USGS National Land Imaging

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

USGS National Land Imaging Program

Satellite Operations

Develop and operate systems to acquire, produce, preserve, and deliver products and services to meet civil Earth observation research and operational requirements

- Collect, archive, process & disseminate Landsat & Landsat-like data (Landsat 1-8, S-2)
- Operate the Landsat 7 and 8 satellites, calibrate and validate the incoming data
- Develop the Landsat 9 ground system in concert with NASA for 2020 launch
- Collect, maintain and analyze user requirements; inform 2019 Landsat 10 decision

Science, Research & Investigations

Conduct science, research and technology investigations to improve upon and develop new products and services

- Applied science & applications, including drought monitoring, global cropland estimates
- Remote sensing research and development, including unmanned airborne systems

Manage National Civil Applications activities

- Provide National Security Space system geospatial data supporting USGS applications
- Facilitate Federal civil agency use of these systems via Civil Applications Committee

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Fundamental goal: Ensure public availability of a primary data record about the *current state and historical condition* of the Earth's land surface

Landsat Operations and Development Status

Landsat 7 Flight Operations (1999-)

- Collecting about 470 new scenes per day; latest fuel estimate projects operations into 2021.

Landsat 8 Flight Operations (2013-)

- Collecting up to 740 new scenes per day; frequent night and off-nadir imaging of volcano and fire imaging.

Landsat Archive Operations

- Over 8 million Landsat scenes available; many other datasets: ResourceSat-2 over US, Sentinel-2, Commercial satellite data, aerial photography, UAS data.

Landsat 9 (December 2020 launch)

- Essentially a copy of Landsat 8, but with important improvements for accuracy and resiliency (upgrade to fully Risk Class B); 14-bit data.

Landsat 10 (~2025-2030 launch)

- Technology and user needs studies over the past year led to standup of an architecture study team.
- Everything is on the table at this point (e.g., smallsats, hyperspectral, data buys, Public-Private Partnerships).

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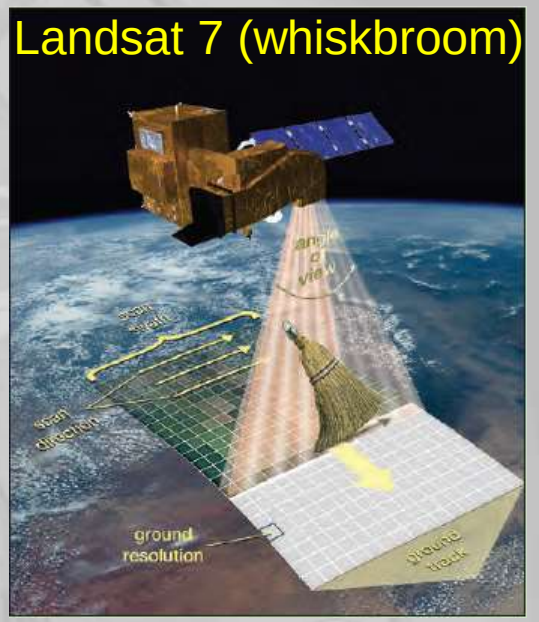
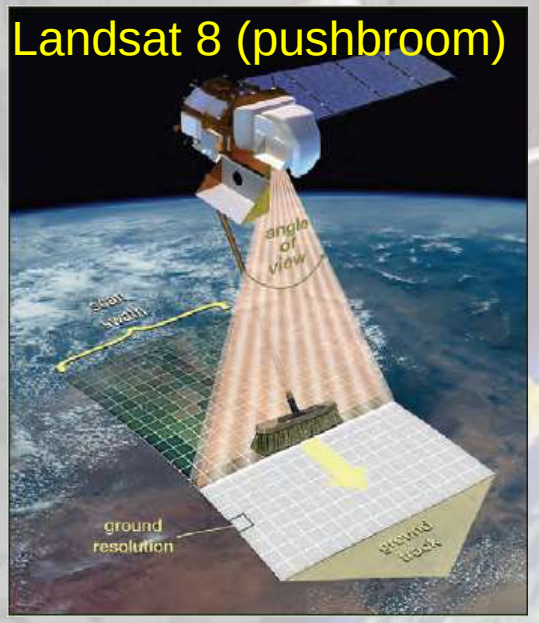
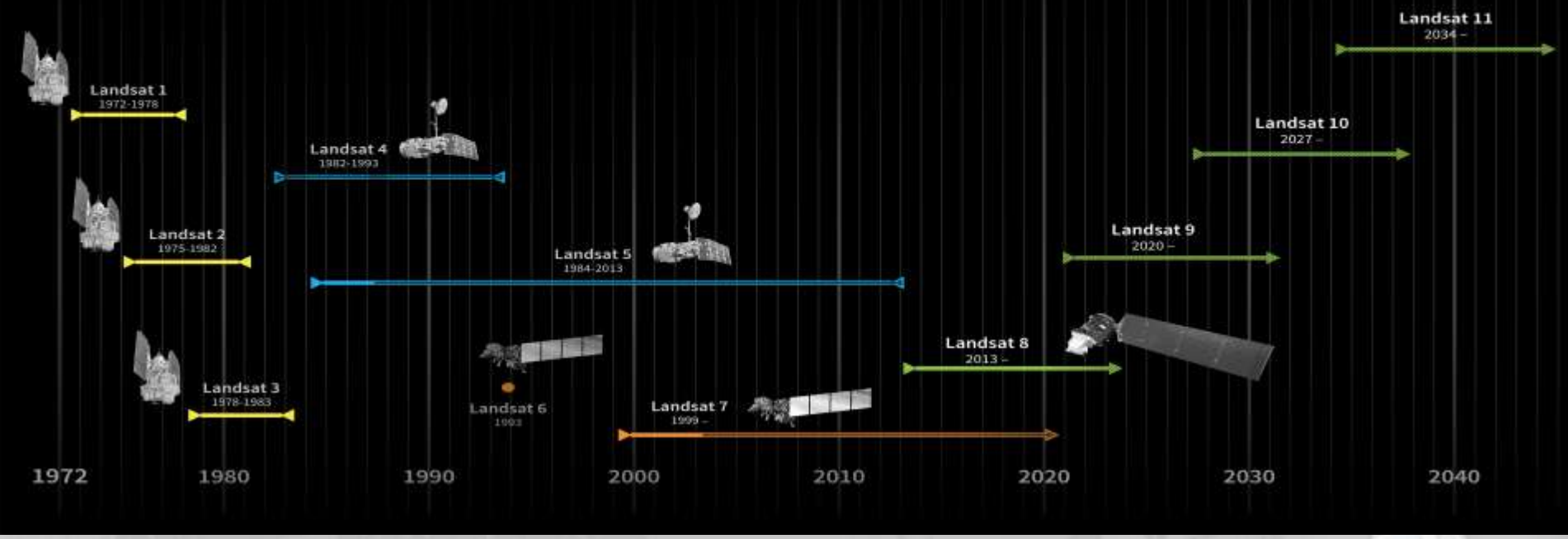




