

Abstract Submission to: Joint Space Resources Roundtable (SRR)/ Planetary and Terrestrial Mining and Sciences Symposium (PTMSS)

Date: June 12 - 15, 2018

Location: Golden, CO

Current Activities in the Advanced Exploration Systems ISRU Technology Project

Diane L. Linne and Terence F. O'Malley
NASA Glenn Research Center
Cleveland, OH, USA

Gerald B. Sanders
NASA Johnson Space Center

David J. Eisenman
NASA Jet Propulsion Laboratory

Paul E. Hintze
NASA Kennedy Space Center

and

Nantel H. Suzuki
NASA Headquarters

In-situ resource utilization (ISRU) involves any hardware or operation that harnesses and utilizes 'in-situ' resources, both natural and discarded, to create products and services for robotic and human space exploration. By collecting and converting local resources into products such as propellants and life support consumables, ISRU can greatly reduce mass, cost, and/or risk of space exploration and lead to Earth independence. ISRU, therefore, is a disruptive capability in that it enables more affordable exploration than today's paradigm and allows for more sustainable system architectures to be developed. Although past work has demonstrated the feasibility of many facets of ISRU, significant work is needed to mature these technologies. Specifically, work is still needed for:

- development and testing closer to full-scale and for longer operational durations,
- testing in relevant environments,
- integration of the many components and subsystems into system prototypes, and
- realization of the synergy between ISRU and other system technologies.

A focused ISRU project has been started in FY18 to answer the technology questions and retire the risks so that we can inject credible performance information into the exploration systems architecture trades, understand the ripple effects in the other Exploration systems, and provide confidence in the maturity and performance of ISRU capabilities before decisions are made in other Exploration elements that may reduce or preclude the benefits that ISRU can provide. Research and development work in lunar and Mars ISRU

resource acquisition and processing into consumables will be presented. Both NASA in-house work and recently awarded work under the NextSTEP-2 BAA ISRU appendix will be included.