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Deadline June 20, 2014

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

Increasing the Landsat 8 Daily Imaging Rate

During the 2014 Northern Hemisphere growing season, the daily imaging rate will gradually increase to optimize Landsat 8's science data collection.

An average of 550 images per day have been collected since operations began on May 30, 2013. The collection rate will be incrementally increased to approximately 650 images per day, and will continue at a conservative rate until all day-lit descending land images are scheduled or until any indication of a ground system limit is identified.

After the 2014 Northern Hemisphere growing season, the daily collection rate will be set to the optimal daily imaging rate established by the study.

Product News

Landsat 8 Thermal Infrared Sensor (TIRS) Update

During the early on-orbit period of Landsat 8, ground-based measurements indicated a significant error in the radiance produced from the Thermal Infrared Sensor (TIRS), especially in Band 11.

After several months of analysis, the NASA TIRS team suspected a stray light issue with the sensor. Scans of the moon by the TIRS instrument have confirmed this. Users were notified of the issue through the Landsat 8 Calibration Notices (https://landsat.usgs.gov/calibration_notices.php) and the USGS Landsat Updates (http://landsat.usgs.gov/about_Landsat_Updates.php), starting in August 2013.

Because of this issue, users currently cannot fully exploit the capability of the TIRS instrument. In particular, the "split-window" correction technique to retrieve surface temperature cannot be used due to anomalies in Band 11. However, Band 10, the shorter wavelength TIRS band, can be used with a radiative transfer model and emissivity parameters to retrieve surface temperature. This single-band radiative transfer model technique is used with historical Landsat Thematic Mapper (TM) data and with Enhanced Thematic Mapper Plus (ETM+) data, which is still acquired daily from Landsat 7.

USGS and NASA scientists are working together to characterize the problem, and several approaches to characterize and correct for the stray light contamination are under investigation. Each of these exploratory approaches has pros and cons and none have been proven to be effective in a wide variety of scenes. As investigations continue, notices will be posted to the Landsat Mission Headlines and in future issues of the Landsat Update.

Description

During the early on-orbit period of Landsat 8, ground-based measurements indicated a significant error in the radiance produced from the TIRS. After collecting additional ground measurements through the summer of 2013, this error was estimated to be 0.29 W/m2/sr/mm for Band 10 and 0.51 W/m2/sr/mm for Band 11.

All errors showed that TIRS reported a higher radiance than the ground measurements, as shown in the left graph of Figure 1. The right graph shows the results after accounting for this average radiance error, which is the calibration adjustment that was implemented for reprocessing in February 2014. The adjustment accounts for the apparent bias, but there remains a significant amount of variance, especially within Band 11.

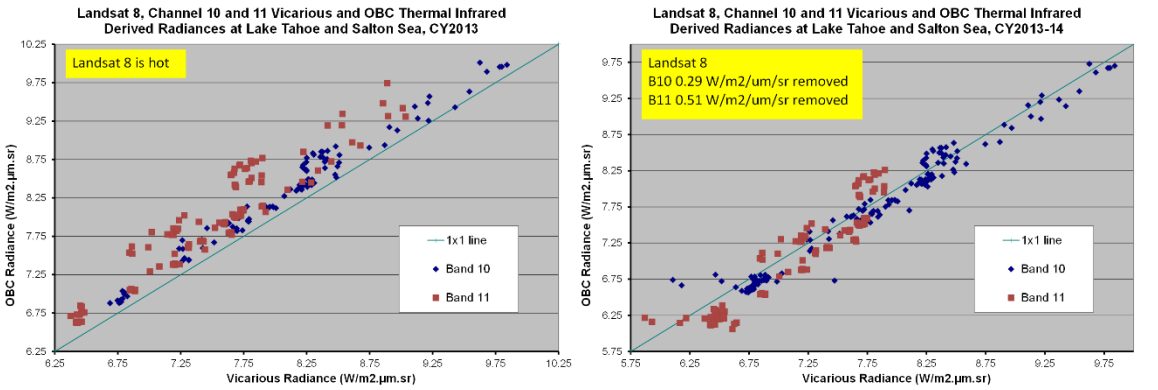


Figure 1: Thermal band errors (left graph) prior to calibration adjustment and (right graph) after calibration adjustment

Also during the early orbit period, the image in Figure 2 was acquired over Lake Superior. This image illustrates that the calibration appears to change (shown with red arrows) with the along-track TIRS scan across the lake. This is a good example of the difficulty in eliminating the banding issues that were observed during this time period.

