

IAF SPACE EXPLORATION SYMPOSIUM (A3)
Mars Exploration – missions current and future (3A)

Author: Mr. Vipul Mani
TU Berlin, Germany, mani.vipul7@gmail.com

Mr. Harshit Goel
University of Petroleum and Energy Studies, India, hgoel412@gmail.com

Ms. Lawanya Awasthi
University of Petroleum and Energy Studies, India, lawanya1499@gmail.com

Mr. Dushyant Singh
University of Petroleum and Energy Studies, India, dushyant.singh15798@gmail.com

Mr. Adwait Sidhana
University of Petroleum and Energy Studies, India, 2000ad30wait@gmail.com

Mr. Ramesh Kumar
University of Petroleum and Energy Studies, India, ramesh.kumar@ddn.upes.ac.in

COLONIZING MARS: IN-SITU RESOURCE UTILIZATION OF THE MARTIAN MOONS

Abstract

The two Martian moons were discovered by an American Astronomer Asaph Hall within a week of each other in 1877. Hall named the moons for the mythological sons of Ares, the Greek counterpart of the Roman god, Mars. Phobos means fear and Deimos means dread. Fitting names for the sons of a war god. They may be asteroids that were captured by Mars while some argue that they might have both arose from the remains of a larger moon that once orbited the Red Planet. The origin of the Martian Moons remains uncertain and scientists are still trying to unravel the mysteries of these moons. Both the moons are blacker than coal and look like battered potatoes. Phobos is 27 km across at its widest point and has a large impact crater on one side. It flies around Mars three times in one Martian day. Deimos is even smaller and one of the smallest moons in the Solar System. It is further from Mars, so each orbit around the planet takes a little over one day. Being so irregular and small in shape, Martian moons are difficult to study by astronomical means and pose challenges for spacecraft exploration as well. This paper takes a futuristic case study of an exploration mission to the Martian Moons, that are both weird and fascinating. Several studies have shown the presence of water ice on Mars however, for a sustainable Martian colony, it becomes more efficient to utilize all the resources available at our disposal. This paper will take a futuristic case study of colonization techniques and various possibilities of surface mining will be discussed. Comprehensive tables and graphs will be given, which will depict the amount of time that will pass at each mode of travel and more importantly some idea on the cost in terms of energy as well as money will be discussed within today's context. In addition, prerequisites to such an interplanetary colonizing mission to Mars and a prospect of utilizing minerals on Martian moons would be given in detail. Even though the possibility of such a mission is probably non-existent for this decade, it is essential to do these exercises so that mankind's understanding of the planet will be increased.