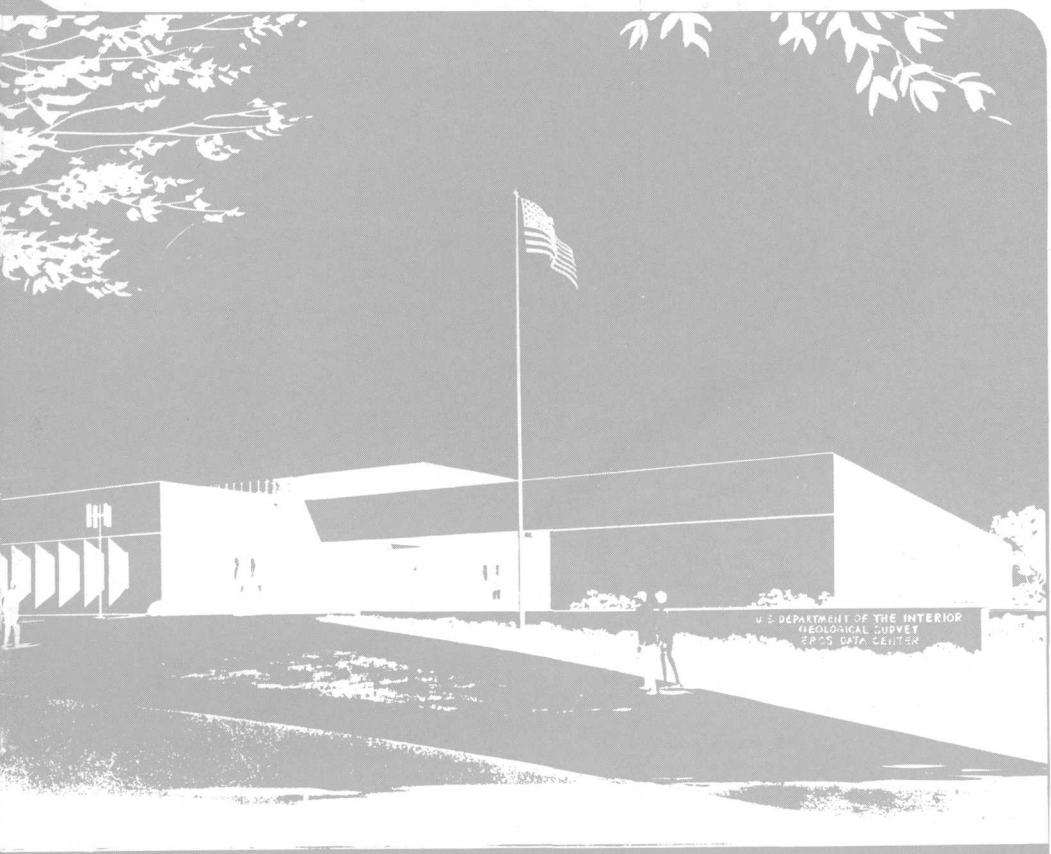
THE EROS DATA CENTER



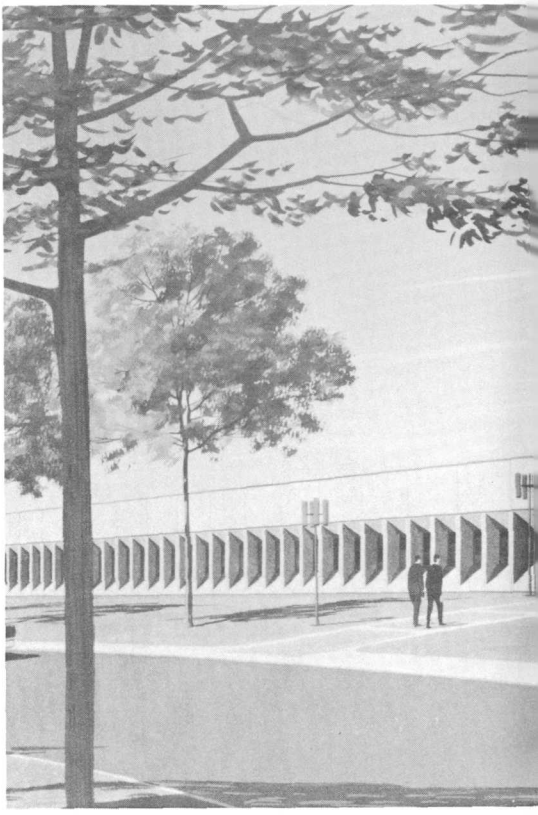
UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

USGS: INF–72–24

THE EROS DATA CENTER

The EROS Data Center in Sioux Falls, South Dakota, is operated for the Earth Resources Observation Systems Program of the Department of the Interior by the Topographic Division of the Geological Survey to provide access to Earth Resources Technology Satellite (ERTS) imagery, USGS aerial photography, and NASA aircraft data for the general public, domestic government agencies at all levels, and foreign government agencies at all levels, and foreign governments. Facilities are available for data storage, retrieval, reproduction, and dissemination, and for user assistance and training.

The EROS Data Center is located at:
10th & Dakota Avenue
Sioux Falls, South Dakota 57198
This is a temporary location until the permanent center is completed at a site north of Sioux Falls. The services and products that are available at the interim facility will be available at the permanent Data Center.

