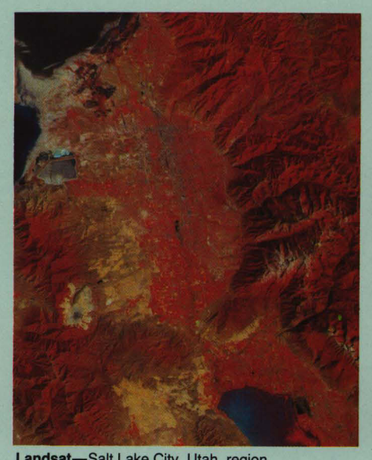
National Mapping Program

Index of Earth Resources Observation Systems

Department of the Interior
United States Geological Survey

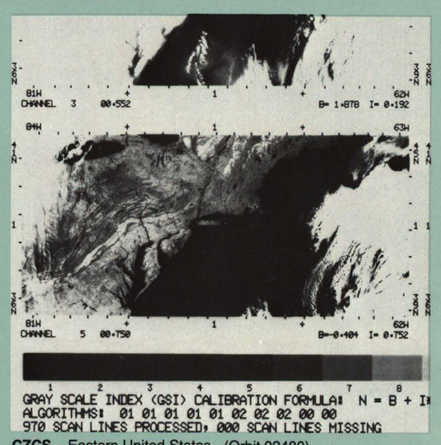
Compiled by
C. Scott Southworth



Landsat—Salt Lake City, Utah, region. (MSS 22045-17301)

(RBV 30556-17300xB)

Coastal Zone Color Scanner (CZCS)



CZCS—Eastern United States. (Orbit 02480)

Launch Date: October 24, 1978.

Orbital Elements:
Orbit: Sun-synchronous, near polar; ascending node at about 1200 hours local time.
Altitude: 955 km (kilometers).
Inclination: 99.3°.
Period: 104 minutes.
Cycle: 6 days.

Sensor:
Coastal Zone Color Scanner (CZCS)

Wavelength (μm) Micrometers	Pixel Spatial Resolution	Swath	Measurements
0.43-0.45	800 m	1800 km	Chlorophyll absorption
0.51-0.53	800 m		Chlorophyll distribution
0.54-0.56	800 m		Gelbstoffe (yellow substance)
0.66-0.68	800 m		Chlorophyll concentration
0.70-0.80	800 m		Surface vegetation
10.5-12.5	800 m		Surface temperature/Diffuse attenuation coefficient.

Standard Products (CZCS)

Imagery format is a 241-mm film transparency (positive, negative, black-and-white) including all 6 bands. Each band is 36 x 60 mm (an area 700 x 1636 km), approximately 2-minute data.

9-track, 1600-bpi CCT. May contain three 2-minute scenes.

For Information (CZCS)

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

Nimbus-7 Data Users Bulletin
Nimbus Data Applications System
Code 902
National Aeronautics and Space Administration (NASA)
Goddard Space Flight Center (GSFC)
Greenbelt, MD 20771
(301) 344-5770 FTS: 344-5770

Seasat

Seasat—Appalachian Mountains, Virginia, West Virginia. (03780247)

Launch Date: June 26, 1978
Operation ended October 10, 1978.

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

Sensor:
Synthetic Aperture Radar (SAR) (Data limited to 60 min/day direct readout only)

Frequency	Wavelength	Polarization	Spatial Resolution	Swath Width/Field of View	Antenna Depression Angle
1.275 gigahertz.	L-band, 23 cm.	Horizontal, Horizontal (HH).	25 m at 4-look directions.	100 km swath on one side of spacecraft.	70° off horizontal.

