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HUMAN AND ROBOTIC PARTNERSHIPS FROM EUROMOONMARS ANALOGUE MISSIONS 2011

**Abstract**

The International Lunar Exploration Working Group (ILEWG) through the means of the EuroMoon-Mars missions investigates the feasibility and limitations of human and robotic planetary exploration. Field tests were performed since 2008 up to 2011 at the Mars Desert Research Station (MDRS) in Utah. In two week rotations crews of six members came to the station to perform new missions and established the knowledge, conditions, systems, and equipment necessary to perform successful planetary exploration activities.

The activities carried out during the EuroMoonMars 2011 campaign are described in this paper while taking into account prior lessons learned from the ILEWG EuroMoonMars missions since 2008. The research includes the usage of a Rover on loan from NASA Ames and an Unmanned Aerial Vehicle (UAV) for reconnaissance purposes and investigations into: the system requirements; Operator interaction and tele-operation learning cycles; Combined Rover and UAV excursions; Human and Robotic Partnership as EVA assistance or replacement; and extending of the RF robotic remote control network.

The MDRS environment constrained the crew to working and living together in a closed extreme

environment designed on the basis of a early Moon or Mars outpost. This simulation offers a reality where space activities can be experienced first hand which is essential to an increased understanding for Human and Robotic Partnership during planetary exploration being either on Moon, Mars or other outposts.

The environment allowed additional research to be performed in parallel into Extra-Vehicular Activities (EVA) communication efficiency with its related stress factors and Moon Mars Habitability Project (environmental aspects of the habitat, human factors, food and sleep study).

The purpose of this paper is to give an overview of the achievements and lessons learned, discuss the scenario of experiments and research performed related to the usage of remote controlled Rovers and UAV's, as well as their partnerships during reconnaissance and during EVA's. Several factors (i.e. Habitat, Human Technological Factors) will be shown with the aid of the various backgrounds and perspectives of the crew members and their supporters.

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