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NGAC Landsat Advisory Group (LAG) Subcommittee Update

NGAC Meeting
April 27, 2021

Frank Avila, LAG Chair
Roberta (Bobbi) Lenczowski, LAG Vice-Chair

LAG Mission

Provide advice *to the Federal Government, through the Department of the Interior National Geospatial Advisory Committee,* ***on the requirements, objectives and actions of the Landsat Program*** *as they apply to continued delivery of societal benefits for the Nation and the global Earth observation community*

LAG was established in April 2012 as a subcommittee under the NGAC.

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LAG 2021 Membership

Name	Organization
Frank Avila *(LAG Chair, NGAC Member)*	*National Geospatial-Intelligence Agency (NGA)*
Bobbi Lenczowski *(LAG Vice-Chair, NGAC Member)*	*Roberta E. Lenczowski Consulting, LLC*
May Yuan *(NGAC Member)*	*University of Texas-Dallas*
Vasit Sagan *(NGAC Member)*	*Saint Louis University*
Mariel Borowitz	*Georgia Institute of Technology*
Steven Brumby	*Impact Observatory, Inc*
Keith Masback	*Plum Run, LLC.*
Anne Hale Miglarese	*Saildrone, Inc.*
Walter Scott	*MAXAR*
Robbie Schingler	*Planet*
Federal Contacts: Tim Newman, Tim Stryker, Greg Snyder, Peter Doucette *USGS/National Land Imaging Program*	

Published LAG Reports

Landsat Data: Community Standard for Data Calibration – October 2020

Evaluation of a Range of Landsat Data Cost Sharing Models – June 2019

Landsat Future Mission Recommendations – April 2018

Landsat Data Cube Feasibility for Forecasting – April 2018

Analysis of Non-Federal Landsat User Requirements – June 2016

Sentinel Data Use Policies – December 2015

The Value Proposition for Landsat Applications – December 2014

Cloud Computing: Potential New Approaches to Data Management and Distribution – December 2013

Comments on NRC Report: Landsat and Beyond: Sustaining and Enhancing the Nation's Land Imaging Program – December 2013

Product Improvement – Advice USGS on Potential Means of Modifying the Current Products to Make Them More Useful to Commercial Information Providers and Value-added Analysts – December 2013

Statement on Landsat Data Use and Charges – September 2012

The Value Proposition for Ten Landsat Applications – September 2012

Documents can be accessed at www.fgdc.gov/ngac/key-documents

Task #2
Final Report Presentation:

Formulating a Big Data Challenge for Land Imaging Time-Series Data

Lead: Anne Hale Miglarese – Saildrone, Inc

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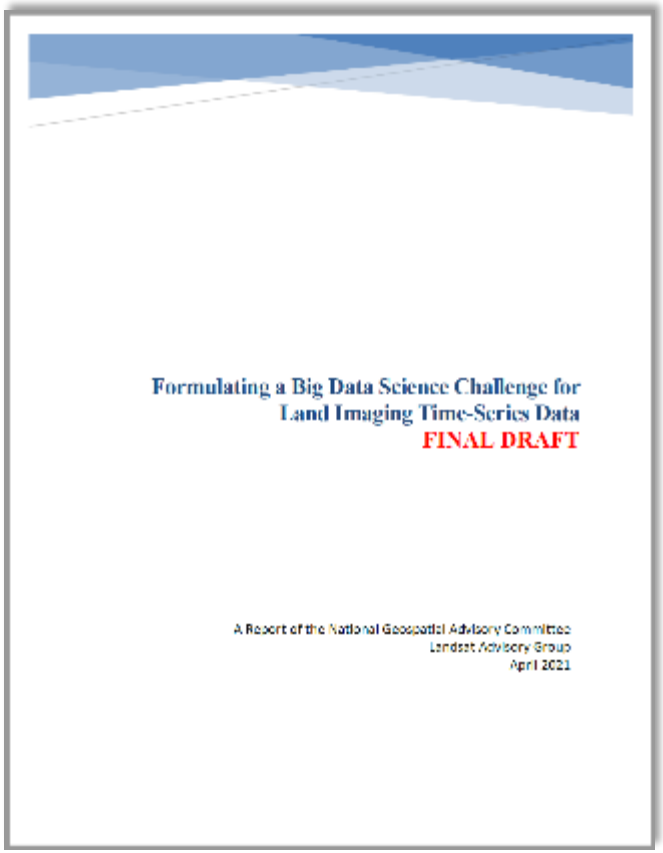
LAG Task #2