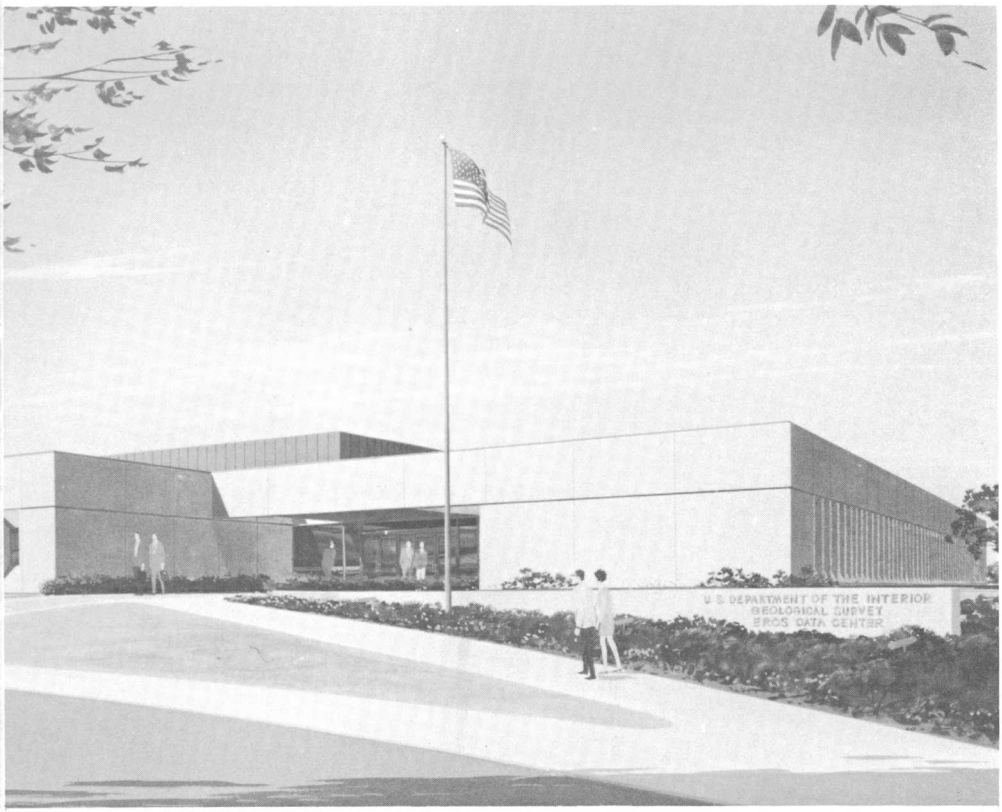


PRODUCTS

All products of the EROS Data Center are for sale. Price lists are available on request.

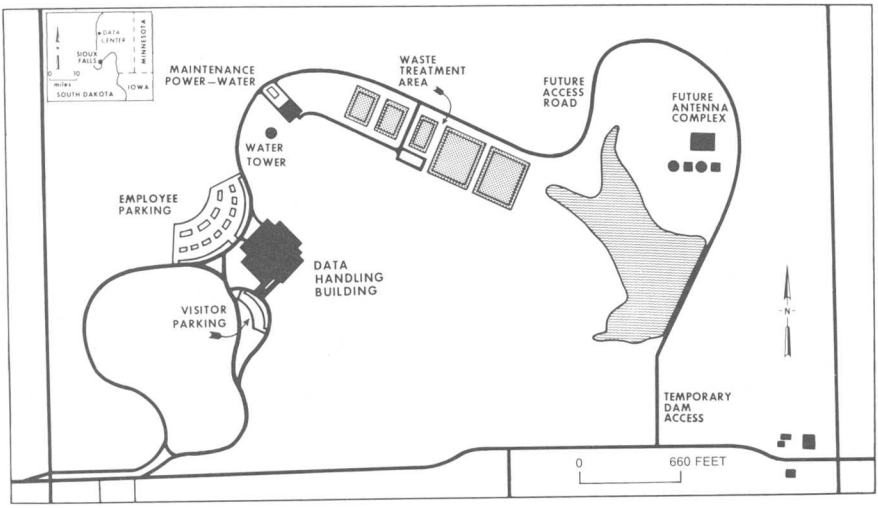
ERTS Imagery

ERTS imagery, originally processed at the Goddard Space Flight Center, NASA Data Processing Facility (NDPF), is a significant part of the Data Center imagery file. Each scene, covering 10,000 square nautical miles, is imaged seven times from ERTS-A and



Permanent location of the EROS Data Center, Sioux Falls, South Dakota.

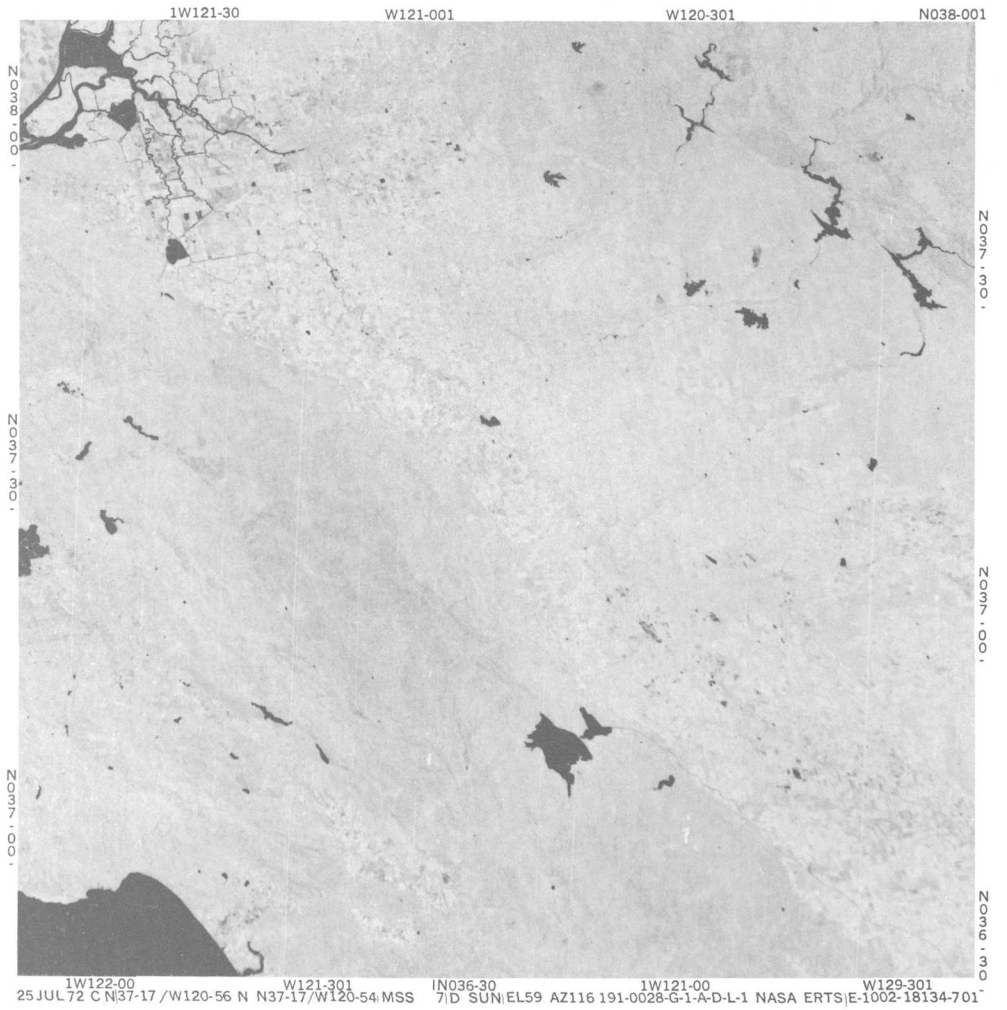
Site development plan for the EROS Data Center, Sioux Falls, South Dakota.



