Land Remote Sensing
## *Program Update*

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Burned Area Analysis for the Soda Fire, Idaho

On August 10, 2015, the Soda Fire began burning about 8 miles northeast of Jordan Valley, OR. It spread rapidly because of high winds, parched fuels, triple digit heat, and low humidity. Over 283,000 acres had burned by August 20.
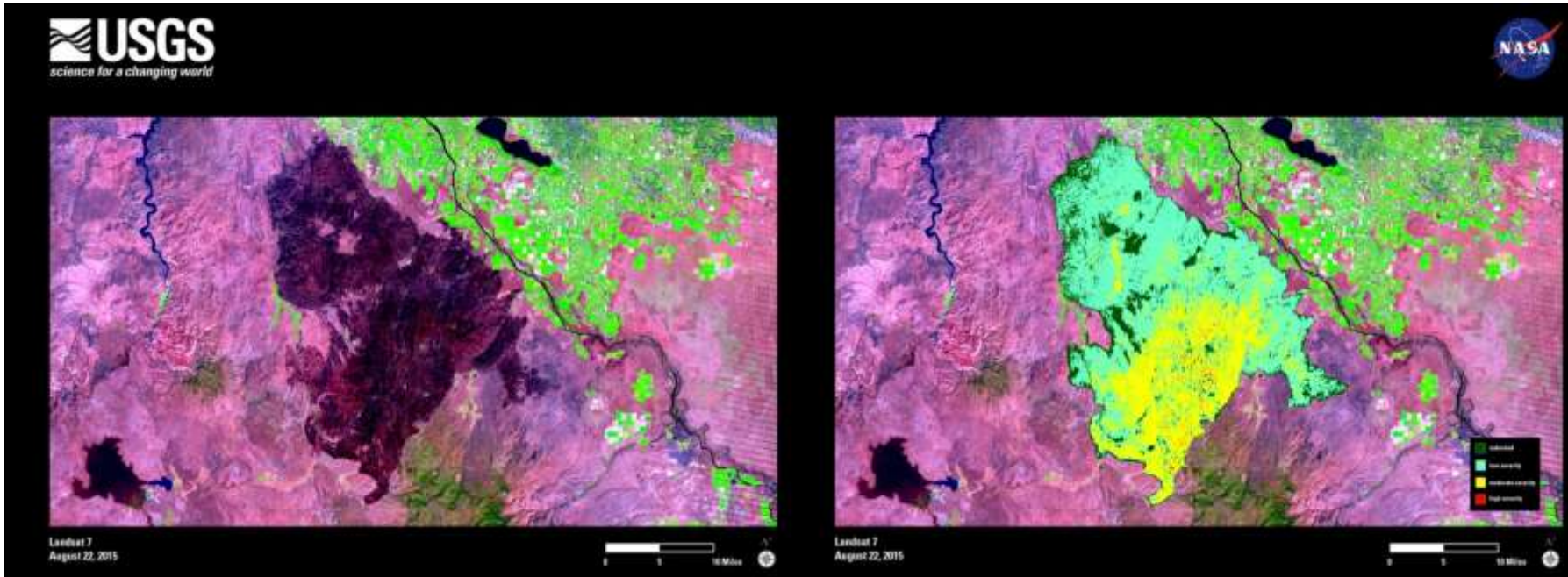
On the morning of August 22, Landsat 7 captured a postfire image (left above) of the Soda Fire burn scar. This image was used along with a prefire image from Landsat 8 to derive a Burned Area Reflectance Classification (BARC) map.

The BARC map (right) was created using digital image analysis techniques developed by USGS, USFS, and other scientists, and it allows a synoptic view of fire extent and severity. The map is preliminary and has not yet been field-validated.

This type of detailed information would be difficult to obtain in a timely manner based on ground observations alone. Reflecting the amount of vegetation loss caused by the fire, the colors on this map show that the Soda Fire was mostly classified as low and moderate severity (light green and yellow), with few high severity areas (red).