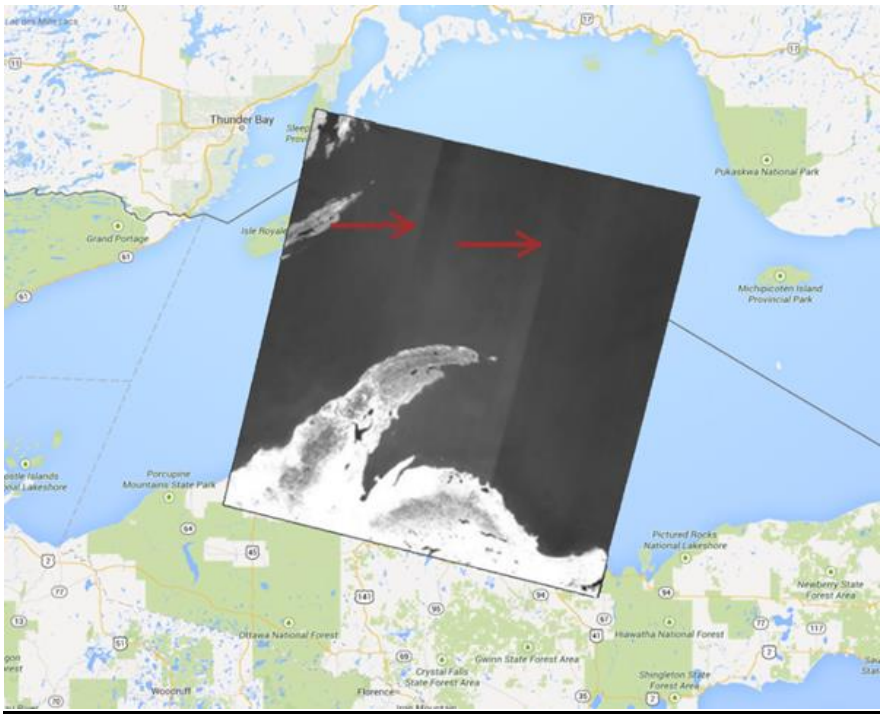


Figure 2: TIRS image of Lake Superior showing apparent time-varying errors

After several months of struggling to get these errors corrected, the TIRS team began to suspect a stray light issue with the sensor. In an attempt to prove or disprove this theory, the TIRS team worked with the flight operations team to turn on TIRS during the slew from Earth pointing to moon pointing.

During these scans, an image of the moon was seen in the TIRS focal plane well before the detectors should have seen the moon. This supported the theory that there was a stray light issue. Additional work was done to design further lunar scanning in order to better quantify the amount of stray light that was affecting the TIRS imagery. The lunar scanning is shown in Figure 3. The gray lines indicate the angle between the TIRS boresight and the moon where there was no ghost visible in the TIRS detectors. The blue lines indicate where a lunar ghost was observed somewhere within the TIRS focal plane.

