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First results from the Mojave Volatiles Prospector (MVP) Field Campaign, a Lunar Polar Rover Mission Analog

The Mojave Volatiles Prospector (MVP) project is a science-driven field program with the goal to produce critical knowledge for conducting robotic exploration of the Moon. MVP will feed science, payload, and operational lessons learned to the development of a real-time, short-duration lunar polar volatiles prospecting mission. MVP achieves these goals through a simulated lunar rover mission to investigate the composition and distribution of surface and subsurface volatiles in a natural and a priori unknown environment within the Mojave Desert, improving our understanding of how to find, characterize, and access volatiles on the Moon. The MVP field site is the Mojave Desert, selected for its low, naturally occurring water abundance. The Mojave typically has on the order of 2-6% water, making it a suitable lunar analog for this field test. MVP uses the Near Infrared and Visible Spectrometer Subsystem (NIRVSS), Neutron Spectrometer Subsystem (NSS), and a downward facing GroundCam camera on the KREX-2 rover to investigate the relationship between the distribution of volatiles and soil crust variation. Through this investigation, we mature robotic in situ instruments and concepts of instrument operations, improve ground software tools for real time science, and carry out publishable research on the water cycle and its connection to geomorphology and mineralogy in desert environments.

A lunar polar rover mission is unlike prior space missions and requires a new concept of operations. The rover must navigate 3-5 km of terrain and examine multiple sites in in just ~6 days. Operational decisions must be made in real time, requiring constant situational awareness, data analysis and rapid turnaround decision support tools. This presentation will focus on the first science results and operational architecture findings from the MVP field deployment relevant to a lunar polar rover mission.