- **Task: Formulating a Big Data Science challenge for land imaging time-series data.**
  - USGS is requesting the Landsat Advisory Group to investigate the formulation of a Big Data Science Government Challenge (e.g., implemented via an Xprize-like mechanism) to incentivize exploration into the utility and efficacy of ML/DNNs methods for purposes of exploiting Landsat ARD for time-series analysis and land change forecasting applications, and to augment those developed as part of the USGS LCMAP initiative.
- **Team:** Anne Miglarese (Lead), Frank Avila, Steven Brumby, Vasit Sagan, Robbie Schingler, May Yuan

Task #2 Report – Overview

This paper provides input regarding the initiation of a Big Data Science Government Challenge to explore the benefits of computer vision and Machine Learning for the purposes of exploiting Landsat Analysis Ready Data for time-series analysis and land change forecasting applications.

- The LAG strongly encourages the USGS conduct an initial LCMAP spectral and temporal resolution-focused data challenge in 2021 and to consult with the Landsat Science Team and Federal challenge experts to refine this focus.
- Based on the outcomes of this initial challenge, the LAG encourages USGS to consider creating a series of follow-on challenges in 2022 and beyond in recognition of the 50th anniversary of the Landsat program.
- The LAG suggest that USGS would be well served to hire an organization to facilitate the design and management of the challenge and further that USGS engage other Federal agencies to participate as sponsors of the activity.



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Task #2 Report – LAG Recommendations

- USGS should craft a problem statement that directs competitors to mine the breadth and depth of the Landsat archive.
  - With almost 5 decades of imagery available for analysis there is no better open repository of global coverage to analyze
- USGS considers hiring an organization to participate in the design and to oversee the management of the challenge.
  - There are numerous organizations – both commercial and not-for-profit – that specialize in designing and managing such challenges.
- Training datasets be constructed and made public that extend the state of the art and should aim for a minimum of 100 million human-labeled pixels across at least 3000 locations.
  - To demonstrate the full value of the Landsat archive, this training dataset should be distributed globally.
- Big thinking and swift action is encouraged to envision a challenge program that that will focus on enhancing existing products as well as the development of new products and services generated from the analysis of Landsat and other observations from other government or commercial sources.
  - We recommend a careful evaluation of the Copernicus Masters Challenge for a model of what to design and implement

Task #3
Final Report Presentation:

Revisiting the Land Remote Sensing Act of 1992

Leads: Keith Masback – Plum Run, LLC,
Dr. Mariel Borowitz – Georgia Institute of Technology

LAG Task #3

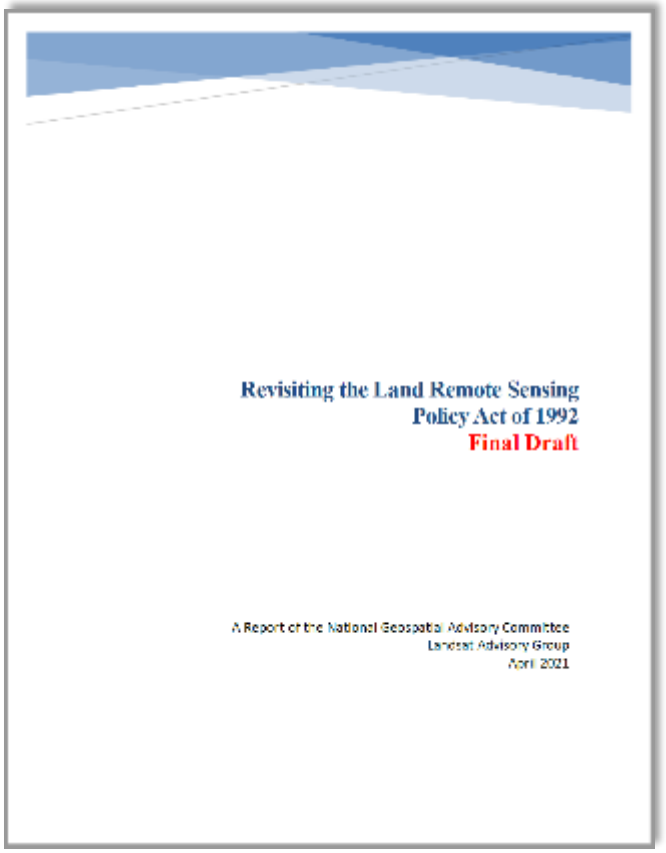
- **Task: Modernized interpretation of the Land Remote Sensing Policy Act of 1992 (Public Law No: 102-555)**
  - USGS is requesting the LAG to provide a modernized interpretation of the current language of PL 102-555 that can serve to inform future Land Remote Sensing policy formulation among decision makers, and which remains consistent with the spirit of the existing language. Factors to consider include technology trends in space and ground mission segments, public-private partnering opportunities, and evolving user needs across a broad range of applications.

