Goldschmidt 2022 Abstract
https://doi.org/10.46427/gold2022.10581

# Alteration minerals assemblage on the floor of Jezero crater, Mars: one year of SuperCam IR observations onboard the Perseverance rover

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The Perseverance rover (Mars 2020 mission, NASA) landed in Jezero crater, Mars, the site of an ancient lake, on February 2021. The main science objectives of the mission are the characterization of past environments, the search for preserved biosignatures and the collection of samples to be returned to Earth by the MSR mission (Mars Sample Return) [1]. The payload of Perseverance includes the SuperCam instrument, which combines various remote-sensing techniques to investigate the elemental and mineralogical composition of rocks and soils: high-resolution color imaging, laser-induced breakdown spectroscopy, Raman spectroscopy, visible and near-infrared reflectance spectroscopy, and acoustic sensing [2, 3]. In particular, the near-infrared reflectance spectrometer (IRS), which covers the 1.3–2.6 µm range, allows for the identification of a wide variety of mineral phases, and especially hydrated ones.

During the first year of observations, we identified various secondary phases in the SuperCam reflectance data, including Fe/Mg-phyllosilicates, Mg-sulfates, Fe/Mg-carbonates and Fe-oxyhydroxides [4]. The detection limits of the corresponding signatures are presented in [5, 6]. We show that in Jezero, water-rock interactions pervasively affected the crater floor, with hydrated minerals present at least to some degree in most of the rocks analyzed so far. On the other hand, Al-phyllosilicates do not appear to be abundant (in agreement with orbital observations), and a significant amount of olivine crystals of the protolith have been preserved, which shows that aqueous alteration was likely limited in time, water/rock ratio and/or intensity, or that rock burial was fast. Carbonates detected by SuperCam techniques (including the IRS, the LIBS and Raman measurements) are likely products of olivine alteration, and the rocks of the crater floor might have been marginally altered through the carbonation process, an alteration environment that could have been favorable for life. The sulfates observed by SuperCam might record some late aqueous environment corresponding to the evaporation of the lake.

[1] Farley, K. A. et al., 2020. *Space Sci. Rev*; [2] Wiens, R.C. et al., 2020. *Space Sci. Rev*; [3] Maurice, S. et al., 2021. *Space Sci. Rev*; [4] Mandon et al., *in prep*.; [5] Royer, C. et al. *this conference*; [6] Royer et al., *in prep*.