RCA-EO

Requirements, Capabilities, and Analysis for Earth Observations

USGS Land Remote Sensing Program (LRSP): Requirements, Capabilities and Analysis for Earth Observations (RCA-EO)

Project Overview for JALBTCX

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

RCA-EO Overview

- Purpose
- Examples of analyses
- What's ahead

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Purpose of RCA-EO

RCA-EO provides data and analyses to help optimize investments in Earth observing technology and products to better meet user needs

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RCA-EO Data Collection within USGS

SCOPE

- **24 USGS Programs elicited**
- **500+ scientists engaged**
- **340+ Key Products/Services/Research Areas evaluated**
- **1000+ data sources identified and assessed**

Provides:

- Integrated view of Earth observation data dependencies and applications across USGS mission areas and programs, down to the individual project level
- Detailed insights about user satisfaction with data currently available to support research and to produce operational products

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What can we do with the data?

USGS Level – Understand the relative impact of Earth Observation data on USGS in an integrated way

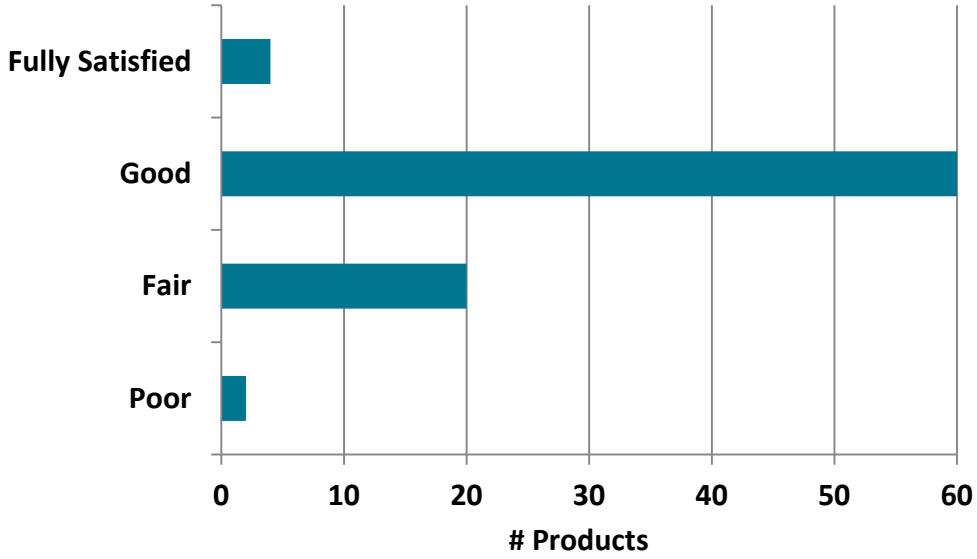
Top 10 highest impact Observing Capabilities and Datasets in USGS

Field Work/Campaigns	**Very High**
USGS Stream Gage Network	**High**
Airborne LiDAR	**High**
Landsat	**High**
GPS	**High**
National Elevation Dataset	**High**
Airborne High-Resolution Imagery	**High**
Geologic Data and Reports	Moderate
National Hydrography Dataset (NHD)	Moderate
USGS Water Quality Samples	Moderate

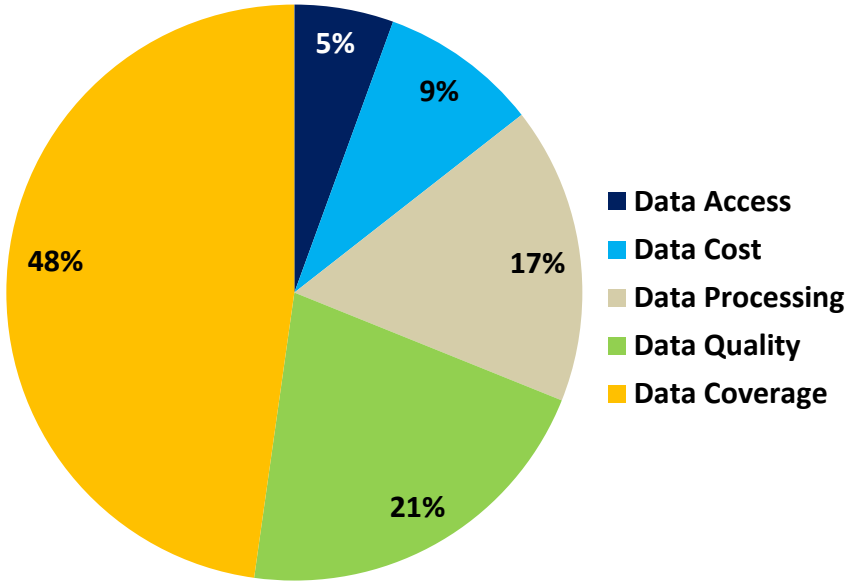
Lidar Data Insights

Identify where data investments might be needed

User satisfaction of Lidar data



Current Lidar Data Limitations



- Lidar data are critical: commercial airborne lidar, airborne lidar bathymetry, and terrestrial lidar
- Satisfied with lidar data quality where lidar data are available
- Unsatisfied with gaps in coverage, data cost, quality, access and ease of use

