

Lunar Exploration (2)
Lunar Exploration (1) (1)

Author: Mr. R. Marshall Smith
National Aeronautics and Space Administration (NASA), United States

LAYING THE FOUNDATION FOR SUCCESS AT THE MOON – A PRECURSOR FOR MARS

Abstract

The global effort to establish a sustained human presence at the Moon is underway, with NASA leading development through the agency's Artemis Lunar Exploration Program. Two prominent efforts under Artemis include the Gateway in lunar orbit, and the Human Landing System (HLS) required to deliver the first woman and the next man to the surface by 2024. Gateway assembly in orbit will draw on lessons learned from the International Space Station, and will provide a continuous operational post in deep space. Although the first elements will be delivered by NASA and its U.S. industry partners, NASA has taken important steps to baseline International Deep Space Interoperability Standards so that the modular infrastructure may receive payloads or additional structural elements from any partner provider. The Gateway will operate autonomously during the long, uncrewed stretches, and will be a port for astronauts ferrying to and from the lunar surface aboard the HLS. Achieving a steady cadence of multinational missions with operational confidence is key; to ensure long-term exploration sustainability, these lunar operations must be repeatable and extensible to missions to Mars. Doing this in the 2020s, when we are 250 thousand miles from Earth, is crucial before embarking on human missions 140 million miles away at Mars. NASA has received enthusiastic interest from long-standing international partners CSA, ESA, JAXA, Roscosmos, as well as several other international space agencies who are newer to space exploration. The new and continued interest, coupled with a rise in public-private partnerships, is mounting toward a truly sustainable human expansion into deep space. Like many examples of historical human expansion, governments are poised to fund and advance the technologies to pave the way, making it possible, and increasingly economically viable, for private industry and private citizens to join the endeavour as providers or customers. As NASA continues partner discussions to lay the foundation for long-term exploration, a key focus is fostering lunar economic opportunities to create a natural supply and demand for access to Earth's nearest neighbour. This paper will discuss NASA's recent efforts to develop this foundation, the agency's current status for the Artemis Lunar Exploration Program, and goals for extending lunar success to Mars.