order. Most banks making currency rate adjustments charge a nominal processing or exchange fee; therefore, make sure that this fee is not deducted from the check to be submitted for payment. Each check must be made out in the amount of the total cost of the order. If the check is to be sent directly to the Survey from the bank, please inform the bank that the contact number must appear on the check and accompanying correspondence.

PHOTO CREDIT

There are no restrictions on the reprinting of images. It is requested, however, that the National Aeronautics and Space Administration (NASA) be given credit for the original Landsat, Skylab, Apollo, or Gemini imagery or photographs and NASA aerial photography; that the U.S. Geological Survey be given credit for USGS aerial photography; that the sources of other photography be credited; and that the Survey receive credit for the reproduction. It is also asked that the unique scene identification number be published with each image or photograph to aid those who may wish to order a copy.

OTHER PRODUCTS

A large variety of other accession aides, imagery, and electronic data are available through the EROS Data Center. These include standard Landsat catalogs as prepared by NASA in two series: The U.S. STANDARD CATALOG (all data of the United States and parts of Canada and Mexico), and the NON-U.S. STANDARD CATALOG (all other foreign areas). Cumulative catalogs have been published to cover data available from launch of Landsat-1 through July 23, 1974, for the U.S. STANDARD CATALOG (four volumes) and from launch of Landsat-1 through July 23, 1974, for the NON-U.S. STANDARD CATALOG (eight volumes). After the cumulative issues, the catalogs have been issued monthly and show data processed during the month rather than data acquired during the month. They contain information on areal coverage of data included, availability of computer compatible tapes, and, in the U.S. STANDARD CATALOG, a graphic presentation of percentage of cloud cover. Copies of these catalogs may be purchased from the Data Center at a cost of $1.25 per volume.



EARTH RESOURCES TECHNOLOGY SATELLITE

NON-U.S. STANDARD CATALOG

NO. N-10

STANDARD CATALOG FOR NON-US
FROM 02/23/73 TO 06/30/73

13:31 JUL 10,'73

OBSERVATION ID	MICROFILM ROLL NO./ POSITION IN ROLL RBV	MSS	DATE ACQUIRED	CLOUD COVER	ORBIT NUMBER	PRINCIPAL POINT OF IMAGE LAT	LONG	SUN ELEV.	SUN AZIM.	IMAGE QUALITY RBV 123	MSS 45678
1273-19485	00000/0000	20022/0001	04/22/73	10	3808	7843N	09925W	23.1	199.6		GGGG
1273-19491	00000/0000	20022/0002	04/22/73	10	3808	7747N	10501W	24.3	193.9		GGGG
1273-19494	00000/0000	20022/0003	04/22/73	30	3808	7645N	10947W	25.5	189.0		GGGG
1273-19500	00000/0000	20022/0004	04/22/73	0	3808	7540N	11350W	26.7	184.8		GGGG
1273-19503	00000/0000	20022/0005	04/22/73	0	3808	7431N	11720W	27.9	181.0		GPGG
1273-19505	00000/0000	20022/0006	04/22/73	50	3808	7319N	12022W	29.1	177.8		GGGG
1273-19512	00000/0000	20022/0007	04/22/73	10	3808	7206N	12259W	30.3	174.8		GGPG
1273-19514	00000/0000	20022/0008	04/22/73	10	3808	7050N	12518W	31.4	172.2		GGGG
1273-19521	00000/0000	20022/0009	04/22/73	30	3808	6933N	12722W	32.6	169.8		GGGG
1273-19523	00000/0000	20022/0010	04/22/73	70	3808	6814N	12914W	33.7	167.6		GGGG
1273-19530	00000/0000	20022/0011	04/22/73	80	3808	6655N	13053W	34.9	165.6		GGPG
1273-19532	00000/0000	20022/0012	04/22/73	60	3809	6535N	13223W	36.0	163.7		GGGP
1273-21341	00000/0000	20022/0013	04/22/73	10	3809	7320N	14810W	29.1	177.8		GGGP
1273-21343	00000/0000	20022/0014	04/22/73	10	3810	7206N	14850W	30.3	174.8		GGGG
1273-23143	00000/0000	20022/0015	04/22/73	0	3810	8012N	13708W	20.7	213.5		PGGG
1273-23145	00000/0000	20022/0016	04/22/73	0	3810	7932N	14431W	21.9	206.0		GPGG
1273-23152	00000/0000	20022/0017	04/22/73	0	3810	7843N	15057W	23.2	199.5		GGGG
1273-23154	00000/0000	20022/0018	04/22/73	0	3810	7747N	15631W	24.4	193.9		GGGG
1273-23161	00000/0000	20022/0019	04/22/73	0	3810	7646N	16116W	25.6	189.0		GGPG
1273-23163	00000/0000	20022/0020	04/22/73	100	3810	7540N	16521W	26.8	184.7		GGGF
1273-23170	00000/0000	20022/0021	04/22/73	100	3810	7431N	16853W	27.9	181.0		GGGI
1273-23172	00000/0000	20022/0022	04/22/73	90	3810	7319N	17157W	29.1	177.8		PGG
1273-23175	00000/0000	20022/0023	04/22/73	80	3844	7205N	17437W	30.3	174.8		GGG
		20022/0024	04/25/73	60	3844	7049N	17657W	31.5	172.2		G
						1730N	00248W	59.9	93.7		GG
						1604N	00309W	59.7	91.2		GG
						1436N	00330W	59.5	88.6		GG
						1310N	00349W	59.2	86.2		GG
								58.8	83.7		G
									81.4		G

