Geophysical Research Abstracts
Vol. 16, EGU2014-12924, 2014
EGU General Assembly 2014

Prediction of phosphorus adsorbed and iron oxides using diffuse reflectance spectroscopy in areas of sugarcane

Livia Camargo and José Marques Jr.
FCAV/UNESP. Via de Acesso Prof. Paulo Donato Castellane s/n, Jaboticabal, SP, Brazil

Traditional technologies for measuring phosphorus adsorbed (Pads) and other soil attributes of agronomic importance are relatively unfeasible when aims to mapping large areas using the characterization of the spatial variability of soil attributes. These mappings need a large number of samples, which makes it expensive in mappings scale detail. This arouses in scientific society the need to develop methodologies able to assess these attributes within the landscape quickly, nondestructive, and not expensive. The diffuse reflectance spectroscopy (DRS) has been used to aid the characterization of soil attributes view of these requirements. In this sensing, the objective of this study was to evaluate the ability of DRS to estimate the Pads, clay, Fe extracted by dithionite-citrate-bicarbonate (Fedcb), contents of goethite (Gt) and hematite (Hm) and ratio Gt/(Gt + Hm) in Oxisols in The Northeastern State of São Paulo. Soil samples were collected in the transects each 25 m (100 samples). Geomorphic surfaces (GSs) were mapped in detail to support soil mapping. The soil in GS I was a Typic Hapludox, that in GS II a Typic Hapludox and Typic Eutrudox, and that in GS III a Typic Eutrudox. The soil samples were taken to the laboratory for chemical, physical and mineralogical analysis and DRS spectra were obtained over 380-2300 nm. Chemometric calibration and validation (using a one-out crossvalidation procedure) were done on absorbance measurements [Log10 (1/Reflectance)] by Partial least-squares regression (PLSR) analysis. The calibration accuracy was evaluated via the determination coefficient (R2), RMSE and the ratio performance deviation (RPD). The graph of Variable Importance in the Projection (VIP) for the Pad was built. The DRS was effective in predicting the attributes studied whereas the obtained models for the prediction of clay, Fedcb and Gt with greater accuracy (RPD> 1.4) were calibrated in the visible (380-800 nm) and to predict Pads, ratio Gt/(Gt + Hm) and Hm were calibrated in the visible + near infrared (801-2300 nm). The highest peaks of VIP for the Pads have been found in wavelengths: 480-580 nm and 780-980 nm which are assigned to crystalline iron oxides, mainly Gt and Hm. This result demonstrates the influence of these oxides on the P adsorption. In weathered soils, P adsorption is mainly correlated to iron oxides and aluminum clay fraction due phosphate interact with the functional groups of these oxides.