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Space Architecture: Habitats, Habitability, and Bases (1)

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PROPOSAL OF A HABITAT FOR MARTIAN SURFACE AND ANALOG RESEARCH WITH AN
ARCHITECTURAL APPROACH**Abstract**

Human exploration of Mars is a topic currently studied by several space agencies and institutions. One of the key elements for the success of this endeavor is the development of habitats, and the execution of analog missions to test such concepts. Following this line of work, this paper presents the final architectural design developed of a habitat for the exploration of Mars, and considering its relevance for analog research, the adjustments made for its construction as an analog station. Given the conditions of isolation and confinement that the astronauts will have to endure, the physical and psychological wellness of the astronauts can be improved by taking into account human factors in the architectonic design. For this proposal, the concept of dwelling was incorporated into the habitat, in which not only the technical aspects of the design are considered, but also the human ones in order to improve the wellness of the astronauts and their experience. Working and living factors like resting and recreation are included, in order to help to cope with stress agents that might affect the astronauts during the mission. The proposed design consists of a three level dome with a diameter of 10 meters, for a crew size of seven members, including crew quarters, geological and biological laboratories, medical station, command and control center, manufacturing and maintenance shops, kitchen, bathrooms, and social areas of different sized spaces. Additionally, the inside of the dome is designed with a distribution that brings the feeling of an open space. The general structure is made with a modular conception, such that it can shift its usage towards other distributions, as the requirements change, so it can work in parallel with similar structures as a proposed greenhouse. Those structures are connected with tunnels, allowing growth of the station from the base core according to the needs of the mission. Given the importance of analog missions, Colombia seeks to establish a program of research on the mentioned area of study, implementing the construction of the proposed habitat in a suitable location that will be disposed for the development of analog missions. Constructive details of the station were made considering locally available resources and manufacturing capabilities. General characteristics such as the electrical network, water, equipment and additional requirements are presented, along with a general budget for the projects implementation.