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HELIOS-LUNE TRANQUILLITAS: ARTEMIS III EXPLORATION MISSION WITH RETRIEVAL OF SOLAR ACTIVITY RECORDS

Abstract

Helios-Lune Tranquillitas (HLT) is a proposal for a commercial Artemis III lunar exploration mission to the Mare Tranquillitatis pit crater. HLT has a primary mission objective of obtaining samples to be returned to Earth for analysis from two locations within the crater: the sunlit wall and talus pile. The samples will be collected using a tailored, mission specific rover to rappel into the lunar pit. The rappelling rover is controlled by Artemis lll crew using real-time telerobotic systems from the cabin of the mission's lunar lander or pressurized rover located near the crater's rim. The unique mission location and sampling strategy allows for solar activity record (SAR) data to be analyzed from the sample layers upon return to Earth. SAR imprinted on the long dormant Moon can provide critical data about solar behavior over geological time that is vital to building a reliable Climate Change model for Earth.

HLT's secondary objective is observation and scientific exploration of the lunar pit crater, through utilization of the rappelling rover's onboard scientific payloads including wide field and narrow lens cameras, ground penetrating radar, a spectrometer and three-dimensional laser scanning capabilities.

The mission is designed to align with US Space Policy goals and objectives to advance progress through a "robust, innovative and commercial space sector" as well as "extending human economic activity in deep space" by facilitating science-driven exploration on the Moon. Further, the mission aligns with Artemis program objectives as the Tranquillitatis pit is a prime location for initial study aimed at revealing ancient SAR data as well as lava studies that provide insight into past lunar planetary processes.

HLT is a Commercial Human Space Exploration (CHASE) mission. All stages of mission development can be open to company applications through worldwide tender, promoting international scientific collaboration and cooperation. Data from the mission and results from sample analysis can be sold to public and private space sector companies, educational institutions, and other interested parties.