

HUMAN SPACEFLIGHT SYMPOSIUM (B3)

Human and Robotic Partnerships in Exploration - Joint session of the Human Spaceflight and Exploration
Symposia (6-A5.3)

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HUMAN ROBOTIC PARTNERSHIP DURING EIFEL VOLCANIC AREA SIMULATION CAMPAIGN

Abstract

Moon-Mars analogue missions using a mock-up lander that is part of the ESA/ILEWG ExoGeoLab project were conducted during Eifel field campaigns in 2009, 2015 and 2016 (Foing et al., 2010; Kamps et al., 2016). In the last EuroMoonMars2016 campaign the lander was used to conduct reconnaissance experiments and in situ geological scientific analysis of samples, with a payload that mainly consisted of a telescope and a UV-VIS reflectance spectrometer. The aim of the campaign was to exhibit possibilities for the ExoGeoLab lander to perform remotely controlled experiments and test its applicability in the field by simulating the interaction with astronauts.

The Eifel region in Germany where the experiments with the ExoGeoLab lander were conducted is Moon-Mars analogue due to its geological setting and volcanic rock composition. The research conducted by analysis equipment on the lander could function in support of Moon-Mars sample return missions, by providing preliminary insight into characteristics of the analyzed samples.

The set-up of the prototype lander was that of a telescope with camera and solar power equipment deployed on the top, the UV-VIS reflectance spectrometer together with computers and a sample webcam were situated in the middle compartment and to the side a sample analysis test bench was attached, attainable by astronauts from outside the lander. An alternative light source that illuminated the samples in case of insufficient daylight was placed on top of the lander and functioned on solar power.

The telescope, teleoperated from a nearby stationed pressurized transport vehicle that functioned as a base control center, attained an overview of the sampling area and assisted the astronauts in their initial scouting pursuits. Locations of suitable sampling sites based on these obtained images were communicated to the astronauts, before being acquired during a simulated EVA. Sampled rocks and soils were remotely analyzed by the base control center, while the astronauts assisted by placing the samples onto the sample holder and adjusting test bench settings in order to obtain spectra. After analysis the collected samples were documented and stored by the astronauts, before returning to the base.

Acknowledgements: we thank ILEWG for support, Dominic Doyle for ESTEC optical lab support, Aidan Cowley (EAC) and Matthias Sperl (DLR) for discussions, and the participants to Eifel 2016 simulation campaigns