Landsat

http://landsat.usgs.gov/

"The opening of the Landsat archive to free, web-based access is like giving a library card for the world's best library of Earth conditions to everyone in the world."
- Adam Gerrand, Food and Agriculture Organization of the United Nations

Leonid M. Mitnik

V.I. Il'ichev Pacific Oceanological Institute FEB RAS, Vladivostok, Russia, mitnik@poi.dvo.ru

Acquisition

Landsat scenes downlinked directly to the USGS EROS archive are available for download or processing within about 6 hours after downlink.
Scenes downlinked to other ground receiving stations may become available in the USGS archive, but the **International Ground Station** that collects the data is the primary distributor.

Landsat 7 Acquisitions (1999 to present)

Landsat 7 collects approximately 300 scenes per day, in accordance with the **Long Term Acquisition Plan (LTAP).** The LTAP directs the acquisition of **Landsat 7** scenes, using parameters such as seasonality, land definition, historical cloud cover, gain settings, and sun angle.

Landsat 7 acquisitions planned today:
Landsat 7 (graphic) **Landsat 7** (text)
Landsat 7 acquisition calendar
Landsat 7 acquisitions archive

Landsat 5 Acquisitions (1984 to present)

Landsat 5 must be in direct contact with a ground receiving station in order to capture data. Acquisition modifications were made in 2010 to maximize quality collects, reduce the number of unusable scenes and extend the life of the mission. Certain areas of the world may see reduced **Landsat 5** collects.

Landsat 5 acquisitions today:

Landsat 5 (graphic) **Landsat 5** (text)

Landsat 5 acquisition calendar

Landsat 5 acquisitions archive

USGS Landsat Global Archive

USGS Landsat Archive Collections per year, spacecraft and sensor

View maps where data were collected and from which satellite and sensor from 1972 to 2008.

http://esa.snre.umich.edu/resources/LandsatAcquisitionImportInstructions_2010.pdf

12/2010 compiled by K. Bergen (kbergen@umich.edu), M. Gentile & K. von Kluge. *Environmental Spatial Analysis Laboratory, University of Michigan School of Natural Resources & Environment*

ACQUIRING AND IMPORTING LANDSAT DATA

These instructions are for acquiring new **Landsat** data from the U.S. Geological Survey (USGS) and importing/viewing it using ERDAS IMAGINE and ArcGIS software. We will retrieve images from the online database called GloVis. Additionally, instructions for retrieving images from another online database called WIST are included.

New versions of images from past years are also available for order at no cost. For information about the data formats, see **http://landsat.usgs.gov/products_productinformation.php** and **http://landsat.usgs.gov/Landsat_Processing_Details.php**.

Method 1: Using GloVis to Locate and Download Landsat

The Landsat data archive at the U.S. Geological Survey (USGS) Earth Resources Observation and Science (EROS) Center holds an unequaled 36-year record of the Earth's surface and **is available at no cost to users via the Internet**. Users can access and search the Landsat data archive via the Earth Explorer (EE) http://earthexplorer.usgs.gov.
or Global Visualization Viewer (GloVis) http://glovis.usgs.gov web sites.
The Landsat scenes collected by locations within the International Ground Station (IGS) network may be available only from the particular station that collected the scene.

Landsat

The Landsat series of satellites provides the longest continuous record of satellite-based observations. As such, Landsat is an invaluable resource for monitoring global change. The Landsat Program began in early 1972 with the launch of the first satellite in the series. As technological capabilities increased, so did the amount and quality of image data captured by the various sensors onboard the satellites. Landsat satellites can be classified into three groups, based on sensor and platform characteristics.

The first group: Landsat 1 (L1), Landsat 2 (L2), and Landsat 3 (L3), with the *Multispectral Scanner* (*MSS*) sensor and the *Return Beam Vidicon* (*RBV*) camera. The spatial resolution of the *MSS* sensor - 79m, with four bands ranging from the visible blue to the Near-Infrared (NIR) wavelengths. The *MSS* sensor on L3 included a 5-th band in the thermal IR (10.4-12.6 μm.

The L1–L3 *MSS* sensors used a band-naming convention of MSS-4, MSS-5, MSS-6, and MSS-7 for the blue, green, red, and NIR bands, respectively. This designation is obsolete, and to be consistent with the *TM* and *ETM+* sensors, the *MSS* bands are referred to here as Bands 1–4, respectively.

