

25th IAA SYMPOSIUM ON HUMAN EXPLORATION OF THE SOLAR SYSTEM (A5)
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SPACE SETTLEMENT DESIGN IN THE MOON'S QUASI-FROZEN ORBIT

Abstract

Space exploration and settlement have been a keen topic of research around the world. This paper presents an overview of space settlement in lunar reconnaissance orbiter orbit, i.e., the 30 x 216 km quasi-frozen polar orbit. It expresses the essential design features and crucial subsystems required for the initiation of a settlement. Various physics concepts underlying the space settlement were addressed during the design phase. Diversification and redundancy of food supplements, energy sources, environmental control systems, and living arrangements all contribute to the lushness of life and survival from unforeseen catastrophes. The colonisation of space will depend on our ability to routinely provide for metabolic needs such as agriculture, water, food, and so forth for a crew with minimal resupply from Earth, which has been done with a unique strategy of hydroponics and morgue room techniques, respectively. Methodological approaches such as solar photovoltaic cells, nuclear fusion, and the usage of chemical energy have been taken for power generation. An overview of all the considerations that have to be taken into account to ensure complete protection of the settlement from the threats of debris and radiation in space. It will contribute to take initiatives for designing a complete protection and shielding system for any future orbital settlements. It has been considered to create an atmosphere with the same pressure as Earth's. To generate and recycle water for daily use, two main approaches have been suggested, including sewage treatment and water production from the moon. Recreation of earthly commodities in space settlement is an important segment. It assists the residents in meeting their psychological needs. Amusement parks, auditoriums, theatres, swimming pools, parks, restaurants, space hotels, hospitals, and pharmaceutical companies are all set up as part of health and wellness zones. The arrangement for transportation necessities outside of the settlement is also discussed. For example, a versatile vehicle that is primarily used for maintenance as well as short-distance transport. Also, a vehicle that can convey a large group of people at once, as well as commodities and liquid containers from one point to another. Asteroids can be used to obtain various resources. A design for a vehicle capable of transporting large asteroids is also being presented. The proposed subsystems make it easier for residents to meet their fundamental and psychological requirements. In the near future, the settlement aspires to reproduce the planet Earth in LRO's orbit for space tourism, exploration, and permanent residency.