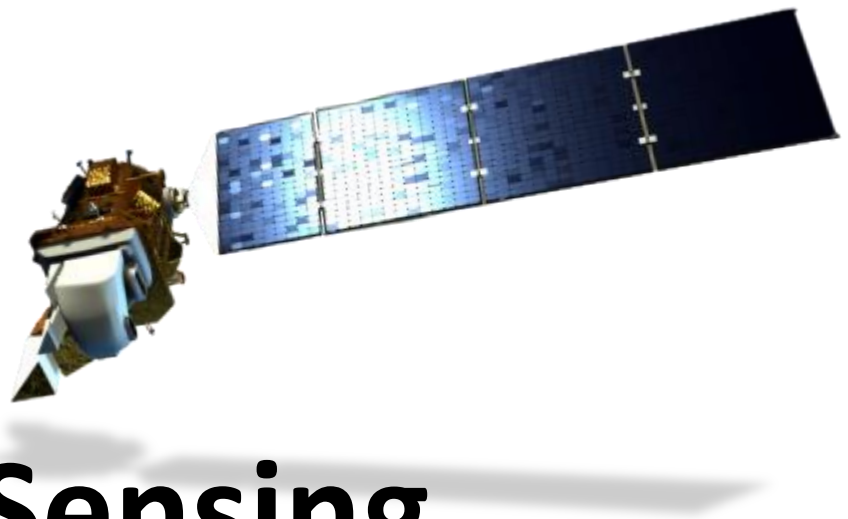


Land Remote Sensing Program Update

Tim Newman
USGS Land Remote Sensing Program Coordinator

National Geospatial Advisory Committee
June 10, 2015

USGS

Sustainable Land Imaging (SLI) in FY16 President's Budget

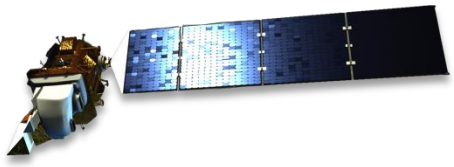
FY16PB proposed "3+1" SLI program, with essential investments in technology and observational innovation to ensure a world-class, sustainable, and responsible land imaging program through 2035:

1. Thermal Infrared Free Flyer (Risk Class D) to launch ASAP (estimated NLT 2019) and fly in constellation with a reflective-band imager
2. Landsat 9 (fully Class B rebuild of Landsat 8) to launch NLT 2023
3. Land Imaging Technology and Systems Innovation
   - Conduct hardware, operations and data management/processing technology investments to reduce risk in next-generation missions
4. Landsat 10 (Risk Class B, Full-spectrum) to launch NLT 2030
   - Mission definition to be informed by the technology investments in 2015-2018, leading to a key decision point in 2019

Landsat Operational Satellite Status

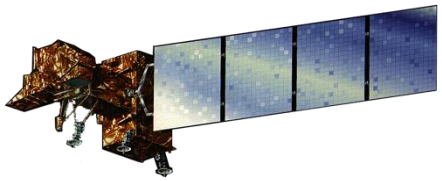
Landsat 8

- Collecting approximately 725 new scenes per day; supports 8-day revisit cycle
- An anomaly in the electronics associated with the Thermal Infrared Sensor (TIRS) was resolved by switchover to B-side subsystems; A-side systems remain available for future use
    - Thermal data from that period now calibrated and available



Landsat 7

- Collecting about 475 new scenes per day; about 22% of pixels missing per scene (faulty scan-line corrector)
- L7 collection strategy concentrates 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 2020, and perhaps into 2021, barring failure of a key subsystem



Landsat-based Information Products -- Status

- Standard orthorectified “L1T” calibrated-radiance Landsat scenes and “LandsatLook” (full-resolution JPEG browse images); approximately 1M downloaded per month
- Landsat 5&7-based *Surface Reflectance* Climate Data Record product available via Earth Explorer, along with a *provisional Landsat 8-based product*
- *Global 30m Land Cover*:
  - *Forest Gain/Loss* product available through Google Earth Engine
  - *Percent Tree Cover 2010* available for evaluation via USGS Visualization tool
- *Burned Area Extent* and *Surface Water Extent* information products released in March
- Coming soon (September/October) for stakeholder evaluation:
  - Landsat 5&7-based *Surface Temperature* Climate Data Record product
  - *Fractional Snow Covered Area* information product
- Further out:
  - *Biomass* information product in early stages of development (modeling and estimation)

Wider Access to Landsat Data

Many companies and organizations are now providing public access to Landsat imagery and services:

- Google Earth Engine offers a Landsat-based, on-line platform for planetary environmental data and analysis
- Esri Change Matters offers on-line Landsat data processing, including change analysis and web-mapping services
- Amazon Web Services is offering a Landsat 8 “Public Data Set” combined with on-demand computer services
- Blackbridge Networks and Cybera are offering 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 4-8
- The University of Maryland Global Land Cover Facility provides access to data and products from Landsat and other Earth-observing satellites
- Harris Corporation offers government and commercial users web-service based processing of geospatial products derived from Landsat

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 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 earth observing 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.