NASA’s Desert RATS Science Backroom: Remotely Supporting Planetary Exploration

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NASA’s Desert Research and Technology Studies (Desert RATS) is a multi-year series of tests designed to exercise planetary surface hardware and operations in conditions where long-distance, multi-day roving is achievable. In recent years, a D-RATS science backroom has conducted science operations and tested specific operational approaches. Approaches from the Apollo, Mars Exploration Rovers and Phoenix missions were merged to become the baseline for these tests. In 2010, six days of lunar-analog traverse operations were conducted during each week of the 2-week test, with three traverse days each week conducted with voice and data communications continuously available, and three traverse days conducted with only two 1-hour communications periods per day. In 2011, a variety of exploration science scenarios that tested operations for a near-earth asteroid using several small exploration vehicles and a single habitat. Communications between the “ground” and the crew in the field used a 50-second one-way delay, while communications between crewmembers in the exploration vehicles and the habitat were instantaneous. Within these frameworks, the team evaluated integrated science operations management using real-time science operations to oversee daily crew activities, and strategic level evaluations of science data and daily traverse results. Exploration scenarios for Mars may include architectural similarities such as crew in a habitat communicating with crew in a vehicle, but significantly more autonomy will have to be given to the crew rather than step-by-step interaction with a science backroom on Earth.