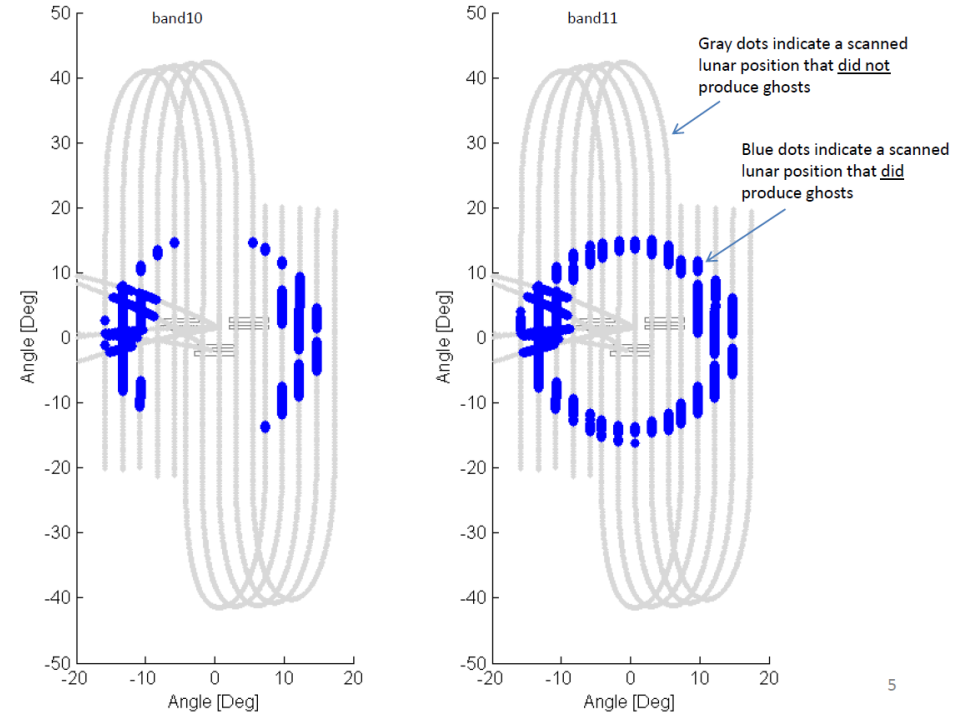


Figure 3: TIRS special lunar scan to characterize the stray light issue

The additional amount of stray light observed in Band 11 is consistent with previous observations of variation in the accuracy of the imagery based on ground measurements and the larger amount of banding. There is little doubt that the errors observed in the current thermal band data are caused by stray light.

Based on the lunar scans, a rough model of the stray light is being put together. However, many assumptions need to be made to fill in between the sparse sampling of the lunar scans.

Figure 4 shows one such model for a single detector sample in the upper middle portion of a TIRS scene (Lake Tahoe). The blue regions outside of the TIRS scene indicate the ghosting region that affects the single detector sample. In this example, a Geostationary Operational Environmental Satellite (GOES) image is used to estimate how much stray light affects the ground measurements for the Lake Tahoe site. Using this somewhat basic approach, 50 to 70 percent of the errors are estimated and removed.

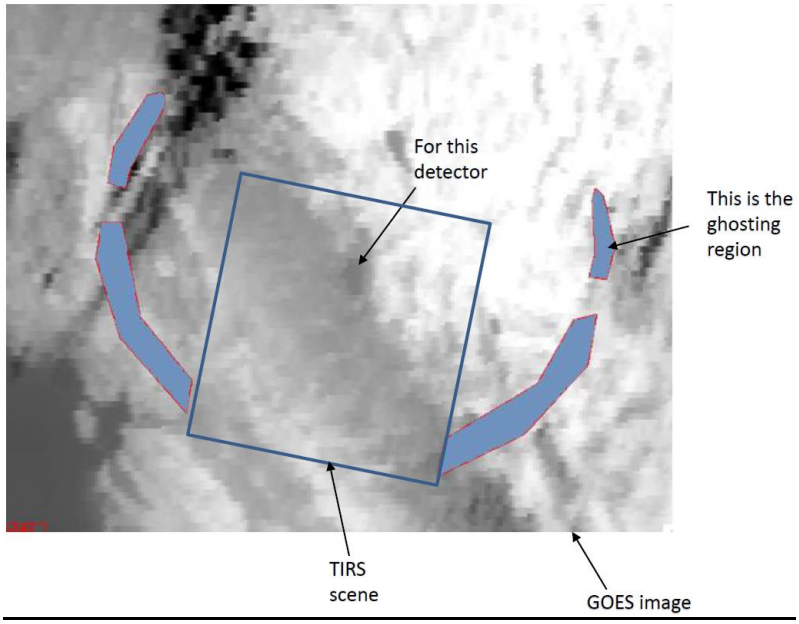


Figure 4: Rough approximation of the out-of-scene contribution to the stray light for a single detector sample

There are several technical challenges to an operational implementation of this approach. Getting GOES or analogous data for the surrounding area for every TIRS scene acquired is difficult, if not impossible, on a daily global basis; and the rough model may not hold up over different sites.

Several methods by which to characterize and correct for the stray light contamination are under investigation: using GOES or another coincident dataset to estimate the stray light based on a stray light model (see above); using our current Image Assessment System (IAS) database to estimate the amount of stray light on a per-scene basis; estimating the stray light based on in-scene statistics; and estimating stray light based on the scene and season. Other methods seem less likely to be effective.

Each of these approaches has pros and cons, and none have proven to be effective in a wide variety of scenes. However, all of these approaches are in early exploratory stages.

