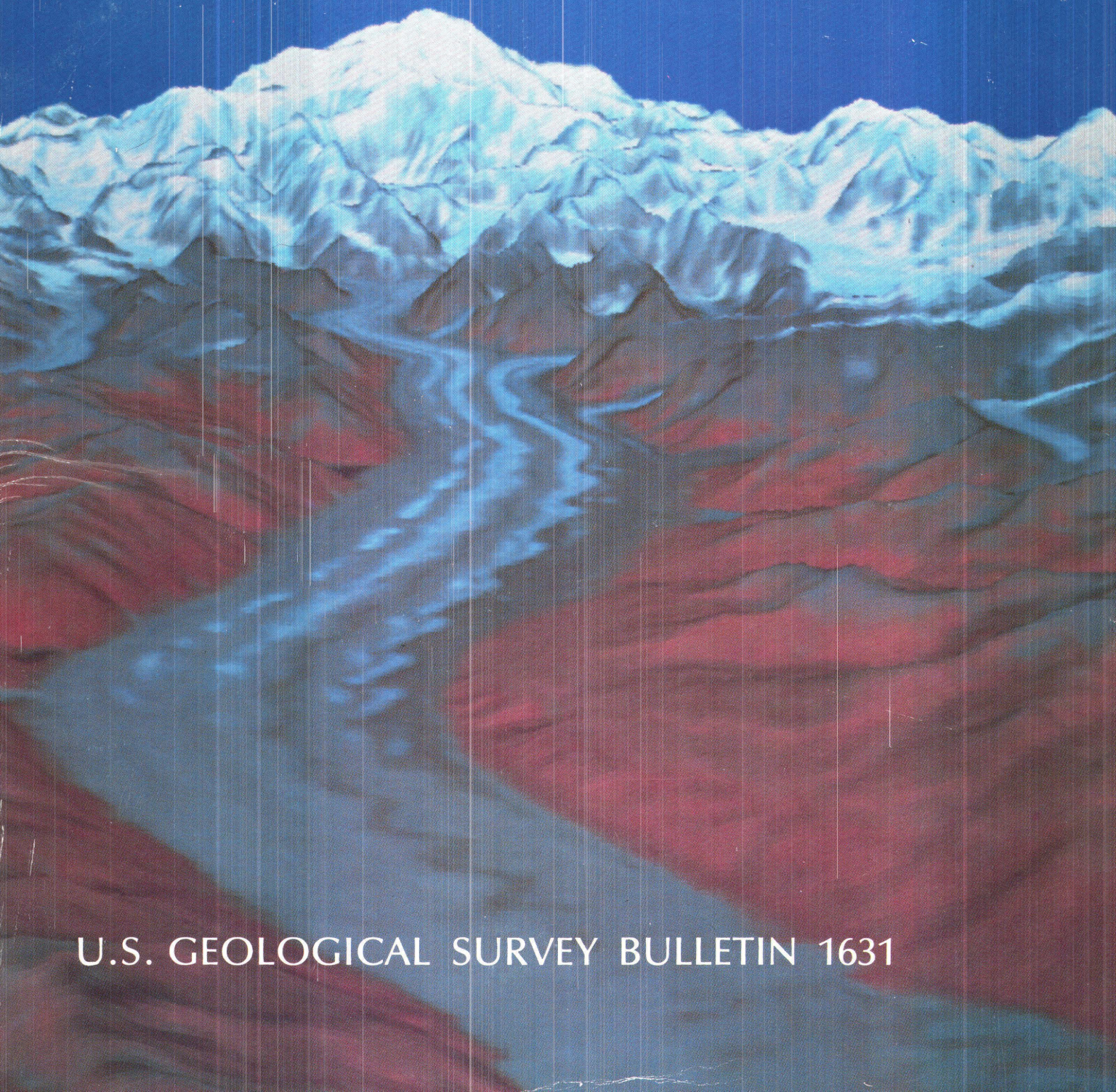
Characteristics and Availability of Data From Earth-Imaging Satellites



U.S. GEOLOGICAL SURVEY BULLETIN 1631

Cover: This high, oblique view of Mount McKinley, Alaska, was produced by digital merging of a Landsat multispectral scanner false color composite image (ID 30537-20443, Path 76, Row 16) acquired August 24, 1979, with the corresponding digital terrain data. The image simulates the view from a point 15,000 feet above the Tokositna River. (Produced by the EROS Data Center, National Mapping Division, U.S. Geological Survey, Sioux Falls, South Dakota.)

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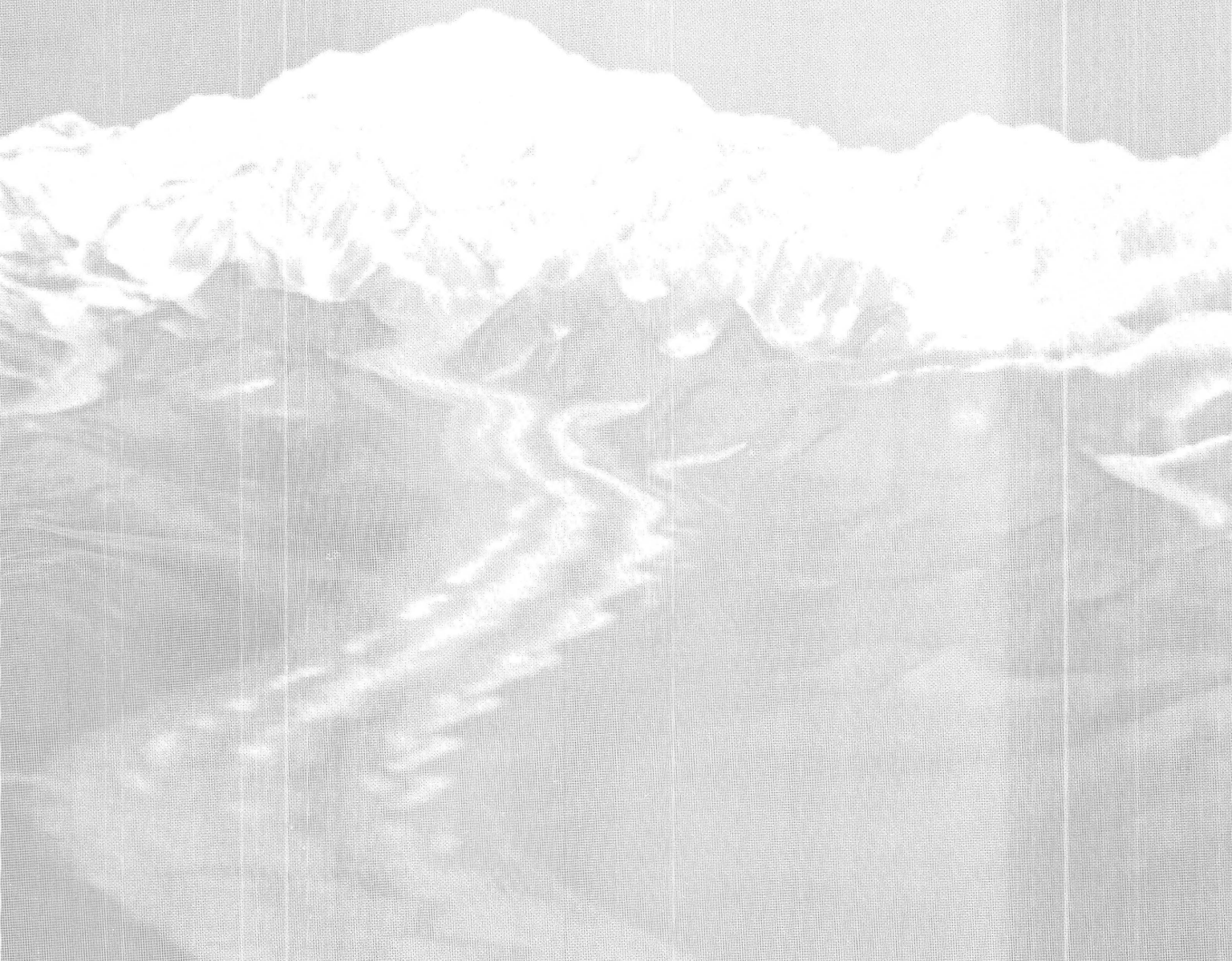
By C. Scott Southworth



U.S. GEOLOGICAL SURVEY BULLETIN 1631

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Characteristics and Availability of Data From Earth-Imaging Satellites

By C. Scott Southworth

Abstract

In the past 10 years, the United States has launched numerous satellites equipped with systems for imaging the Earth. Although all of these satellites were launched by the National Aeronautics and Space Administration (NASA), several government agencies, including the U.S. Geological Survey (USGS), NASA, and the National Oceanic and Atmospheric Administration (NOAA) are responsible for archiving and distributing data from specific satellites. Remote sensing technology has evolved so rapidly, however, that a comprehensive listing of the various data bases does not exist. This report compiles the types of satellite data information available from the individual federal agencies. The objectives are to describe the sensor characteristics, indicate what data are available, show coverage index maps and sample data products, and list additional sources of information of several Earth-imaging systems, specifically, Landsat, Heat Capacity Mapping Mission, Seasat, Nimbus-7, and shuttle imaging radar-A.

Introduction

Images of the Earth acquired from space have provided multidisciplinary scientists with a unique perspective for studying Earth resources and the dynamic nature of our planet. Numerous satellites launched within the past decade have acquired an enormous number of Earth images that enable comparative studies of past and present and also make possible future studies of the Earth. This document provides a description of several Earth-imaging satellites, sensors, available data products, and sources of information to allow persons rapid access to remotely sensed data. Characteristics and specifications of Earth-imaging systems and data were compiled from over 30 existing publications to provide a concise guide to help people obtain imaging data to support scientific investigations.

Only Earth-imaging satellites with sensors having moderate to high spatial resolution (800 m–25 m) are presented. This discussion includes Landsat, Heat Capacity Mapping Mission, Seasat, Nimbus-7, and shuttle imaging radar-A. Information on low resolution (>1 km) meteorological satellites, such as NOAA's Global Operation Environmental Satellite (GOES) and Television-Infrared Observational Satellite (TIROS), is discussed by McClain (1980) and Cornillion (1982).

In this bulletin each satellite is briefly described. The descriptions are followed by tables that provide (1) satellite launch and orbital statistics, (2) sensor types and characteristics, (3) the location of the data archive, and (4) the data products available. Sample images are provided as well as index coverage maps and, in some cases, data listings. Data user's guides and key applications references are described in each introductory section, and information sources and handbooks are listed in table 9. Department of the Army (1979), Cornillion (1982), Williams (1983), and Southworth (1983) have useful information on satellite data bases; however, no single publication contains coverage maps and geographic data listings for all the satellites discussed in this bulletin. Although data users should obtain all material referenced herein, this paper is designed to provide them a one-stop guide to some of the available data from Earth-imaging satellites.

Acknowledgments

Acknowledgment for the production of existing documents and technical review of this report is owed to representatives of each Federal Government data center, specifically, Leo A. Braconnier and Karla K. Sprenger, User Services, USGS EROS Data Center, Bruce Needham, National Environmental Satellite Data and Information Service (NESDIS), NOAA, and Linda C. Brenton and Yi-Tsuei Sheu, National Space Science Data Center (NSSDC). Additional acknowledgment for technical review is owed to Richard S. Williams, Jr., Daniel H. Knepper, Jr., and Terri L. Purdy, Branch of Geophysics, USGS, and Locke Stuart, HCMM Project Office, NASA Goddard Space Flight Center.

Landsat

Landsat 1, 2, and 3 contained two independent sensors, the multispectral scanner (MSS) (Taranik, 1978a) and the return beam vidicon (RBV) camera. Landsat 4 and 5 also contained two independent sensors, the MSS and the thematic mapper (TM). Of the five satellites only Landsat 4 and 5 remain in operation. By mid-1982, over 1 million images had been acquired by Landsat 1, 2, and 3.

Landsat detects reflected energy in discrete wavelengths and provides data having a pixel resolution of 79 m for the Landsat 1, 2, 3, 4, and 5 MSS and Landsat 1 and 2 RBV, and a pixel resolution of 30 m for Landsat 3 RBV and Landsat 4 and 5 TM's. Landsat 4 and 5 TM band 6 detects emitted thermal-infrared energy (10.4–12.5 μm) at a pixel resolution of 120 m. The digital MSS, TM, and Landsat 3 RBV data are used for energy and mineral resource exploration, structural analysis, vegetation classification, monitoring of dynamic phenomena, and shallow seas mapping. Landsat and its geological applications are further detailed by Short and others (1976), Williams and Carter (1976), Lintz and Simonett (1976), Smith (1977), Taranik (1978b), Lillesand and Kiefer (1979), Sabins (1978, 1981), Siegel and Gillespie (1980), Slater (1980), Short (1982), and Williams (1983).

The Landsat Data User's Handbook (U.S. Geological Survey, 1979) and the Landsat Data User's Notes, published quarterly by NOAA, provide information on the Landsat program. Landsat data can be accessed through microfiche and microfilm and the Inquiry Order and Accounting (INORAC) system. The U.S. Geological Survey's National Cartographic Information Center (NCIC) offices and NCIC State affiliate offices support Landsat data user's requests (Clarke and others, 1982) (U.S. Geological Survey, 1981).

Table 1 provides characteristics of Landsat 1, 2, and 3 satellites and sensors, available data, and location of the data archive; table 2 provides similar information for Landsat 4 and 5. Figures 1, 2, and 3 portray Landsat MSS, RBV, and TM image examples, respectively. Figure 4 depicts U.S. coverage of Landsat 4 and 5.

Table 1. Characteristics of the Landsat 1, 2, and 3 satellites, sensors, and available data

LAUNCH DATES:

Landsat 1–July 23, 1972. Operation ended on January 6, 1978.
(Until the launch of Landsat 2, Landsat 1 was called ERTS 1 (Earth Resources Technology Satellite 1.)
Landsat 2–January 22, 1975. Operation ended on February 8, 1982.
Landsat 3–March 5, 1978. Operation ended on March 31, 1983.

ORBITAL ELEMENTS:

Orbit:	Circular, near polar.
Inclination:	99.09°.
Altitude:	919 km.
Coverage:	81°N. to 81°S.
Period:	103 minutes with crossing of Equator at 9:30 a.m., local time.
Cycle:	18 days. Note: Landsat 3 followed Landsat 2 by 9 days, providing 9-day repetitive coverage.

SENSORS:

Return Beam Vidicon (RBV) Cameras

	Wavelength (μm)	Pixel spatial resolution (m)	Image format/Comments
Landsats 1 and 2, three RBV cameras:			
Band 1	0.475–0.575 (blue-green)	80	Simultaneous view from 3 cameras of a scene 185 km × 185 km with 14 percent sidelap at Equator and 10 percent forward lap along orbital track. Coverage similar to the single MSS Image. Frame format.
Band 2	0.580–0.680 (yellow-red)	80	
Band 3	0.690–0.830 (red-infrared)	80	
Landsat 3, two RBV's			
	0.505–0.750 (panchromatic into near-infrared)	30	Two side-by-side, slightly overlapping images 98 km × 98 km (4 RBV images coincide with a single MSS frame). Frame format.

Table 1. Characteristics of Landsat 1, 2, and 3 satellites, sensers, and available data—Continued.

Multispectral Scanner (MSS)

	Wavelength (μm)	Pixel spatial resolution (m)	Image format/Comments
Landsats 1, 2, 3			
Band 4	0.50–0.60 (green)	80	185-km strip images have 10 percent forward lap and 14 percent sidelap at Equator and these increase toward the poles.
Band 5	0.60–0.70 (red)	80	
Band 6	0.70–0.80 (near-infrared)	80	
Band 7	0.80–1.1 (near-infrared)	80	
Landsat 3 only:			
Band 8	10.4–12.5 (thermal infrared)	240 Range of thermal sensitivity: 260K–340K	Thermal sensor never operated properly. Usable data available for only a few areas.

DATA ARCHIVE:
NOAA/NESDIS
Landsat Customer Services
Mundt Federal Building
Sioux Falls, South Dakota 57198
(605) 594-6511
FTS: 784-7151

STANDARD FILM OR COMPUTER-COMPATIBLE TAPE (CCT) FORMATS OF LANDSAT MSS AND RBV IMAGE PRODUCTS AVAILABLE

Standard Landsat Images

Image Size	Nominal Scale	Product Format
55.8 mm (2.2 in)	1:3,369,000	Film Positive
55.8 mm (2.2 in.)	1:3,369,000	Film Negative[1]
18.5 cm (7.3 in.)	1:1,000,000	Paper
18.5 cm (7.3 in.)	1:1,000,000	Film Positive
18.5 cm (7.3 in.)	1:1,000,000	Film Negative[1]
37.1 cm (14.6 in.)	1:500,000	Paper
74.2 cm (29.2 in.)	1:250,000	Paper

Computer-compatible tapes (CCT's)

Tracks	Bits Per Inch	Format
9	1,600	Tape Set
9	6,250	Tape Set

[1] Film products are available in black-and-white or color; color is not available in the film negative format. Landsat 3 RBV images are available only as 1:500,000-, 1:250,000-, and 1:125,000-scale, black-and-white, standard products at 18.5 cm, 37.1 cm, and 74.2 cm, respectively. Also, not all Landsat 3 RBV scenes are available in the CCT format.

Table 2. Characteristics of Landsat 4 and 5 satellites, sensors, and available data

LAUNCH DATES:
Landsat 4–July 16, 1982.
Landsat 5–March 1, 1984.

ORBITAL ELEMENTS:

Orbit:	Circular, near polar.
Inclination:	98.2°.
Altitude:	705 km.
Coverage:	81°N. to 81°S.
Period:	99 minutes, crossing Equator at 9:45 a.m., local time.
Cycle:	16 days.

Table 2. Characteristics of Landsat 4 and 5 satellites, sensors, and available data—Continued.

SENSORS:

Multispectral Scanner (MSS)

Band	Wavelength (μm)	Resolution (m)	Image format
1	0.50–0.60 (green)	80	185-km strip image framed with 5.4% forward lap, 7.3% sidelap at Equator, increasing toward poles.
2	0.60–0.70 (red)	80	
3	0.70–0.80 (near infrared)	80	
4	0.80–1.1 (near-infrared)		

Thematic Mapper (TM)

Band	Wavelength (μm)	Resolution (m)	Image format
1	0.45–0.52	30	185-km strip image framed with 5.4% forward lap, 7.3% sidelap at Equator, increasing toward poles.
2	0.52–0.60	30	
3	0.63–0.69	30	
4	0.76–0.90	30	
5	1.55–1.75	30	
6	10.40–12.50	120	
7	2.08–2.35	30	

DATA ARCHIVE:

NOAA/NESDIS
Landsat Customer Services
Mundt Federal Building
Sioux Falls, South Dakota 57198
(605) 594-6151
FTS: 784-7151

STANDARD FILM OR COMPUTER-COMPATIBLE TAPE (CCT) FORMATS OF LANDSAT MSS AND TM IMAGE PRODUCTS AVAILABLE

Standard Landsat (MSS) Images

Image Size	Nominal Scale	Product Format[1]
18.5 cm (7.3 in.)	1:1,1000,000	Paper
18.5 cm (7.3)	1:1,000,000	Film Positive
18.5 cm (7.3 in.)	1:1,000,000	Film Negative
37.1 cm (14.6 in.)	1:500,000	Paper
74.2 cm (29.2 in.)	1:250,000	Paper

Standard Landsat 4 and 5 TM Images

Image Size	Scrounge	Tips	Product Format
18.5 cm (7.3 in.)	1:750,000	1:1,000,000	Paper
18.5 cm (7.3 in.)	1:750,000	1:1,000,000	Film Positive
18.5 cm (7.3 in.)	1:750,000	1:1,000,000	Film Positive
37.1 cm (14.6 in.)	1:375,000	1:500,000	Paper
74.2 cm (29.2 in.)	1:187,500	1:250,000	Paper

Computer-compatible tapes (CCT's)

Tracks	Bits Per Inch	Format
9	1,600	Tape Set
9	6,250	Tape Set

[1] NOTE: Film products are available in both black-and-white and color; color is not available in the film negative format.

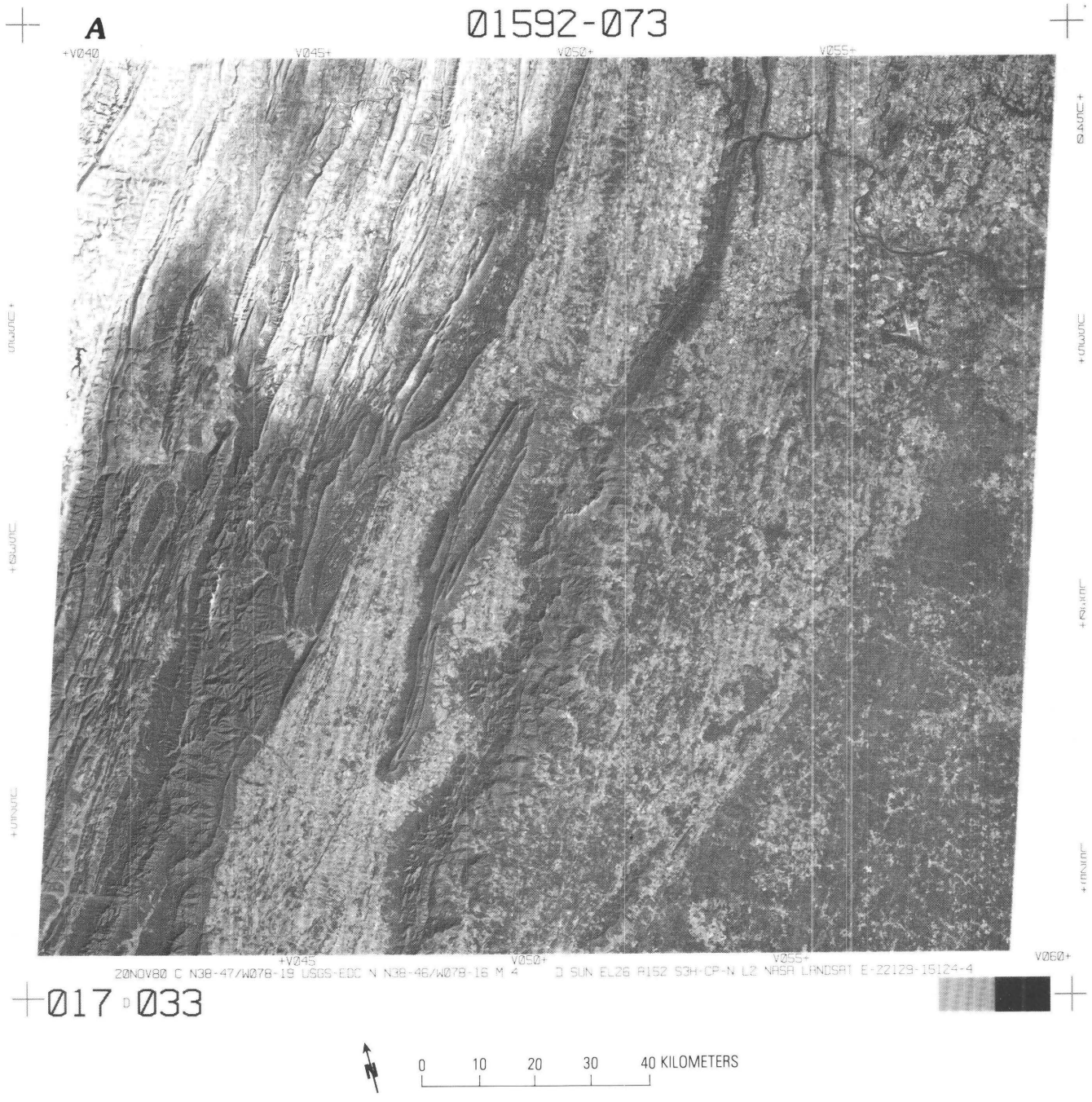


Figure 1. Landsat 2 multispectral scanner images (bands 4 through 7) (ID 22129–15124, path 17, row 33) acquired November 20, 1980, over the Blue Ridge Mountains of Virginia. From the east (right) to the west (left) are the Piedmont Province, Triassic basins, Blue Ridge anticlinorium, Shenandoah Valley, Massanutten Mountain, and the Valley and Ridge Province. Light snow cover in upper left of image provides topographic enhancement. The scale of the 79-m resolution 9 inch by 9 inch prints is 1:1,000,000. For comparison see figures 2, 3, and 7 for Landsat RBV, TM, and Seasat SAR images of the same region. *A*, band 4 (0.5–0.6μm) provides data on water turbidity.

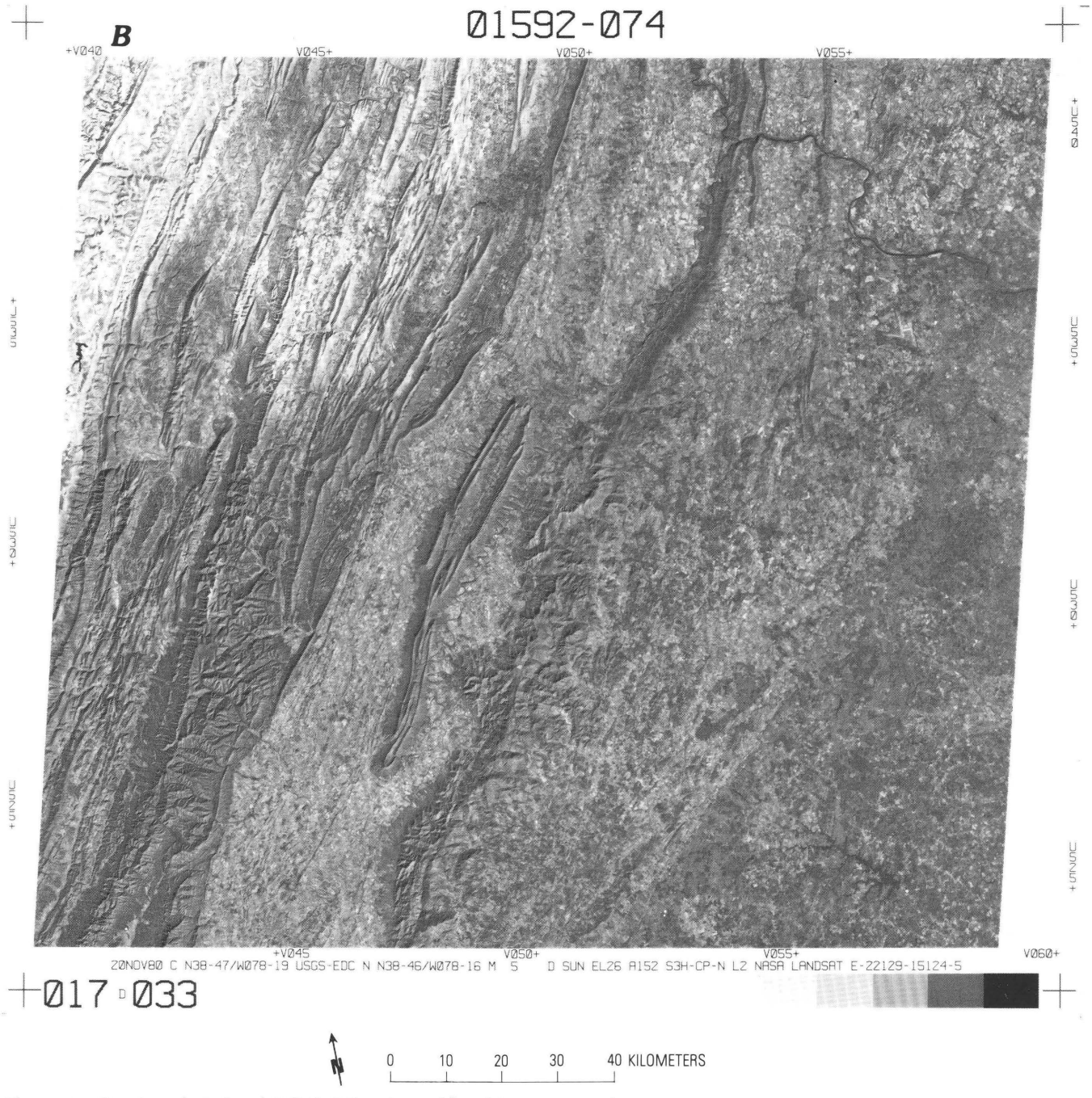


Figure 1.—Continued. *B,* Band 5 (0.6–0.7 μm) provides data on vegetation.

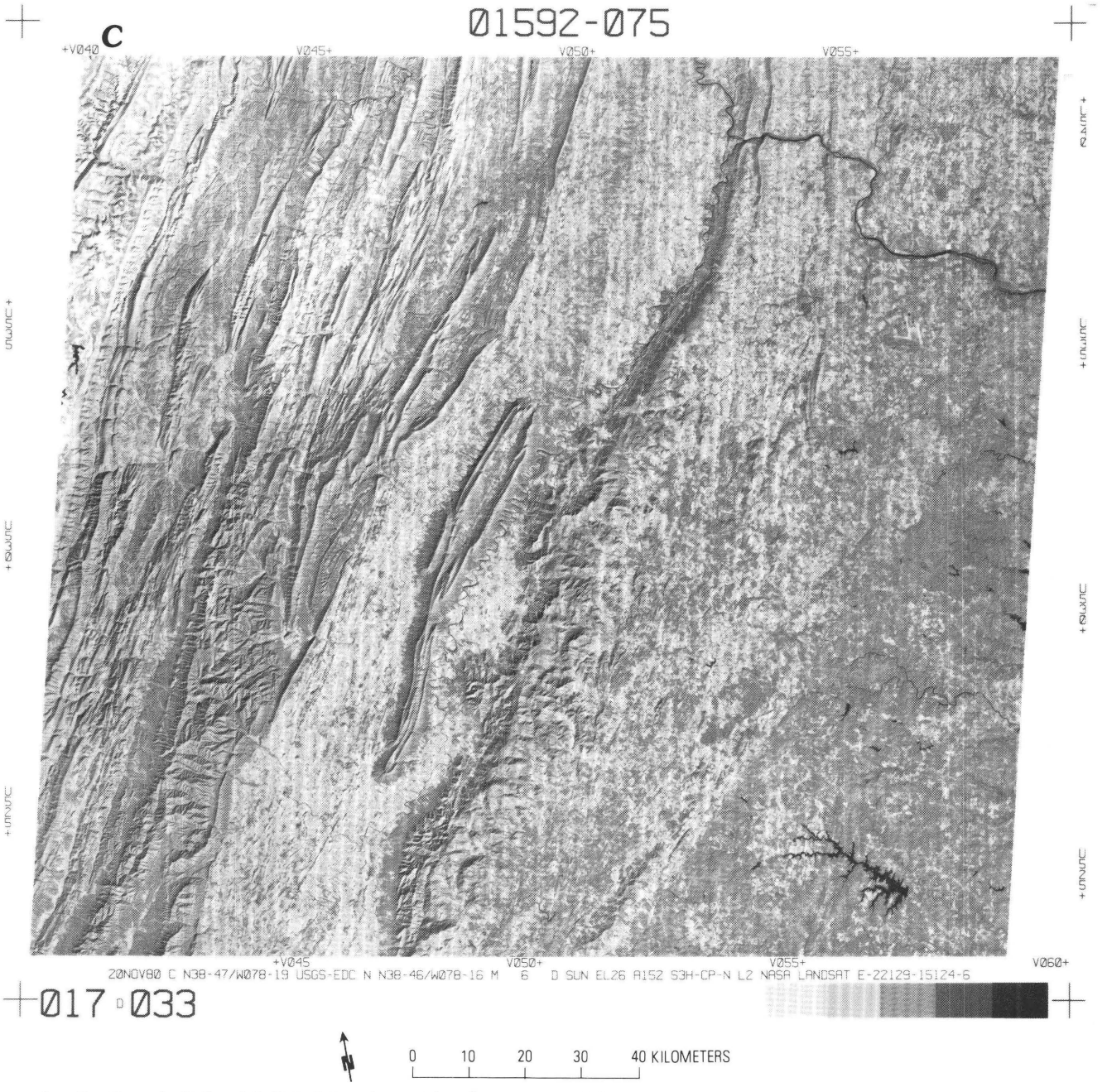


Figure 1.—Continued. *C*, Band 6 (0.7–0.8 μm) provides data on vegetation.

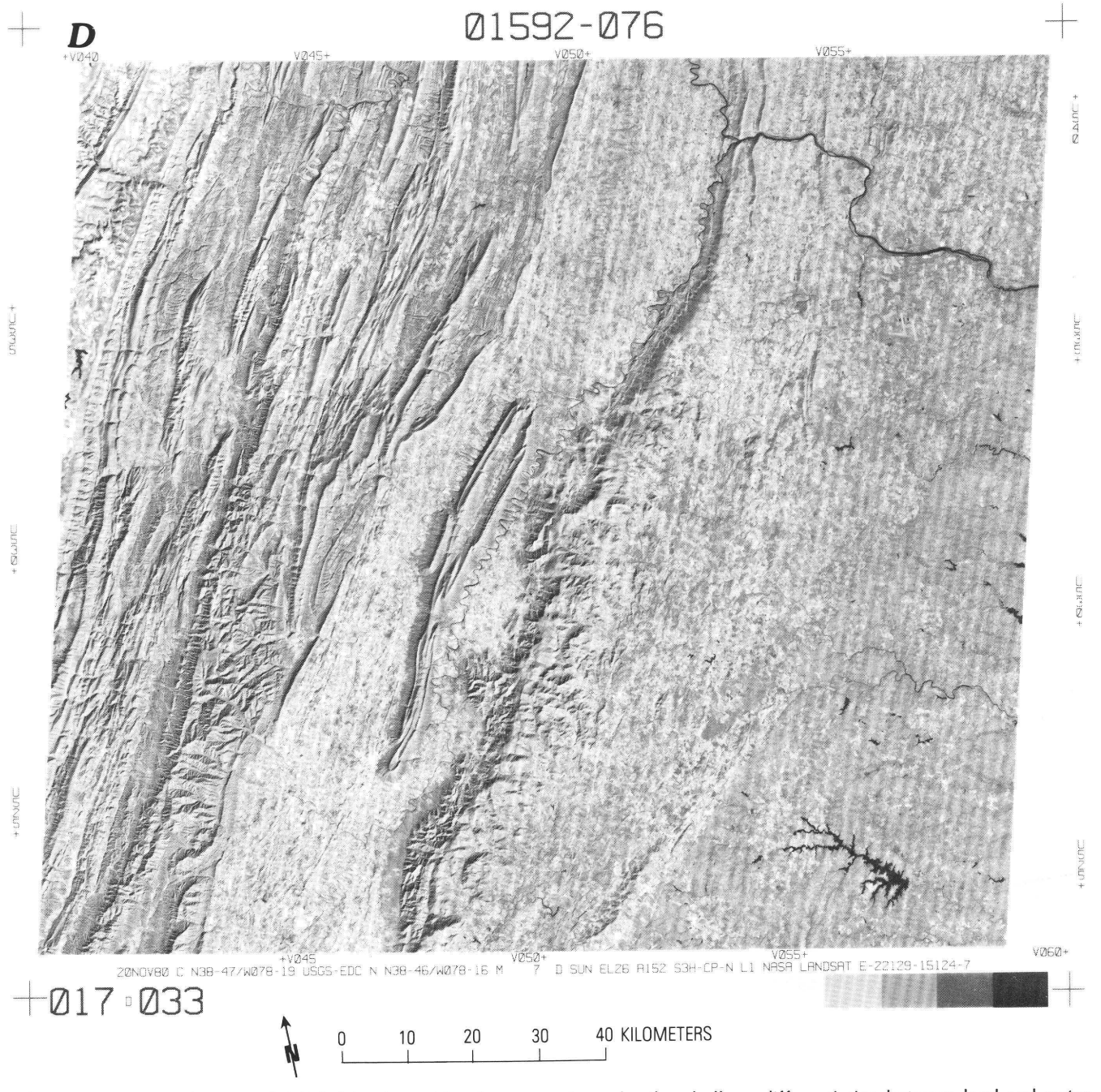


Figure 1.—Continued. *D*, Band 7 (0.8–1.1μm) provides data on rocks and soil and allows differentiation between land and water bodies due to the high reflectance of vegetation and absorption by water in the near-infrared.

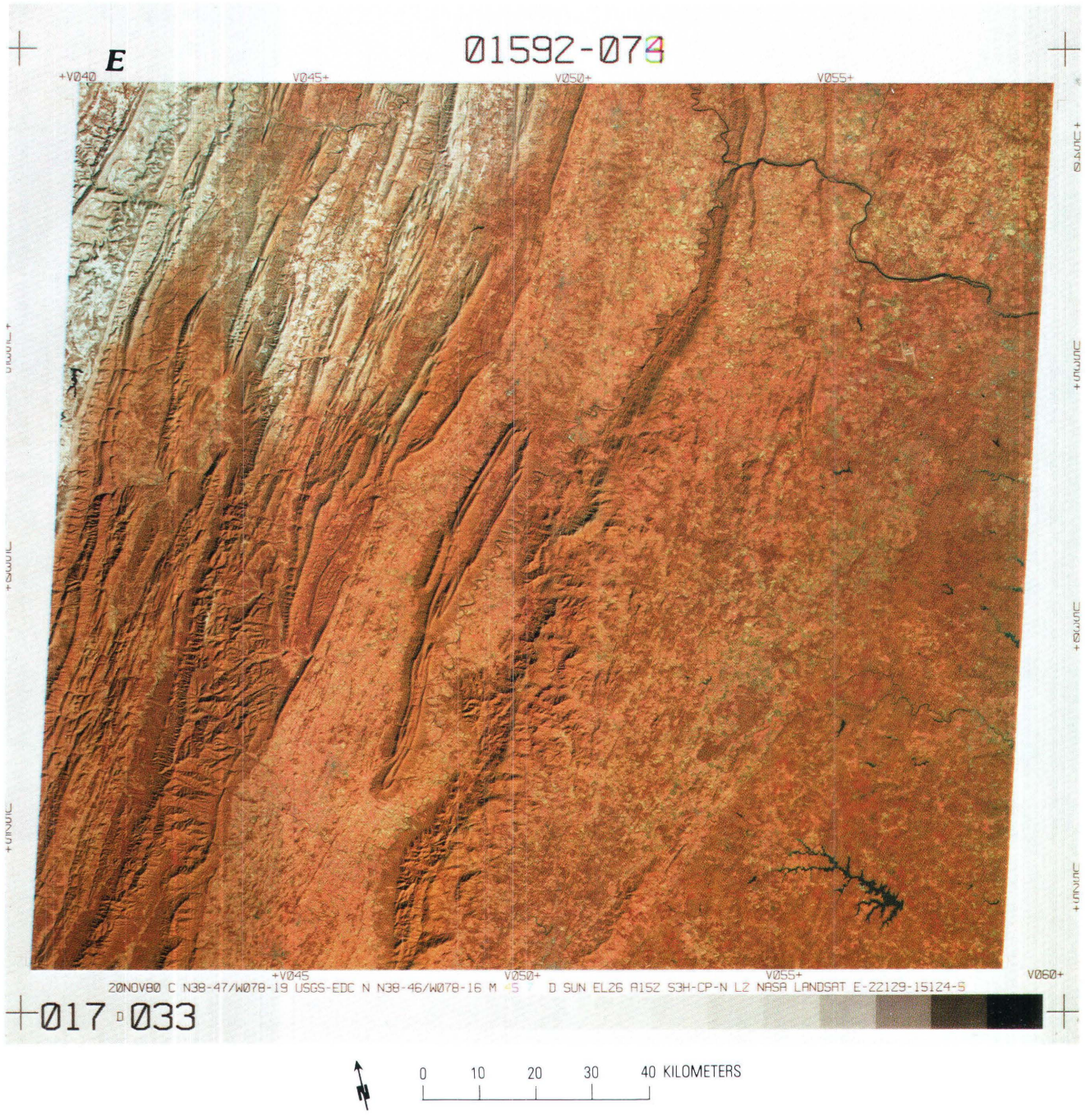


Figure 1.—Continued. *E*, A false-color composite (FCC) produced by combining bands 4, 5, and 7 with a blue, green, and red filter, respectively.

Figure 2. 1:500,000-scale Landsat 3 return beam vidicon subscene C (ID 31090–15052 x C) acquired February 27, 1981, over the Valley and Ridge Province, Virginia and West Virginia. Precambrian to Cambrian rocks compose the Blue Ridge Mountain anticlinorium, which trends northeast on the right side of the image. The Massanutten Mountain syncline lies in the Shenandoah Valley, which is composed of sedimentary units of Cambrian to Devonian age. To the west are the folded and thrust-faulted Appalachian Mountains, which are composed of sedimentary units of Cambrian through Devonian age. The black reseau marks (+) are etched into the faceplate of the vidicon camera to provide a means of restoring the geometric fidelity of the 30-m resolution imagery. The broad waveband, 0.505–0.750 μm, provides hue similar to black-and-white aerial photographs for transfer of field data from large- to small-scale images. See figures 1, 3, and 7 for Landsat MSS, TM, and Seasat SAR images of the same region.

Figure 3. Landsat 4 thematic mapper (TM) images (ID 40123–15272, path 17, row 34) acquired November 16, 1982, over the folded and faulted Appalachian Mountains near Roanoke, Virginia (right-center of image). The narrow spectral bands and 30-m resolution of the TM provide significant improvement over the multispectral scanner. From the lower right to upper left, the 1:1,000,000-scale image shows the Piedmont Province, Blue Ridge Mountains, Valley and Ridge Province, and the Appalachian Plateau. See figures 1, 2, and 7 for Landsat MSS, RBV, and Seasat SAR images of the same region. *A*, band 1 (0.45–0.52μm) allows observation of turbid water.

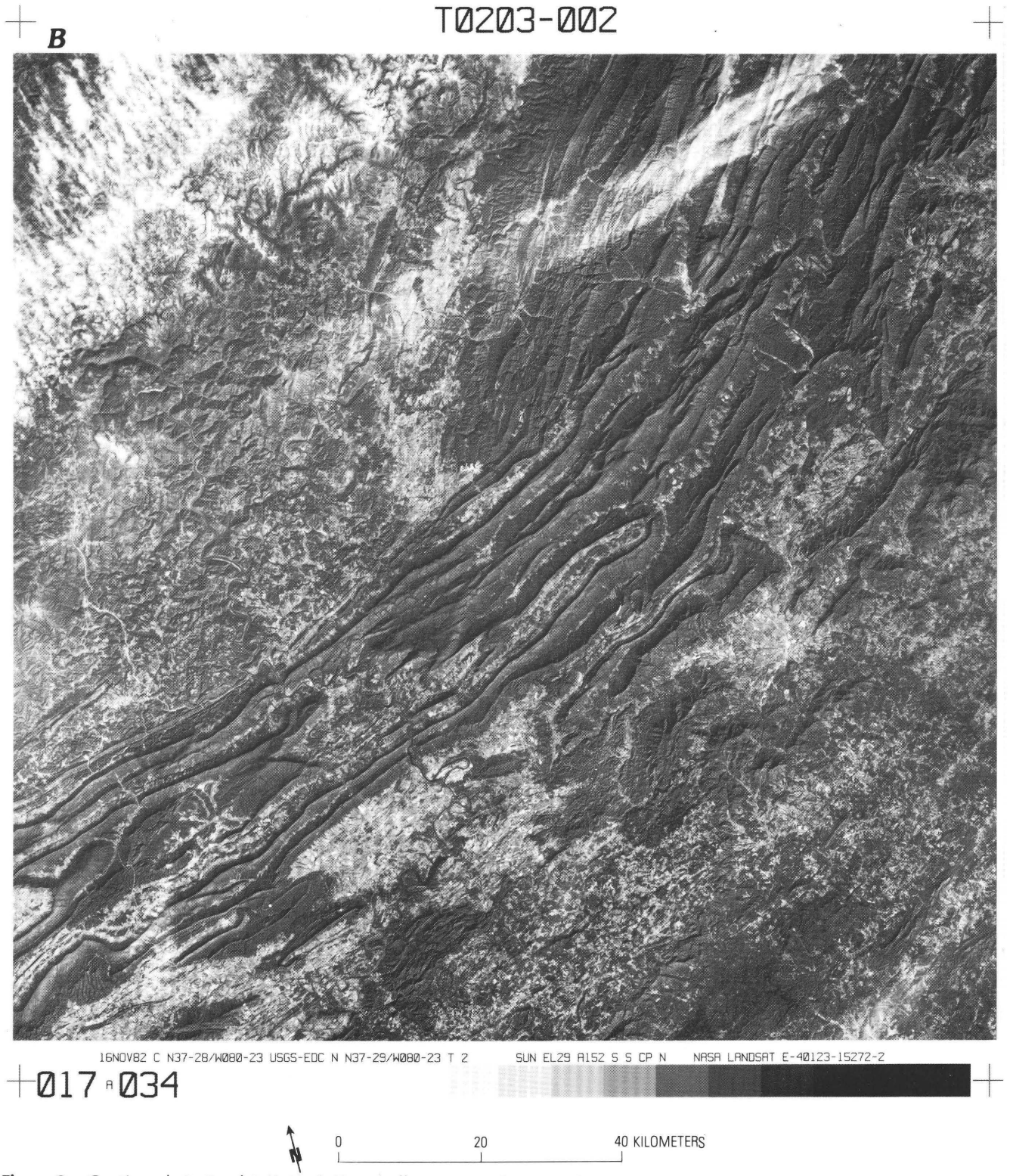


Figure 3.—Continued. *B,* Band 2 (0.52–0.60 μm) allows vegetation mapping.

