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Prediction models for soil organic carbon (SOC) using spectral data have shown variable accuracy due to multivariate calibration methods and the number of samples used for model calibration. However, few studies have demonstrated the performance of the models when using a regional spectral library (RSL) composed by samples with distinct soil properties, characterizing a heterogeneous RSL (HRSL). Considering the hypothesis that the predictive ability of the models is linked to soil data complexity, the stratification of a spectral library based on soil texture is a strategy to improve the accuracy of SOC predictions. Therefore, the objective of this study was to evaluate the performance of SOC prediction models after the stratification of a HRSL, using soil texture as criterion. A HRSL (n = 1,922 samples) from the Rio Grande do Sul (RS) and Santa Catarina (SC) state, south of Brazil, was used. The database is composed by samples from the Planalto and Depressão Central of RS and from the mountain region of SC. The spectral reflectance measurements were performed in laboratory with a spectroradiometer in the 350-2500 nm range. Spectral data were submitted to normalization preprocessing analysis. The multivariate partial squares regression (PLSR) calibration method was used to generate the models. Firstly, a model was generated using all the samples in the HRSL and then the spectral library was stratified in two groups based on soil texture, namely sandy, silt and medium texture (> 15% sand and < 35% clay – 332 samples) – T1; and, clayey and very clayey texture (> 35% clay – 1,590 samples) – T2. Models were built with 70% of the samples for calibration and 30% for validation. Coefficient of determination (R^2_V) and root mean square error ($RMSE_V$) of validation were used to assess the performance of the models. The model generated with all the samples reached an accuracy of R^2_V = 0.60 and $RMSE_V$ = 0.67%. After stratification, the model generated for group T2 showed the best accuracy (R^2_V = 0.70, $RMSE_V$ = 0.46%), followed by group T1 (R^2_V = 0.41, $RMSE_V$ = 1.52%). This study highlights that samples with sandy and medium texture have smaller accuracy of regional prediction models for SOC. The application of VIS-NIR spectroscopy shows potential as a reliable and inexpensive tool to quantify SOC for subtropical soils with high clay contents. Predictive models for soil properties can be improved when the variability of soil characteristics is considered in HRSL.
Keywords: Hyperspectral remote sensing; soil carbon; regional spectral library; partial least squares regression
Financial support: Conselho Nacional de Desenvolvimento Científico e Tecnológico – CNPq

(7624 - 3204) The Brazilian Soil Spectral Library (BSSL): a general overview

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The Brazilian Soil Spectral Library (BSSL) began its collection in 1995 at the Department of Soil Science (ESALQ-USP). Currently, SSLB has gathered data from all the 26 States of Brazil, reaching more than 38,000 soil samples. This achievement was only possible to reach due to the collaboration (33instituitions) and 49 researchers. The objective of this manuscript is to present the system on the utilization and applications of this dataset. The spectral data range from visible to shortwave infrared (350 to 2.500 nm). The BSSL allow identify the main spectral behavior of Brazilian soils. With the development of BSSL, it is possible to: a) locate partners for joint research development; b) assess, via internet, whether a local, regional, or national estimative of your own spectra, based on calibrated models. In this context, we also can perform the prediction of soil color by using the reflectance data. In the present work, we determined how many spectral patterns are required to represent Brazilian soils. The preliminary results showed that 5 spectral curves can represent the spectral patterns of Brazilian soils. The BSSL can be informative regarding classification, soil surveys and quantification. It will be presented the utility of national spectra to predict soil attributes, such as organic matter (OM), sand, silt, clay, cation exchange capacity (CEC), and pH. The result of national estimation model for these attributes showed that the granulometry presented good performances (R^2 between 0.55 and 0.70) and slightly smaller for OM, CEC and pH. New contributions to the BSSL are still encouraged for a second round for 2019. We hope that this work reinvigorate our community's discussion towards the importance of sensors in agriculture, environment and extend the soil researches.
Keywords: Soil sensing, library, remote sensing, soil mapping, environment, big data
Financial support: Grant #2014-22262-0, São Paulo Research Foundation (FAPESP)

(1791 - 3209) The geographic and environmental characterization of the Brazilian Soil Spectral Library (BSSL)

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The Brazilian Soil Spectral Library (BSSL) started with a collection of soil samples in 1995 at the Department of Soil Science (ESALQ-USP). Currently, BSSL has gathered data from 26 States of Brazil, totaling more than 38,000 soil samples. Thus, the objective of this work was to present the first results of this databank in relation to Brazilian soils and its soil attributes. The BSSL allows to extract and associate the inherent spectral information with the geographic and environmental variables. With the development of BSSL, it was possible to demonstrate the potential of this tool for tropical soils management, and relate the soil spectral reflectance to the regions and states, biomes, geology, soil classes, and vegetation. Principal component analysis was performed to explore and visualize correlated data. The average spectrum was determined for each group. The group of spectra of Amazonas and Pernambuco States, the North and Northeast regions showed higher reflectance corroborating the presence of sandy soils. While spectra from the States of Rio Grande do Sul, Rio de Janeiro, and Mato Grosso do Sul, also the South, Southeast and Center-West regions revealed low spectral