Some Landsat data have been processed to precise geometric accuracies (scene corrected or precision processed). Data from the RBV sensors from Landsat-1 and Landsat-2 are also available. Copies of 16-mm microfilm used to review most types of imagery can be purchased from the Data Center.

The Soil Conservation Service of the U.S. Department of Agriculture has compiled from Landsat imagery black and white mosaics of the conterminous United States and Alaska. They are not available from the Data Center. Orders or requests for further information should be addressed to the:

Cartographic Division
Soil Conservation Service
Federal Center, Building No. 1
Hyattsville, Maryland 20782

A lithographic copy of the mosaic of the conterminous United States, band 5 or band 7, at a scale of 1:5,000,000 is available for $1.25 from:

Branch of Distribution
U.S. Geological Survey
1200 South Eads Street
Arlington, Virginia 22202

Training courses in remote sensing are conducted at frequent intervals.

APPLICATIONS ASSISTANCE

Training and assistance in techniques for analysis of remotely sensed data are available at the EROS Data Center. Inquiries can be made by telephone, letter, or personal visit; however, the Applications Assistance Branch should be contacted before making travel plans.

The Applications Assistance Branch provides state-of-the-art remote sensing capabilities to resource scientists and land managers within the USDI, other cooperating agencies, and foreign countries and, thus, assists in the technology transfer of proven remote-sensing applications to users. A comprehensive domestic and international training program is underway involving orientation sessions, disciplinary or technique workshops, and structured, complete courses. Orientation sessions are 2 to 4 days and present the basic principles of remote sensing in an introductory format. Disciplinary or techniques workshops are designed to present specific and often advanced subjects. These workshops are frequently offered at the request of groups or agencies with an expressed need for specific training. The structured, complete courses are usually multidisciplinary in nature. The basic

Interpretation of imagery is accomplished through analytical equipment at the Data Center.

principles of remote sensing are presented first, then a series of application examples in various natural resources disciplines (agriculture, forestry, geography, geology, hydrology, land use, and range management). The most common structured courses are the International Remote Sensing Workshops, an annual series of two 4-week programs for foreign scientists and resource managers.

With the exception of the International Remote Sensing Workshop sequence, none of the training programs is given on a routine schedule. Instead, courses are designed, announced, and presented in response to a defined need. Once the need for a particular type of training is defined, a course is offered in which the type, scope, content, length, and mix between classroom lectures, laboratory exercises, and field work are geared to best meet that need.

