

15th IAA SYMPOSIUM ON BUILDING BLOCKS FOR FUTURE SPACE EXPLORATION AND
DEVELOPMENT (D3)

Novel Concepts and Technologies to Enable Future Building Blocks in Space Exploration and
Development (3)

Author: Ms. Diane Linne
NASA Glenn Research Center, United States

Mr. Jerry Sanders
National Aeronautics and Space Administration (NASA), Johnson Space Center, United States
Ms. Molly Anderson
NASA, United States
Dr. Koorosh Araghi
NASA Johnson Space Center, United States
Mr. Stanley Starr
National Aeronautics and Space Administration (NASA), Kennedy Space Center, United States
Mr. Nantel Suzuki
National Aeronautics and Space Administration (NASA), United States
Mr. Terence O'Malley
National Aeronautics and Space Administration (NASA), United States
Dr. David Eisenman
Jet Propulsion Laboratory, United States
Dr. George Schmidt
NASA Glenn Research Center, United States

OVERVIEW OF NASA TECHNOLOGY DEVELOPMENT FOR IN-SITU RESOURCE UTILIZATION
(ISRU)

Abstract

In-Situ Resource Utilization (ISRU) encompasses a broad range of systems that enable the production and use of extraterrestrial resources in support of future exploration missions. It has the potential to greatly reduce the dependency on resources transported from Earth (e.g., propellants, life support fluids), thereby significantly improving the ability to conduct future missions. ISRU has long been considered a critical technology for lowering the mass and cost of space exploration architectures, and dramatically reducing the amount of supplies that must be launched from Earth. It is generally recognized that ISRU is a key enabler and necessary capability for eventual establishment of any permanent human presence on the Moon or Mars.

Recognizing the critical importance of ISRU for the future, NASA is currently conducting technology development projects in two of its four major mission directorates. The Advanced Exploration Systems (AES) program in the Agency's Human Exploration and Operations Mission Directorate (HEOMD) has initiated a new project for ISRU Technology focused on component, subsystem, and system maturation in the areas of water/volatiles resource acquisition, and water/volatiles and atmospheric processing into propellants and other consumable products. The Game Changing Development (GCD) program in the Space Technology Mission Directorate (STMD) has an ISRU project focused on component technology development in the areas of Mars atmosphere acquisition, including dust management, and oxygen production from Mars atmosphere for propellant and life support consumables. Together, these two coordinated

projects are working towards a common goal of demonstrating ISRU Systems in preparation for future flight applications.

This paper provides an overview of these two projects, including a status of their current and future technology development activities.