Building on the Landsat Legacy



- Sustainable Land Imaging (SLI) is a partnership between DOI/USGS and NASA to maintain a sustainable program for spaceborne land imaging
  - Landsat-9 development is on track to meet a December 2020 launch date
  - Joint SLI Architecture Study Team (AST) has just started a study to define the next mission
    - AST will release an RFI in the near future; we are very interested in your responses

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Landsat Calibrated Data = Global Reference

- Well-calibrated datasets like Landsat provide the **data infrastructure** upon which the public and private sectors rely
  - Robust geometric and radiometric calibration is foundational to science applications
  - The public and private sectors use this data to **improve current information products** and as a base layer to **enable the development of new information products** and derived services
- These products and services provide **significant economic, environmental and societal benefits** worldwide
- USGS is committed to maintaining Landsat as a well-calibrated system
  - USGS has established the EROS Calibration Center of Excellence (ECCOE) to ensure calibration processes are well established & documented

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Joint Agency Commercial Imagery Evaluation Forum

- The U.S. Government is a voracious user of remote sensing data and has an absolute requirement to understand the characteristics and performance of U.S. government, commercial and international Earth observation satellites
- JACIE provides the U.S. Federal Government with information about the data quality of remotely sensed data sources, including new civil and commercial systems/data/products
- The JACIE partnership provides a common calibration and data quality baseline to support interoperability and usability
  - Expanding sources of reliable imagery allows for use of multiple sources together to improve temporal frequency, and spatial and spectral complements
  - Cross-characterizing and calibrating these imaging sources provides truth for lower-resolution applications
- JACIE provides a win-win partnership for government, industry and our civil and international partners
- USGS is committed to supporting JACIE for the Earth Observations community

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Future Path of Calibration

- USGS is committed to high-quality Landsat data and higher-order products
  - Higher-order products: Surface Reflectance, Land Surface Temperature and beyond
  - All require very stable, accurate inputs
  - Establish, maintain interoperability with other systems (for example, Landsat-Sentinel-2 Geometric cross-calibration)
  - Collaborate with others in cross-sensor, cross-dataset comparisons
- USGS commends the recent "Interoperability Workshop" organized by Industry and held at USGS Menlo Park.
  - USGS looks forward to continued discussion and work in improving the ability to work among multiple datasets, repository, and the rapidly increasing number of tools and techniques to support science and learning
- Continue working with government agencies, nations, universities, and Industry
  - Develop new methods, resources, collaborations
  - Promote high-quality data and interoperability
  - Understand cloud environment and the impact of machine learning on calibration, validation, and science
  - Common processes, guidelines, standards; the need for standardization of calibration and validation processes.

We need to move beyond a loosely-knit set of earth observing systems toward a more integrated “Earth Observations Enterprise,” meeting more user needs

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Landsat Data Policy Study for 2018

- Landsat Advisory Group (LAG) Task topic title: “Considerations of cost sharing models for Landsat data”
- DOI leadership is seeking to better understand economic and data policy considerations and impacts in relation to user needs, as well as the potential for public-private partnering (“P3”), with respect to various cost sharing models for Landsat data.
- The “fee recovery” issue has been looked into as recently as 2012 by the LAG—that paper can be found online at the NGAC website.
- This represents a good opportunity to inform current leadership on a number of Landsat data policy issues, in particular, the interplay with ESA’s adoption of a free and open policy for Sentinel.
- NLI’s position is to support an objective investigation by the LAG.
- Feedback and information: Email account (Landsatdatapolicy@usgs.gov) and FAQ section on EE website.

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