National Aeronautics and Space Administration

FY25 Strategic University Research Partnership (SURP)

Building Endurance-P: A Purdue Lunar Science Working Group for the Endurance Mission Concept

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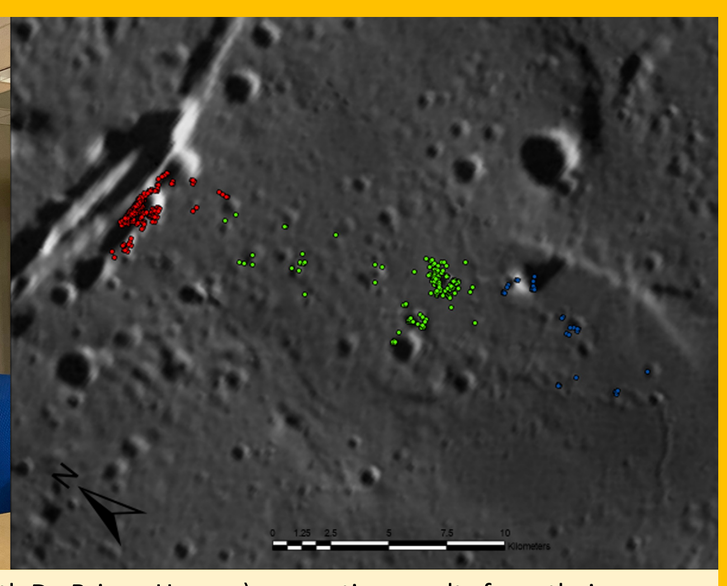
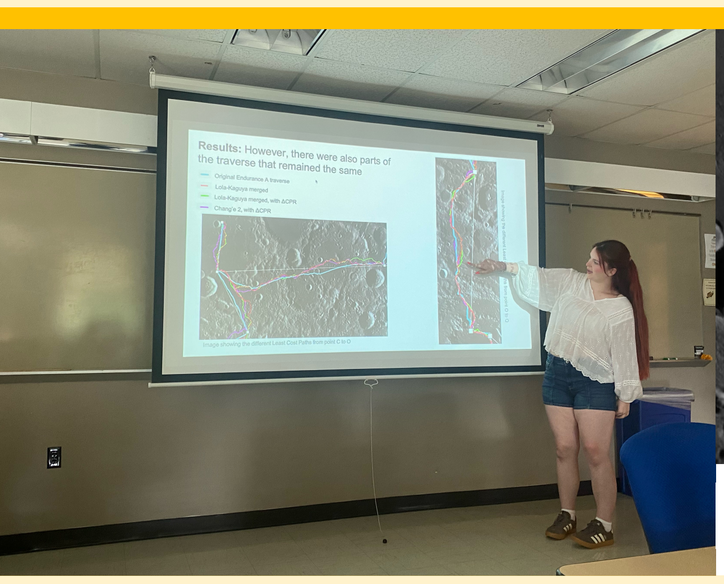
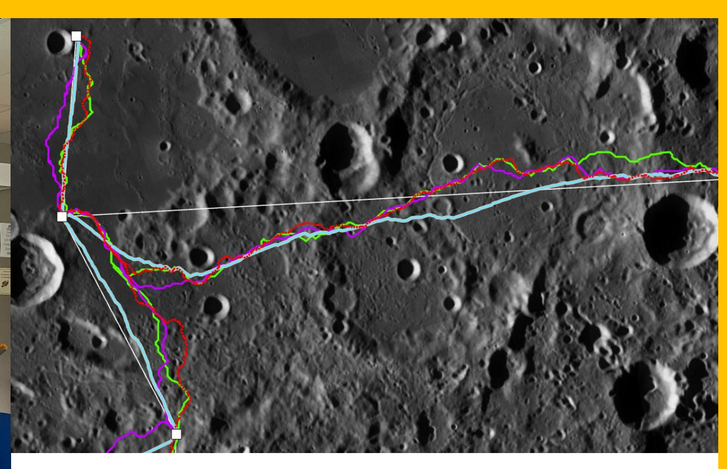
Bringing together JPL and Purdue scientific expertise to advance the next strategic lunar mission with innovative student research experiences

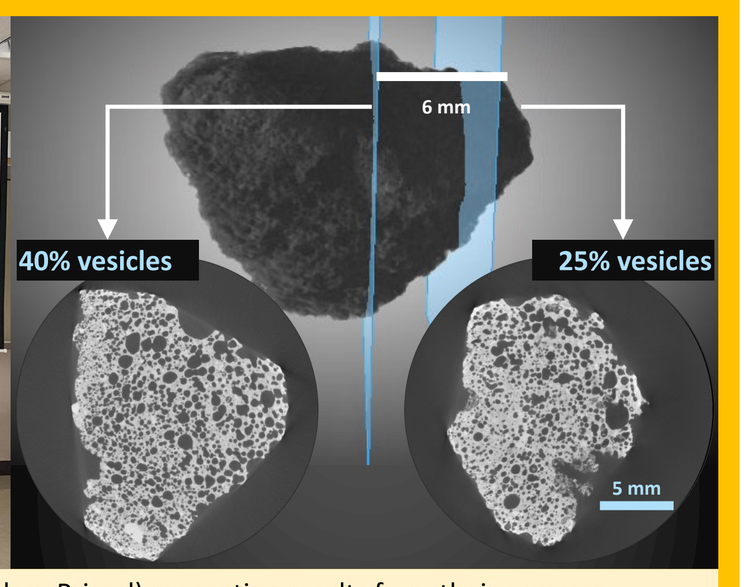


▲**TASK #1:** Left: Student Walker Millhoff (who worked with Dr. Briony Horgan) presenting results from their summer research project. Right: Example results showing mapped boulders in the vicinity of the Endurance traverse.





▲**TASK #2:** Left: Student Isabella Shockley (who worked with Dr. Ali Bramson) presenting results from their summer research project. Right: Example results showing updated notional traverses for Endurance that include a variety of datasets (e.g., LRO LOLA & Mini-RF, Kaguya, Chang'e-2).



▲**TASK #3:** Left: Student Ky Dodd (who worked with Dr. Kelsey Prissel) presenting results from their summer research project. Right: Example results showing XCT data for analog lunar basalts, where they were able to quantify the fraction of vesicles and characterize the sample's heterogeneity.

Endurance is a concept for a large, autonomous rover to traverse the gigantic South Pole–Aitken (SPA) basin on the farside of the Moon and deliver a diverse, scientifically rich cache of samples to Artemis astronauts for return to Earth. Endurance is a high-priority, Decadal Survey mission concept of strategic importance to JPL. Endurance is a natural progression of many JPL core strengths including planetary science, mobility, robotics, and autonomy.

There are three objectives for this project:

1. Refine potential Endurance traverses by incorporating mini-RF data and roughness considerations.
2. Identify and classify boulders along key points of the proposed Endurance traverse.
3. Assess the effect of sample size on geologic interpretations of lunar analog lithologies to inform Endurance sampling activities.

The student-led projects are novel investigations that produce science products (maps, sample guidelines) to inform Endurance science and exploration planning. By combining interdisciplinary approaches, the program is helping to identify Endurance target lithologies from outcrop to orbit. These three sub-projects serve as the cornerstones of a new joint Purdue/JPL Lunar Science Working Group to prepare for the Endurance mission and other future lunar exploration opportunities, including Artemis. In the first year, we have trained three undergraduate students and provided them with hands-on research experience in planetary science.

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Publications:
None yet.

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