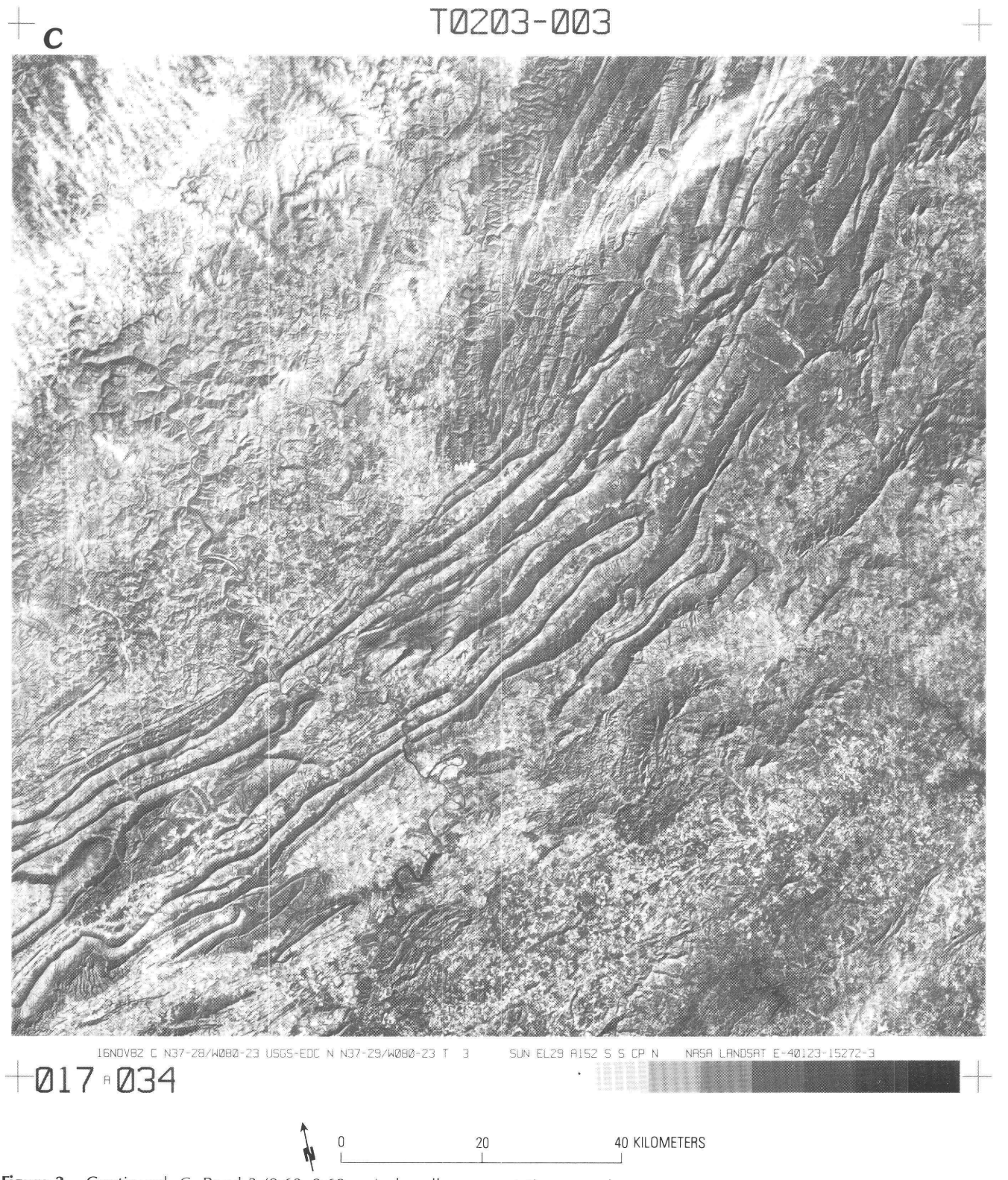


Figure 3.—Continued. *C*, Band 3 (0.63–0.69 μm) also allows vegetation mapping.

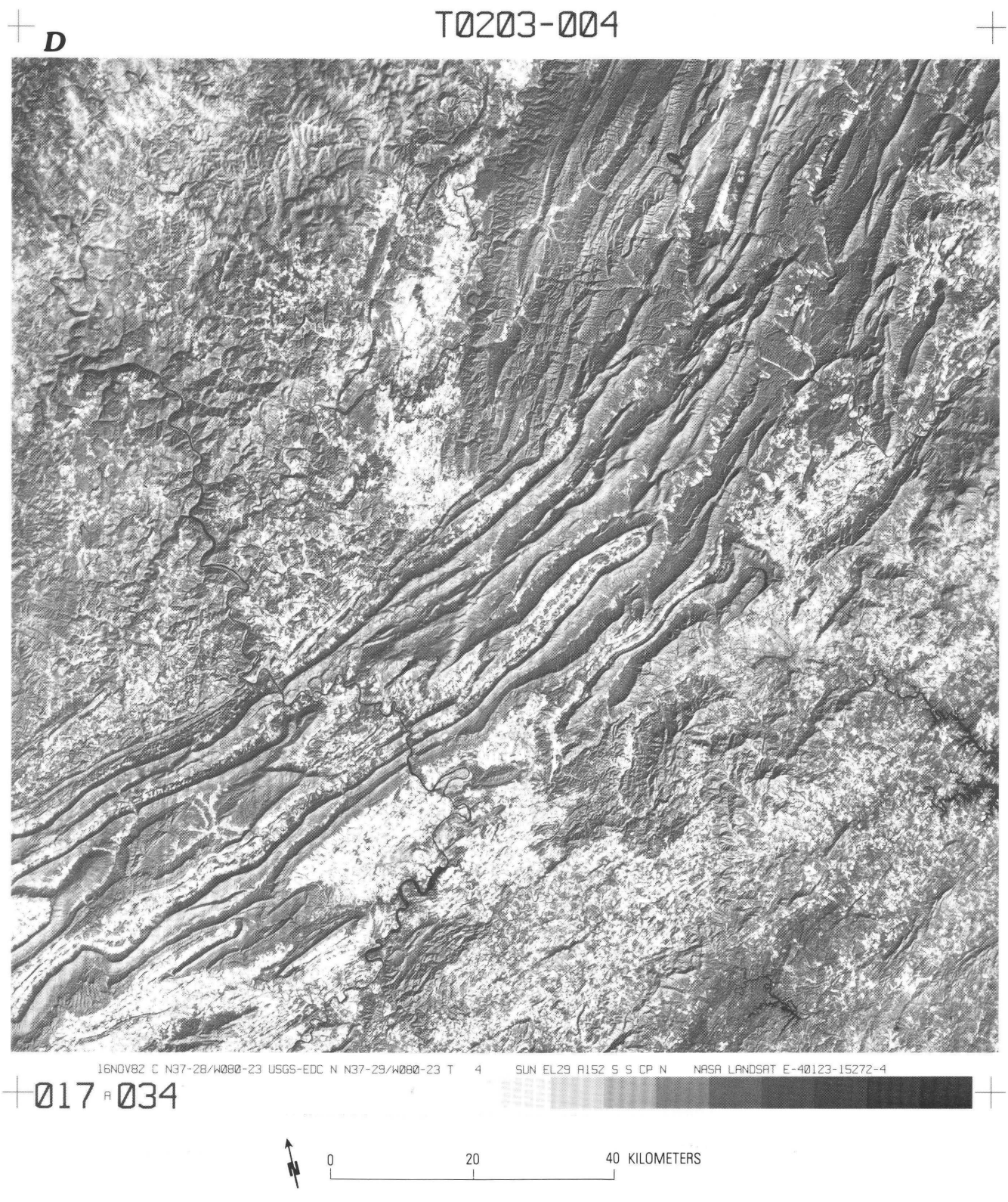


Figure 3.—Continued. *D,* Band 4 (0.76–0.90 μm) separates vegetation from water.

Figure 3.—Continued. *E,* Band 5 (1.55–1.75 μm) allows snow/cloud differentiation.

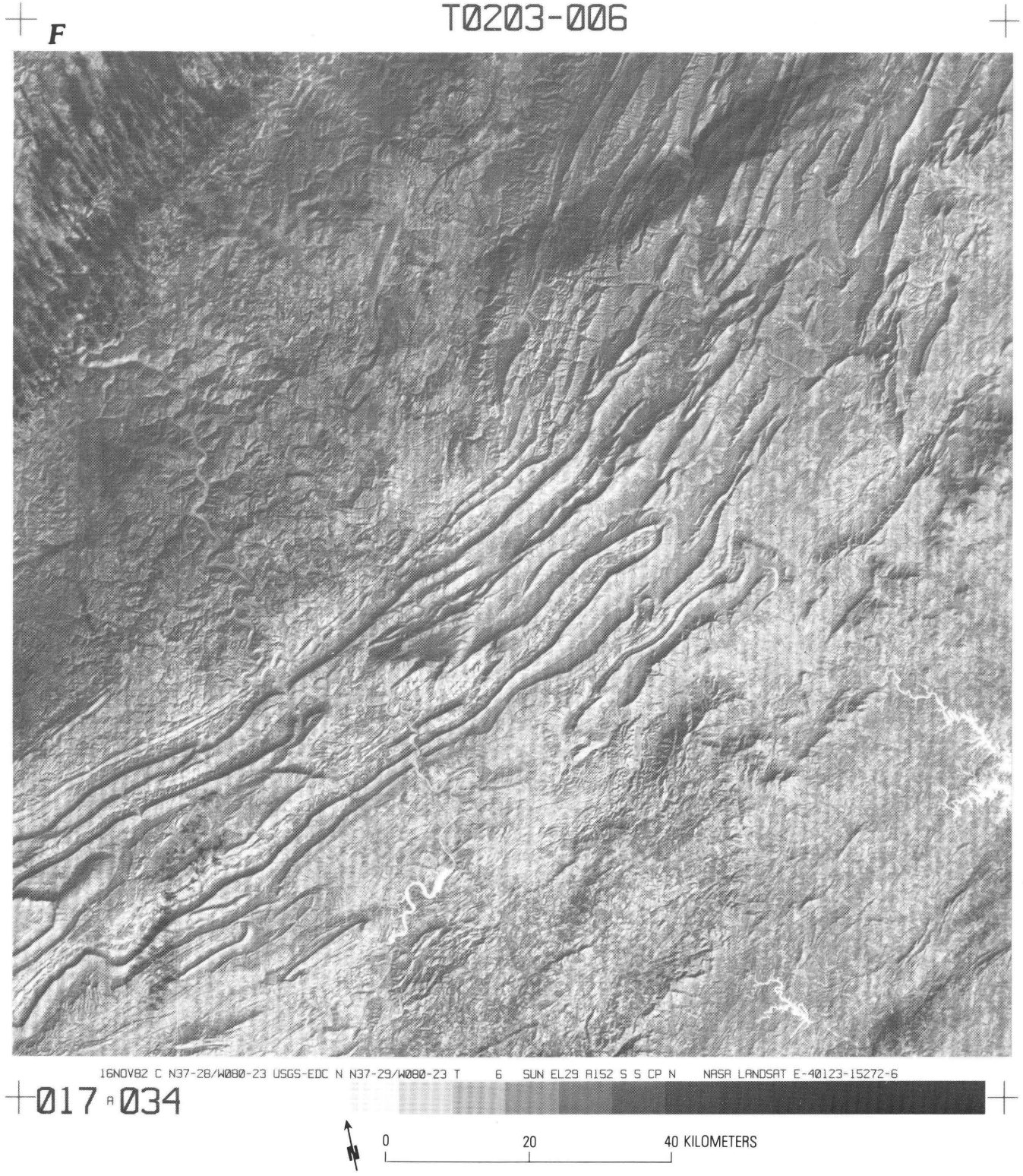


Figure 3.—Continued. *F,* Band 6 (10.4–12.5 μm) allows mapping of temperature differences.

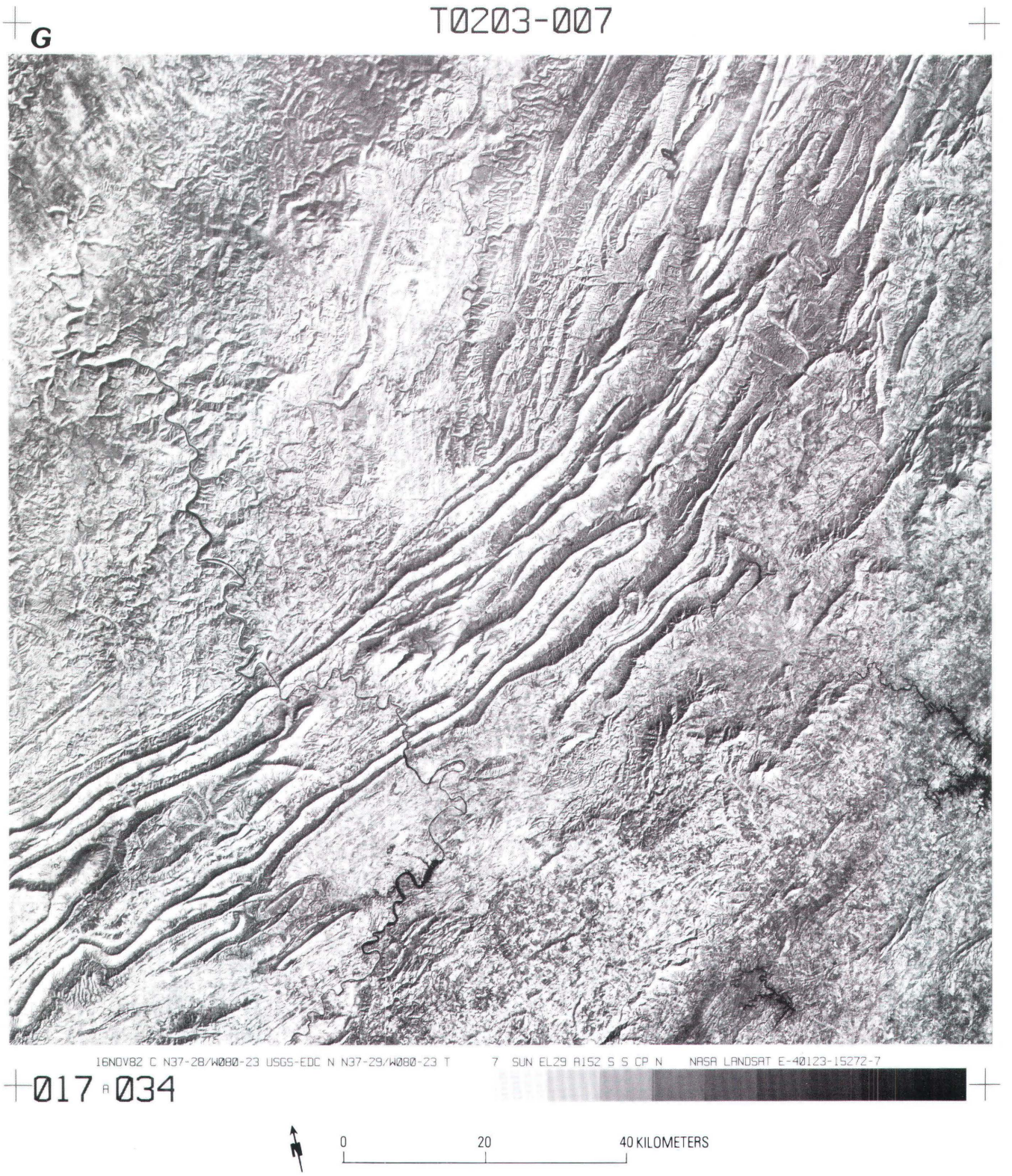


Figure 3.—Continued. *G*, Band 7 (2.08–2.35μm) is sensitive to absorption bands of common hydrothermal alteration clay minerals.

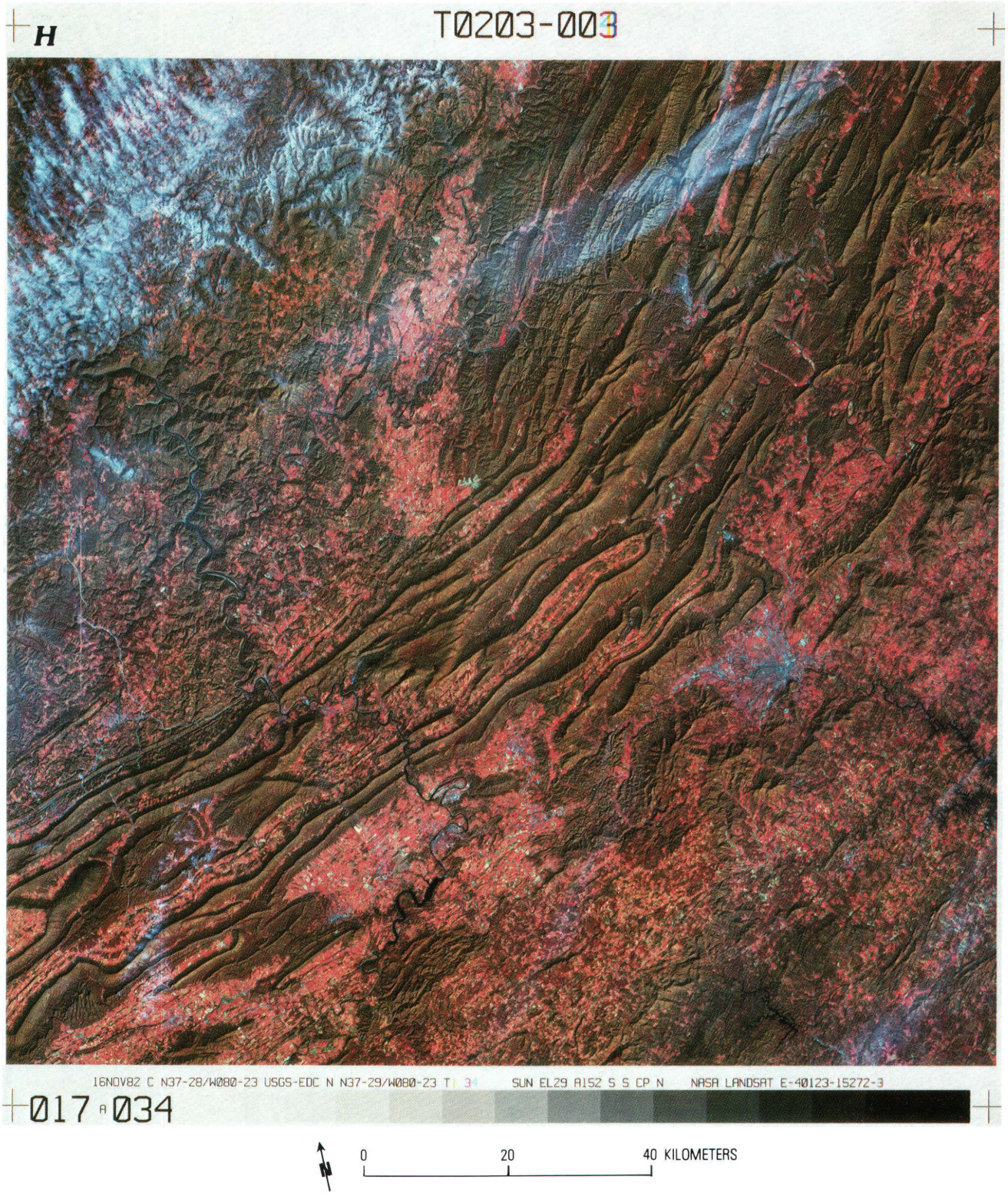


Figure 3.—Continued. *H*, A TM false-color composite, is created by combining bands 1, 3, and 4 with blue, green, and red filters respectively.

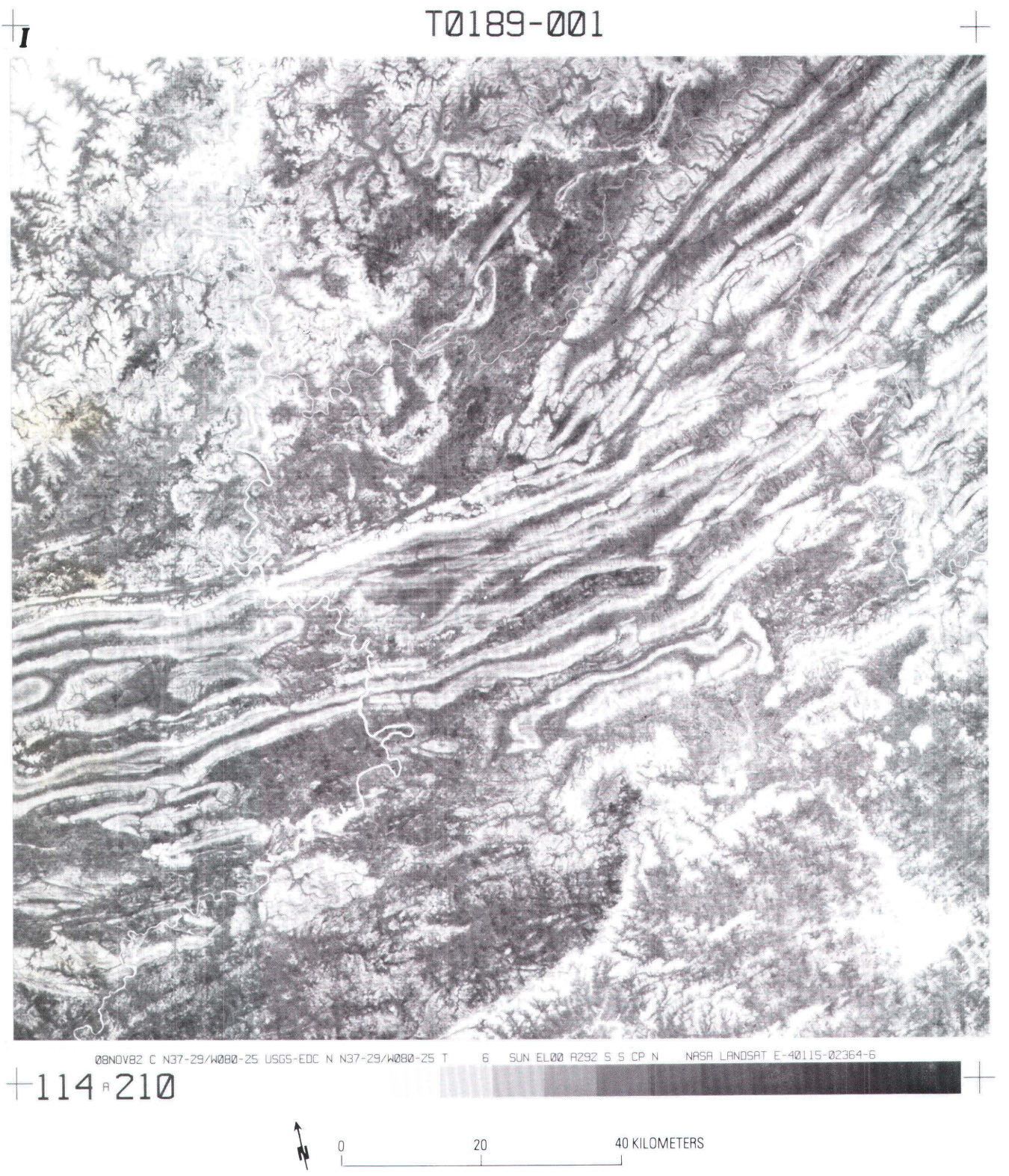


Figure 3.—Continued. *I*, TM band 6 (10.4–12.5μm) acquired at night on November 8, 1982, provides information on the bulk density of surficial materials. Water bodies, as well as resistant orthoquartzite, which forms cap rock on Appalachian ridges, appear white (hot) due to high thermal inertia.

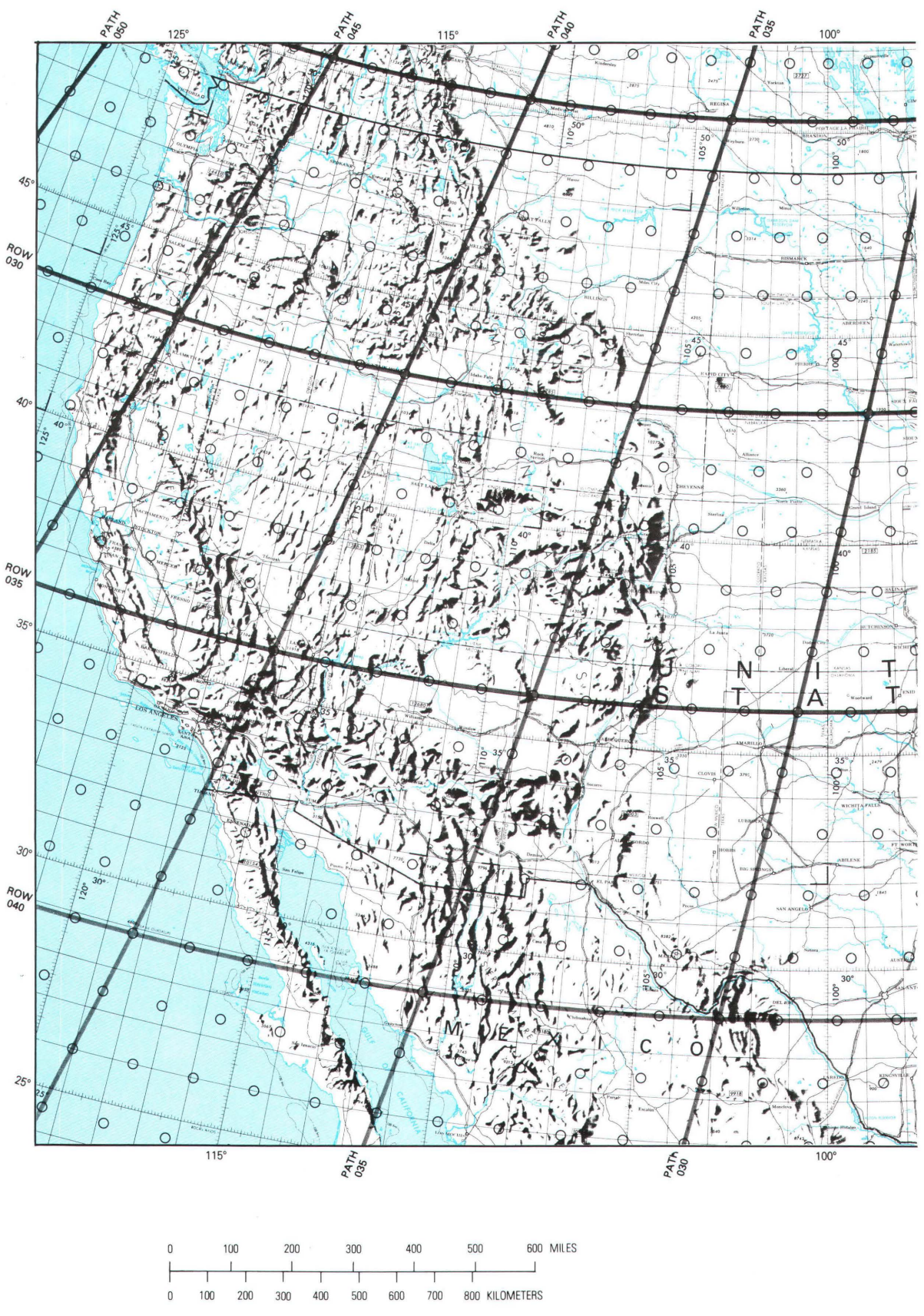
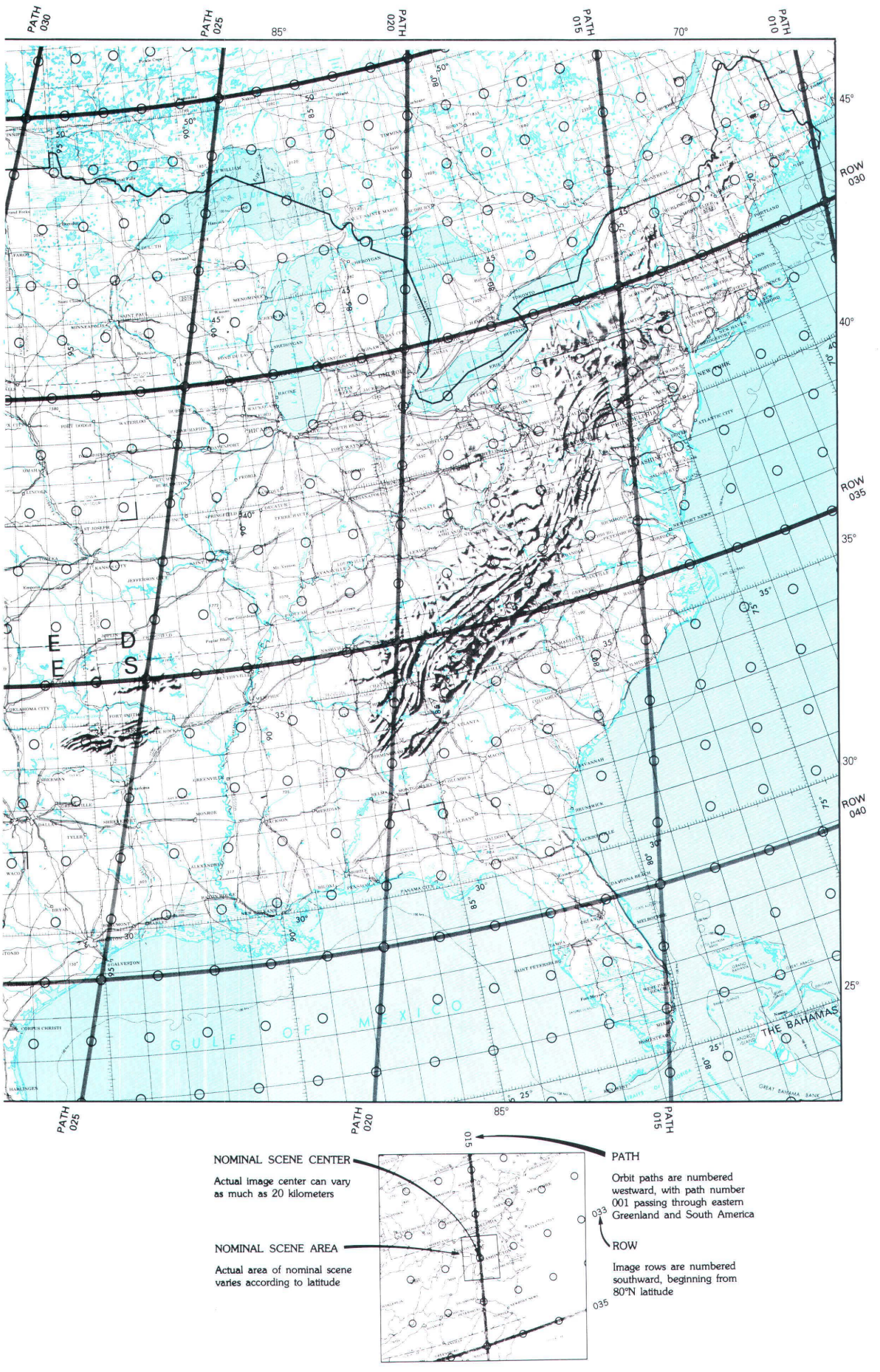


Figure 4. Coverage map of the conterminous United States showing nominal scene centers for each path and row of



Landsat 4 and 5 coverage. More-detailed maps can be obtained from Landsat data archive (see tables 1 and 2).

Heat Capacity Mapping Mission

The Heat Capacity Mapping Mission (HCMM), launched on April 26, 1978, was the first civilian spacecraft specifically designed to test the feasibility of measuring variations in the Earth's surface temperature to infer surface characteristics. The HCMM spacecraft carried a special thermal sensor, the heat capacity mapping radiometer (HCMR), which operated in two channels: one in the visible near-infrared, having 500-m resolution, and the other in the thermal-infrared region, having 600-m resolution. Reporting on various analyses and applications of the HCMR data to geologic research, HCMM investigators indicate that mapping of geologic structure, discrimination of lithology, and detection of surface seepage of hydrocarbons are possible. See the reports by Sabins (1981), Taranik (1981), Kahle and others (1981), Watson and others (1981), Short (1982), and Short and Stuart (1983), for detailed discussions of geologic applications of thermal-inertia mapping from use of HCMM data. HCMM was an experimental mission; therefore, it was not designed to obtain global coverage. The lack of an onboard tape recorder restricted data coverage to areas within range of ground receiving stations, specifically, North America, Europe, and Australia (NASA, 1980). Over 37,600 standard image products were obtained in the 28 months of flight operation. Data can be accessed by geographic coordinates, for which a microfiche enclosure is included with the HCMM Data User's Guide (NASA, 1980). Maps depicting coverage of HCMM computer-compatible tape (CCT) data of day and night passes and of day and night registered pairs are also available. Table 3 provides characteristics of the HCMM satellite, the heat capacity mapping radiometer (HCMR) sensor, available data, and location of data archive. Examples of HCMM image data are provided in figure 5.

Figure 6*A–D* provides HCMM's CCT day and night coverage of the Eastern and Western United States. Figure 6*E–O* provides HCMM night and day image coverage of the Eastern and Western United States. Figure 6*P–T* provides HCMM night and day image coverage of Europe, and figure 6*U–W* provides HCMM night and day image coverage of Australia.

Table 3. Characteristics of the Heat Capacity Mapping Mission (HCMM) satellite, the heat capacity mapping radiometer (HCMR), and available data

LAUNCH DATE: April 26, 1978. Data termination on August 31, 1980.

ORBITAL ELEMENTS:

Orbit:	Circular, sun-synchronous.
Altitude:	620 km (540 km from February 23, 1980, until data termination on August 31, 1980).
Inclination:	97.6°.
Coverage:	Day and night passes over given area within 12 hours at 35° latitude and poleward; within 36 hours most other latitudes. Real time only of the United States including Alaska, southern Canada, northern Mexico, Europe, and eastern Australia.
Cycle:	16 days.

SENSOR: Heat capacity mapping radiometer (HCMR) (Previously flown on the Nimbus-5 spacecraft as the surface composition mapping radiometer)

	Wavelength	IFOV (Instantaneous field of view)	Swath	Range	NEP / NEΔT (Noise equivalent radiance/noise equivalent temperature difference
Visible near-infrared channel	0.55–1.1 μm	500 m	716 km	0–100% albedo	0.2 mw/cm² (NER)
Thermal-infrared channel	10.5–12.5 μm	600 m	716 km	260K–340K	0.3 K at 280K for instrument (system NEΔT 0.4K at 280K)

Table 3. Characteristics of the Heat Capacity Mapping Mission (HCMM) satellite, the heat capacity mapping radiometer (HCMR), and available data—Continued.

DATA ARCHIVE:

National Space Science Data Center/World Data Center-A
Code 601
National Aeronautics and Space Administration
Goddard Space Flight Center
Greenbelt, Maryland 20771
(301) 344-6695

STANDARD FILM OR CCT FORMATS OF HCMM IMAGE PRODUCTS AVAILABLE

1:400,000-scale black-and-white images on 241-mm print paper or positive or negative transparencies:

Day visible	Temperature difference (night vs. day)
Day thermal infrared	Thermal inertia
Night thermal infrared	

Computer-compatible tapes (CCT's): 9-track, 800 or 1,600 bits per inch

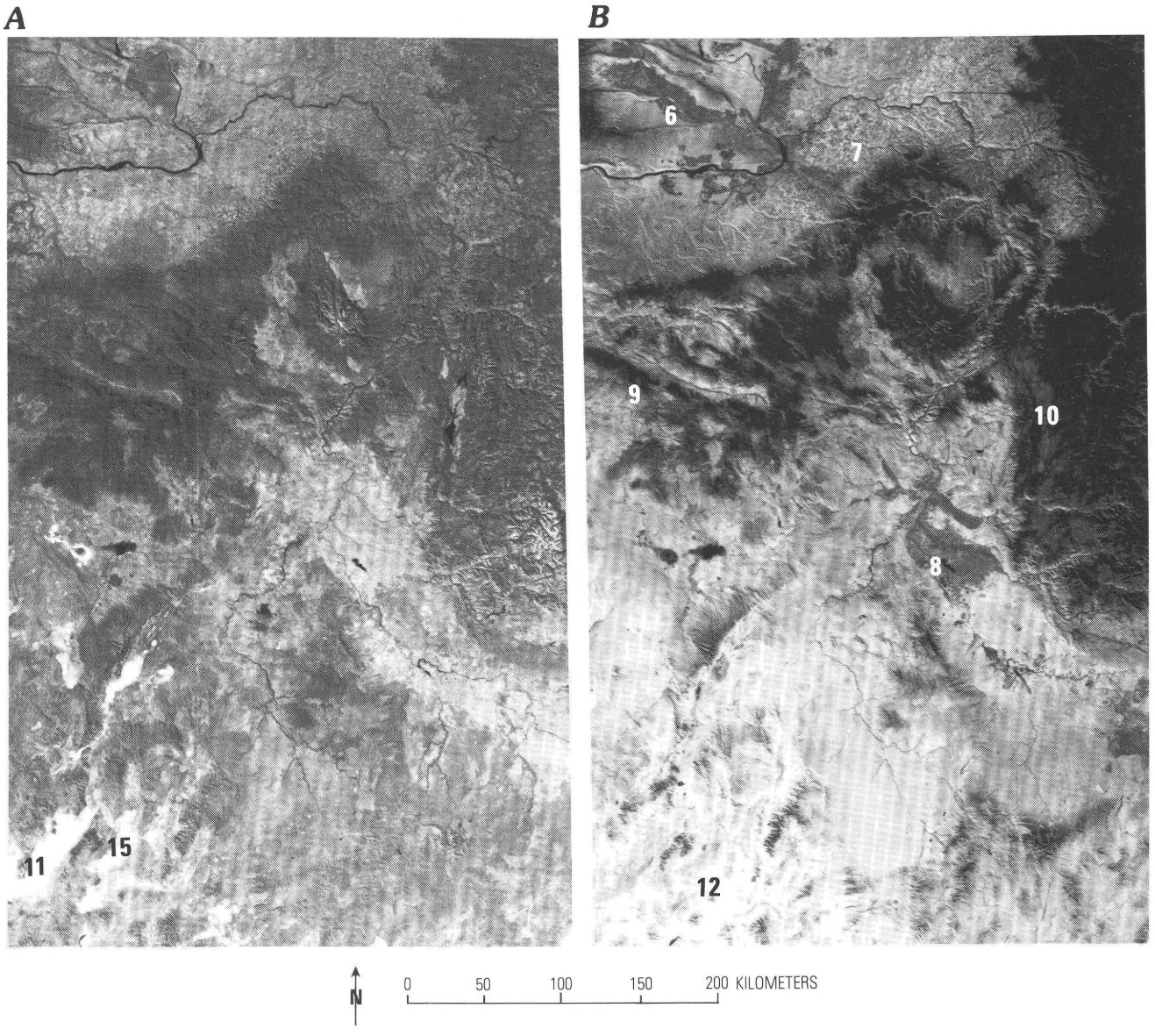


Figure 5. Subscenes of Heat Capacity Mapping Mission image data (ID A–A0087–10040) acquired July 22, 1978, over the Washington, Oregon, Idaho, California, and Nevada region. *A,* the day visible (reflectance), and *B,* the day infrared (emitted), were acquired at approximately 1:30 p.m. (EST); *C,* the night infrared (emitted), was acquired at approximately 2:30 a.m. (EST) on the same day. *D,* Thermal inertia, is a derivative product of the day reflectance image (A) (albedo) and day thermal image (B) and night thermal image (C) (ΔT values). Water bodies, such as (1) the Columbia River, (2) the Snake River, (3) Harney Lake, (4) Malheur Lake, and (5) Cascade Reservoir, display high thermal inertia (white) (see *D*). Agricultural vegetation in the (6) Yakima basin, (7) Columbia River Plateau, and (8) Snake River downwarp, as well as (9) the forest-covered Ochoco–Blue Mountain uplift and (10) Idaho batholith, display cool signatures due to evapotranspiration during the day (see *B*). Evaporite deposits (11) display high albedo in day reflectance data (see *A*), while Tertiary and Quaternary sediments (12) display high thermal-infrared response due to both lack of moisture and their low density (see *B*). Paleozoic and Mesozoic metamorphic rock of the block-faulted mountains of the Basin and Range Province (13) are differentiated from Tertiary and Quaternary sedimentary valley fill (14) in night thermal-infrared data (see *C*) due to their differences in bulk density, although the albedos of these units are similar (15) (see *A*).

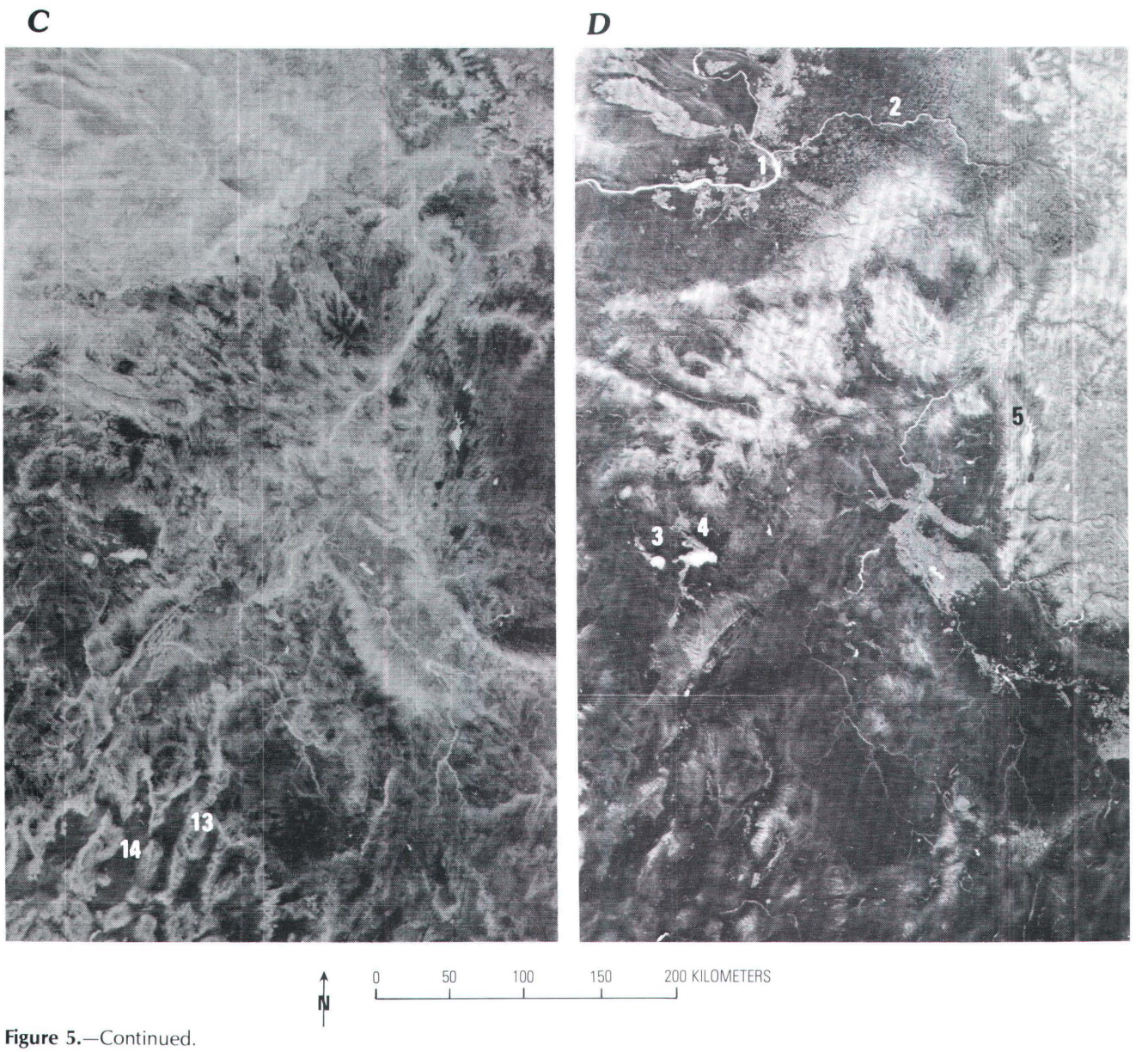


Figure 5.—Continued.

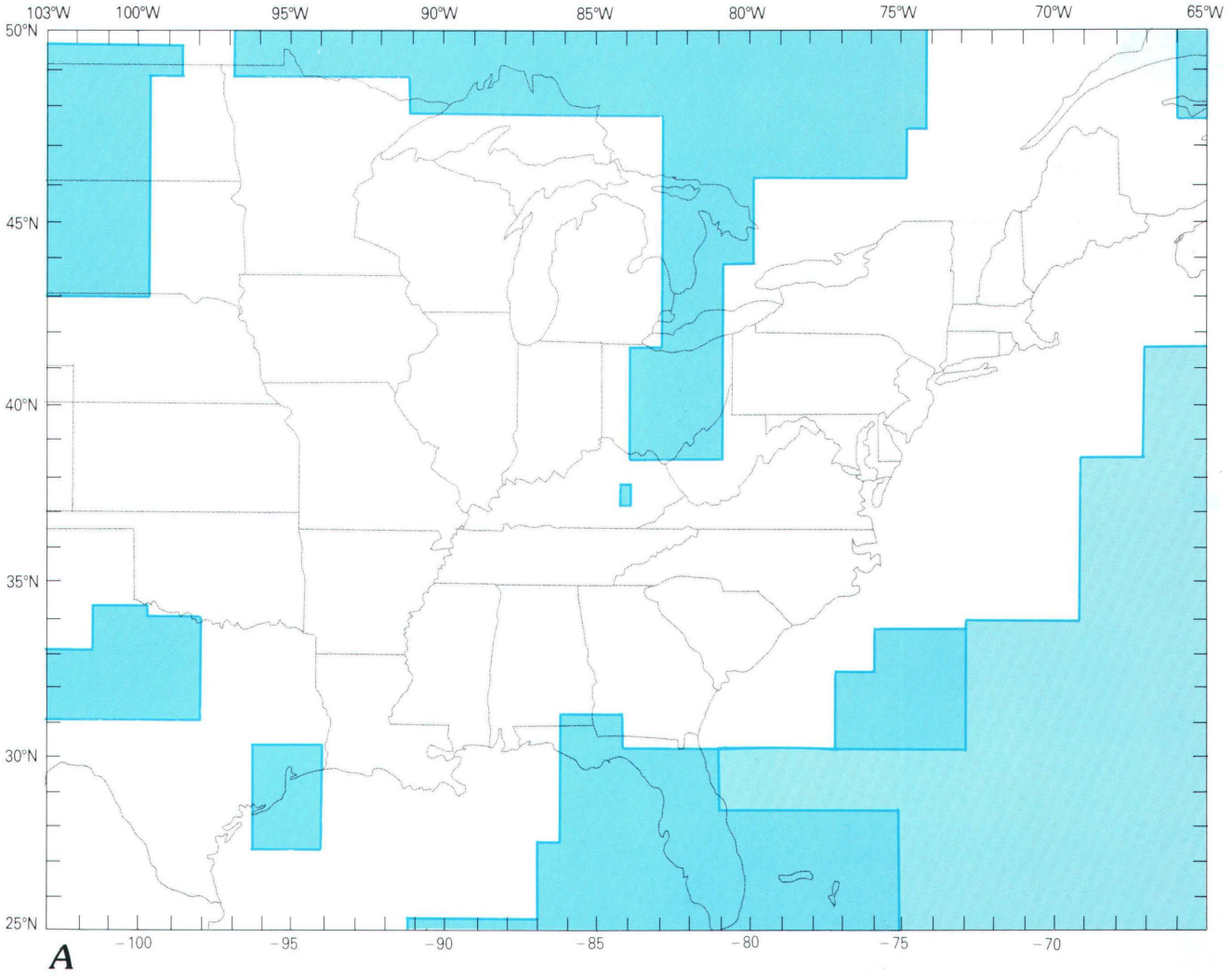
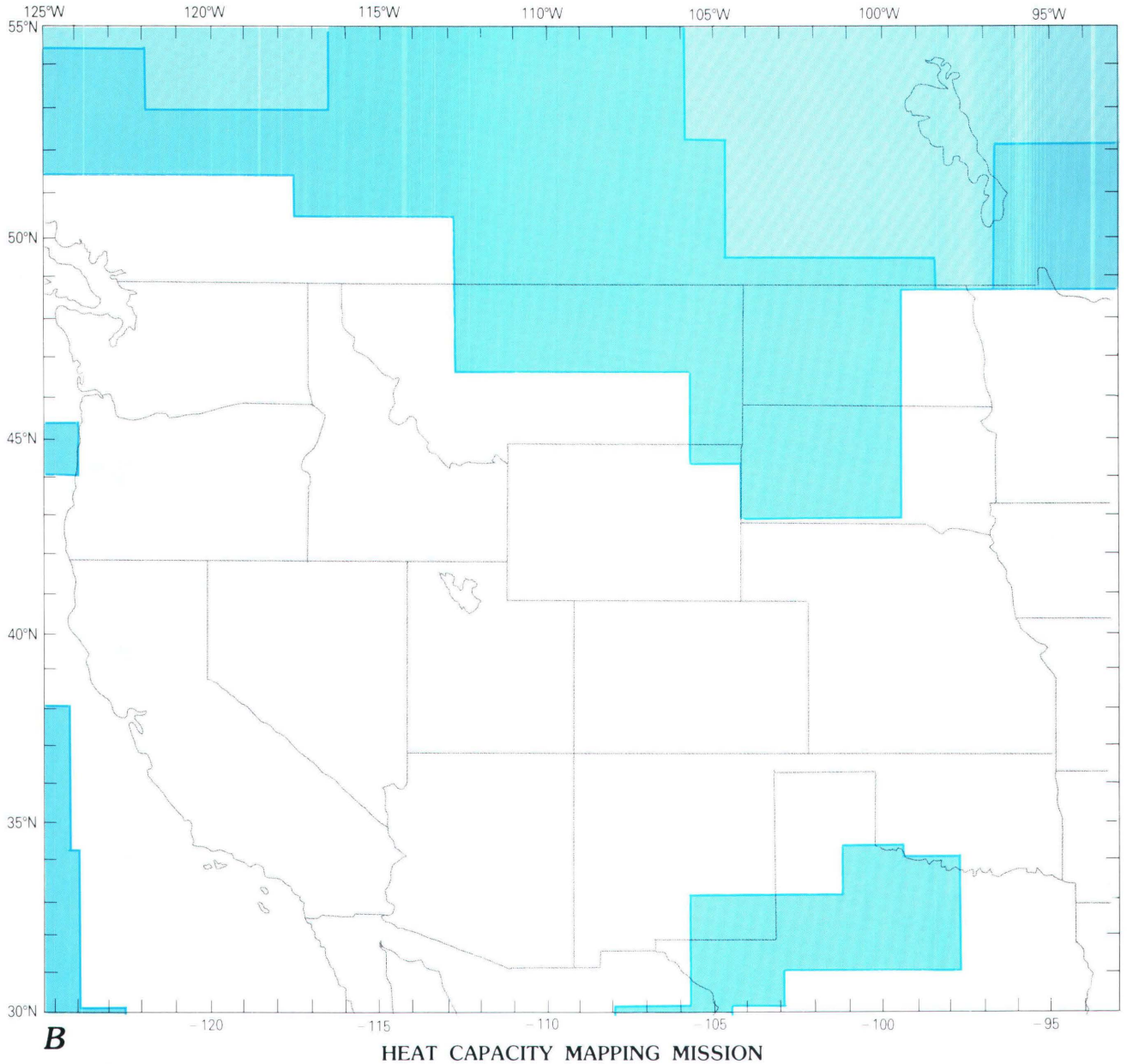


Figure 6. Heat Capacity Mapping Mission coverage maps. *A*, day-acquired CCT data of the Eastern United States; *B*, day-acquired CCT data of the Western United States; *C*, night-acquired CCT data of the Eastern United States; *D*, night-acquired CCT data of the Western United States; *E–H*, day- and night-acquired image data of Eastern United States with scene identification (ID); *I–O*, day- and night-acquired image and CCT data of the Western United States with scene ID; *P–T*, day- and night-acquired image and CCT data of Europe with scene ID; *U–W*, day- and night-acquired image and CCT data of Australia with scene ID.



