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Exploring the sensitivity of soil sample numbers in digital soil mapping and then choosing a suitable soil sampling plan

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The soil sampling plan plays an important role in digital soil mapping because it can directly influence the quality of the sample datasets and hypothesis testing of different soil models. However, traditional sampling methods pay more attention to the geographical locations of the soil samples and ignore the spatial distribution characteristics of the soil types. The objective of this research was to check the performance of three traditional soil sampling methods, namely, random sampling, grid sampling and Latin hypercube sampling (LHS), and choose the suitable soil sampling numbers by three new indices: the ratio of sampling efficiency to performance (RSEP), the number of soil samples index (NSSI) and the comprehensive evaluation index of prediction accuracy (CEPA). Headwall hyperspectral sensors carried on a helicopter were used to collect visible and near-infrared spectral images (400–1,700 nm) to predict the continuous the soil total carbon (STC) map. Our results showed that hyperspectral images can be used to estimate the spatial distribution of STC at a spatial resolution of 3 m, the performance of the grid sampling method was better than random sampling and LHS, and RSEP can be used to choose a suitable number of soil samples for the study region. Moreover, the actual field sampling plan can further certify the results of this study, and the hyperspectral images and the RSEP can be helpful in choosing a suitable soil sampling plan based on different demands and can offer useful information for digital soil mapping.

Biography

Long Guo has completed his PhD from Wuhan University. Currently, he is the Lecturer of Huazhong Agricultural University. He has published more than 6 papers in reputed journals. His research focuses on the quantitative remote sensing of soil, the geostatistics and the digital soil mapping.

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