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HUMAN EXPLORATION OF THE SOLAR SYSTEM SYMPOSIUM (A5)
Long Term Scenarios for Human Moon/Mars Presence (2)

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SCIENTIFIC RESULTS AND LESSONS LEARNED FROM AN INTEGRATED CREWED MARS EXPLORATION SIMULATION AT THE RIO TINTO MARS ANALOGUE SITE

Abstract

In the framework of the PolAres program of the Austrian Space Forum, a five-day field test of the Aouda.X spacesuit simulator was conducted at the Rio Tinto Mars-analogue site in southern Spain. The field crew was supported by a full-scale Mission Control Center (MCC) in Innsbruck, Austria. The field telemetry data were channeled to the MCC to enable a Remote Science Support team to study field data in near-real-time and adjust the flight planning in a flexible manner. We report on experiments in the field of robotics, geophysics (Georadar) and geology (Raman spectroscopy, VIS/NIR spectroscopy, Drill ring for core sampling, Scaled Observations) and life sciences (Yeti: Youth Explores Terra Incognita, Microbial Assessment) in an operational environment. Extravehicular Activity (EVA) maps had been prepared using Google Earth and aerial images. The Rio Tinto mining area offers an excellent location for Mars analogue simulations. It is recognized as a terrestrial Mars analogue because of the presence of jarosite and related sulfates, which have been identified by the NASA Mars Exploration Rover "Opportunity" in the El Capitan region of Meridiani Planum on Mars. During our Mars simulation, 18 different types of soil and rock samples were collected inside Rock Garden" area by the spacesuit tester. Collected samples were transferred to laboratories where Raman spectroscopic investigation and YETI experiment were done. The Raman results confirm the presence of minerals expected, such as jarosite, different Fe oxides and oxihydroxides, pyrite and complex Mg and Ca sulfates. Six successfully finished activities were conducted in the field. In the contribution first we list the important findings during the management and realization of tests. Secondly, the geology-related results regarding the EVA tracks and the Scaled Observation projects are listed. Thirdly, the main suggestions for future analogue work are summarized. We had to deal with some challenges on the field, which could be improved during a follow-up mission, including the preparation of the experiments, communication and data transfer.