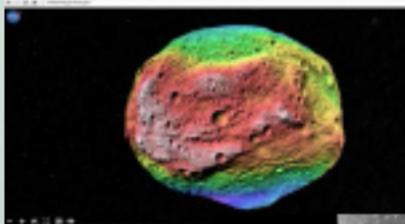




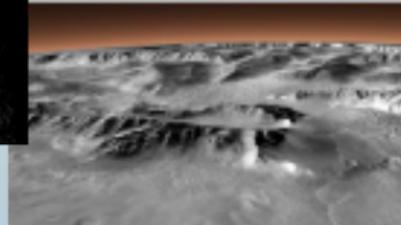
Technology for Planetary Science and Education

**Lunar and Planetary Mapping and Modeling:
LMMP, Vesta Trek, Mars Trek**



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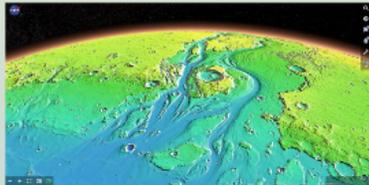
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Government sponsorship acknowledged.

Background

- Sponsored by  PSD SMD & AES HEOMD
- Managed by Solar System Exploration Research Virtual Institute
- Developed at Jet Propulsion Laboratory: 
Data services, a suite of interactive visualization & analysis tools
- Initially built for Lunar exploration under the Constellation Program
- Designated as a component of NASA SMD Science Education's Infrastructure
 - A resource for NASA Science Education & Communication programs
 - Available to greater education & engagement community

Overview

- Resource: Data, Technology, Technical Expertise
- Data from instruments aboard a variety of past & current missions
 - Feature web-based portals
 - Enable users to browse, search, download, & create visualizations



- Allow data products to be layered and adjusted to optimize data visualization
- Visualizations can easily be stored and shared

- Include analysis tools for measurement and study of planetary terrain

- Facilitate 3D visualization and 3D printing of surface landforms



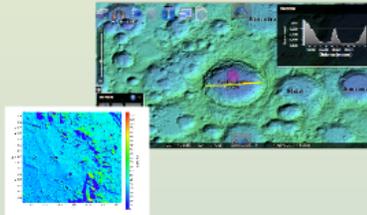
- Portals publicly available for the Moon, Vesta, and Mars
- Support a growing number of planetary bodies



LMMP



<http://lmmp.nasa.gov>



- Analysis tools include distance measurement, elevation plots, Sun angle, and more

- Over 700 data products

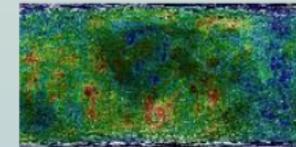
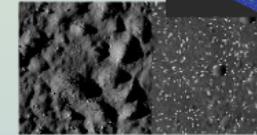
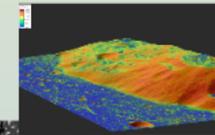
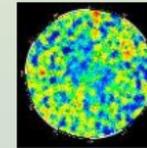
- LRO, Apollo, LP, GRAIL, Clementine, Chandrayaan-1, Kaguya

