

The Lunar Mapping and Modeling Project

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Project Background and Overview

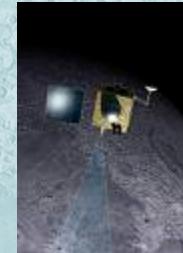
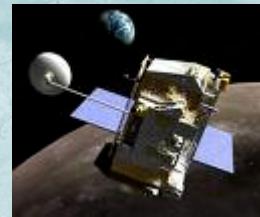
- LMMP was initiated in 2007
 - to help in making the anticipated results of the LRO spacecraft useful and accessible to Constellation
 - the MSFC Lunar Precursor Robotic Program Office (LPRP) was given management responsibilities
- The LMMP is managing and developing a suite of lunar mapping and modeling tools and products that support the Constellation Program (CxP) and other lunar exploration activities
- In addition to the LRO Principal Investigators, relevant activities and expertise that had already been funded by NASA was identified at ARC, CRREL (Army Cold Regions Research & Engineering Laboratory), GSFC, JPL, & USGS
- LMMP is a cost capped, design-to-cost project
 - Project budget was established prior to obtaining Constellation needs

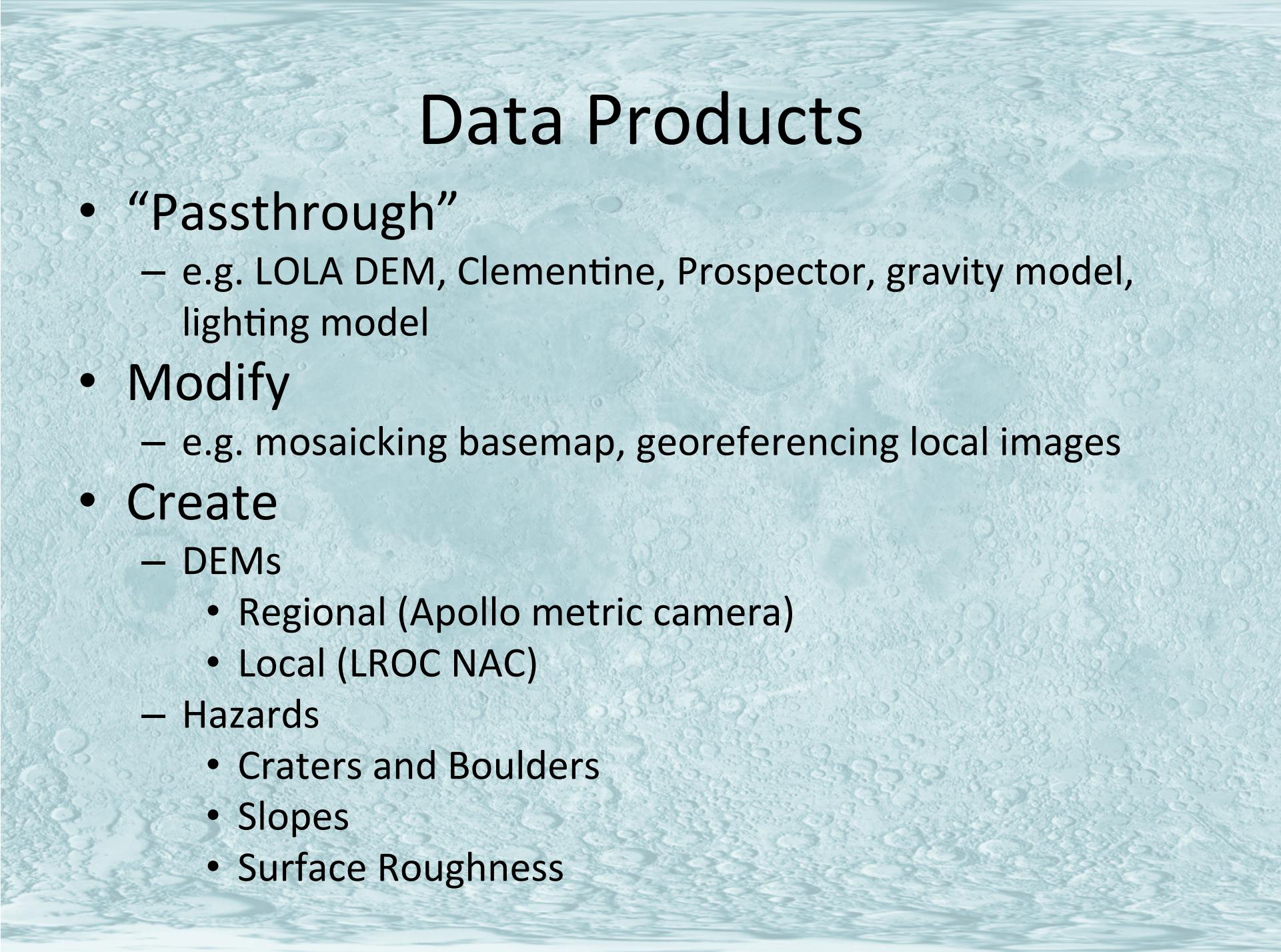
