



Landsat Update

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Landsat Mission News

Landsat 8 Satellite Recovered from Safehold
Landsat Long Term Acquisition Plan Changes

Product News

Upcoming: Landsat 8 Data Reprocessing
Landsat 7 Thermal Band Calibration Update Made

Tips and Tricks

Explaining ESUN and Landsat 8

Meetings

Sustainable Land Imaging Users Forum
Other Conferences

Landsat Image of Interest

Flooding in Cambodia

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

Landsat 8 Satellite Recovered from Safehold

On September 19, 2013 at 15:38 CDT, the Landsat 8 satellite experienced an unplanned transition to safe hold condition following an attitude control anomaly. This condition suspended the collection of science data until 11:07 CDT on September 21, 2013.

Post-anomaly calibration checks detected a systematic change in the alignment between the OLI and TIRS sensors. No change in the OLI alignment to the spacecraft attitude control system was apparent so the shift is being attributed to the TIRS instrument.

On September 27, 2013, a Calibration Parameter File (CPF) update was put into production to correct for registration performance degradation caused by the safe hold event. Details about the CPF update are available on http://landsat.usgs.gov/calibration_notices.php.

Landsat Long Term Acquisition Plan Changes

Changes will be made to the Landsat Long Term Acquisition Plan (LTAP) during the month of November 2013.

The Landsat 7 satellite will discontinue routine night, ocean, and Antarctica data collection campaigns, and will collect only long intervals of data over continental land masses. This plan will increase the proportion of land imaged every day from 69 percent to 90 percent of acquisition opportunities. The increased number of acquisitions over land masses will provide more opportunities to fill data gaps caused by the Scan Line Corrector failure (SLC-off) as well as cloud cover. This change will also mitigate risks to the life expectancy of the Enhanced Thematic Mapper Plus (ETM+) sensor.

The improved dynamic range and the additional bands of the Operational Land Imager (OLI) and Thermal Infrared Sensor (TIRS) make Landsat 8 data the preference for snow/ice and water imaging. Because the satellite is also able to acquire significantly more data, it will be tasked to collect oceanic islands, ocean, and night time scenes. Additional acquisitions over the Antarctic and Arctic are also planned.

Special acquisition requests for either satellite can still be submitted by contacting landsat@usgs.gov; however, scheduling priorities will be given to hazards or disasters.

Product News

Upcoming: Landsat 8 Data Reprocessing

In early 2014, all Landsat 8 data that have been acquired will be reprocessed using updated calibration parameters for Thermal Infrared Sensor (TIRS) and Operational Land Imager (OLI) data. During this time, all online products will be purged and the online inventory will be re-populated through forward processing while reprocessing proceeds in reverse chronological order.

The calibration changes will affect both TIRS bands and all of the OLI bands on Landsat 8.

The OLI radiance-to-reflectance conversion coefficients will be adjusted for the cirrus band (Band 9) to account for on-orbit performance. The prelaunch derived coefficients were calculated using heliostat measurements, which were expected to be in error because little sunlight reaches the ground at these wavelengths. This adjustment changes the reflectance by about 7 percent in the cirrus band. Additionally, the precision of the other spectral bands' radiance-to-reflectance conversion coefficients will be increased, changing the reflectance by up to 0.3 percent.

Relating to TIRS thermal band calibration, prior to the early-2014 update, users may subtract 0.29 W/(m² sr μm) from every TIRS Band 10 calibrated radiance value, and 0.51 W/(m² sr μm) for every TIRS Band 11 calibrated radiance value to provide values closer (on average) to the actual radiances. The equations to convert from calibrated product pixel values to calibrated radiance values can be found here (http://landsat.usgs.gov/Landsat8_Using_Product.php). These numbers are based on comparisons to surface water temperatures and correspond to a -2.1 K correction (Band 10) and a -4.4 K correction (Band 11) for a 295 K brightness temperature. The rms variability in the required adjustment is roughly 0.12 W/(m² sr μm) (0.8 K) for Band 10 and 0.2 W/(m² sr μm) (1.75 K) for Band 11. Studies indicate that the errors are scene dependent and probably related to out-of-field response in the TIRS instrument.