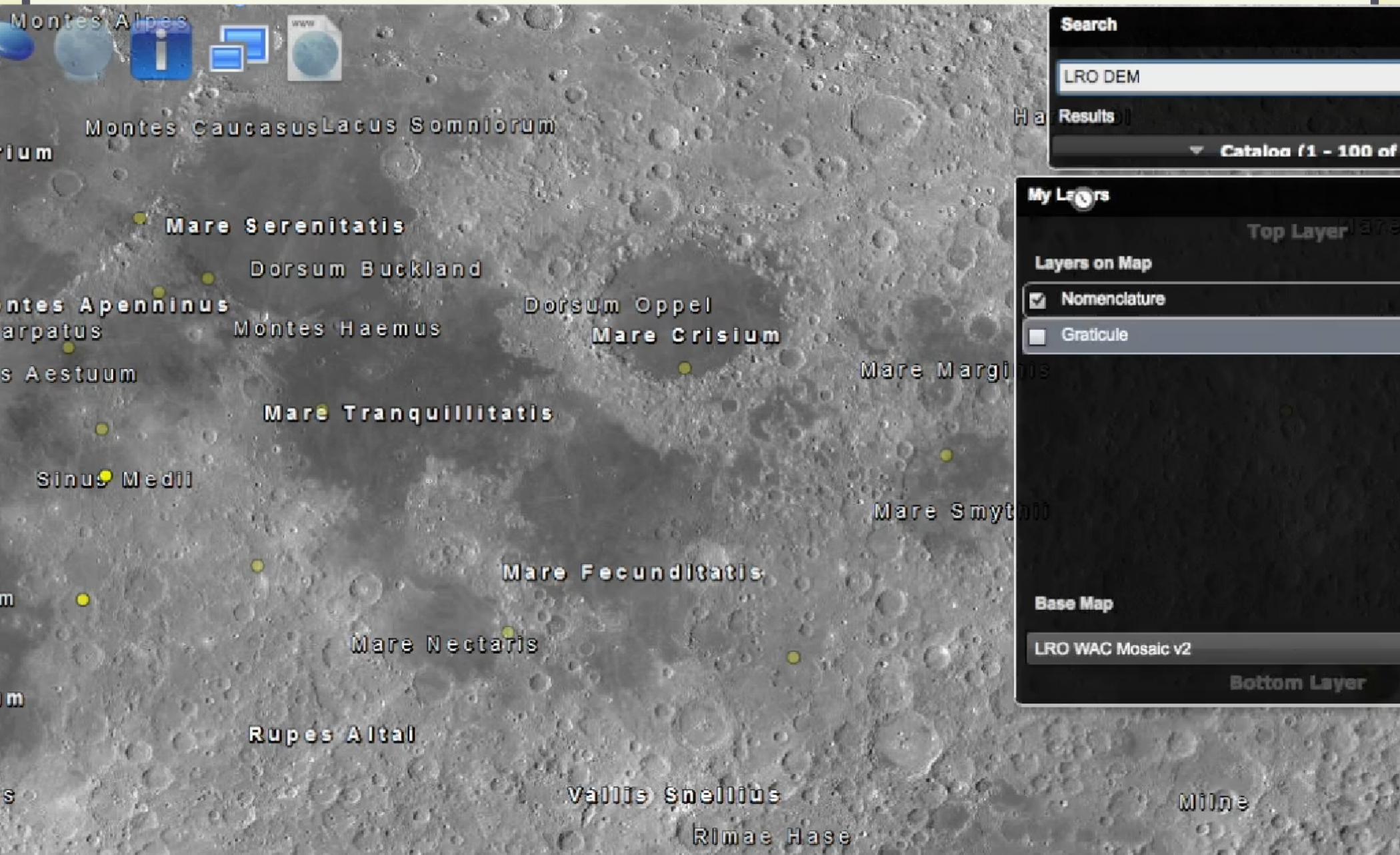
- Gravity models, Imagery, DEMs, Hazards, Resources

- Visualization (with overlays)

- Allows students and public to examine targets of past and upcoming missions

- Future release will include integration with Apollo lunar sample database, showing the context from which the samples were retrieved





Search

LRO DEM

Results

Catalog (1 - 100 of ...)

My Layers

Top Layer

Layers on Map

- Nomenclature
- Graticule

Base Map

LRO WAC Mosaic v2

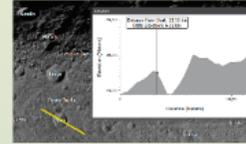
Bottom Layer

Search across all data products as well as PDS (Planetary Data System)

Vesta Trek

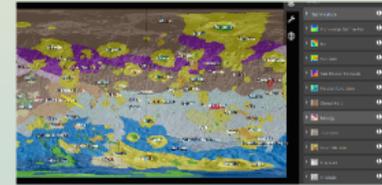
<http://vestatrek.jpl.nasa.gov>

- Analysis tools



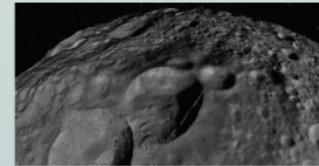
- Distance, Profile, Sun Angle, Sun & Earth Overhead

- Browse data products from Dawn

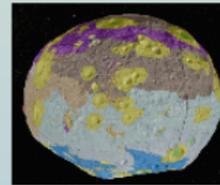
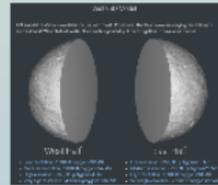


- Visualization (with overlays)

- Enhanced interface for 3D flyovers



- Data



- Iron, Hydrogen, Neutron, Geology, Hillshade, High-energy Gamma-Ray



- Current Dawn data being ingested for the upcoming Ceres Trek

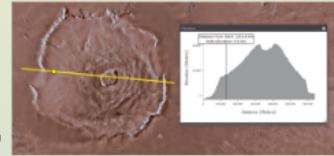




Mars Trek

<http://marstrek.jpl.nasa.gov>

- Analysis tools

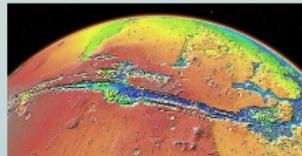
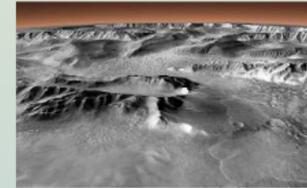
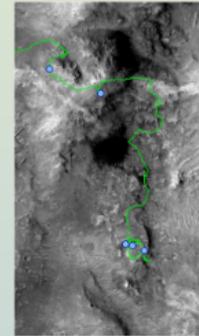


