

Effects of multi-temporal environmental variables on SOC spatial prediction models in coastal wetlands of a Chinese delta

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Abstract

Mapping the SOC distributions in coastal wetlands plays an important role in assessing ecosystem services, predicting the greenhouse effects and investigating global carbon cycle. Few research has explored the relationships of SOC and environmental variables with seasonal changes, and the effects of multi-temporal environmental variables on Digital Soil Mapping (DSM). The results showed that the relationships between SOC and environmental variables in different months varied significantly in coastal wetlands of the Yellow River Delta (YRD). In general, the environmental variables in wet season showed stronger correlations and higher importance scores with SOC compared with those in dry season. In addition, SOC prediction models based on multi-temporal data in wet season and mono-temporal data in April had stronger prediction performance compared with those based on multi-temporal data in dry season. As a result, data fusion of multi-temporal data did not necessarily contribute to the model performance enhancement. Relative homogenous soil-landscape attributes and spectral characteristics in coastal wetlands of the YRD in dry season could not accurately explain the strong spatial variation of SOC in this area, and it might be the major reason that caused the stronger model performance of soil prediction models based on wet season than those based on dry season. Therefore, the accurate spatial prediction of soil properties requires the characterization of the seasonal dynamics of soil-landscape relationships. In general, the findings of this research demonstrated that the selection of the environmental variables in the establishment of DSM model should consider the seasonal effects of environmental variables.

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