CanMoon Canadian Lunar Sample Return Analogue Mission Traverse Planning and Pre-Mission Remote Sensing Analysis

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Abstract. The 2019 CanMoon Canadian Lunar Sample Return Analogue Mission is a high-fidelity lunar rover mission simulation and training exercise that is being conducted as a joint effort of the Canadian Space Agency (CSA), Centre for Planetary Science and Exploration (CPSX) at Western University, and the Planetary Spectrophotometer Facility at the University of Winnipeg. This analogue mission will simulate the near-real time control of a rover platform on the lunar surface from an Earth-based mission control center. The analogue mission is set to take place the first two weeks of August 2019, with a mission control center hosted at Western University in London Ontario Canada, and a field team with an analogue lunar rover deployed to a remote field site on the volcanic island of Lanzarote Spain. During the two week mission deployment the mission team has four main science goals: (1) Characterize the general geologic setting of the operational field area, (2) identify and collect the best rock sample for radiometric age dating, (3) identify and collect the most volatile rich rock sample, and (4) identify and collect a sample that contains mantle or crustal xenoliths.

Prior to the start of mission operations, a detailed rover traverse plan is being created based on the analysis of a set of lunar-analogous remote sensing data products. These datasets include: a Landsat 8 30m/pixel visible image analogous to low resolution Lunar Reconnaissance Orbiter Narrow Angle Camera (LRO-NAC) data, a pair of 50cm/pixel aerial photographs analogous to high resolution LRO-NAC data, 30 m/pixel Landsat 8 and 90 m/pixel ASTER multi-spectral datasets analogous to both Clementine and M3 compositional datasets, as well as 2 digital elevation models (a 70m/pixel DEM for full island coverage and a 2 m/pixel DEM covering only the operational field area) each analogous to LRO Wide Angle Camera (WAC) – derived topographic data. Additional higher level data products have been derived from these base data including slope maps, and basic compositional maps of the field area. The combination of all of the above data products will allow the mission control team to draft a rover traverse plan prior to the start of mission operations that ensures the rover visits as many observed geomorphologic and geochemical sites of interest as possible within the limited time window for mission operations. It is important to note that the in-simulation CanMoon science teams are limited in their knowledge of the chosen operational field site to only the information contained in these select analogue datasets and any additional data collected by the rover platform once mission operations begin. A more detailed description of the exact rover traverse plan and traverse planning methodology will be presented at the conference.