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

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M.A.R.S. MISSION: FIRST RESULTS FROM ROBOTICS TO HUMAN FACTORS IN POLAND 2017

Abstract

At the Modular Analogue Research Station (M.A.R.S.) in Poland, from 8 to 22 July 2017a group of six astronauts performed a mission simulation organized in partnership with ESA ESTEC, ILEWG, Astronomia Nova Association, West Pomeranian University of Technology, Infinity Rover Team, Hipromine, and other entities .

The mission aims to study human-robotic partnerships, technological advances, astronomy operations, and human factors in order to prepare for future human Lunar exploration missions. While previous analog missions mainly focused on Mars surface exploration scenarios and were predominantly conducted in the USA, this mission has been entirely executed in Europe, using the newly built M.A.R.S. near Turza in southern Poland.

A strict crew selection process has been applied to ensure suitable composition of the crew. In preparation of the mission, a dedicated test mission was performed in August 2016 to verify harmonious relations among the crew and to reinforce team building.

The crew of six astronauts that was finally selected has been performing experiments and investigations in various fields of research under professional supervision in order to gain new knowledge for future manned missions, such as:

•Robotics Astronomy (Harasymczuk, Prof. Wszołek): test of lander and rover coordination, astronomy observation with Celestrone remote control.

•Human Factors (Dr. Schlacht): analysis of crew dynamics and habitability problems using a remotely controlled guided procedure.

•Time perception experiment (Dr. Kołodziejczyk): analysis of behavioral and physiological responses to programmed time illusions and lighting conditions

• Stress well-being (Dr. Alcibiade): analysis of language performance and stress impact with an algorithm

• Psychosocial research (Davidova): study of aspects of intragroup and intergroup interactions of the

crew based on focused observation and questionnaires analysis as well as conduction of post-experimental interviews for further information and verification of the other findings;

• Mission coordination (Dr. Kołodziejczyk, Prof. Foing): conclusions and lessons learned about overall mission dynamics and organization

• as well as research and experiment in other fields such as biomedical engineering.

The astronauts have been supported by a well-prepared hierarchically structured ground control team at ESTEC and other partner locations. Here the crew has been monitored and coordinated by a team of medical doctors, psychologists, scientist and technical staff. In conclusion, the mission research conducted by multidisciplinary experts from different fields offers lessons learned that could be applied in preparation of Moon-Mars missions by providing preliminary robotic/astronaut partnership dynamics and test results.