Updated Ground Control Points for 171 Path/Rows

Landsat is updating Ground Control Points (GCPs) for 171 path / rows in the Landsat archive. These points include island and coastal locations where meager coverage existed (lack of reference data in the original triangulation, few GCPs available, etc.), desert regions where shifting dunes caused existing GCPs to become obsolete, and other anomalous locations in which an apparent bias remained.

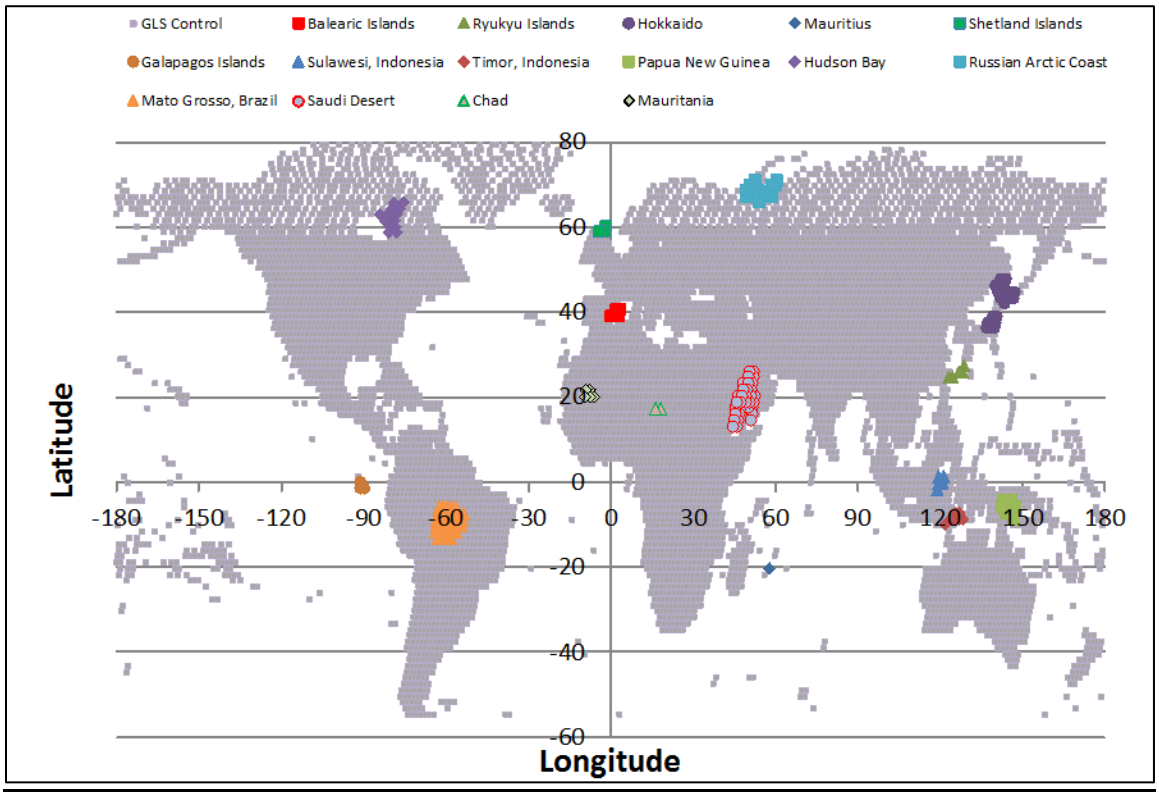


Figure 5. Location of Updated Ground Control Points

Because the updated GCPs are more accurate, users should consider re-ordering previously downloaded images. Scenes that once processed to a systematic L1G or L1Gt may now process to a precision L1T product. The offsets are significant for many of the scenes, which may affect time series analysis.

The scenes affected and the magnitude of the offsets are described in detail in the Phase 1 GCP Improvement Summary.

These GCPs are updated through a three-phase process. Phase 1, now complete with the next Level 1 Product Generation System (LPGS) release expected in the fall of 2014, adjusts areas where the largest offsets occurred. Phase 2 will incorporate remaining low-latitude areas, and Phase 3 will modify high-latitude areas.

This process consists of the removal of old GCPs, the creation of new GCPs, introduction of time-specific GCPs due to the age of the original GCP image chips, and the addition of some seasonal GCPs. The metadata files (MTL) distributed with future Landsat L1T products will include the version number of GCPs used.