ERTS-B: three images from the Return Beam Vidicon (RBV) and four images from the Multispectral Scanner (MSS). The raw data are either system corrected images (bulk processed) and provided to the Data Center in the form of 70mm film, or scene corrected images (precision processed) and provided on 240mm film at a scale of 1:1,000,000. The Data Center has a catalog of the ERTS imagery and a 16mm browse film including only one RBV image and one MSS image per scene for rapid evaluation of coverage and cloud cover.

Copies of the system corrected individual images are available at contact scale, 1:3,369,000 approximately 2½ x 2½ inches or enlarged by a factor of 3.369 to 1:1,000,000 scale, approximately

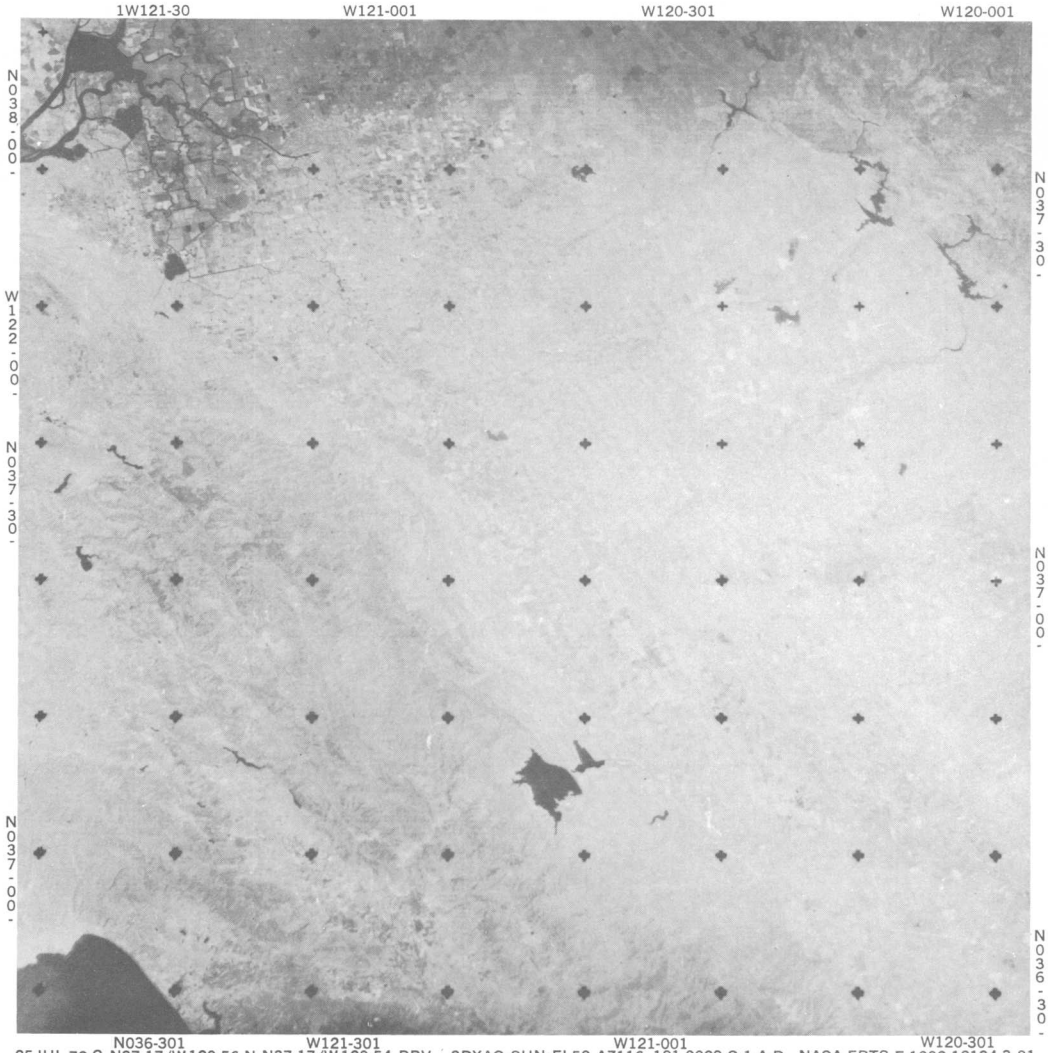
Format of system corrected (bulk) MSS 1:1,000,000-scale ERTS images. Actual ERTS image trimmed (cropped) for purposes of this illustration.