Given the larger uncertainty in the Band 11 values, users should work with TIRS Band 10 data as a single spectral band (like Landsat 7 Enhanced Thematic Mapper Plus (ETM+)) and should not attempt a split-window correction using both TIRS Bands 10 and 11 to retrieve surface temperature values.

On November 27, 2013, the relative gains of single detectors on the edges of each OLI Sensor Chip Assembly (SCA) will be updated to correct slight striping that is typically not visible. This update will affect all OLI spectral bands.

Landsat 7 Thermal Band Calibration Update Made

Effective October 1, 2013, the calibration of the Landsat 7 Enhanced Thematic Mapper Plus (ETM+) Band 6 was updated to correct a bias error that had been present in all thermal data since the last calibration update in 2010.

Vicarious calibration teams detected a bias error of 0.036 ($W/(m^2 \text{ sr } \mu\text{m})$) that causes overestimation of top-of-atmosphere (TOA) temperatures by approximately 0.26 Kelvin (K) at 300K. Parameters within the Calibration Parameter File (CPF) have been adjusted to correct for this bias error.

All data processed by the USGS EROS Center from October 1, 2013 forward are correctly calibrated within 0.4K at 300K using updated CPF coefficients. Users can correct for the bias error themselves by subtracting 0.036 $W/(m^2 \text{ sr } \mu\text{m})$ from the TOA radiance product for data products processed between January 1, 2010 and September 30, 2013.

More details about this update can be found at http://landsat.usgs.gov/science_L7_Cal_Notices.php.

Tips and Tricks

Explaining ESUN and Landsat 8

A number of science users have contacted us asking how to find the solar exoatmospheric spectral irradiance (ESUN) values for Landsat 8 OLI data.

ESUN values are not provided for Landsat 8 data because they are not required for converting data to reflectance. Landsat 8's Operational Land Imager (OLI) adopted two independent National Institute for Standards and Technology (NIST) traceable radiance and reflectance calibration methods. The Landsat 8 metadata file provides coefficients necessary to convert digital numbers (DNs) directly to radiance and reflectance from the quantized and calibrated Digital Numbers (DNs) of the product (see http://landsat.usgs.gov/Landsat8_Using_Product.php). Thus, ESUN values are not required for reflectance conversion.

Relative Spectral Response (RSR) of the OLI spectral bands can be found on http://ldcm.gsfc.nasa.gov/spacecraft_instruments/oli_band_average.html and used along with the user's preferred solar spectrum to calculate ESUN values corresponding to Landsat 8 OLI bands. (NOTE: ESUN values calculated from RSRs were not used for OLI calibration).

Meetings

December 4, 2013

Sustainable Land Imaging Users Forum

NASA Goddard – Greenbelt, MD

On December 4, the U.S. Geological Survey (USGS) and NASA will host an event in which leadership from both agencies will provide details about how user needs will be assessed to help inform NASA's Sustainable Land Imaging Program. User requirements are a critical source of information used as input to help inform the design and implementation of future spaceborne systems intended to provide global, continuous Landsat-quality visible to shortwave infrared and thermal infrared measurements for at least the next 25 years.

The USGS has been developing a structured methodology for acquiring, cataloging, maintaining and evaluating user requirements for Earth observations through its Land Remote Sensing Program, which manages the USGS contributions to the joint efforts of USGS and NASA for the Landsat program.

The Users Forum will feature the methodologies and approaches the USGS is utilizing to acquire and evaluate user requirements and will present some findings and evaluations that can be applied to design considerations for the development of the future architecture. The forum will include presentation of methods and preliminary findings, and will offer opportunities for feedback with regard to the approach and requirements gathered to date. The requirements component will be described in the context of our upcoming planning timeline and identify opportunities and processes for providing input into our planning.

This is a notice of a meeting, not a solicitation of any kind.