B

HEAT CAPACITY MAPPING MISSION
COMPUTER COMPATIBLE TAPE
DAY COVERAGE
WESTERN UNITED STATES
CLOUD COVER = TEN PERCENT OR LESS

No existing or planned coverage *

Future coverage planned. No current coverage

Existing coverage

*No available usable scenes with cloud cover of ten percent or less; twenty percent coverage is planned for these (LAND) areas

Figure 6.—Continued.

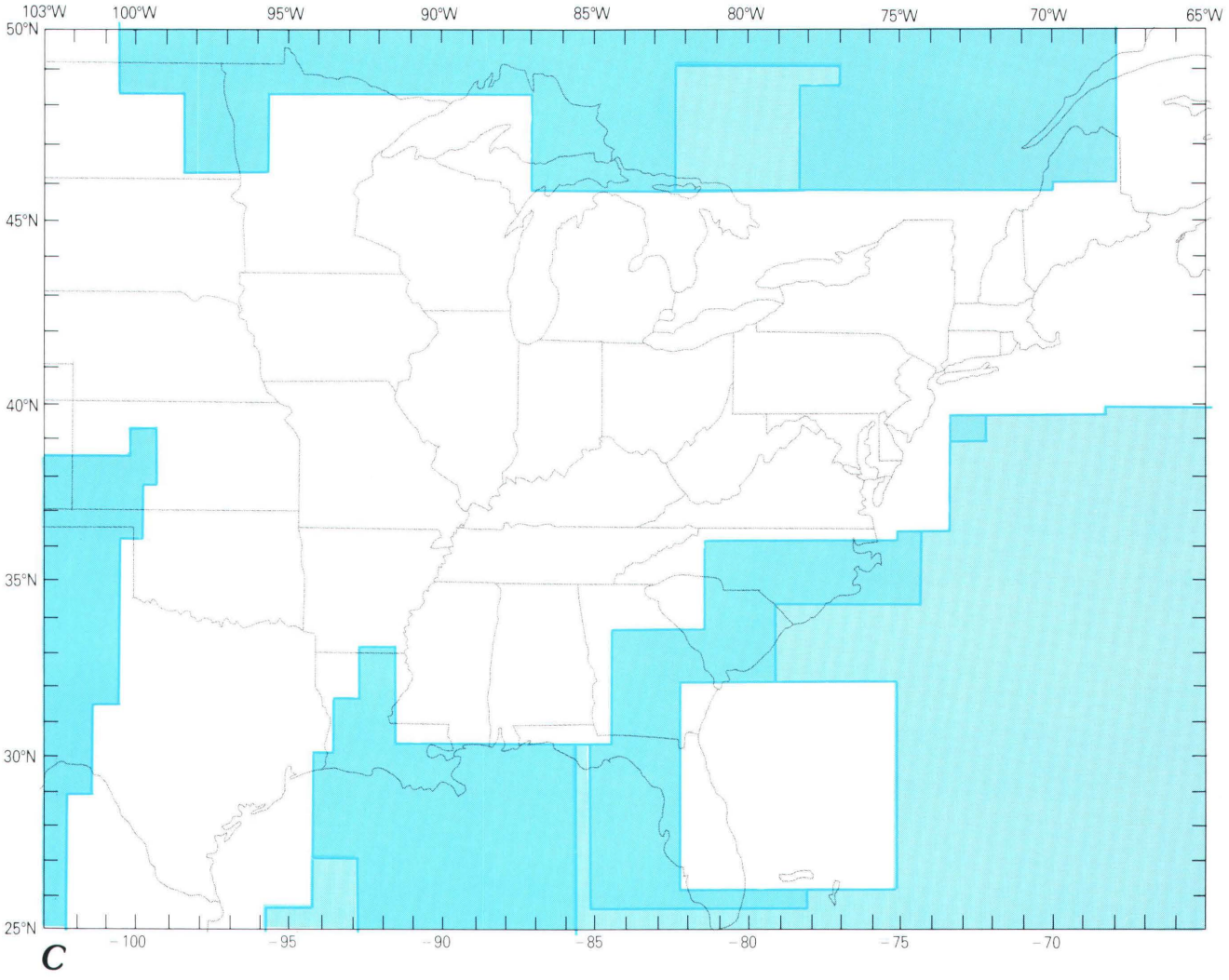
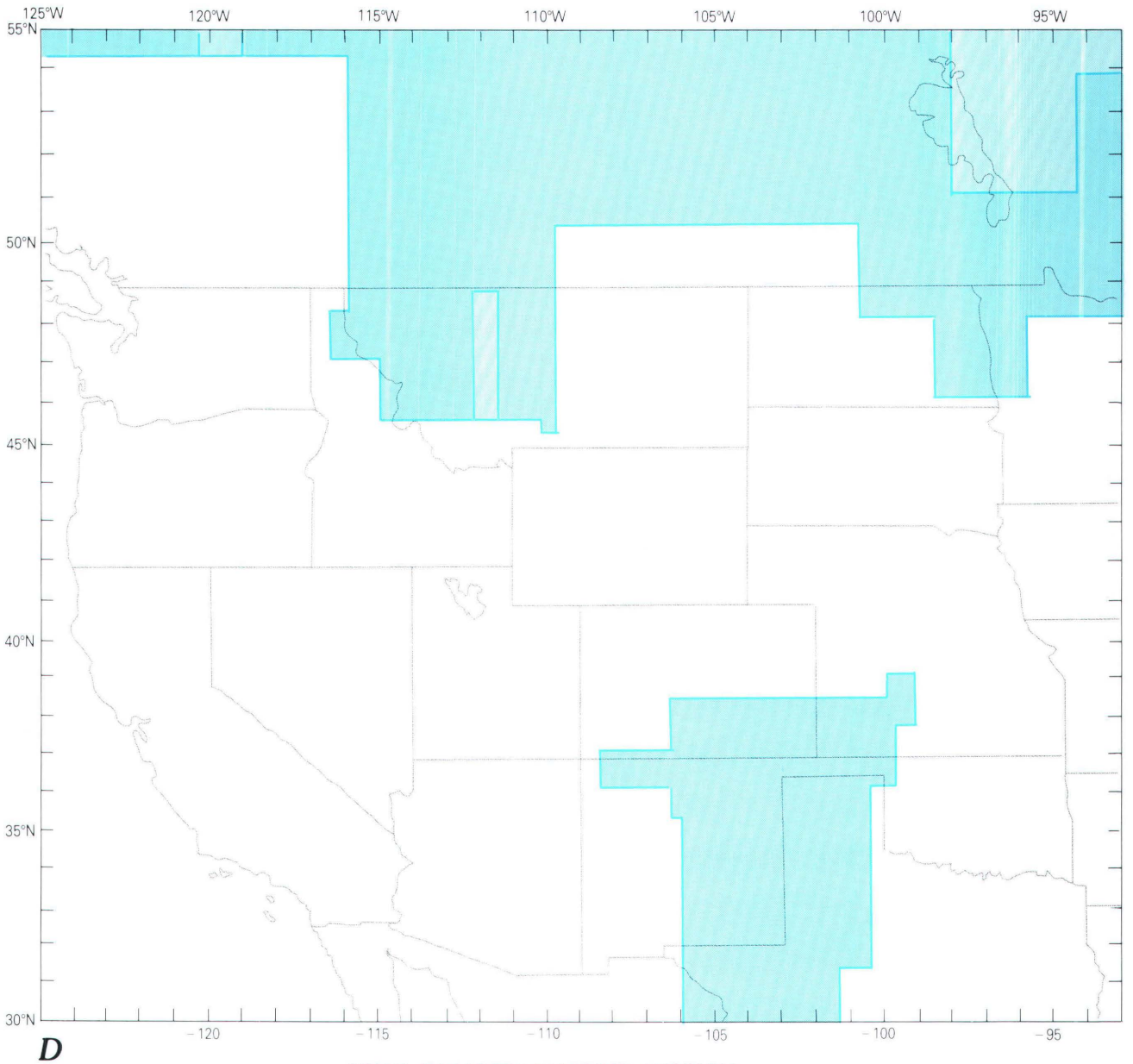


Figure 6.—Continued.



HEAT CAPACITY MAPPING MISSION
COMPUTER COMPATIBLE TAPE
NIGHT COVERAGE
WESTERN UNITED STATES
CLOUD COVER = TEN PERCENT OR LESS

No existing or planned coverage *

Future coverage planned. No current coverage

Existing coverage

*No available usable scenes with cloud cover of ten percent or less; twenty percent coverage is planned for these (LAND) areas

Figure 6.—Continued.

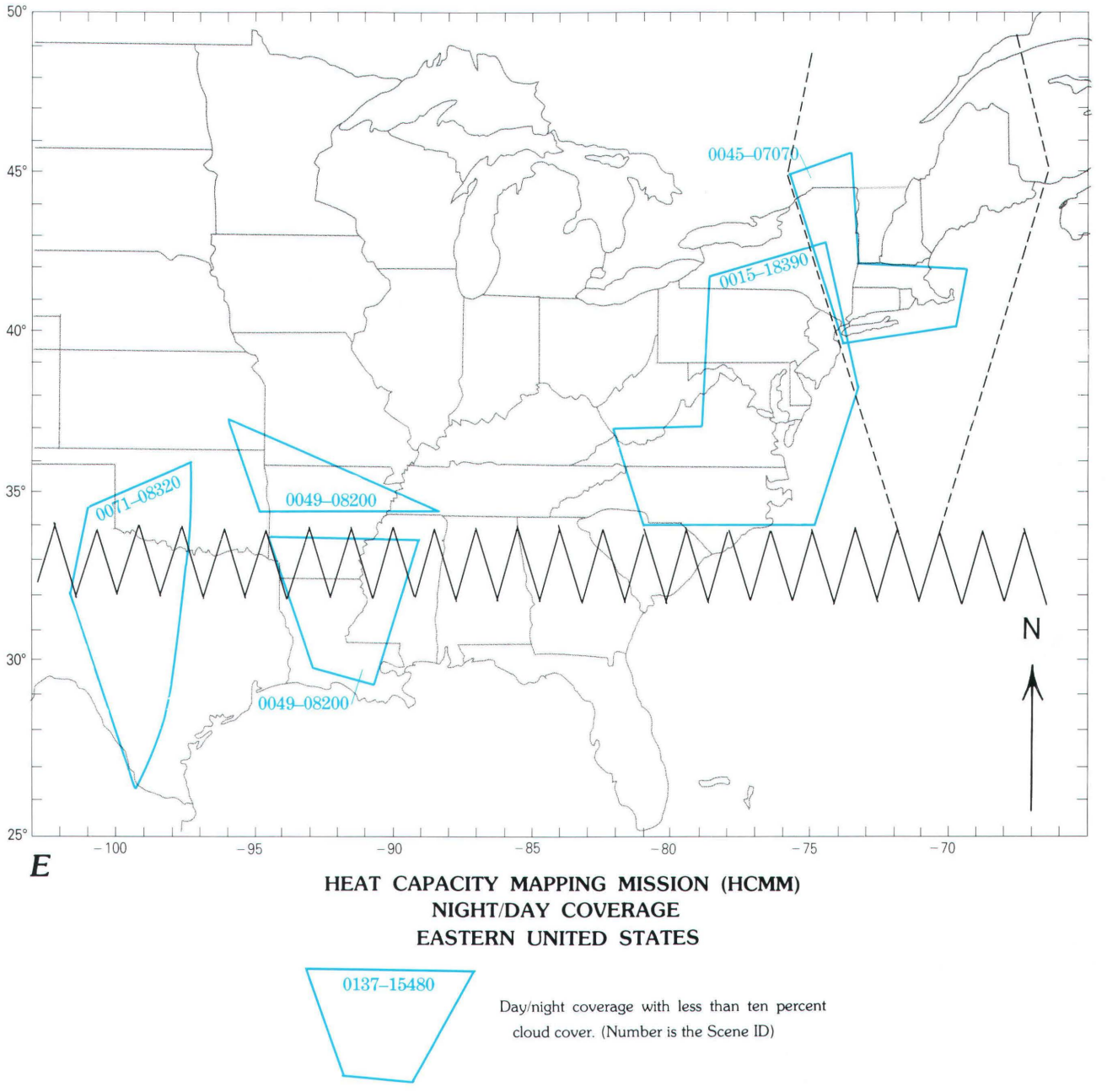


Figure 6.—Continued.

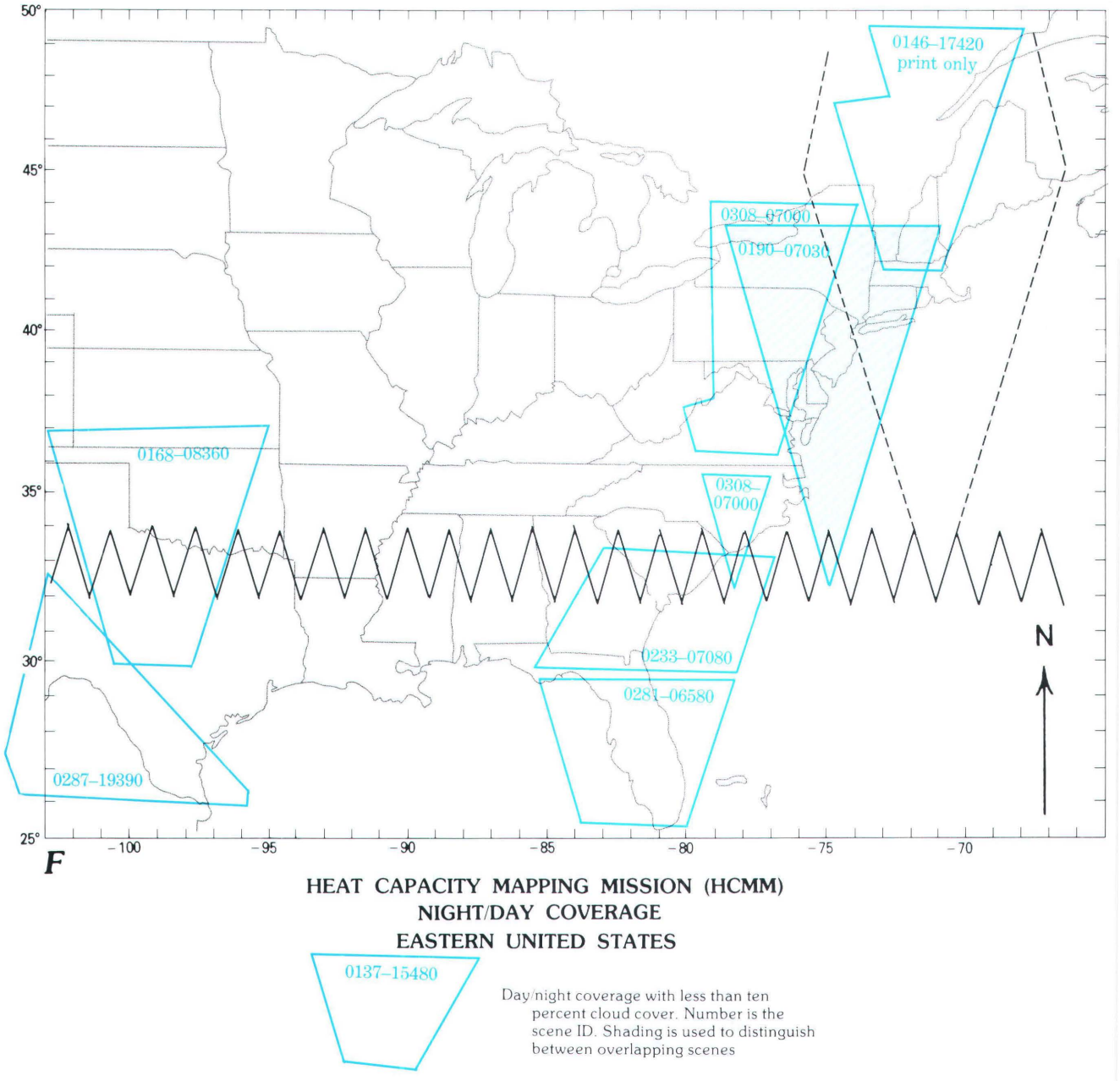


Figure 6.—Continued.

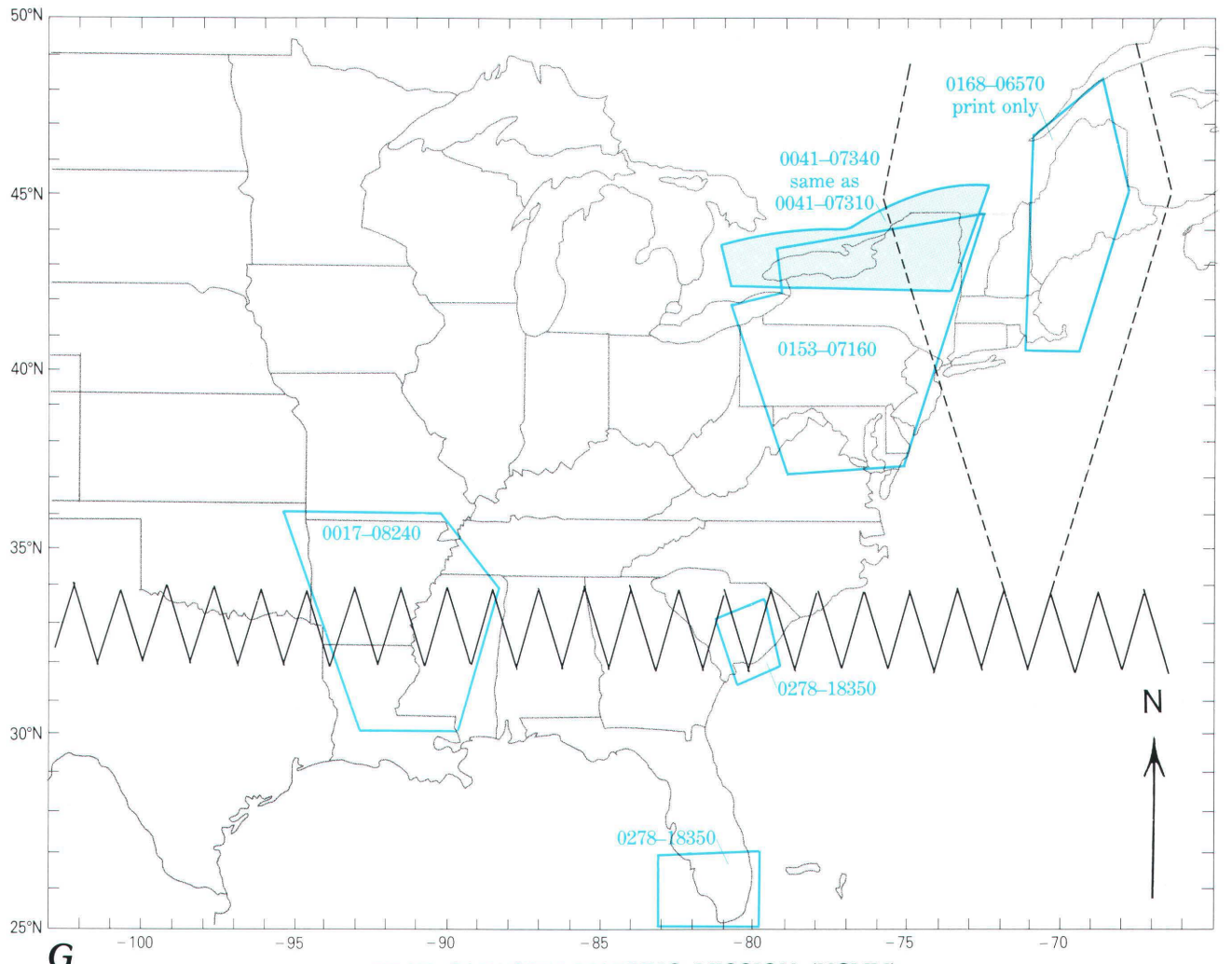


Figure 6.—Continued.

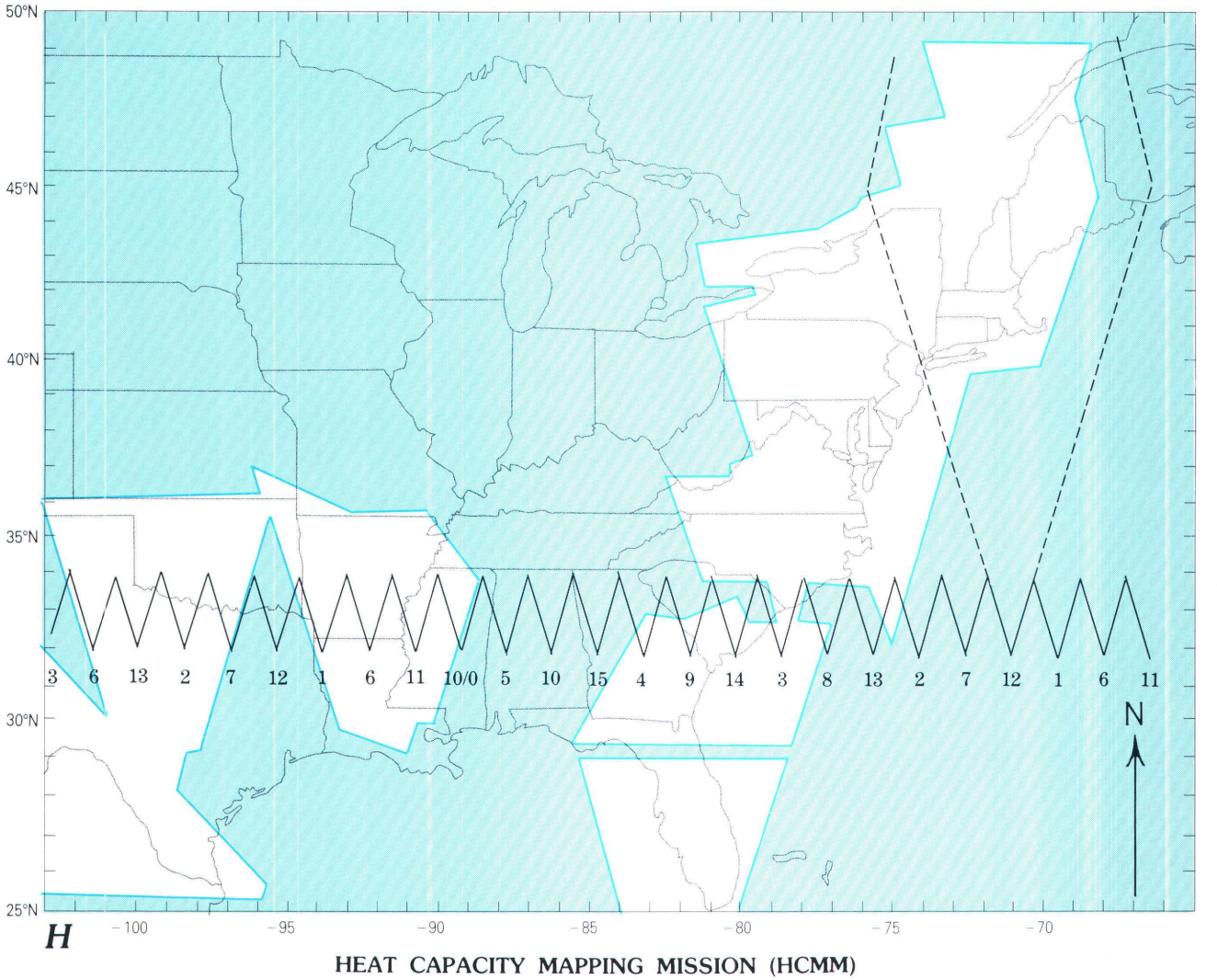
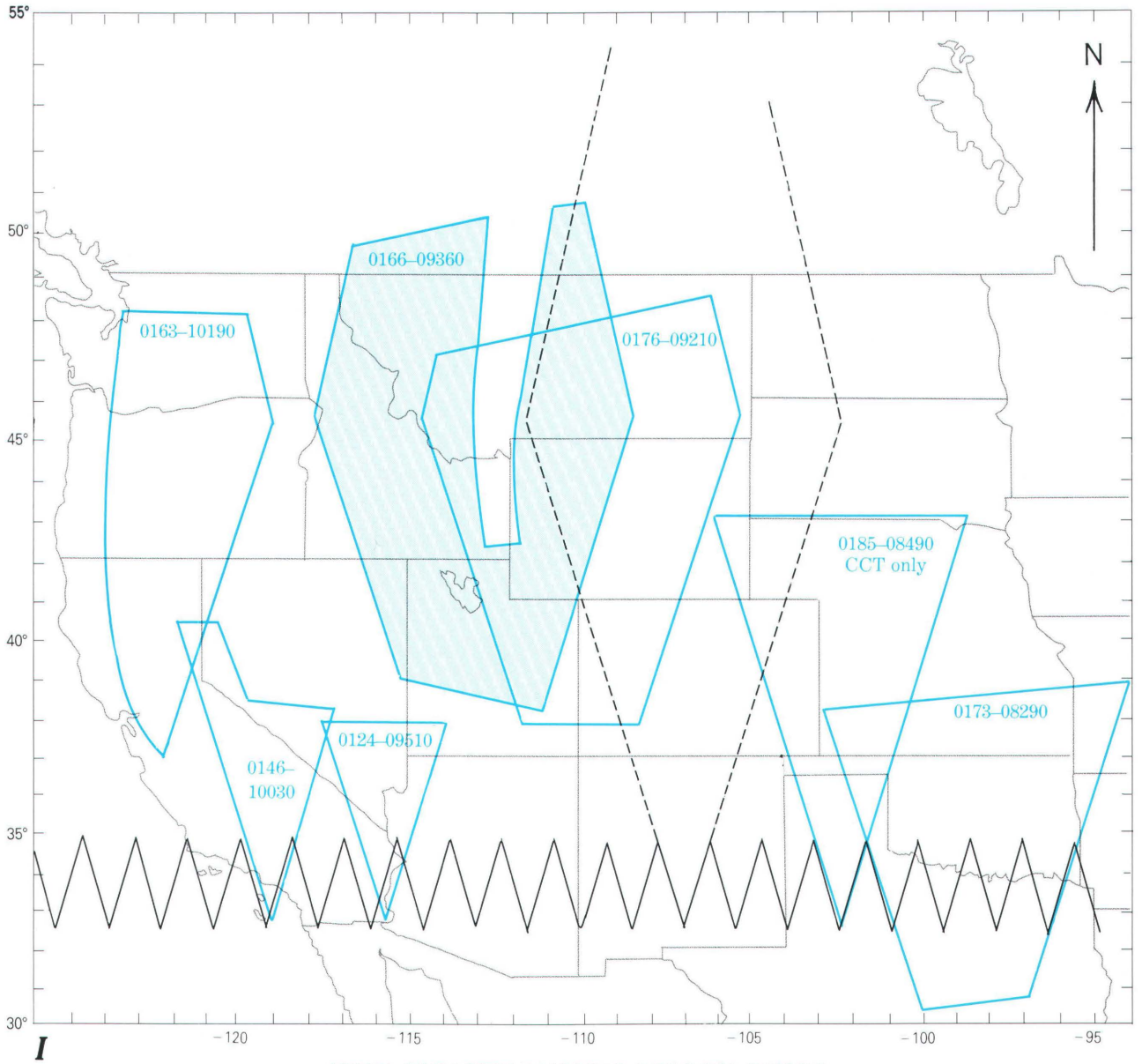
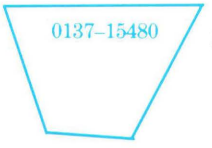


Figure 6.—Continued.

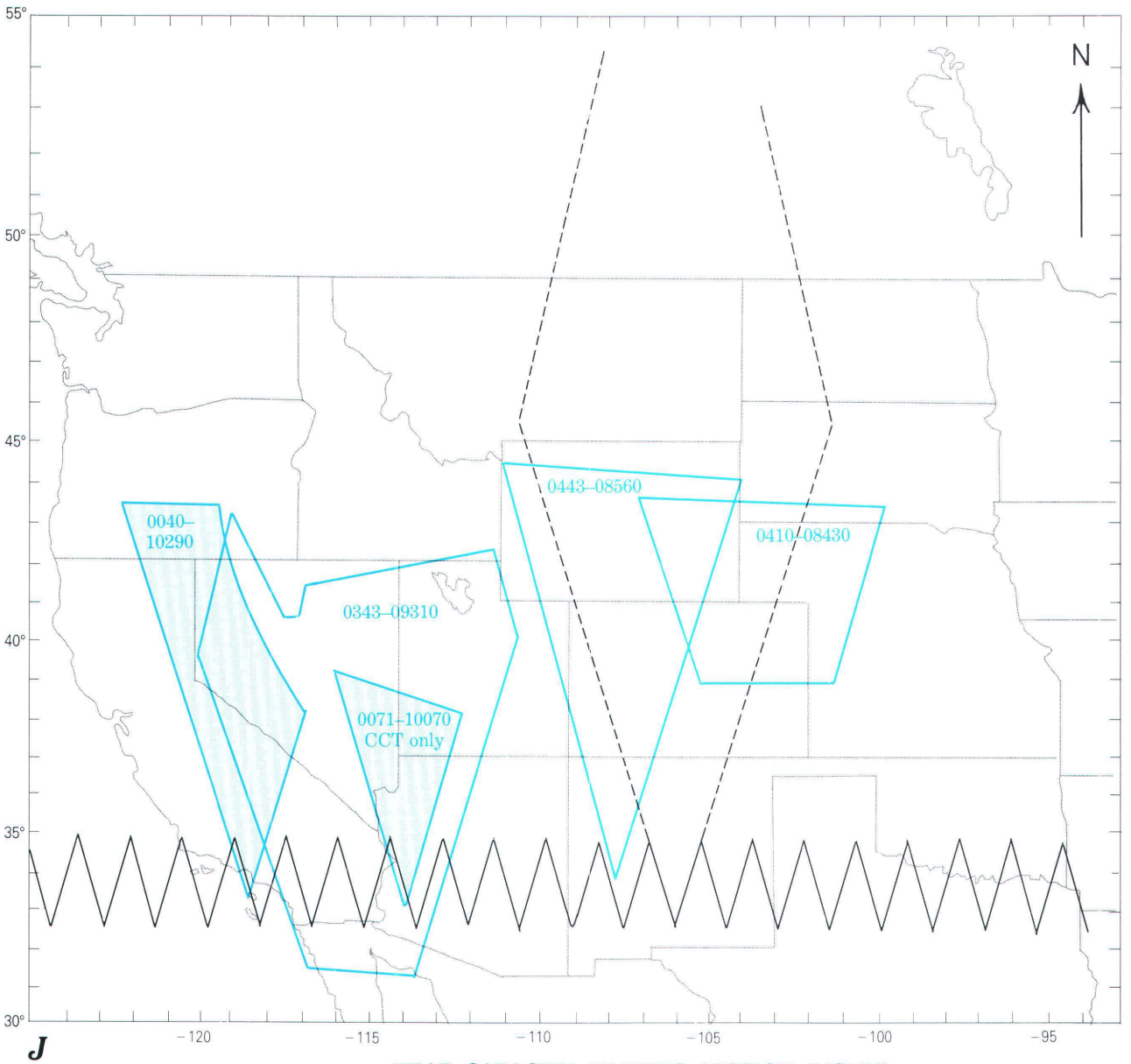


HEAT CAPACITY MAPPING MISSION (HCMM)
NIGHT/DAY COVERAGE
WESTERN UNITED STATES



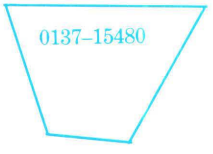
Day/night coverage with less than ten percent cloud cover. Number is the scene ID. Shading is used to distinguish between overlapping scenes

Figure 6.—Continued.



J

HEAT CAPACITY MAPPING MISSION (HCMM)
NIGHT/DAY COVERAGE
WESTERN UNITED STATES



Day/night coverage with less than ten percent cloud cover. Number is the scene ID. Shading is used to distinguish between overlapping scenes

Figure 6.—Continued.

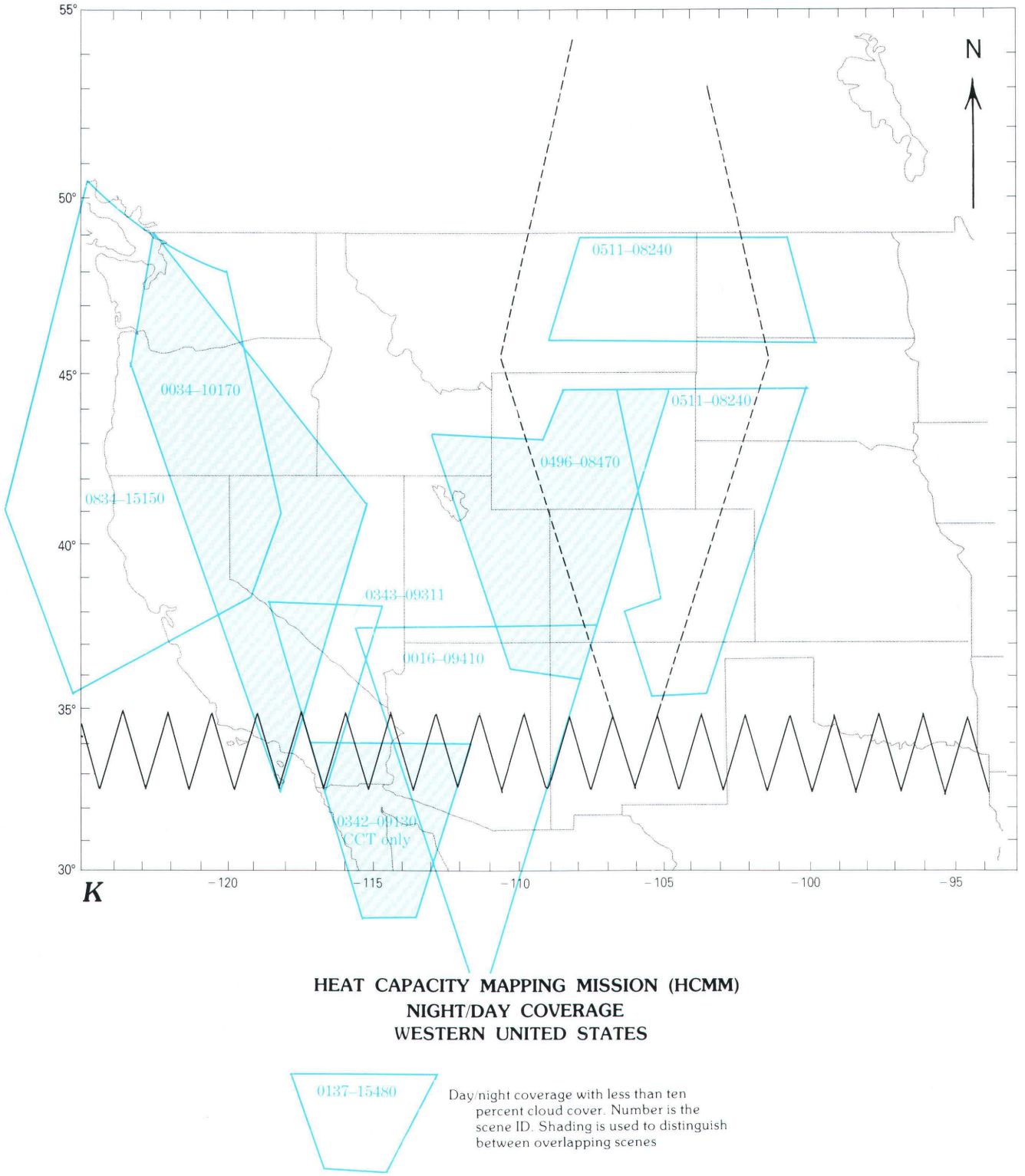
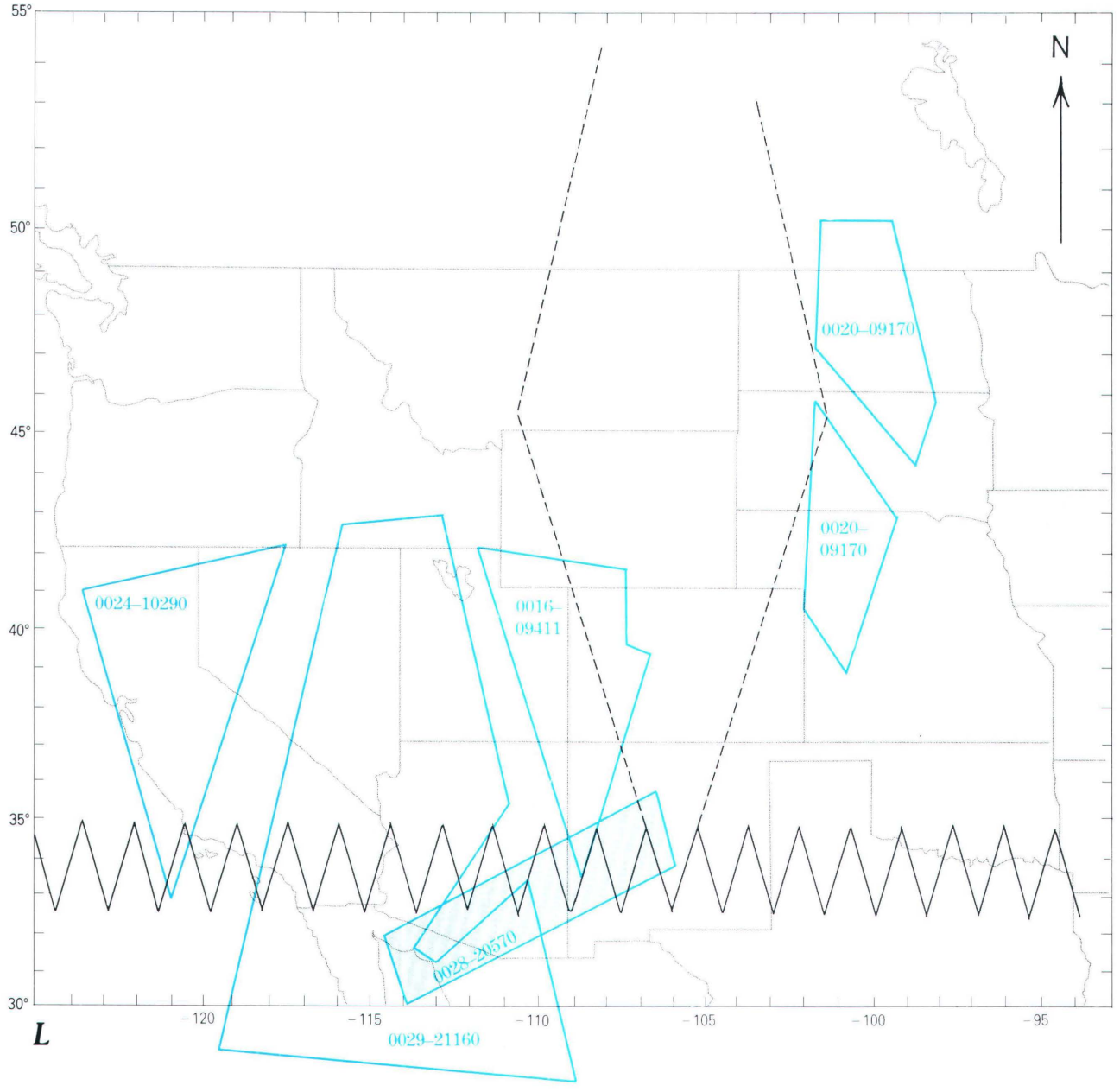
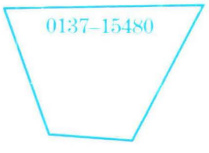


Figure 6.—Continued.



HEAT CAPACITY MAPPING MISSION (HCMM)
NIGHT/DAY COVERAGE
WESTERN UNITED STATES



Day/night coverage with less than ten percent cloud cover. Number is the scene ID. Shading is used to distinguish between overlapping scenes

Figure 6.—Continued.

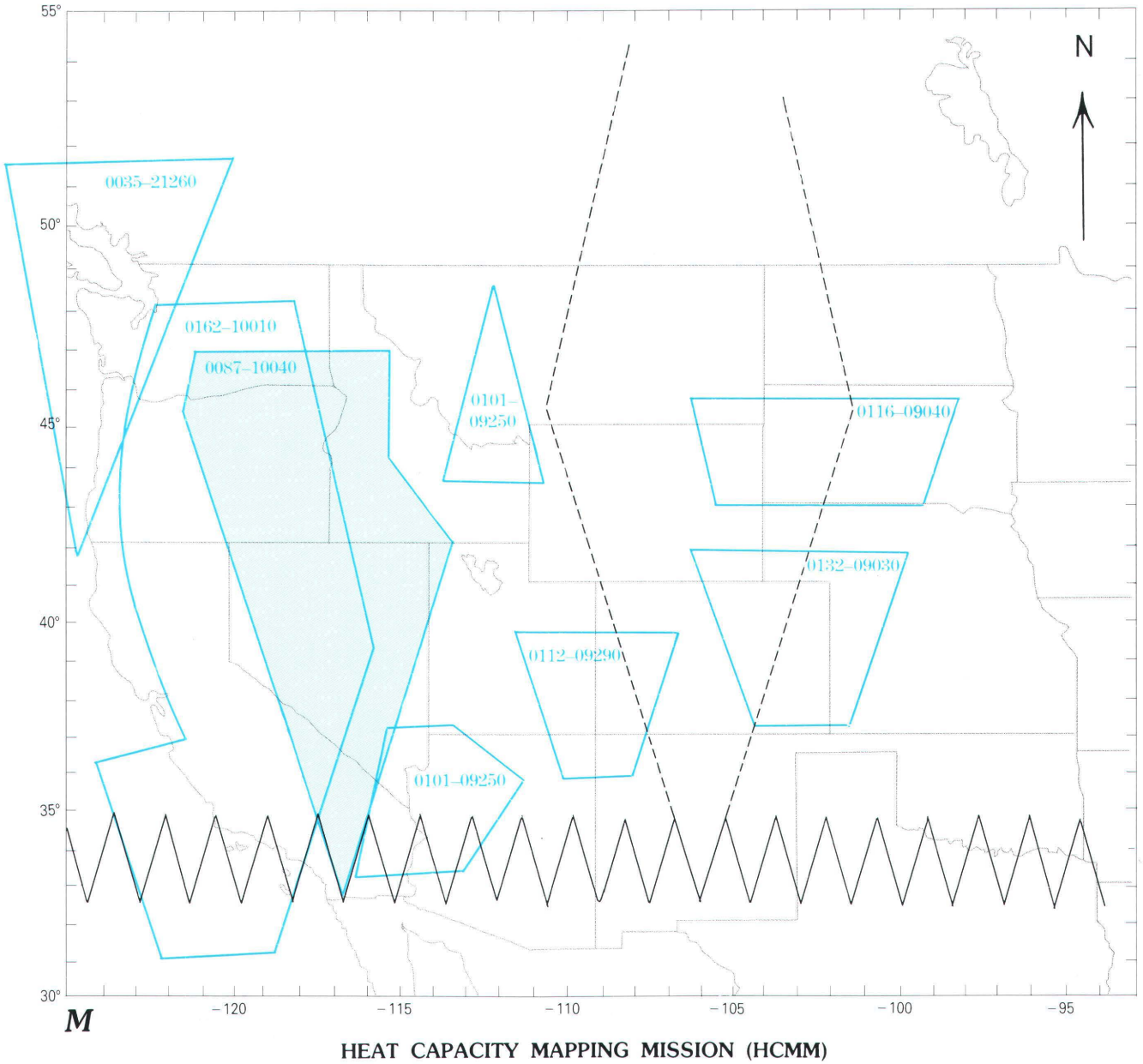


Figure 6.—Continued.

