USGS
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NASA

# Landsat Data Continuity Mission

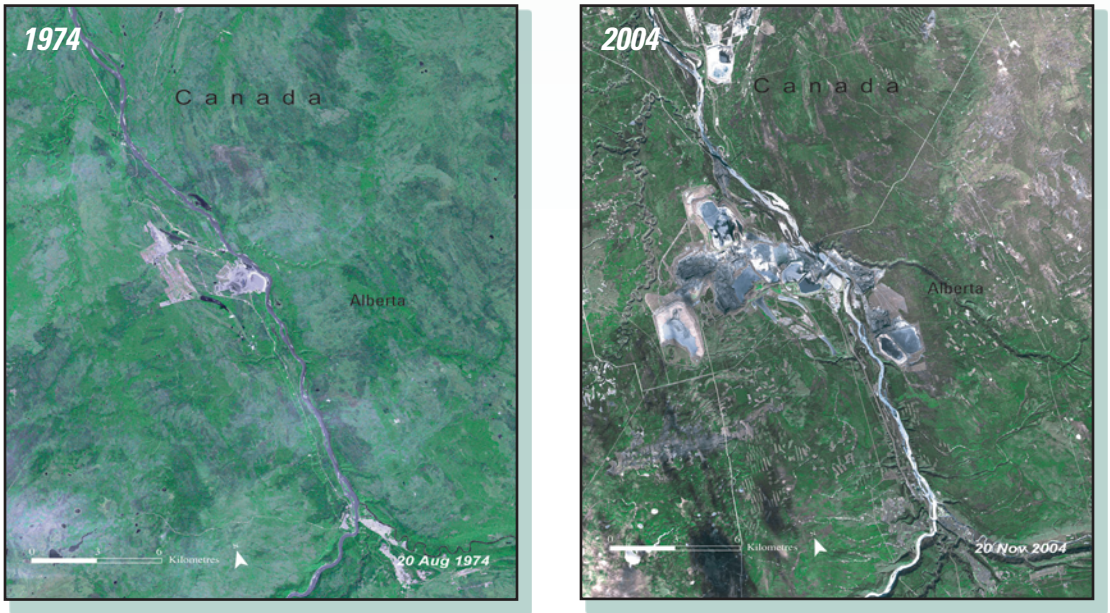
## What Is the LDCM and Why Is It Important?

The Landsat Data Continuity Mission (LDCM) is a partnership between the National Aeronautics and Space Administration (NASA) and the U.S. Geological Survey (USGS) to place the next Landsat satellite in orbit by late 2012. The Landsat era that began in 1972 will become a nearly 45-year global land record with the successful launch and operation of the LDCM. The LDCM will continue the acquisition, archival, and distribution of multispectral imagery affording global, synoptic, and repetitive coverage of the Earth's land surfaces at a scale where natural and human-induced changes can be detected, differentiated, characterized, and monitored over time.

The mission objectives of the LDCM are to (1) collect and archive medium resolution (circa 30-m spatial resolution) multispectral image data affording seasonal coverage of the global landmasses for a period of no less than 5 years; (2) ensure that LDCM data are sufficiently consistent with data from the earlier Landsat missions, in terms of acquisition geometry, calibration, coverage characteristics, spectral characteristics, output product quality, and data availability to permit studies of land-cover and land-use change over time; and (3) distribute LDCM data products to the general public on a nondiscriminatory basis and at a price no greater than the incremental cost of fulfilling a user request. Distribution of LDCM data over the Internet at no cost to the user is currently planned.

## LDCM History

The original LDCM plans called for NASA to purchase data meeting LDCM specifications from a commercially owned and operated satellite system. However, after an evaluation of proposals received from industry, NASA cancelled the Request for Proposals in September 2003. In August 2004, a memorandum from the White House Office of Science and Technology Policy (OSTP) directed Federal agencies to place Landsat-type sensors on the National Polar-orbiting Operational Environmental Satellite System platform. Following an evaluation of the technical complexity of this task, the strategy was adjusted and on December 23, 2005, the OSTP issued a memorandum directing NASA to implement the LDCM in the form of a free-flyer spacecraft carrying an instrument referred to as the Operational Land Imager, or OLI. NASA and the USGS are now implementing the OSTP directive.




