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ROBOTIC PRE-CURSOR MISSIONS: ENHANCING HUMAN EXPLORATION

Abstract

Developed by the participating agencies of the ISECG (International Space Exploration Coordination Group), the lunar global Point of Departure architecture (gPoD) represents an emerging international consensus on a lunar exploration approach and demonstrates the importance of agencies working together early in program formulation. It has been specified in a notional international mission manifest.

Lunar exploration begins years before humans return to the surface with a series of international robotic precursors that characterize the lunar surface and environment, test and validate key technologies in an operational environment, and perform high priority science. These missions will reduce risk and provide valuable information that will allow the humans to maximize their productivity once they arrive. The precursor missions are designed as an integral part of the campaign and thus shall address common lunar exploration goals as far as applicable. In particular, they shall provide early opportunities to generate public excitement and strengthen public support for subsequent exploration. The overarching strategic guidance applied to the ISECG Reference Architecture for Human Lunar Exploration, i.e. advancing the principles of programmatic and technical sustainability and balancing Mars forward and Science objectives are also enforced for this precursor mission phase.

These precursor missions contribute to advancing key operational capabilities required for the implementation of the overall lunar exploration architecture such as the ability for systems to survive and operate in the hostile lunar environment, particularly during the long night cycles, the collaboration between multiple international elements on the surface, and the capability to relocate elements between different sites. The precursor missions shall also support the development and demonstration of certain technologies necessary to enable long-duration human operations without a burdensome supply chain from earth.

The precursor missions shall finally consist of a group of coordinated and integrated missions that shall allow a broad international participation and build upon existing agency plans for future lunar studies or missions.