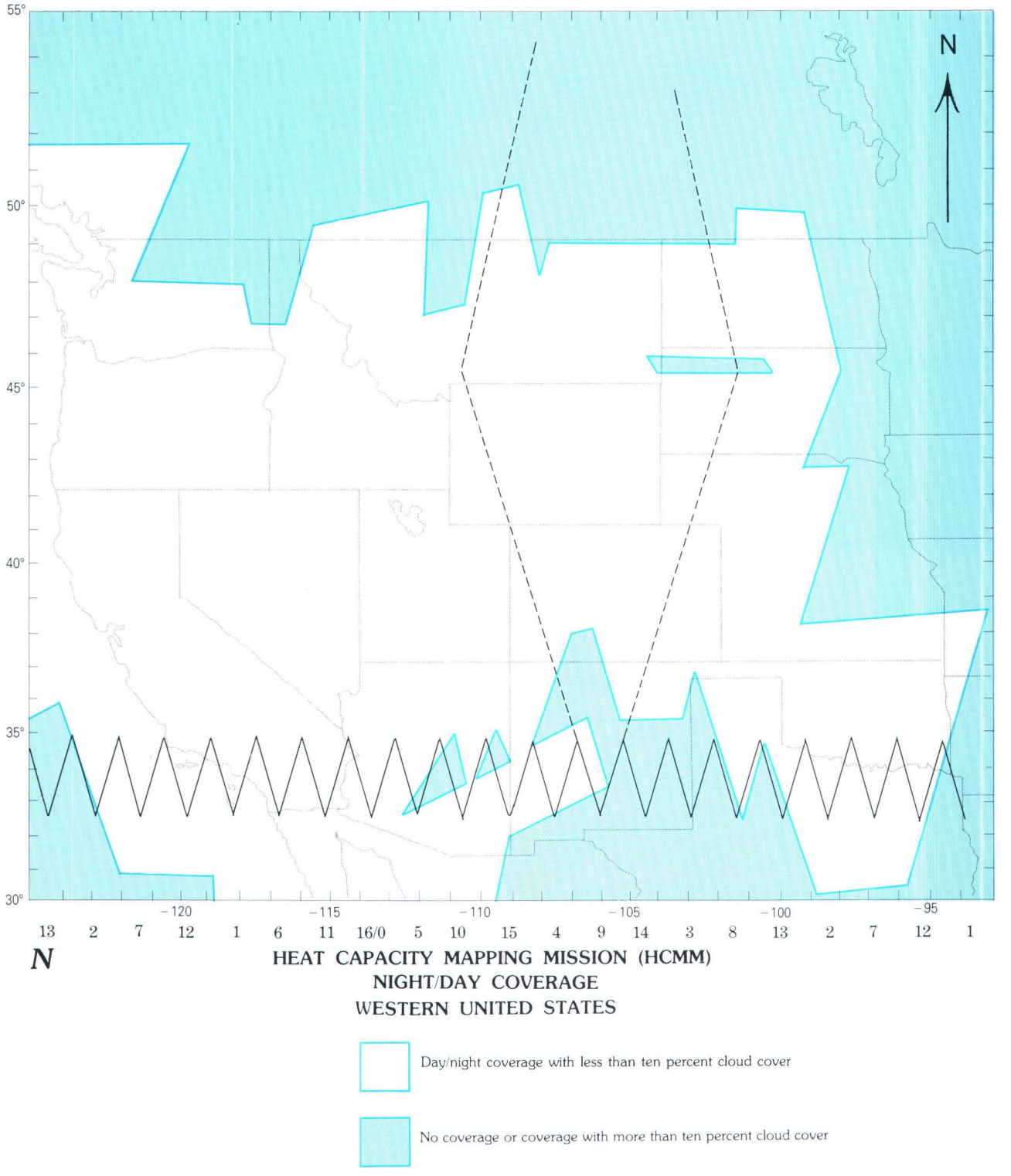
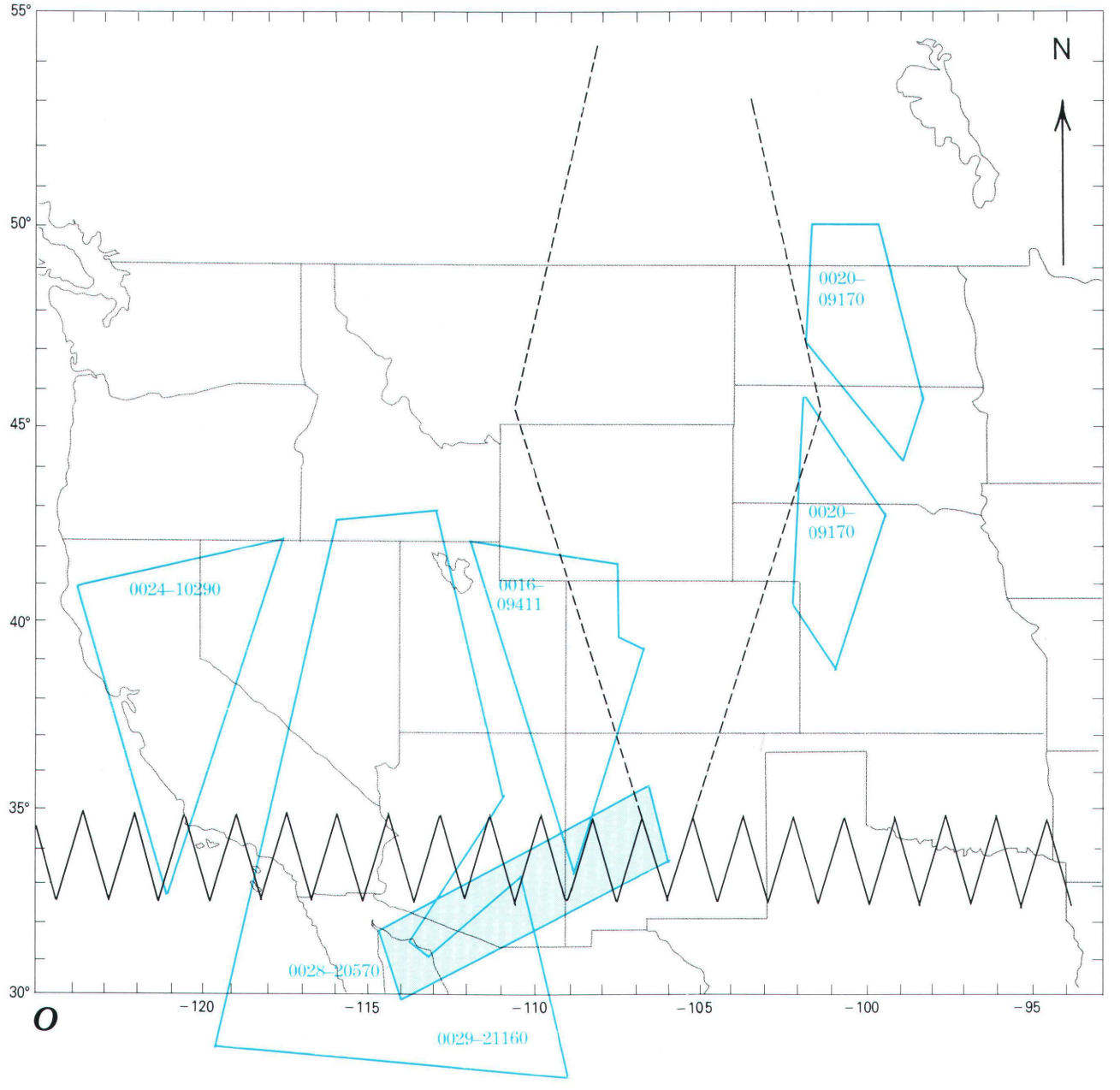
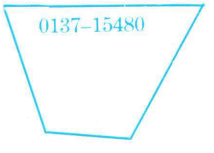


Figure 6.—Continued.

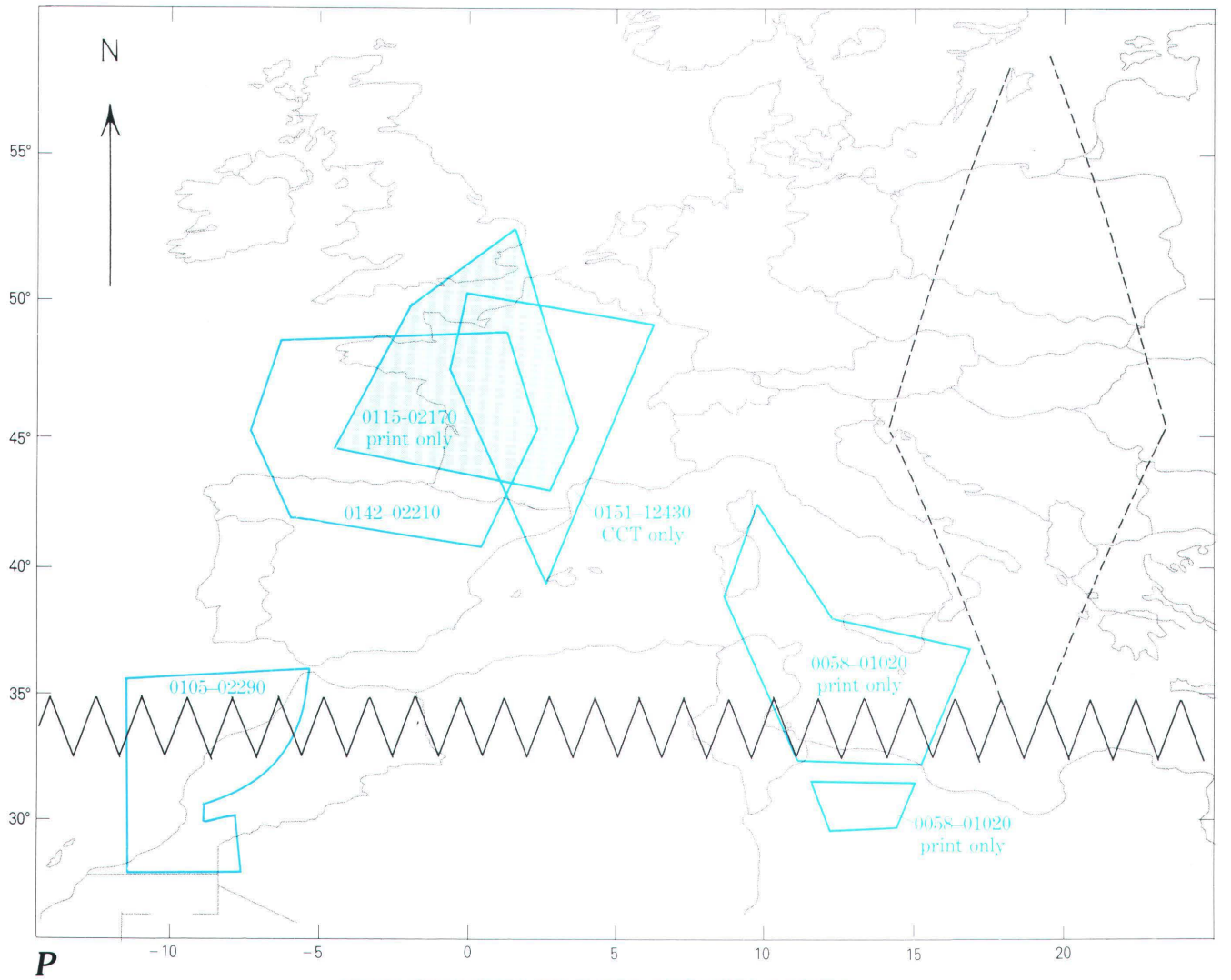


HEAT CAPACITY MAPPING MISSION (HCMM)
NIGHT/DAY COVERAGE
WESTERN UNITED STATES

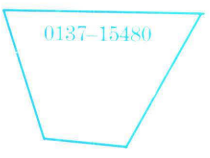


Day/night coverage with less than ten percent cloud cover. Number is the scene ID. Shading is used to distinguish between overlapping scenes

Figure 6.—Continued.

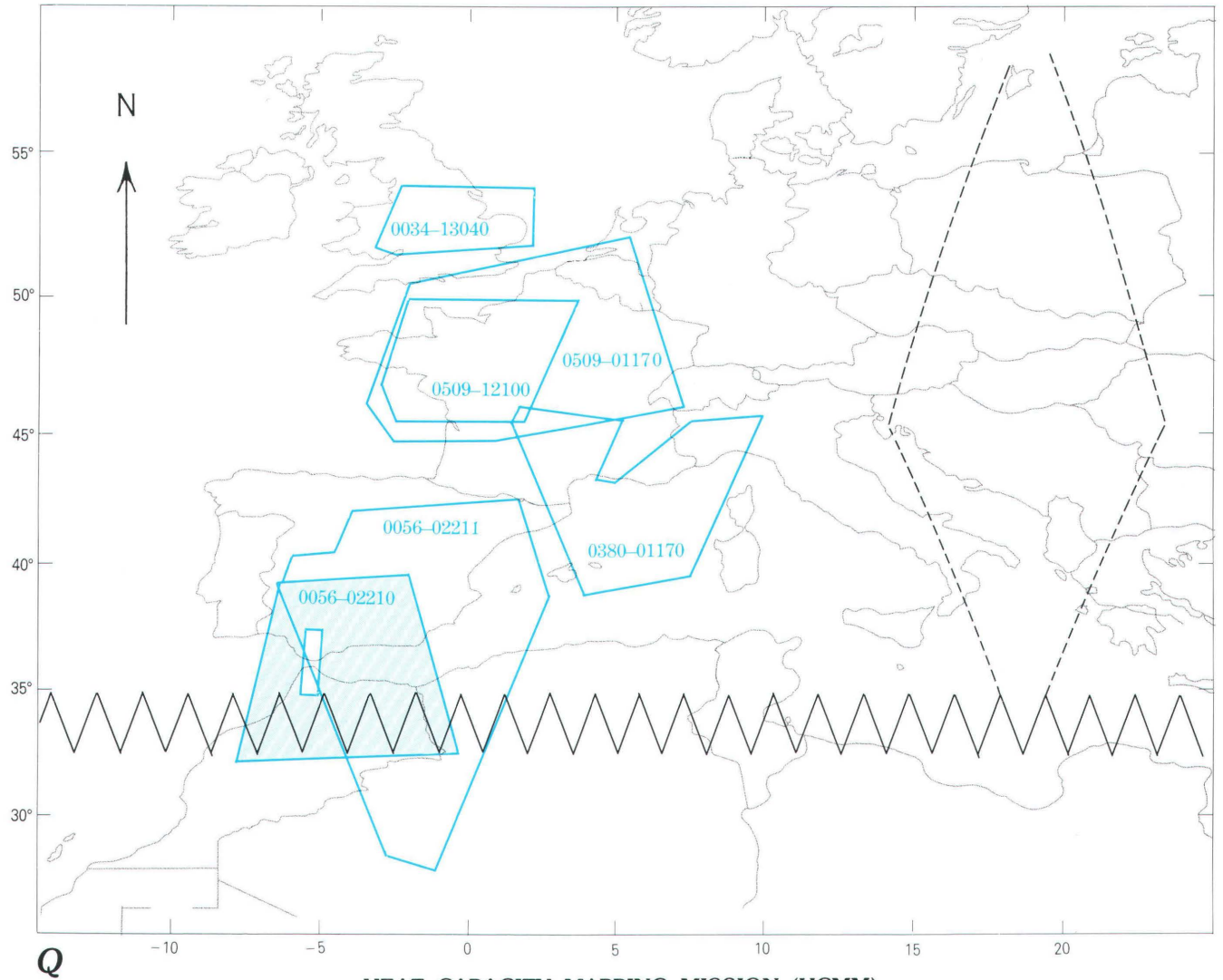


HEAT CAPACITY MAPPING MISSION (HCMM)
NIGHT/DAY COVERAGE
EUROPE

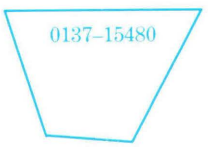


Day night coverage with less than ten percent cloud cover. Number is the scene ID. Shading is used to distinguish between overlapping scenes

Figure 6.—Continued.



HEAT CAPACITY MAPPING MISSION (HCMM)
NIGHT/DAY COVERAGE
EUROPE



Day/night coverage with less than ten percent cloud cover. Number is the scene ID. Shading is used to distinguish between overlapping scenes

Figure 6.—Continued.

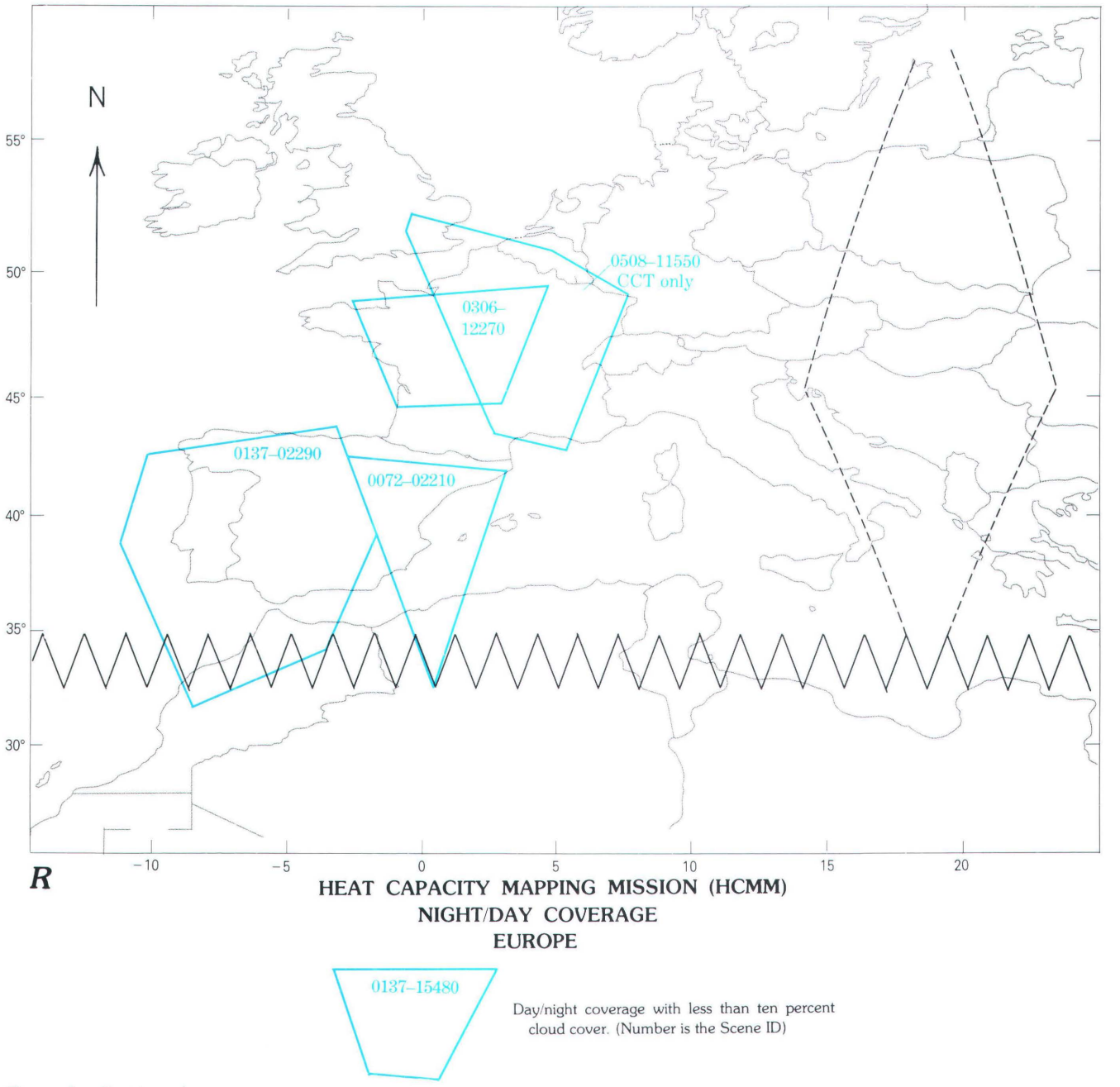


Figure 6.—Continued.

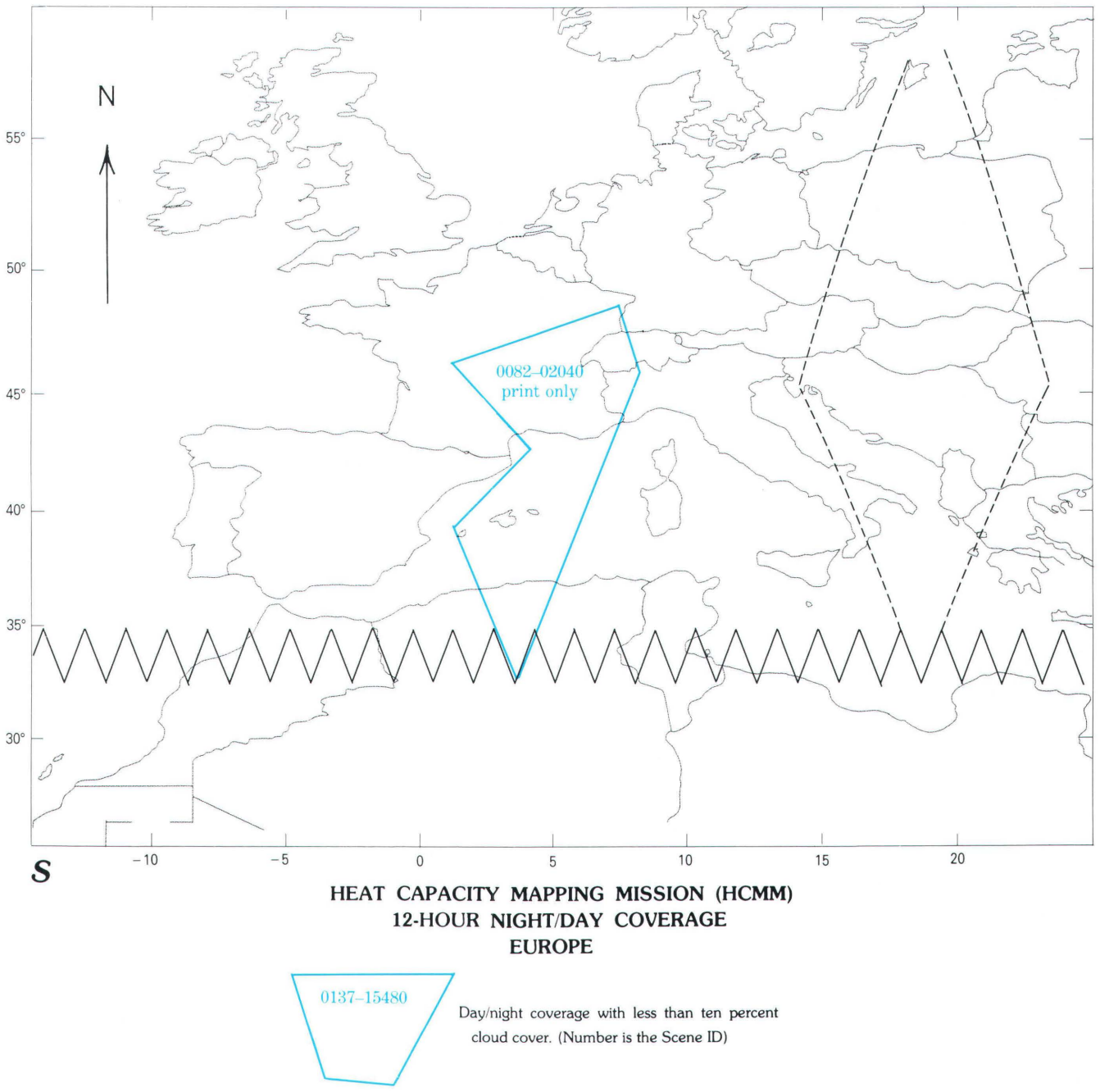
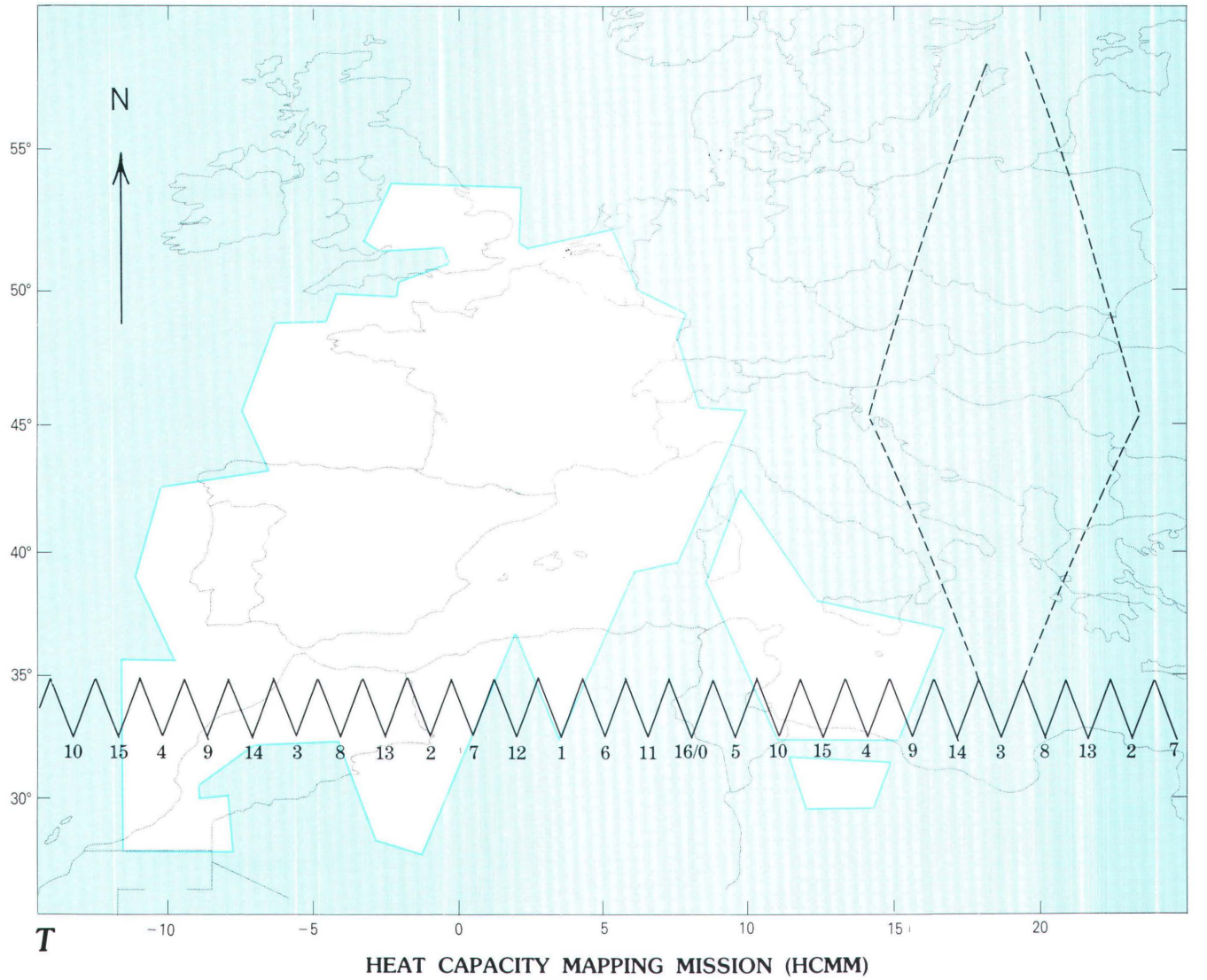


Figure 6.—Continued.



HEAT CAPACITY MAPPING MISSION (HCMM)
NIGHT/DAY COVERAGE
EUROPE

Day/night coverage with less than ten percent cloud cover

No coverage or coverage with more than ten percent cloud cover

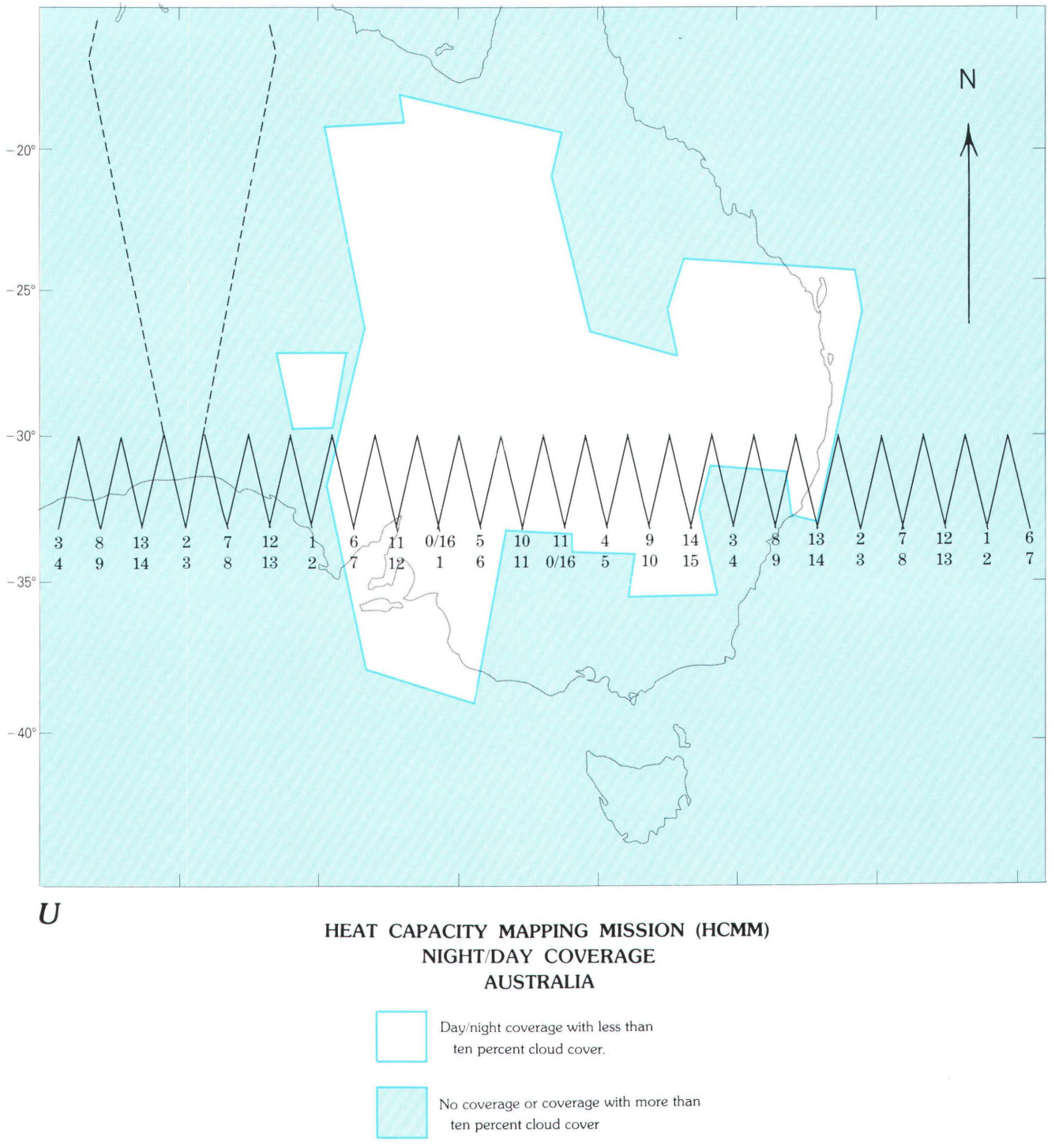


Figure 6.—Continued.

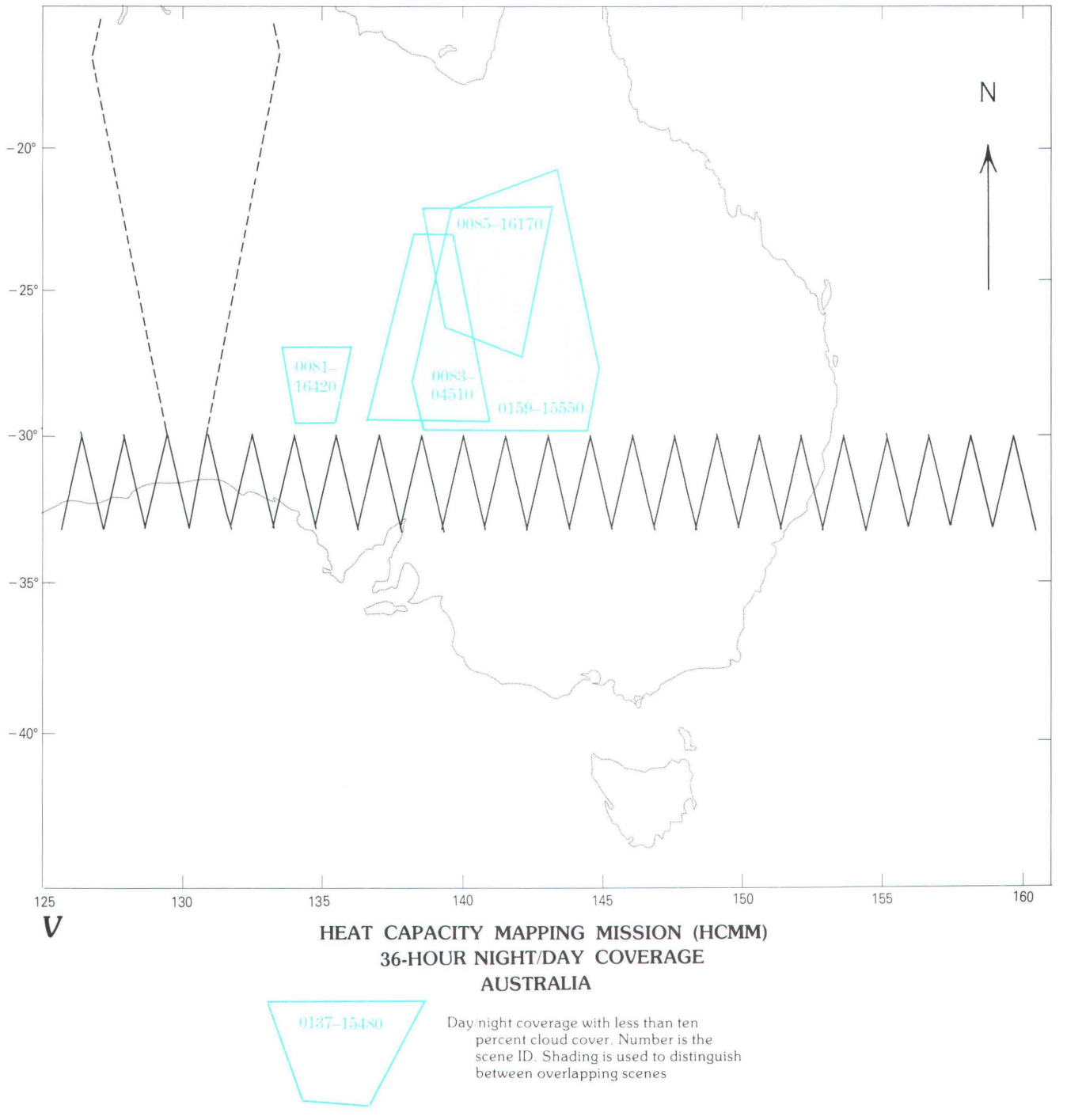


Figure 6.—Continued.

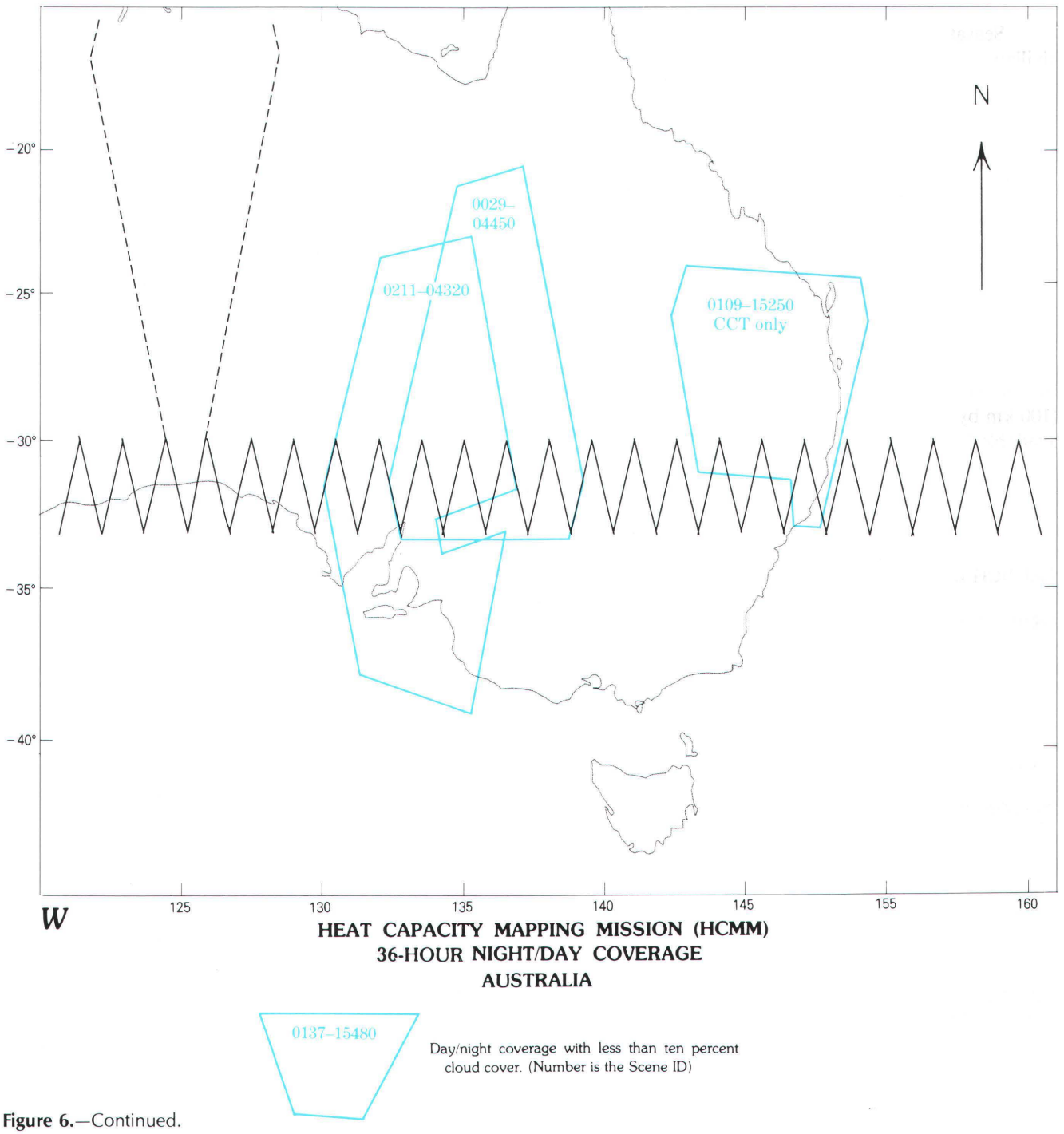


Figure 6.—Continued.

Seasat

Seasat, launched June 26, 1978, was the first civilian space platform to acquire synthetic aperture radar (SAR) imagery of the Earth. Although the mission was primarily designed for oceanographic monitoring, passes over North America, western Europe, and the Caribbean region (Ford and others, 1980) provided significant new data for geologists. The Seasat SAR acquired L-band (23.5 cm wavelength) imagery at approximately 25-m resolution having look directions of northeast (ascending node) and northwest (descending node). Optically processed Seasat SAR data have been used to produce uncontrolled mosaics of California, Pennsylvania, Florida, Jamaica, the United Kingdom, and Iceland. Over 300 digitally correlated subscenes (100 km by 100 km) and nearly 400 optically correlated scenes (100 km by up to 4,000 km) have been produced and are available from NOAA/NESDIS. Additional information can be obtained through the Satellite (Seasat) Data User's Bulletin (NOAA/NESDIS) and the Seasat Synthetic-Aperture Radar Data User's Manual (Pravdo and others, 1983; Ford and others, 1980; Elachi, 1980; and Wu and others, 1981). Table 4 provides characteristics of the Seasat satellite, SAR, and available data. Figure 7 is a Seasat SAR image. Figure 8 provides general Seasat SAR coverage of North America, and figure 9 provides Seasat SAR coverage of Alaska. Figures 10 through 14 provide Seasat SAR image orbital passes covering Western United States, Eastern United States, Alaska, Canada, and Europe, respectively (Pravdo and others, 1983). Appendix 1 provides a chronological data listing of Seasat SAR optically processed data on archive at NOAA/NESDIS. Revolution numbers are referenced adjacent to each orbital pass in figures 10 through 14. Figure 15 shows the approximate areas covered by Seasat SAR digitally processed tapes and film imagery. This material is on archive at NOAA/NESDIS. Appendix 2 provides a chronological listing of Seasat SAR digitally processed tapes and film imagery data on archive at NOAA/NESDIS.

Table 4. Characteristics of the Seasat satellite, synthetic aperture radar (SAR), and available data

LAUNCH DATE: June 26, 1978. Operation ended October 10, 1978.

ORBITAL ELEMENTS:

Orbit:	Nearly circular.
Altitude:	790.17 km ± 50 m.
Inclination:	108° nominal, 104° to 108° range.
Period:	100.75 minutes.
Orbits per day:	14.3.
Cycle:	152 days.

SENSOR: Synthetic aperture radar (data limited to 60 min/day; direct readout only)

Frequency	Wavelength	Polarization	Spatial resolution	Swath width/ Field of view	Antenna depression angle
1.275 GHz	L-band, 23.5 cm	Horizontal, horizontal (HH)	25 m at 4-look directions	100 km swath on one side of spacecraft	70° from the horizontal

DATA ARCHIVE:

NOAA/NESDIS
Satellite Data Services Division
World Weather Building—Room 100
Washington, DC 20233
(301) 763-8111

STANDARD FILM OR CCT FORMATS OF SEASAT SAR IMAGE PRODUCTS AVAILABLE:

Optically or Digitally Processed:
1:500,000-scale
70-mm format (black-and-white) (100 km by 100 km coverage)
Paper print
Duplicate negative
Positive transparency

Computer-compatible tapes (CCT's): 9 track, 1,600 bits per inch.

