



Continuum removal versus PLSR method for digital mapping of Clay and Calcium carbonate contents, using laboratory and airborne hyperspectral measurements

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Reflectance spectroscopy provides an alternate method to classical physical and chemical laboratory soil analysis for the estimation of a large range of soil properties. Techniques, including classical chemometrics approaches and specific absorption features studies, have been developed for deriving estimates of soil characteristics from Visible-Near Infrared (vis-NIR) reflectance measurements.

This paper aims to compare two of these techniques, namely the continuum removal (CR) analysis and the Partial least-squares regression (PLSR) method for estimating clay and calcium carbonate (CaCO_3) contents, two key soil properties for erosion prediction. The CR analysis uses the spectral absorption bands at 2206 and 2341nm to quantify respectively clay and CaCO_3 contents whereas the PLSR method with leave one-out cross-validation is a classical chemometrics technique using the vis-NIR full spectra. The CR and PLSR methods were applied to vis-NIR laboratory and airborne HYMAP reflectance measurements collected over a set of 53 bare soil sites located in La Peyne Valley area, southern France.

This study shows that the PLSR gives satisfactory results for clay and calcium carbonate contents estimation (R^2 of 0.65 and 0.77 respectively using HYMAP data) and clearly outclass the CR approach (R^2 of 0.58 and 0.47 respectively using HYMAP

data). We deduces from these results that, in the pedological context of La Peyne valley, the Partial least-squares regression method can contribute significantly to the digital mapping of soil properties.