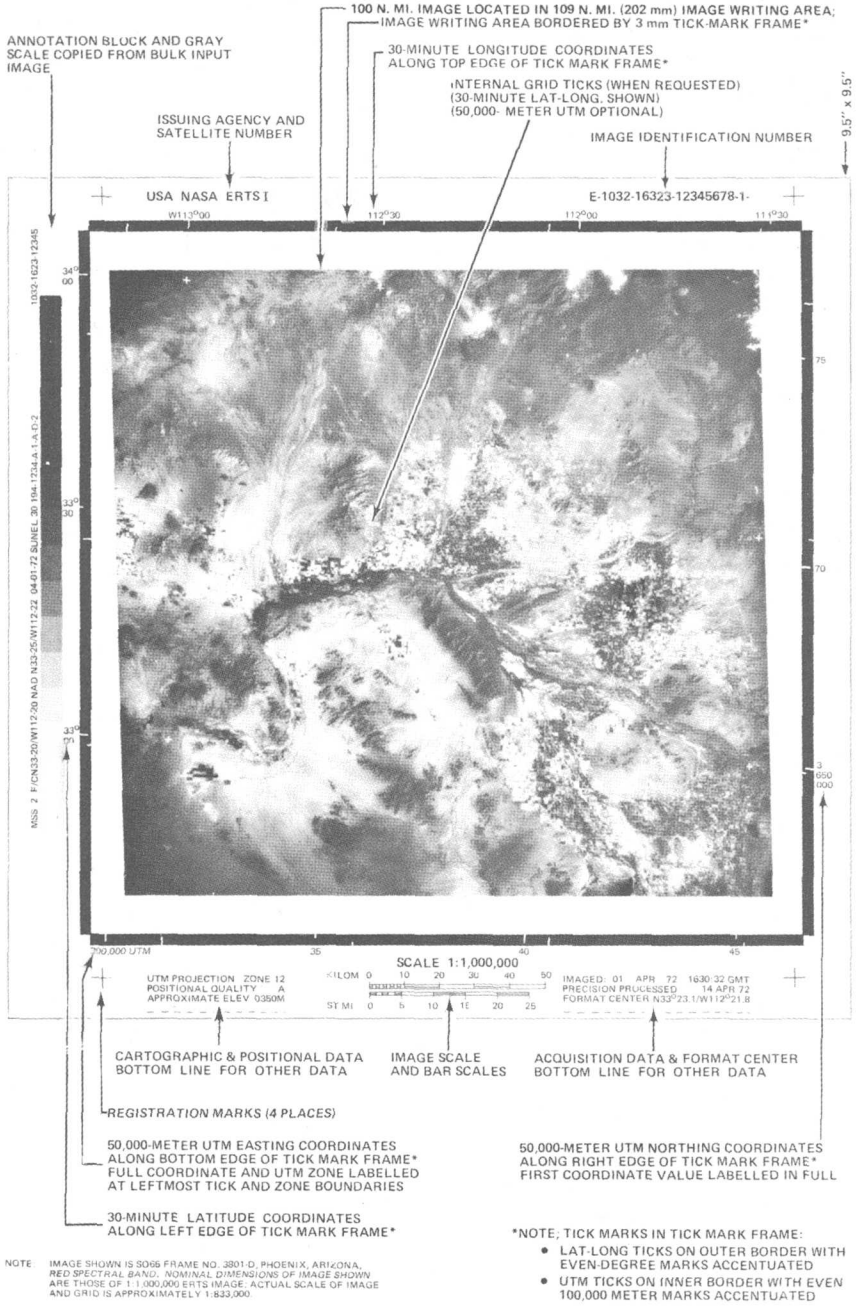


9 x 9 inches including marginal data. Color composites, derived by processing the three RBV or three of the four MSS images together are available only at a scale of 1:1,000,000 of those frames prepared by NDPF.

Copies of scene corrected (precision) images may be obtained only at scales of 1:1,000,000 or larger. These images have been rectified at the NDPF to orthographic photographs and have been overprinted with the UTM grid. Both individual and color composites are available at 1:1,000,000-scale, approximately 9 x 9 inches including marginal data. Only about 5 percent of the ERTS images available in the Data Center will have been precision processed.

Format of system corrected (bulk) RBV 1:1,000,000-scale ERTS images. Actual ERTS image trimmed (cropped) for purposes of this illustration.





Format and annotations of scene corrected (precision) 1:1,000,000-scale ERTS images.

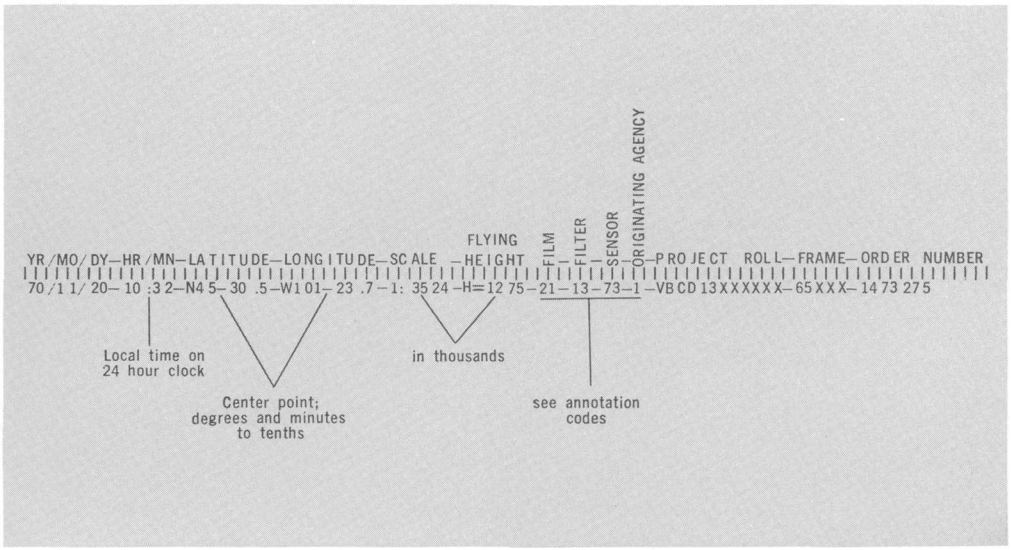
Processing time for most requests is 1 week. However, requests for film negatives, film positives, and paper prints of individual images enlarged to a scale of 1:250,000 will take at least 2 weeks to process.

NASA Aircraft Imagery and Photography

Imagery and photography obtained by NASA, as part of its Aircraft Program in support of the development of Earth Resources Surveys by aircraft and spacecraft, are processed at the Manned Spacecraft Center, Houston, Texas, and at the Ames Research Center, Moffett Field, California. The data were acquired for specific purposes and to varied specifications as to time, areal coverage, and sensors, and are primarily of test sites within the continental United States. Supplementary to the NASA Aircraft Program data, are the earth-oriented photographs from the Apollo and Gemini manned spacecraft missions. A catalog of all of this NASA imagery and photography, and browse films, are also at the Data Center.

Copies of these images and photographs may be purchased at contact scales, enlargements, or reductions, in color or black and white, on film or on paper, in rolls or cut. Provided with each image order are annotations on a computer printout that provide: date, local time, geographic coordinates, print scale, flying height, film, filter, sensor, originating agency, project, roll, and frame, and order number in an understandable code. A request for reproductions is normally processed within 1 week.