Please watch the Landsat Mission Headlines (http://landsat.usgs.gov/index.php) and Calibration Notices (http://landsat.usgs.gov/science_calibration.php) for future announcements and a timeline for GCP releases.

Landsat Downloads top 17 million!

The USGS archive "opened" on December 1, 2008, providing all users worldwide the opportunity to download Landsat data at no cost.

As of April 30, 2014, over 17 million Landsat scenes had been downloaded from the USGS Archive! This demonstrates the importance of temporal and geographic expansion of Landsat research and allows introduction to new communities that are exploring and using the 40-plus years of global Landsat data.

Landsat Global Archive Consolidation (LGAC) Status

Landsat satellites have collected data from across the globe for more than four decades. Throughout the years, these data have been downlinked not only at the USGS Earth Resources Observation and Science (EROS) Center but also at numerous International Ground Stations (IGS). Much of these data held internationally are unique, relative to each station's area of coverage, and not duplicated in the USGS archive.

The Landsat Global Archive Consolidation (LGAC) effort started in 2010, with a goal to consolidate the Landsat archives from all stations worldwide and make all acquired Landsat scenes available to users.

As of March 31, 2014, nearly 3 million Landsat 1-5 MSS, Landsat 4-5 TM, and Landsat 7 ETM+ scenes have been added to the USGS archive, significantly increasing the USGS Landsat data archive.

Maps showing the coverage of data added are frequently updated online at http://landsat.usgs.gov/Landsat_Global_Archive_Consolidation.php.

ESPA Interface Login Changes Coming

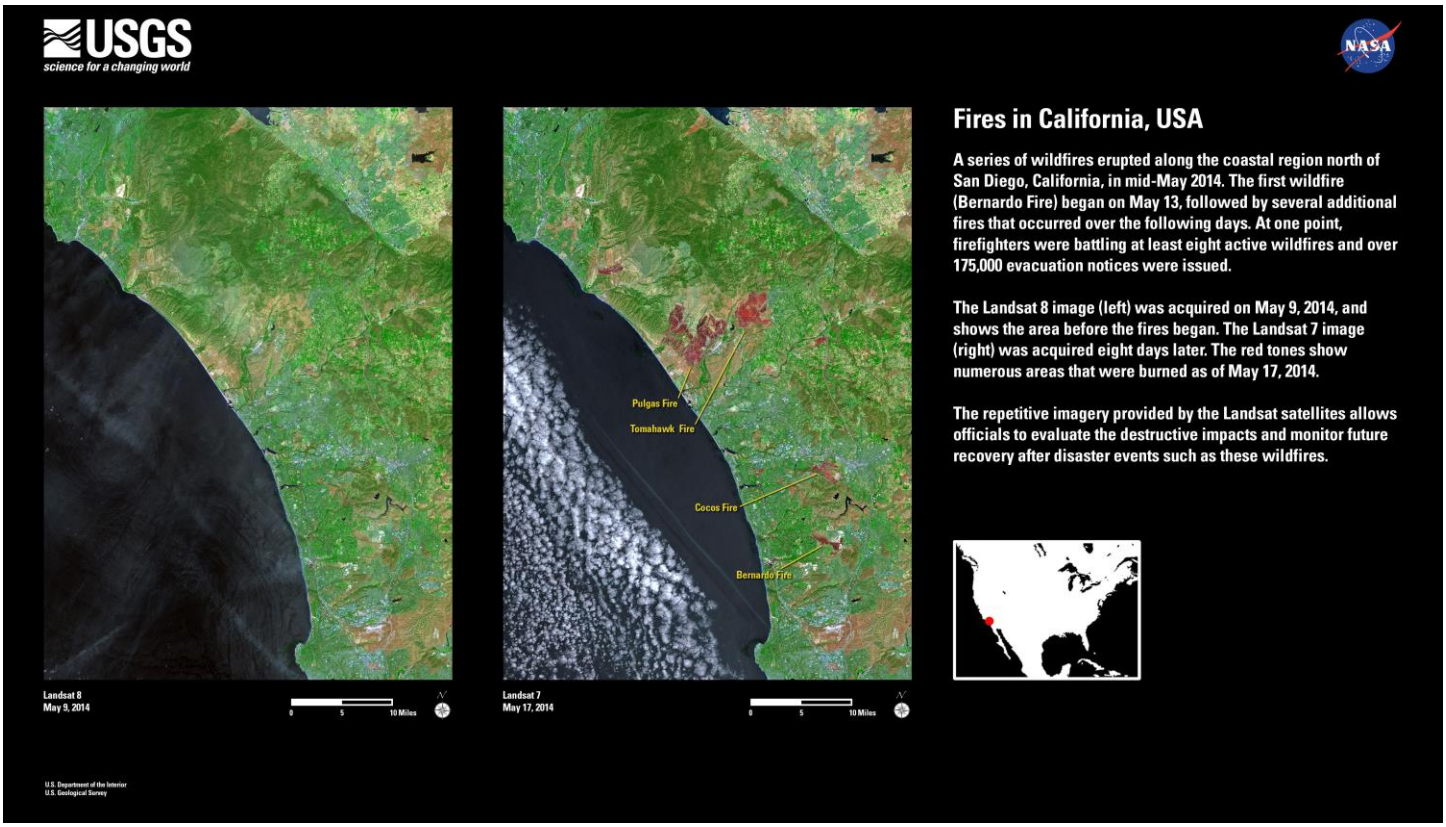
During the week of June 23, 2014, the username and password currently used to request Landsat Surface Reflectance and Spectral Indices products through the ESPA On-Demand Ordering Interface (https://espa.cr.usgs.gov) will be disabled.

