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

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THE MOON AS A STEPPING STONE TO HUMAN MARS MISSIONS

Abstract

Human space mission designers stretching back to von Braun and beyond have envisioned the moon as a waypoint to the more challenging missions to Mars. The moon is seen as proving ground for technologies, equipment and operations, and a venue upon which to learn the art of surface exploration. Mars missions are lyears in duration with very limited Earth return opportunities, but the moon provides the opportunity to perfect exploration concepts while being only a few days from Earth. Though the environment and gravity differ from Mars, and will thereby not provide a perfectly analogous environment, the remoteness, limited logistics, and harsh conditions provide an environment that can be used to stress many systems that will be used on, or will be extensible to hardware and operations that will be used on, Mars.

This paper begins by describing the systems, or options for systems, that together comprise a human Mars architecture. With this human Mars operational concept as a basis of comparison, each of these systems is analyzed in the context of an exploration program that first targets lunar exploration experience, examining how the lunar experience can be best used to prepare for the eventual human mission to Mars. The paper concludes with a concise summary of specific areas that have the strongest applicability between exploration experience on the lunar surface and extensibility to human Mars exploration.