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NORTH WEST AFRICA 8657 SHERGOTTITE MICRO-INVESTIGATION BY IMAGING TECHNIQUES

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Introduction: Reflectance spectroscopy measurements on martian meteorites are increasingly important for a better understanding of remote sensed data.

Previously, reflectance investigations on Martian meteorites [e.g., 1, 2 and references therein] were conducted by means of punctual spectrometers. Given its high spatial resolution (38 μm) and high spectral resolution, the SPectral IMager-SPIM, the visible-infrared spectrometer (0.22 to 5.09 μm) that is the spare of Dawn spacecraft [3,4] is capable to detect the main mineralogical phases in fine grained rocks [5]. Recently, De Angelis et al., [6] mapped the spectral facies on a shergottite slab of NWA 8657.

Materials and Methods: In this study we report the preliminary interpretation of data collected by SPIM validated by scanning electron microscopy (SEM) analyses on a shergottite slab of North West Africa (NWA) 8657 (paired with NWA 8656, [7]). NWA 8657 is composed by zoned clinopyroxene (up to 3.8 mm long) and maskelynite laths (up to 1.8 mm long) with accessory ilmenite, ulvöspinel, pyrrhotite, merrillite, chlorapatite and vesicular glass [7].

Results: From a first interpretation of data collected by SPIM, NWA8657 is mainly composed by Fe-rich, Ca-pyroxenes, maskelynite, plagioclase, silica by comparison with RELAB library. Qualitative and quantitative analyses (EDS-WDS) of the same slab, at magnification comparable with that of SPIM, confirmed the occurrences of Fe-augite, Fe-pigeonite, plagioclase, and silica together with troilite, ilmenite and apatite grains. Further grain by grain investigations are underway comparing the two imaging techniques, in particular regarding the NWA 8657 microstructures, featureless-low albedo mineral phases like troilite, ilmenite-ulvöspinel, and the very tiny phases like apatite.

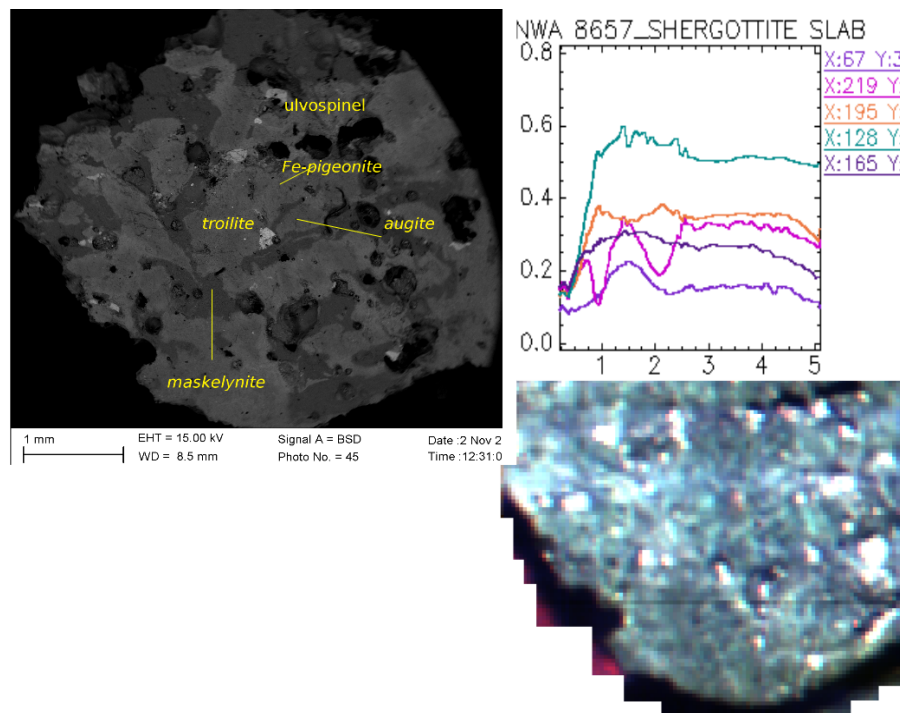


Figure 1: region of NWA 8657 viewed by SPIM spectrometer (bottom RGB image) and SEM backscattered image (left). Top right: the spectral classes found in NWA8657

References [1] Llorca J., 2014, LPSC, abs#1199; [2] Hiroi et al. 2011, Polar Science, 5 ; [3] De Sanctis et al. 2011, Space Science Reviews, 163, 1; [4] De Angelis et al., 2015, Rev. Scient. Instrum; 86(9); [5] Manzari et al., 2016, Earth and Space Science, 276, doi:10.1002/2015EA000153 [6] De Angelis et al., 2016, LPSC, abs#1223 [7] Meteoritical Bulletin Database.