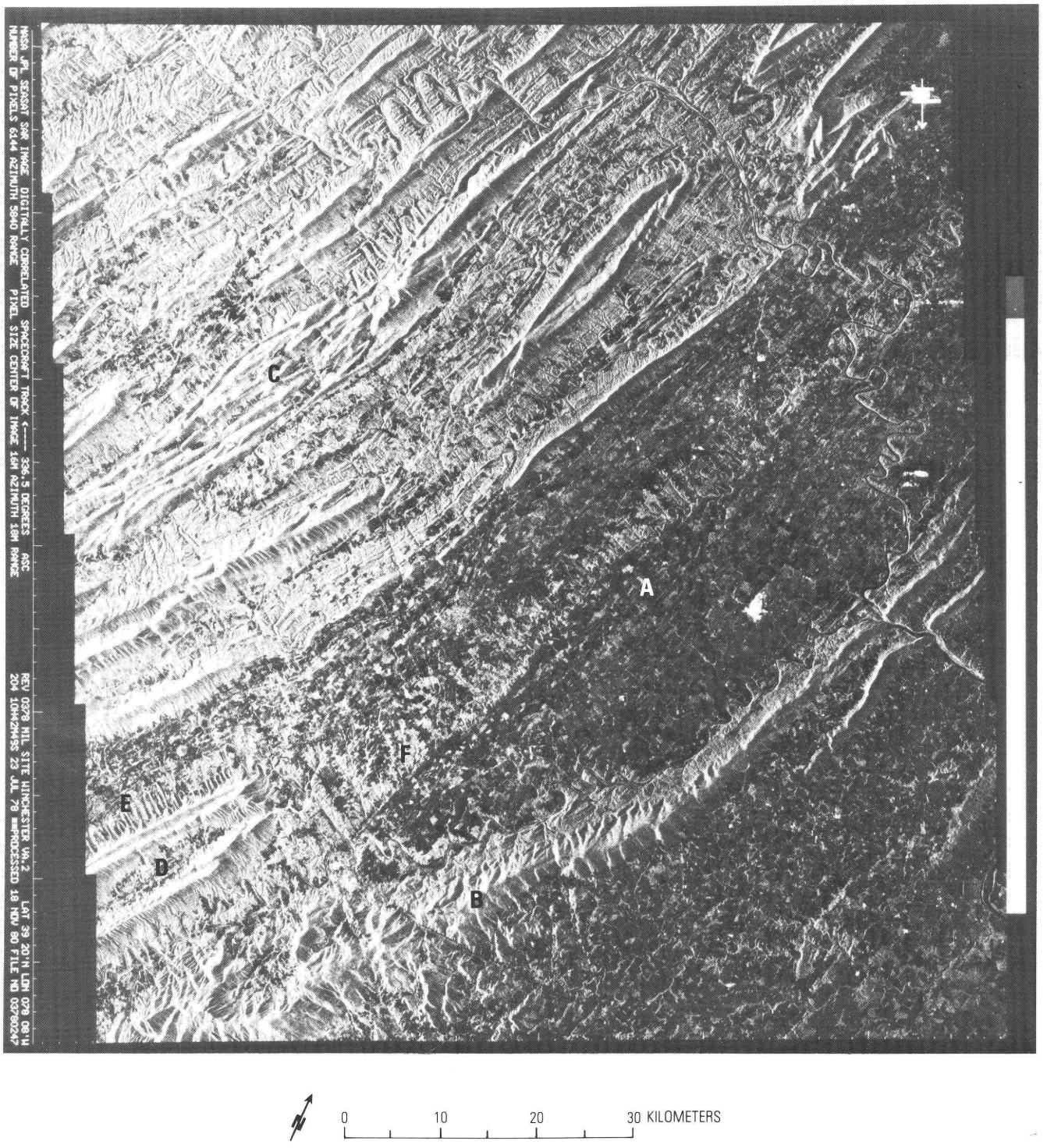
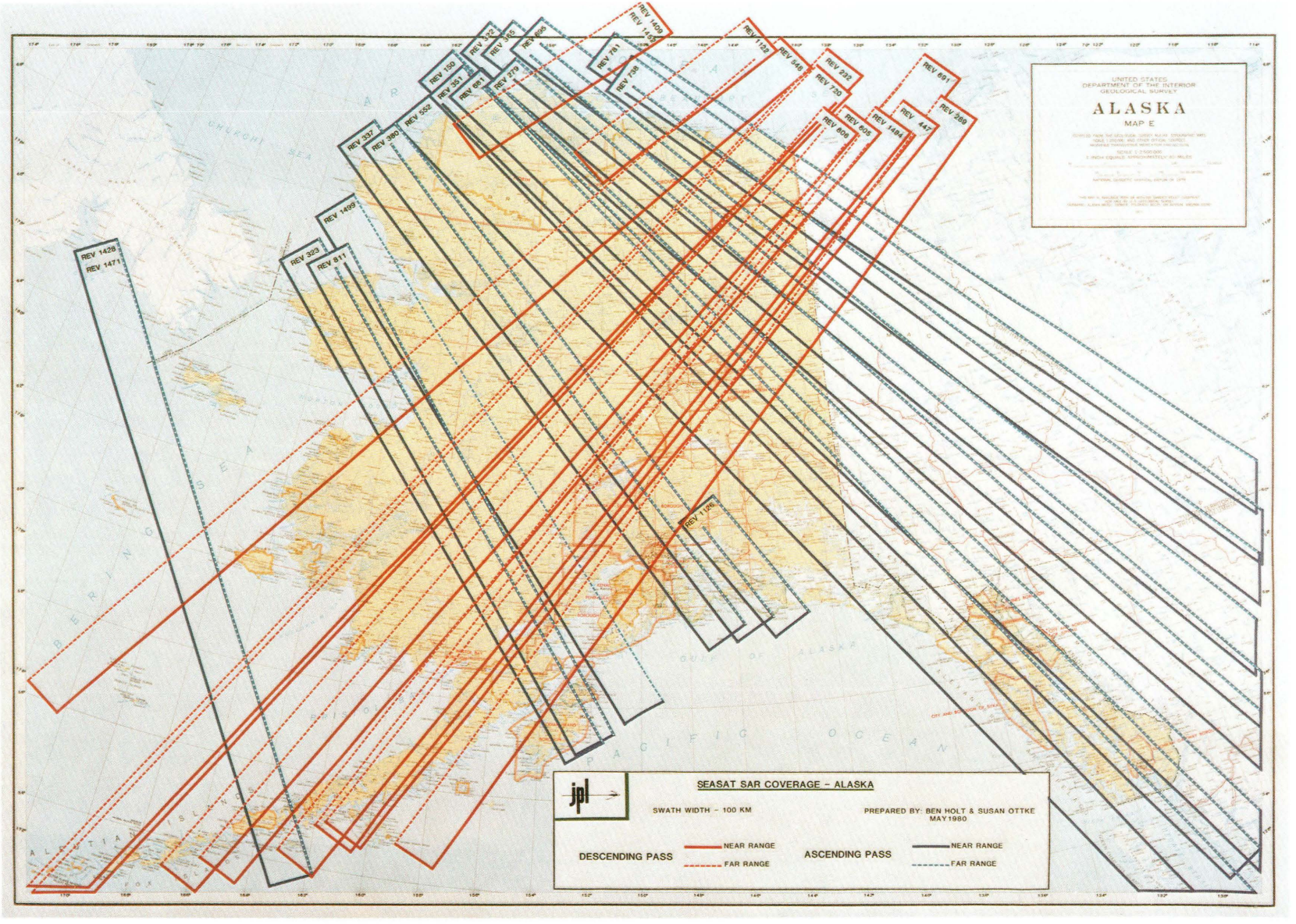
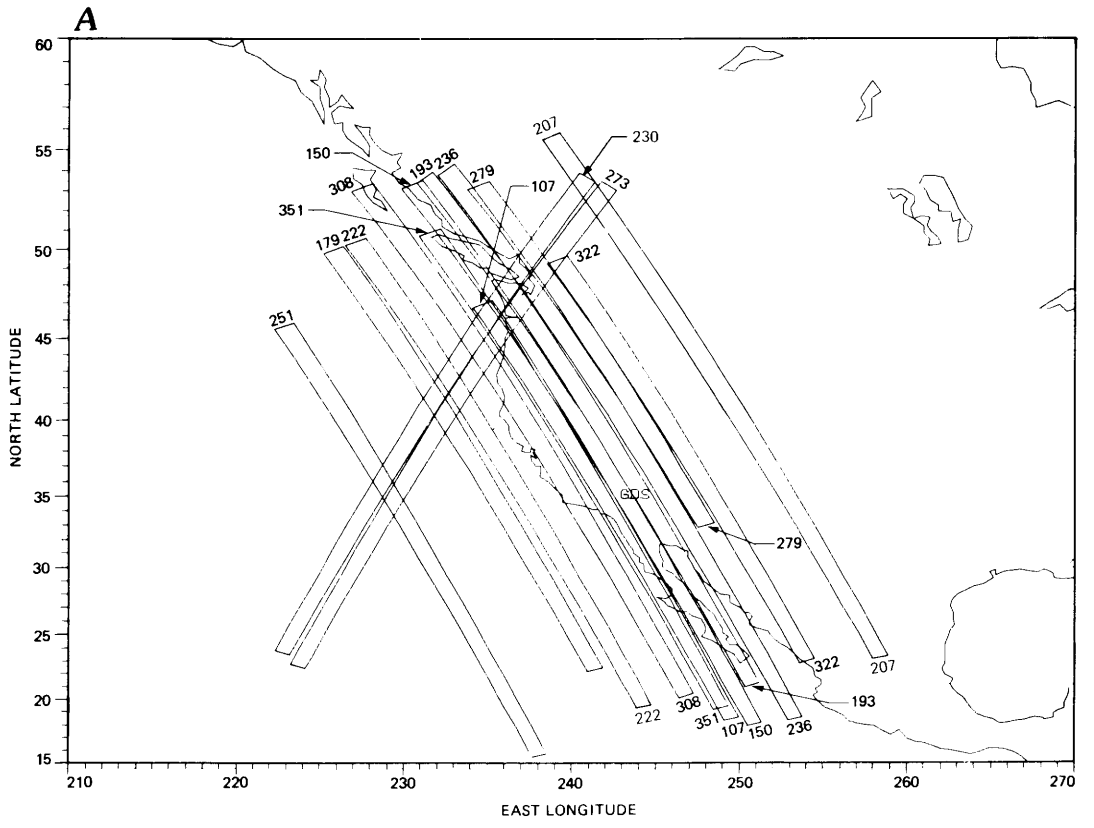


Figure 7. A Seasat synthetic aperture radar digitally correlated image covering the Valley and Ridge Province of Virginia. The image (ID 03780247) was acquired July 23, 1978, as the satellite ascended from Cape Hatteras, North Carolina, to Lake Erie. The Seasat SAR data were acquired on revolution 0378 with a look direction of northeast and a look angle of 20.5° from the vertical. The image is centered on the Shenandoah Valley of Virginia (A), which is composed of sedimentary rocks of Cambrian through Devonian and is bounded to the east by the Precambrian to Cambrian igneous and metamorphic rocks of the Blue Ridge anticlinorium (B). To the west of the valley are the folded and thrust faulted Cambrian through Devonian sedimentary units of the Appalachian Mountains (C). Of interest in the scene is the Massanutten Mountain syncline (D) with the seven fracture-controlled bends of the Shenandoah River on its west flank (E). The distinct trellis drainage pattern and associated land use pattern (nonagricultural) of the Ordovician Martinsburg Shale is identified (F). See figures 1, 2, and 3 for Landsat MSS, RBV, and TM imagery of the same region.

Figure 8. General coverage of Seasat synthetic aperture radar over the North American continent from the June 26, 1978, launch until the October 10, 1978, termination of the mission. United States coverage portrays ascending (southeast to northwest) and descending (northeast to southwest) satellite tracks.


UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
ALASKA
MAP E
jpl
SEASAT SAR COVERAGE – ALASKA
SWATH WIDTH – 100 KM
PREPARED BY: BEN HOLT & SUSAN OTTKE
MAY 1980
DESCENDING PASS
NEAR RANGE
FAR RANGE
ASCENDING PASS
NEAR RANGE
FAR RANGE
REV 1428
REV 1471
REV 1499
REV 323
REV 811
REV 337
REV 380
REV 532
REV 150
REV 357
REV 681
REV 279
REV 1409
REV 1452
REV 781
REV 738
REV 1124
REV 146
REV 232
REV 733
REV 605
REV 605
REV 1484
REV 447
REV 691
REV 289
REV 1126
BERING SEA
GULF OF ALASKA
PACIFIC OCEAN
ALEUTIAN ISLANDS



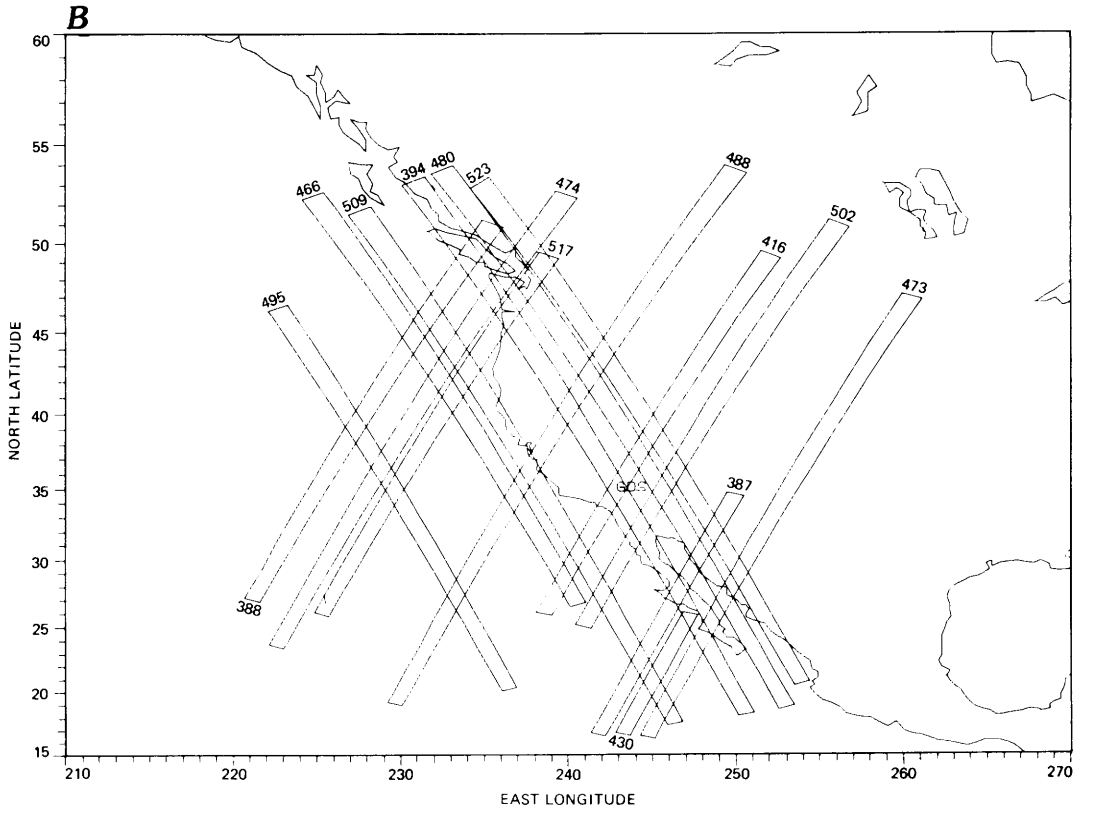


Figure 10. Seasat synthetic aperture radar coverage map of the Western United States received by the Goldstone, California, receiving station. *A*, July 4 through July 21, 1978. *B*, July 22 through August 2, 1978.

Figure 9. Seasat synthetic aperture radar coverage map of Alaska depicting ascending (southeast to northwest) and descending (northeast to southwest) passes with respective look directions of northeast and northwest. (Index map courtesy of Ben Holt, Jet Propulsion Laboratory.)

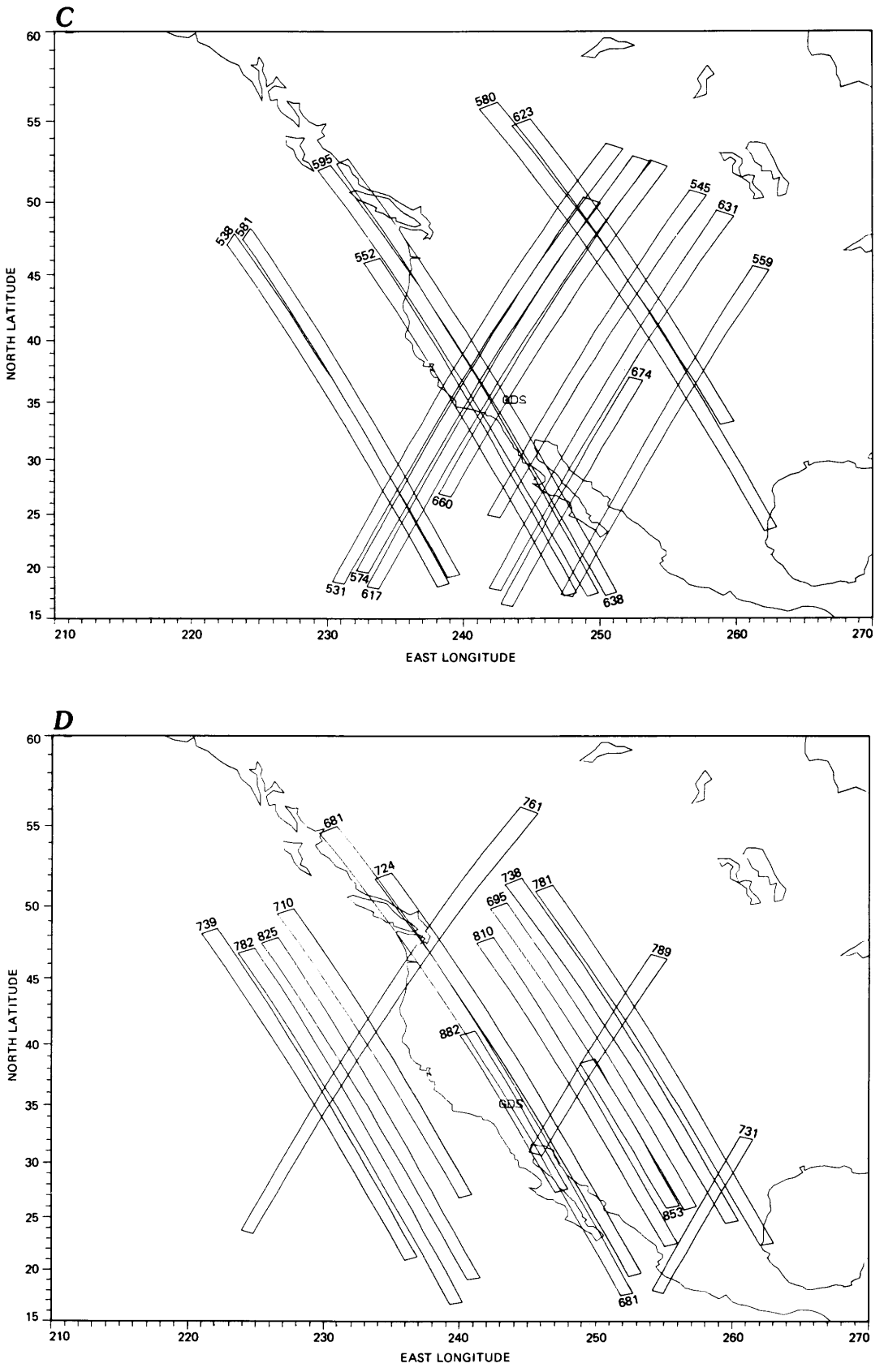


Figure 10.—Continued. *C*, August 3 through August 13, 1978. *D*, August 13 through August 27, 1978.

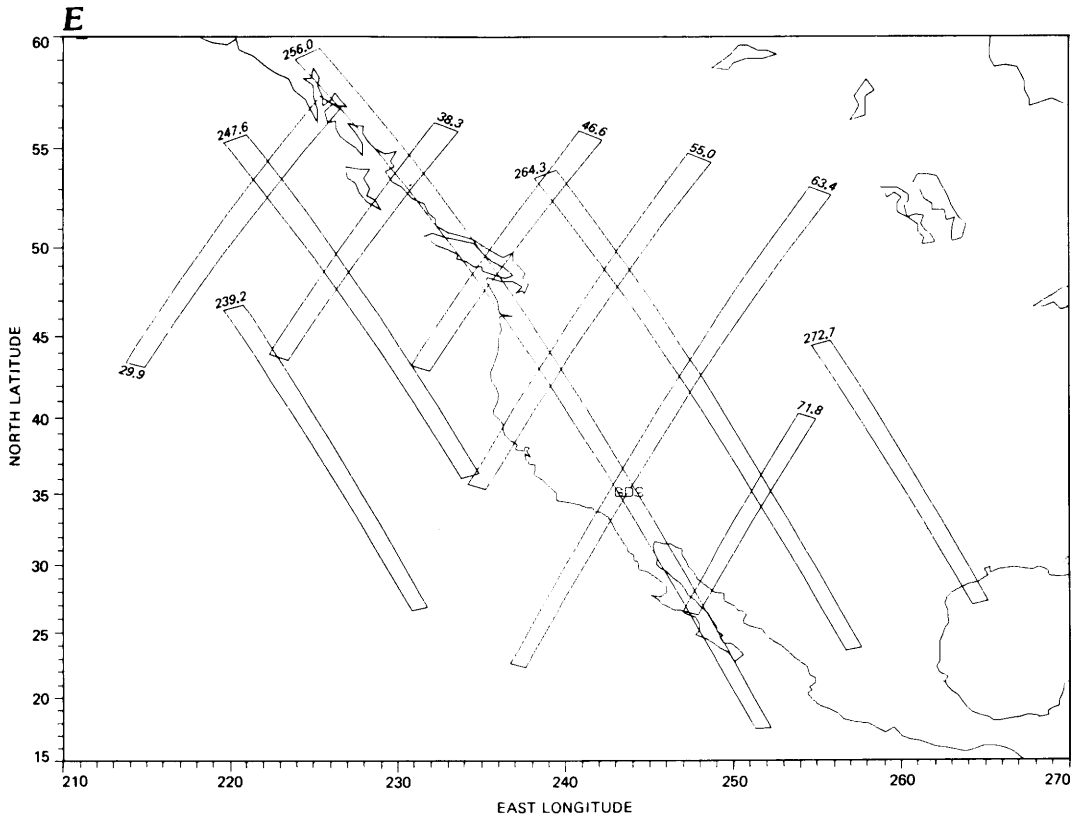


Figure 10.—Continued. *E*, August 28 through October 9, 1978.

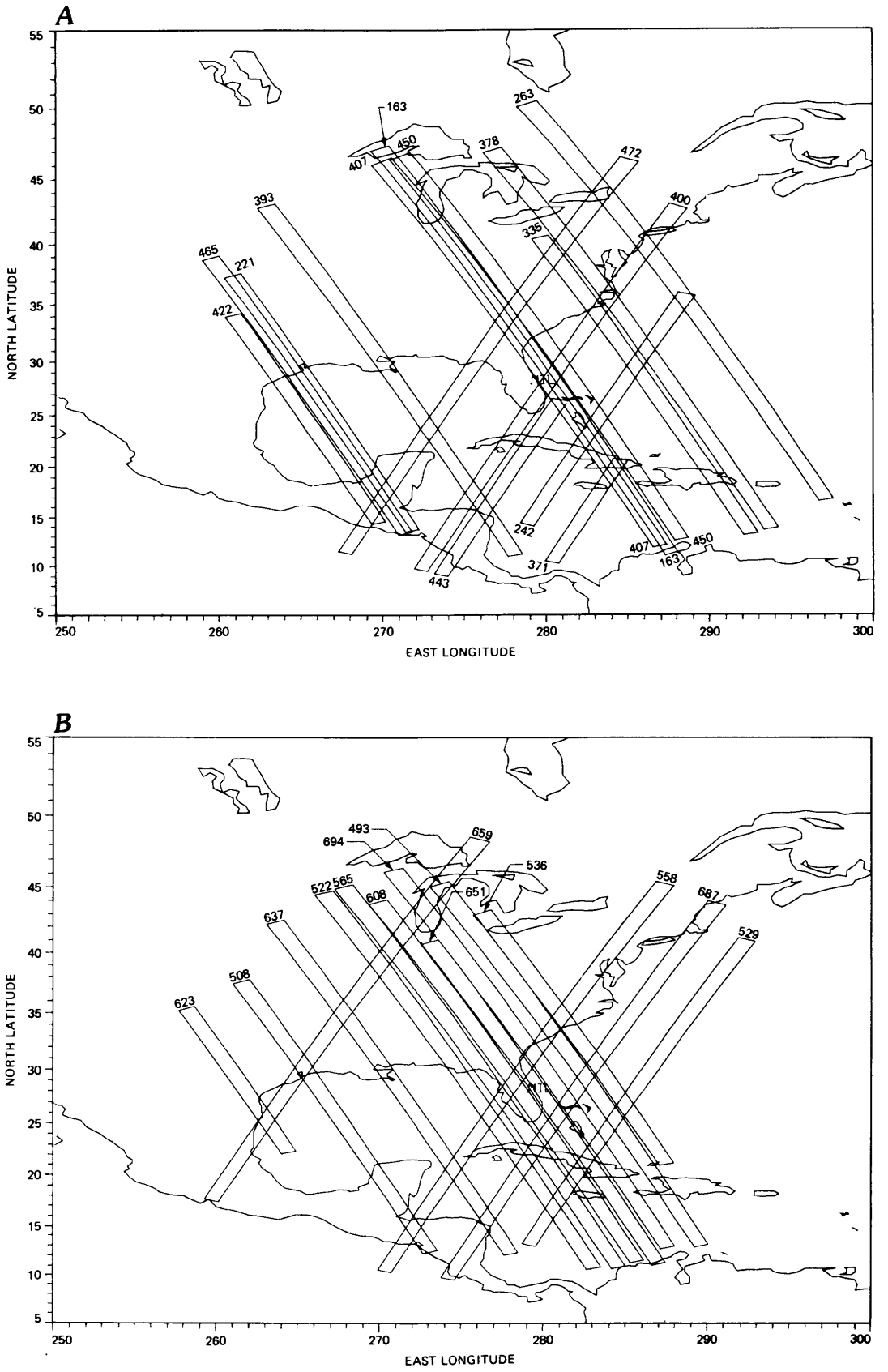
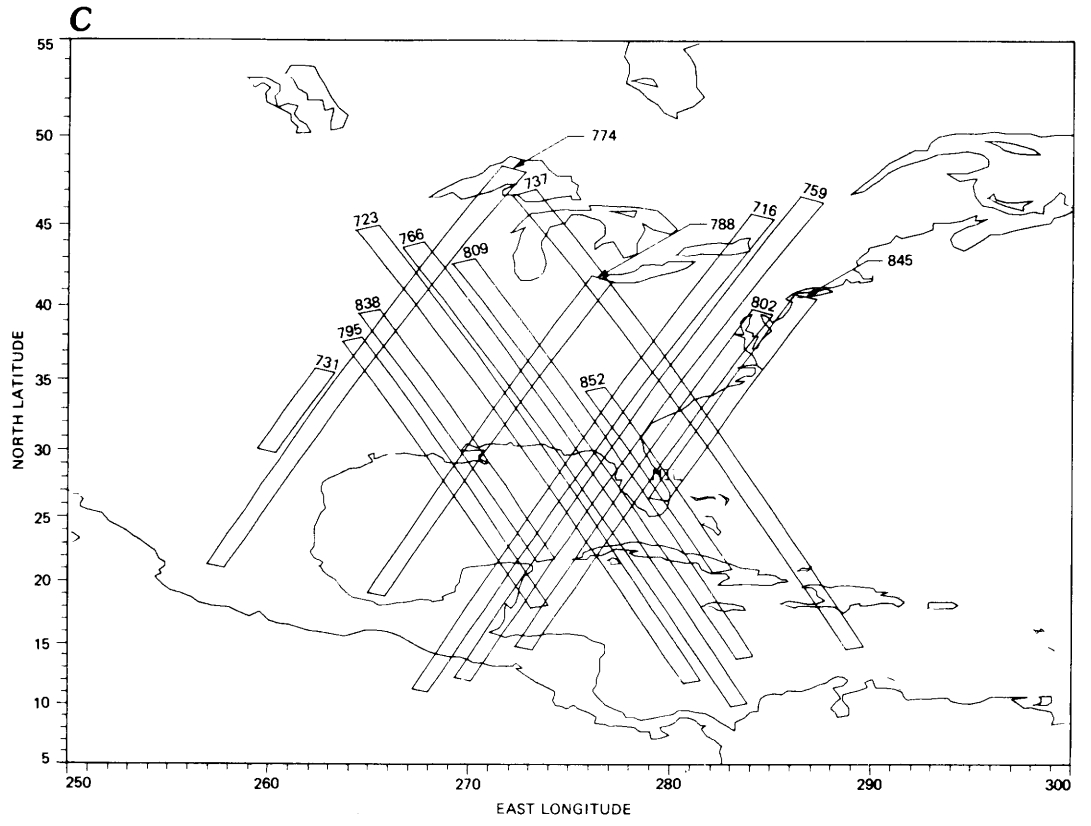


Figure 11. Seasat synthetic aperture radar coverage map of the Eastern United States received by the Merritt Island, Florida, receiving station. *A*, July 8 through July 30, 1978. *B*, July 31 through August 14, 1978.



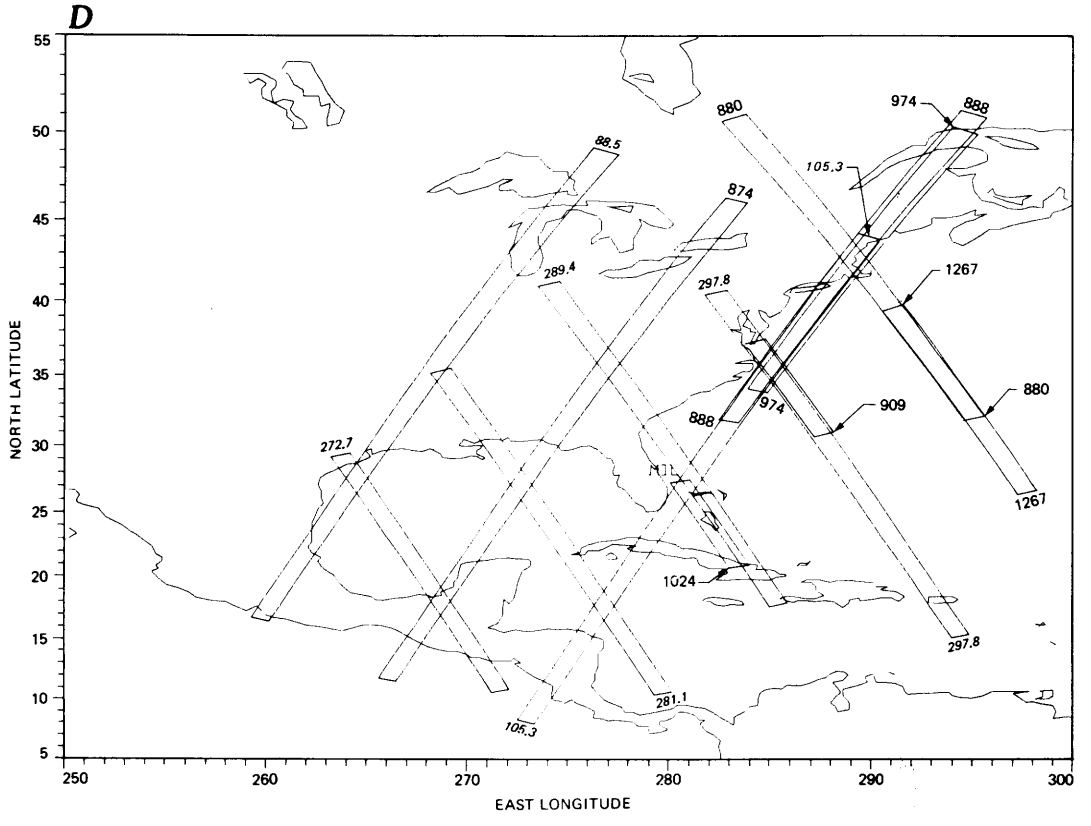


Figure 11.—Continued. *C*, August 15 through August 25, 1978. *D*, August 26 through October 9, 1978.

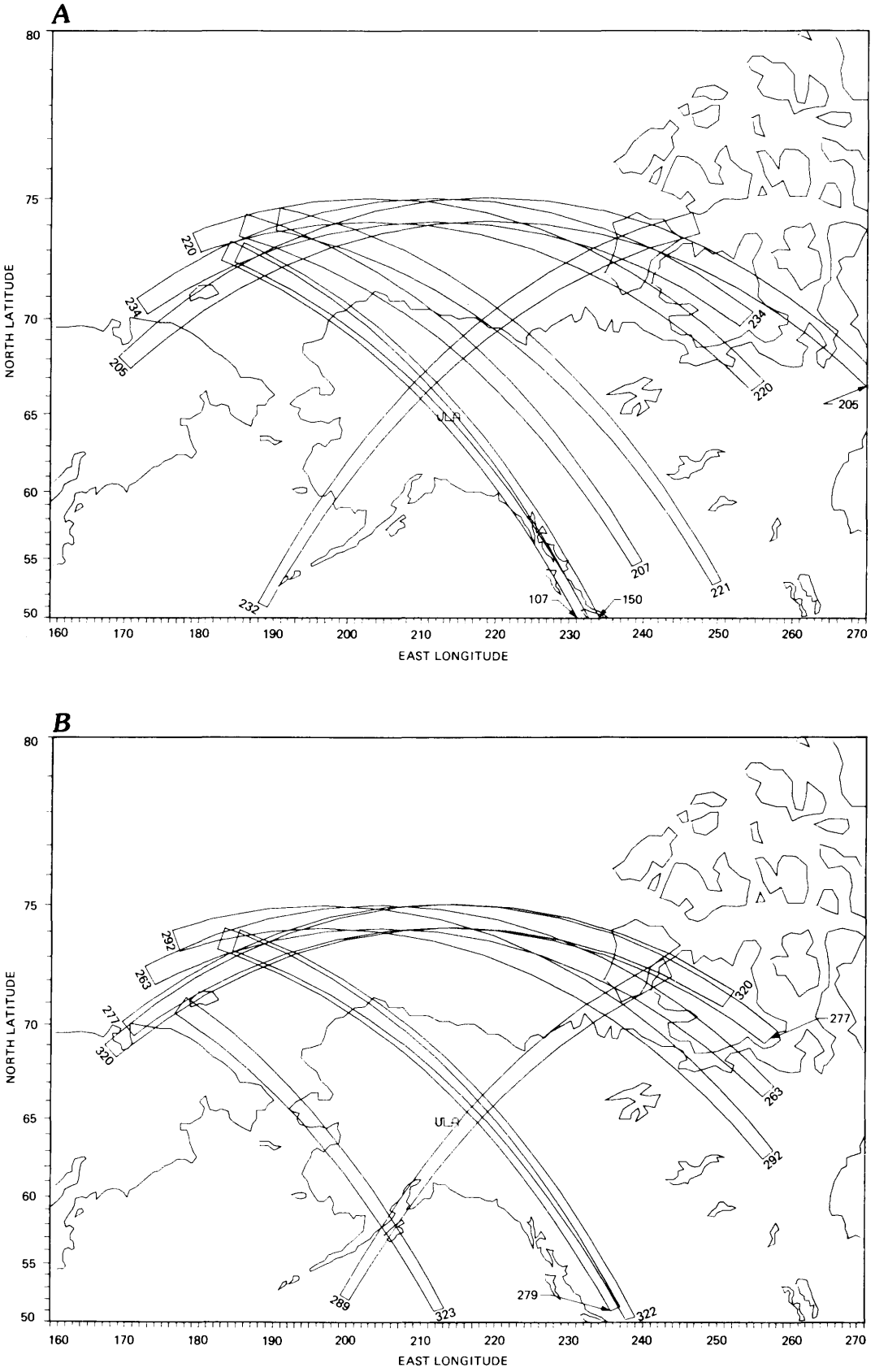


Figure 12. Seasat synthetic aperture radar coverage map of Alaska received by the Fairbanks, Alaska, receiving station. *A*, July 4 through July 13, 1978. *B*, July 14 through July 19, 1978.

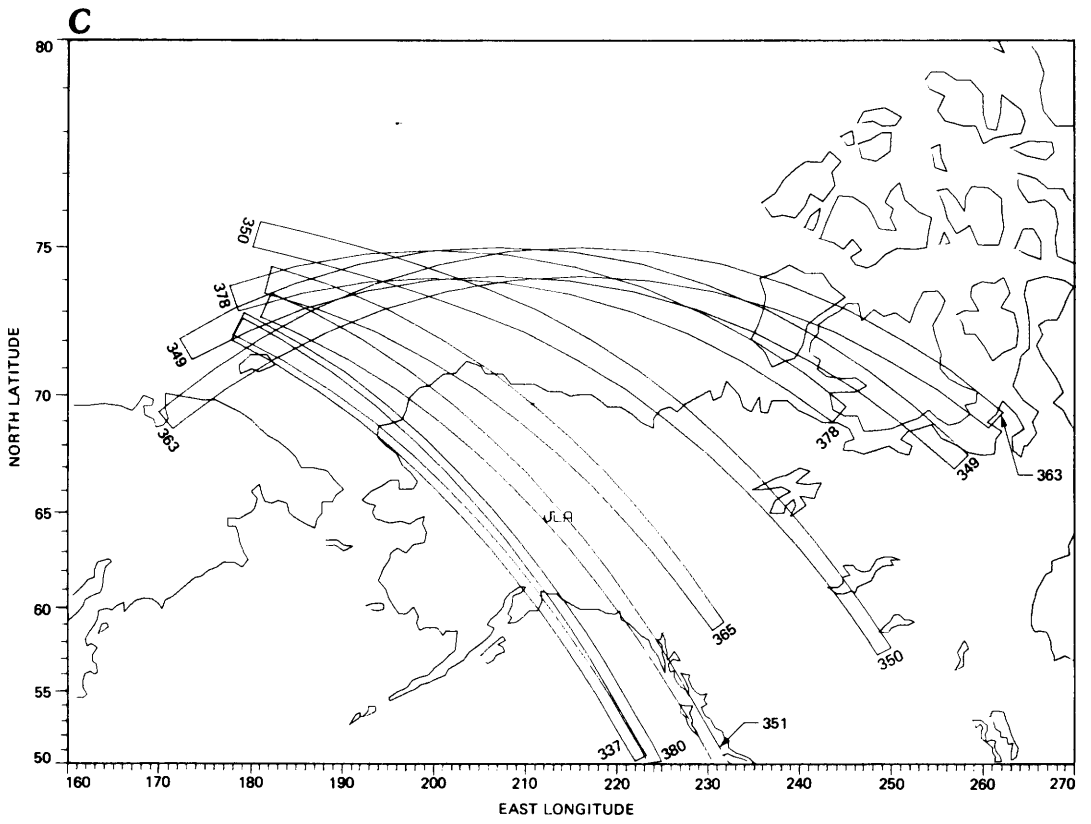


Figure 12.—Continued. *C,* July 20 through July 23, 1978. *D,* July 24 through July 29, 1978.

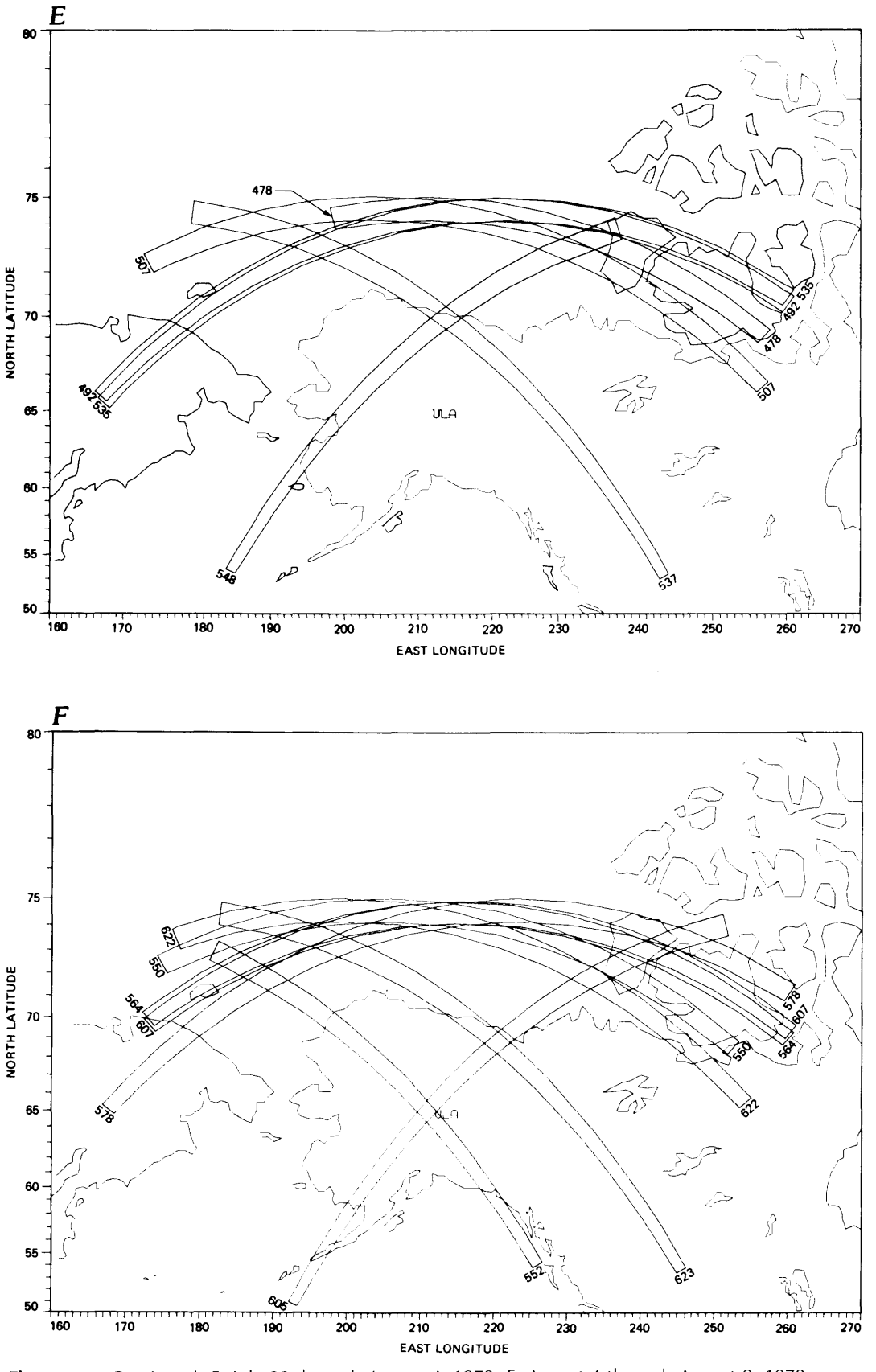


Figure 12.—Continued. *E*, July 30 through August 4, 1978. *F*, August 4 through August 9, 1978.

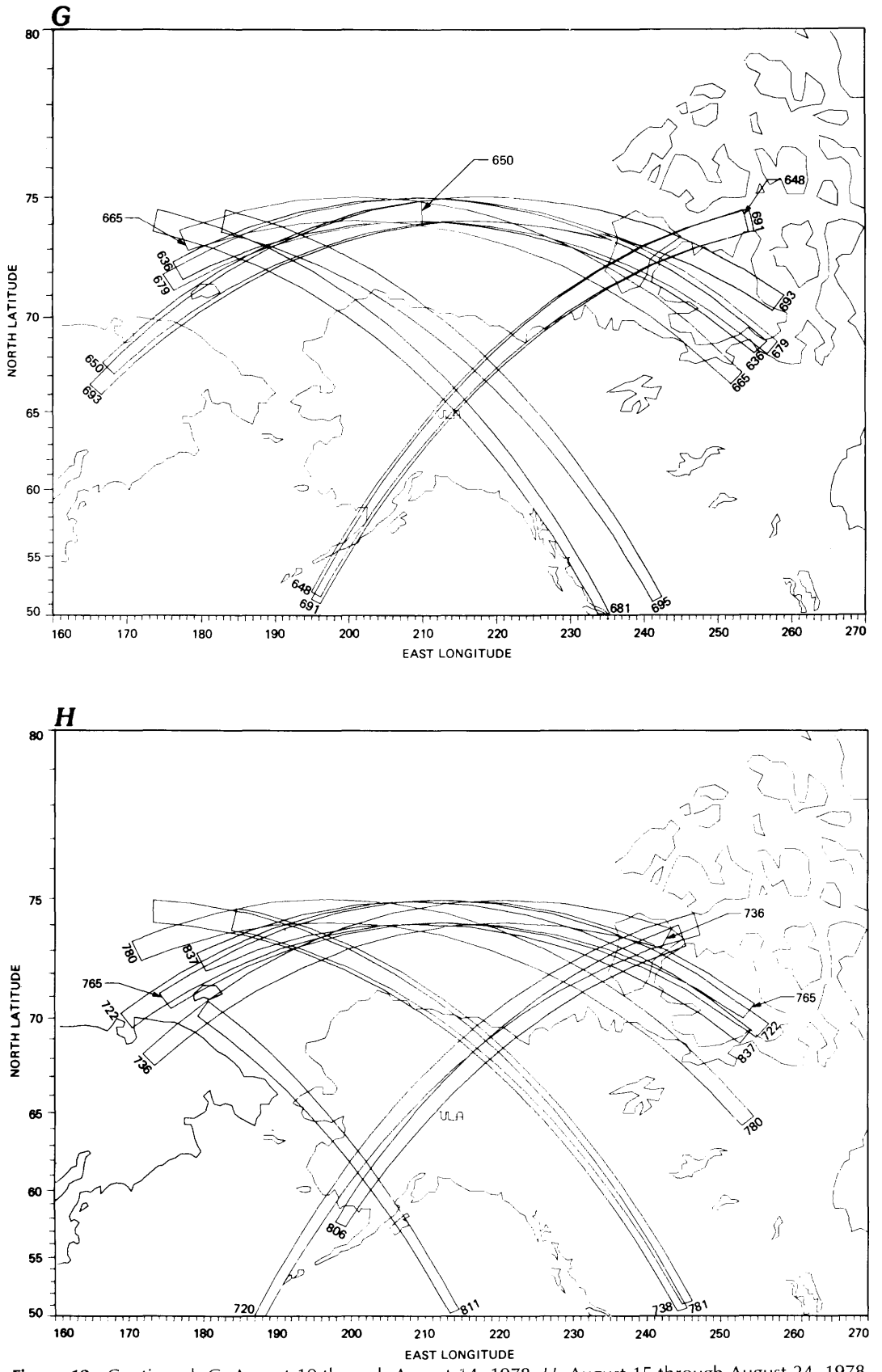


Figure 12—Continued. *G*, August 10 through August 14, 1978. *H*, August 15 through August 24, 1978.

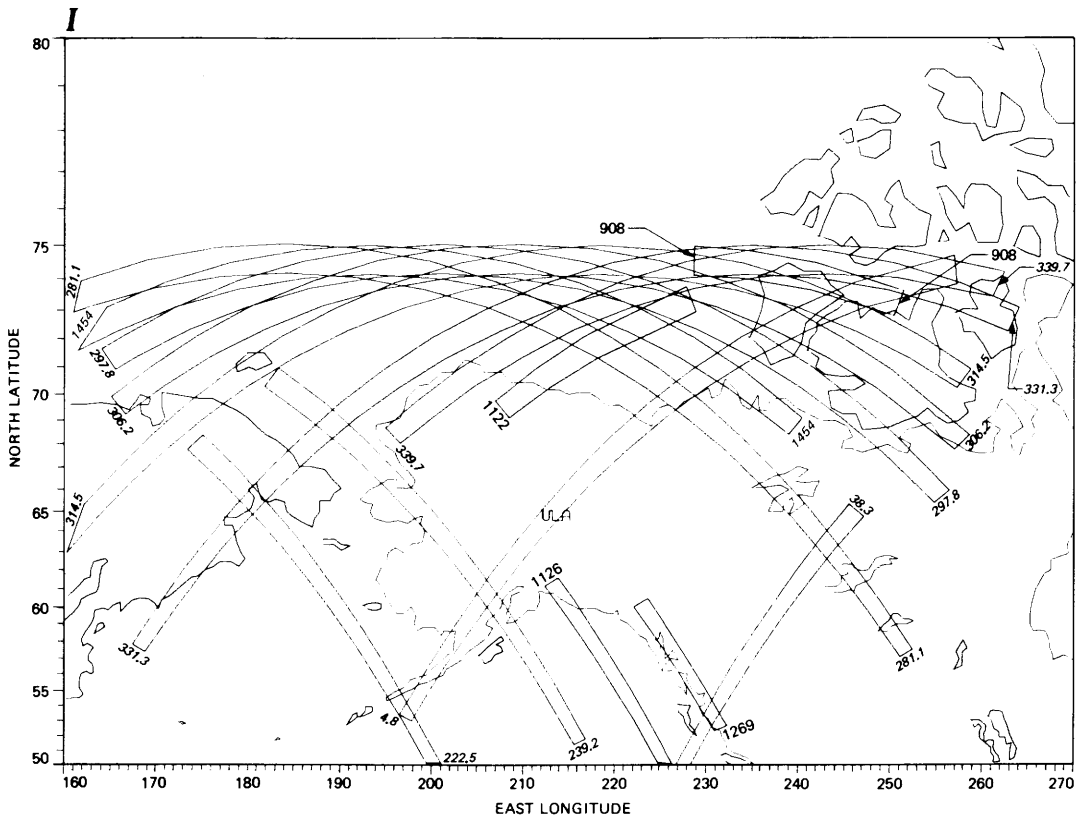


Figure 12.—Continued. *I*, August 25 through October 9, 1978

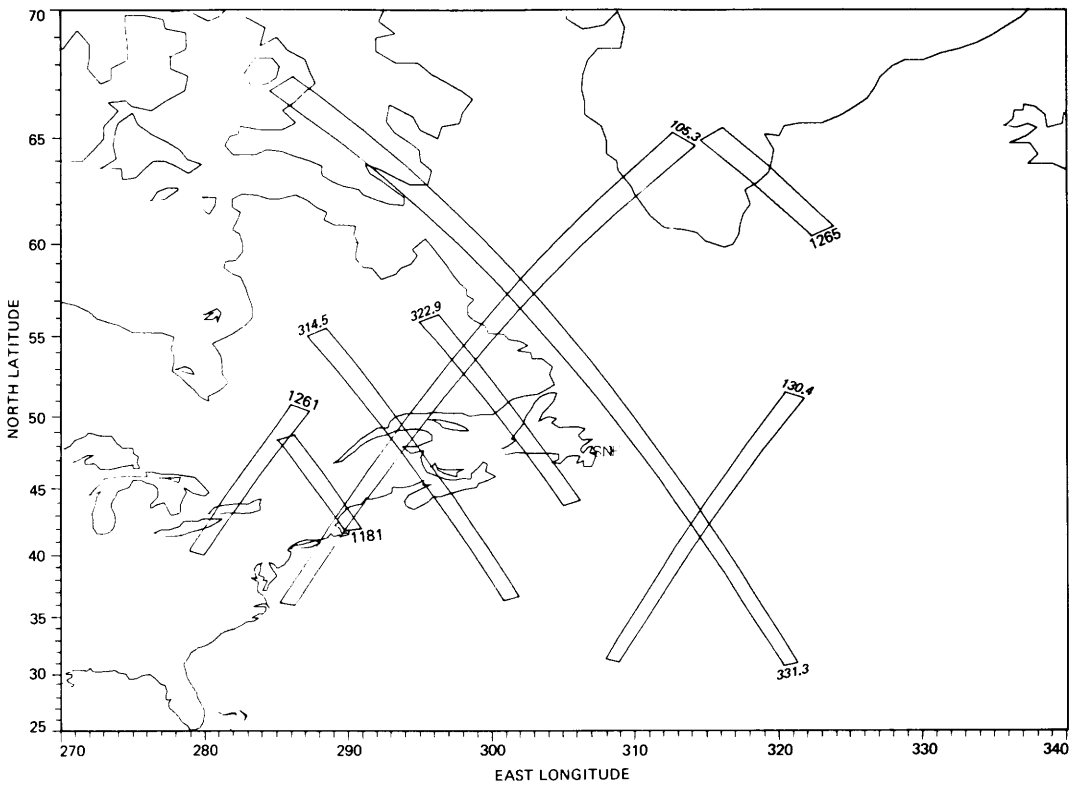


Figure 13. Seasat synthetic aperture radar coverage map of northern Atlantic received by the Shoe Cove, Newfoundland, receiving station, September 17 through October 9, 1978.

