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Área: Divisão 1 – Solo no espaço e no tempo: Comissão 1.3 - Pedometria

Título: DIGITAL MAPPING OF Fe_2O_3 , Nb AND TiO_2 CONTENTS IN MORRO DOS SEIS LAGOS (AM)

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Resumo:

The increasing usage of machine learning tools to estimate soil chemical properties has contributed to identify areas with economic potential for mineral prospecting. The availability of multiple geographic data in open access databases turns possible to build predictive models applied to mineral mapping and prospecting, with a favorable cost-benefit ratio, especially in poorly-accessible areas. In this sense, the study aimed to evaluate the performance of Multivariate Adaptive Regression Spline (MARS), Radial Support Vector Machine (svmRadial) and Random Forest (RF) models to predict the spatial distribution of Fe_2O_3 , Nb and TiO_2 contents in Morro dos Seis Lagos-AM, Brazil. The input dataset gathers geochemical data from 341 sample points (soil, sediment, and rock materials) with morphometric covariates and spectral indices from remote sensing data, obtained by combining satellite bands from Sentinel-2A and Advanced Spaceborne Thermal Emission and Reflectance Radiometer (ASTER). The most important covariates for each mineral compound and each model were selected using the Recursive Feature Elimination (RFE) algorithm. The results obtained showed better performance for the prediction of Fe_2O_3 ($R^2 = 0.23$), Nb ($R^2 = 0.23$) contents using the RF model, while the svmRadial model showed better performance for TiO_2 ($R^2 = 0.14$). The RFE algorithm indicated the importance of the covariates Elevation, LS-factor, Saga Wetness Index and Multiresolution Index of Valley Bottom Flatness (MRVBF), in predicting the spatial variability of the elements contents. In this sense, it was found that the morphometric covariates had a greater contribution to explain the variability of the mineral compounds when compared to the covariates from spectral indices.

Palavras-chave: Pedometrics. Machine-learning; poorly-accessible areas

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