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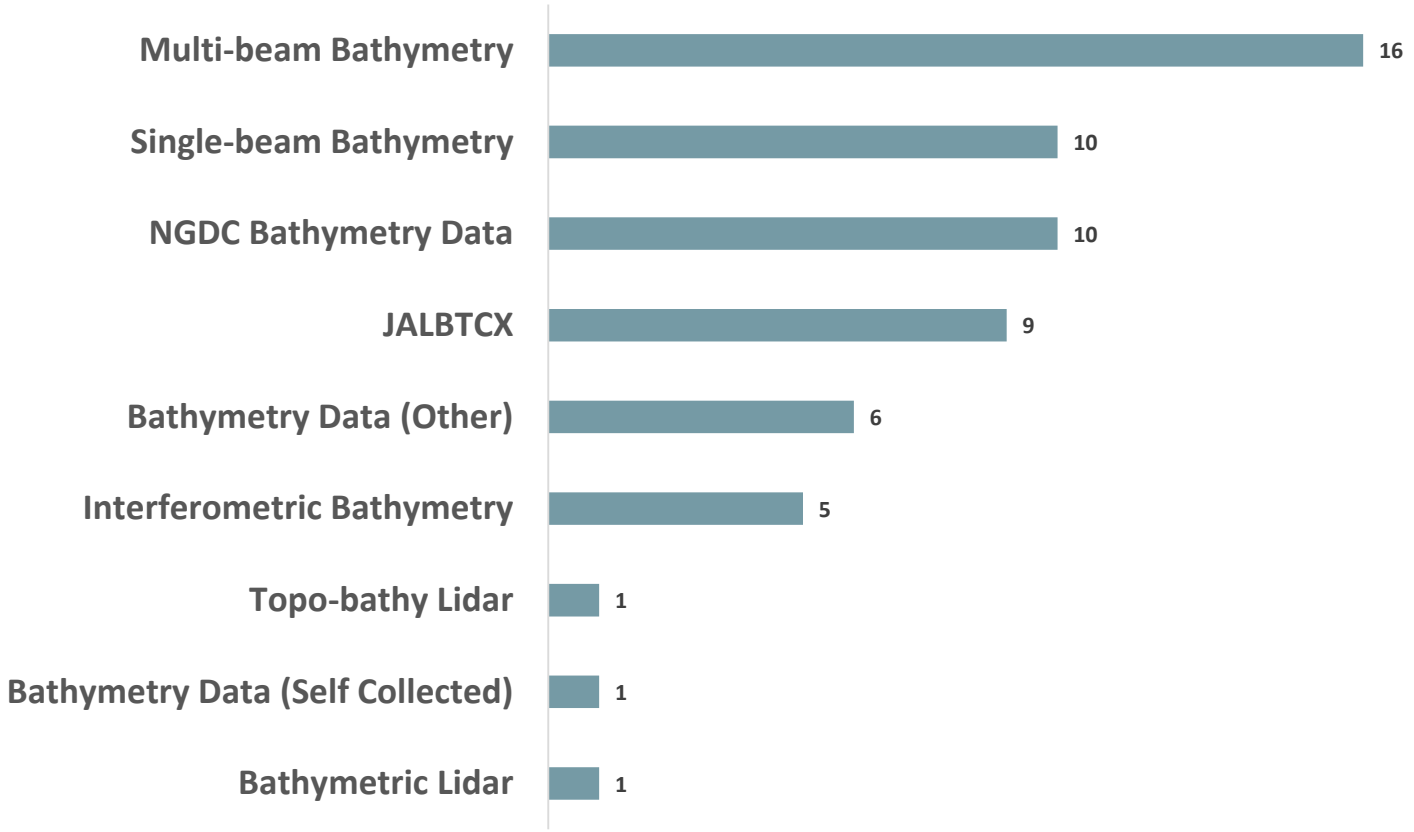
Bathymetry data usage in the USGS

