Paper ID: 72954
oral
student

IAF SPACE EXPLORATION SYMPOSIUM (A3)
Moon Exploration – Part 3 (2C)

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ASTRONAUT TRAINING AND STUDIES ON SPACE TECHNOLOGIES, PHYSIOLOGY, AND LIFE SUPPORT DURING EMMPOL 10 & 11 SPACE ANALOG SIMULATIONS

Abstract

Thanks to the Analog Astronaut Training Center (AATC), a series of EuroMoonMars POLand (EMMPOL) analog habitat isolation campaigns have taken place. The aim of these campaigns is to investigate the effects of isolation on the crews, as well as to conduct unique scientific experiments to advance space science. These missions also serve as astronaut training simulations by improving one's ability to work under stress, control and operate equipment found in the habitat with the end goal of preparing one for the rigours of space travel.

The EMMPOL 10-11 campaigns have crews of six analog astronauts, with each crewmember being assigned a specific role based on their expertise and background. Crew composition for EMMPOL 10/11 is as follows: commander (I. Bustamante/P. Frering), vice-commander/Capcom (W. Dobney/K. Gautam), medical officer/biomedical engineer (F. Palma/ S. Solbiati/L. Balotti), engineer (S. Mutte/ L. Bryne/J. Renaghan), public relations officer (K. Claeys/A. Gigimon). During these isolation periods, a series of distinct scientific experiments will take place to investigate envisioned requirements of future space missions. These experiments include comprehensive physiological research related to nutrition, sleep and cryotherapy as well as studies to assess how individuals in a team setting react under pressure using different parameters such as performance, social skills and mental health. Furthermore, the impact of virtual reality on stress levels, metabolism and other physiological parameters including breathing and heart activity will be monitored.

Simultaneously, studies focusing on living quarter usage and proxemics will take place. The data collected will serve as basis for certain energy reclamation technologies to be implemented. The use of remote-controlled telescopes from inside this isolated, confined, and artificial environment representative of a space habitat will be evaluated. Lastly, space life support systems (plants, rotifers, and bacteria), in specifically designed 3D printed modules, and colloids will be subjected to simulated microgravity using a Random Positioning Machine, along with cryogenic treatments to study the effects of microgravity and temperature dependant behaviour. To further aid the mission, a dedicated imaging system will be developed and mounted on the RPM.

The results obtained during EMMPOL 10 11 will further broaden our scientific understanding and the effects of isolation in a space analog habitat and will be discussed in this presentation.

Acknowledgements: Student grants and support provided by KU Leuven, SCK CEN and EMMESI. This work was funded by ESA/BELSPO/Prodex IMPULSE-2 contract (PEA 4000109861). The mission was made possible with the organization of EuroMoonMars and AATC Poland.