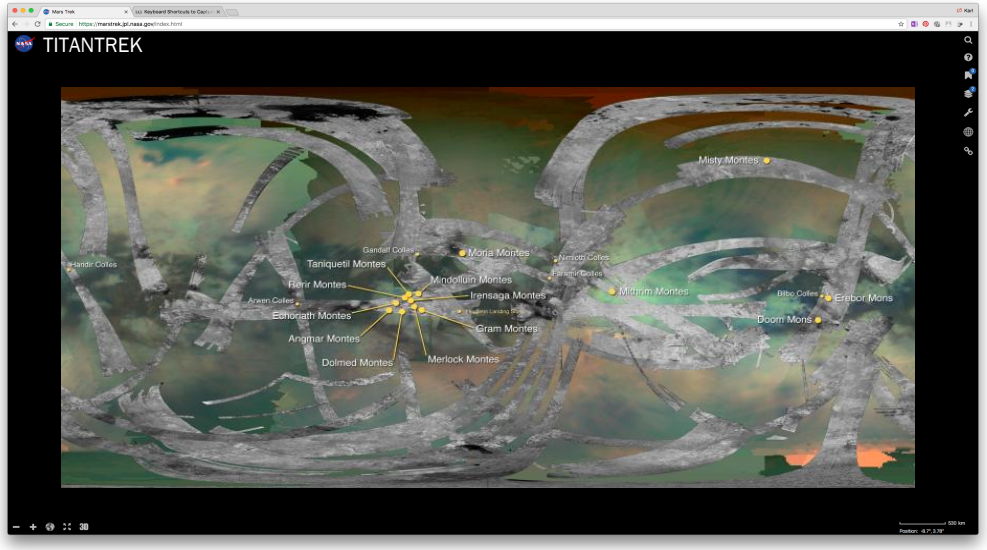
National Aeronautics and Space Administration

Jet Propulsion Laboratory
California Institute of Technology
Pasadena, California

Titan Trek: A New Online NASA Visualization and Analysis Portal for Saturn's Largest Moon



Emily Law, Brian Day &
Solar System Treks Team

JpGU
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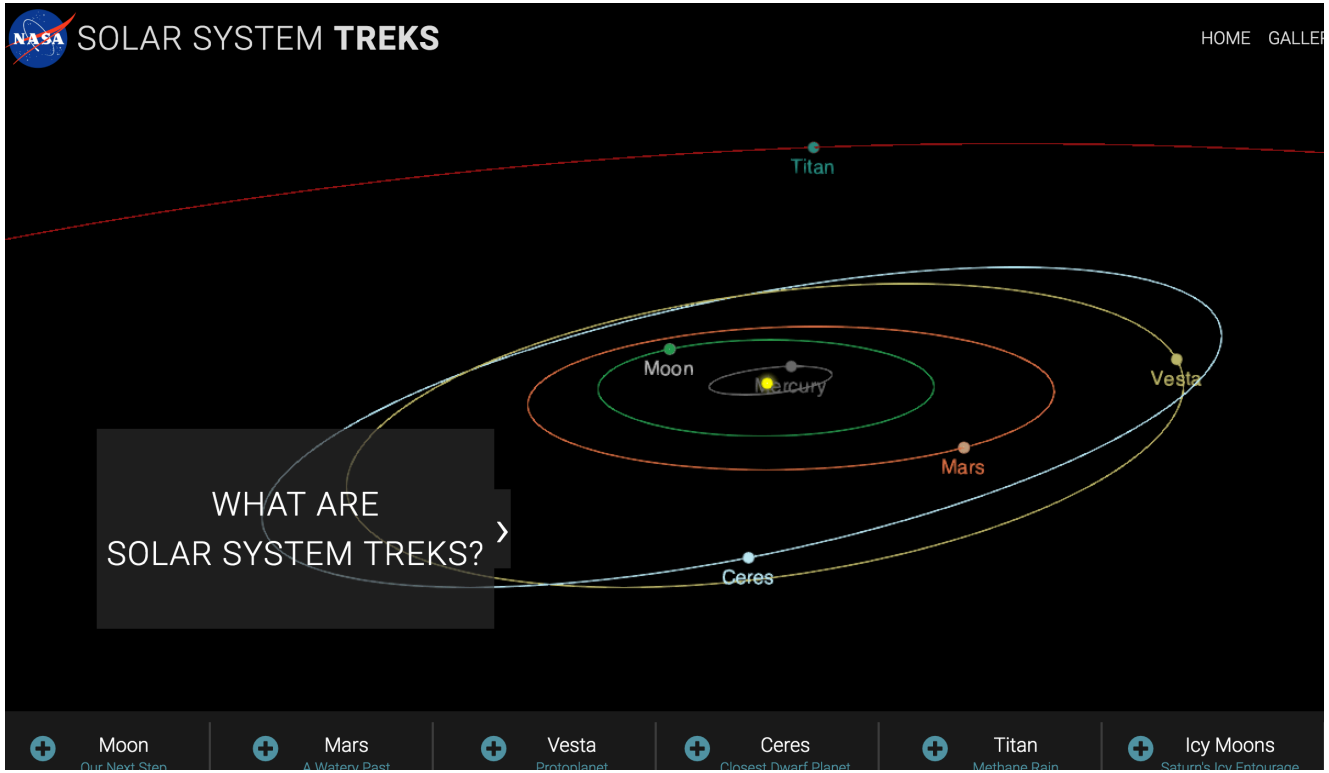
Solar System Treks (SST)

