

Habitat detection and identification at Salar de Pajonales, a Mars analog environment

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Introduction: Our goal is to establish thresholds of detection (recognize characteristics of a target) and identification (positive identification of a target) for habitats in terrestrial Mars analog environments. Such thresholds inform the search for possible paleohabitats on Mars and can guide performance objectives for future instruments. To understand how detection and identification of specific geologic features inhabited by microbes and recognizable from aerial images correlate with image resolution we conducted unmanned aerial vehicle (UAV) imaging campaigns at Salar de Pajonales (SdP, 25° 08' 00" S, 68° 50' 00" W, 3545 m), Chile. SdP is part of the Chilean Altiplano between the Atacama Central Depression and the pre-Andean Cordillera de Domeyko [1]. Surface features within putative evaporitic basins on Mars that match characteristics of those at our study location would be high priority targets for future landed missions.

Results: Our study location within SdP is gypsum-dominated [2] and we have defined four main units: i) isolated, near-circular **domes** comprised of radial selenite, ii) sinuous **ridges** commonly connected as edges of polygonal networks, iii) **flat polygons**, commonly with polished surfaces, forming a polygonal-patterned ground, and iv) surficial **aeolian/detrital cover** [2]. These surface units represent distinct microbial habitats within the salar and have different colonization coverage [2]. We conducted flight campaigns with ground sampling distances of 2 mm/pixel, 4 mm/pixel, 4.2 cm/pixel, and 8.4 cm/pixel. From these images we simulated lower resolution images and images homologous to those from Mars orbital platforms. Preliminary results indicate that ridges and domes should be identifiable in images currently available from Mars.

References: [1] Chong, G. (1988) In S. Central Andes, Springer, 135-151. [2] Warren-Rhodes, K., et al. (2019) AbSciCon.

Acknowledgements: This research is supported by NASA Astrobiology Institute's Grant No. NNX15BB01A, under the "Changing Planetary Environment and the Fingerprints of Life", SETI Institute NAI team (N. Cabrol, P.I.).