

IAF SPACE EXPLORATION SYMPOSIUM (A3)
Space Exploration Overview (1)

Author: Dr. Greg Chavers
NASA Marshall Space Flight Center, United States

Mr. Mark Kirasich
NASA, United States
Ms. Darcy Elburn
NASA Headquarters, United States
Ms. Erin Mahoney
Stardog Union, United States

ARTEMIS III AND BEYOND: FROM THE MOON TO MARS

Abstract

NASA's human exploration strategy is built upon two architectures developed in tandem to derive commonalities, share research, reduce development costs, and provide critical opportunities to leverage systems and operations at the Moon to prepare for Mars.

Artemis III will mark the first human return to the lunar surface in more than 50 years and will signal the beginning of a movement toward long-term, human-led exploration in deep space. The Artemis campaign represents a series of interrelated missions that will incrementally build foundational capabilities for human exploration on the lunar surface, in lunar orbit, and in the future, at Mars.

The mission class structure of Artemis will be similar to that of Apollo, but with far greater strides between missions. Missions will grow longer and more complex as NASA and its partners assemble and operate the Gateway in lunar orbit and place key mobility, habitation, and utility systems on the lunar surface. The hallmark event of the Artemis III mission will be the demonstration of the first-ever commercially developed human lunar lander. Two landing astronauts will spend 6.5 days on the surface—more than half the time of all Apollo surface expeditions combined—making this an unprecedented opportunity for lunar research with modern technologies.

Each additional mission will bring more capabilities and opportunities for research and partner collaboration. The Gateway is designed with internationally agreed-to interoperability standards, making it possible to accommodate a mixed fleet of arriving ships and operate an innumerable number of science and technology payloads over its lifetime.

With surface payload deliveries of rovers, habitats, power systems, and supplies, the world will see Artemis Base Camp come to life as the only known extraterrestrial research station.

Each system that is built for the Moon is designed with a lens for Mars. Artemis operational protocols and mission objectives will advance our abilities to live and work on another world while we are relatively close to Earth, in preparation for missions to Mars that will require a degree of operational confidence and crew autonomy that is difficult to comprehend.

This paper will provide an overview of NASA's lunar architecture and the current concepts for early human missions to Mars. Readers will understand that Artemis is much more than a precursor to Mars, but will learn how NASA is harnessing every opportunity that can be leveraged throughout Artemis to prepare for the first human missions to the Red Planet.