Standard Products (SAR)

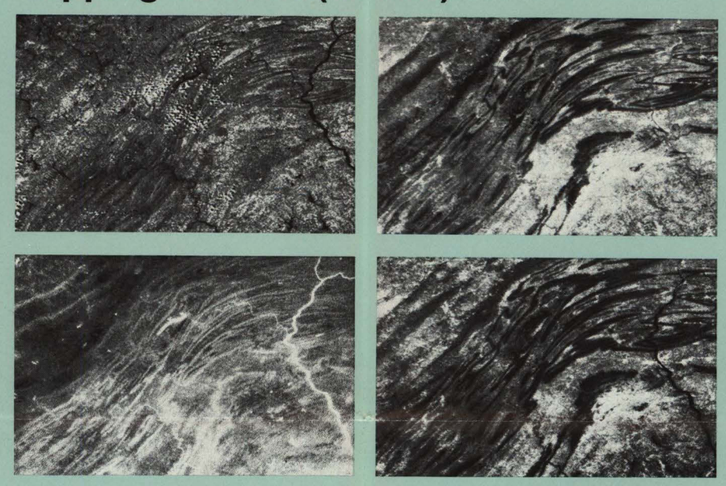
Optically processed	70-mm format, black-and-white: 1:500,000-scale paper print. Duplicate negative. Positive transparency.
Digitally processed	90 x 90 km coverage: 1:500,000-scale paper print. Duplicate negative. Positive transparency.

9-track, 1600-bpi CCT.

For Information (SAR)

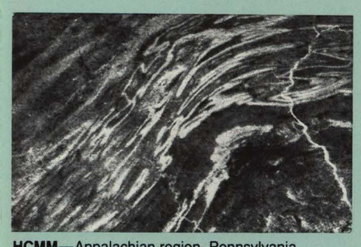
National Oceanic and Atmospheric Administration (NOAA)
National Environmental Satellite Data and Information Service (NESDIS)
National Climatic Center
Satellite Data Services Division
Room 100
World Weather Building
Washington, DC 20233
(301) 763-8111 FTS: 763-8111

Heat Capacity Mapping Mission (HCMM)



Launch Date: April 26, 1978.

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



HCMM—Appalachian region, Pennsylvania. (AA015318160)

Sensor:
Heat Capacity Mapping Radiometer (HCMR)

Wavelength (μm) Micrometers		Instantaneous field of view	Swath	Range	NER/NEΔT (Noise equivalent radiance/Noise equivalent temperature difference).
Visible channel	0.55-1.1	500 m	716 km	0-100% Albedo.	0.2 milliwatt/centimeter^2 (NER).
Thermal channel	10.5-12.5	600 m	716 km	260-340 Kelvin.	0.3 Kelvin at 280 Kelvin (system NEΔT; 0.4 Kelvin at 280 Kelvin).

Standard Products (HCMR)

1:4,000,000-scale images on 241-mm film or print (positive, negative, black-and-white):
Day visible.
Day infrared.
Night infrared.
Temperature difference (night vs. day).
Thermal inertia.

9-track, 800- and 1600-bpi CCT.

For Information (HCMR)

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

HCMM Data Users Handbook
Code 902
National Aeronautics and Space Administration (NASA)
Goddard Space Flight Center (GSFC)
Greenbelt, MD 20771
(301) 344-5770 FTS: 344-5770

Shuttle Imaging Radar (SIR-A)

SIR-A—Appalachian region, Virginia. (Data take 24-A)

Launch Date: November 12, 1981, OSTA-1 (30-hour mission).

Orbital Elements:
Orbit: Circular.
Altitude: 245 km.
Inclination: 38°-40°.
Coverage: 40°N to 30°S.

Sensor:
Synthetic Aperture Radar (SAR)

Frequency	Wavelength	Polarization	Spatial Resolution	Swath Width/Field of view	Antenna Depression Angle
1.278 gigahertz.	L-band, 23 cm.	Horizontal, Horizontal (HH).	40 m at 7-look directions.	50 km	43° off horizontal.

Standard Products (SIR-A)

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

For Information (SIR-A)

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

Jet Propulsion Laboratory
California Institute of Technology
4800 Oak Grove Drive
Pasadena, CA 91103
(213) 354-5673 FTS: 792-5673

Landsats 1, 2, 3, and 4

Initially called Earth Resources Technology Satellite (ERTS)

Landsats 1, 2, and 3
Launch Dates:
- Landsat 1, July 23, 1972. Operation ended January 6, 1978.
- Landsat 2, January 22, 1975. Operation ended February 25, 1982.
- Landsat 3, March 5, 1978. In standby mode (March 31, 1983).

