Planetary Surface Visualization & Analytics

Planetary Science Informatics and Data Analytics

Emily Law

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Solar System Treks (SST)

- Web based interactive portals for mission planning, research and EPO
  - Planetary surface Visualization and Analysis tools
  - GeoSpatial Data processing pipeline
  - GeoSpatial Data products based on PDS data from past and current missions

- Standard Data Access and Web Service APIs
  - A variety of user interfaces (e.g., virtual reality)
  - A variety of external platforms (e.g., planetariums)

- Publicly available portals
  - Mars (https://marstrek.jpl.nasa.gov)
  - Moon (https://moontrek.jpl.nasa.gov)
  - Vesta (https://vestatrek.jpl.nasa.gov)
  - More to come (e.g., Phobos, Titan)
Architecture

Solar System Treks

GeoSpatial Data Processing

Planetary Data Archives

Other GeoSpatial Data Pipelines

2D, 3D, VR Visualization

Analytic Tools

GeoSpatial Data

Data Access

Standards

Policy

PSDI

User
Visualization

Layers

Added
MGS MOLA, Global Color Hillshade
MRO CTX, Mosaic InSight

Static

Metadata:
- Identification Information
- Source Reference: MGS MOLA
- Source Reference: MRO CTX

Citation:

Description:

This is a Stereo CTX composite mosaic of the 103391 Landing Site. After being transmitted and processed on the ground, the mosaic (16 images) is combined into a single RGB image. All of the Jonamoid changes were then mosaicked into a single image and color enhanced using Envisat Advanced SAR data.
3D Visualization
Other User Interfaces

- Virtual Reality Goggles
- Mobile Apps
- HyperWall
- Touch Table
Analytics

- Basic tools
  - Distance, Elevation, Sun Angle, 3D prints generation

- Advanced tools for exploration and research
  - Lighting, Crater Detection, Rock Detection, Slope, Path, Surface Potential
3D Model
Lighting Analysis
Lighting Analysis Result
Slope Analysis
### Crater/Rock Detection Result

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#### Craters and Rocks

![Craters and Rocks Graph](image-url)
Summary

• Planetary exploration and science are complex
  – Data is difficult to interpret and use

• Interactive Visualization and Analytics have major impact
  – Lower barrier of usability, advance science & science communication, inspire public

• Technologies and capabilities exist but lacking, more investments needed
  – Visualization and analytics
  – Value added geospatial product generation

• Solar System Treks project continues to advance these fields
  – New portals coming soon: Phobos, Titan, IcyMoons, Ceres
Thank You

https://moontrek.jpl.nasa.gov
https://marstrek.jpl.nasa.gov
https://vestatrek.jpl.nasa.gov

Emily S. Law  emily.s.law@jpl.nasa.gov

Brian Day, Eddie Arevalo, Bach Bui, George Chang, Natalie Gallegos, Richard Kim, Shan Malhotra, Syed Sadaqathullah, Catherine Suh, Marshall Trautman, Dan Yu, Quoc Vu