

IAF/IAA SPACE LIFE SCIENCES SYMPOSIUM (A1)
Medicine in Space and Extreme Environments (4)

Author: Dr. Rochelle Velho
University of Warwick, United Kingdom, rockyvelho@gmail.com

Dr. Bonnie Posselt
United Kingdom, bonnieposselt@gmail.com

Dr. Stefan Dobrovlny
Austria, st.dobro@gmail.com

Mr. Andreas Zoller
Ulm University, Germany, andreas.zoller@uni-ulm.de

Mr. Nils Kaufmann
United Kingdom, nils.kaufmann@student.manchester.ac.uk

Dr. Lucas Rehnberg
United Kingdom, lukirehnberg@gmail.com

A MARS ANALOG MISSION; A MEDICAL PERSPECTIVE

Abstract

A human base on the surface of the Martian planet is an aspiration for Space Communities around the world. Such a mission will push the boundaries of technology and human physiology. However, such a remote location is not a suitable environment to test proof of concepts for new technologies, potentially harming crew members should they fail. A method of testing and developing technologies, procedures and operations for facilitating a Martian mission, is to realistically simulate the environment here on Earth. In February 2018, the Austrian Space Forum conducted such an analogue mission in the isolation of the deserts of the Dhofar region, in the sultanate of Oman. 15 individuals from across 9 European countries made up the group deployed to the field, supported by a team in the Mission Support Centre (MSC) located in Innsbruck, Austria.

For simulated Extravehicular Activities (EVAs), analogue astronauts (AAs) wore suits designed to represent the pressure, movement range, dexterity and sensory deprivation experienced in real life spacesuits. This space analogue environment required specific occupational considerations, such as local poisonous animals, heat and dust, as well as providing real life medical response in an austere and remote location. From a medical point of view, the mission posed many challenges in terms of capabilities, particularly with monitoring and communications to the MSC having a 20-minute time delay.

All field crew had a health screen prior to deploying. Medical plans were also put in place to cover varying levels of medical needs, including a real life medical emergency. During the mission, prior to and after partaking in EVAs, the fitness of each AA was reviewed by the field medic. Any issues encountered were investigated and discussed with the medic back at the MSC. Heart rate, ECG trace, in-suit temperature, oxygen and carbon dioxide levels were monitored throughout; both in the field and remotely with simulated time delay at the MSC. Several medical issues became apparent during the mission. Firstly, the environmental temperatures were higher than expected and mitigations were implemented to minimise the risk of heat illnesses. Additionally, the bulk and weight of the suit was significant, requiring careful monitoring of musculoskeletal injury.

During this presentation, the scope of the mission will be described, focusing on the medical operations, issues faced, actions taken and suggestions for future analogue missions.