Landsat Operational Satellite Status

Landsat 8

- Collecting up to 725 new scenes per day; supports 8-day revisit cycle

- Thermal Infrared Sensor (TIRS) continues to operate on B-side subsystems with observatory engineers closely tracking hardware performance; A-side systems remain available for future use

- The Landsat 8 team is nearing completion of a 2-year effort to reengineer the Mission Operations Center computer systems to a virtualized architecture, providing greater resiliency and lower maintenance costs

Landsat 7

- Collecting about 475 new scenes per day; about 22% of pixels missing per scene (faulty scan-line corrector)

- L7 collection strategy modified to concentrate on continental coverage; L8 capturing islands and reefs in addition to continents

- Following less atmospheric drag than anticipated, plus highly efficient orbit-correction burns, the latest fuel estimate projects L7 operating into to 2021, barring failure of a key subsystem

SLI in FY16 President's Budget Submit

- **Joint NASA/USGS Sustainable Land Imaging (SLI) program**

- **A 3+1 part program, with essential investments in technology and observational innovation to ensure a world-class, sustainable, and responsible land imaging program through 2035:**

  - Class D Thermal Infrared Free Flyer (TIR-FF) to launch ASAP (estimated NLT 2019) and to fly in constellation with a reflective-band imager

  - Landsat 9 (fully Class-B rebuild of Landsat 8) to launch NLT 2023

  - Land Imaging Technology and Systems Innovation

    - Conducts hardware, operations and data management/processing investments to reduce risk in next generation missions

  - Landsat 10, Class B full spectrum, launch in 2030

    - Mission definition to be informed by the technology investments in 2015 – 2018, leading to a key decision point around 2019

≋USGS

Landsat 9

Landsat 9 is underway:

- Strong support from Administration, Congress, NASA, and USGS
- Strong support from Landsat Science Team and users around the world
- Strong team is being assembled by NASA and USGS
  - Great mix of Landsat veterans and talented new blood
- Strong engineering and management relationship between NASA and USGS continuing directly from Landsat 8 project
- Landsat 9 builds on outstanding performance of Landsat 8

NASA and USGS responsibilities identical to Landsat 8:

- NASA develops, launches, and tests satellite and imaging instruments
- USGS develops ground systems; assumes ownership & operation of spacecraft; archives, processes, and distributes image data

Back-up

Landsat-based Information Products -- Status

- **Standard orthorectified L1T calibrated-radiance Landsat scenes and LandsatLook (full-resolution JPEG browse images); approximately 1M downloaded per month**

- **TM/ETM+ surface reflectance Climate Data Record product released in EE May 2013**

- **Global 30m Land Cover Forest Gain/Loss product available through Google Earth Engine**

- **Landsat 8 OLI "provisional" surface reflectance product released December 2014**

- **Coming soon:**

  - Provisional Burned Area Extent and Surface Water Extent ECV products released in March 2015 for stakeholder evaluation

  - Global 30m Land Cover Percent Tree Cover 2010 and validation data available for evaluation via USGS Visualization tool

  - Landsat TM/ETM+ provisional surface temperature products now scheduled for September 2015 release for stakeholder evaluation

- **Further out:**

  - Fractional Snow Covered Area ECV available in provisional status Q4 FY15

  - Biomass ECV in early stages of development (modeling and estimation)

2015 Guidance to LAG

Non-Federal Land Imaging User Requirement Compilation. The USGS will share with the LAG its plans and current progress toward identifying Federal user requirements for remotely sensed data. A USGS presentation will be followed by LAG members providing information about non-Federal data requirements that could include both LAG member input plus information obtained from non-Federal users contacted by LAG members. This could include a paper describing user perspectives on future requirements (perhaps based on interviews with non-Federal Landsat download customers, focusing on what they see as the needs of the future). This project would begin in March/April 2015 and conclude with specific information provided to USGS by late 2015.

Sentinel Satellite Series User Feedback and Recommendations. Regarding the Sentinel 1 (radar), Sentinel 2 (land-imaging) satellites, and new commercial smallsats and microsats, the USGS is interested in learning what success non-Federal users are having with data access and delivery mechanisms, data-use policies, and data applications. The USGS would also be interested in hearing what recommendations the LAG may have for USGS actions associated with these systems. This project could be a white paper assembled in the fall of 2015 to highlight initial user experiences and recommendations.

Previous Task Follow-up. In 2013, the LAG wrote several white papers requested by the USGS which made specific recommendations on the use of new technologies like cloud computing and on potential steps to improve USGS products. In 2015, the USGS will brief the LAG on progress made to date in regard to those topics. In the course of these briefings the USGS and LAG may recognize possible follow-up activities requiring further study and recommendations to enable improved USGS support to the non-federal remote sensing community.

Wider Access to Landsat Data

In addition to Google and Esri, other companies & organizations are providing public access to Landsat imagery and services:

- Amazon Web Services offers a Landsat 8 "Public Data Set" combined with on-demand computing services

- Blackbridge Networks and Cybera offers thousands of Landsat 8 images to Canadian nonprofit organizations

- Landsat.org, an affiliate of the Tropical Rain Forest Information Center, offers multi-faceted access to images from Landsats 4, 5, 7, and 8

- For many years, the University of Maryland-based Global Land Cover Facility has provided access to data and products from Landsat and other Earth-observing satellites