- Distance, Profile, Sun Angle, Spacecraft Overhead

- Landing Site features

- MER, MSL, Phoenix, Pathfinder

- Path from The Martian



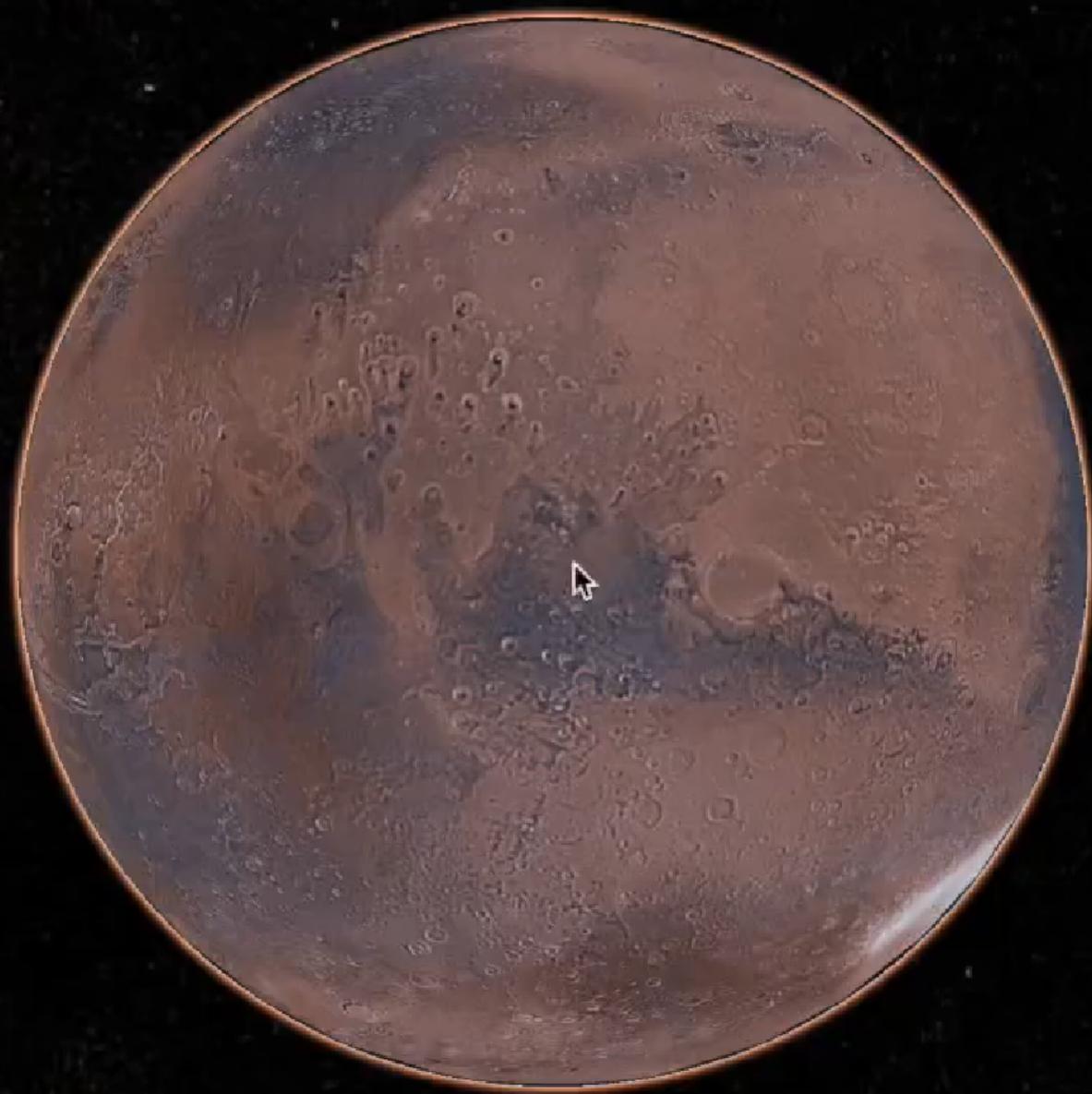
- Data

- MRO, Odyssey, MGS, Viking, Mars Express HRSC

- Shown at Comic-Con International



- Being enhanced for use in human landing site selection as well as student/public engagement in the process



User Experience

Additional clients and interfaces



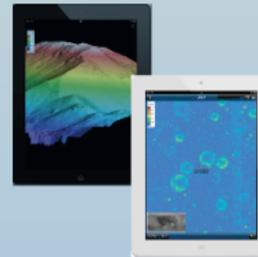
- Web- REST APIs serving data to a variety of external platforms (e.g. Eyes, Planetariums)

- Prototype client for virtual reality goggles successfully demonstrated



- Touch table, adapt interface to support attended exhibits in museums

- Mobile apps for planetary exploration in your palms





Technology for Planetary Science & Education

- Available free of charge
- Look forward to working with this community
 - Understanding how to best use these products
 - Helping you integrate them into your programs
 - Gathering your input to improve these products
- If you have custom requirements, we can work with you to determine specifications and costs for custom development and deployment

Contact me!

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Thank You!