Multiple bathymetry data sources support USGS activities



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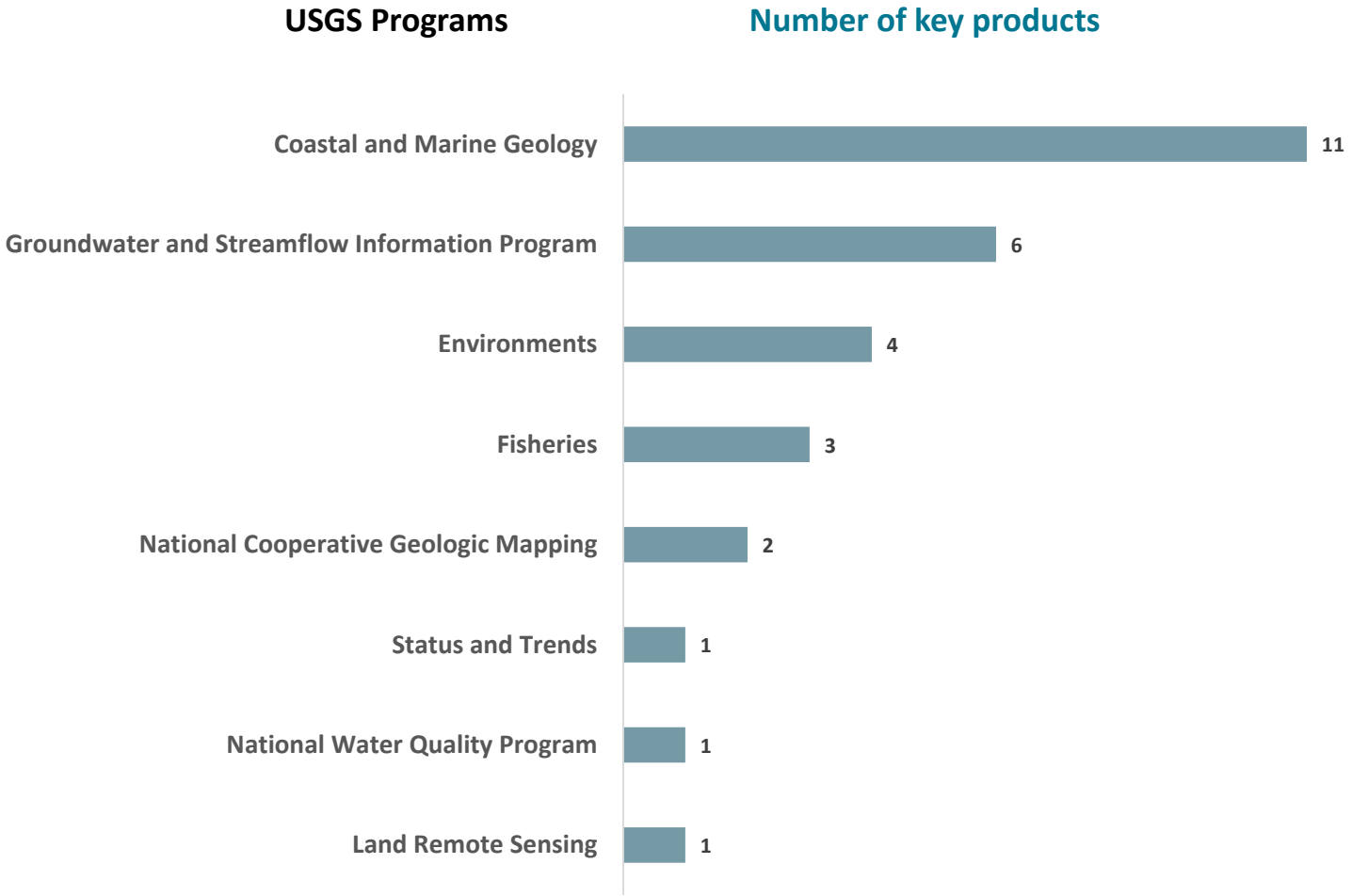
Bathymetry data usage in the USGS



