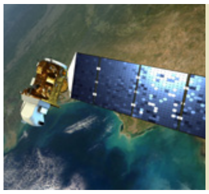
National Aeronautics and Space Administration

Landsat Data Continuity Mission
Continuity in Global Land Observation

A revolution began with a roar in 1972, when the first Landsat satellite blasted into orbit around the Earth carrying what were then experimental land-observing instruments. 40 years later and still cutting edge, the Landsat Data Continuity Mission (LDCM; aka Landsat 8) is poised to expand, improve, and advance this unique and highly beneficial long-term record of Earth's landscapes, while maintaining the high-value heritage of its seven Landsat satellite predecessors.

Landsat sensors enable us to see beyond what our human eyes alone can see, not only because the satellite's perspective on Earth comes from an orbit of 705 kilometers (438 miles), but also because the sensors record light reflected from the Earth's surface in specific infrared wavelengths as well as visible ones. With help from Landsat we can monitor the cultivation of our food crops, quantify our precious water resources as they ebb and flow, and track deforestation globally. Landsat data constitute a key ingredient in decision making for agriculture, climate research, disaster mitigation, ecosystems, forestry, human health, urban growth, and water management. What was unknown before 1972 has become an essential part of our national infrastructure.

LDCM holds a unique place in the federal government's constellation of satellites. Long-term consistency in data collection, image format, geometry, moderate spatial resolution, calibration, global coverage and spectral characteristics at the scale of human interactions with our landscapes remain hallmarks of this program.



ABOUT LANDSAT

Landsat satellites provide an unparalleled record of Earth's varying landscapes. Landsat's 30-meter resolution is ideal for measuring human impacts on the land. The consistency of Landsat's digital image data from sensor to sensor and year to year makes it possible to trace land cover changes from 1972 to the present.

Landsat Data Continuity Mission

Improving and expanding an unparalleled record of Earth's changing landscapes

Evolutionary Advances

Like previous Landsat satellites, LDCM will collect many layers of data in specific segments of the visible and invisible light spectrum. The satellite will carry two instruments: the **Operational Land Imager (OLI)** and the **Thermal Infrared Sensor (TIRS)**. LDCM improves technical performance over its predecessors. One improvement will be greater sensitivity. Landsat 7 measures the amount of reflected light on a scale of 0 to 255 (8 bits), while LDCM will measure light on a scale of 0 to 4,095 (12 bits). This improvement will enable researchers to better characterize land cover and land use on a global scale.

OLI was built by Ball Aerospace & Technology Corp. It will measure reflected light in eight parts of the light spectrum, including visible light, near infrared, and shortwave infrared. Those measurements will have a resolution of 30 meters per pixel. OLI also includes a ninth panchromatic band, which measures all visible light at 15 meters per pixel. OLI's mode of collecting data results in a more sensitive instrument and provides improved land surface information with fewer moving parts than previous Landsat sensors.

TIRS was built at NASA Goddard Space Flight Center to continue thermal infrared measurements sensitive to surface temperature. These measurements will support emerging applications such as tracking water consumption in arid regions. TIRS records two different wavelengths of thermal infrared light at a resolution of 100 meters per pixel—enough detail to monitor a single agricultural field.

Spacecraft and Rocket

Orbital Sciences Corp. is assembling the LDCM spacecraft under contract to NASA. LDCM will launch aboard a United Launch Alliance Atlas-V Rocket into an orbit from pole to pole around the Earth at 705 kilometers altitude. The spacecraft will take about 90 minutes to complete one orbit, revisiting the same spot on Earth every 16 days.

The Role of Moderate Resolution

The extremely high volumes of data that a high-resolution satellite would produce if it acquired global measurements would exceed the capacity of today's space and ground communication systems. For that reason, moderate-resolution systems such as Landsat fit a special niche between very high-resolution systems useful for capturing narrow-view images of the Earth and low resolution systems that do not capture sufficient detail to detect "human scale" features on the Earth.

Strength in Partnership

LDCM is made possible by a partnership between NASA and USGS that was built and strengthened during previous Landsat missions. NASA leads the design and building of the spacecraft and its two sensors; calibrates the instruments before launch to ensure accurate measurements; integrates all of the components of the satellite so they work together; and launches the spacecraft. USGS develops and operates the ground stations and the network that record and transport data from the satellite; archives and distributes the data to the public (at no cost); operates the satellite; and calibrates the instruments after launch. USGS also leads the LDCM Science Team. USGS plans to rename LDCM as Landsat 8 following launch.

Further Reading

NASA Landsat: http://www.nasa.gov/landsat

Landsat Science: http://landsat.gsfc.nasa.gov

USGS Landsat: http://landsat.usgs.gov/

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