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Contribution of Moon Village to Solving Global Societal Issues (2)

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A LITERATURE REVIEW OF PSYCHOSOCIAL STRESS IN ICE ENVIRONMENTS FOR THE MOON VILLAGE RESIDENCE

Abstract

In the Moon Village, astronauts or participants should be exposed to psychological and physical stressors such as isolation and confinement, limited habitability, interpersonal issues, microgravity and space radiation like as in the International Space Station (ISS). The new and unknown stressors might be additionally found in the moon village. To assess physiological and psychological responses during a stay in various isolation, confinement and extreme (ICE) environments, several confinement studies have been conducted to simulate the conditions of the ISS, the Mir space station, and potential habitats on Moon and Mars, and to survey psychological interpersonal communication between the crew in ICE environments, including the Isolation Study for European Manned Space Infrastructure, Experimental Campaign for the European Manned Space Infrastructure, Simulation of Flight of International Crew on Space Station, Human Behavior in Extended Spaceflight, Mars-500, Hawaii Space Exploration Analog and Simulation,

and Human Exploration Research Analog. From these studies about ICE environments, astronauts are exposed to psychological stressors such as isolation and confinement, limited habitability, and interpersonal issues with crewmembers and/or ground staff, in addition to physical stressors such as microgravity and space radiation. Excessive psychological stress perturbs the homeostasis of living creatures and results in tissue damage and disease. It is also reported that extremely high mental workloads and uncontrolled stressors decrease cognitive abilities such as working memory, executive function, and cognitive efficiency in humans. The negative effects of psychological stress on astronauts' health and performance will become a serious issue in the Moon Village, because the distance from Earth and the duration of spaceflight increase several times more than before. Impacts on long-term stay in ICE environments have been studied on the stay in the Arctic and Antarctic polar regions. In Japan, Science Union of Human Planetary Habitation in Space (SUHPHS) was established in 2016. This union will bring together the wisdom from the basic sciences of the natural sciences to the applied sciences as well as the human sciences and social sciences. This unions' aim is to cooperate and unite academic societies and individuals to enable humans to live long in space. In order to resolve the new and unknown problems in the Moon Village, a multidisciplinary approach is needed. This review was supported by the JSPS Grant in Aid for scientific research (15H05941).