The second and third groups

The second group: Landsat 4 (L4) and Landsat 5 (L5), which carry the *Thematic Mapper* (*TM*) sensor, as well as the *MSS*, on the *Multimission Modular Spacecraft*. This second generation of Landsat satellites marked a significant advance in remote sensing through the addition of a more sophisticated sensor, improved acquisition and transmission of data, and more rapid data processing at a highly automated processing facility.
The *MSS* sensor was included to provide continuity with the earlier Landsat missions, but *TM* data quickly became the primary source of information because the data offered enhanced spatial, spectral, radiometric, and geometric performance over data from the *MSS* sensor. The *TM* sensor has a spatial resolution of 30 m for the six reflective bands and 120 m for the thermal band. Because there are no onboard recorders on these sensors, acquisitions are limited to real-time downlink only.

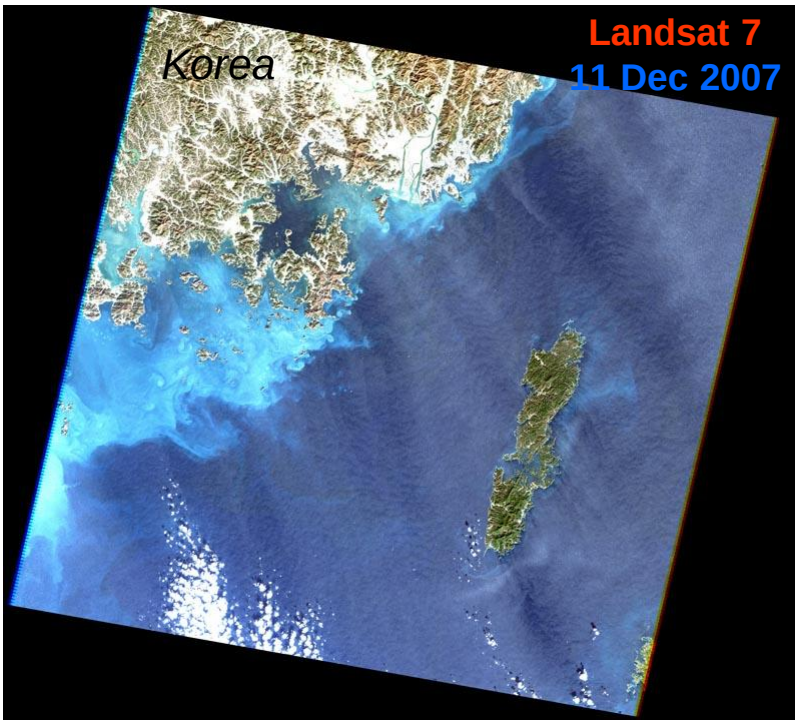
The third group: Landsat 6 (L6) and Landsat 7 (L7), which include the *Enhanced Thematic Mapper* (*ETM*) and the *Enhanced Thematic Mapper Plus* (*ETM+*) sensors, respectively. Landsat 6 failed on launch. The L7 ETM+ sensor has a spatial resolution of 30 m for the six reflective bands, 60 m for the thermal band, and includes a panchromatic (pan) band with a 15 m resolution. (L7 Science Data User's Handbook *http://landsathandbook.gsfc.nasa.gov/handbook.html*

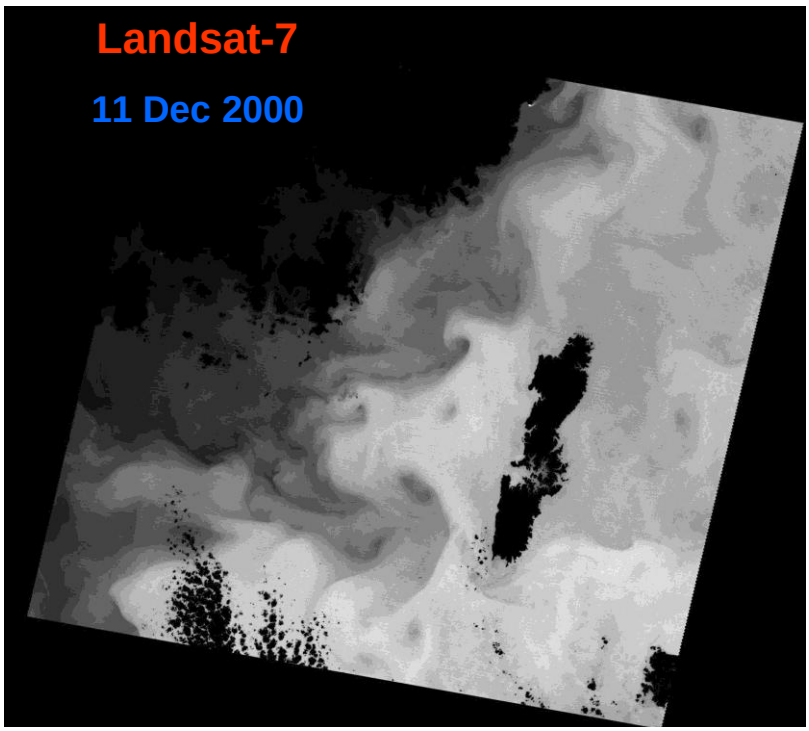
G. Chander, B.L. Markham and D.L. Helder, Summary of current radiometric calibration coefficients for Landsat MSS, TM, ETM+, and EO-1 ALI sensors, Remote Sensing of Environment 113 (2009) 893–903.

