
Landsat Advisory Group (LAG) Status Report

NGAC Webinar

December 14, 2016

**Joanne Gabrynowicz, LAG Chair
and
Frank Avila
LAG Vice-Chair**

LAG Purpose

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 2016 Membership

Name	Organization
Joanne Gabrynowicz (LAG Chair, NGAC Member)	University of Mississippi
Frank Avila (LAG Vice-Chair, NGAC Member)	National Geospatial-Intelligence Agency (NGA)
Roger Mitchell (NGAC Member)	MDA Information Systems, Inc.
Rebecca Moore (NGAC Member)	Google, Inc.
Kass Green	Kass Green & Associates
Peter Becker	ESRI
Roberta Lenczowski	AmericaView
Tony Willardson	Western States Water Council
Steven Brumby	Descartes Labs
Walter Scott	DigitalGlobe
Jed Sundwall	Amazon Web Services

Federal Contacts: Tim Newman and Peter Doucette (USGS)

Status

- Initial LAG meeting held on August 2, 2016
 - Introduction of Team Members
 - Review and discussion of Study Tasks
 - Team member topic selections

- Team leads assigned
 - Leads were previous LAG team member
 - Task #1 lead: Kass Green
 - Task #2 lead: Bobbi Lenczowski

LAG Task #1 – Revisit Smallsat Investigation

- Team Members:

Name	Organization
Kass Green – TEAM LEAD	Kass Green & Associates
Roger Mitchell (NGAC Member)	MDA Information Systems, Inc.
Peter Becker	ESRI
Roberta Lenczowski	AmericaView
Steven Brumby	Descartes Labs
Walter Scott	DigitalGlobe

- First Team meeting held on October 3, 2016
- Proposed Report Due Date – March 31, 2017

LAG Task #1 – Revisit Smallsat Investigation

- Topic is a carry-over from 2015 study question
- USGS asking LAG formulate comprehensive **narrative on pros and cons** of *existing* smallsat technology **juxtaposed with Landsats 8 and 9**:
 - Spectral **collection** capabilities and **user needs**, e.g., visible and near-IR, versus shortwave and thermal IR wavelengths
 - Radiometric and geometric **calibration needs** to support robust change analysis from a continuity of collection over time
 - **Collection tradeoffs** among swath width, spatial resolution, and area coverage
 - Support to **different mission needs**, e.g., situational awareness versus science driven; tactical versus strategic monitoring; spatial and temporal scales of the process being monitored; etc.
- Task is divided into 4 parts

1. Mission

- Steven – lead. Members: Bobbi, Roger, Peter, Joanne
 - **Support to different mission needs**, e.g., situational awareness versus science driven; tactical versus strategic monitoring; spatial and temporal scales of the process being monitored; etc.
 - In general to what **extent** are simultaneous **observations required vs. disaggregated observations**? Hybrid approaches.
 - What are **applications** being supported by small sats?
 - How **does the leveraging** of small sat technologies and products, as they sufficiently mature to address operational and scientific needs, **satisfy** interests of **the civil user community**?
 - **How** can maintaining a **broad** portfolio of **capabilities reduce the risk** to meeting current operational needs?

2. System Capabilities

- Walter – lead. Members: Kass, Steven
 - **Classification scheme** for cube to small sats. Bench mark data points. Chart of systems. Match to requirements.
 - **Spectral collection capabilities and user needs**, e.g., visible and near-IR, versus shortwave and thermal IR wavelengths.
 - **Collection tradeoffs** among agility, swath width, spatial resolution, and area and geographic coverage.
 - Processing requirements on the **ground** and band width. Ground stations. Need for additional US calibration facilities. Processing on board vs. processing on the ground.
 - Cost.
 - **Trade-offs** by **weight** explain capabilities and the **size** of the satellite that results.