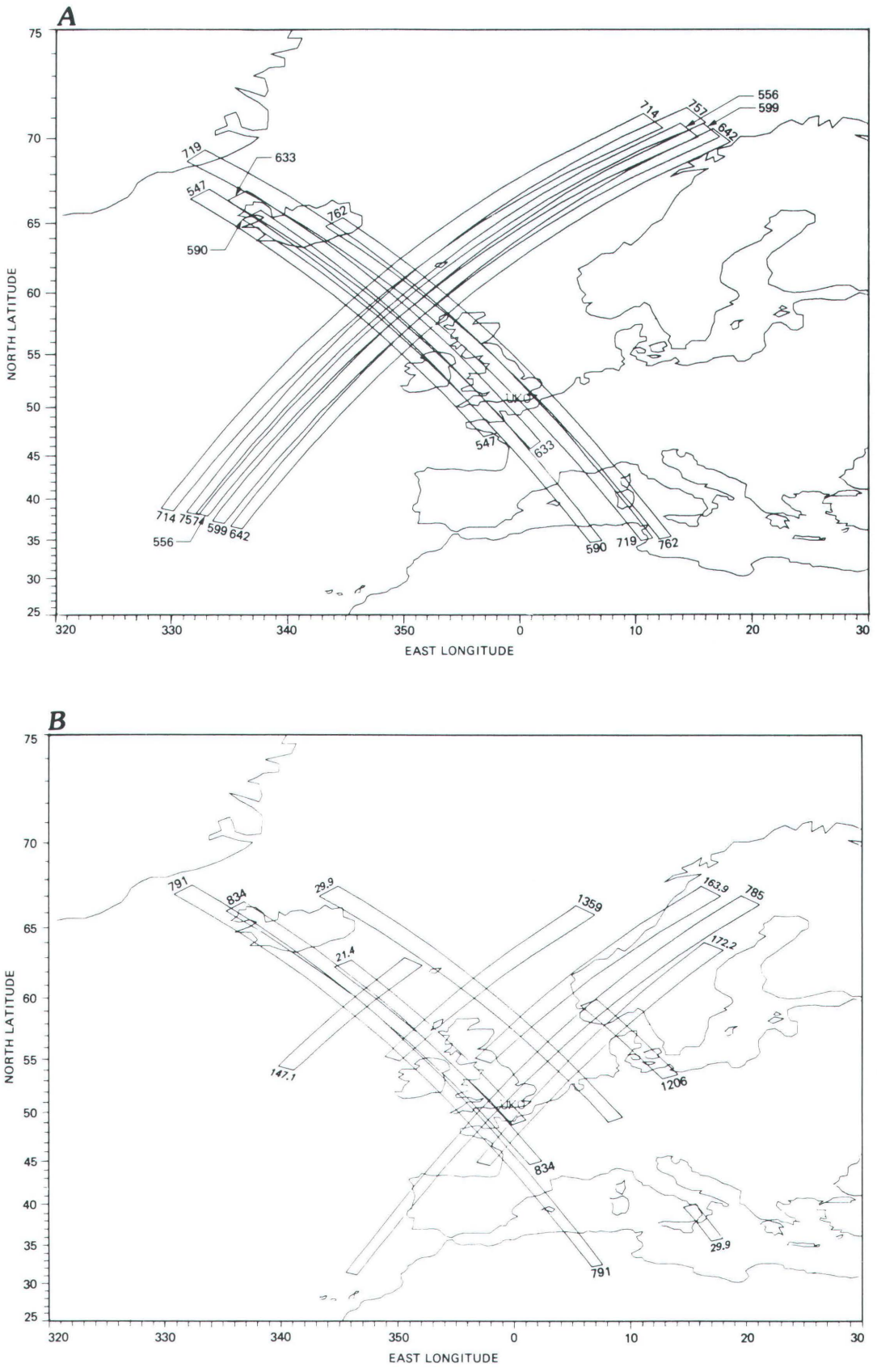


Figure 14. Seasat synthetic aperture radar coverage map of Europe received by the Oakhanger, England, receiving station. *A,* August 4 through August 19; *B,* August 20 through October 10, 1978.

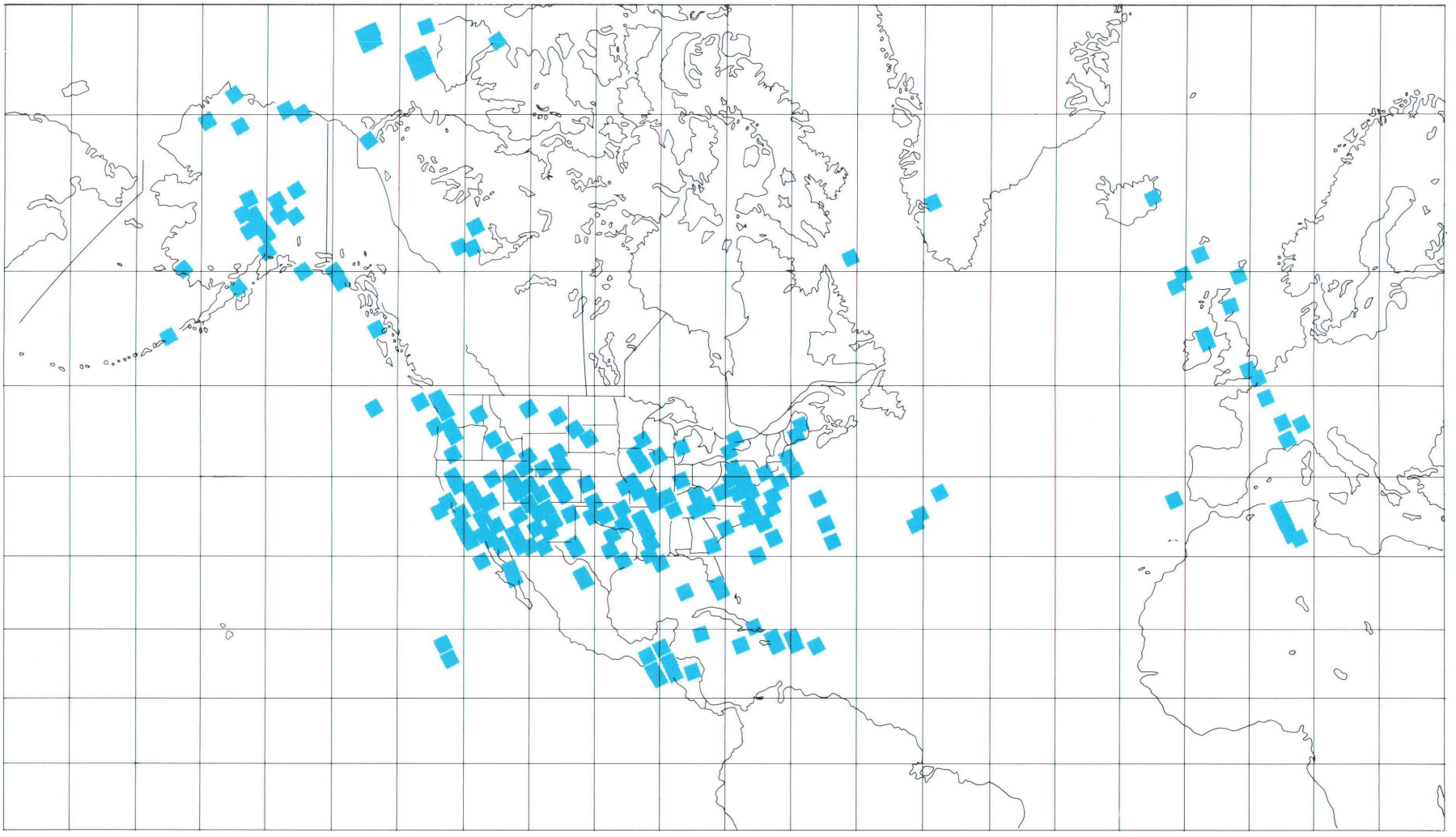


Figure 15. Approximate areas covered by Seasat synthetic aperture radar digitally processed images. The images cover 100 km by 100 km and are on archive at NOAA/NESDIS.

Nimbus-7 Coastal Zone Color Scanner

The coastal zone color scanner (CZCS) on Nimbus-7 is the only sensor in orbit that is specifically designed to enable study of living marine resources. Potential applications of CZCS data include the study of algal blooms, water-land mass boundaries, mesoscale circulation patterns, sediment distribution, and regional structure. The 6-band MSS acquires 825-m resolution data with a swath width of 1,600 km. Information on the satellite and data is available through the Nimbus-7 Data User's Bulletin that is issued periodically by NASA's Goddard Space Flight Center. CZCS data catalogs covering monthly orbits from 1978–1981 are available through NOAA/NESDIS (NASA, 1978a, b). A discussion of the applications of CZCS images can be found in Hovis and others (1980) and Short (1982). Table 5 provides characteristics of the Nimbus-7 spacecraft, CZCS, and available data. Figure 16 is a 6-band CZCS image of the Eastern United States, and figure 17 is an index map showing an example of daily orbital coverage of the Nimbus-7. Table 6 presents an example of CZCS data listings as provided monthly by NASA.

Table 5. Characteristics of the Nimbus-7 satellite, the coastal zone color scanner (CZCS), and available data

LAUNCH DATE: October 24, 1978.

ORBITAL ELEMENTS:

Orbit:	Sun-synchronous, near polar; ascending node at about 12:00 p.m.
Altitude:	955 km.
Inclination:	104°.
Period:	99.3 minutes.
Cycle:	6 days.

SENSOR:

Coastal Zone Color Scanner (CZCS)

Band Number	Wavelength (μm)	Pixel spatial resolution (m)	Swath (km)	Measurements
1	0.43–0.45	825	1,600	Chlorophyll absorption.
2	0.51–0.53	825	1,600	Chlorophyll distribution.
3	0.54–0.56	825	1,600	Gelbstoffe (yellow substance) concentration.
4	0.66–0.68	825	1,600	Chlorophyll concentration.
5	0.70–0.80	825	1,600	Surface vegetation.
6	10.5–12.5	825	1,600	Surface temperature and diffuse attenuation coefficient.

DATA ARCHIVE:

NOAA/NESDIS
Satellite Data Services Division
World Weather Building—Room 100
Washington, DC 20233
(301) 763-8111

STANDARD FILM OR CCT FORMATS OF CZCS IMAGE PRODUCTS AVAILABLE:

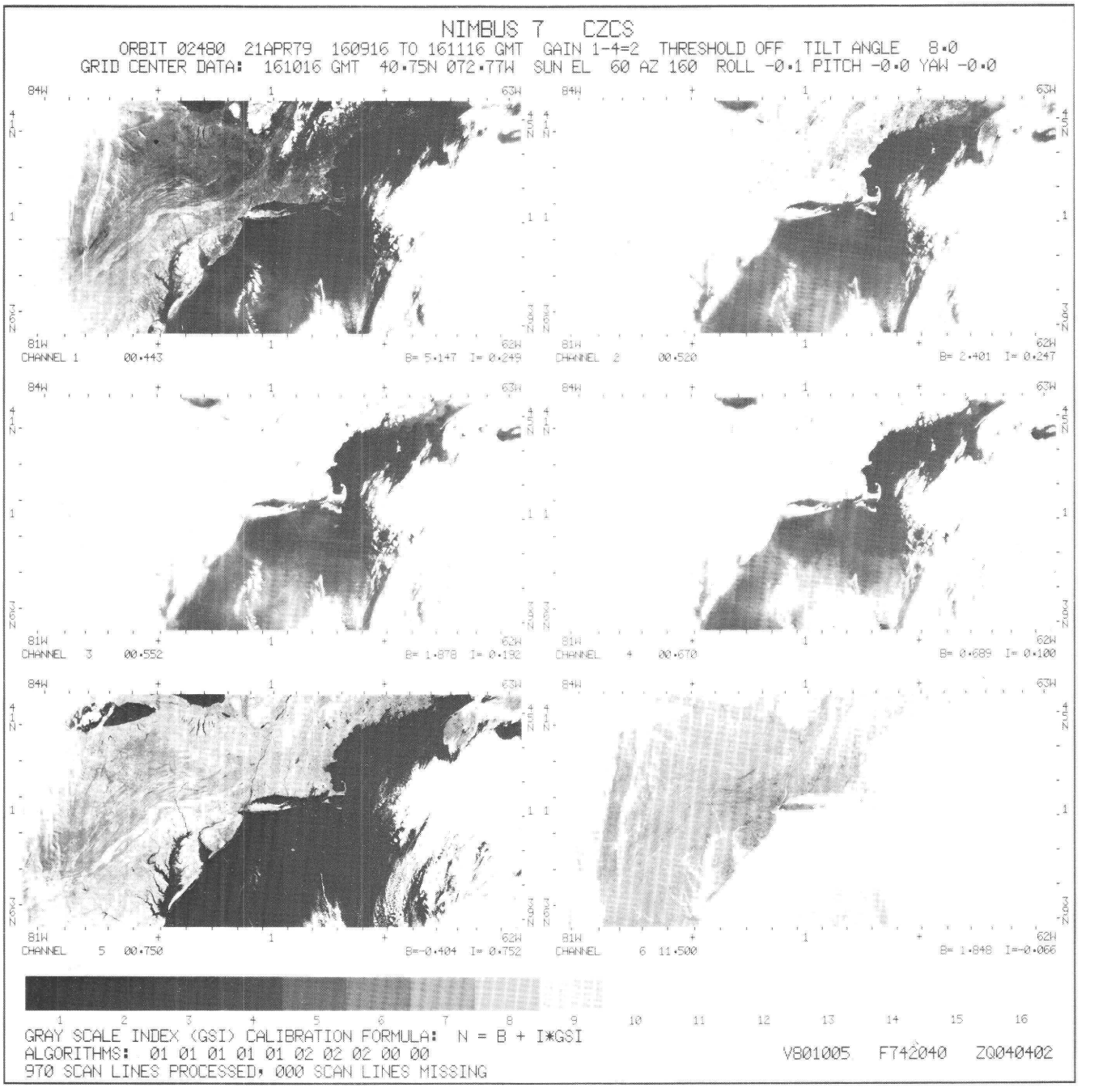
Image format is 25.4 cm × 25.4 cm (10 in. × 10 in) for black-and-white prints or positive or negative film transparencies that includes all 6 spectral bands. Each band measures 3.8 cm × 6.4 cm (1½ in. × 2½ in.) depicting an area of 700 km × 1,636 km, acquired during 2 minutes of sensor operation.

Computer-compatible tapes (CCT's): 9 tracks, 1,600 bits per inch, and contain up to three 2-minute scenes.

Table 6. Nimbus-7 coastal zone color scanner data

NIMBUS-7 COASTAL ZONE COLOR SCANNER (CZCS) DATA LISTING PAGE: 64
DATE GENERATED: AUGUST 3, 1901

ORBIT	STRT DATE	HH:MM:SS	STP DATE	HH:MM:SS	CORNER LATITUDES/LONGITUDES	CHANL	CC	TAPE ID.	FP	SEQNO	FILM NO	AVAIL
2481	04/21/79	17:25:21	04/21/79	17:26:55	0 - 0 0 - 0 0 - 0 0 - 0		0	15003-1	2	37301		N
2482	04/21/79	19:35:56	04/21/79	19:37:56	32N-132W 36N-112W 37N-136W 41N-112W	1-6	50	15037-1	1	22501	22502	Y
2482	04/21/79	19:37:56	04/21/79	19:39:56	38N-136W 42N-112W 43N-140W 48N-114W	1-6	50	15037-1	2	22501	22503	Y
2482	04/21/79	19:39:56	04/21/79	19:41:56	0 - 0 0 - 0 0 - 0 0 - 0		0	15037-1	3	22501		N
2482	04/21/79	19:39:56	04/21/79	19:41:56	45N-140W 49N-114W 50N-144W 55N-114W	1-6	40	0-0	0	0	22504	Y
2482	04/21/79	19:41:56	04/21/79	19:42:56	51N-144W 56N-114W 53N-147W 59N-115W	1-6	70	15036-1	3	22502	22505	Y
2485	04/22/79	00:52:16	04/22/79	00:54:16	0 - 0 0 - 0 0 - 0 0 - 0		0	15020-2	2	90601		N
2485	04/22/79	00:54:16	04/22/79	00:55:53	0 - 0 0 - 0 0 - 0 0 - 0		0	15020-2	3	90601		N
2486	04/22/79	02:17:56	04/22/79	02:19:56	0 - 0 0 - 0 0 - 0 0 - 0		0	15057-1	1	79611		N
2486	04/22/79	02:17:56	04/22/79	02:19:56	23S-141E 21S-153E 17S-140E 15S-151E	1-6	30	0-0	0	0	843201	Y
2486	04/22/79	02:19:56	04/22/79	02:21:56	0 - 0 0 - 0 0 - 0 0 - 0		0	15057-1	2	43201		N
2486	04/22/79	02:19:56	04/22/79	02:21:56	16S-140E 14S-151E 11S-138E 9S-150E	1-6	30	0-0	0	0	843202	Y
2486	04/22/79	02:21:56	04/22/79	02:23:36	0 - 0 0 - 0 0 - 0 0 - 0		0	15057-1	3	43201		N
2486	04/22/79	02:21:56	04/22/79	02:23:36	9S-138E 7S-150E 4S-137E 2S-148E	1-6	20	0-0	0	0	843203	Y
2491	04/22/79	10:51:26	04/22/79	10:53:26	0 - 0 0 - 0 0 - 0 0 - 0		0	15001-1	1	30801		N
2491	04/22/79	10:53:26	04/22/79	10:55:26	0 - 0 0 - 0 0 - 0 0 - 0		0	15001-1	2	30801		N
2491	04/22/79	10:55:26	04/22/79	10:57:26	0 - 0 0 - 0 0 - 0 0 - 0		0	15001-1	3	30801		N
2491	04/22/79	10:57:26	04/22/79	10:59:26	0 - 0 0 - 0 0 - 0 0 - 0		0	15002-1	1	30802		N
2493	04/22/79	14:45:06	04/22/79	14:47:06	40N- 60W 43N- 42W 45N- 64W 48N- 44W	1-6	80	15041-1	1	77701	77701	Y
2493	04/22/79	14:47:06	04/22/79	14:49:06	46N- 64W 50N- 44W 51N- 68W 55N- 46W	1-6	60	15041-1	2	77701	77702	Y
2496	04/22/79	19:54:01	04/22/79	19:56:01	30N-130W 33N-110W 35N-139W 39N-117W	1-6	50	15006-2	2	92701	92701	Y
2496	04/22/79	19:54:01	04/22/79	19:56:01	0 - 0 0 - 0 0 - 0 0 - 0		0	15045-1	1	48111		N
2496	04/22/79	19:54:01	04/22/79	19:56:01	30N-136W 33N-116W 35N-139W 39N-117W	1-6	40	0-0	0	0	148101	Y
2496	04/22/79	19:56:01	04/22/79	19:58:01	0 - 0 0 - 0 0 - 0 0 - 0		0	15045-1	2	48111		N
2496	04/22/79	19:56:01	04/22/79	19:58:01	36N-138W 40N-118W 41N-142W 45N-118W	1-6	50	0-0	0	0	148102	Y
2496	04/22/79	19:58:01	04/22/79	20:00:01	43N-142W 47N-118W 48N-147W 52N-122W	1-6	50	15006-2	3	92701	92703	Y
2496	04/22/79	19:58:01	04/22/79	19:58:01	0 - 0 0 - 0 0 - 0 0 - 0		0	15045-1	3	48111		N
2496	04/22/79	19:58:01	04/22/79	20:00:01	43N-142W 47N-118W 48N-146W 52N-120W	1-6	50	0-0	0	0	148103	Y
2496	04/22/79	20:00:01	04/22/79	20:01:06	49N-147W 53N-122W 54N-152W 59N-127W	1-6	70	15015-1	1	92702	92704	Y
2496	04/22/79	20:00:01	04/22/79	20:01:06	0 - 0 0 - 0 0 - 0 0 - 0		0	15047-1	1	48112		N
2496	04/22/79	20:00:01	04/22/79	20:01:06	49N-146W 53N-120W 50N-152W 56N-120W	1-6	60	0-0	0	0	148104	Y
2506	04/23/79	13:05:31	04/23/79	13:07:31	10S- 23W 8S- 11W 5S- 24W 3S- 13W	1-6	90	15054-1	1	13211	113201	Y
2506	04/23/79	13:07:31	04/23/79	13:08:41	3S- 24W 1S- 13W 0N- 25W 2N- 14W	1-6	90	15054-1	2	13211	113202	Y
2506	04/23/79	13:09:36	04/23/79	13:10:11	4N- 26W 6N- 15W 5N- 26W 17N- 15W	1-6	90	15054-1	3	13211	113203	Y
2518	04/24/79	10:07:31	04/24/79	10:09:31	34N- 9E 38N- 30E 40N- 6E 44N- 29E	1-6	60	15009-1	1	90701	90701	Y
2518	04/24/79	10:09:31	04/24/79	10:10:41	41N- 6E 45N- 29E 46N- 1E 50N- 26E	1-6	90	15009-1	2	90701	90702	Y
2518	04/24/79	10:12:11	04/24/79	10:14:11	49N- 0E 54N- 25E 54N- 6W 59N- 19E	1-6	90	15009-1	3	90701	90703	Y
2518	04/24/79	10:14:11	04/24/79	10:15:56	55N- 6W 61N- 26E 60N- 12W 66N- 24E	1-6	80	15006-1	3	90702	90704	Y
2518	04/24/79	10:15:56	04/24/79	10:16:36	60N- 12W 67N- 24E 64N- 22W 72N- 24E	1-6	70	15006-2	1	90702	90705	Y
2519	04/24/79	11:41:21	04/24/79	11:43:21	0 - 0 0 - 0 0 - 0 0 - 0		0	15032-1	3	59011		N
2519	04/24/79	11:43:21	04/24/79	11:44:31	0 - 0 0 - 0 0 - 0 0 - 0		0	15032-2	1	59011		N
2520	04/24/79	13:22:46	04/24/79	13:24:46	15S- 26W 13S- 15W 9S- 28W 7S- 17W	1-6	30	15031-1	1	59311	159301	Y
2520	04/24/79	13:24:46	04/24/79	13:26:46	8S- 28W 6S- 17W 2S- 29W 0S- 18W	1-6	30	15031-1	2	59311	159302	Y
2520	04/24/79	13:26:46	04/24/79	13:28:06	1S- 29W 1N- 18W 3N- 31W 5N- 20W	1-6	50	15031-1	3	59311	159303	Y
2521	04/24/79	15:18:06	04/24/79	15:20:06	29N- 60W 33N- 46W 34N- 71W 38N- 47W	1-6	60	15004-1	1	52501	52501	Y
2521	04/24/79	15:20:06	04/24/79	15:22:06	35N- 71W 39N- 47W 41N- 75W 45N- 50W	1-6	50	15004-1	2	52501	52502	Y
2521	04/24/79	15:22:06	04/24/79	15:24:06	42N- 75W 46N- 50W 47N- 79W 52N- 54W	1-6	60	15004-1	3	52501	52503	Y
2523	04/24/79	18:43:41	04/24/79	18:45:41	20N-117W 23N- 96W 25N-119W 29N- 97W	1-6	30	15047-1	2	92801	92801	Y
2523	04/24/79	18:45:41	04/24/79	18:47:31	26N-119W 30N- 97W 32N-122W 36N- 98W	1-6	10	15047-1	3	92801	92802	Y
2527	04/25/79	01:19:11	04/25/79	01:21:11	0 - 0 0 - 0 0 - 0 0 - 0		0	15055-1	1	20781		N
2527	04/25/79	01:21:11	04/25/79	01:23:11	0 - 0 0 - 0 0 - 0 0 - 0		0	15055-1	2	20781		N
2527	04/25/79	01:23:11	04/25/79	01:25:11	0 - 0 0 - 0 0 - 0 0 - 0		0	15055-1	3	20781		N
2531	04/25/79	08:24:51	04/25/79	08:26:51	28S- 50E 26S- 63E 23S- 49E 20S- 61E	1-6	40	0-0	0	0	159801	Y
2531	04/25/79	08:24:51	04/25/79	08:26:51	0 - 0 0 - 0 0 - 0 0 - 0		0	15025-1	1	59811		N



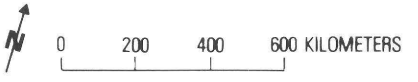


Figure 16. Six-band Nimbus–7 coastal zone color scanner image acquired April 21, 1979, (orbit 2480) at approximately 11:10 a.m. local time over the eastern seaboard region of the United States. Channels 1 through 6 are labeled according to increasing wavelength. Oversaturation of land in bands 3 and 4 is due to high gain needed for ocean monitoring.

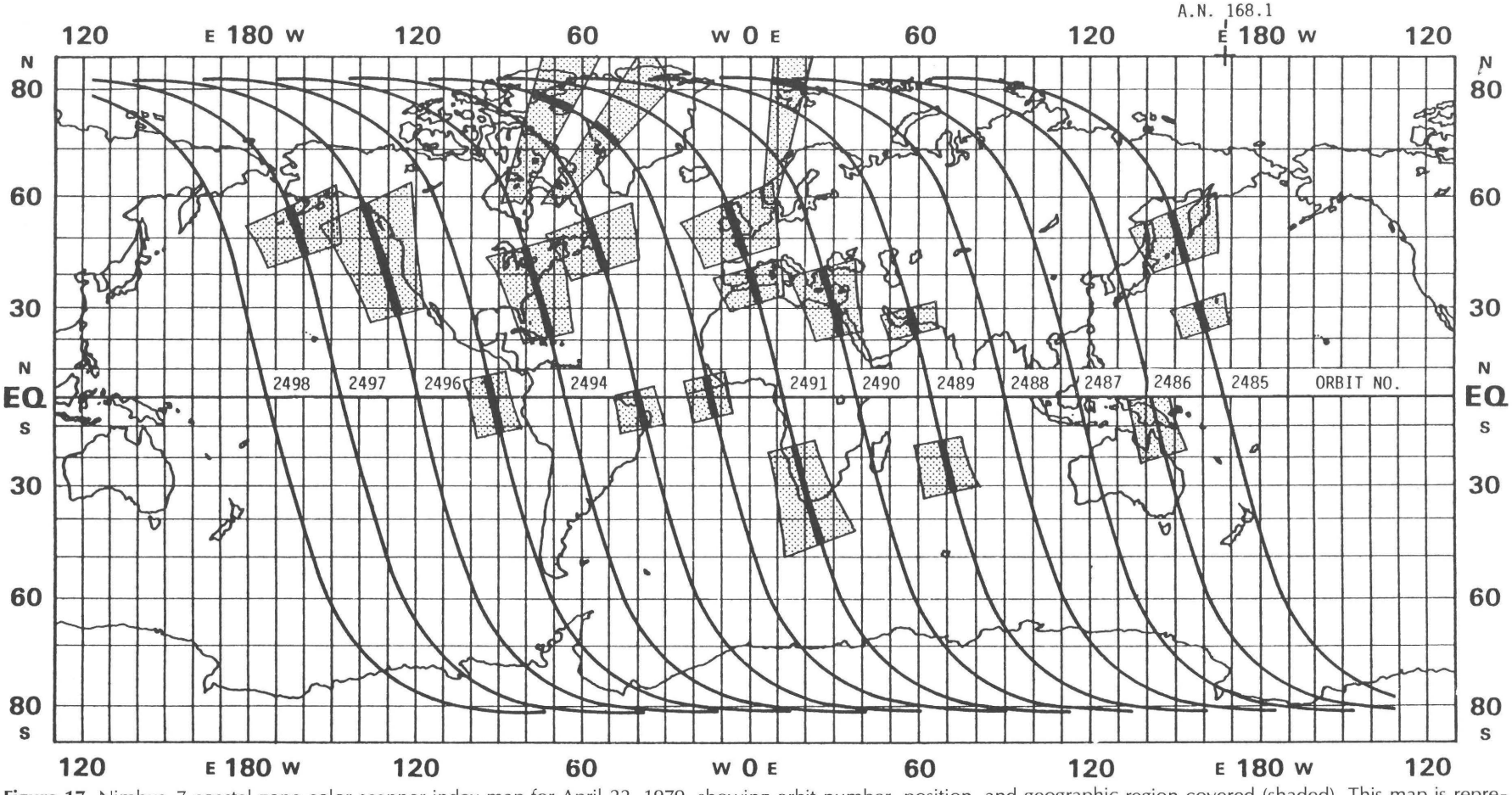


Figure 17. Nimbus–7 coastal zone color scanner index map for April 22, 1979, showing orbit number, position, and geographic region covered (shaded). This map is representative of data coverage maps published monthly by NASA.

Shuttle Imaging Radar-A

The shuttle imaging radar-A (SIR-A) is an L-band system (23.5 cm wavelength) that acquired imagery with a ground resolution of 40 m by 40 m and a swath width of 50 km. SIR-A was carried as part of the first scientific payload on the NASA Office of Space and Terrestrial Applications (OSTA-1), the second flight of the Space Shuttle *Columbia* that began on November 12, 1981. The objective of the SIR-A experiment was to determine whether the antenna configuration was optimal for acquiring images for geologic mapping in different global environments (Taranik and Settle, 1981). Approximately 10 million km^2 of SIR-A data were acquired and are available through NASA's National Space Science Data Center (NSSDC). Preliminary results of SIR-A data analysis of western Egypt and the Sudan reveal that radar energy penetrated as much as 2 to 5 m of dry sand to reveal the topographical nature of the concealed bedrock (Elachi and others, 1982). Additional information on SIR-A may be obtained from Cimino and Elachi (1982), Elachi (1982), Settle and Taranik (1982), and Ford and others (1983). Table 7 provides characteristics of the space shuttle (OSTA-1) mission, SIR-A, and available data. Figure 18 provides an example of a SIR-A image acquired over northern Oman. Figure 19 is an index map to SIR-A image acquisition of the world, and figure 20 is larger-scale index maps of SIR-A image acquisition over North America, Central America, South America, Africa, Indonesia, Asia, and Australia (Ford and others, 1983; Cimino and Elachi, 1982). Table 8 provides characteristics of the SIR-A data takes referenced in figure 20.

Table 7. Characteristics of the Space Shuttle (OSTA-1) mission, the shuttle imaging radar-A (SIR-A), and available data

LAUNCH DATE: November 12, 1981, OSTA-1 (30-hour mission).

ORBITAL ELEMENTS:

Orbit:	Circular.
Altitude:	259 km.
Inclination:	38–40°.
Coverage:	40° N. to 35°S. latitude.

SENSOR: Synthetic aperture radar (SAR)

Frequency	Wavelength	Polarization	Spatial resolution	Swathwidth/ field of view	Antenna depression angle
1.278 GHz	L-band, 23.5 cm	Horizontal, horizontal (HH)	40 m, 7-look directions	50 km	43° off horizontal

DATA ARCHIVE:

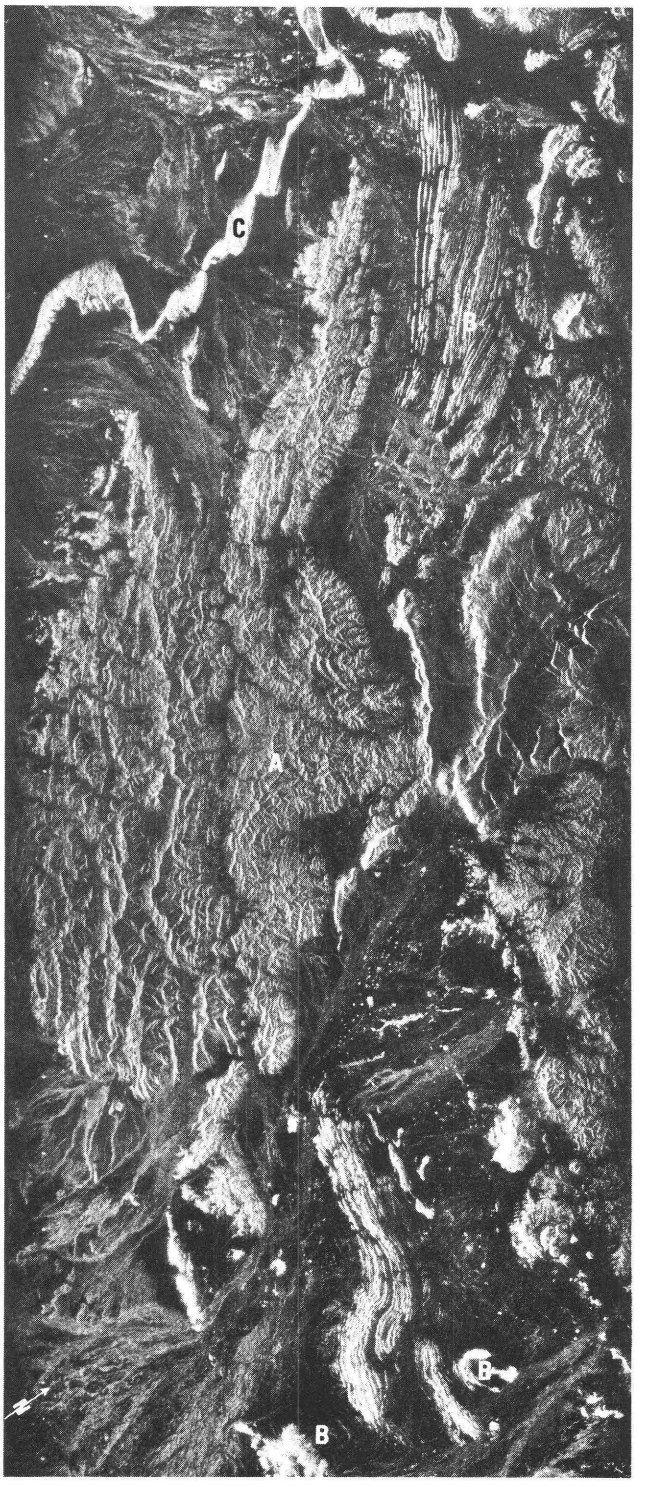
National Space Science Data Center/World Data Center-A
Code 601
National Aeronautics and Space Administration
Goddard Space Flight Center
Greenbelt, Maryland 20771
(301) 344-6695

STANDARD FILM OR CCT FORMATS OF SIR-A IMAGE PRODUCTS AVAILABLE:

Optically Processed: 125-mm wide film or print, black-and-white, 1:500,000-scale.

Table 8. Continental coverage of the shuttle imaging radar-A (SIR-A), November, 1981 (Ford and others, 1983)
[AF = Africa; AUST = Australia; CA = Central America; EU = Europe; INDON = Indonesia; SA = South America; US = United States]

Data Take	Orbit	Continent	Begin	End	Run Time	Altitude (nautical miles)
7	10/11	AF/ASIA	0:14:43:09	0:15:12:17	1750	141.5
16–17	15/16	SA/EU	0:20:44:39	0:21:05:32	1253	140.8
18	16	CA	0:22:16:54	0:22:21:47	293	140.0
21	17	CA/US	0:23:50:15	1:00:01:20	665	141.4
22	18	US	1:01:23:00	1:01:34:00	660	142.1
23	18	AUST	1:02:21:45	1:02:31:15	570	141.8
24	19	AUST	1:03:55:18	1:04:08:40	802	140.7
24A	20	US	1:04:29:39	1:04:42:02	743	142.5
24B	21	US	1:06:04:09	1:06:20:47	998	141.7
24BB	21/22	INDON	1:07:04:09	1:07:16:02	713	139.0
24C	22	US/SA	1:07:38:39	1:08:04:17	1538	141.6
24CCC	23	SA	1:09:23:09	1:09:39:02	953	140.2
26	23	AF	1:09:52:54	1:09:57:02	248	141.7
28	27	AF/ASIA	1:14:39:39	1:15:07:02	1643	140.6
29–30	27/28	SA/AF	1:15:50:39	1:16:20:47	1808	140.4
31	28	SA	1:17:27:09	1:17:35:32	503	139.4
32–33	29	AF/ASIA/ INDON	1:17:43:54	1:18:25:32	2498	140.2
34	29	SA	1:19:02:39	1:19:09:17	503	138.9
35–36	30	EU/ASIA/AUST	1:19:22:39	1:20:04:34	2515	141.2
37	31	CA	1:20:10:09	1:20:43:02	1973	138.8
37A	31	EU/ASIA	1:20:56:09	1:21:16:02	1119	141.3
38	31	AUST	1:21:29:39	1:21:52:47	1388	141.0



0 10 20 30 KILOMETERS

Figure 18. Shuttle imaging radar–A image acquired November 13, 1981, on data take 37–A over northern Oman near the town of Nazwa. In this arid environment where materials are spectrally similar in the visible spectrum, surface texture of rock outcrop and alluvial fans provide unique signatures that allow gross delineation of lithologic units based on differences in tonal patterns, the occurrence of fractures, and drainage patterns. The Cretaceous Hawasina carbonate complex (A), Cretaceous Semail igneous complex (B), and the Tertiary marl and limestone unit (C) have unique radar response. Physically rough materials with scarps perpendicular to the radar beam produce a diffuse return (bright) and smooth surfaces produce a specular return (dark) due to lack of radar backscatter.The radar image was acquired with a northeast look direction and an antenna depression angle of 43° from horizontal.

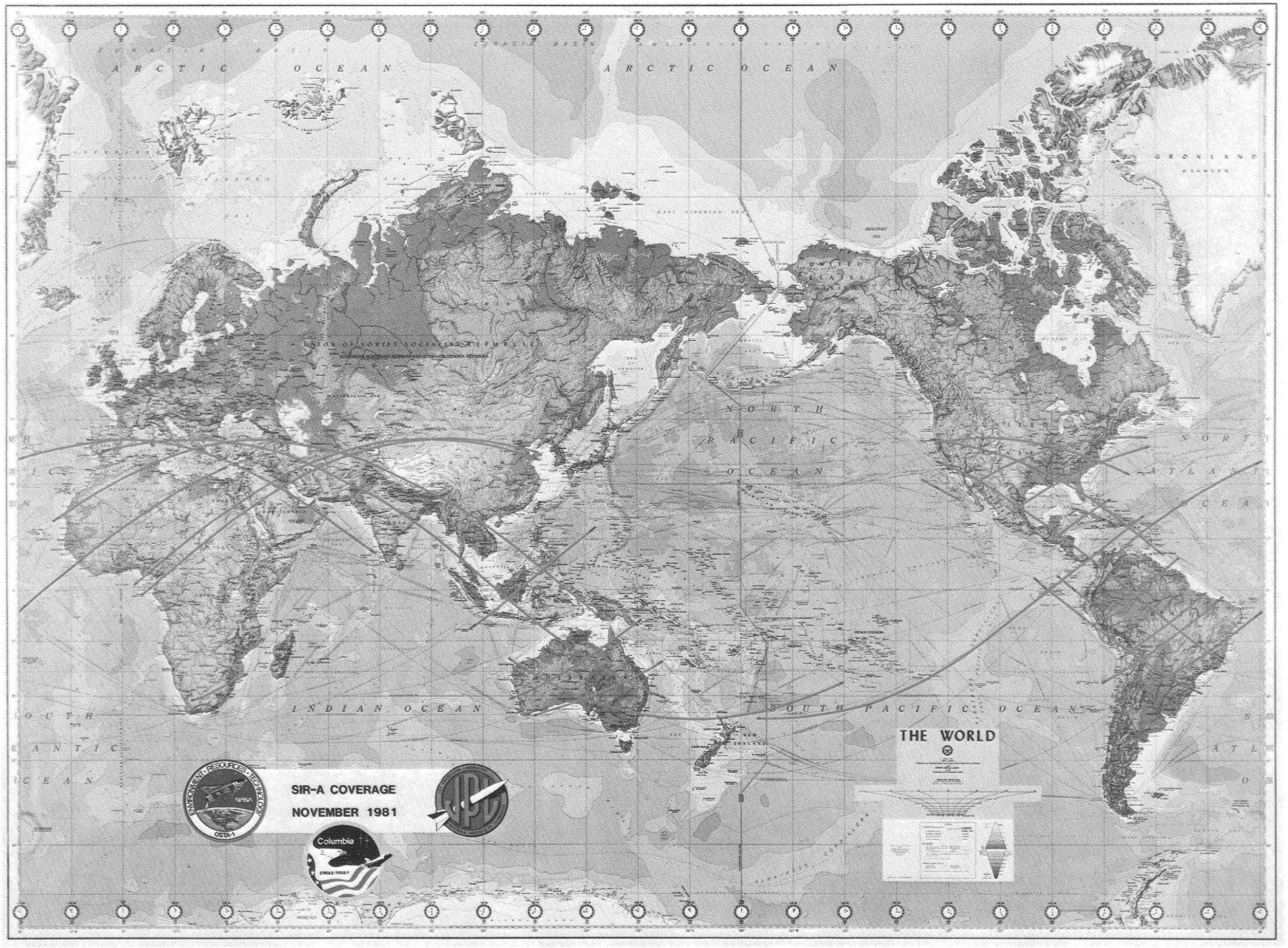


Figure 19. Index map to shuttle imaging radar–A image acquisition showing the 26 data takes acquired during the November 12–14, 1981, flight of the Space Shuttle *Columbia*'s OSTA–1 mission. Longitudes are degrees east of Greenwich. (Index map courtesy of J.P. Ford, Jet Propulsion Laboratory.)

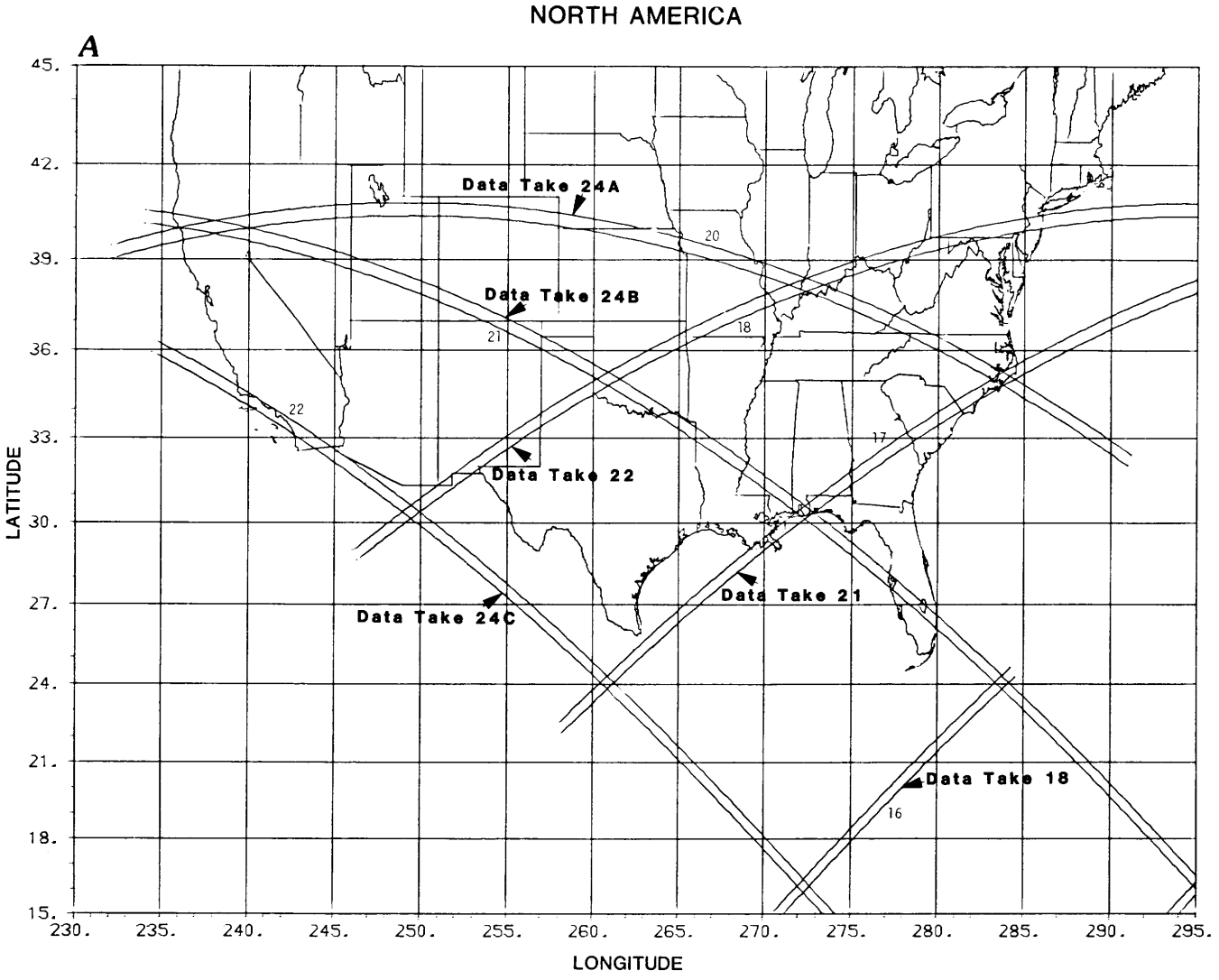


Figure 20. Shuttle imaging radar–A coverage index maps. Data takes are labeled with orbit number next to track (reference table 8). Longitude degrees are east of Greenwich. *A*, North America.

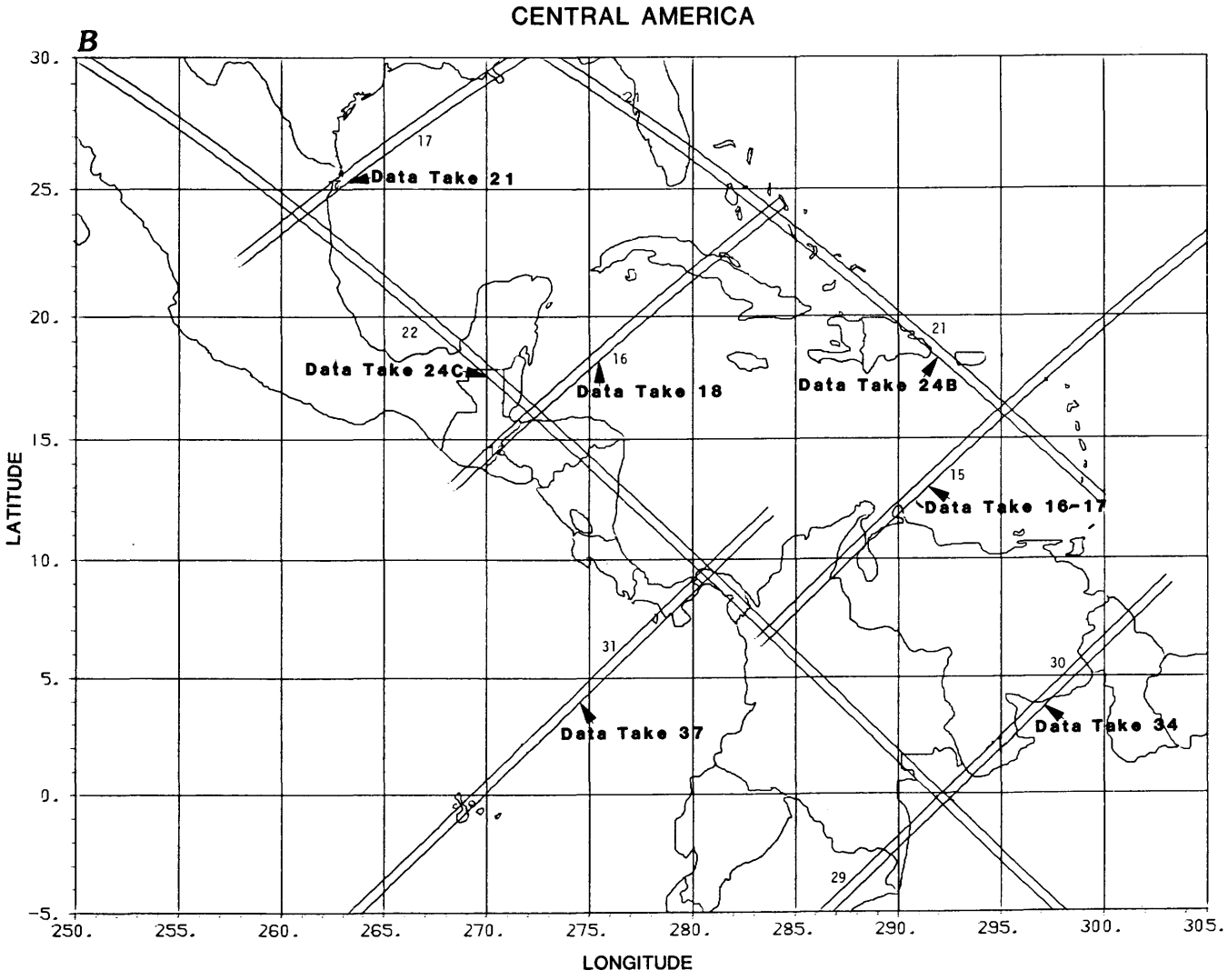


Figure 20.—Continued. *B,* Central America.