Customers

- **Main customer is the Constellation program**
The information provided through LMMP will assist them in:
 - planning tasks in the areas of landing site evaluation and selection
 - design and placement of landers and other stationary assets
 - design of rovers and other mobile assets
 - developing terrain-relative navigation (TRN) capabilities
 - assessment and planning of science traverses
- **Other customers**
 - Science community
 - Commercial community
 - Education/Public Outreach community

Data Sources

- LRO
- M3
- Kaguya (gravity model)
- Apollo (metric & panoramic cameras)
- Clementine
- Prospector





Data Products

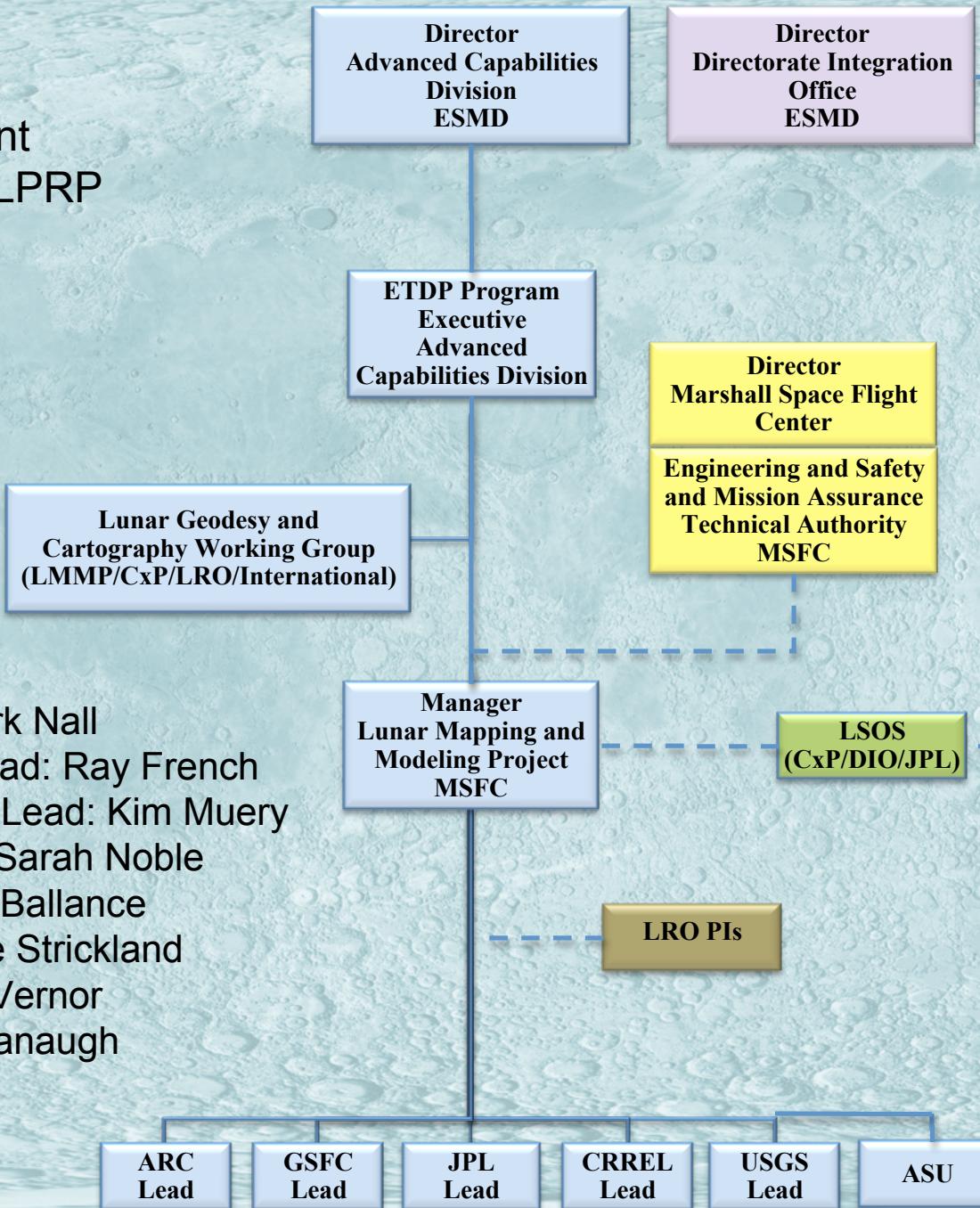
- “Passthrough”
 - e.g. LOLA DEM, Clementine, Prospector, gravity model, lighting model
- Modify
 - e.g. mosaicking basemap, georeferencing local images
- Create
 - DEMs
 - Regional (Apollo metric camera)
 - Local (LROC NAC)
 - Hazards
 - Craters and Boulders
 - Slopes
 - Surface Roughness

