HUMAN EXPLORATION OF THE SOLAR SYSTEM SYMPOSIUM (A5)
Human Exploration of Mars (2)

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ADVICE FROM ARES: ENHANCING HABITAT AND LIFE SUPPORT SYSTEM DESIGN WITH MARTIAN AND LUNAR ANALOGUE TEST SITE MISSIONS

Abstract

Since mid-2011 the German Aerospace Center Institute of Space Systems has been working in the field of habitat design, specializing also in life-support systems within the project EDEN. Having conducted several design studies about off- and on-planet habitats and greenhouse systems, the Department of System Analysis Space Segment had the opportunity to participate in the International Lunar Exploration Working Group's EuroMoonMars B mission (Crew 125) at the Mars Society's Mars Desert Research Station (MDRS) in early 2013. This participation took place mainly under the auspice of relating the analogue test site with the habitat design studies of the department and to prepare future missions with the perspective of greenhouse system tests. One year later in 2014 the department participated in the Reliability and Redundancy of Extreme Environment Habitat Structures and Power Systems mission (RAR Mission) within Crew 135. The main focus of the mission has been structural and power assessments to improve habitat performance, efficiency, reliability and redundancy. In particular a study on illumination and nutrient delivery systems of the GreenHab was performed to make it more efficient in terms of plant production and crew time use. The authors present in this paper an overview about the research conducted off-site, describe the status of MDRS and the missions and elaborate the experiments and lessons learnt during the Crew 125 and Crew 135 participation. It is shown how analogue test site utilization enhances the department's research in the field of habitat and life-support system design and in general the preparation of human missions to Moon and Mars.