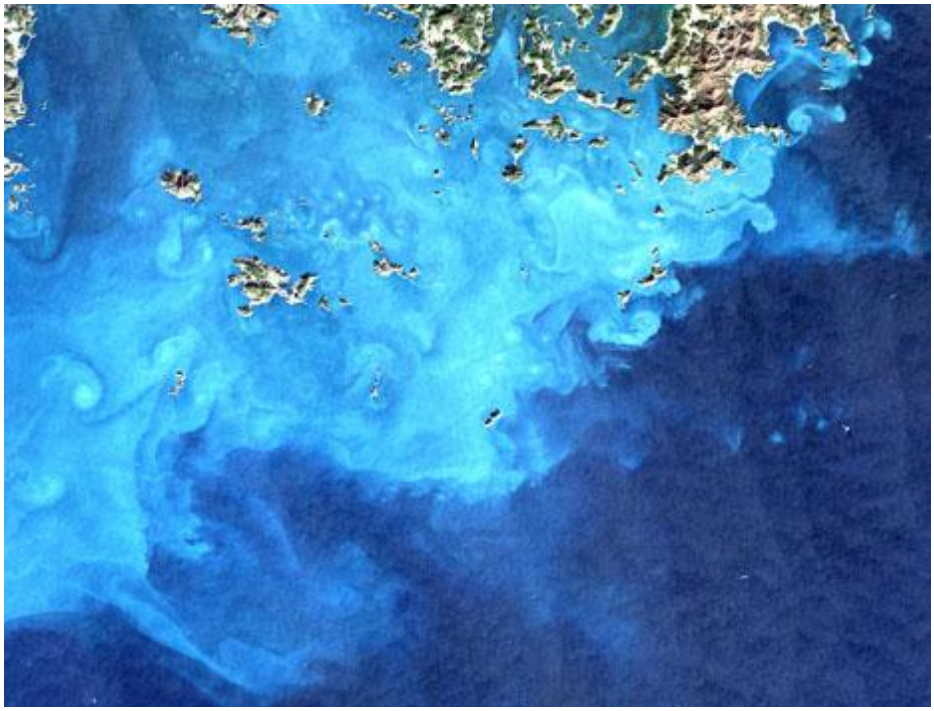
Landsat

Satellite	Sensors	Launch date	Decommission	Altitude km	Inclin deg	Period min	Repeat cycle days	Crossing time (a.m.)
Landsat 1	MSS and RBV	July 23, 1972	January 7, 1978	920	99.20	103.34	18	9:30
Landsat 2	MSS and RBV	Jan 22, 1975	Febr 25, 1982	920	99.20	103.34	18	9:30
Landsat 3	MSS and RBV	Mar 5, 1978	March 31, 1983	920	99.20	103.34	18	9:30
Landsat 4	MSS and TM	July 16, 1982	June 30, 2001	705	98.20	98.20	16	9:45
Landsat 5	MSS and TM	Mar 1, 1984	Operational	705	98.20	98.20	16	9:45
Landsat 6	ETM	Oct 5, 1993	Did not achieve orbit					
Landsat 7	ETM+	April 15, 1999	Operational	705	98.20	98.20	16	10:00
EO-1	ALI	Nov 21, 2000	Operational	705	98.20	98.20	16	10:01

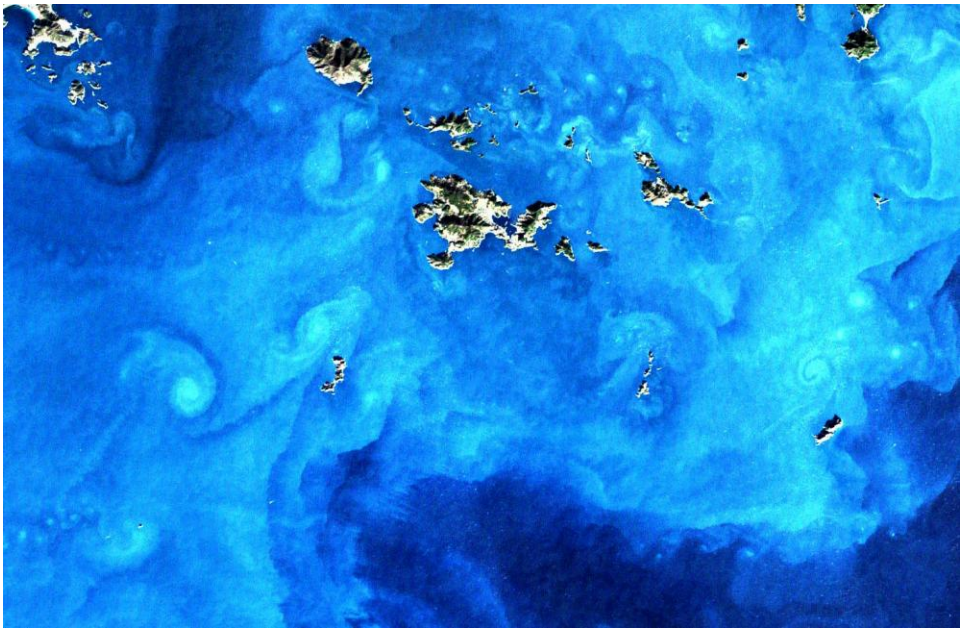
Landsat images were processed by Dr. Vyacheslav Dubina