Management Structure Post LPRP

FY 2010-11

MSFC Team:

Project Manager: Mark Nall
Project Integration Lead: Ray French
Project Development Lead: Kim Muery
Project Scientist: Dr. Sarah Noble
Chief Engineer: Judy Ballance
S&MA TA: Rosalynne Strickland
Scheduling: Kathryn Verner
Risk: Dominique Cavanaugh



LMMP Team

ARC

- Regional Apollo visible base imagery mosaics
- Regional DEMs
- EPO web-based neo-geography interfaces

USGS

- Local/site visible base imagery mosaics
- Regional/polar visible base imagery mosaics
- Local/site DEMs

JPL

- Visualization system infrastructure, web portal and interoperable GIS infrastructure
- Local/site DEMs (stereo photoclinometry)
- Local/site albedo maps
- Hazard assessment maps (including slope maps)

ASU

- Local/site DEMs

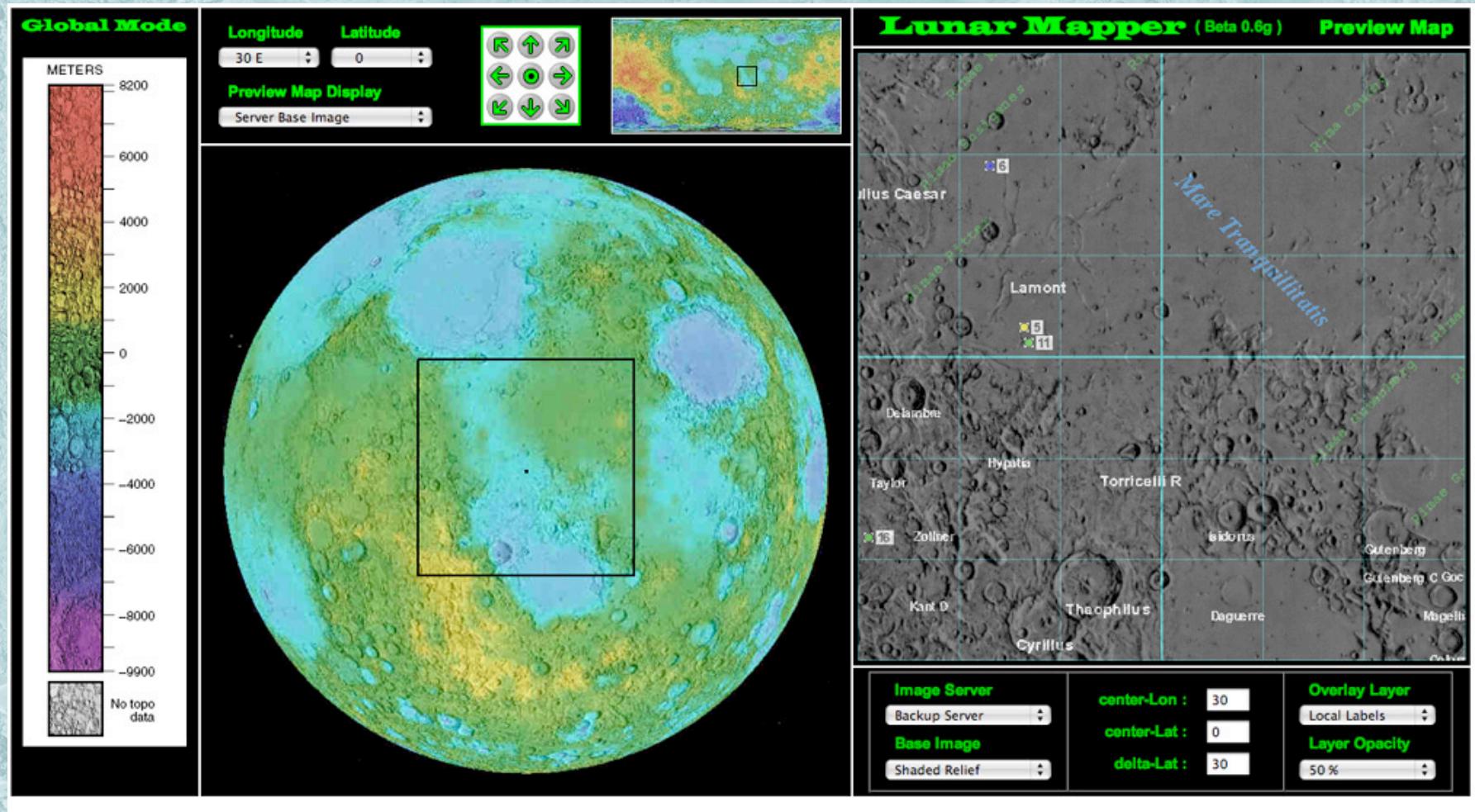
CRREL

- Web-based visualization system digital overlay tools

GSFC

- Desktop visualization client – Integrated Lunar Information Architecture for Decision Support (ILIADS)

Lunar Mapper (pre-beta)



Lunar Mapper in Global Mode

Lunar Mapper (pre-beta)

Search Mode

Mare Tranquillitatis	Craters 160+ km
Mons / Montes	Craters 125+ km
Rima	Craters 107+ km
Rimae	Craters 96+ km
Dorsa / Dorsum	Craters 90+ km
Other Features	
Manmade Objects	