- An element of NASA's Solar System Exploration Research Virtual Institute (SSERVI)
- Software development and operations done at JPL
- A family of interactive web-based Trek portals
  - Mission Planning
  - Scientific Research
  - Public Outreach/STEM

https://trek.nasa.gov



Trek Portals

- Trek portals support NASA missions and NASA collaborations with partnering agencies
  - Currently supporting lunar & Mars landing sites selection, Cassini science, Dawn outreach
  - Supporting NASA partnerships with JAXA, ESA, KARI, INFN, IRAP
- Visualization of data products from many instruments aboard many missions
  - 2D & 3D viewing, interactive fly-overs, virtual reality path viewing, 3D printing of terrain
- Analysis tools
  - Lighting, Slope, Crater and Boulder Hazards, Elevation Profile, Sun Angle, Surface Potential

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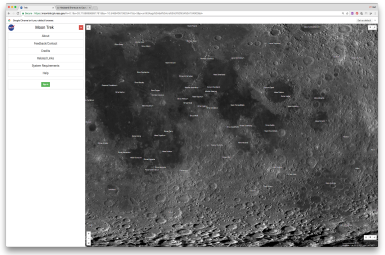
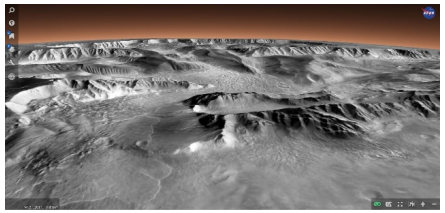
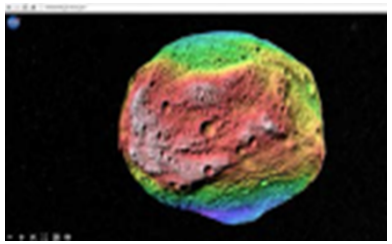
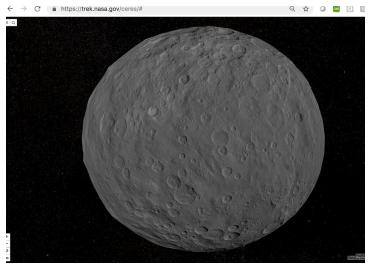
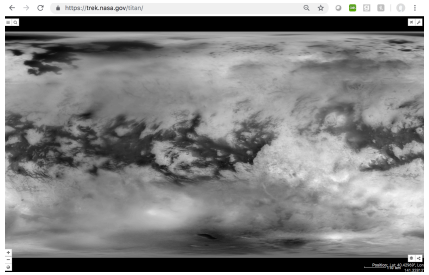
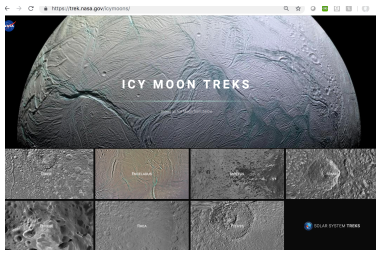
Various Trek Portals

Publicly Available

- Moon Trek – https://trek.nasa.gov/moon
- Mars Trek – https://trek.nasa.gov/mars
- Vesta Trek – https://trek.nasa.gov/vesta
- Ceres Trek - https://trek.nasa.gov/ceres
- Titan Trek – https://trek.nasa.gov/titan
- IcyMoons Trek – https://trek.nasa.gov/icymoons

Under Development

- Ryugu, Mercury, Phobos, Bennu, 67P/C-G

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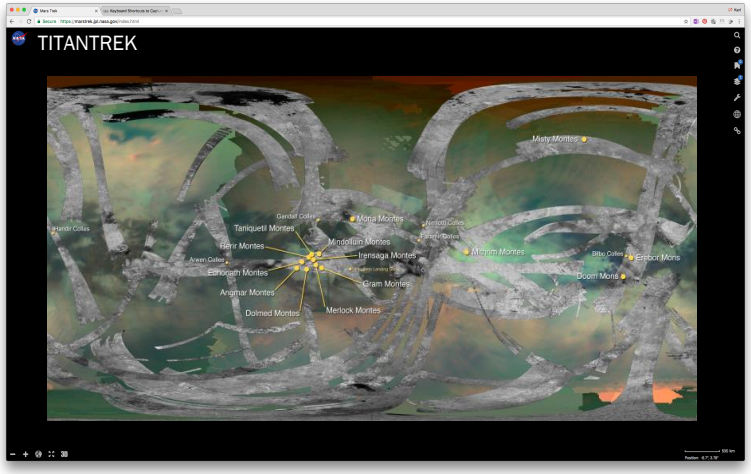
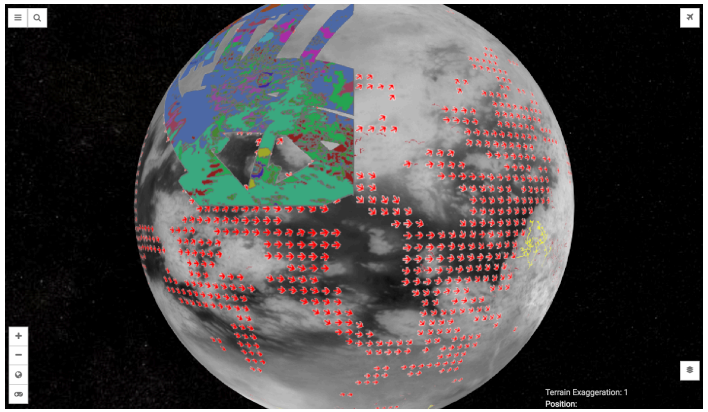
Titan Trek