Orbital Elements:
Orbit: Circular, near polar.
Altitude: 919 km.
Inclination: 99.09°.
Coverage: 82°N to 82°S.
Period: 103 minutes, crossing Equator at 0930 hours, local time.
Cycle: 18 days.

Sensors:
Multispectral Scanner (MSS)

Wavelength (μm) Micrometers		Pixel Spatial Resolution	Image Format/Comments
Landsats 1, 2, and 3:			185-km strip images have 10% forward lap and 14% sidelap at Equator and these increase toward the poles.
Band 4	0.50-0.60 (green)	80 m	
Band 5	0.60-0.70 (red)	80 m	
Band 6	0.70-0.80 (near-infrared)	80 m	
Band 7	0.80-1.1 (near-infrared)	80 m	
Landsat 3 only:			
Band 8	10.4-12.5 (thermal infrared)	Range of thermal sensitivity: 260-340 Kelvin	Thermal sensor never operated properly. Only a few scenes available of a limited number of areas.

Return Beam Vidicon Camera (RBV)

Landsats 1 and 2, three RBV's:			Simultaneous view from 3 cameras of a scene 185 x 185 km with 14% sidelap at Equator and 10% forward lap along orbital track.
Band 1	0.475-0.575 (blue-green)	80 m	
Band 2	0.580-0.680 (yellow-red)	80 m	
Band 3	0.690-0.830 (red-infrared)	80 m	
Landsat 3, two RBV's:			2 side-by-side images, 98 x 98 km (4 RBV images nearly coincide with one MSS frame).
	0.505-0.750 (panchromatic into near-infrared)	30 m	

Standard Products (Landsats 1, 2, & 3)

MSS and RBV	Film transparency or print (positive, and negative, black-and-white). Scales 1:3,369,000 to 1:250,000 for Landsats 1, 2, and 3 MSS and Landsats 1 and 2 RBV images. Scales 1:500,000 to 1:125,000 for Landsat 3 RBV images.
MSS	Film transparency or print (positive, false-color composite). Scales 1:1,000,000 to 1:250,000 for Landsats 1, 2, and 3 MSS and Landsats 1 and 2 RBV images.
MSS and RBV	9-track, 800- or 1600-bpi CCT.

For Information (Landsats 1, 2, & 3)

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

National Oceanic and Atmospheric Administration (NOAA)
National Environmental Satellite Data and Information Service (NESDIS)
Landsat Customer Services
Mundt Federal Building
Sioux Falls, SD 57198
(605) 594-6151 FTS: 784-7151

Landsat Data Users Handbook
Eastern Distribution Branch
Text Products Section
U.S. Geological Survey
604 South Pickett Street
Alexandria, VA 22304
(703) 756-6141 FTS: 756-6141

Landsat 4
Launch Date: July 16, 1982.

Orbital Elements:
Orbit: Circular, near polar.
Altitude: 705 km.
Inclination: 98.2°.
Coverage: 81° N to 81° S.
Period: 99 minutes, crossing Equator at nominal 0945, local time.
Cycle: 16 days.

Sensors:
Multispectral Scanner (MSS)

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

Thematic Mapper (TM)

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

Standard Products (Landsat 4)

MSS	Film transparency or print (positive, negative, black-and-white) scales 1:1,000,000 to 1:250,000. Film transparency or print (positive, false-color composite) scales 1:1,000,000 to 1:250,000.
TM	Film transparency or print (positive, negative, black-and-white). Film transparency or print (positive, natural- or false-color composite) scales 1:750,000, 1:375,000, and 1:187,500.

9-track, 1600- or 6250-bpi CCT.

For Information (Landsat 4)

U.S. Geological Survey
National Cartographic Information Center
507 National Center
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National Oceanic and Atmospheric Administration (NOAA)
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Landsat Customer Services
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