Planetary Terrestrial Analogues Library (PTAL) project: NIR Characterization of samples

F. POULET[1], D. LOIZEAU[1], C. LANTZ[1], C. PILORGET[1], J.-P. BIBRING[1], V. HAMM[1]

[1]Université Paris-Saclay, CNRS, Institut d'astrophysique spatiale, 91405, Orsay, France.

Multiple spectroscopic techniques have been selected on previous, present and forthcoming missions to explore planetary surfaces in the Solar System. In particular, forthcoming ESA/Roscosmos and NASA missions to the surface of Mars will bring instruments capable of near-infrared (NIR), Raman and Laser Induced Breakdown Spectroscopies to analyze the mineralogy and chemistry of rocks. The PTAL (Planetary Terrestrial Analogues Library) project aims at building a multi-instrument spectral database of a large variety of natural Earth rock samples, including Mars analogues. Two instruments were selected to characterize the mineralogy of these analogues in the NIR range: a flight spare of NIR hyperspectral microscope MicrOmega/ExoMars and a commercial NIR point spectrometer. The diversity of the PTAL powdered and bulk samples is well revealed by the huge diversity of spectra in the 1-4.0 µm. The detected minerals are representative of various formation, alteration and geochemical environments. The major diagnostic features observed are primary silicates like Olivine or Pyroxene with low and/or high Calcium content; various altered silicates detected with vibrational features associated to OH and/or H2O and/or metal-OH features; Oxides; Zeolites; Carbonates. In addition, the imaging capability of MicrOmega reveals complex assemblages of these different phases allowing to better constrain the alteration processes at microscopic scale. We will emphasize the multi-analytical study that provides an unique opportunity to coordinate minerals/elements detection by different techniques that are similar to the instruments on board current and forthcoming Martian missions.

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