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HABITATION OVER MARS ENVIRONMENT: A CONCEPTUAL RESEARCH AND RESOURCE
UTILIZATION

Abstract

The idea of establishing a sustainable human settlement in space, with Mars being the main target, has gained considerable interest among the scientific community. The establishment of a permanent settlement on Mars not only ensures the survival of humanity, but it also advances scientific discovery and exploration, develops space technologies, creates novel economic opportunities, and inspires future generations to push the boundaries of human knowledge and exploration. The planet Mars experiences a broad range of temperatures, reaching extreme lows and highs, and its average distance from Earth is around 140 million miles, which can fluctuate based on the planetary positions, making it a challenging task to establish a settlement on the planet. To achieve this goal, a space settlement called HOME (Habitation Over Mars Environment) has been proposed, which aims to design and park an orbital space habitat near Phobos, which is one of the Mars' moon, in the Mars Reconnaissance Orbiter's orbit (250 x 316 km). The proposed HOME will provide housing for an initial population of 3000 residents and will have various food sources, power systems, atmospheric monitoring devices, and housing arrangements to improve the residents' quality of life and increase their resilience to unexpected events. The habitat will be supported by resource mining operations, including water mining, on Mars, its moons, and surrounding asteroids, and two methods have been proposed for producing and recycling water for daily use. The HOME will also have health and leisure zones, such as theme parks, convention centers, cinemas, pools, recreational areas, restaurants, space hotels, healthcare facilities, and pharmaceuticals, to meet the physical and mental needs of the residents. The habitat will be powered by solar energy captured by solar panels and photovoltaic cells integrated onto its torus body, with Martian regolith and composites providing radiation protection and protection from foreign objects. The modules are designed to meet the basic and emotional needs of the residents. The HOME coin will be introduced as a new currency for transactions related to travel, leisure, and other services to support the economic viability of the settlement. The proposed HOME habitat could pave the way for future Mars colonization and provide opportunities for human exploration. With proper planning, resource management, and technological advancements, the HOME could represent a crucial milestone in the pursuit of human settlement in space, with exciting prospects for future research and exploration.