Mapping and discrimination of eclogites from the Egéré domain using Landsat 8 OLI and Sentinel-2A multispectral data (Egéré-Aleksod terrane, Central Hoggar, South Algeria)

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The analysis of Landsat 8 OLI and Sentinel-2A multispectral data constitutes a privileged tool in digital geological mapping, for lithological discriminations in a region like the Egéré (Central Hoggar, South Algeria), devoid of vegetation and showing a great diversity of metamorphic series with the remarkable preservation of eclogites.

To map the different lithologies and geological structures that characterize the Egéré domain, various spectral and textural enhancements were performed. Firstly, we selected the best RGB composite image that contains the maximum information on all three channels, Principal Component Analysis (PCA) which is a multivariate statistical technique that ranks uncorrelated linear combinations of variables. The band rationing (BR) technique offers the possibility to test the best band ratios with different wavelengths that discriminate different rock units from each other, a transformation known as the Minimum Noise Fraction (MNF) transformation and Directional filters help to highlight features oriented in any specific direction. They are particularly useful for detecting and enhancing linear features with a specific orientation such as tectonic structures.

The results of RGB composite treatments and even other digital image processing such as PCA, MNF and even Band Ratios, combined with previous work have allowed the eclogites to be mapped accurately. Directional filters generated a lineament map and highlighted the relationship between faults and these formations.

Therefore, the sensors used have shown great potential for mapping and lithological discrimination.