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# Using Vis-NIR spectroscopy for monitoring temporal change of SOC

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Soil organic carbon (SOC) is the largest carbon pool in the terrestrial system, and it also affecting the provision of agricultural ecosystem service and goods. Hence, finding cost-effective way to monitor spatial temporal changes of SOC is a challenge for both climate change and agricultural practices. The existing soil monitoring methods for SOC are heavily depending on time and resource. This paper examines utilization of Visible near infrared spectroscopy (VIS-NIR) to predict SOC in a rapid manner which overcomes the difficulties found in other measurements. Danish soil spectral library was used for the prediction for both topsoil (0-25cm) and subsoil (25-50) from 1986 and 2009 respectively. Empirical Bayesian Kriging was adopted here for mapping SOC. Results indicate that VIS-NIR predicted topsoil has slightly decreasing of SOC content in Denmark (from 1986 to 2009), this can be confirmed by the actual SOC value. Nevertheless, for the subsoil, SOC difference calculated from model predicting and the actual value are significantly different from each other. In other regions of Denmark (including WestJyland, MidtJyland, NordJyland and Thy), VIS-NIR based SOC concentration do not differ from the actual SOC. While in East Denmark, VIS-NIR prediction demonstrate a significant difference with the actual SOC value. Spatial pattern both from actual and predicted SOC is quite consistent in topsoil SOC change over the 23 years. But there are more spatial distinctions are found in the subsoil SOC difference map.