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TECHNOLOGIES AND TECHNIQUES FOR IMPROVING SCIENCE RETURN FROM HUMAN EXPLORATION ACTIVITIES

Abstract

Here we present results and recommendations from the EuroMoonMars-B analogue campaign at the Mars Desert Research Station (MDRS). The two week campaign was based on the human exploration of Gale Crater. A criterion for sending humans to conduct exploration is the perceived notion that an experienced field explorer will be able to improve the scientific return. Therefore, not only do the human explorers need to improve the quality of science return, but they must also maximize the quantity of science they can return in order to justify the expense of sending them in the first place. As such, one of the operational objectives of the campaign was to assess the performance of experienced field geologists during simulated extra vehicular activities (EVAs).

Simulated EVAs to field sites were studied for procedural activities: from departing the airlock, travel to the field site, site assessment and target selection, sample collection, and return to the airlock. Several EVAs were required to study the various sites, however due to the time restrictions and the desire to study several more locations, the number of EVAs to each site was limited. Different field sites each provided also unique procedural activities to perform.

Based on all of these activities, several recommendations were made in order to improve upon the effectiveness of the time spent by the field geologists. These recommendations focus on robotics and automation, which were projected to reduce to time to complete target sample collection by half. Further techniques could further reduce the time spent on sample analysis and reporting. Specific robotic technologies, such as robotic scouting and motion capturing, were studied at MDRS to assess their utility.