

**Opportunity Title:** Comparative Planetology Investigations using Novel Velocity-Sensing Mobile Kinematic- and Rover-Based 3D LiDAR Systems

**Opportunity Reference Code:** 0014-NPP-JUL24-MSFC-PlanetSci

**Organization** National Aeronautics and Space Administration (NASA)

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**Application Deadline** 7/1/2024 6:00:59 PM Eastern Time Zone

**Description** Topographic measurements are a critical element to the understanding of the geologic history and evolution of planetary surfaces. New capabilities using mobile LiDAR sensors are enabling rapid, ultra-high resolution, 3D topographic mapping from different platforms. The same mobile LiDAR mapping capabilities are also useful for navigation of rover- and landing-system- based platforms. A new, velocity sensing, Frequency-Modulated Continuous Wave (FMCW)-LiDAR sensor has been incorporated into a mobile kinematic (backpack-mounted) 3D mapping system that contains high accuracy GPS, inertial measurement, and a time-of-flight LiDAR. This system creates 3D point clouds that contain both range and velocity for each of millions of points sampled per second, including measurements of the motion of rapidly moving objects in real-time and in post-processing, and the ability to generate 3D topographic maps. Using simultaneous localization and mapping algorithms and the unique velocity- and range-sensing capabilities of the sensors incorporated in our various backpack and rover mounted LiDAR mapping systems, we welcome solicitations of original research in the use of mobile, high-resolution velocity-sensing FMCW- LiDAR. Examples may be related to (but are not limited to): mobile LiDAR terrain mapping for topography and morphology of terrestrial surfaces for comparative planetology, the use of FMCW-LiDAR for navigation of roving platforms, and those that seek to use the unique velocity sensing capabilities of the FMCW-LiDAR sensor for novel scientific investigations. Local-area field data collection, from backpack and rover platforms, of natural environments are anticipated, but far-afield field data collection cannot be guaranteed. Other areas of interests may include integration of other datasets with mobile LiDAR data collection (e.g., visible imagery with LiDAR to create virtual reality environments for scientific analysis), landscape evolution or modeling using data produced by the systems, or concepts-of-operations (i.e., ConOps) for mission data collection and planning scenarios will also be considered.

**Location:**

Marshall Space Flight Center  
Huntsville, Alabama

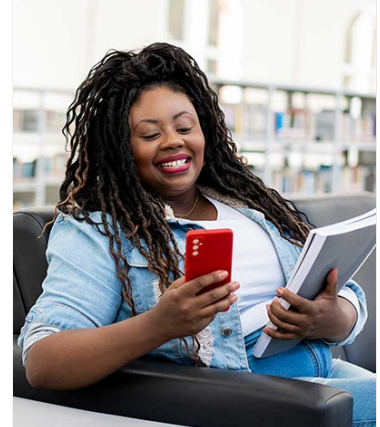
**Field of Science:** Planetary Science

**Advisors:**

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**Eligibility** • **Citizenship:** U.S. Citizen Only

**Requirements** • **Degree:** Doctoral Degree.



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