

Field Exploration and Life Detection Sampling through Planetary Analogue Research (FELDSPAR)

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Exploration missions to Mars rely on orbiters to collect large-scale data, and landed missions are constrained to footprints of a rover or lander, with individual samples on the mm to cm scale. It is currently not well-constrained how habitability varies over these spatial scales. FELDSPAR seeks to conduct field studies analogous to Mars sample return from landing site selection, in-field sample selection, remote or stand-off analysis, in situ analysis, and home laboratory (sample return) analysis [1]. This abstract represents an overview of the data collected during the 2017 field season and a comparison to data from prior field seasons in 2013 [1, 2], 2015, and 2016.

Volcanic regions, particularly in Iceland, are relevant Martian analogues [1-2]. The four field sites include two recent lava fields at Fimmvörðuháls and Holuhraun, a recently deglaciated plain (Mælifellssandur), and an alluvial plain (Dyngjúsandur). Samples in nested triangular grids every order of magnitude from the 10 cm scale to the 1 km scale were collected at each site. In-field analyses included overhead imagery at 1 m to 200 m elevation, in-field reflectance spectroscopy and X-ray fluorescence. ATP content was analyzed in a field lab, and Raman spectroscopy and qPCR for fungal, bacterial, and archaeal DNA are ongoing in the home lab(s).

Spatial variation in ATP content at the 10 cm scale averaged out at larger scales, while the other analyses revealed limited variability. A follow-on expedition is planned summer 2018 to elucidate which geochemical and geochemical parameters dictate habitability. For more information, follow us on Facebook @FELDSPARResearch

[1] Amador, E. S. et al. (2015) Planet. Space Sci. [2] Gentry, et al., (2017) Astrobio.