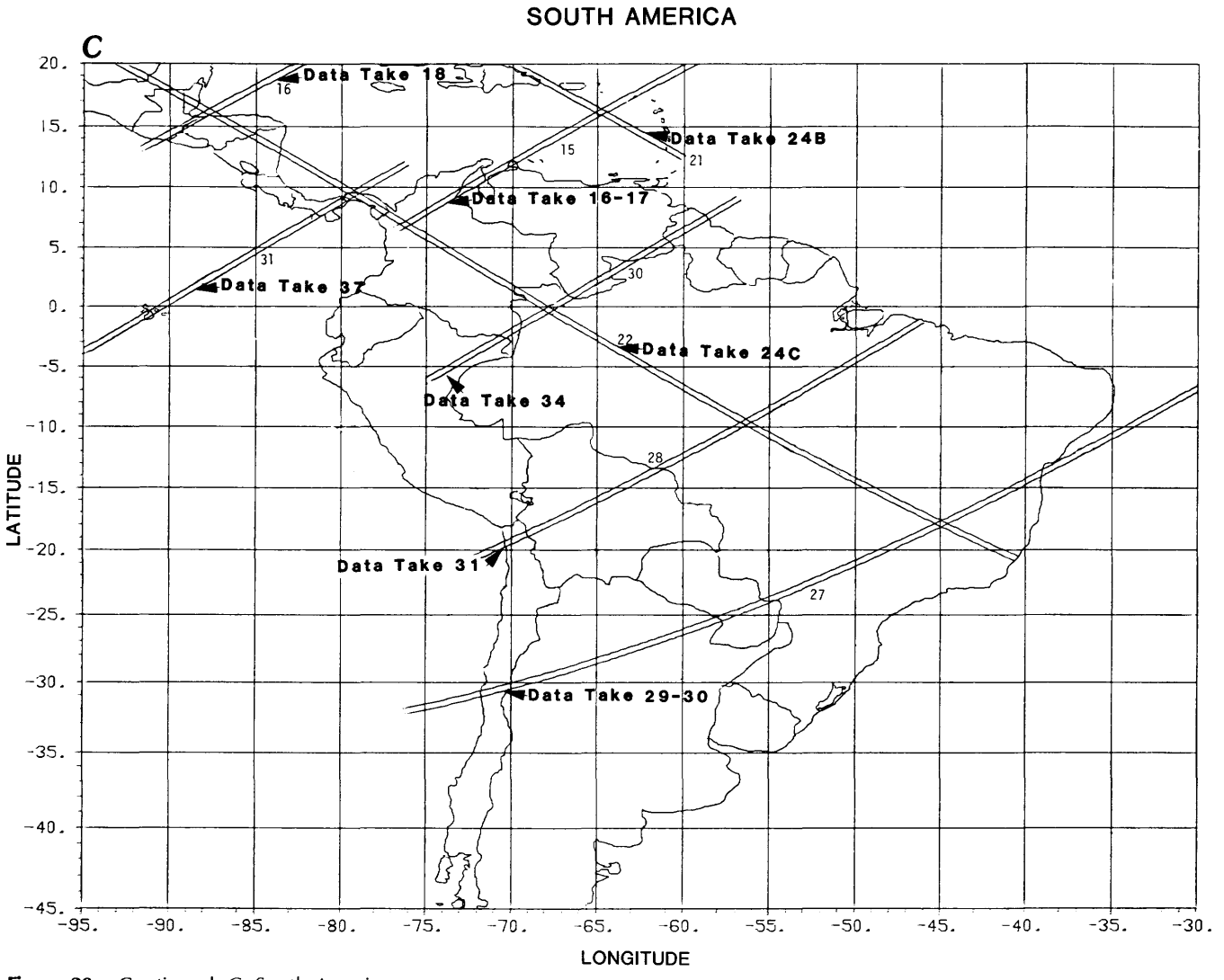


Figure 20.—Continued. C, South America.

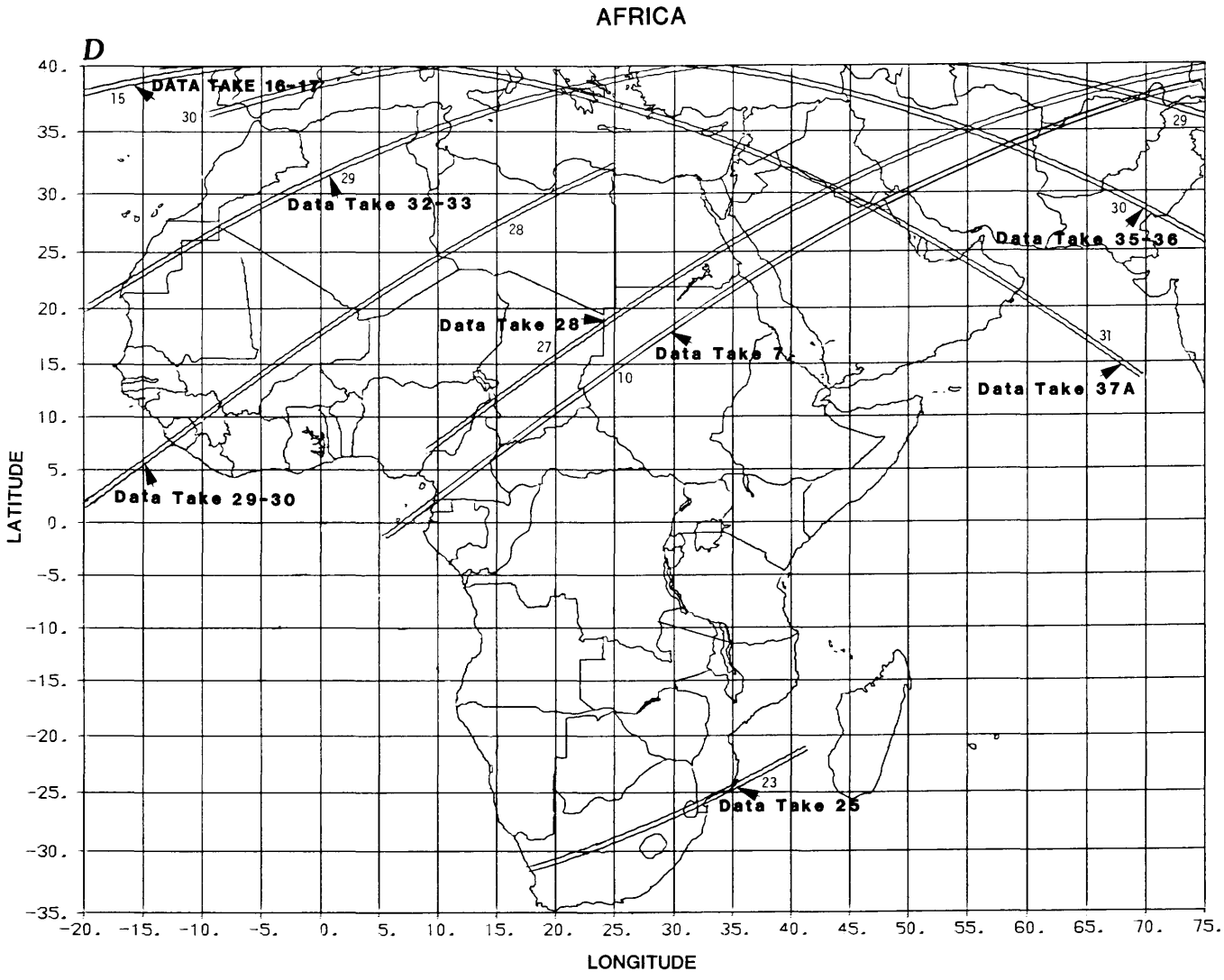


Figure 20.—Continued. *D,* Africa.

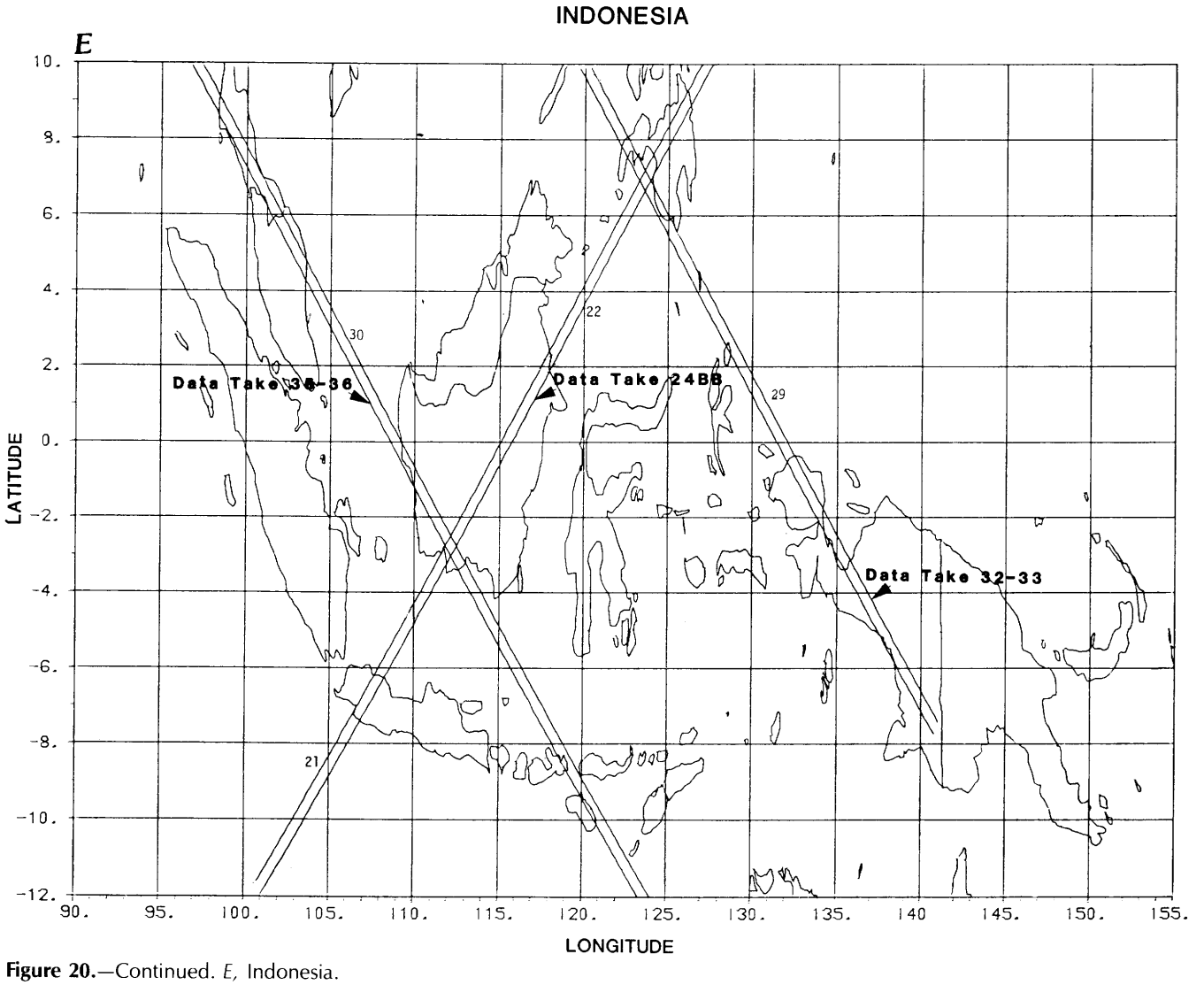


Figure 20.—Continued. *E,* Indonesia.

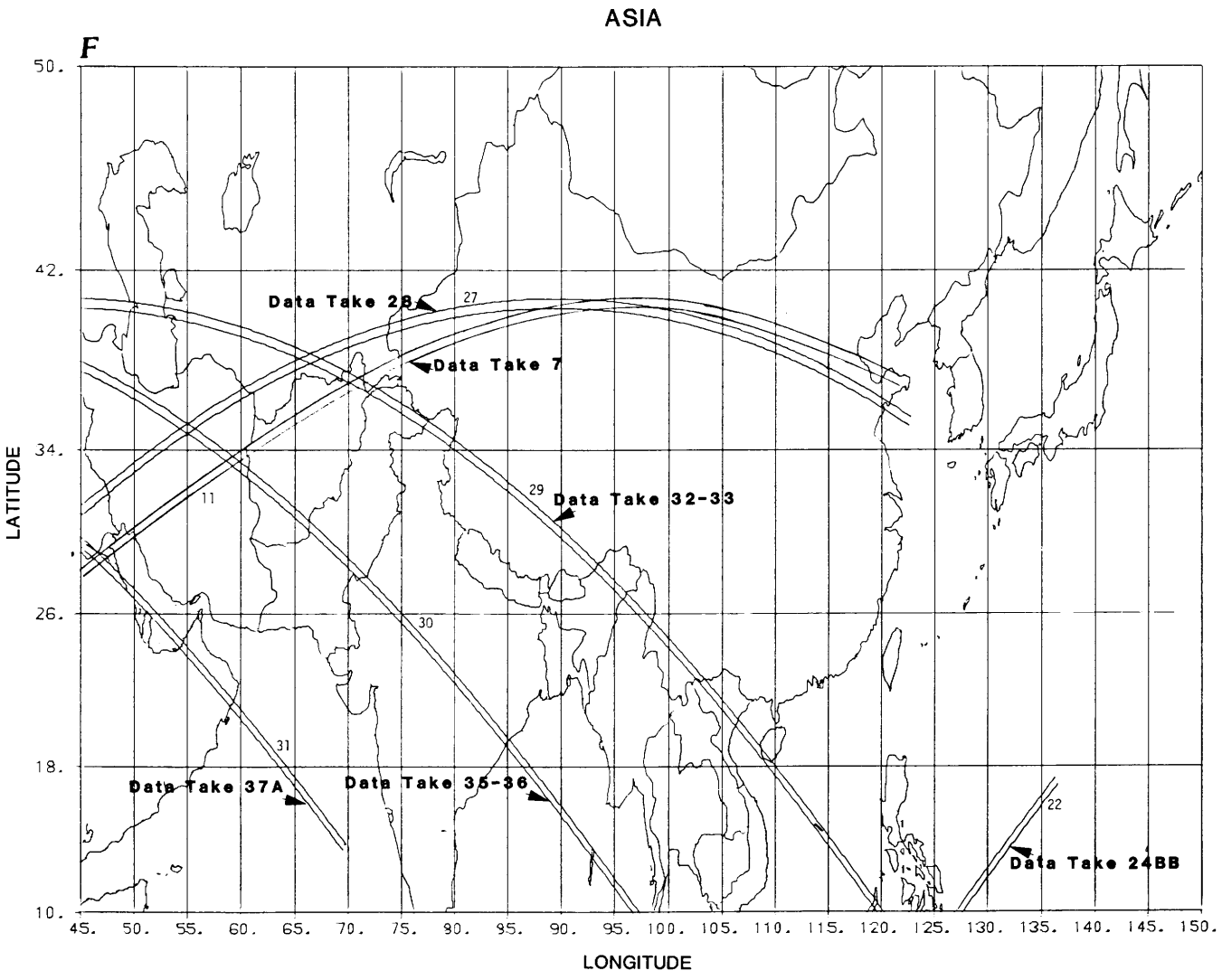


Figure 20.—Continued. *F,* Asia.

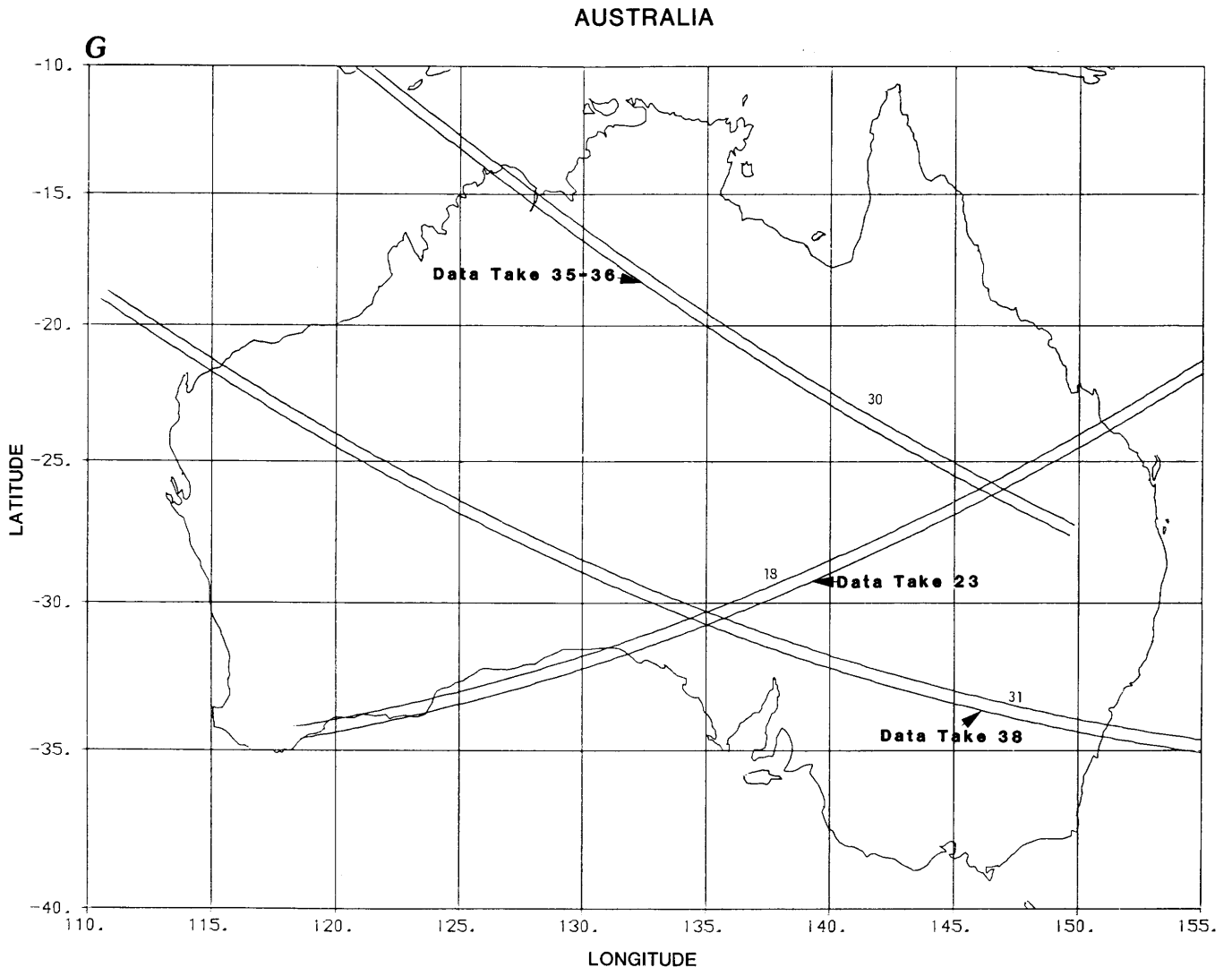


Figure 20.—Continued. *G*, Australia.

Satellite Data Information Sources

Satellite data user's handbooks, bulletins, and periodic newsletters are provided for each satellite by the responsible government agency. Much of the information contained in this bulletin was derived from these existing documents. Although this bulletin provides a quick reference to these various data bases, the comprehensive handbooks, bulletins, and periodic newsletters are recommended for the serious user. Table 9 provides a quick-reference, cumulative listing of the available handbooks, user guides, bulletins, and newsletters of each satellite.

Table 9. Satellite data information sources

Satellite	Handbook	Newsletter
Landsat	Landsat Data User's Handbook Eastern Distribution Branch Text Products Section U.S. Geological Survey 604 South Pickett Street Alexandria, VA 22304	Landsat Data User's Notes Mundt Federal Building Sioux Falls, SD 57198 (605) 594-6151 FTS: 784-7151
HCMM	HCMM Data User's Handbook Code 902 NASA/GSFC Greenbelt, MD 20771 (301) 344-5770	HCMM Data User's Bulletin Code 902 NASA/GSFC Greenbelt, MD 20771 (301) 344-5770
Seasat	Seasat Synthetic-Aperture Radar Data User's Manual JPL Publication 82-90 Jet Propulsion Laboratory California Institute of Technology Pasadena, CA 91103	Satellite Data User's Bulletin (Seasat) NOAA, National Environmental Satellite, Data and Information Service Room 100, World Weather Building Washington, DC 20233 (301) 763-8111
Nimbus-7	Nimbus-7 User's Guide Nimbus-7 Data User's Bulletin Code 902, NASA/GSFC Greenbelt, MD 20771	Nimbus-7 CZCS Data Catalog Environmental Data Information Center National Climatic Center Satellite Data Services Division Room 100, World Weather Building Washington, DC 20233 (301) 763-8111
SIR-A	Shuttle Imaging Radar-A (SIR-A) M/S 183-701 Jet Propulsion Laboratory 4800 Oak Grove Drive Pasadena, CA 91109	SIR-A Information Packet National Space Science Data Center World Data Center A for Rockets and Satellites Code 601 NASA/Goddard Space Flight Center Greenbelt, MD 20771

References Cited

Cimino, J. B., and Elachi, Charles, eds., 1982, Shuttle imaging radar-A (SIR-A) experiment: California Institute of Technology, Jet Propulsion Laboratory, Pasadena, California, JPL Publication 82-77 (December 15, 1982), 224 p.

Clarke, P. F., Hodgson, H. E., and North, G. W., 1982, A guide to obtaining information from the USGS 1982: U.S. Geological Survey Circular 777, U.S. Geological Survey, Reston, Virginia, 42 p.

Cornillon, Peter, 1982, A guide to environmental satellite data: University of Rhode Island, Graduate School of Oceanography, Ocean Engineering NOAA Sea Grant, Technical Report 79, Kingston, Rhode Island, 469 p.

Department of the Army, 1979, Remote sensing applications guide: U.S. Army Corps of Engineers, DAEN-RDC, Washington, D.C., 820 p.

Elachi, Charles, 1980, Spaceborne imaging radar: Geologic and oceanographic applications: Science, v. 209, no. 4461, p. 1073-1082.

———1982, Radar images of the Earth from space: Scientific American, v. 247, no. 6, p. 54-61.

Elachi, Charles, Brown, W. E., Cimino, J. B., Dixon, T., Evans, D. L., Ford, J. P., Saunders, R. S., Breed, Carol, Masursky, Harold, McCauley, J. F., Schaber, Gerald, Dellwig, Louis, England, Anthony, MacDonald, Harold, Martin-Kaye, P., and Sabins, Floyd, 1982, Shuttle imaging radar experiment: Science, v. 218, no. 4576, p. 996-1003.

Ford, J. P., Blom, R. G., Bryan, M. L., Daily, M. I., Dixon, T. H., Elachi, Charles, and Xenos, E. C., 1980, Seasat views North America, the Caribbean, and western Europe with imaging radar: California Institute of Technology, Jet Propulsion Laboratory, Pasadena, California, JPL Publication 80-67 (November 1, 1980), 141 p.

Ford, J. P., Cimino, J. B., and Elachi, Charles, 1983, Space shuttle *Columbia* views the world with imaging radar: the SIR-A experiment: California Institute of Technology, Jet Propulsion Laboratory, Pasadena, California, JPL Publication 82-95 (January 1, 1983), 179 p.

Hovis, W. A., Clark, D. K., Anderson, F., Austin, R. W., Wilson, W. H., Baker, E. T., Ball, D., Gordon, H. R., Mueller, J. L., El-Sayed, S. Z., Sturm, B., Wrigley, R. C., and Yentsch, C. S., 1980, Nimbus-7 coastal zone color scanner: System description and initial imagery: Science, v. 210, no. 4465, p. 60-63.

Kahle, A. B., Schieldge, J. P., Abrams, M. J., Ally, R. E., and Levine, C. J., 1981, Geologic applications of thermal inertia imaging using HCMM data: National Aeronautics and Space Administration, Jet Propulsion Laboratory Publication 81-55, 199 p.

Lillesand, T. M., and Kiefer, R. W., 1979, Remote sensing and image interpretation: John Wiley and Sons, New York, 612 p.

Lintz, Joseph, Jr., and Simonett, D. S., 1976, Remote sensing of environment: Addison-Wesley Publishing Co., Boston, 694 p.

McClain, E. P., 1980, Environmental satellites: Reprinted from the McGraw-Hill Encyclopedia of Environmental Sciences, McGraw-Hill Book Company, Inc., New York, 16 p.

NASA, 1978a, Nimbus-7 CZCS data catalog: National Aeronautics and Space Administration, Goddard Space Flight Center, Greenbelt, Maryland, issued monthly.

———1978b, The Nimbus-7 user's guide: National Aeronautics and Space Administration, Goddard Space Flight Center, Greenbelt, Maryland, August, 263 p.

———1980, Heat Capacity Mapping Mission (HCMM) data user's guide for Applications Explorer Mission-A (AEM): National Aeronautics and Space Administration, Goddard Space Flight Center, Greenbelt, Maryland, 120 p., (originally issued in December 1978, revised in November 1979 and October 1980).

Pravdo, S. H., Huneycutt, Bryan, Holt, B. M., and Held, D. N., 1983, Seasat Synthetic-Aperture Radar Data User's Manual: JPL Publication 82-90, Jet Propulsion Laboratory, Pasadena, California, 107 p.

Sabins, F. F., Jr., 1978, Remote sensing, principles and techniques: W. H. Freeman and Company, San Francisco, California, 426 p.

———1981, Remote sensing laboratory manual: Remote Sensing Enterprises, La Habra, California, looseleaf notebook variously paginated by sections. One of three sections. The other two sections are Instructor Guide and a 35-mm slide set.

Settle, Mark, and Taranik, J. V., 1982, Use of the Space Shuttle for remote sensing research: Recent results and future prospects: Science, v. 218, no. 4576, p. 993-995.

Short, N. M., 1982, The Landsat tutorial workbook; basics of satellite remote sensing: NASA Reference Publication No. 1078, 553 p.

Short, N. M., and Stuart, L. M., Jr., 1983, The Heat Capacity Mapping Mission (HCMM) Anthology: National Aeronautics and Space Administration Special Publications 465, Washington, D.C., 264 p.

Short, N. M., Lowman, P. D., Jr., Freden, S. C., and Finch, W. A., 1976, Mission to Earth: Landsat views the world: NASA Special Publication, SP-360, National Aeronautics and Space Administration, Washington, D.C., 459 p.

Siegal, B. S., and Gillespie, A. R., eds., 1980, Remote sensing in geology: John Wiley and Sons, New York, 702 p.

Slater, P. N., 1980, Remote sensing, optics and optical systems: Addison-Wesley Publishing Company, Reading, Massachusetts, 575 p.

Smith, W. L., ed., 1977, Remote-sensing applications for mineral exploration: Dowden, Hutchinson, and Ross, Stroudsburg, Pennsylvania, 391 p.

Southworth, C. S., 1983, Index to Earth resources observation systems: National Mapping Program Poster, U.S. Geological Survey, Reston, Virginia, 2 p.

Taranik, J. V., 1978a, Characteristics of the Landsat multispectral data system: U.S. Geological Survey Open-File Report 78-187, 114 p.

———1978b, Principles of computer processing of Landsat data for geological applications: U.S. Geological Survey Open-File Report 78-117, 98 p.

———1981, Heat capacity mapping mission: Interim results and achievements *in* Workshop on Geological Applications of Thermal Infrared Remote Sensing Techniques (Settle, Mark, editor): Technical Report No. 81-06, Lunar and Planetary Institute, Houston, Texas, p. 23-26.

Taranik, J. V., and Settle, M., 1981, Space Shuttle: A new era in terrestrial remote sensing: Science, v. 214, no. 4521, p. 619–626.

U.S. Geological Survey, 1979, Landsat data user's handbook: U.S. Geological Survey, EROS Data Center, Sioux Falls, South Dakota; looseleaf notebook with pagination by sections.

———1981, How to order Landsat images: National Mapping Program leaflet, U.S. Geological Survey, Reston, Virginia, 2 p.

Watson, Kenneth, Hummer-Miller, Susanne, and Offield, T. W., 1981, Geologic applications of thermal-inertia mapping from satellite: U.S. Geological Survey Open-File Report 81–1352, 73 p.

Williams, R. S., Jr., 1983, ed., Chapter 31, Geological applications, *in* Manual of remote sensing, second edition American Society of Photogrammetry, Falls Church, Virginia, p. 1664–1953.

Williams, R. S., and Carter, W. D., eds., 1976, ERTS-1, A new window on our planet: U.S. Geological Survey Professional Paper 929, 362 p.

Wu, C., Barkan, B., Huneycutt, B., Teang, C., and Pang, S., 1981, An introduction to the interim digital SAR processor and the characteristics of the associated Seasat SAR imagery: JPL Publication 81–26, Jet Propulsion Laboratory, Pasadena, California, 82 p.

Appendixes 1 and 2

APPENDIX 1.

National Oceanic and Atmospheric Administration
Environmental Data and Information Service
National Climatic Center
Satellite Data Services Division
Room 100, World Weather Building
Washington, DC 20233
(301) 763-8111 FTS 763-8111

This chronological data listing provides the latest information on all Seasat SAR optically processed data on archive at SDSD. These data are archived on 70 mm negative reels of film. No digital tapes are available. The information listed below is for each archived 70 mm reel. Users may request reproductions of all or only specific portions of each reel. Each reel contains all four quarter swaths laid end to end. A quarter swath measures approximately 28 km on the ground. The entire swath of the SAR is 100 km wide. Each reel (ID#) may contain imagery measuring from 400 to 4,000 km in length. Each minute of SAR data contains approximately 400 km of ground imagery and measures approximately 2½ feet long. All longitudes are in degrees east from Greenwich. Times are GMT. The ID is a unique number assigned each reel. Node is ascending longitude of revolution. Latitude/longitude are in nearest whole degrees. Time on is start time of imagery, Δ T is length of imagery in minutes and seconds.

Seasat Synthetic Aperture Radar (SAR) Optically Correlated Data Listing

ID #	REV	DATE MO/DAY	NODE LONGITUDE	START LAT/LONG	END LAT/LONG	TIME ON HH:MM:SS	Δ T MM:SS
001A	107	7/04	253.67	25/246	42/237	12:08:00	5:00
001B	107	7/04	253.67	42/238	48/232	12:12:50	2:00
002A	150	7/07	255.10	52/232	74/177	12:23:00	8:30
002B	150	7/07	255.10	18/250	38/241	12:13:06	6:00
002C	150	7/07	255.10	38/241	53/230	12:18:50	5:10
003A	163	7/08	289.03	11/287	49/269	09:59:18	11:21
003B	163	7/08	289.03	12/288	50/267	09:59:18	11:20
007	179	7/09	247.70	13/245	52/224	12:49:14	11:45
011A	193	7/10	256.54	33/246	39/242	12:24:20	2:00
011B	193	7/10	256.54	48/236	54/230	12:29:00	2:00
011C	193	7/10	256.54	18/252	48/236	12:20:15	9:00
012A	205	7/11	315.55	70/260	68/170	08:44:11	7:57
012B	205	7/11	315.55	73/190	68/170	08:50:00	2:20
013A	207	7/11	265.38	69/214	75/179	12:05:00	3:15
013B	207	7/11	265.38	54/239	69/214	12:00:05	5:00
013C	207	7/11	265.38	22/254	55/239	11:50:05	10:00
015	220	7/12	299.30	66/255	73/170	09:52:09	7:32
016A	221	7/12	274.22	28/266	39/260	11:20:35	3:00
016B	221	7/12	274.22	53/249	74/180	11:28:18	9:21
016C	221	7/12	274.22	18/270	33/261	11:16:19	5:00
017	222	7/12	249.14	23/247	51/227	12:56:47	11:27

ID #	REV	DATE MO/DAY	NODE LONGITUDE	START LAT/LONG	END LAT/LONG	TIME ON HH:MM:SS	Δ T MM:SS
018A	230	7/13	048.48	56/243	22/223	02:52:28	9:42
018B	230	7/13	048.48	52/240	44/234	02:53:00	2:00
019	232	7/13	358.31	74/260	50/188	06:04:48	10:15
020	234	7/13	308.15	68/260	71/181	09:21:51	7:56
021A	236	7/13	257.98	35/245	43/241	12:32:00	2:00
021B	236	7/13	257.98	48/238	55/232	12:36:00	2:00
021C	236	7/13	257.98	18/253	35/246	12:27:25	5:00
022	242	7/13	107.48	37/287	15/278	23:05:50	6:10
024A	251	7/14	241.74	17/238	50/219	13:35:00	10:00
024B	251	7/14	241.74	13/239	46/223	13:35:00	10:00
024C	251	7/14	241.74	17/238	26/234	13:36:00	3:00
025A	263	7/15	300.74	17/297	52/277	09:43:48	10:15
025B	263	7/15	300.74	68/250	73/179	09:59:20	7:32
026	273	7/16	049.92	55/245	22/224	02:59:33	9:55
027	277	7/16	309.59	69/259	70/169	09:29:01	8:01
028A	279	7/16	259.42	48/238	74/176	12:43:00	10:00
028B	279	7/16	259.42	33/248	55/232	12:38:45	7:00
031A	289	7/17	008.59	72/240	65/217	05:43:00	3:00
031B	289	7/17	008.59	64/215	52/200	05:46:33	4:00
031C	289	7/17	008.59	68/225	62/212	05:45:00	2:00
032	292	7/17	293.34	64/254	73/168	10:36:25	8:17
035A	308	7/18	252.02	21/247	45/232	13:14:30	6:00
035B	308	7/18	252.02	20/247	38/238	13:12:18	5:30
035C	308	7/18	252.02	38/239	53/227	13:17:30	5:12
036	320	7/19	311.03	75/228	61/152	09:39:09	8:02
037A	322	7/19	260.87	33/250	52/237	12:45:00	6:00
037B	322	7/19	260.87	69/209	74/180	12:57:29	2:40
037C	322	7/19	260.87	49/239	71/204	12:50:30	7:30
037D	322	7/19	260.87	24/254	34/248	12:43:04	2:30
038	323	7/19	235.78	52/211	71/179	14:31:57	6:43
039	335	7/20	294.79	13/292	42/277	10:28:02	8:12
040	337	7/20	244.63	50/223	73/179	14:00:07	8:10
044	349	7/21	303.64	68/255	71/170	10:13:40	7:34
045A	350	7/21	278.56	56/250	74/180	11:50:35	8:42
045B	350	7/21	278.56	68/232	75/178	11:54:00	5:20
045C	350	7/21	278.56	57/250	68/229	11:50:35	4:00
046A	351	7/21	253.47	32/243	38/238	13:23:30	2:00
046B	351	7/21	253.47	18/248	52/230	13:19:22	10:00
046C	351	7/21	253.47	52/230	74/172	13:29:30	8:45
048	363	7/22	312.48	70/259	68/169	09:43:16	8:09
049	365	7/22	262.32	52/238	74/180	12:58:20	9:00
050	371	7/22	111.82	22/285	11/281	23:31:30	3:00
051A	378	7/23	296.24	28/287	43/280	10:39:30	4:00
051B	378	7/23	296.24	14/293	34/284	10:35:15	6:00
051C	378	7/23	296.24	68/251	72/170	10:51:00	7:43
051D	378	7/23	296.24	40/281	47/276	10:43:00	2:00
052	380	7/23	246.08	48/226	73/179	14:06:39	8:46
053	387	7/24	070.50	34/250	17/242	02:17:30	5:20
054	388	7/24	045.42	50/235	27/222	03:53:20	7:00
055	392	7/24	305.09	68/265	73/197	10:20:54	6:20
056A	393	7/24	280.00	26/272	37/265	11:48:00	3:00

ID #	REV	DATE MO/DAY	NODE LONGITUDE	START LAT/LONG	END LAT/LONG	TIME ON HH:MM:SS	Δ T MM:SS
056B	393	7/24	280.00	34/268	44/262	11:50:30	2:52
056C	393	7/24	280.00	12/278	34/268	11:43:50	7:00
057A	394	7/24	254.92	38/241	50/232	13:22:50	4:20
057B	394	7/24	254.92	20/249	33/244	13:26:32	4:00
058A	400	7/25	104.42	44/290	25/279	00:02:40	6:00
058B	400	7/25	104.42	43/290	23/278	00:02:40	6:00
058C	400	7/25	104.42	27/280	09/272	00:07:50	5:12
059	406	7/25	313.93	69/261	75/200	09:50:29	6:10
060A	407	7/25	288.85	12/287	48/269	11:12:46	10:39
060B	407	7/25	288.85	23/283	44/272	11:16:10	6:00
060C	407	7/25	288.85	13/286	24/281	11:12:46	3:30
062	416	7/26	063.10	52/254	26/238	02:50:27	7:52
063A	422	7/26	272.61	25/265	35/260	12:26:00	3:56
063B	422	7/26	272.61	15/269	30/263	12:23:03	4:00
065	430	7/27	071.94	25/245	17/242	02:27:10	2:51
067	435	7/27	306.53	69/255	73/185	10:28:05	6:11
069A	443	7/28	105.87	17/277	08/274	00:18:00	2:07
069B	443	7/28	105.87	30/283	13/275	00:14:00	4:15
069C	447	7/28	005.52	73/252	64/210	06:41:00	5:00
069D	447	7/28	005.52	64/210	50/195	06:45:40	4:40
070	449	7/28	315.37	70/260	71/182	09:57:37	6:15
071	450	7/28	290.90	13/288	33/280	11:19:53	6:00
072	464	7/29	299.13	66/255	72/170	11:05:33	7:31
073A	465	7/29	274.05	26/267	39/259	12:33:21	4:00
073B	465	7/29	274.05	14/272	30/264	12:29:45	4:30
074	466	7/29	248.97	23/242	50/227	14:13:24	8:15
076A	473	7/30	073.39	32/253	17/245	02:32:00	5:00
076B	473	7/30	073.39	47/260	32/252	02:27:51	4:30
077A	474	7/30	048.31	55/242	44/235	04:05:53	3:00
077B	474	7/30	048.31	52/239	24/222	04:07:00	8:30
078	478	7/30	307.97	69/255	73/185	10:35:15	6:08
079A	480	7/30	257.81	46/238	55/232	13:48:30	3:00
079B	480	7/30	257.81	18/253	48/237	13:40:47	8:00
080A	488	7/31	057.15	43/242	33/236	03:38:00	3:00
080B	488	7/31	057.15	38/240	18/230	09:39:30	6:08
080C	488	7/31	057.15	54/250	42/241	03:35:07	3:30
081	492	7/31	316.82	70/260	66/166	10:04:44	9:05
082	493	7/31	291.74	12/290	46/273	11:27:01	10:00
083	495	7/31	241.57	23/237	43/225	14:50:22	8:12
084A	502	8/01	065.99	50/255	41/249	03:04:50	3:00
084B	502	8/01	065.99	38/248	32/244	03:09:00	2:00
084C	502	8/01	065.99	52/251	35/246	03:07:30	5:08
086	507	8/01	300.58	67/254	72/168	11:12:43	7:28
087A	508	8/01	275.50	12/274	40/261	12:36:00	8:12
087B	508	8/01	275.50	26/267	32/265	12:40:32	2:00
088A	509	8/01	250.41	37/237	42/234	14:24:20	2:00
088B	509	8/01	250.41	18/246	53/227	14:18:38	10:13
091A	517	8/02	049.75	54/242	44/235	04:13:30	3:00

ID #	REV	DATE MO/DAY	NODE LONGITUDE	START LAT/LONG	END LAT/LONG	TIME ON HH:MM:SS	Δ T MM:SS
091B	517	8/02	049.75	54/242	23/224	04:12:55	9:50
093	522	8/02	284.34	12/283	48/265	12:04:48	10:17
094A	523	8/02	259.26	22/253	32/248	13:48:30	3:00
094B	523	8/02	259.26	34/247	55/232	13:52:20	6:20
095	529	8/03	108.77	41/292	14/278	00:24:22	8:44
096A	531	8/03	058.60	41/242	34/238	03:46:00	2:00
096B	531	8/03	058.60	53/251	20/232	03:42:15	10:33
097	535	8/03	318.27	70/260	65/165	10:11:51	9:16
098	536	8/03	293.19	13/291	46/276	11:34:12	9:21
099	537	8/03	268.11	67/223	74/170	13:31:30	5:00
100	538	8/03	243.02	22/238	50/222	14:57:12	8:40
101	545	8/04	067.44	41/250	27/244	03:15:00	4:00
102	547	8/04	017.28	48/356	68/329	06:11:31	6:41
103A	548	8/04	352.20	74/255	64/198	08:03:10	6:00
103B	548	8/04	352.20	71/219	55/187	08:07:00	6:00
104	550	8/04	302.03	67/255	72/170	11:19:52	7:29
106A	552	8/04	251.87	28/243	47/233	14:28:45	5:00
106B	552	8/04	251.87	52/228	74/172	14:35:45	8:15
106C	552	8/04	251.87	52/228	65/210	14:35:45	4:15
106D	552	8/04	251.87	16/246	35/237	14:25:40	5:00
107	556	8/04	151.54	70/012	38/333	21:32:03	10:35
108A	558	8/05	101.37	45/287	32/280	01:01:33	4:00
108B	558	8/05	101.37	34/280	10/270	01:05:00	7:03
109A	559	8/05	076.29	43/263	17/247	02:42:52	8:18
109B	559	8/05	076.29	40/257	33/254	02:43:51	2:00
109C	559	8/05	076.29	34/255	18/248	02:45:45	5:05
109D	559	8/05	076.29	44/262	32/250	02:42:32	3:30
110	564	8/05	310.88	70/255	69/168	10:49:31	7:58
111A	565	8/05	285.80	22/280	38/272	12:15:30	5:00
111B	565	8/05	285.80	12/284	27/277	12:11:51	4:20
111C	565	8/05	285.80	40/270	48/265	12:20:20	2:00
113A	574	8/06	060.05	41/243	27/236	03:53:00	4:00
113B	574	8/06	060.05	39/241	23/234	03:54:30	5:30
113C	574	8/06	060.05	50/250	40/242	03:50:23	3:00
114	578	8/06	319.72	72/259	63/167	10:19:00	9:19
115A	580	8/06	269.56	30/260	45/252	13:27:00	4:00
115B	580	8/06	269.56	43/252	59/237	13:30:33	5:08
116	581	8/06	244.47	27/237	53/220	15:04:22	8:50
118A	590	8/07	018.73	35/006	64/340	06:16:00	8:03
118B	590	8/07	018.73	36/006	65/339	06:16:00	8:30
120A	595	8/07	253.32	31/243	37/240	14:36:30	2:00
120B	595	8/07	253.32	18/250	52/230	14:32:12	10:30
121	599	8/07	152.99	69/012	37/334	21:39:07	10:43
123A	605	8/08	002.50	74/260	68/220	07:39:34	4:00
123B	605	8/08	002.50	70/226	50/192	07:42:30	7:04
124	607	8/08	312.33	70/258	68/169	10:56:36	8:06
125A	608	8/08	287.25	13/285	45/269	12:18:54	9:44
125B	608	8/08	287.25	24/280	34/275	12:22:30	3:00
125C	608	8/08	287.25	14/285	46/269	12:19:02	9:44
127A	617	8/09	061.50	52/253	29/238	03:56:31	6:59
127B	617	8/09	061.50	37/243	18/233	04:01:00	6:00
128A	622	8/09	296.09	65/253	73/230	12:04:19	3:00
128B	622	8/09	296.09	67/255	74/182	12:04:12	7:42

ID #	REV	DATE MO/DAY	NODE LONGITUDE	START LAT/LONG	END LAT/LONG	TIME ON HH:MM:SS	Δ T MM:SS
129A	623	8/09	271.01	35/258	42/255	13:35:00	2:00
129B	623	8/09	271.01	66/228	74/180	13:45:00	5:00
129C	623	8/09	271.01	17/267	37/257	13:29:49	6:00
129D	623	8/09	271.01	50/249	67/227	13:40:00	5:30
130A	631	8/10	070.35	49/259	42/254	03:26:29	2:00
130B	631	8/10	070.35	43/254	17/242	03:28:00	7:50
131A	633	8/10	020.18	44/001	67/333	06:25:00	7:30
131B	633	8/10	020.18	44/001	52/356	06:25:00	2:00
132	636	8/10	304.94	68/255	70/168	11:34:09	7:38
133	637	8/10	279.86	13/278	45/262	12:57:04	9:30
134A	638	8/10	254.77	18/250	39/240	14:39:46	6:00
134B	638	8/10	254.77	17/247	52/228	14:45:30	4:52
135	642	8/10	154.44	58/355	40/336	21:48:20	4:00
136A	648	8/11	003.95	74/260	67/220	07:46:42	4:00
136B	648	8/11	003.95	67/214	48/192	07:50:30	6:10
137	650	8/11	313.78	70/259	67/165	11:03:42	8:27
138A	651	8/11	288.70	18/284	32/278	12:28:00	4:00
138B	651	8/11	288.70	12/286	22/282	12:25:58	3:00
140	659	8/12	088.04	48/276	17/260	02:24:12	9:19
141	660	8/12	062.96	42/246	29/240	04:06:30	4:00
142	665	8/12	297.55	68/252	73/170	12:11:33	7:34
144	674	8/13	071.80	27/247	07/240	03:38:00	5:11
145	679	8/13	306.39	68/257	70/170	11:41:17	7:46
146A	681	8/13	256.23	32/246	48/238	14:51:00	4:00
146B	681	8/13	256.23	49/235	74/180	14:57:00	8:17
146C	681	8/13	256.23	20/252	37/244	14:46:51	4:40
147A	687	8/14	105.73	43/290	24/281	01:23:11	6:00
147B	687	8/14	105.73	24/280	10/275	01:29:00	4:25
148A	691	8/14	005.40	74/255	67/218	07:53:56	4:00
148B	691	8/14	005.40	70/225	49/195	07:56:30	7:13
149	693	8/14	315.24	70/261	69/175	11:10:54	8:41
150	694	8/14	290.16	12/288	48/270	12:33:08	10:34
151A	695	8/14	265.08	35/253	42/248	14:20:30	2:00
151B	695	8/14	265.08	52/241	74/175	14:25:30	9:20
151C	695	8/14	265.08	23/259	51/242	14:16:41	8:40
152	710	8/15	248.86	28/241	53/225	15:26:37	8:15
153	714	8/15	148.56	69/007	37/329	22:31:17	10:24
154	716	8/16	098.41	32/276	12/267	02:04:30	7:03
155A	719	8/16	023.19	35/010	67/335	06:35:33	10:13
155B	719	8/16	023.19	44/006	50/002	06:37:30	2:00
155C	719	8/16	023.19	36/010	70/330	06:35:33	11:23
156	720	8/16	358.12	74/250	49/188	08:31:30	10:10
157	722	8/16	307.97	70/252	68/167	11:48:32	7:47
158A	723	8/16	282.89	25/275	35/270	13:14:30	3:00
158B	723	8/16	282.89	14/280	28/273	13:11:01	4:00
158C	723	8/16	282.89	34/271	48/262	13;17:20	3:45
159A	724	8/16	257.82	22/252	35/245	14:54:01	4:00
159B	724	8/16	257.82	32/247	55/230	14:57:30	7:10
160	731	8/17	082.30	34/262	28/258	03:12:43	2:00
161	736	8/17	316.92	74/225	64/162	11:19:50	7:06
162	737	8/17	291.85	16/288	31/281	12:40:16	5:00