https://trek.nasa.gov/titan

- Based on Cassini's observations
- Provides a suite of interactive visualization and analysis tools
- Offers > 130,000 products
- A web portal that supports
  - Titan Scientific Research
  - Education & Engagement





Data Products

- Globe VIMS mosaics (2, 5 microns, color ratio)
- Global ISS mosaics (Titan_ISS_Globe_65Sto54N_450M_AvgMos, Titan_ISS_P19658_Mosaic_Global_4km, global albedo from 9873 USS unages at 983 nm wavelength)
- Global Radar mosaic (Titan_SAR_HiSAR_MosaicThru_T104_Jan2015_clon180_128ppd)
- Radar SAR BIDR BIFQI (corrected, uncorrected, incidence angle) swaths
- Vector data (geological units of Afekan region, material flux based on dune orientation, fluvial networks, Lake example)
- Nomenclature
- ISS footprints
- VIMS footprints

Key Features

Browse/Search Engine

- Data products Browse
  - Footprints, Metadata
- Data products Search
  - Spatial, Temporal, Text, Geometry, Instrument, Coverage
- Data products Download
  - Individual, Bundle w/ associated metadata and products (e.g., associated PDS data)

Metadata

- Title, abstract, publication date, provider, bounding coordinates, instrument name, instrument mode, start and stop time, resolution, flyby/sequence number, NoData value, Projection type/coordinate system, Datum, Reference radius, False easting/northing, Units, 0->360 or -180->180, Positive East or positive west

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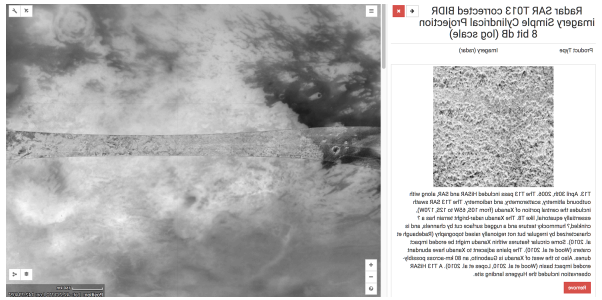
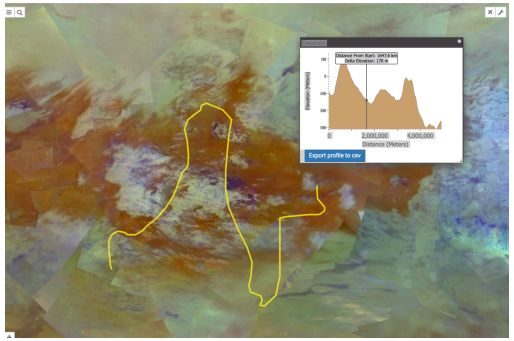
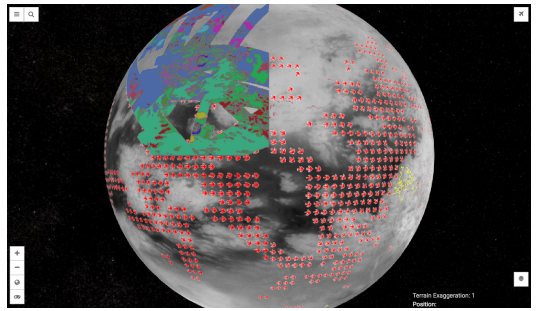
Tools

- Visualization
  - 2D, Overlay (stacking and blending), Interactive 3D Flyover, 3D print file generation







- Analysis
  - Measurement
  - Elevation Profile
  - 3D print file generation

Titan Trek Movie

- To be added

Summary

- Planetary exploration and science are complex
  - Data can be difficult to find, interpret and use
- Titan Trek
  - Lower barrier of usability
  - Advance science
  - Support science communication
  - Inspire public
- Solar System Treks project continues to grow
  - New portals coming soon: Ryugu, Mercury, Phobos, etc

Acknowledgements

Cassini Mission

NASA's Science Mission Directorate (SMD)

Planetary Science Division

Science Engagement and Partnerships Division

We thank their support and guidance of the development of Titan Trek

Thank You

Questions?

https://trek.nasa.gov
https://trek.nasa.gov/titan

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