Users will instead be required to enter the site with USGS authenticated registration credentials (the same used to access EarthExplorer).

Notices will be placed on the Webpage listed above when this change is implemented.

Landsat Image of Interest

Image of Interest



Sensors: Landsat 8 Operational Land Imager (OLI) and Landsat 7 Enhanced Thematic Mapper Plus (ETM+)
Acquisition Dates: May 9, 2014, May 17, 2014
Path/Row: 40/37

A series of wildfires erupted along the coastal region north of San Diego, California, in mid-May 2014. The first wildfire (Bernardo Fire) began on May 13, followed by several additional fires that occurred over the following days. At one point, firefighters were battling at least eight active wildfires and over 175,000 evacuation notices were issued.

The Landsat 8 image (left) was acquired on May 9, 2014, and shows the area before the fires began. The Landsat 7 image (right) was acquired eight days later. The red tones show numerous areas that were burned as of May 17, 2014.

The repetitive imagery provided by the Landsat satellites allows officials to evaluate the destructive impacts and monitor future recovery after disaster events such as these wildfires.

This and other Landsat Images of Interest can be found in the Landsat Image Gallery: http://landsat.usgs.gov/gallery.php.

Pecora 19 Call for Abstracts

Deadline June 20, 2014

PECORA 19

Sustaining Land Imaging…
UAS to Satellites

In conjunction with the Joint Symposium of ISPRS Technical Commission I and IAG Commission 4

Call for Abstracts –*Now Open!*

November 17-20 * Denver, Colorado USA
Renaissance Denver Hotel

PECORA Symposium Theme: ***Sustaining Land Imaging…UAS to Satellites***

The Technical Program Committee seeks presentations and posters that highlight past remote sensing successes, current investigations, technological advances for assessing the Earth's systems, and operational monitoring of land surface.

PECORA Symposium Topics:

- **Detecting and Monitoring Changes in the Earth's Surface at Regional, Landscape and Sub-pixel Scales**
- **Emergence of UAS and Other New Remote Sensing Technologies for Studying Terrestrial and Aquatic Ecosystems**
- **Using Remotely Sensed Observations to Managing Natural Resources within Nations, Countries and Cities**
- **Data Mining and Computer Assisted Image Analysis in the Era of Big Data**

Be inspired! The above are the four (4) main topic areas suggested for this years' program. There are MANY other sub-categories to support these topic areas that may be of interest for you. For more information, please visit the Symposium Web Site here or

Click HERE to View the Call for Abstracts PDF!

*The symposium is utilizing the ISPRS abstract management company, Copernicus, for this event. The submitter will directed to an outside website when using the submission tool. ISPRS and IAG submissions may require different perimeters for abstract and final paper submissions. This is a combined symposium; however, please follow the submission requirements for the organization you are submitting (Pecora, IAG, or ISPRS).

SUBMIT YOUR ABSTRACT TODAY.
Deadline: June 20, 2014