ID #	REV	DATE MO/DAY	NODE LONGITUDE	START LAT/LONG	END LAT/LONG	TIME ON HH:MM:SS	Δ T MM:SS
163A	738	8/17	266.77	28/258	36/254	14:24:30	2:00
163B	738	8/17	266.77	32/256	47/246	14:25:30	4:30
163C	738	8/17	266.77	52/243	74/160	14:31:30	10:30
163D	738	8/17	266.77	27/258	34/255	14:23:56	2:00
164	739	8/17	241.78	23/235	49/220	16:03:37	8:07
165A	757	8/18	150.36	69/009	55/344	22:36:43	5:00
165B	757	8/18	150.36	35/330	55/345	22:41:30	5:47
166	759	8/19	100.22	45/286	11/269	02:05:55	10:30
167	761	8/19	050.08	54/244	20/223	05:24:21	9:48
168A	762	8/19	025.02	36/013	52/002	06:40:44	5:00
168B	762	8/19	025.02	49/004	67/340	06:44:45	6:00
169	765	8/19	309.81	69/259	70/170	11:53:35	7:41
170A	766	8/19	284.74	26/276	41/268	13:20:00	4:30
170B	766	8/19	284.74	11/283	32/274	13:15:54	6:00
170C	766	8/19	284.74	39/270	46/265	13:24:10	2:00
172	774	8/20	084.19	48/273	21/257	03:13:58	8:20
173A	780	8/20	293.77	66/251	74/170	13:00:50	7:19
173B	780	8/20	293.77	68/248	72/168	13:00:20	7:49
174A	781	8/20	268.70	30/259	43/251	14:30:00	4:00
174B	781	8/20	268.70	52/246	74/179	14:36:40	9:30
174C	781	8/20	268.70	22/263	30/259	14:28:20	2:00
174D	781	8/20	268.70	42/253	58/239	14:33:30	5:00
175	782	8/20	243.64	18/239	47/223	16:07:19	8:50
176	785	8/20	168.43	70/030	35/348	21:34:12	11:14
177A	788	8/21	093.22	41/276	30/271	02:44:00	3:00
177B	788	8/21	093.22	33/272	23/267	02:46:40	2:00
178	789	8/21	068.15	50/257	32/246	04:22:01	6:00
179A	791	8/21	018.01	34/006	50/355	07:16:59	5:00
179B	791	8/21	018.01	52/355	64/336	07:22:20	4:00
182A	795	8/21	277.73	25/270	35/265	13:56:00	3:00
182B	795	8/21	277.73	29/267	41/263	13:58:30	2:30
182C	795	8/21	277.73	14/276	24/271	13:55:00	3:15
183	802	8/22	102.25	39/284	18/274	02:17:47	6:32
184A	806	8/22	001.97	73/252	68/230	08:42:43	2:45
184B	806	8/22	001.97	70/225	56/196	08:44:30	5:00
186	809	8/22	286.76	13/285	46/268	13:20:39	10:00
187A	810	8/22	261.69	25/255	50/240	15:05:00	7:27
187B	810	8/22	261.69	24/255	50/240	15:05:00	7:27
188	811	8/22	236.62	52/213	71/180	16:53:59	6:44
190A	825	8/23	245.64	38/232	48/223	16:18:00	3:07
190B	825	8/23	245.64	20/241	47/229	16:12:34	8:30
193	834	8/24	019.88	46/001	67/332	07:25:40	7:16
195	837	8/24	304.63	66/262	73/180	12:34:20	7:33
196A	838	8/24	279.54	22/273	33/268	14:01:14	3:00
196B	838	8/24	279.54	22/274	40/263	14:01:14	5:24
197	845	8/25	103.96	41/285	24/278	02:17:39	4:25
198A	849	8/25	003.62	74/266	68/222	08:47:15	4:00
198B	849	8/25	003.62	71/230	57/200	08:50:10	5:00
200A	852	8/25	288.37	18/284	33/276	13:28:22	5:00
200B	852	8/25	288.37	32/277	43/271	13:33:00	3:00
201	853	8/25	263.28	27/255	41/247	15:12:00	4:00

ID #	REV	DATE MO/DAY	NODE LONGITUDE	START LAT/LONG	END LAT/LONG	TIME ON HH:MM:SS	Δ T MM:SS
203A	874	8/27	096.52	40/279	32/274	02:56:50	2:00
203B	874	8/27	096.52	33/275	11/265	02:58:30	6:43
203C	874	8/27	096.52	47/282	33/275	02:54:39	4:00
207A	880	8/27	305.84	70/250	74/191	12:44:00	5:00
207B	880	8/27	305.84	33/294	47/285	12:32:00	4:00
208	882	8/27	255.61	29/247	43/240	15:52:00	4:00
210	888	8/28	104.93	52/295	33/284	02:23:39	6:00
213	894	8/28	314.24	70/260	73/192	12:14:32	5:27
215	908	8/28	322.64	73/250	74/205	11:46:41	3:30
216	909	8/28	297.53	32/287	39/282	13:13:26	2:00
226	931	8/31	105.02	45/291	32/283	02:38:00	4:00
233	958	8/31	146.94	63/356	55/348	23:52:56	2:00
235	963	9/02	021.37	49/000	56/355	07:59:00	2:00
236	966	9/02	306.03	73/231	74/205	13:10:36	2:00
240A	974	9/03	105.11	49/294	35/285	02:48:57	5:00
240B	974	9/03	105.11	52/294	34/284	02:48:57	5:00
240C	974	9/03	105.11	50/294	33/283	02:48:57	5:00
242	980	9/03	314.43	74/230	73/205	12:41:38	2:00
244	991	9/04	038.17	52/230	47/225	07:21:24	2:00
248	1001	9/05	147.02	61/349	57/342	00:05:35	1:00
249	1005	9/05	046.65	52/238	45/231	06:51:55	2:00
250A	1006	9/05	021.45	55/355	62/345	08:13:50	2:00
250B	1006	9/05	021.45	55/350	62/345	08:13:50	2:00
251	1009	9/05	306.10	73/224	74/205	13:23:35	2:00
252	1011	9/05	255.87	32/246	38/242	16:30:05	2:00
255	1020	9/06	029.84	52/211	44/207	08:03:11	2:00
256	1023	9/06	314.50	73/255	72/229	12:52:26	2:00
257	1024	9/06	289.38	21/283	28/281	14:16:51	2:00
260	1034	9/07	038.23	50/228	47/225	07:34:12	1:00
261	1038	9/07	297.77	33/288	36/285	13:50:52	1:00
262	1038	9/07	297.77	70/242	74/210	14:02:52	3:00
264	1044	9/08	147.08	63/350	56/340	00:17:33	2:00
265	1048	9/08	046.62	52/238	46/231	07:04:14	2:00
266	1049	9/08	021.51	56/355	62/348	08:26:10	2:00
267	1052	9/08	306.17	71/247	73/229	13:33:57	2:00
268	1054	9/08	255.94	30/246	38/242	16:42:29	2:00
270	1080	9/10	322.95	75/250	76/222	12:36:17	2:00
271	1081	9/10	297.84	32/287	35/284	14:03:30	1:00
272	1081	9/10	297.84	73/232	74/208	14:16:30	2:00
273	1083	9/10	247.62	59/218	65/207	17:27:59	2:00
274	1087	9/11	147.18	62/349	55/340	00:30:16	2:00
276	1095	9/11	306.25	73/222	73/195	13:48:42	2:00
277	1096	9/11	281.14	23/275	30/272	15:11:45	2:00
280	1109	9/12	314.62	72/254	73/202	13:17:21	4:00
281	1110	9/12	289.51	18/285	39/275	14:41:07	6:00
282	1112	9/12	239.27	43/222	50/218	18:09:10	2:00
283	1122	9/13	348.11	73/227	68/206	11:12:15	2:00
286A	1126	9/13	247.64	44/230	62/211	17:40:30	6:00

ID #	REV	DATE MO/DAY	NODE LONGITUDE	START LAT/LONG	END LAT/LONG	TIME ON HH:MM:SS	Δ T MM:SS
286B	1126	9/13	247.64	43/230	62/213	17:40:30	6:00
286C	1126	9/13	247.64	50/225	63/210	17:42:34	4:08
288	1138	9/14	306.25	73/222	73/185	13:39:25	3:00
289	1139	9/14	281.13	28/273	38/267	15:24:09	3:00
290A	1140	9/14	256.01	22/250	55/230	17:04:43	10:00
290B	1140	9/14	256.01	22/250	33/245	17.04:43	3:30
291	1149	9/15	029.96	37/017	67/342	08:16:05	10:00
292	1153	9/15	289.50	21/284	33/278	14:54:38	4:00
293	1155	9/15	239.26	24/233	47/220	18:16:46	7:00
294A	1163	9/16	038.33	51/227	42/222	08:11:34	3:00
296A	1167	9/16	297.87	66/257	72/167	14:38:41	8:00
296B	1167	9/16	297.87	16/295	32/287	14:23:17	5:00
297A	1169	9/16	247.63	35/235	48/227	17:51:26	4:00
297B	1169	9/16	247.63	37/235	51/226	17:56:26	4:00
298A	1177	9/17	046.70	51/236	45/232	07:42:24	2:00
298B	1177	9/17	046.70	51/236	41/230	07:42:24	2:00
300	1181	9/17	306.24	42/290	48/285	14:02:11	2:00
301	1182	9/17	281.12	30/271	37/267	15:39:30	1:42
302A	1183	9/17	256.00	29/247	48/236	17:19:30	5:30
302B	1183	9/17	256.00	47/237	53/232	17:24:50	2:00
302C	1183	9/17	256.00	23/250	34/245	17:17:26	3:30
303	1193	9/18	004.84	73/241	52/209	10:26:04	4:30
304	1195	9/18	314.61	73/241	74/210	13:43:35	2:30
305	1196	9/18	289.49	19/285	31/279	15:06:51	3:30
306A	1197	9/18	264.37	35/253	43/248	16:52:20	2:00
306B	1197	9/18	264.37	24/257	54/238	16:49:07	9:00
308	1201	9/18	163.91	67/015	62/005	23:55:09	2:00
309	1204	9/19	088.56	48/276	16/260	05:03:26	10:00
310	1205	9/19	063.44	40/246	32/242	06:47:12	2:30
311	1206	9/19	038.32	53/012	60/005	08:04:57	2:00
312A	1206	9/19	038.32	56/233	50/228	08:22:57	2:00
312B	1206	9/19	038.32	61/240	52/230	08:22:57	2:00
313	1209	9/19	322.98	47/302	59/290	13:04:14	4:00
314A	1210	9/19	297.86	28/287	37/283	14:40:00	3:00
314B	1210	9/19	297.86	75/213	74/188	14:55:00	2:00
316	1211	9/19	272.74	12/272	23/266	16:15:46	3:00
317A	1212	9/19	247.62	45/230	51/225	18:06:31	2:00
317B	1212	9/19	247.63	46/229	52/224	18:06:31	2:00
318	1215	9/19	172.28	57/008	50/001	23:28:48	2:00
322	1224	9/20	306.23	73/237	74/209	14:25:19	2:30
323	1225	9/20	281.11	21/275	31/271	15:49:24	3:00
324	1226	9/20	256.00	25/238	38/241	17:31:10	4:00
326	1231	9/21	130.41	45/315	38/312	02:25:28	2:00
327	1232	9/21	105.30	44/290	32/283	04:06:20	4:00
329A	1235	9/21	029.95	58/227	52/221	09:04:01	2:10
329B	1235	9/21	029.95	58/228	51/220	09:04:01	2:00
330	1236	9/21	004.38	70/221	58/201	10:39:06	4:00

ID #	REV	DATE MO/DAY	NODE LONGITUDE	START LAT/LONG	END LAT/LONG	TIME ON HH:MM:SS	Δ T MM:SS
331	1238	9/21	314.60	43/297	54/288	13:45:48	4:00
332	1239	9/21	289.48	20/285	32/279	15:19:33	3:30
333	1241	9/21	239.25	55/214	61/205	18:51:15	2:00
338	1252	9/22	322.97	45/304	62/288	13:16:56	5:00
339A	1253	9/22	297.85	17/293	43/282	14:49:12	8:00
339B	1253	9/22	297.85	27/289	40/282	14:52:30	3:30
339C	1253	9/22	297.85	17/292	30/288	14:49:12	4:00
341A	1254	9/22	272.74	29/263	41/256	16:33:40	3:30
341B	1254	9/22	272.74	17/268	30/262	16:29:28	4:30
341C	1254	9/22	272.74	38/259	45/254	16:36:30	2:00
342A	1255	9/22	247.62	41/234	51/225	18:18:13	3:00
342B	1255	9/22	247.62	42/232	51/224	18:18:13	3:00
343	1258	9/22	172.27	60/011	50/001	23:41:30	2:00
344	1259	9/23	147.16	63/350	57/341	01:21:16	2:00
345	1261	9/23	096.92	50/286	39/279	04:46:47	3:00
346	1263	9/23	046.69	50/236	44/232	08:07:48	2:00
347	1265	9/23	356.46	59/325	65/311	11:11:20	2:30
348	1267	9/23	306.22	28/296	41/291	14:23:21	4:00
349	1267	9/23	306.22	73/225	73/205	14:39:21	2:00
350A	1269	9/23	255.99	28/247	60/222	17:44:52	10:00
350B	1269	9/23	255.99	48/235	61/221	17:51:00	4:00
350C	1269	9/23	255.99	52/233	61/221	17:52:00	3:00
353	1275	9/24	105.29	46/292	37/286	04:18:30	3:00
355	1279	9/24	004.83	74/239	63/209	10:51:28	4:00
357	1281	9/24	314.59	73/228	73/200	14:10:00	2:00
358A	1282	9/24	289.48	25/282	42/273	15:34:00	5:00
358B	1282	9/24	289.48	19/284	26/281	15:32:15	2:00
360	1284	9/24	239.25	57/211	63/203	19:04:46	2:00
361	1287	9/25	163.90	68/019	62/008	00:21:03	2:00
363	1291	9/25	063.43	35/242	23/238	07:13:50	3:00
364	1292	9/25	038.31	65/246	50/228	08:45:23	5:05
365A	1296	9/25	297.85	29/288	43/282	15:05:51	4:00
365B	1296	9/25	297.85	30/289	43/282	15:05:51	5:14
366	1296	9/25	297.85	72/238	74/188	15:19:10	4:00
368A	1298	9/25	247.62	39/333	52/225	18:30:13	4:00
368B	1298	9/25	247.62	38/234	52/224	18:30:13	4:00
369	1299	9/25	222.50	58/191	64/182	20:16:29	2:00
371A	1306	9/26	046.68	55/240	42/230	08:19:14	4:00
371B	1306	9/26	046.68	57/242	43/231	08:19:14	4:00
372A	1307	9/26	021.57	51/359	64/341	09:41:05	4:00
372B	1307	9/26	021.57	52/358	64/342	09:41:05	4:00
374	1310	9/26	306.22	68/258	74/185	14:49:00	6:00
375	1311	9/26	281.10	58/250	73/212	16:26:27	5:39
376	1312	9/26	255.99	27/247	47/236	17:57:20	6:00
379A	1318	9/27	105.29	50/294	37/286	04:30:21	4:00
379B	1318	9/27	105.29	47/292	33/283	04:30:10	4:00
380	1321	9/27	029.94	54/221	42/212	09:30:35	4:00
381	1322	9/27	004.82	75/255	65/215	11:03:44	4:00
382	1324	9/27	314.59	38/301	44/296	14:09:45	2:00
383	1325	9/27	289.47	20/285	33/279	15:45:28	4:00
384	1327	9/27	239.24	34/228	47/219	19:10:57	4:00

ID #	REV	DATE MO/DAY	NODE LONGITUDE	START LAT/LONG	END LAT/LONG	TIME ON HH:MM:SS	Δ T MM:SS
385	1333	9/28	088.54	48/276	43/272	05:41:33	2:00
386	1334	9/28	063.43	42/247	28/240	07:24:40	4:00
387	1335	9/28	038.31	63/241	47/225	08:58:06	5:14
388A	1339	9/28	297.84	30/289	43/282	15:18:34	4:03
388B	1339	9/28	297.84	29/288	42/281	15:18:34	4:00
389	1339	9/28	297.84	72/238	74/215	15:32:53	2:00
390	1340	9/28	272.73	29/263	42/255	16:59:43	4:00
391	1341	9/28	247.61	49/233	52/223	18:43:06	4:00
394	1349	9/29	046.68	55/240	41/230	08:31:58	4:00
396	1352	9/29	331.33	48/312	61/297	13:13:42	5:00
397	1353	9/29	306.21	73/230	73/180	15:04:45	4:00
399	1355	9/29	255.98	24/248	38/242	18:10:11	5:00
400	1359	9/30	155.52	67/007	55/350	01:51:45	4:00
401	1360	9/30	130.40	48/318	35/310	03:02:35	4:00
403	1364	9/30	029.93	54/221	42/212	09:43:13	4:00
404	1365	9/30	004.82	74/255	66/218	11:16:27	4:00
405	1367	9/30	314.58	38/300	45/295	14:22:28	2:00
406	1368	9/30	289.47	20/285	33/279	15:58:11	4:00
407	1370	9/30	239.24	34/227	47/219	19:23:41	4:00
409	1377	10/01	063.42	41/246	28/239	07:37:01	4:00
410A	1378	10/01	038.30	58/236	48/226	09:13:00	3:00
410B	1378	10/01	038.30	55/231	42/221	09:14:00	4:00
412	1382	10/01	297.84	73/231	74/205	15:45:36	2:00
413	1383	10/01	272.72	30/263	44/255	17:12:26	4:00
414	1384	10/01	247.61	36/235	49/225	18:55:40	4:00
415	1385	10/01	222.49	58/191	65/180	20:41:55	2:00
416	1387	10/01	172.26	59/010	52/001	00:19:59	2:00
417	1391	10/02	071.79	39/253	25/247	07:08:57	4:00
418	1395	10/02	331.33	32/321	68/281	13:22:04	11:25
419	1395	10/02	331.33	74/221	66/182	13:35:54	10:21
420	1396	10/02	306.21	68/255	68/165	15:14:31	8:25
421	1397	10/02	281.09	18/277	32/270	16:37:20	4:00
422A	1397	10/02	281.09	67/235	74/205	16:55:00	3:00
422B	1397	10/02	281.09	67/235	74/168	16:55:00	6:00
423A	1398	10/02	255.98	26/248	42/240	18:22:20	5:00
423B	1398	10/02	255.98	16/253	29/248	18:20:17	4:00
424	1403	10/03	130/40	50/320	32/309	03:14:32	6:00
425A	1404	10/03	105.28	44/291	32/284	04:57:15	4:00
425B	1404	10/03	105.28	32/284	20/278	05:01:00	3:50
426	1406	10/03	055.05	48/243	33/235	08:17:40	4:00
427	1408	10/03	004.82	74/260	62/207	11:28:36	5:58
428	1409	10/03	339.70	74/262	68/195	13:07:15	5:58
429	1411	10/03	289.47	18/285	38/275	16:10:08	6:00
430	1411	10/03	289.47	69/237	74/168	16:26:20	6:00
432	1419	10/04	088.54	48/276	29/265	06:07:28	5:54
433	1420	10/04	063.42	38/246	26/238	07:50:00	4:00
435A	1425	10/04	297.84	28/288	38/283	15:44:10	3:00
435B	1425	10/04	297.84	23/292	42/282	15:41:10	6:00

ID #	REV	DATE MO/DAY	NODE LONGITUDE	START LAT/LONG	END LAT/LONG	TIME ON HH:MM:SS	Δ T MM:SS
436	1425	10/04	297.84	66/252	70/160	15:55:43	8:14
437	1426	10/04	272.72	35/261	42/256	17:26:30	2:00
438	1428	10/04	222.49	51/200	68/173	20:52:52	6:00
439	1430	10/05	172.26	64/017	43/357	00:30:56	6:00
440	1434	10/05	071.79	40/254	26/247	07:21:38	4:00
441	1438	10/05	331.33	32/322	68/285	13:34:47	11:25
442	1438	10/05	331.38	74/259	54/168	13:48:37	10:23
443	1439	10/05	306.21	68/257	69/165	15:27:13	8:25
444	1440	10/05	281.10	10/280	23/275	16:50:01	4:00
445	1440	10/05	281.10	62/248	73/160	17:04:22	9:12
446A	1441	10/05	255.98	25/248	46/236	18:35:00	6:09
446B	1441	10/05	255.98	19/250	32/244	18:33:00	4:00
447	1446	10/06	130.46	53/321	33/310	03:27:13	6:00
448A	1447	10/06	105.28	44/291	32/284	05:10:00	4:00
448B	1447	10/06	105.28	33/284	09/274	05:13:45	7:23
449	1449	10/06	055.05	48/242	35/235	08:30:21	4:00
450	1451	10/06	004.82	74/261	70/226	11:41:18	3:00
451	1452	10/06	339.70	74/260	68/197	13:19:58	5:56
453	1454	10/06	289.47	68/239	73/169	16:39:00	6:00
455	1462	10/07	088.54	36/269	28/265	06:24:00	2:03
456	1463	10/07	063.43	52/255	22/238	07:59:50	9:00
458A	1468	10/07	297.84	23/292	43/282	15:54:51	6:00
458B	1468	10/07	297.84	33/287	44/280	15:57:00	3:00
458C	1468	10/07	297.84	23/292	43/280	15:54:51	6:00
459	1468	10/07	297.84	68/252	71/162	16:08:25	8:14
460	1469	10/07	272.73	35/261	42/256	17:39:20	2:00
461	1471	10/07	222.50	51/200	68/173	21:05:33	6:00
462	1473	10/08	172.26	64/015	44/356	00:43:47	6:00
465	1481	10/08	331.33	74/225	58/167	14:01:19	10:23
466	1482	10/08	306.22	68/255	68/165	15:39:55	8:25
467	1483	10/08	281.10	10/280	25/274	17:02:42	4:00
468	1483	10/08	281.10	53/257	60/249	17:17:44	2:00
469A	1484	10/08	255.98	20/251	40/241	18:45:42	6:00
469B	1484	10/08	255.98	36/243	54/230	18:51:00	5:30
470	1489	10/09	130.40	42/314	35/310	03:42:04	2:00
471A	1490	10/09	105.29	64/310	51/295	05:16:00	4:00
471B	1490	10/09	105.29	44/291	32/284	05:22:40	4:00
471C	1490	10/09	105.29	33/283	15/275	05:26:20	5:00
471D	1490	10/09	105.29	17/276	08/272	05:31:00	2:40
472	1492	10/09	055.06	54/248	37/236	08:41:12	5:00
473	1493	10/09	029.94	50/008	57/001	10:02:01	2:00
474A	1494	10/09	004.82	74/250	53/197	11:54:55	8:00
474B	1494	10/09	004.82	65/214	53/197	11:59:00	3:55
476	1496	10/09	314.59	70/260	65/164	15:11:19	9:20
477	1497	10/09	289.48	24/282	31/280	16:37:30	2:00
479	1499	10/09	239.25	53/215	73/170	20:07:27	7:30
480	1502	10/10	163.90	68/018	51/354	01:24:14	5:26

APPENDIX 2.

National Oceanic and Atmospheric Administration
Environmental Data and Information Service
National Climatic Center
Satellite Data Services Division
Room 100, World Weather Building
Washington, DC 20233
(301) 763-8111 FTS 763-8111

This chronological data listing provides the latest information on all Seasat SAR digitally processed data tapes and film imagery on archive at SDSD. The tape number is a unique ID assigned to each scene. Use this number when ordering data. Only one scene can be placed on any CCT. Each scene measures approximately 100 × 100 km. Station ID's are GDS (Goldstone, California), MIL (Merritt Island, Florida), UKO (United Kingdom), SNF (St. Johns, Newfoundland) and ULA (Fairbanks, Alaska). The aspect of each pass is indicated as either A for ascending or D for descending. Dates shown are month, day (1/24 is January 24), all in 1978. Start time is start of frame (GMT). However the latitude/longitude coordinate given is for the target, which is not necessarily the center of the image. All items shown are available on 9 track, 1,600 BPI computer compatible tapes, normally with 6,144 lines of data and 6,144 samples per line. Nominal resolution is 25. Photographic reproductions of the data on the tape are also available.

Seasat Synthetic Aperture Radar (SAR) Digitally Correlated Data List

TAPE NUMBER	REV#	STA	ASP	DATE MO/DAY	START TIME HH:MM:SS	TARGET LAT/LONG	GEOGRAPHIC COVERAGE MAJOR AREA	SUB-AREA
01070030	107	GDS	A	7/04	12:17:16	55-35N/132-45W	ALASKA	PRINCE OF WALES, ISLAND
01070042	107	GDS	A	7/04	12:11:01	35-07N/119-06W	CALIFORNIA	KERN COUNTY
01070096	107	GDS	A	7/04	12:10:10	32-40N/117-14W	CALIFORNIA	POINT LOMA
01070132	107	GDS	A	7/04	12:12:50	41-10N/121-30W	CALIFORNIA	MEDICINE LAKE
02050105	205	ULA	D	7/11	08:45:41	73-21N/114-15W	BEAUFORT SEA	
02070082	207	GDS	A	7/11	11:54:00	35-31N/107-01W	NEW MEXICO	MESA PRIETA
02070187	207	GDS	A	7/11	15:53:47	34-50N/106-30W	NEW MEXICO	ALBUQUERQUE
02070275	207	GDS	A	7/11	11:54:53	38-30N/108-20W	COLORADO	SOUTHWEST
02070315	207	GDS	A	7/11	11:56:56	45-13N/112-38W	MONTANA	DILLON
02070316	207	GDS	A	7/11	11:57:09	45-56N/113-14W	MONTANA	ANACONDA
02210043	221	MIL	A	7/12	11:24:05	39-20N/100-50W	KANSAS	COLBY
02210065	221	MIL	A	7/12	11:22:37	35-00N/ 98-00W	OKLAHOMA	CHICKASHA
02210222	221	ULA	A	7/12	11:33:36	68-59N/135-25W	CANADA	MACKENZIE RIVER DELTA
02210223	221	ULA	A	7/12	11:31:00	61-57N/120-16W	CANADA	FORT SIMPSON, NWT.
02300131	230	GDS	D	7/13	02:54:20	49-00N/123-00W	CANADA	STRAIGHTS OF GEORGIA
02320168	232	ULA	D	7/13	06:12:11	60-00N/162-30W	ALASKA	KUSKOKWIM RIVER
02360134	236	GDS	A	7/13	12:36:18	49-00N/123-00W	CANADA	STRAIGHTS OF GEORGIA
02420216	242	MIL	D	7/13	23:06:55	32-30N/ 73-00W	ATLANTIC OCEAN	BLAKE ESCARPEMENT
02510049	251	GDS	A	7/14	13:36:06	16-46N/122-02W	PACIFIC OCEAN	HURRICANE FICO
02510050	251	GDS	A	7/14	13:36:24	17-48N/122-27W	PACIFIC OCEAN	HURRICANE FICO
02510051	251	GDS	A	7/14	13:36:42	18-50N/122-52W	PACIFIC OCEAN	HURRICANE FICO
02630228	263	MIL	A	7/15	09:50:42	40-30N/ 74-15W	NEW YORK	NEW YORK CITY
02890164	289	ULA	D	7/17	05:47:37	61-13N/150-25W	ALASKA	ANCHORAGE
02890300	289	ULA	D	7/17	05:46:39	63-50N/146-00W	ALASKA	DELTA "2"
02890312	289	ULA	D	7/17	05:48:30	58-25N/154-15W	ALASKA	KATMAI
03080040	308	GDS	A	7/18	13:15:56	30-20N/117-05W	PACIFIC OCEAN	GOASEX

TAPE NUMBER	REV#	STA	ASP	DATE MO/DAY	START TIME HH:MM:SS	TARGET LAT/LONG	GEOGRAPHIC COVERAGE MAJOR AREA	SUB-AREA
03080022	308	GDS	A	7/18	13:17:08	34-10N/119-36W	CALIFORNIA	SANTA BARBARA
03080215	308	GDS	A	7/18	13:16:57	33-45N/119-20W	CALIFORNIA	SAN NICHOLAS ISLAND
03080243	308	GDS	A	7/18	13:18;36	39-13N/121-50W	CALIFORNIA	SUTTER'S BUTTE
03220071	322	GDS	A	7/19	12:45:21	32-50N/109-40W	ARIZONA	SAFFORD
03220079	322	ULA	A	7/19	12:58:00	70-48N/156-25W	ALASKA	DEASE INLET
03220150	322	GDS	A	7/19	12:46:36	36-15N/112-15W	ARIZONA	GRAND CANYON
03220262	322	GDS	A	7/19	12:47:05	38-10N/112-50W	UTAH	BLACK MOUNTAINS "1"
03220263	322	GDS	A	7/19	12:47:18	38-55N/113-10W	UTAH	SEVIER LAKE
03229009	322	GDS	A	7/19	12:46:25	35-30N/111-40W	ARIZONA	GRAND CANYON
03350126	335	MIL	A	7/20	10:35:27	39-00N/ 78-52W	WEST VIRGINIA	LOST RIVER
03350130	335	MIL	A	7/20	10:29:43	19-30N/ 70-00W	DOMINICAN REPUBLIC	"A"
03350148	335	MIL	A	7/20	10:29:30	18-40N/ 69-50W	DOMINICAN REPUBLIC	"B"
03500297	350	ULA	A	7/21	11:52:39	63-17N/118-15W	CANADA	LAC LAMARTE, NWT.
03510023	351	GDS	A	7/21	13:24:09	34-00N/118-20W	CALIFORNIA	LOS ANGELES
03510070	351	GDS	A	7/21	13:24:18	34-50N/118-10W	CALIFORNIA	GARLOCK FAULT
03510121	351	GDS	A	7/21	13:26:05	40-35N/121-20W	CALIFORNIA	CINDER CONE
03510127	351	GDS	A	7/21	13:24:06	34-00N/118-15W	CALIFORNIA	LOS ANGELES
03710245	371	MIL	D	7/22	23:31:34	20-20N/ 75-30W	CUBA	MICARO MOUNTAINS
03780063	378	MIL	A	7/23	10:41:29	35-40N/ 76-55W	NORTH CAROLINA	HALL SWAMP
03780247	378	MIL	A	7/23	10:42:40	39-20N/ 78-08W	VIRGINIA	WINCHESTER "2"
03780310	378	MIL	A	7/23	10:42:54	40-05N/ 78-30W	PENNSYLVANIA	BEDFORD
03780319	378	MIL	A	7/23	10:42:16	38-17N/ 77-24W	VIRGINIA	FREDRICKSBURG "2"
03800083	380	ULA	A	7/23	14:11:23	62-56N/150-50W	ALASKA	ALASKAN RANGE
03800283	380	ULA	A	7/23	14:11:46	64-05N/151-50W	ALASKA	KUSKOKWIM MOUNTAINS
03930140	393	MIL	A	7/24	11:49:22	30-04N/ 89-51W	LOUISIANA	NEW ORLEANS "2"
03930143	393	MIL	A	7/24	11:49:08	29-13N/ 89-29W	LOUISIANA	MISSISSIPPI DELTA "2"
03930185	393	MIL	A	7/24	11:50:46	35-00N/ 92-05W	ARKANSAS	LITTLE ROCK
03930286	393	MIL	A	7/24	11:51:46	38-15N/ 93-45W	MISSOURI	CLINTON
03930287	393	MIL	A	7/24	11:52:21	40-09N/ 94-52W	MISSOURI	GUILDFORD
03949001	394	GDS	A	7/24	13:31:12	34-51N/117-05W	CALIFORNIA	GOLDSTONE (BARSTOW)
03940197	394	GDS	A	7/24	13:31:58	36-40N/117-35W	CALIFORNIA	PANAMINT MOUNTAINS
04070005	407	MIL	A	7/25	11:21:10	40-11N/ 86-21W	INDIANA	KOKOMO
04070250	407	MIL	A	7/25	11:21:03	39-51N/ 85-56W	INDIANA	INDIANAPOLIS
04070345	407	MIL	A	7/25	11:20:50	39-07N/ 85-20W	INDIANA	OSGOOD
04079006	407	MIL	A	7/25	11:19:57	36-36N/ 84-07W	KENTUCKY/TENNESSE	JELLICO
04160288	416	GDS	D	7/26	02:55:48	34-04N/118-00W	CALIFORNIA	LOS ANGELES "4"
04160367	416	GDS	D	7/26	02:54:52	37-22N/116-18W	NEVADA	YUCCA FLATS
04220062	422	MIL	A	7/26	12:27:54	31-11N/ 97-25W	TEXAS	TEMPLE
04470308	447	ULA	D	7/28	06:45:51	64-12N/148-40W	ALASKA	NORTH ALASKAN RANGE
04500246	450	MIL	A	7/28	11:21:41	18-18N/ 74-07W	HAITI	PORTE-A-PIMENT
04650060	465	MIL	A	7/29	12:36:04	35-00N/ 98-00W	OKLAHOMA	CHICKASHA
04650061	465	MIL	A	7/29	12:35:38	33-32N/ 96-50W	TEXAS	HONEY
04650205	465	MIL	A	7/29	12:30:46	17-13N/ 89-38W	GUATEMALA	TIKAL
04650208	465	MIL	A	7/29	12:34:29	29-44N/ 95-22W	TEXAS	HOUSTON
04720203	472	MIL	D	7/30	00:49:52	37-52N/ 80-33W	WEST VIRGINIA	ALTA
04720229	472	MIL	D	7/30	00:48:46	41-30N/ 78-22W	PENNSYLVANIA	EMPORIUM
04720309	472	MIL	D	7/30	00:49:00	40-43N/ 70-00W	PENNSYLVANIA	ALTOONA
04730284	473	GDS	D	7/30	02:30:01	39-30N/105-00W	COLORADO	DENVER
04740077	474	GDS	D	7/30	04:07:41	49-00N/123-00W	CANADA	STRAIGHTS OF GEORGIA
04740170	474	GDS	D	7/30	04:07:54	48-20N/124-00W	CANADA	ST. OF JUAN DE FUCA
04800137	480	GDS	A	7/30	13:49:41	49-00N/123-00W	CANADA	STRAIGHTS OF GEORGIA
04800208	480	GDS	A	7/30	13:49:18	47-35N/122-03W	WASHINGTON	SEATTLE "3"
04880028	488	GDS	D	7/31	03:37:09	46-50N/116-10W	IDAHO	ELK RIVER
04930027	493	MIL	A	7/31	11:33:27	34-20N/ 80-35W	SOUTH CAROLINA	KERSHAW COUNTY
04930202	493	MIL	A	7/31	11:34:36	38-11N/ 82-01W	WEST VIRGINIA	BERNIE

TAPE NUMBER	REV#	STA	ASP	DATE MO/DAY	START TIME HH:MM:SS	TARGET LAT/LONG	GEOGRAPHIC COVERAGE MAJOR AREA	SUB-AREA
05020004	502	GDS	D	8/01	03:05:48	47-17N/106-36W	MONTANA	JORDON
05020019	502	GDS	D	8/01	03:07:10	42-55N/110-00W	WYOMING	PINEDALE
05020111	502	GDS	D	8/01	03:10:05	33-15N/115-25W	CALIFORNIA	ALGADONE DUNES
05020225	502	GDS	D	8/01	03:07:43	41-12N/111-05W	WYOMING	EVANSTON
05020292	502	GDS	D	8/01	03:08:21	39-00N/112-28W	UTAH	SEVIER DESSERT "2"
05020293	502	GDS	D	8/01	03:08:34	38-13N/112-50W	UTAH	BLACK MOUNTAINS "2"
05080113	508	MIL	A	8/01	12:36:43	13-39N/ 86-58W	HONDURAS	
05080114	508	MIL	A	8/01	12:36:33	12-49N/ 86-39W	NICARAGUA	
05080184	508	MIL	A	8/01	12:42:53	34-25N/ 95-45W	OKLAHOMA	TUSKAHOMA
05080343	508	MIL	A	8/01	12:37:49	17-08N/ 88-24W	BELIZE	COAST #1
05080354	508	MIL	A	8/01	12:36:55	14-10N/ 87-13W	HONDURAS	TEGUCIGALPA
05080355	508	MIL	A	8/01	12:37:08	14-57N/ 87-34W	HONDURAS	PIJOL MTS
05220298	522	MIL	A	8/02	12:14:50	44-50N/ 93-20W	MINNESOTA	TWIN CITIES
05229011	522	MIL	A	8/02	12:11:54	35-04N/ 88-15W	TENNESSEE	PICKWICK DAM
05230020	523	GDS	A	8/02	13:51:35	31-52N/111-12W	ARIZONA	SIERRITA MOUNTAINS
05230055	523	GDS	A	8/02	13:51:45	32-30N/111-40W	ARIZONA	SILVER BELL
05230074	523	GDS	A	8/02	13:51:34	31-47N/111-10W	ARIZONA	HELVETIA
05230090	523	GDS	A	8/02	13:52:03	33-30N/112-30W	ARIZONA	PHOENIX
05230156	523	GDS	A	8/02	13:52:17	34-20N/112-21W	ARIZONA	FOUR CORNERS
05520046	552	GDS	A	8/02	14:30:27	34-10N/120-00W	CALIFORNIA	SANTA BARBARA
05520121	552	GDS	A	8/04	14:30:32	34-10N/120-00W	CALIFORNIA	SANTA BARBARA
05520232	552	ULA	A	8/04	14:40:03	64-40N/147-15W	ALASKA	FAIRBANKS
05520244	552	GDS	A	8/04	14:31:39	38-12N/121-51W	CALIFORNIA	SACREMENTO DELTA
05520248	552	ULA	A	8/04	14:39:46	63-50N/146-00W	ALASKA	DELTA
05520252	552	ULA	A	8/04	14:38:12	59-24N/139-07W	ALASKA	YUKATAT
05520276	552	ULA	A	8/04	14:38:32	60-15N/140-00W	ALASKA	MALASPINA GLACIER
05520312	552	ULA	A	8/04	14:41:57	69-33N/159-48W	ALASKA	UTUKOIC RIVER
05580010	558	MIL	D	8/05	01:03:30	38-55N/ 76-55W	WASHINGTON, D.C.	DISTRICT OF COLUMBIA
05580147	558	MIL	D	8/05	01:03:54	37-56N/ 77-35W	VIRGINIA	FREDERICKSBURG
05580318	558	MIL	D	8/05	01:04:07	37-10N/ 78-00W	VIRGINIA	FORT PICKETT
05580347	558	MIL	D	8/05	01:10:25	15-47N/ 87-52W	HONDURAS	SAN PEDRO SULA
05580348	558	MIL	D	8/05	01:10:38	14-57N/ 88-15W	HONDURAS	SANTA BARBARA
05580350	558	MIL	D	8/05	01:10:51	14-17N/ 88-32W	HONDURAS	ERANDIQUE
05590036	559	GDS	D	8/05	02:45:06	36-24N/103-08W	NEW MEXICO	CLAYTON
05650149	565	MIL	A	8/05	12:19:30	37-15N/ 87-15W	KENTUCKY	POND RIVER
05650173	565	MIL	A	8/05	12:19:36	37-40N/87-15W	KENTUCKY	OWENSBORO
05650174	565	MIL	A	8/05	12:19:49	38-20N/87-40W	INDIANA	PRINCETON
05740183	574	GDS	D	8/06	03:54:32	36-00N/120-00W	CALIFORNIA	KETTLEMAN HILLS
05800011	580	GDS	A	8/06	13:29:41	39-37N/105-00W	COLORADO	DENVER
05800029	580	GDS	A	8/06	13:29:48	40-00N/105-50W	COLORADO	GRAND COUNTY (DENVER)
05800037	580	GDS	A	8/06	13:28:43	36-24N/103-08W	NEW MEXICO	CLAYTON
05800303	580	GDS	A	8/06	13:30:25	42-03N/106-22W	WYOMING	SHIRLEY MOUNTAINS
05950041	595	GDS	A	8/07	14:37:45	35-07N/119-06W	CALIFORNIA	KERN COUNTY
05950068	595	GDS	A	8/07	14:39:37	41-20N/122-00W	CALIFORNIA	HUMBOLT (MT SHASTA)
05950086	595	GDS	A	8/07	14:37:49	35-19N/119-06W	CALIFORNIA	KERN COUNTY
05950242	595	GDS	A	8/07	14:39:11	39-53N/121-11W	CALIFORNIA	BUCKS LAKE
06050167	605	ULA	D	8/08	07:48:14	54-50N/164-00W	ALASKA	UNIMAK ISLAND
06050256	605	ULA	D	8/08	07:44:53	64-44N/150-35W	ALASKA	TANANA RIVER
06050257	605	ULA	D	8/08	07:45:08	64-11N/151-57W	ALASKA	KUSKOKWIM MOUNTAINS
06080017	608	MIL	A	8/08	12:23:37	27-23N/ 80-50W	FLORIDA	LAKE OKEECHOBEE
06080177	608	MIL	A	8/08	12:02:57	18-02N/ 77-05W	JAMAICA	

TAPE NUMBER	REV#	STA	ASP	DATE MO/DAY	START TIME HH:MM:SS	TARGET LAT/LONG	GEOGRAPHIC COVERAGE MAJOR AREA	SUB-AREA
14460212	1446	SNF	D	10/06	03:13:59	35-31N/ 49-58W	ATLANTIC OCEAN	ROCKAWAY SEAMOUNT "A"
14460213	1446	SNF	D	10/06	03:32:13	34-26N/ 50-23W	ATLANTIC OCEAN	ROCKAWAY SEAMOUNT "B"
14470206	1447	MIL	D	10/06	05:10:32	42-42N/ 71-05W	MASSACHUSETTS	BOSTON
14490239	1449	GDS	D	10/06	08:30:29	47-36N/117-38W	WASHINGTON	SPOKANE "2"
14630133	1463	GDS	D	10/07	08:05:18	33-56N/117-33W	CALIFORNIA	LOS ANGELES "4"
14680103	1468	MIL	A	10/07	15:59:11	37-00N/ 76-00W	VIRGINIA	CHESAPEAKE BAY
14680211	1468	ULA	A	10/07	16:11:52	73-20N/135-48W	BEAUFORT SEA	ZERO
14680237	1468	MIL	A	10/07	15:59:45	39-05N/ 77-00W	WASHINGTON, D.C.	DISTRICT OF COLUMBIA 2
14690035	1469	GDS	A	10/07	17:40:08	37-44N/100-50W	KANSAS	SUBLETT
14900165	1490	SNF	D	10/09	05:16:24	64-00N/ 49-00W	GREENLAND	
14920190	1492	GDS	D	10/09	08:44:38	43-40N/121-00W	OREGON	NEWBERRY
14940307	1494	ULA	D	10/09	11:59:19	64-18N/149-06W	ALASKA	NENANA/TANANA RIVERS
14980084	1498	GDS	A	10/09	18:22:15	38-08N/109-45W	COLORADO	PARADOX BASIN
12360416	1236	ULA	D	9/21	10:42:04	67°00'N/143°40'W	Alaska	Porcupine River
12790417	1279	ULA	D	9/24	10:54:50	67°00'N/143°40'W	Alaska	Porcupine River

ADDENDUM

RECENT DIGITALLY PROCESSED SEASAT SAR DATA ON ARCHIVE AT SDSD

TAPE NUMBER	REV	STA	ASP	DATE	START TIME	TARGET LAT/LON	GEOGRAPHIC REGION MAJOR AREA	SUB-AREA
03320335	322	GDS	A	7/19	12:46:12	35-02N/111-01W	ARIZONA	METEOR CRATER
04720340	472	MIL	D	7/30	00:56:13	16-20N/ 90-33W	GUATEMALA	RIO SALINAS #2
04720341	472	MIL	D	7/30	00:56:26	15-36N/ 90-54W	GUATEMALA	LANCETILLO
04720342	472	MIL	D	7/30	00:56:39	14-49N/ 91-11W	GUATEMALA	LAKE ATITLAN
05580351	558	MIL	D	8/05	01:11:04	13-37N/ 88-52W	EL SALVADOR	SAN VICENTE
05900336	590	UKO	A	8/07	06:20:33	54-20N/ 6-39W	IRELAND	LOUGH NEAGH
06380329	638	GDS	A	8/10	14:43:56	32-15N/115-50W	MEXICO	JAUREZ MOUNTAINS
06380330	638	GDS	A	8/10	14:44:09	32-58N/116-14W	CALIFORNIA	AQUA CALIENTE
07910337	791	UKO	A	8/21	07:23:33	54-47N/ 7-44W	IRELAND	DONEGAL
08520361	852	MIL	A	8/25	13:34:03	37-58N/ 85-04W	KENTUCKY	HARRODSBURG
08820346	882	GDS	A	8/27	15:53:31	33-48N/115-52W	CALIFORNIA	EAGLE MOUNTAINS
12820362	1282	MIL	A	9/24	15:37:44	37-52N/ 84-00W	KENTUCKY	MT. STERLING
13970359	1397	MIL	A	10/02	16:39:51	19-25N/ 84-24W	CARIBBEAN SEA	MISTERIOSA BANK
13970360	1397	MIL	A	10/02	16:40:05	20-10N/ 84-07W	CARIBBEAN SEA	EDDY
14060357	1406	GDS	D	10/03	08:20:32	38-55N/124-40W	CALIFORNIA	STEWART'S POINT
14060358	1406	GDS	D	10/03	08:20:45	37-50N/124-06W	PACIFIC OCEAN	CALIF. COASTAL WATER
14090331	1409	ULA	D	10/03	13:09:25	74-40N/125-35W	CANADA	BANKS ISLAND #1
14090332	1452	ULA	D	10/06	13:22:07	74-40N/125-35W	CANADA	BANKS ISLAND #2

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