

SPACE LIFE SCIENCES SYMPOSIUM (A1)
Radiation Fields, Effects and Risks in Human Space Missions (4)

Author: Prof. Konstantinos-Alketas Oungrinis
Technical University of Crete, Greece, kougrinis@isc.tuc.gr

Ms. Marianthi Liapi
Aristotle University of Thessaloniki, Greece, marianthi.liapi@gmail.com
Prof. Olga Bannova
University of Houston, United States, obannova@central.uh.edu

DEPLOYABLE ISOLATION CHAMBER AND RADIATION PROTECTION UNIT

Abstract

This paper proposes the design of a deployable chamber that can be used in two ways: as a private compartment and as a radiation safe haven. An isolation chamber incorporates a number of features enabling more privacy for crewmembers. The interior of that chamber creates an environment with a variety of spatial stimulants and customizable settings that stimulate astronauts' psychological health. Secondly, it can act as a radiation-shielded chamber in case of emergency, facilitating prompt protection of the whole crew from intense SPE radiation. Both issues are considered of high importance for the success of any long duration space mission.

Currently there are many approaches proposing mitigation solutions for radiation hazards caused by SPEs and GCR including electromagnetism and material shielding. This paper discusses the approach where water is used as a medium for protection, since it is one of resources necessary for crew survival. In particular, any type of water, either white, grey or black, can be used in a stowage as shielding from radiation if the stowage design meets storage and management requirements.

The design approach is based on inflatable cushions that form a flexible configuration making the whole chamber a deployable structure. The cushions also may act as actuators, a necessary feature for interior spatial transformations. Water in this case acts as the main mechanism through which spatial characteristics are controlled, providing a customized environment and conditions necessary for each crewmember to perform his/her personal activities, ranging from meditation to "holodeck" experiences.