Mapping Boulder Distributions on the Lunar South Pole

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Mapping boulders on the Lunar South Pole (LSP) is critical for supporting NASA's Artemis Initiative, particularly for landing site selection, mobility planning, and resource assessment. This study focuses on the de Gerlache Crater, a region of high scientific interest within the LSP, as well as the surrounding highlands. Using ArcGIS Pro, we analyze a high-resolution Lunar Reconnaissance Orbiter (LRO) Narrow Angle Camera (NAC) mosaic with a spatial resolution of 1 meter per pixel, derived from the Lunar Orbiter Laser Altimeter (LOLA) spacecraft in orbit around the Moon.

Our methodology involves creating a classification system for lunar boulder distributions, as well as a grid system to divide and proceduralize the mapping process. We manually identify and digitize boulders within the crater and surrounding highlands. This dataset will enhance terrain hazard assessments, aiding in the safe navigation of future crewed Extravehicular Activities (EVA). Additionally, boulder distribution patterns may provide insights into the geological history of the region, including impact processes and regolith transport. The results of this study contribute to Artemis mission planning by refining site characterization efforts and identifying potential hazards or sampling sites. Future work will integrate spectral data and slope analysis to determine composition and potential origin.