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MARTIAN HABITATS: A REVIEW

Abstract

Establishing colonies in Lunar and Martian environments is the major task of our primary means to become a multi-planetary civilization. The Space Exploration Initiative (SEI), administered by President George H.W. Bush in 1989, was the first spark that ignited humanity's vision to establish space settlements beyond low Earth orbit (LEO). At present, private space companies (like SpaceX and Blue Origin) are competing to be the first ones to colonize space. From the late 1980s to the present space race, many space habitat designs to suit human factors, ensure protection from space radiation, and be capable of regulating our day-to-day activities have been proposed for both lunar and martian settlements, respectively. In this paper, we are only interested in Martian settlements, and the reason for that follows next. While the moon is closer to Earth than Mars, Mars has several other advantages that make it an equal, if not a better, candidate for colonization. Some of the reasons why martian colonization is preferred over lunar colonization include the presence of an atmosphere on Mars, its resource-rich nature, and its rotation period being closer to Earth's rotation period (Mars has 24.5 hours per day, while the moon has 28-day day). Another added advantage is its proximity to the main belt asteroids, which will further increase the potential for space mining in the future. So in this paper, we will be reviewing the various Martian habitat designs proposed over the last four decades in terms of their construction and operations. To do so, we are assuming that every step associated with delivering the habitats to the Martian environment is achievable. These steps include the following: propulsion systems for long-term spaceflights; launch vehicles capable of lifting the habitats and fitting the habitat modules within them.