- **Team:** Keith Masback (Co-lead), Mariel Borowitz (Co-lead), Bobbi Lenczowski, Anne Miglarese, Robbie Schingler, Walter Scott, May Yuan

Task #3 Report – Overview

The goal of this review is to inform future Land Remote Sensing policy formulation. USGS requested that the LAG study team specifically factor in: the consideration of technology trends in space and ground mission segments, public-private partnering opportunities, and evolving user needs across a broad range of applications.

- The purpose of the Land Remote Sensing Policy Act was *"to enable the United States to maintain its leadership in land remote sensing by providing data continuity for the Landsat program, to establish a new national land remote sensing policy, and for other purposes."*
- Many of the specific objectives of the Act, including program continuity, data sharing, and the emergence of the commercial industry have been realized to a significant degree.
- Much has changed in the nearly 30 years since the Land Remote Sensing Policy Act was passed in terms of technology, economic conditions, international environment, and applications.
- This paper reexamines the Act in light of the myriad advancements in the satellite remote sensing sector over the past three decades.



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Task #3 Report – Themes Explored

- The report explores a number of key themes in the Land Remote Sensing Policy Act that would benefit from a re-examination in light of these significant trends.
  - Importance of Land Remote Sensing Data and Expanding Users
  - Global Leadership
  - Data Sharing
  - Data Archiving
  - Commercialization and Public Private Partnerships
  - Stable Funding
  - Technology Demonstration Program
  - Data Continuity
  - Program Management

Task #3 Report – LAG Recommendations

- The LAG finds several policy areas which the Landsat program office might find beneficial for further examination, reflecting the underlying guidance of the Land Remote Sensing Policy Act and the influence of great technological change:
  - Looking forward, precisely what does 'continuity' for the Landsat program require, and what combination of approaches to accomplishing 'continuity' hold the most promise?
  - Should Landsat continue to be optimized for medium resolution earth observation or should there be a broader set of objectives considered, to include diverse phenomenologies (as in the European Copernicus program)?
  - How do the Earth observation capabilities of the U.S. compare to other countries and regions, particularly China and Europe? What is Landsat's role in maintaining the 'global leadership' mandate set forth in the Land Remote Sensing Act?
  - How can or should the Landsat program leverage existing international Earth observing capabilities, such as the Copernicus program in Europe?
  - What principles should be considered for inclusion in a new national land remote sensing policy that would "enable the United States to maintain its leadership in land remote sensing"?

Landsat Advisory Group

Landsat Program Update

Tim Newman

USGS National Land Imaging Program

Landsat Operations & Development Status

Active
In Development
Planned

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 7 Flight Operations (1999-)

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

Landsat 9 (Launch in 2021)

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

Landsat Next (~ late 2020s launch)

Technology and user needs analyses led to an architecture study, which delivered post-Landsat 9 recommendations to NASA and USGS in 2020.

NASA and DOI/USGS working together to define a multi-component architecture; details to be announced with FY22 Budget.

Landsat Archive Operations

Over 9 million unique Landsat scenes available in the 50-year archive, with over 100 million downloads since Landsat data become freely available in 2008.

New “Collection 2” now available on the Amazon Cloud.

