Suite of Geochemical and Spatial Analogues for Planetary Life Detection. Carlie M. Novak[1], A. M. Stockton[1*] G. K. Tan[1], Z. A. Duca[1], V. Balayan, M. L. Cable[2], D. Cullen[3], and W. Geppert[4], and FELDSPAR Team; [1]Chemistry and Biochemistry, Georgia Institute of Technology, MoSE 1100K, 901 Atlantic Dr NW, Atlanta, GA 30332, USA, cnovak7@gatech.edu, [1*]astockto@gatech.edu, [2]NASA Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA, USA, [3]University of Washington, Seattle, WA, USA, [4]Royal Institute of Technology or Stockholm University, Stockholm, Sweden.

Introduction: In attempt to discover signs of life on Mars, NASA's 2020 mission will be the first exploration of its kind in which extraterrestrial samples will be collected and stored for a future return to Earth. Field Exploration and Life Detection Sampling through Planetary Analogue Research (FELDSPAR) performs Martian analogue studies to inform sampling strategies of sample return missions like that of the Mars 2020 mission, ensuring the most relevant samples are returned to Earth.

Iceland is a good analogue for Mars due to its cold temperatures, volcanic regions, and minimal anthropogenic contamination. The field site at Dyngjusandur is an alluvial plain where the sediment is regularly mechanically redistributed, which is the likely cause of its continued barrenness, and thus serves as an analogue for basaltic alluvial plains on Mars.

In 2017, after an initial exploratory campaign in 2016 (sister abstract by Sutton et al), samples were collected in nested triangular grids from 10 cm spacing to 1 km spacing. In-field analyses included near IR spectroscopy, X-ray fluorescence, and overhead imagery at elevations up to 200 meters. ATP content was analyzed in a field lab and used as a biomarker to test biological activity in the samples. Moisture content, grain size, XRD, and qPCR are ongoing in the home lab and preliminary results show that some geochemical parameters dictate habitability[1]. Additionally, biochemical analyses indicate that, due to the stochastic nature of biology, that at least three samples collected at 10 cm spacing are required to represent the biological levels and activity of a site[2]. This is also the first study that can provide temporal data on this alluvial site, by comparison of the 2017 data with the 2016 data (detailed in sister abstract by Sutton et al).

Work is ongoing to build a model that predicts habitability from geochemical and geophysical characteristics alone, and will hopefully contribute to a sampling strategy that results in the Mars 2020 rover finding the samples with the greatest chance of harboring signs of life on Mars.

References: [1] Amador, E. S., Cable, M. L., Chaudry, N., Cullen, T., Gentry, D., Jacobson, M. B., Murukesan, G., Schwieterman, E. W., Stevens, A. H., Stockton, A., Yin, C., Cullen, D. C. & Geppert, W. (2015) *Planetary Space Science, 106,* 1-10. [2] Gentry, D. M., Amador, E. S., Cable, M. L., Chaudry, N., Cullen, T., Jacobsen, M. B., Murukesan, G., Schwieterman, E. W., Stevens, A. H., Stockton, A., Tan, G., Yin, C., Cullen, D. C. & Geppert, W.(2017) *Astrobiology, 17,* 1009-1021.

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