

IAF/IAA SPACE LIFE SCIENCES SYMPOSIUM (A1)
Interactive Presentations - IAF/IAA SPACE LIFE SCIENCES SYMPOSIUM (IP)

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PSYCHOLOGICAL FACTORS ASSOCIATED WITH HABITAT DESIGN FOR SPACE ANALOG
MISSIONS

Abstract

From the introduction of cupola to Skylab's Wardroom table, human psychology is considered an important habitat design factor to introduce a sense of comfort and homeliness in outer space. To create an optimized habitat design for the future interplanetary missions, the compatibility of the living spaces has to be realized in terms of human factor requirements. The only space borne design that provides a database regarding the psychological factors affecting the performance of astronauts in outer space is International Space Station. However these factors are only limited to the orbit but with the interplanetary missions, the stressors would change with the changing environment. The mission requirements will vary as per the targeted habitat zone. Designing a crew habitat for extra terrestrial bodies is one of the key challenges for space architects and engineers. Many design approaches are being proposed considering the engineering requirements in terms of mass, volume and structure. However, these requirements are not only limited to the technical aspects rather a strong case can be observed for psychological aspects as well. This paper will include the research on psychological adaptation of Space habitat design based on a 9-days mission as a part of EPFL Asclepius mission. The Grimsel mission site provides a suitable environment to analyse the tools required to address the psychological aspects of planetary habitat designs. The mission duration will mainly account for the short term effects on crew members. The research will be conducted on the basis of various evaluation themes. Adjacency matrix will suggest the behavior implications due to connecting or separating individual spaces. Ergonomic usability and its adaptability criteria will be used to identify the ease of machine handling activities for instance proximity assessment of the equipment position. Functional adaptability criteria will be implemented to identify the changes in sitting, sleeping, or lying patterns due to the stressors like light, illumination, color and texture of the habitat . Under this evaluation theme, main stressors and its factors, affects and degree of adaptation will be identified. This approach will enable the Engineers to implement the changes in size of habitat, logistics, private/social spaces, flexible interior design to accommodate crew members' needs with increasing duration of their stay. These results will later provide a database to accommodate design changes in future space missions and will lead towards modular approach in building space habitats.