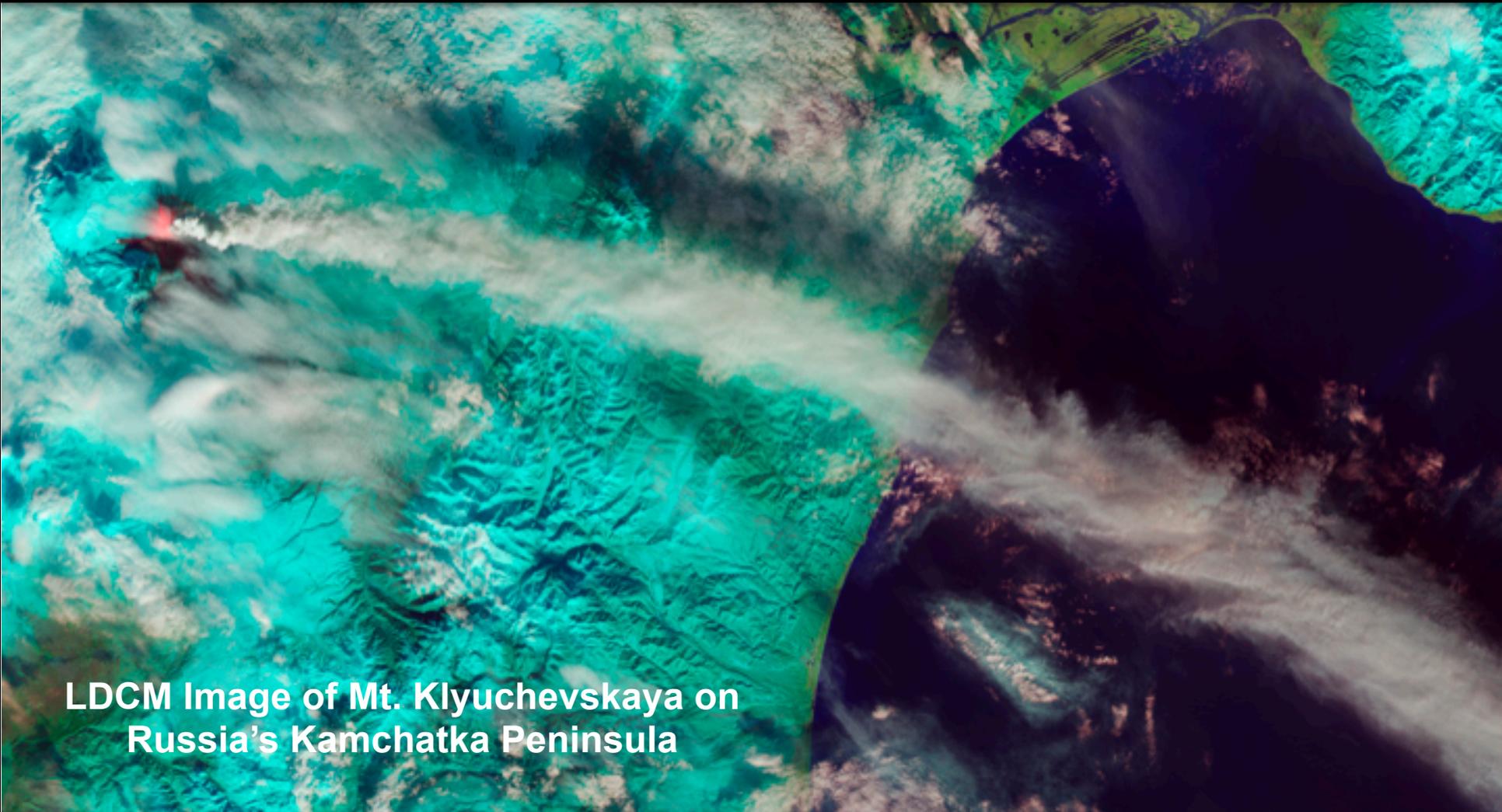


NASA Sustainable Land Imaging Study Overview



LDCM Image of Mt. Klyuchevskaya on
Russia's Kamchatka Peninsula

David B. Jarrett
4 December 2013

Land Imaging in FY 2014 President's Budget for NASA



*In FY14 NASA will initiate the definition of a sustained, space-based, global land imaging capability for the nation, ensuring continuity following LDCM. Near-term activities led by NASA, in cooperation with USGS, will focus on **studies** to define the scope, measurement approaches, cost, and risk of a viable long-term land imaging system that will achieve national objectives. Evaluations and design activities will include consideration of stand-alone new instruments and satellites, as well as potential international partnerships. It is expected that NASA will support the overall system design, flight system implementation, and launch of future missions, while USGS will continue to fund ground system development, post-launch operations, and data processing, archiving, and distribution.*

- President's FY 2014 Budget release

NASA – USGS Collaboration



Study Phase

- NASA will lead the overall system architecture study, utilizing its space systems engineering expertise
- USGS will support all aspects of the study; USGS will represent the consolidated needs and desires of the Landsat user communities and provide expert analyses of the data processing and data dissemination aspects of the system

Implementation Phase

- NASA will be responsible for the overall system design, as well as the implementation, launch, and commissioning of the system's space-borne elements
- USGS will provide unique expertise and guidance in the design of the operations, ground network, data processing (including integration of measurements from multiple sources), and data dissemination components of the complete system
- USGS will be responsible for operating the space-borne assets after commissioning, as well as the downlink, ground processing, archiving, and distribution of the system's information and data products
- The USGS will maintain the national archive of Landsat data, distribute data to users, and administer, on behalf of the U.S. Government, data acquisition by non-USG ground stations.