29 key products in 8 USGS programs use bathymetry data from one or more sources

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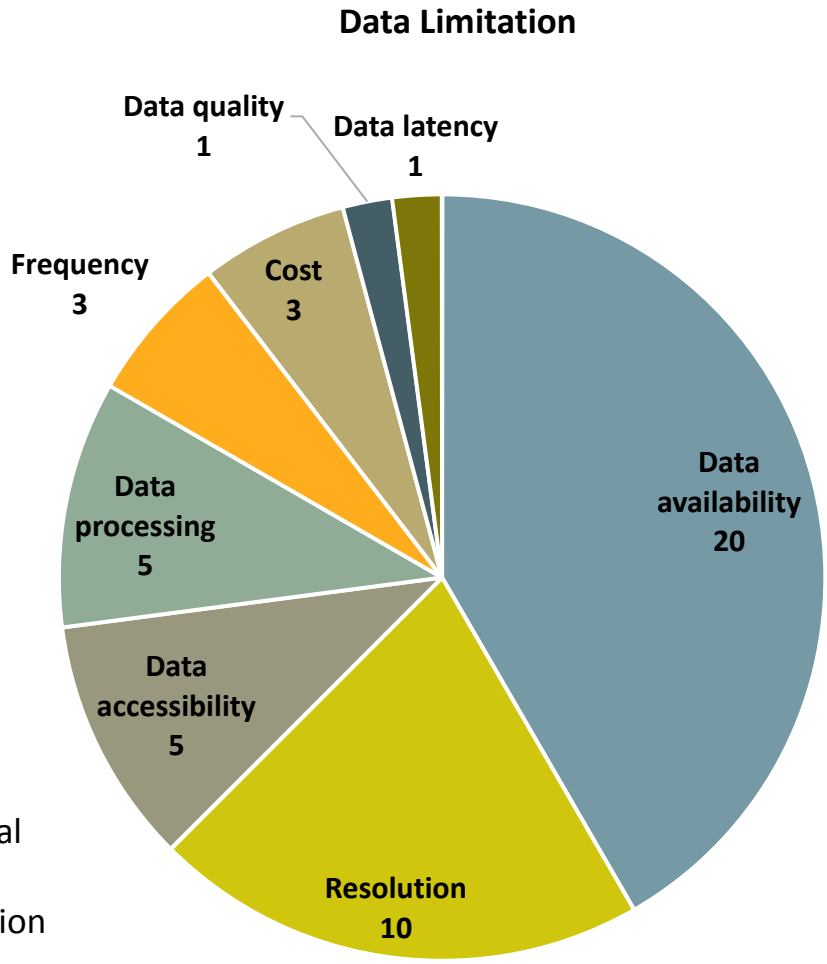
User satisfaction - bathymetry data in the USGS

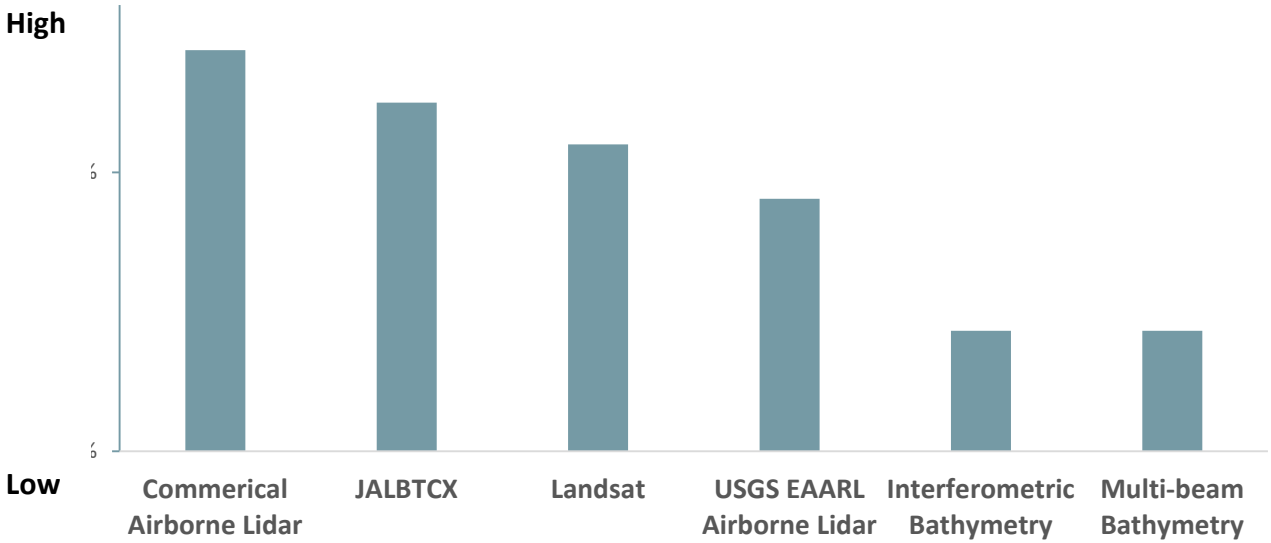


- Bathymetry data - Great data quality and very useful when available, but most USGS users expressed the limitation of data availability.
- USGS users desire: Broader coverage, higher resolution for coastal wetland and near-shore areas, easier access for existing data, advanced post-processing product, and more often data acquisition

Example: Sea Level Rise Mapping

USGS Coastal and Marine Geology Program

- Predict landscape changes in time/space scales that managers of refuges need
- Primary rely on airborne lidar (commercial, JALBTCX, USGS), also use buoy water data, t-lidar, and high resolution imagery.