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In 2021: Join us at the 2nd National Imagery Summit: August 31 – September 2 (all-virtual)

- Attend daily applications-themed workshops
- See how Landsat data are used at the state, city, local, and tribal scale
- Learn about Landsat 9 and Landsat Next
- Hear the perspectives of innovative government, commercial, and non-profit leaders in land remote sensing data and technology
- Discuss the latest land-imaging policy developments with key decision-makers
- Inform Sustainable Land Imaging program development
- Share information on user needs
- Meet tomorrow's remote sensing workforce through an educational/student track

USGS

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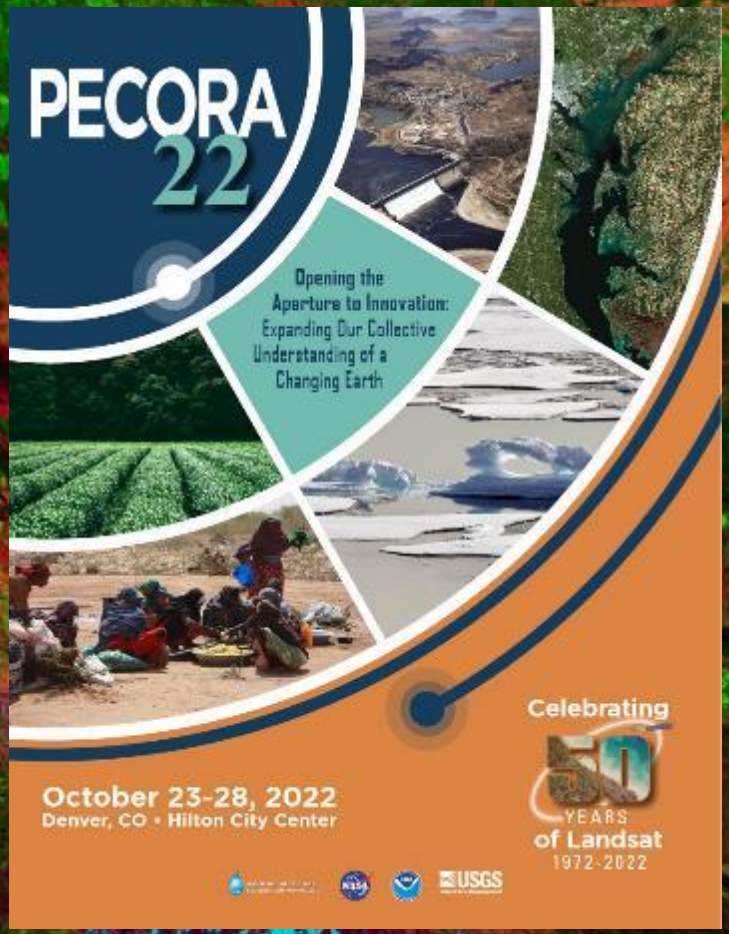
And in 2022: Join us at Pecora-22



The Nation's biennial flagship conference on land imaging science, technology, user needs, applications, and policy

USGS

Potential CY2021 LAG Study Topics

Determining Commercial/Non-Federal use and needs for Landsat data

- Landsat widely used in commercial, state/local governments, tribal, international and non-governmental sectors.
- Identifying and understanding non-Federal use case applications for Landsat data and desires for improvements in future Landsat missions

Landsat in the Cloud Era

- Alignment of the Landsat free and open data policy to data and services in a commercial cloud
- Roles for the Federal Government to periodically assess the data from Government systems like Landsat in the commercial cloud to ensure data provenance
- Innovations that might best exploit the cloud environment for the provision of free and open data

Performance Metrics

- Metrics historically focused on data managed within government archive systems and on data volume distributed from government distribution systems
- Metrics needed with the transition to the commercial cloud and new service models

Mission Focus: Where is the Water's Edge of NLI Scope?

- Role of the National Land Imaging (NLI) program in a resource-limited environment
- Balance between operational capability and the improved user experience
- Higher-order information products necessary for the "public good" and clear priorities for NLI program as well as for other organizations (Initiation, insertion, and integration points)
- Guiding principles for balancing investments in light of core goal of providing authoritative, scientifically relevant and productive datasets to the larger community

Questions/Discussion