Return to the Moon (02)
Scientific Highlights and Lessons from Recent Lunar Missions (1)

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WHAT DO WE NEED TO KNOW, AND WHEN DO WE NEED TO KNOW IT? A LEAG-SAT EXAMINATION OF STRATEGIC KNOWLEDGE GAPS FOR THE MOON FIRST SCENARIO.

Abstract

The Lunar Exploration Analysis Group (LEAG) was tasked by the Human Exploration Operations Mission Directorate (HEOMD) to establish a Specific Action Team (SAT) to evaluate and provide findings related to NASA's draft Strategic Knowledge Gaps (SKGs) identified by NASA's Human Spaceflight Architecture Team's destination leads. The SAT focused on the SKGs in the context of implementing lunar mission scenarios. The Moon is one of the destinations being considered by NASA's Human Space Flight Architecture Team and the International Space Exploration Coordination Group's Global Exploration Roadmap (GER). Of particular note is use of In Situ Resource Utilization (ISRU). The specific resource and its use will depend upon the specifics of the mission scenario and objectives. For each mission scenario, the group will consider the knowledge / data gaps that exist in order to determine the viability of exploiting the resource in an effective manner. This presentation will outline the findings of this examination. Specific deliverables of the GAP-SAT analysis include: (1) List of required knowledge/data sets that are required to safely, effectively, and efficiently implement human missions to the different destinations. (2) Gaps in that knowledge/data sets /technology relative to our current understand or subsequent to an extended Lunar Reconnaissance Orbiter mission or the successful implementation of the LADEE, GRAIL, and projected international robotic missions. (3) A timeline of when the missing knowledge must be acquired (or technology developed) in order to make architecture-specific decisions or in order to make subsequent measurement decisions. In the context of this timeline, the group should consider the typical amount of time between acquisition of the relevant information and the amount of time needed to define and implement a subsequent measurement. (4) Provide a conceptual list of potential robotic precursor missions, experiments, modeling activities, technology, or any other activity that would fill the knowledge gaps. Links of potential missions to past National Academy studies and the LEAG Lunar Exploration Roadmap should be explored. (5) If additional measurements are required to fill knowledge gaps, identify the fidelity of the measurements needed, and if relevant, provide examples of existing instruments capable of making the measurements.