

VISUALIZING DAWN MISSION DATA WITH NASA'S CERES TREK AND VESTA TREK ONLINE PORTALS. Brian H. Day¹ and Emily S. Law², ¹ NASA Solar System Exploration Research Virtual Institute. (NASA Ames Research Center. M/S 17-1. Moffett Field, CA, USA. 94035. Brian.H.Day@nasa.gov), ² Jet Propulsion Laboratory, California Institute of Technology. (M/S 168-200. 4800 Oak Grove Dr. Pasadena, CA, USA 91109. Emily.S.Law@jpl.nasa.gov).

Introduction: With the completion of a spectacularly successful mission in 2018, the Dawn Mission commissioned NASA's Solar System Treks Project (SSTP) to update the existing Vesta Trek portal and also release a new portal highlighting data collected by Dawn at Ceres. These online portals enable mission planners, planetary scientists, engineers, students, and the general public to interactively access, visualize, and analyze selected Dawn mapped data products from Ceres and Vesta.

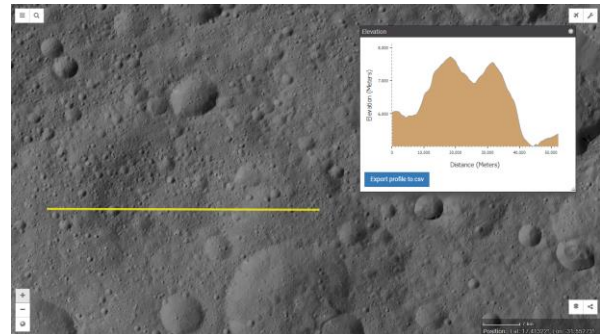
New views from Dawn: The new release of SSTP's Vesta Trek portal (<https://trek.nasa.gov/vesta>) features updated data layers as well as an update to the user interface providing enhanced capabilities and a consistent user experience with the other SSTP portals. In addition to previously available distance and elevation profiling tools, users can now draw user-defined bounding boxes across Vesta's terrain to generate STL or OBJ files for 3D printing. Users can also draw a freehand path anywhere across the surface and have Vesta Trek return a QR code that can be scanned into a smartphone (Android or iOS). The smartphone can then be placed into a pair of inexpensive cardboard-compatible goggles. The user will then be able to fly their defined path in virtual reality.

The new Ceres Trek portal (<https://trek.nasa.gov/ceres>) features the same capabilities (including 3D print file generation and on-the-fly VR generation) featured in other SSTP portals. Dawn Framing Camera HAMO and LAMO datasets are presented for 2D mapping and 3D visualization. While Dawn commissioned the Vesta and Ceres portals to primarily serve as outreach tools, they also demonstrate significant value for scientific researchers.

One example occurred as Ceres Trek was being prepared for release in the fall of 2018. At that same time, an article was published identifying 21 domes on Ceres as potential older cryovolcanoes flattened by viscous relaxation [1]. These became excellent test cases for the Ceres Trek portal's visualization and measurement capabilities. The results were shared with the lead author, who is now using Ceres Trek to create visualizations for future presentations, and who will be advising the project on future enhancements.

In this presentation, we will review the capabilities and usage of the two portals, demonstrate Ceres Trek's visualization and analysis capabilities with regards to

Ceres' relic cryovolcanoes as an example use case, and solicit input from the community as to desired enhancements to further scientific utility.



Ceres Trek elevation profile of dome in Begbalel crater

Two Components in an Integrated Suite: Ceres Trek and Vesta Trek are among the growing number of portals provided by the NASA Solar System Treks Project, available at <https://trek.nasa.gov>. NASA's Solar System Trek online portals for lunar and planetary mapping and modeling provide web-based suites of interactive data visualization and analysis tools to enable mission planners, planetary scientists, students, and the general public to access mapped data products from past and current missions for the Moon, Mars, Vesta, Ceres, and Titan. As web-based toolsets, the portals do not require users to purchase or install any software beyond current web browsers. These portals are being used for site selection and analysis by NASA and a number of its international partners, supporting upcoming missions.

References: [1] Sori M, et al (2018) *Nature Astronomy*, 2, 946–950.