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UPDATE ON NASA'S ISRU DEVELOPMENT AND MISSION PLANS FOR THE ARTEMIS  
PROGRAM

**Abstract**

In 2017, NASA initiated the Artemis program to send astronauts back to the lunar surface, create a sustainable human lunar exploration program, and lead the first human exploration mission to the Mars surface. While much of NASA's plans for the Artemis program currently focus on the Human Lunar Return and the ability for astronauts to explore the lunar surface for limited durations each year, the longer-term vision for the Artemis program is to enable sustained human exploration and commercial operations in cis-lunar space and the lunar surface. An important aspect of achieving this long-term vision, is to better understand and characterize the resources on the Moon and Mars and learn how to extract and use these resources. Known as In Situ Resource Utilization (ISRU), the identification, mapping, extraction, and processing of space resources has the potential to greatly reduce the cost and risk of human exploration, This is achieved by reducing what needs to be delivered from Earth and the dependency on these supplies, lowering costs through commercial operations, and expanding infrastructure for safer and more capable exploration and surface operations. To guide development of ISRU technologies and systems on the ground and demonstrate these capabilities on the Moon and Mars, NASA created and released the ISRU Envisioned Future Priorities (EFP) strategic plan in 2021 and updated it in 2022. While lunar ISRU technology development had already started, these publicly released strategic plans have been used to guide and prioritize technology development and assess the progress in achieving the vision. In 2023, four significant activities/events occurred with respect to human lunar exploration, surface infrastructure, and ISRU. One was the release of the Artemis Architecture Definition Document Revision 1 that included ISRU as a sub-architecture. The second was technology advancement through on-going and new projects through several NASA internal projects, solicitations, and challenges. The third was the release of a Request for Information for the Lunar Infrastructure Foundational Technology-1 (LIFT-1) mission with the primary objective of extracting oxygen from lunar regolith. The fourth was the Defense Advanced Research Projects Agency release and selection of participants in the LunA-10 lunar architecture study aimed at achieving a thriving lunar economy in 10 years (2035). This paper will provide an overview and status of on-going technology and system development activities, the LIFT-1 mission, an update of ISRU into the Artemis campaign, and an assessment of the implications from the DARPA Luna-10 study.