

The Lunar Mapping & Modeling Portal: An Application of Lunar Landing Support Tools to Mars. R. C. Weber¹, M. E. Nall¹, and E. S. Law² ¹George C. Marshall Space Flight Center, AL ²Jet Propulsion Laboratory, Pasadena, CA.

Abstract: The Lunar Mapping and Modeling Portal (LMMP), www.lmmp.nasa.gov led by NASA's Marshall Space Flight Center, has developed a web-based Portal and a suite of interactive visualization and analysis tools to enable lunar scientists, engineers, and mission planners to access mapped lunar data products from past and current lunar missions, e.g., Lunar Reconnaissance Orbiter, Apollo, Lunar Orbiter, Lunar Prospector, and Clementine.

The Portal allows users to search, view and download a vast number of the most recent lunar digital products including image mosaics, digital elevation models, and in situ lunar resource maps such as soil maturity and hydrogen abundance.

The Portal also provides a number of visualization and analysis tools that perform lighting analysis and local hazard assessments, such as, slope, surface roughness and crater/boulder distribution. Through the Portal, users may also access two visualization and analysis software applications: Lunar Mapper (LM), a thin client Web-based Geographic Information System (GIS); and ILIADS (Integrated Lunar Information Architecture for Decision Support), a rich GIS client that runs on a user-supplied desk side or laptop PC/Mac computer.

The data and tools available through the LMMP allow users to perform in-depth analyses to support lunar surface mission planning and system design for future lunar exploration and science missions. The combination of the Portal, LM, and ILIADS fosters detailed scientific analysis and discovery, and opens the door to educational and public outreach opportunities.

The LMMP's system infrastructure design uses a combination of custom software, commercial and open-source components, off-the-shelf hardware and pay-by-use cloud computing services. Compute-intensive functions employ a workflow system that allows jobs to be outsourced to the cloud. Highly parallelizable jobs employ a Map Reduce framework to increase performance and lower latency. A system and data security layer allows the system to manage private, competition-sensitive, and public data and services. It also provides a transparent bridge to the Planetary Data System (PDS) to allow users access to NASA archives. Other planetary data servers that adhere to the Open Geospatial Consortium (OGC) web services protocol standards may also be accessed. Its web interfaces, iPad and Android mobile platforms, and large screen Multi-touch with 3-D allow for a rich browsing experience.

The LMMP was targeted to support "Return to the Moon". However, the Portal and the client applications LM and ILIADS are designed to support other planetary bodies, e.g., asteroids, and planets including the Earth. This system can easily be extended to support Mars landings and exploration.



Overlay of Digital Elevation Model data on an LROC mosaic.