

14th HUMAN EXPLORATION OF THE MOON AND MARS SYMPOSIUM (A5)  
Going beyond the Earth-Moon system: Human Missions to Mars, Libration points, and NEO's (4)

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MARS LITE, AN AFFORDABLE WAY TO SOLVE MARS'S MYSTERIES

**Abstract**

Abstract The United States has chosen a flexible path to future Human Space Exploration. The plan is for NASA to conduct robotic exploration of various places of interest and gather data justifying the need for future human exploration, plus the necessary environmental data to design safe human exploration elements. Current candidates for Human Space Exploration include: a return to the moon, a human servicing mission to the Earth-Sun L2 point, a trip to a Near Earth Asteroid, and a Visit to Mars. It is our opinion that Mars is the logical flagship mission for Human Space Exploration and in this paper, we layout a future development plan leading to a Mars Exploration strategy we call "Mars Lite". It's called Mars Lite because we never put humans on Mars, but on Phobos where they can tele-operate major Mars Exploration elements in real time. This approach gains all the science and publicity of a Mars Landing Mission, but costs about half as much because no human rated systems are landed on Mars (e.g. the lander, the rovers, a habitat, and an ascent vehicle). The human habitation system sent to Phobos is a logical extension of the ISS and could be rehearsed using the existing ISS. New in-space transportation systems are required and four architectures are compared in the paper; Chemical Propulsion, Nuclear Thermal Propulsion, Nuclear Electric Propulsion, and Solar Electric Propulsion. Exploration elements are defined and the architectures are compared on a cost basis for various candidate launch systems. Key technology developments are scheduled, costed, and compared as part of the recommended approach to future Human Space Exploration.