*Oil extraction in the Fort McMurray area, Alberta, Canada.*

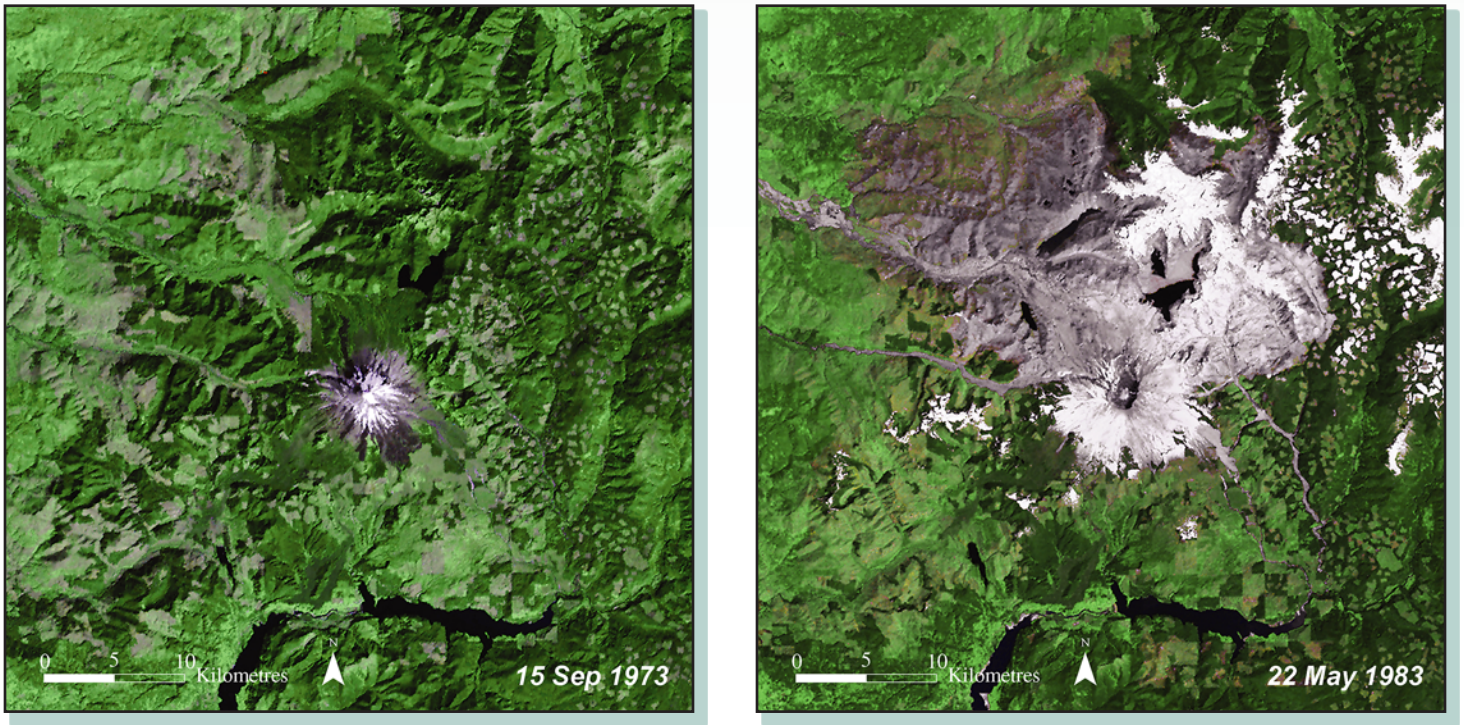
## Implementing the LDCM

The LDCM is planned as a 5-year mission and will include enough fuel for 10 years of operation. NASA and the USGS share responsibility for LDCM implementation. NASA will develop the flight systems including the spacecraft, the instrumentation, the mission-operations element, and the mission launch, and perform on-orbit checkout. The USGS will develop, implement, and operate the ground-data acquisition network and image-processing and archive facilities, and will provide data products to the user community. In addition, the USGS will be responsible for satellite flight operations following launch.

The centerpiece of the LDCM space segment is the OLI. By collecting land-surface data with spatial resolution and spectral band specifications consistent with historical Landsat data, the OLI instrument will advance future measurement capabilities. The OLI will feature two additional spectral channels: an "ultra-blue" band for coastal and aerosol studies, and a band for cirrus cloud detection. A thermal infrared sensor (TIRS) will collect data in two long wavelength bands that will be co-registered with OLI data.