Slow Spin

Reference Map

-LON 51.1 29.2 -LAT

Lunar Mapper (Beta 0.6g) Preview Map

Image Server
Backup Server
Base Image
Shaded Relief

center-Lon : 30
center-Lat : 9
delta-Lat : 30

Overlay Layer
Local Labels
Layer Opacity
50 %

Lunar Mapper in Search Mode

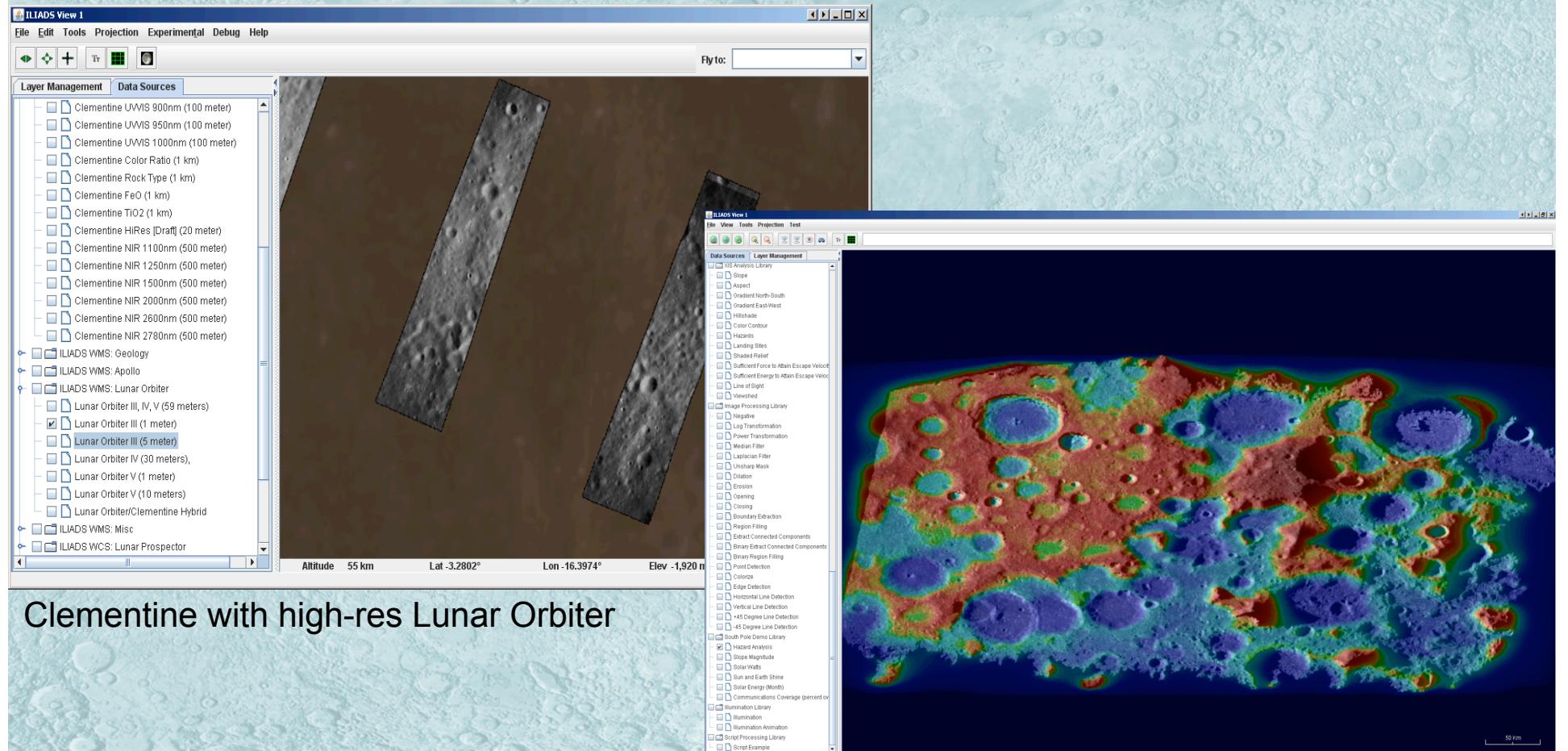
Integrated Lunar Information Architecture for Decision Support (ILIADS) (pre-beta)

The image shows a screenshot of the ILIADS software interface, which consists of two main windows. The left window is titled "ILIADS View 1" and displays an oblique view of the Moon's surface. It features a toolbar at the top with icons for file operations, zoom, and search. Below the toolbar is a menu bar with File, View, Tools, Projection, Experimental, Debug, and Help. A status bar at the bottom shows coordinates: Altitude 209 km, Lat -49.1987°, Lon -16.2989°, and Elev. On the left side of this window is a "Data Sources" panel listing various lunar datasets, including Clementine Albedo (100 m), which is currently selected. The right window is also titled "ILIADS View 1" and shows another oblique view of the Moon's surface. It has its own toolbar, menu bar, and status bar. A "Layer Management" panel on the left lists various layers such as PIVWAD Lunar Data, ILIADS Clementine, ILIADS Geology, ILIADS Apollo, ILIADS Missions, and ILIADS Topography. The main view in this window shows a specific area of the Moon's surface with several red outlines highlighting regions of interest. Labels "20 km" and "Off globe" are visible at the bottom.

Clementine Albedo (oblique view)

Lunar Surface Traverse Tool (oblique view)

Integrated Lunar Information Architecture for Decision Support (ILIADS) (pre-beta)



LMMP Milestones

- Apr 2009 – Formulation review
- Jun 2009 – LRO launched!
- Jun 2009 – Requirements review
- Aug-Sep 2009 – Individual product process validation audits
- Sep 2009 – Preliminary System design audit
- Nov 2009 – Beta release of Mapper, ILIADS, Portal, infrastructure and content
- Late 2010/Early 2011 – Version 1 release