In addition, graphic and media training aids are being prepared and disseminated that include briefing aids, workshop exercises, application examples, documented application packages, slide/tape presentations, and closed circuit television presentations. For example, training presentations made during seminars and workshops, as well as other self-learning and classroom materials, are recorded in slide-cassette, cassette-filmstrip, and video-cassette formats. These materials are then studied by individuals, visiting scientists, workshop participants, and other student groups.

Applications Assistance Branch personnel participation in demonstration projects provides the mechanism by which training aids can be developed and up-dated. These aids are needed for effective performance of various technology transfer tasks. Demonstration projects are based on cooperation between the EROS Data Center and a user agency, and the utilization and assessment of proven remote-sensing technology.

A critical element in the EROS Data Center's training and assistance program is the maintenance and operation of a state-of-the-art Data Analysis Laboratory. The laboratory is designed to provide both digital and analog multispectral/multitemporal image analysis capabilities in support of all technology transfer programs. These capabilities include use of the most sophisticated methods for classification of digital data, and interactive thematic extraction techniques.

Other assistance activities include: Maintaining current information on capabilities, limitations, and requirements in remote-sensing technology, as a source of information for staff scientists as well as visitors; responding to written and telephone inquiries about remote-sensing applications; and compiling and distributing lists of other training programs and professional society meetings.

The Applications Assistance Branch also maintains the Don Lee Kulow Memorial Library, holding a collection of remote-sensing literature and information which is one of the most extensive collections of its kind in the world.

All inquiries about applications assistance and demonstrations of analytical equipment at the Data Center should be addressed to:

Applications Assistance Branch
EROS Data Center
Sioux Falls, South Dakota 57198
Phone: 605-594-6511, ext. 111
FTS: 784-7111

VISITS, TOURS, AND NEWS MEDIA INQUIRIES

The visitors' lobby of the EROS Data Center is open to the general public from 8 a.m. to 4:30 p.m. on weekdays and from 10 a.m. to 4:30 p.m. on Saturdays. Pictorial exhibits and photographic gallery displays are located in the lobby area.

The visitors' lobby contains various displays of Data Center activities.

Guided tours and film presentations for individuals and small groups are offered on weekdays at 10:30 a.m. and 2:30 p.m. Guided tours and educational slide and film presentations for upper elementary school, high school, and college groups, service clubs, and professional organizations, as well as for the news media, may be arranged by contacting:

Community Affairs Representative
EROS Data Center
Sioux Falls, South Dakota 57198
Phone: 605-594-6511, ext. 546
FTS: 784-7546

THE EROS DATA CENTER IN THE FUTURE

The EROS Data Center will continue to provide archival storage, processing, and dissemination of Earth resources information with emphasis on rapidly providing more data of high quality and information content. New state-of-the-art digital data processing and handling systems will be installed as they become available, allowing imagery to be produced in a geometrically correct mode with tonal density of images and formats customized to the specific requirements of the user.

(from material supplied by Allen H. Watkins)

OTHER SOURCES OF INFORMATION

American Elsevier Publishing Co., Inc., **Remote Sensing of Environment.** Quarterly journal. 52 Vanderbilt Avenue, New York, New York 10017

American Society of Photogrammetry, 1972, **Operational Remote Sensing:** 105 North Virginia Street, Falls Church, Virginia 22046.
—1974, **Proceedings of the Annual Fall Meetings.**
—1974, **Proceedings of the Annual March Meetings.**
—1973, **Third Biennial Workshop. Color Photography in the Plant Sciences and Related Fields.**
—**Photogrammetric Engineering and Remote Sensing.** Monthly journal.

Anderson, James R., et. al., 1976, **A Land Use Classification System for Use with Remote-Sensor Data:** U.S. Geol. Survey Prof. Paper 964.

Avery, T. Eugene, 1968, **Interpretation of Aerial Photographs,** 2d ed.: Minneapolis, Burgess Publishing Co.

Colvocoresses, Alden P., 1975, **Remote Sensing Platforms:** U.S. Geol. Survey Circ. 693.

