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SPATIAL PREDICTION OF SOIL CLASSES BY USING SOIL WEATHERING PARAMETERS DERIVED FROM vis-NIR SPECTROSCOPY

Leonardo Ramirez-Lopez (1) and Jose Alexandre Dematte (2)

(1) Institute of Geography, University of Tuebingen, Tuebingen, Germany (leonardo.ramirez-lopez@geographie.uni-tuebingen.de), (2) Universidade de Sao Paulo, Piracicaba, Brazil (jamdemat@esalq.usp.br)

There is consensus in the scientific community about the great need of spatial soil information. Conventional mapping methods are time consuming and involve high costs. Digital soil mapping has emerged as an area in which the soil mapping is optimized by the application of mathematical and statistical approaches, as well as the application of expert knowledge in pedology. In this sense, the objective of the study was to develop a methodology for the spatial prediction of soil classes by using soil spectroscopy methodologies related with fieldwork, spectral data from satellite image and terrain attributes in simultaneous. The studied area is located in São Paulo State, and comprised an area of 473 ha, which was covered by a regular grid (100 x 100 m). In each grid node was collected soil samples at two depths (layers A and B). There were extracted 206 samples from transect sections and submitted to soil analysis (clay, Al_2O_3, Fe_2O_3, SiO_2 TiO_2, and weathering index). The first analog soil class map (ASC-N) contains only soil information regarding from orders to subgroups of the USDA Soil Taxonomy System. The second (ASC-H) map contains some additional information related to some soil attributes like color, ferric levels and base sum. For the elaboration of the digital soil maps the data was divided into three groups: i) Predicted soil attributes of the layer B (related to the soil weathering) which were obtained by using a local soil spectral library; ii) Spectral bands data extracted from a Landsat image; and iii) Terrain parameters. This information was summarized by a principal component analysis (PCA) in each group. Digital soil maps were generated by supervised classification using a maximum likelihood method. The trainee information for this classification was extracted from five toposequences based on the analog soil class maps. The spectral models of weathering soil attributes shown a high predictive performance with low error (R^2 0.71 to 0.90). The spatial prediction of these attributes also showed a high performance (validations with $R^2 > 0.78$). These models allowed to increase spatial resolution of soil weathering information. On the other hand, the comparison between the analog and digital soil maps showed a global accuracy of 69% for the ASC-N map and 62% in the ASC-H map, with kappa indices of 0.52 and 0.45 respectively.