October 29-31, 2013

Landsat Science Team Meeting

USGS EROS – Sioux Falls, SD

Agenda and presentations are posted http://landsat.usgs.gov/science_LST_Team_Meetings.php

December 9-13, 2013

American Geophysical Union (AGU)

San Francisco, California

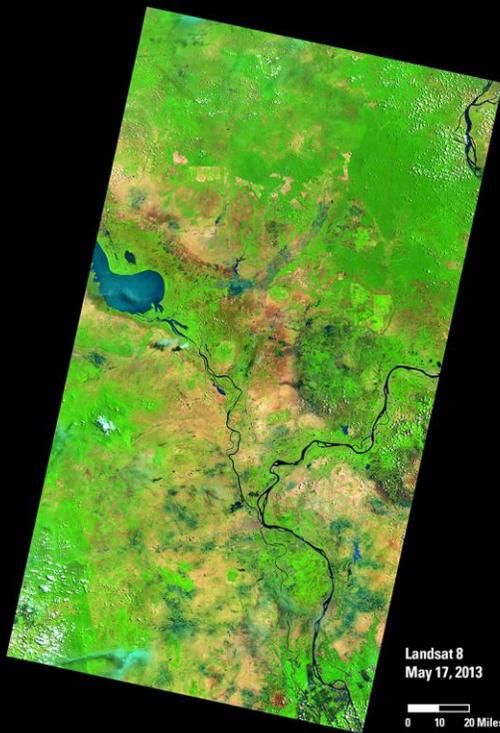
December 10-12, 2013

Cal/Val Technical Interchange Meeting (TIM)

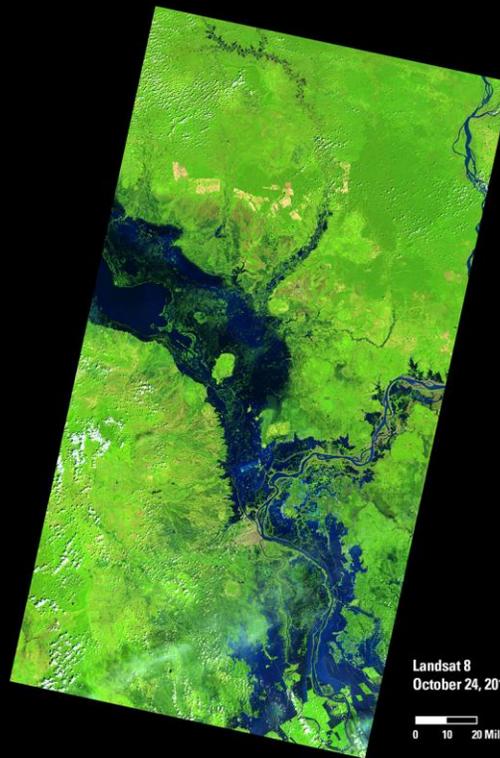
USGS EROS, Sioux Falls, South Dakota

Landsat Image of Interest

Flooding in Cambodia



Landsat 8
May 17, 2013



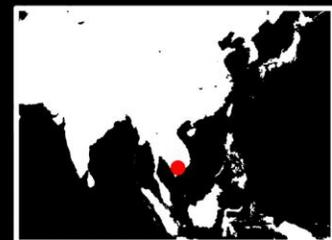
Landsat 8
October 24, 2013

Flooding in Cambodia

In October 2013, heavy seasonal rains were followed by Typhoon Nari to create substantial flooding along the Mekong and Tonlé Sap Rivers in Cambodia in Southeast Asia. The flood affected over a half million people, and over 300,000 hectares (approximately ¾ million acres) of rice fields are believed to have been destroyed.

These images show the drastic landscape change between May 17, 2013, and October 24, 2013. Floodwaters remain high, impacting all aspects of life in the area.

The capital city of Phnom Penh can be seen just south of the image center.



U.S. Department of the Interior
U.S. Geological Survey

This and other Landsat Images of Interest can be viewed and downloaded from <http://landsat.usgs.gov/gallery.php>.