Annotations provided with non-ERTS data.



Annotation Codes

Film:

00	8401
01	8403
02	2405
03	2402
04	2403
05	2485
06	2498
07	3400
08	5425
09	3401
10	5401
11	XX (Kodak or Dupont)
20	8442
21	2448
22	2450
23	SO-121
24	SO-118
25	SO-368
26	SO397
27	D-500
28	D-1000
29	SO-271
30	SO-360
31	SO-278
32	267
33	-C
40	SO-246
41	2424
42	5424
43	-I
50	8443
51	8401
52	SO-117
53	SO-180
54	2443
55	2445
56	SO-356

Filter:

07	0.7 microns
2A	2A
2E	2E
3	3
5A	5A
5G	15G
6A	65A
7A	7A
7B	47B
8B	58B
9B	89B
12	12
15	15
20	2.0 AV
22	2.2 AV
25	25
38	38
47	47
48	48
57	57
58	58
A	57A
BL	Blue
CA	Clear AV
CL	Clear
W5	W-15
ZB	Zeiss B
ZD	Zeiss D
S1	0.41-0.46
S2	0.46-0.51
S3	0.52-0.56
S4	0.56-0.61
S5	0.62-0.67
S6	0.68-0.76
S7	0.78-0.88
S8	0.98-1.08
S9	1.09-1.19
SA	1.20-1.30
SB	1.55-1.75
SC	2.10-2.35
SD	10.2-12.5
T1	3.0-5.50
T2	0.3-0.55
T3	1.0-1.30
T4	1.5-1.8
T5	2.0-2.5
T6	1.0-2.5
T7	0.7-0.9
T8	8-14
T9	8-10.5
V1	0.475-0.575
V2	0.580-0.680
V3	0.690-0.760
V4	0.510-0.900
R1	RBV1
R2	RBV2
R3	RBV3
M4	MSS4
M5	MSS5
M6	MSS6
M7	MSS7
M8	MSS8
P1	0.400
P2	1.6
P3	13.3
P4	1.420
P5	10.625
P6	22.235
P7	22.355
P8	31.4
P9	10.69
PA	16.5

Annotation Codes

Sensor:

01	AAS-5UV
02	Bendix 24 CH
03	UM
04	RECON-4
05	RS-7
06	RS-14
07	RS-310
08	RS-314
09	S192
10	RBV
11	MSS
12	APQ-97
13	DPD-2
14	HP-307D
31	WILD RC-8
32	T-11
33	APS
34	K-17 CHI AER
35	K-17 Nikon Data
36	Zeiss
37	Zeiss RMK 30/23
38	Zeiss RMK 15/23
39	Hasselblad (40mm focal length)
40	ITEK MBAND (100mm focal length)
41	ITEK MBAND (150mm focal length)
42	Hass A
43	Hass B
44	Hass C
45	Hass D
46	Hass E
47	Hass F
48	KA62A
49	KA62B
50	KA62C
51	KA62D
52	S190
53	KA50A
54	Vinten
55	Smith
56	Fairchild
57	Hurd
58	Park
59	Wild RC-5
60	K17
61	Aero 63
62	Aerogon
63	Kargl
64	Aerogon Eng
65	Wild
66	Aero View
67	Kargl K-17
68	Kargl T-12
69	Wild RC-9
70	Aero

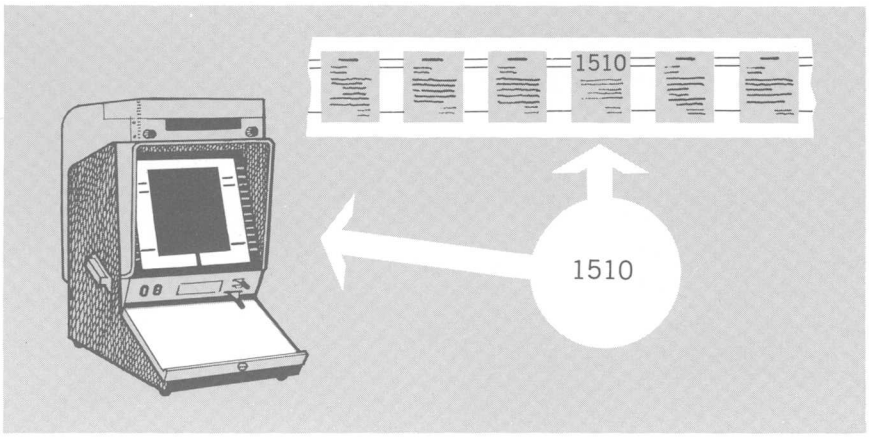
Originating agency:

1. U. S. Geological Survey
2. U. S. Bureau of Reclamation
3. U. S. Forest Service
4. U. S. Bureau of Land Management
5. NASA Ames Research Center
6. NASA (high altitude aircraft)
7. NASA, Manned Spacecraft Center (aircraft and Apollo and Gemini)
8. NASA (ERTS)
9. University of Michigan
A. U. S. Navy
B. U. S. Air Force

USGS Aerial Photography

Aerial photographs taken by the U. S. Geological Survey primarily for purposes of topographic and geologic mapping are available from the Data Center. The vast majority are black and white, vertical photographs at a scale of approximately 1:24,000, but they range in scale from 1:12,000 to 1:66,000. Contact prints are 9 x 9 inches. Because of the need to see the ground surface these photographs were usually taken in the late fall or early spring. Coverage is of discontinuous areas throughout the conterminous U. S., Alaska, Hawaii, and the Territories. The remainder are either low oblique, taken with cameras tilted approximately 20° from the vertical, or high-altitude photographs. Both are black and white and in a 9 x 9 inch format. In addition, photography flown in support of various projects of the Bureaus of Reclamation and Land Management is routinely provided to the U. S. Geological Survey for indexing and general distribution. These photographs are at various scales reflecting the specifications of the particular project. A computerized index to the USGS-held photographs and a browse film for evaluation of coverage are available at the Data Center.

All photographs are available at contact scales, enlargements, or reductions, on film or on paper, in rolls or cut. Provided with each photograph order are annotations on a computer printout that provide: date, local time, geographic coordinates, print scale, flying height, film, filter, sensor, originating agency, project, roll, and frame, and order number in an understandable code. Photographs obtained prior to 1941 are held by the National Archives and Record Service. This material is available on request but not within the normal 1 week reproduction time.

