

Carbonate Mineral mapping and Geologic Outcrop Modelling using Hyperspectral in the Agadir basin targeting the Jurassic sequence, Western High Atlas, Morocco

Brahim Ouajhain¹, Kamal Labbassi¹, Patrick Launeau², Rachid Baissa^{1,2}, Haddou Jabour³, Anne Gaudin², Patrick Pinet⁴

¹Equipe Géosciences & Environnement Numérique_LGMSS_URAC 45, Faculté des Sciences, Université Chouaïb Doukkali, BP 20, 24 000 El Jadida, Morocco
e-mail: brahim_ouajhain@yahoo.fr

²Laboratoire de Planétologie & Géodynamique/UMR-CNRS 6112, Université de Nantes, Nantes, France.

³ONHYM, 5, Avenue My Hassan - B.P 99. Rabat, 10050 Morocco

⁴Laboratoire de Dynamique terrestre et Planétaire/ UMR-CNRS 5562, Université de Toulouse, France

Hyperspectral imaging is a proven technology used for identifying and mapping minerals based on their reflectance or emissivity signatures. Hypspx allows direct identification of carbonate minerals such as calcite, dolomite, ankerite and siderite in the visible/near infrared (VNIR); clays and sulfates, and other minerals in the short wave infrared (SWIR); The unique capability of imaging spectrometry to produce detailed maps of the spatial distribution of specific minerals (carbonates in this case), mineral assemblages, and mineral variability on the Agadir basin during the Jurassic makes it an ideal tool for enhanced geomorphic mapping. Imaging spectrometry, used in conjunction with complimentary datasets such as Light Detection and Ranging (LiDAR), or Digital Elevation Model (DEM), provides a unique means of visualizing the spatial distribution and association of mineralogy with topography, thus contributing to the understanding of the relationship between geology and landscape and to improved interpretation of surface geologic processes. A site in the Imouzzar anticline is used to illustrate the basic results of mineral mapping for characterization of dolomitization systems and exploration of all minerals species. Jurassic bedrock in the area consists of limestones, dolomites, marls, evaporites and sandstones. A variety of minerals, including calcite, dolomite, kaolinite, illite and gypsum were mapped in these systems and verified on the ground. The analysis approach uses extraction of spectral signatures and map specific minerals and mineral assemblages exposed at the surface of each sample extracted from different Jurassic formations from Liassic to the Kimmeridgian.