A key feature in the ground segment being planned by the USGS is the provision of high-quality LDCM standard data products. About 400 scenes per day will

| Band number | Band name | Center wavelength (nanometers) | Minimum lower band edge (nanometers) | Maximum upper band edge (nanometers) | Ground resolution (square meters) |
|---|---|---|---|---|---|
| 1 | Coastal aerosol | 443 | 433 | 453 | 30 |
| 2 | Blue | 482 | 450 | 515 | 30 |
| 3 | Green | 562 | 525 | 600 | 30 |
| 4 | Red | 655 | 630 | 680 | 30 |
| 5 | NIR | 865 | 845 | 885 | 30 |
| 6 | SWIR 1 | 1,610 | 1,560 | 1,660 | 30 |
| 7 | SWIR 2 | 2,200 | 2,100 | 2,300 | 30 |
| 8 | Panchromatic | 590 | 500 | 680 | 15 |
| 9 | Cirrus | 1,375 | 1,360 | 1,390 | 30 |
| 10 | TIR 1 | 10,800 | 10,300 | 11,300 | 120 |
| 11 | TIR 2 | 12,000 | 11,500 | 12,500 | 120 |




*Eruption of Mount St. Helens, Washington, USA.*

be imaged and processed over global land and coastal areas. All acceptable scenes will be terrain corrected to a geographic projection and made available at no cost to users via the Internet. The planned specifications for the LDCM standard products are listed in the following table.

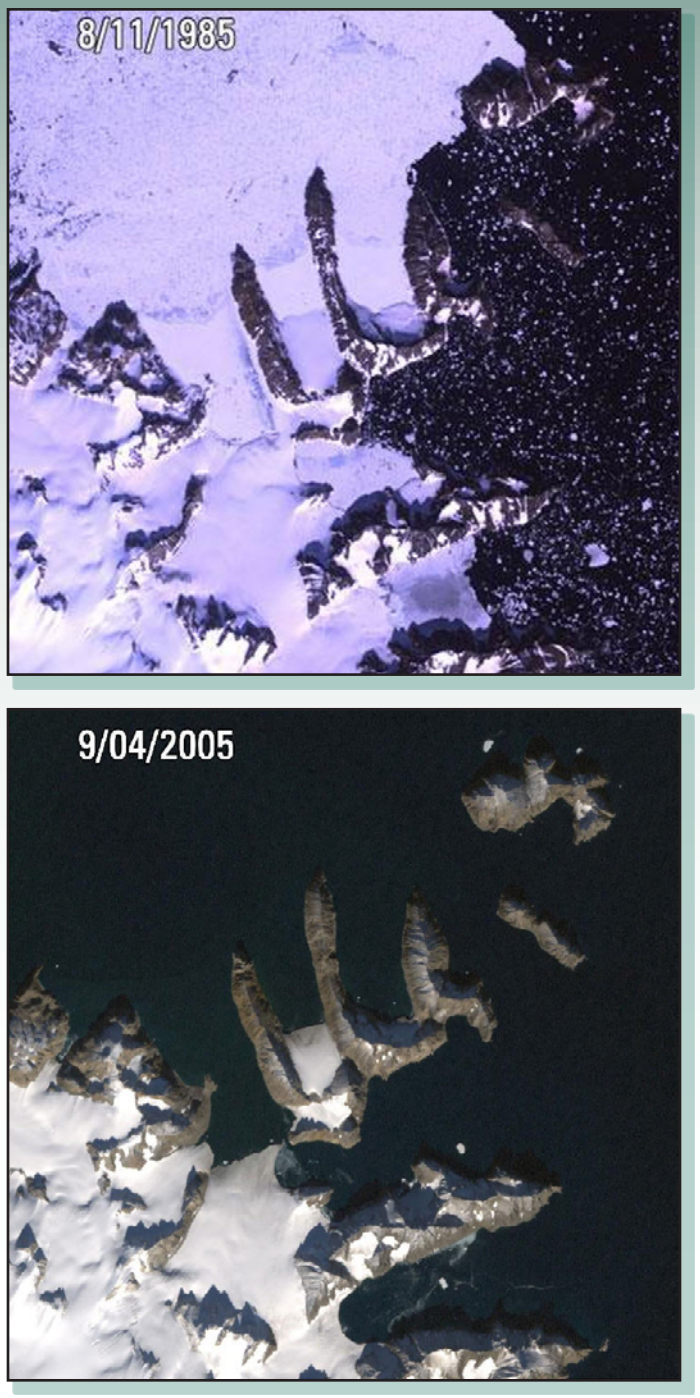
| Characteristic | Specification |
|---|---|
| Pixel size | 15 meters/30 meters/30 meters (panchromatic/ multi-spectral/thermal) |
| Media type | Web-enabled (no cost electronic distribution) |
| Product type | L1T |
| Output format | GeoTIFF |
| Map projection | UTM (Polar Stereographic for Antarctica) |
| Datum | WGS84 |
| Orientation | North up |
| Resampling | Cubic convolution |
| Accuracy | ~12 meters 90 percent (circular error) global |