Colwell, Robert N., 1971, **Monitoring Earth Resources from Aircraft and Spacecraft:** Washington, D.C., U.S. Government Printing Office.

Environmental Research Institute of Michigan, 1974, **Proceedings of the Ninth International Symposium on Remote Sensing of the Environment:** P.O. Box 618, Ann Arbor, Michigan.
—The Eighth Symposium is also available from ERIM.
—The First through Seventh Symposium (some may be out of print) are available from the University of Michigan Extension Service, Ann Arbor, Michigan 46107.

Holz, R. K., ed., 1973, **The Surveillant Science—Remote Sensing of the Environment:** Boston, Houghton, Mifflin Co.

National Academy of Sciences, 1970, **Remote Sensing with Special Reference to Agriculture and Forestry:** Washington, D.C., National Academy of Sciences.

National Aeronautics and Space Administration, **Advanced Scanners and Imaging Systems for Earth Observations:** Washington, D.C. NASA-SP 355. NTIS order no. N74-11287.
—**Remote Sensing of Earth Resources. A Literature Survey with Indexes:** NTIS order no. NASA SP-7036 for period 1962 to 1970; NASA SP-7036 (1) for period 1970 to 1973; NASA SP-7041 (1) beginning quarterly in 1974.
—**Symposium of Significant Results Obtained from Earth Resources Technology Satellite-1:** Washington, D.C. V. I, Technical Presentations, NTIS order no. N73-28207; V. II, Summary of Results, NTIS order no. N73-28389; V. III, Discipline Summary Reports, NTIS order no. N73-28405.

—**Third Earth Resources Technology Satellite-1 Symposium:** Washington, D.C. V. IA, Technical Presentations, NTIS order no. N74-3075; V. IB, Technical Presentations, NTIS order no. N74-30774; V. II, Summary of Results, NTIS order no. 10549.

National Technical Information Service, **NASA Earth Resources Survey Program Weekly Abstracts.** Weekly list of documents related to the Earth Resources programs available through NTIS. Also lists Landsat experiment reports as they become available. 5285 Port Royal Road, Springfield, Virginia 22161.

Reeves, Robert G., ed., 1975, **Manual of Remote Sensing:** Falls Church, American Society of Photogrammetry.

Rudd, Robert D., 1974, **Remote Sensing: A Better View:** North Scituate, Duxbury Press.

Scherz, James P., 1970, **An Introduction to Remote Sensing for Environmental Monitoring:** Madison, University of Wisconsin.

Short, Nicholas M., 1973, **Earth Observations from Space: Outlook for Geological Sciences:** Greenbelt, National Aeronautics and Space Administration. NTIS order no. N74-12157.

Smith, John T., Jr., ed., 1968, **Manual of Color Aerial Photography:** Falls Church, American Society of Photogrammetry.

Technology Application Center (TAC), **Quarterly Literature Review of the Remote Sensing of Natural Resources.** Most complete of the current on-going bibliographies. Lists remote sensing related documents published by NASA, NTIS, Engineering Index, and four other data bases. It is subdivided and covers all areas of remote sensing applications and research. University of New Mexico, Albuquerque, New Mexico.

Way, Douglas, 1973, **Terrain Analysis. A Guide to Site Selection Using Aerial Photographic Interpretation:** Stroudsburg, Dowden Hutchinson, Ross, Inc.

Wiedel, Joseph W., and Kleckner, Richard, 1974, **Using Remote Sensor Data for Land Use Mapping and Inventory: A User Guide:** U.S. Geol. Survey IR-253, NTIS order no. PB242-813.

Williams, Richard S., and Carter, W. D., eds., 1976, **ERTS, A New Window on Our Planet:** U.S. Geol. Survey Prof. Paper 929.

As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering the wisest use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to assure that their development is in the best interests of all our people. The Department also has a major responsibility for American Indian reservation communities and for people who live in Island Territories under U.S. administration.

Cecil D. Andrus, Secretary
U.S. Department of the Interior

V.E. McKelvey, Director
Geological Survey