

HUMAN SPACEFLIGHT SYMPOSIUM (B3)
Interactive Presentations (IP)

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OPERATIONAL LESSONS LEARNED FROM HUMAN-ROBOTIC PARTNERSHIP IN
EXO GEOLOGY ANALOG EXTRAVEHICULAR ACTIVITY SIMULATION AT EIFEL VOLCANIC
REGION: ILEWG EUROMOONMARS

Abstract

1 Introduction

In future human space exploration human-robotic partnership will play a key role. Personal carriers, robots and autonomous scouting drones will enhance and optimize extravehicular activity time and science yield from each expedition. During the analog Extravehicular Activity (EVA) simulations performed in Eifel, Germany region the set of European Space Agency ILEWG scientists and research collaborators has tested proof of concept for the human-robotic partnership, EVA procedures and schedule for geological sampling of the sedimentary layers in former volcanic activity location.

2 Extravehicular Activities

During the simulation the crew prepared three distinct EVAs. The analog astronauts simulated:

- identification of the contingency sample,
- establishing and testing the radio communication with simple and complex transmission,
- mapping the vicinity of lander for possible radio communication problems,
- setup and calibrating the spectrometry analysis device,
- deliver the rock samples using the rover to the spectrometry analysis device on lander,
- conduct spectrometry analysis from habitat using remote control over the wireless internet,
- investigate in-depth details of the sedimentary layers,
- identify detailed location for future EVA,
- test the emergency procedure for EVA termination,
- test rover operations in rough terrain,

- identify and collect biological sample for further analysis and signs of life identification,
- test the rover lights and support for astronauts work in no light conditions,
- test the influence of poor lightning condition on rover control using video navigation aids,
- test in-the-field rover control using portable antenna and sidearm joystick.

3 Identified issues

During EVA scenarios team was able to identify several issues. Most of those issues were connected with communication and mission organization. The problems has been reported and elaborated upon to create a lessons learned article.