## Landsat Science Team

An important component of the LDCM is the Landsat Science Team, funded by the USGS and led by the USGS and NASA. The team works to forward the objectives of LDCM and to contribute to the integration of LDCM data with past, present, and future Landsat and other remotely sensed data. The team also provides science support on issues critical to the success of the mission including data acquisition, product access and format, and science opportunities.

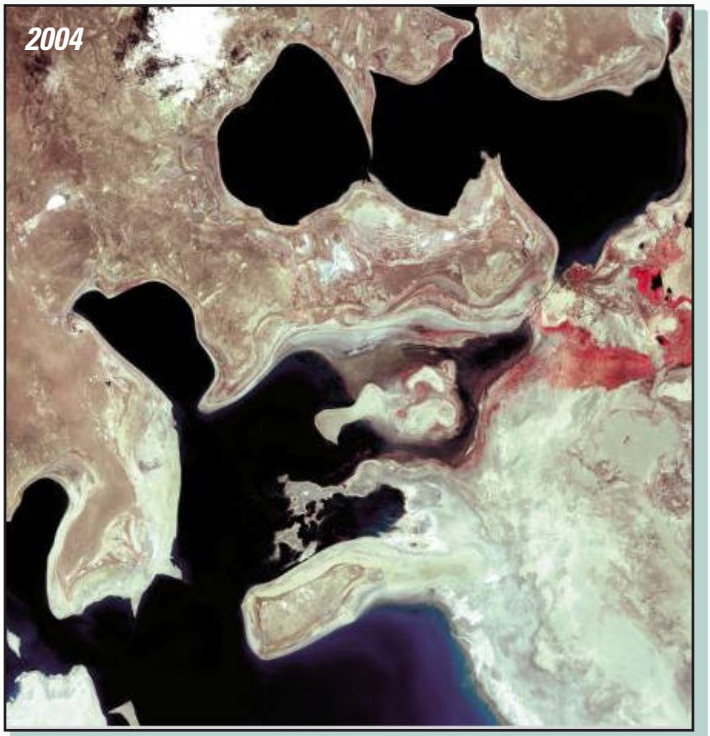
Team members and their affiliations are:

- Richard Allen, University of Idaho
- Martha Anderson, U.S. Department of Agriculture, Agricultural Research Service
- Alan Belward, Joint Research Center of the European Commission
- Robert Bindschadler, NASA Goddard Space Flight Center
- Warren Cohen, U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station
- Feng Gao, Earth Resources Technology
- Sam Goward, University of Maryland
- Dennis Helder, South Dakota State University
- Eileen Helmer, U.S. Department of Agriculture, Forest Service, International Institute of Tropical Forestry
- Rama Nemani, NASA Ames Research Center
- Lazaros Oreopoulos, University of Maryland-Baltimore County
- John Schott, Rochester Institute of Technology




*"Warming Island," Greenland 1985–2005.*

- Prasad Thenkabail, U.S. Geological Survey
- Eric Vermote, University of Maryland
- James Vogelmann, U.S. Geological Survey
- Curtis Woodcock, Boston University
- Michael Wulder, Canadian Forest Service
- Randolph Wynne, Virginia Polytechnic Institute


*Aral Sea, Kazakhstan, 1973–2000.*

## Looking Forward

The U.S. Government ultimately seeks to ensure long-term continuity of Landsat-like data. As stated in the December 2005 OSTP memorandum: "Concurrent with the actions cited, the National Science and Technology Council, in coordination with NASA, DOI/USGS, the Executive Office of the President, and other agencies and offices as appropriate, will lead an effort to develop a long-term plan to achieve technical, financial, and managerial stability for operational land imaging in accord with the goals and objectives of the U.S. Integrated Earth Observation System." Toward this end, the OSTP released a plan in August 2007 for a National Land Imaging Program that includes calling for operational moderate resolution land imaging.

**For information on LDCM and to receive updates and newsletters, visit http://ldcm.usgs.gov, http://ldcm.nasa.gov/, or contact:**

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