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HUMAN EXPLORATION OF THE SOLAR SYSTEM SYMPOSIUM (A5)
Human Exploration of Mars (2)

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PHOBOS: GATEWAY TO MARS

Abstract

NASA is formulating an evolvable campaign of missions for landing humans on Mars in the late 2030s. This Evolvable Mars Campaign may include a human mission to Phobos before sending a crew to the surface of Mars. Phobos has many advantages as a potential stepping-stone on the way to Mars. A human mission to Phobos would demonstrate the capability to conduct long missions in interplanetary space and provide the crew with self-reliant operational experience in the vicinity of Mars. Phobos may have abundant local resources such as ice that could be extracted and used to produce propellants to support Mars exploration. The Martian moon could shield a habitat on its surface from space radiation. Astronauts on Phobos could teleoperate robotic systems on the surface of Mars to prepare landing sites and deploy equipment for follow-on human missions. It is widely accepted by the science community that there are Mars surface materials on Phobos resulting from the ejecta of meteorite impacts on Mars, and astronauts could collect samples for return to Earth.

This paper will give an overview of the Evolvable Mars Campaign, describe a robotic precursor mission to Phobos that could be conducted in the mid-2020s, and discuss mission concepts for sending humans to Phobos and exploring its surface with a hopper. Current activities such as NASA's Asteroid Redirect Mission that are developing technologies directly extensible to Phobos missions will also be discussed.