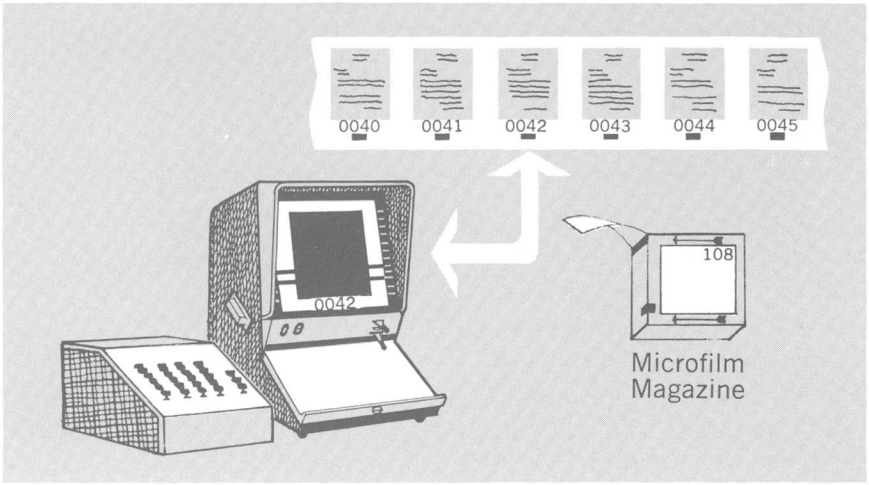


Browse film index code lines.

Browse Films

Copies of ERTS imagery, Aircraft Program imagery and photography, and USGS photography produced on 16mm film are available for purchase. These films are not intended for basic research. They are designed to provide prepurchase evaluation of such things as: areal coverage, cloud cover, and sensor angle. Most of the browse films have two indexes to locate scenes at high speeds: Kodamatic Indexer Codes Lines and Image Control; NASA aircraft program imagery and photography browse films have only Image Control. The film is supplied on an open reel and each film is designed so that it can be cut and mounted by the user for microfiche presentation.

Browse film image control.



Browse films for the ERTS data are updated every 18 days and are available on a subscription basis. Updating of the other browse films is irregular and films must be purchased individually.

SERVICES

Training

Periodically the scientific staff at the Data Center will offer discipline-oriented remote-sensing courses in agriculture, forestry, geography, geology, hydrology and oceanography. These will emphasize the use of ERTS data and will be offered as frequently as the demand requires. Course tuition will be commensurate with course cost.

There will be a basic remote-sensing course that will include simple interpretation tools and techniques for ERTS data. Topics covered will include: the electromagnetic spectrum, ERTS instrumentation and orbital characteristics, image enhancement and automatic data processing, and image retrieval systems.

An advanced scientific remote-sensing course will give research scientists an opportunity to study various research techniques in remote-sensing. This will include computer manipulation of digital data, density slicing, and analysis of the color additive process.

All correspondence concerning training should be addressed to:

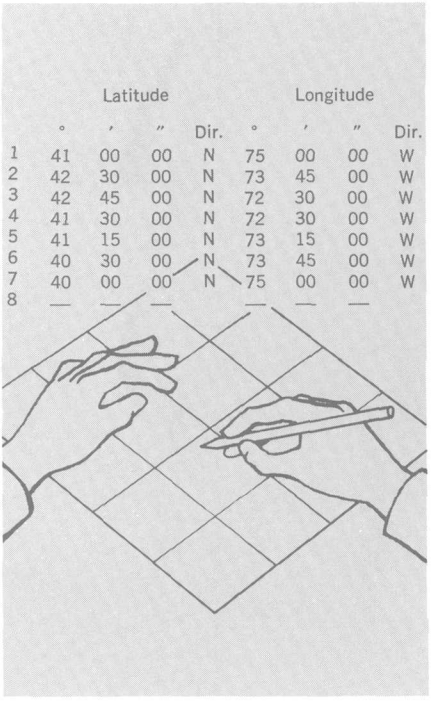
EROS Data Center
Training Officer
10th & Dakota Avenue
Sioux Falls, South Dakota 57198

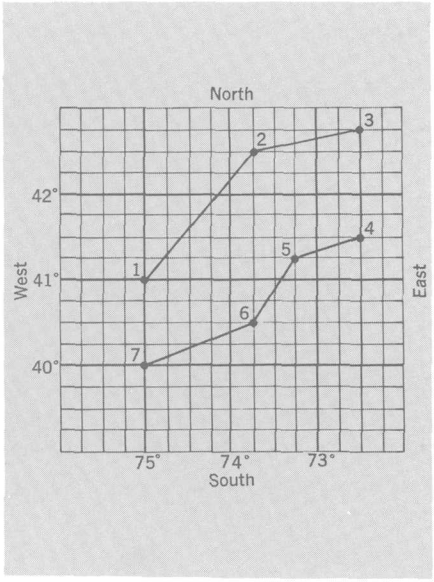
Assistance in Interpretation Techniques

Users who visit the Data Center will find special equipment available for the manipulation of the imagery, such as densitometers, additive color viewers, photo quantizers, zoom transferscopes and stereo viewers. The scientific staff is available for consultation on the use of this equipment and on interpretative problems.

How a Request is Handled

The Search—The EROS Data Center staff is prepared to assist in locating imagery and photography to suit individual needs. The computerized storage and retrieval system is based on a geographical system, including the UTM grid, supplemented by such information as: date, scale, originating agency and originator's identification number, image quality, cloud cover, stereo overlap, and type of image. Upon receipt of a request, the staff first locates the geographic area of interest. This may be a point location or an area of any size or shape that can be defined by a maximum of eight points. The area may be defined to an accuracy of 1/10th of a minute latitude and longitude. Then, based on required or desired scale, need for current data, and use to be made of the data, the computer will search for appropriate materials, indicating the number of items available that meet the specifications. When the number has been refined to a manageable few, the computer will printout the full references from which a final selection can be made. From information in the computer printout it is possible to locate the browse film of the imagery to check it for cloud cover and geographic coverage before placing an order.