Korea
Landsat 7
11 Dec 2007

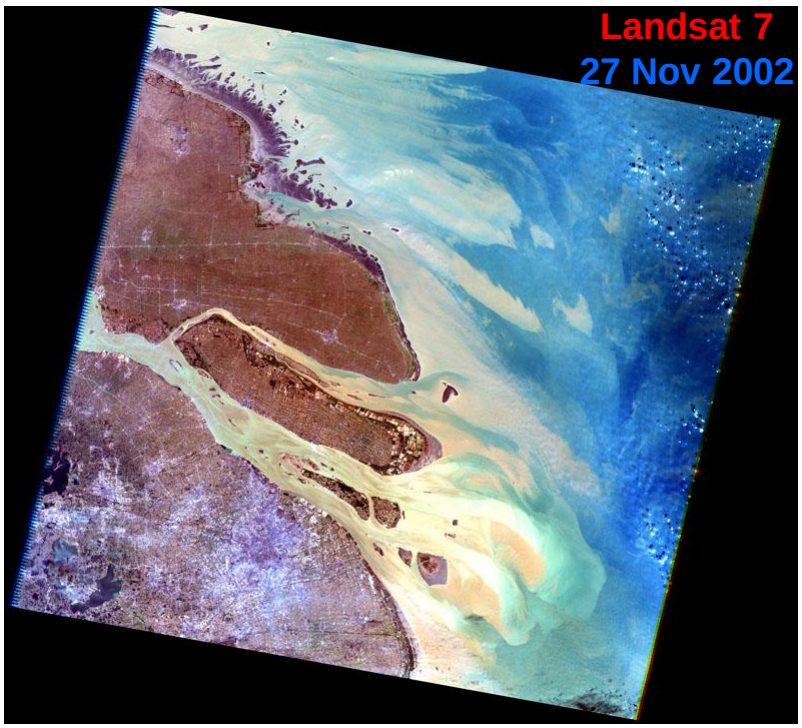

Landsat-7
11 Dec 2000

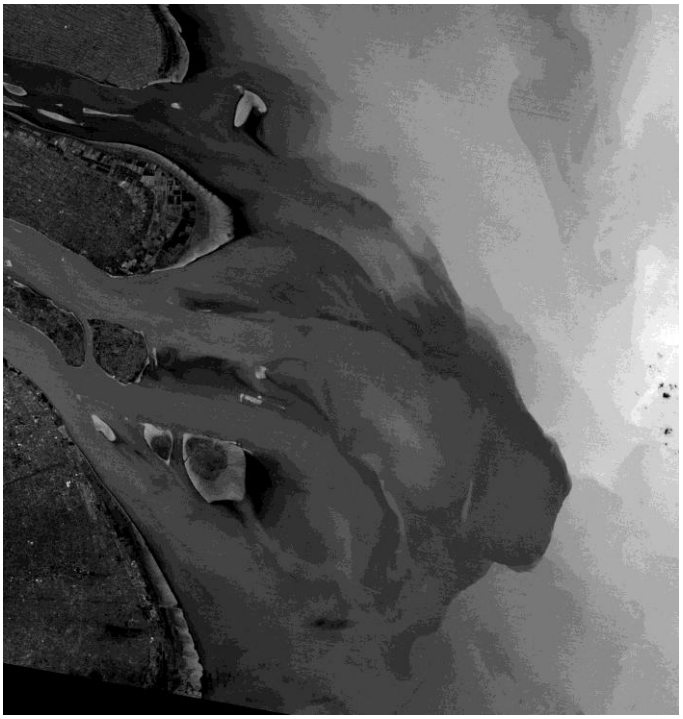


Landsat-7 11 Dectmber 2000



Landsat 7 11 Dec 2000, Farms, foam, wakes





Landsat 7
27 Nov 2002