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Prediction of soil properties by lab and airborne spectral data

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Over the preceding 50 years, issues of soil degradation, food insecurity, water scarcity, and loss of ecosystem services are at the center of environmental studies and global concern. These environmental and social issues have intensified the need for sustainable land management and higher-quality global-scale information on soil. The use of soil spectroscopy and hyperspectral remote sensing (HRS) has advanced the soil science discipline by providing an accurate, rapid, and inexpensive estimation of the Earth's soil composition. In this study, we created field and lab soil spectral libraries (SSL) and predicted elementary soil properties such as water infiltration rate (WIR), soil texture content, and organic carbon (OC), essential for agricultural management. These models were applied in a case study of Campania, Italy, to the high-end HRS AVIRIS NG NASA sensor with a ground resolution of 3 meters, and 224 spectral bands along the VNIR-SWIR range (400-2500 nm). In addition, we discuss the differences between field, lab, airborne, and satellite spectra and emphasize the need for separating the models.