- Need faster data delivery of JALBTCX and USGS EAARL lidar data (weeks)
- Continuity of Landsat mission is critical
- Need more cloud-free high resolution commercial imagery

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What's ahead

- Continue documenting user requirements (USGS and broader)
  - Will enable gap analysis by comparing Earth observing capabilities with user requirements
  - Can inform USGS product and service improvements
  - Will provide information to Landsat 10 development
  - Document emerging Earth observation capabilities
- Expand outreach and program engagement

RCA-EO Summary

- Provides comprehensive and sustained understanding of user needs for earth observations and measurements (ground, air and space)
  - How well are these needs being met?
- Continue
- Informs investment decisions related to technology and product development
  - Where can the greatest benefits be realized?
- Leverages strong partnerships for insight and influence
  - OSTP, NOAA, DOI and many participating agencies

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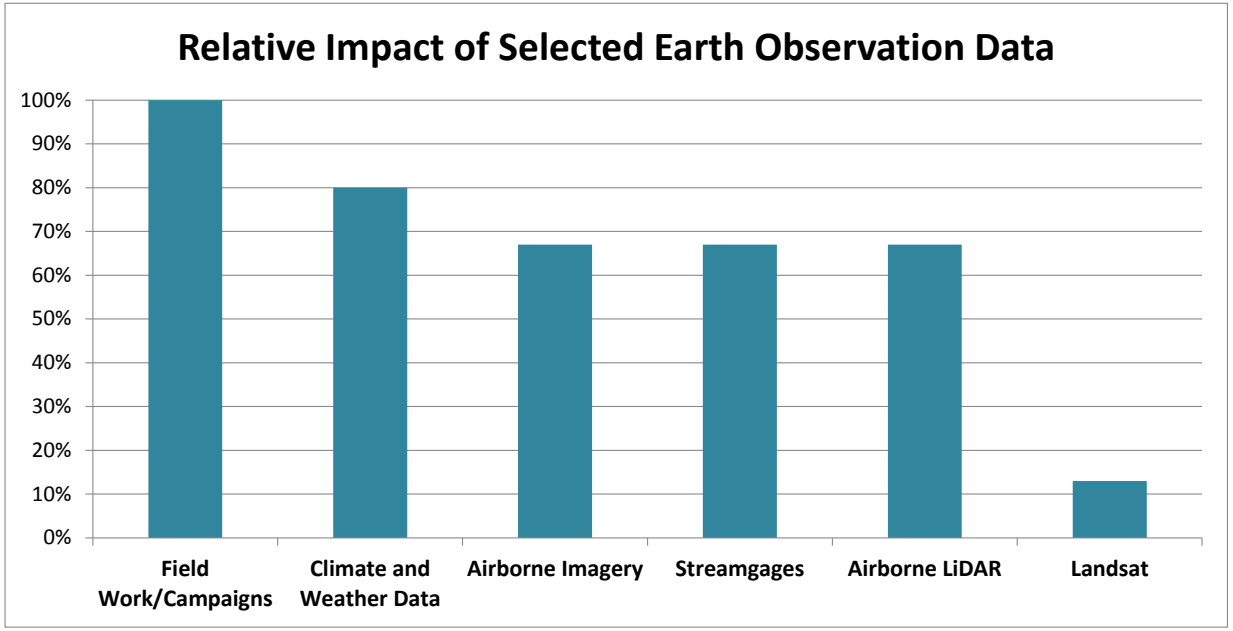
Comments?

- Field work is most critical; weather/climate data, and streamgage information also very important
- Supported by remote sensing: airborne imagery, airborne lidar, and Landsat imagery

USGS Ecosystems Invasive Species Program



Future Needs:

- Would like more high resolution aerial imagery – expensive
- Lower cost lidar with increased consistency

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Requirements collection

- The value tree shows a snapshot of current Earth Observation use and performance
- Requirements identify fundamental observation needs in a non system dependent (technology agnostic) way
  - Requirement attributes include the observable (surface temp, streamflow, temperature, elevation, etc., and its attributes to include:
    - Geographic Coverage
    - Horizontal Resolution
    - Vertical Resolution (if applicable)
    - Sampling Interval
    - Accuracy
    - Data Latency
    - Conditions for Sampling
    - Length of the Data Record
    - Spectral Characteristics
    - Data Services, Access and Formats