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Characterization of silicate minerals in Alfalfa, Maaz Unit of Jezero Crater Floor, Mars.

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The *Perseverance* / Mars 2020 rover has been investigating and sampling the Jezero Crater floor over the past year and a half [1, 2]. The crater floor includes two units: (1) Séítah fm., an olivine cumulate unit, partially altered to carbonate, and (2) Máaz fm., characterized as a high-Fe basaltic lava and largely composed of pyroxene, stratigraphically post deposited relative to Séítah and aerially extensive [1-3]. Here we explore the mineralogy of the target Alfalfa from the Sid outcrop of the Máaz fm. Using results from the proximity instruments located on the rover's arm: SHERLOC (Scanning Habitable Environments with Raman and Luminescence for Organics & Chemicals), WATSON (Wide Angle Topographic Sensor for Operations and Engineering), and PIXL (Planetary Instrument for X-ray Lithochemistry). The SHERLOC Alfalfa scan, completed on sol 370, featured a 1x1 mm^2 HDR 500 pp (pulses per point) map with 780 µm of resolutiom and PIXL scan co-performed on the same target, completed on sol 369, featured a 7x7 mm^2 map.

Here we present comprehensive results of silicate phases from SHERLOC, in the wavelength ranges of ~1000 to 1030 cm^{-1} [4] and complementary fluorescence [5] and PIXL measurements [6] relative to the silicate features. SHERLOC classification of crystalline silicate phases was made by testing a series of crystalline minerals with SHERLOC analogue MOBIUS, which, together with PIXL, indicate that the lighter-toned clasts present in Alfalfa correspond to more crystalline and feldspar compositions, whereas those that make up the red-brown matrix instead correspond to less-crystalline K-silicates. Measurements with SuperCam LIBS (laser induced breakdown spectroscopy) supports these observations. These characterizations are significant as they indicate the power of using two sets of instruments on board Perseverance to give a better characterization of composition and mineral structure together with fluorescence features that have the potential to identify organic features and REE's (rare earth elements).

References: [1] Farley, K.A. et al. (2022), Sci., 377, eabo2196; [2] Liu, Y. et al. (2011), Sci., 377; [3] Scheller et al. (2022), Sci, xyz, [4] Corpolongo et al., accepted, JGR Planets; [5] Sharma, S. et al., accepted, Nature; Tice , M. et al. (2022), Sci. Adv.