Study Objectives



- Define a system for delivering sustained global land-imaging multispectral and thermal infrared information for an approximately 20-year period starting in 2018
- Provide options which consider various weightings of near-term capability, continuity/gap risk mitigation, technology infusion over the system's lifetime, and cost
- Consider refined capabilities requested by the user communities
- Include consideration of new measurement approaches, as well as potential international and private sector partnerships
- Provide complete system architecture recommendations to the Executive Office of the President by August 15, 2014



Three Basic Study Tenets for the Program

✧ Sustainability

- The SLI program should provide the data products for the long haul, without extraordinary infusions of funds, within the budget guidance provided.
- It should also ensure the technology required for the program is available and appropriate for the long haul

✧ Continuity

- The SLI program should continue the long term Landsat data record. This does not necessarily mean the imagery per se, but the usable products that define the utility of the data record.
- Understanding how the data are used is essential when considering potential architectures.

✧ Reliability

- The SLI program should exhibit a form of functional redundancy. The data sets should be able to draw on equivalent or near equivalent deliverables from different sources to provide the data for the highest priority land imaging data products.
- With these “near equivalent” data sources identified in advance, the loss of a single satellite or instrument on orbit should not cripple the program or significantly impact users, and the program will exhibit graceful degradation.

Cost Factors



- ✧ Programmatic stability recognizes that system cost is a critical parameter in the overall design
- ✧ The NASA budget includes development, launch, and commissioning of the space-borne assets
- ✧ The USGS budget includes mission operations, ground systems, and data archiving and distribution
- ✧ Trade-offs between the space and ground elements must factor in the budget constraints of each Agency

Architecture Study Approach



- **NASA established an Architecture Study Team (AST) to perform trade studies and analyses and provide candidate land imaging system architectures**
 - Implemented through and Led by the Earth Systematic Missions Program Office at GSFC
 - Membership includes technical experts from NASA Field Centers, USGS Earth Resources Observation and Science Center, Jet Propulsion Laboratory, Applied Physics Laboratory, and The Aerospace Corporation
- **NASA released an RFI on September 16, 2013**
 - RFI deadline extended by 2 weeks to November 1 because of U.S. Government shutdown
 - 35 RFI responses received from a broad spectrum of the interested community, including government, contractor, academic, and foreign respondents
- **The AST will define and refine architecture options and present them to NASA and USGS for review and evaluation throughout the process**
- **NASA and USGS will hold a Community Forum in March 2014 to communicate architecture options and to solicit feedback**
- **The study activity will result in recommendations and an implementation plan for a Sustainable Land Imaging System (combined space and ground system) to be provided to the Executive Office of the President by August 15, 2014**



Sustainable Land Imaging (SLI) Study Timeline

- ✧ Establish Architecture Study Team (AST) Sep 2013
- ✧ Initiate Community outreach Sep 2013
- ✧ Define and Refine Architecture Designs Nov 2013 – Mar 2014
- ✧ SLI Community Forum: solicit feedback on architectures Mar 2014
- ✧ AST SLI architectures report to NASA ESD May 2014
- ✧ NASA SLI study report development Jun 2014
- ✧ Agency review and concurrence Jul 2014
- ✧ NASA ESD Sustainable Land Imaging report and recommendations delivery to OMB/OSTP Aug 15, 2014

Community Outreach Opportunities



- ✓ *The Architecture Study briefed to Landsat Science Team on October 29-31*
 - *The LST requested to provide user input for the AST, and the LST agreed*
- ✓ USGS/NASA Land Imaging Users Forum on December 4
- ✧ American Geophysical Union (AGU) National Research Council (NRC) Land Imaging Study Town Hall on December 11
- ✧ American Meteorological Society Annual Meeting (AMS) Pre-Formulation mission and Land Imaging Town Hall on February 5, 2014
- ✧ SLI Community Forum in March 2014
- ✧ American Society for Photogrammetry and Remote Sensing (ASPRS) Annual Conference and Joint Agency Commercial Imagery Evaluation (JACIE) Workshop Sustained Land Imaging Session and Industry Discussion on March 23-28
- ✧ Western States Water Council Annual Meeting on April 1-4
- ✧ Biodiversity and Ecological Forecasting Joint Team Meeting in April/May 2014