3. Radiometric and Geometric Correction

- Peter – lead. Member: Walter
 - Radiometric and geometric calibration needs to **support robust change** analysis from a continuity of collection over time.
 - Techniques of **calibration**.
 - **How** have people **applied** calibration techniques? What has and hasn't worked.
 - How **calibration** affects **a higher level product**.
 - **Hybrid** approaches.

4. Synergies

- Roger – lead. Members: Bobbi, Steven
 - How could efficient **synergy** be realized **among government and commercial roles** for small sat development and operation across broad community needs?

Schedule

- First subtask drafts complete and distributed to this group by the middle of Dec. 16, 2016 (this is not going to happen – all groups are behind).
- Final subtask drafts complete and distributed to this group by Feb. 3, 2017.
- Final of report developed by Feb. 24, 2017 and distributed to this group.
- Final of report to NGAC March 3, 2017, including slides for presentation to NGAC.

LAG Task #2 – Temporal Data Cube Study

- Study the **feasibility and utility** of implementing temporal data cubes **to support projection** or ‘forecast’ models of land change trends
- It remains **unclear whether a deeper market demand** for forecasting land change **will develop**. To that end, the following questions are posed for further study:
 - In addition to Landsat, **what other data sources** (to include EO, SAR, and LIDAR) are optimally suited for leveraging (e.g., co-registered) to support data cube implementations for land change analysis and forecast modeling?
 - **What** kinds of Landsat time-series **products would have the broadest community use**, or most impactful contribution in specific areas?
 - Which **organizations** with expertise in forecast modeling are **best postured to evaluate and demonstrate the forecast potential** from a Landsat-based temporal data cube?
 - **How far back in time into the Landsat archive** should the staging of ‘analysis ready data’ be considered? E.g., early data collections such as multi-spectral scanner (MSS) data are less equipped (in terms of metadata) to support rigorous geometric and radiometric calibration compared to later collections.
 - How could efficient **synergy** be realized **among government and commercial roles** for data cube development, and operations (processing, storage, distribution) to satisfy broad community needs?

LAG Task #2 – Temporal Data Cube Study

■ Team Members –

Name	Organization
Roberta Lenczowski - TEAM LEAD	AmericaView
Rebecca Moore (NGAC Member)	Google, Inc.
Peter Becker	ESRI
Tony Willardson	Western States Water Council
Steven Brumby	Descartes Labs
Jed Sundwall	Amazon Web Services
Frank Avila (NGAC Member)	NGA

■ Additional Participants –

- Sara Larsen (WSWC), supporting Tony Willardson
- Matthew D. Hancher (Google), supporting Rebecca Moore
- Joe Flasher (Amazon), supporting Jed Sundwall

■ Meetings to Date

- First Team meeting held on September 9, 2016
- Second Team Meeting held on October 14, 2016
- Third Team meeting held with USGS LCMAP Team on November 16, 2016
- Fourth Team meeting to be held on December 14, 2016

■ Proposed Report Due Date – June 30, 2017

LAG Task #3 – Data Continuity Mission Enhancements

- To what extent could ‘significant’ **sensor enhancements** be made **in future Landsat missions**, while maintaining acceptable backward compatibility? What would be the suggested methods for data aggregation and validation?
 - A working premise of the data continuity mission is that future collection sensor **specifications maintain a level of ‘backward compatibility’ with past missions** to facilitate time-series analysis over the entire record. For this reason, Landsat sensor specifications have evolved deliberately over time.
 - However, the **impact** to the data continuity mission from ‘significant’ sensor design enhancements, e.g., spectral and/or spatial resolution, **needs to be better understood**. This issue applies to future Landsat mission design, as well as integrating continuity data from third party sensors.

LAG Task #3 – Data Continuity Mission Enhancements

- Team Members -

Name	Organization
Joanne Gabrynowicz (LAG Chair)	University of Mississippi
Kass Green	Kass Green & Associates
Tony Willardson	Western States Water Council
Walter Scott	DigitalGlobe

- Task work-off will be deferred to a later date due to topic complexity and lack of a Team Lead
- Proposed Report Due Date – September 30, 2017