MONS MALAPERT: A SITE IN SUPPORT OF EXPLORATION OF THE LUNAR SOUTH POLE AND EARTH OBSERVATIONS. N. E. Petro[1] and D. P. Moriarty III[1,2], [1]NASA Goddard Space Flight Center; Planetary Geology, Geophysics, and Geochemistry Laboratory, [2]Center for Research and Exploration in Space Science &Technology, University of Maryland.

Introduction: Sustained human and robotic exploration of the lunar south pole will require significant investments in infrastructure, beyond landers, rovers, and spacesuits. A sustained presence will require a robust communications network that will meet the demands of real time data links for crew communications and data telemetry, particularly for long-lived science measurements. While orbital assets will supply a valuable communications link, other methods to communicate with assets near the south pole would be advantageous. Here we advocate for a dedicated communications and geophysical station on the summit of Mons Malapert to support future human and robotic exploration of regions near the lunar south pole.

Landing Area(s): Mons Malapert has been considered an exploration target by several authors [1-7] and its value as a relay-communications station discussed due to portions of the summit of the massif having permanent line-of-site with the Earth [8] **(Figure 1)**. In general, the region with 100% Earth visibility is located at ±5° longitude and -85.95° latitude.

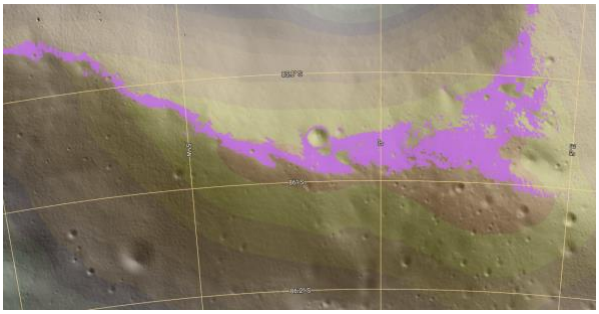

Figure 1. Summit of Mons Malapert as viewed in Lunar QuickMap highlighting (in purple) areas with slopes less than 15° and 100% Earth visibility. Basemap is a hillshade map with SLDEM topography. Crater at center of image is ~1.2 km in diameter.

Science Objectives: In addition to serving as a communications relay station (Figure 2), a lander on Mons Malapert with 100% Earth visibility could provide a base of Earth-Moon laser ranging to support geodetic monitoring as well as any exospheric or Moon-Space interaction monitoring [9]. Science that benefits from the unique capability of having Earth-visibility (i.e. Goal 5c of the Artemis SDT [9]) could be addressed from such a platform. These science objectives are value added to any lander equipped with communications relay capabilities.

Required Capabilities: Beyond precision landing, such an Earth-south pole communications station would be enhanced with the ability to operate continuously in any illumination conditions, not only to support scientific monitoring, but also to maintain 24-7-365 communication operations. As a resource, such facility should be designed to be serviceable by humans, including upgrading the facility as needs grow for communications.

A mast on the lander, of 5 meters (but of any height) enables a wider line-of-site. Trade-studies would establish optimal height, design, and any possible bandwidth needs for such a facility.

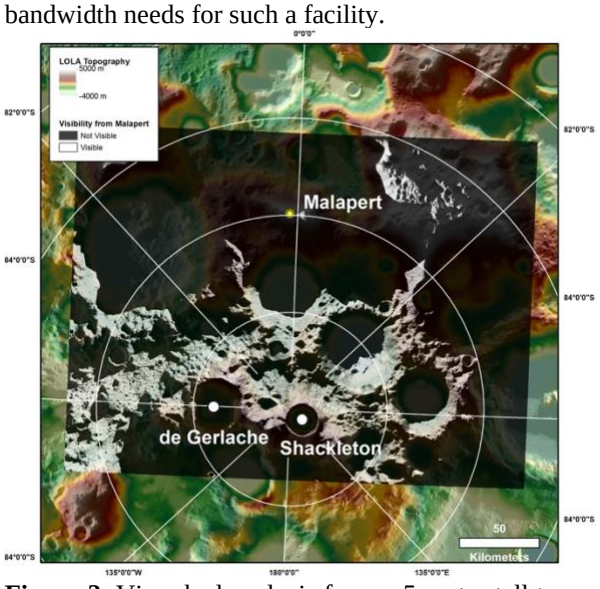

Figure 2. Viewshed analysis from a 5-meter-tall tower on the summit of Mons Malapert. The line-of-site from such a point provides views of portions of the south pole near high priority targets [8].

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