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Human Exploration of Mars (2)

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THE 2019 ANALOG MARS MISSION SEASON AT THE DESERT MARS ANALOG RAMON STATION

Abstract

The Desert Mars Analog Ramon Station (D-MARS) is an organization dedicated for establishing an international planetary analog research center at the Negev desert in Israel. D-MARS aim is to promote space-related education, science and technological innovation via analog mission infrastructure. The Ramon Crater in the Negev desert was chosen for its unique geomorphology and geology, with hyper arid climate conditions allowing for Mars simulated environmental.

The D-MARS habitat is a scalable deployed portable structure. It can support six Ramonauts living in isolation during few weeks of an analog mission. The habitat has a science lab that includes biological safety cabinet and additional equipment to perform geo-biological experiments internally, small hydroponic system, a common room, six encased sleeping pods, kitchenette, a small bathroom and toilet. The power system is a combination of 5kW solar system, batteries and a generator.

D-MARS team members have designed and performed Mars analog missions during 2018 (H. Rubinstein, et al. 50th LPSC, 2019) for the first time in Israel. During the second field campaign (February – March 2019), several types of analog Mars missions were performed: An 11-day main analog mission (see below); a three-day "Landing on Mars" analog mission to prepare and put into operation the infrastructure and technological equipment, simulating a crew in a preliminary phase on Mars; a two-day medical analog mission that included several possible medical emergency chain of events; a dedicated high school student group performed a three-day analog missions as part of the Young Astronaut Academy program by The Davidson Institute for Science Education and D-MARS, supported by the Israeli Space Agency and ICA foundation. This program promotes STEM and the love of space. During all missions, all simulated extravehicular activities were done in a dedicated sim spacesuit for operating outside the habitat. The analog astronauts ("Ramonauts") were in complete isolation and communicated only with the Mission Support Center (MSC) with a 10-minute delay.

During the main 11-day mission various scientific experiments included soil analysis, environmental microorganism's metagenomics, isolation and characterization, rover utilization for external mapping and situational exploration, various psychological analyses of crew's wellness and more.

The international AMADEE-20 analog mission of the Austrian Space Forum will be conducted in a modified and upgraded D-MARS infrastructure during 2020.

In this paper the 2019 Analog mission season is presented, detailing the various missions and their objectives, impacts, lessons learned and future forecasts and plans.