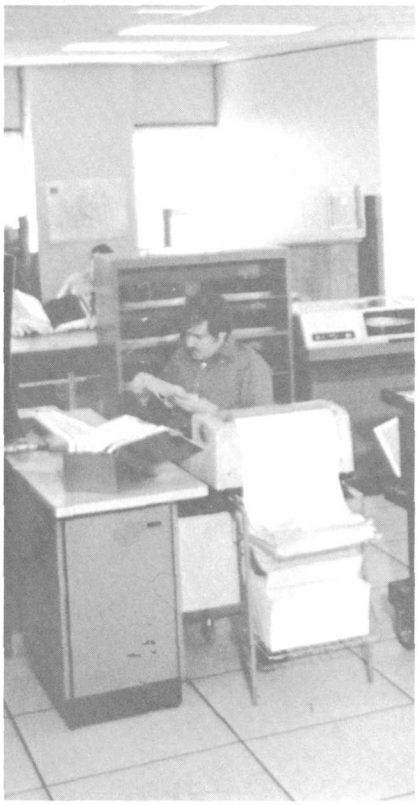


Sample grid describing geographic area by as many as eight points.

The Order—The Data Center staff translates requests for data into specific information required to complete the computerized order form. When the selection of data has been made, either using the search procedures available at the Data Center or from previous knowledge of the originating agency's identification number for the desired data, an order is typed on a machine that simultaneously produces paper copies and a magnetic card. In addition to the identification number of the specific photography or imagery, the order states: the number of copies, whether these are to be in black and white or in color, negatives or positives, paper prints or film, in rolls or cut to individual frames, among other things. A sample order form is shown on page nineteen. If the request has been made by letter or by telephone, copies of the formal order form will be returned to the requester for signature and prepayment. This can be accomplished immediately by the requester who is visiting the Data Center. Receipt of the payment initiates processing of the order.

The Computer—The core of the Data Center is the IBM 360/30 computer with 65,000 bytes of core storage and 116 million bytes of on-line disk storage. This is the device by which the imagery, photography and other data are stored and retrieved; it is the device by which searches are conducted; and it is the management tool for scheduling photo processing.

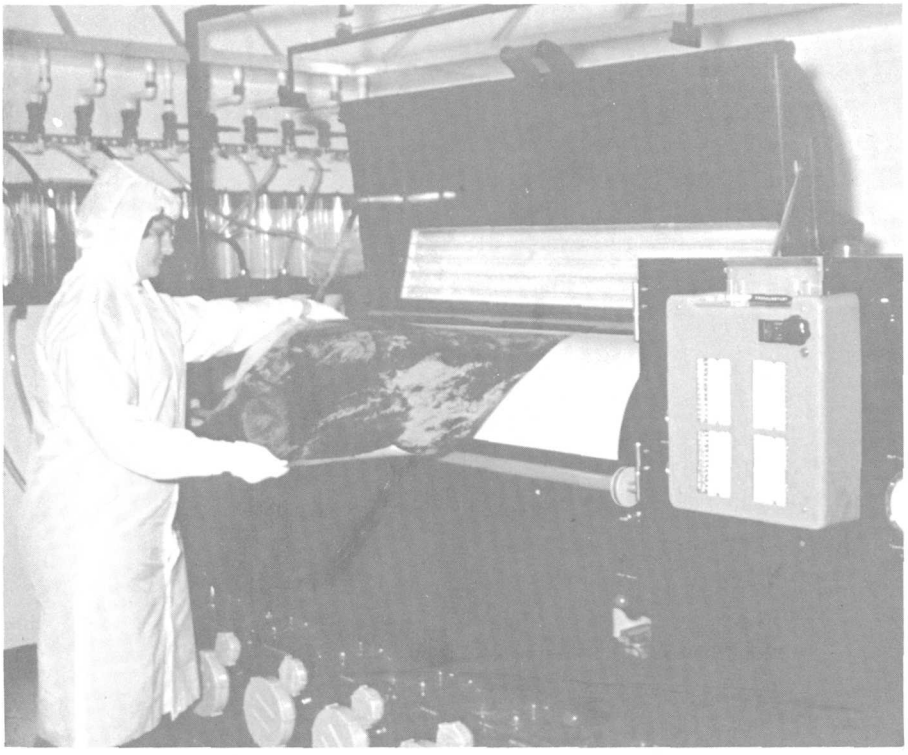
Periodically, the computer reads the accumulated orders that have been prepared simultaneously on paper and magnetic cards. From this reading the computer schedules the complete processing of the order: preparing instructions on where to retrieve the appropriate originals; what photo printer and processor are to be used, the number of copies and format, and preparing annotations for the non-ERTS image.



Searches, photo-processing scheduling, and many other activities are accomplished by use of the multipurpose computer at the Data Center.

The Photo Laboratory — The primary purpose of the Data Center is to provide reproductions of imagery and photography. The laboratory is equipped with modern cameras, contact and projection printers and processors to produce rapidly, high-quality reproductions in color and black and white. In order to maintain the highest standards of quality, the laboratory is operated in clean-room environment. The operation of the various printers and processors is scheduled by the computer to achieve the most efficient use of the equipment.

The photo laboratory is highly automated. Need for maintenance of quality photographic reproduction has resulted in its operation as a clean room environment.



Distribution—Completed orders are delivered to the distribution point where the completeness is rechecked against a computer printout of the original order. This copy also serves as a shipping manifest. The orders are then packaged and shipped.

Included as part of the shipping manifest is a computer printout of: date, local time, geographic coordinates, print scale, flying height, film, filter, sensor, originating agency, project, roll and frame, and order number in an understandable code for each item in the order. The recipient may elect to transfer this information to the imagery.

How to Place an Order

To obtain data you may:

Telephone—from 7:00 a.m. to 7:00 p.m., Central Time
605-339-2270 (commercial)
605-336-2381 (FTS users)

Visit—from 7:45 a.m. to 4:30 p.m., Central Time
EROS Data Center
10th & Dakota Avenue
Sioux Falls, South Dakota

Write—EROS Data Center
Data Management Center
Sioux Falls, South Dakota 57198

Imagery and photography—IF YOU NEED ASSISTANCE we will help you identify the data best suited to your needs, but you must be prepared to tell us:

1. Limits of the geographic area of interest
2. What you want to use the data for
3. How you want to use the data

IF YOU KNOW EXACTLY WHAT YOU WANT, please tell us:

1. *Originating Agency identification number.* Imagery or photography can be retrieved by the computer using the number applied to it by the originator. NASA earth resources photography can be identified by mission, roll, flightline, and run. NASA (Ames) ERTS simulation photography can be identified by year and roll accession number. U.S. Geological Survey photography is identified by project symbol. For all imagery you must, of course,

indicate the frames of interest. If you want a roll or part of a roll of data it is enough to provide the number of the first and last frames of interest.

