

An overview of μ XRF results obtained by PIXL in Jezero crater, Mars

DAVID T FLANNERY¹, ABIGAIL ALLWOOD², JOEL HUROWITZ³, WILLIAM TIMOTHY ELAM⁴ AND DAVID ARGE KLEVANG PEDERSEN⁵

¹Queensland University of Technology

²JPL

³Stony Brook University

⁴University of Washington

⁵Technical University of Denmark

Presenting Author: david.flannery@qut.edu.au

The Planetary Instrument for X-ray Lithochemistry (PIXL) is a micro-focus X-ray fluorescence spectrometer mounted on the robotic arm of NASA's *Perseverance* rover (Allwood et al., 2021). At the time of writing, PIXL has survived for over 350 sols on Mars, acquiring tens of thousands of XRF observations reflecting the chemistry of five abraded targets ("Guillaumes", "Bellegarde", "Dourbes", "Quartier" and "Montpezat") as well as two natural surface targets ("Naltsos" and Beaujeu") representing crater floor units (Stack et al.'s Cf-fr and Cf-f-1 units, now the Maaz and Seitah formations).

We will focus here on summarizing the geochemical data provided by PIXL scans collected during the *Perseverance* rover's crater floor campaign and discussing the origin of these units.

Textural, chemical and mineralogical data collected by PIXL indicate the first rock unit examined by the *Perseverance* rover (Cf-fr, Maaz Formation) is a mafic rock of volcanic origin, most likely a micro-gabbro formed in a basaltic lava flow. PIXL element maps generated by the PIXLISE software show interlocking, light- and dark-toned crystals on the order of 0.5-1 mm in size. We interpret these to be plagioclase, augite and pyroxene.

The Seitah Formation (Cf-f-1) has been correlated with a regional olivine-bearing unit overlying Noachian basement that is exposed from Syrtis Major to Nili Fossae, covering an area of ~70,000 km² and noted for its association with coarse olivine grains. Hypotheses for its origin include pre-Isidis impact melt, pre-Isidis intrusive complex, basaltic lava flows, volcanic ash, pyroclastics, and detrital sedimentary rocks. Seitah was analysed by PIXL in the "Dourbes" abrasion and found to contain abundant euhedral to subhedral olivine grains (1-3.5 mm) with anhedral augite (<8 mm), mesostasis and secondary phases. Context imagery, XRD and XRF data collected by PIXL clearly demonstrate that "Dourbes" is an olivine cumulate rather than an airfall deposit or a sedimentary rock.

Both units have been affected by aqueous alteration leading to the emplacement of salts including sulfates, Cl-salts, phosphates, and carbonates.

CF-Fr



Séitah

