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Note: Any use of trade, firm, or product names is for descriptive purposes only and does not imply endorsement by the U.S. Government.

Landsat Mission News

Welcome Landsat 8!

Since 1972, Landsat satellites have collected information about Earth from space. On February 11, 2013, the Landsat Data Continuity Mission (LDCM) was launched successfully to continue the repetitive acquisition of high quality multispectral data of the Earth's surface.   Since launch, checkout activities have included systems initialization and calibration activities, directing the spacecraft to perform orbit maneuvers, and moving into operational orbit (WRS-2).

On May 30, 2013, the checkout period was completed, and the USGS officially became the operational manager of the Mission during an official ceremony. The Landsat Data Continuity Mission will henceforth be known as **Landsat 8**. Landsat 8 is designed for a 5-year lifespan, and carries 10 years of fuel onboard.

Data products from Landsat 8 are now available for download to all users at no charge from EarthExplorer (http://earthexplorer.usgs.gov), GloVis (http://glovis.usgs.gov), and the LandsatLook Viewer (http://landsatlook.usgs.gov)!

Landsat Product Information

Landsat 8 Data Product Details

The data products available from Landsat 8 are processed to be consistent with Landsat 1 through 7 data products.   The [Operational Land Imager (OLI)](#) and [Thermal Infrared Sensor (TIRS)](#) instruments onboard are providing over 400 new scenes per day.

Processing details include:

- GeoTIFF output format
- Cubic Convolution (CC) resampling method
- 30-meter (OLI multispectral); 15-meter (OLI panchromatic); 100-meter (TIRS) pixel sizes
- Universal Transverse Mercator (UTM) map projection (Polar Stereographic in Antarctica)
- World Geodetic System (WGS) 84 datum
- MAP (North-up) image orientation
- Data products are 16-bit

Landsat 8's additional bands will create a larger data file size, at approximately 1 GB with compression. (See http://landsat.usgs.gov/band_designations_landsat_satellites.php for band designations for all Landsat sensors). More information can be found at http://landsat.usgs.gov/LDCM_DataProduct.php.

Product News

New Multispectral Scanner (MSS) Data Available

The workhorse of the Landsat 5 mission was the Thematic Mapper (TM) instrument. After the TM sensor failed in November 2011, the Multispectral Scanner (MSS) instrument was brought back online a few months later. The MSS had not acquired data for over a decade.

While the MSS was acquiring data, the Landsat ground station was crafting new capabilities to ingest the raw instrument data. The data have recently been successfully ingested and are available from [EarthExplorer](#), [GloVis,](#) and [LandsatLook Viewer](#). More details on the **new** MSS data are available at http://landsat.usgs.gov/NewMSSProduct.php.

Old Metadata Format Removed

Since August 2012, all Landsat products have included a new metadata format to align with operational data from the Landsat Data Continuity Mission/Landsat 8. The historic metadata file was included to allow users enough transition time to adjust to the new format.

Although a number of scenes will continue to have both metadata files until the data is removed from Downloadable status and reprocessed, Landsat scenes processed after April 29, 2013 will no longer have the "*_MTLold.txt" file.

Landsat 8 Quality Assessment Band Information

The new Quality Assessment (QA) band is an important addition to Landsat 8 data files. Each pixel in the QA band contains a decimal value that represents bit-packed combinations of surface, atmosphere, and sensor conditions that can affect the overall usefulness of a given pixel.

Used effectively, QA bits improve the integrity of science investigations by indicating which pixels might be affected by instrument artifacts or subject to cloud contamination. Details about the Landsat 8 QA band can be found at http://landsat.usgs.gov/L8QualityAssessmentBand.php.

Landsat 8 Reflectance and Radiance Conversions

Standard Landsat 8 data products are delivered in 16-bit unsigned integer format. To match data products from Landsat 1 through Landsat 7, the Landsat 8 data can be rescaled to the top-of-atmosphere (TOA) reflectance and/or radiance using radiometric rescaling coefficients provided in the product metadata file (MTL file). The MTL file also contains the thermal constants needed to convert TIRS data to the at-satellite brightness temperature.

Conversion formulas to TOA Radiance, TOA Reflectance, and At-Satellite Brightness Temperature are located at http://landsat.usgs.gov/Landsat8_Using_Product.php.

Questions about Landsat 8?

Questions about Landsat 8, the Landsat Missions, or Landsat data products can be directed to Landsat Customer Services: custserv@usgs.gov.

Tips and Tricks

Learning More about Landsat Surface Reflectance Climate Data Records

Landsat Surface Reflectance products are available on-demand from the archive of Landsat 5 Thematic Mapper (TM) and Landsat 7 Enhanced Thematic Mapper Plus (ETM+) data. The 30+ year archive of data enables the generation of Climate Data Records (CDRs) to support land surface change studies and the creation of other geophysical and biophysical parameters.

Landsat surface reflectance CDRs are generated using the Landsat Ecosystem Disturbance Adaptive Processing System (LEDAPS), originally developed through a National Aeronautics and Space Administration (NASA) Making Earth System Data Records for Use in Research Environments (MEaSUREs) grant by NASA Goddard Space Flight Center (GSFC) and the University of Maryland (Masek et al., 2008). The software is an adaptation of the Moderate Resolution Imaging Spectroradiometer (MODIS) atmospheric correction routines to process Level-1 Landsat TM or ETM+ data.

Water vapor, ozone, geopotential height, aerosol optical thickness, and digital elevation data are used with Landsat data as inputs to the Second Simulation of a Satellite Signal in the Solar Spectrum (6S) radiative transfer model to generate top of atmosphere (TOA) reflectance, surface reflectance, brightness temperature, and masks for clouds and cloud shadows. The results are bundled and delivered as the Landsat surface reflectance CDR product.

Landsat Surface Reflectance CDRs are available to download from EarthExplorer (http://earthexplorer.usgs.gov). Additional information about Surface Reflectance CDR's can be found at http://landsat.usgs.gov/documents/cdr_sr_product_guide.pdf.

Masek, J.G., Huang, C., Wolfe, R., Cohen, W., Hall, F., Kutler, J., and Nelson, P. (2008). North American forest disturbance mapped from a decadal Landsat record. *Remote Sensing of Environment.* 112:2914-2926.

Landsat Image of Interest

LDCM Long Swath Visualization

On April 19, 2013, the Landsat Data Continuity Mission passed over one long swath from Russia to southern Africa: http://www.nasa.gov/mission_pages/landsat/news/russia-south-africa.html.

Our mission partners at NASA crafted a beautiful fly-over that includes this image of the Ethiopian Highlands (Lake Tana is in the upper right).