2. *Number of copies per frame.*

3. Whether reproductions should be in *black-and-white or color.*

4. Whether reproductions should be *negatives or positives.*

5. Whether reproductions should be on *film or paper.*

6. Whether reproductions should be at *contact scale or enlarged.* If you want an enlargement, please indicate an *enlargement factor* in four digits with an appropriately placed decimal point, such as: 5.375, 10.25, or 0.753.

7. Whether reproductions should be delivered in a *roll or cut* into individual frames.

8. Whether reproductions should be *consecutive frames or alternate frames.* Much of the original data are rolls of film taken to provide stereo overlap. If you want stereo overlap you will usually need every frame. If you do not want stereo overlap you will usually need only every other or alternate frame.

9. You may also tell us whether the reproduction should be *dodged or undodged.* This is a method of photo printing in which the velocity or intensity of the light beam is modulated during exposure. By maintaining a desired density range throughout all parts of the print, whether exposed through dense or thin portions of the negative, distracting artifacts, such as join lines in a photomosaic are reduced.

10. Whether the reproductions should be printed normally or to *accentuate highlighted areas or shadowed areas.*

11. Whether the reproduction should be rectified, and if so, what corrections are to be made, providing x and y tilt data.

When ordering ERTS imagery you must also tell us:

12. Whether you want *MSS or RBV* imagery. If you want both, please request as separate items on your order.

13. *Spectral band or bands* desired: The band code is as follows:

MSS	**RBV**
1 = 0.5-0.6 micrometers	1 = 0.475-0.575 micrometers (green)
2 = 0.6-0.7 micrometers	2 = 0.580-0.680 micrometers (red)
3 = 0.7-0.8 micrometers	3 = 0.690-0.830 micrometers (solar infrared)
4 = 0.8-1.1 micrometers	

14. Whether you want a *color composite.* If you want specific bands and a color composite, please request as separate items on your order. Color composites are available only of those frames so processed by NDPF.

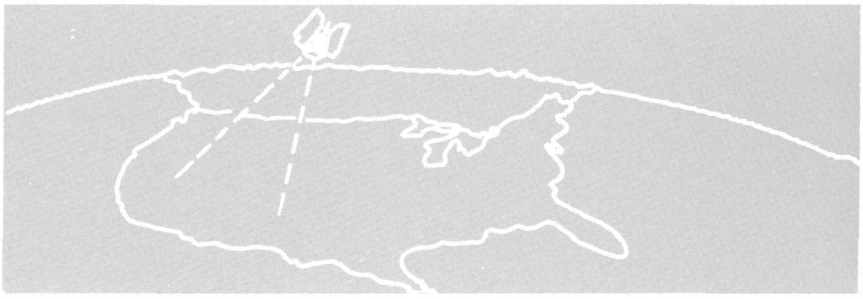
15. Whether you want *system corrected images (bulk) or scene corrected images (precision).* Scene corrected ERTS images are available only for those frames so processed by NDPF.

Browse Film—The browse films are prepared by consecutive EROS Data Center accession numbers, approximately 2000 frames per 16mm roll. If you do not know the appropriate accession numbers for the data you want, please specify the originating agency, the geographic area, and the date or range of dates the browse film should cover.

All orders must be accompanied by prepayment. Normal 1 week processing of orders is from date of receipt of payment. Orders for enlargements of ERTS data other then 1:1,000,000-scale and USGS photography obtained prior to 1941 will require longer processing time.

Prices

A current price list is available on request. Checks, money orders, or drafts should be made payable to the U. S. Geological Survey. Extra charges for shipment by Air Express or Airmail, and Special Delivery are paid by the purchaser. In addition to the cost of your reproduction, you will be assessed the cost of any required interim step product. For example, if you order a black and white positive print from an original color positive transparency, it will be necessary to produce a negative as an interim step. Any such interim products will be retained by the Data Center and made a permanent part of the collection.



GPO 940-215

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
TOPOGRAPHIC DIVISION

SIOUX FALLS, SOUTH DAKOTA 57198

☐ REGISTER MARK

ORDER NUMBER | NAME (LAST, FIRST) | COMMERCIAL

ORGANIZATION | ADDRESS | FTS

ACCOUNT NUMBER | ZIP

☐ AIR MAIL

PHOTO-IDENTIFICATION	FIRST FRAME	PHOTO-IDENTIFICATION	ROLL	LAST FRAME	UNIT NUMBER	SAME PRECEDING	Product Desired: NO. OF COPIES	BLACK & WHITE	OR COLOR	NEGATIVE OR	POSITIVE	FILM OR	PAPER	CONTACT OR	ENLARGEMENT	DELIVERED ROLL	OR CUT (FLAT)	CONSECUTIVE	OR	ALTERNATE FRAMES	Printing Instructions: DODGED OR	UNDODGED	HIGHLIGHTS	NORMAL	SHADOW	ENLARGEMENT FACTOR	* RECTIFY	ERT Satellite Images: MSS OR	RBV	SPECTRAL BAND DESIRED 1	2	3	4	5	* COLOR COMPOSITE	BULK DATA	PREC. PROCESSED	EDC Use Only: ENTIRE ROLL	FORMAT	FRAME EQUIVALENCY	FILM	PROCESS	TOTAL THIS UNIT

TOTAL ORDER ☐☐☐☐☐☐☐☐

DATE: _____

CUSTOMER'S SIGNATURE: _____

EDC USE ONLY _____

EDCOM FORM 7
AUGUST 7, 1972

As the Nation's principal conservation agency, the Department of the Interior has basic responsibilities for water, fish, wildlife, mineral, land, park, and recreational resources. Indian and Territorial affairs are other major concerns of America's "Department of Natural Resources."

The Department works to assure the wisest choice in managing all our resources so each will make its full contribution to a better United States—now and in the future.