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Soil organic carbon estimation in croplands by hyperspectral remote data using LUCAS topsoil database.

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The most commonly used approach to estimate soil variables from remote sensing data entails time consuming and expensive data collection including chemical and physical laboratory analysis. Large spectral libraries could be exploited to decrease the efforts concerning the soil variable estimation and obtaining more widely applicable models. We investigated the feasibility of a new approach, referred to as bottom-up, to provide soil organic carbon (SOC) maps of bare cropland fields over a large area without recurring to chemical analyses, employing both the pan European LUCAS topsoil database and APEX hyperspectral airborne data. This approach was tested in two areas having different soil characteristics: the loam belt in Belgium and the Gutland - Oesling region in Luxembourg. Partial least square regression (PLSR) models were used in each study area to estimate SOC content, using both bottom-up and traditional approaches. The PLSR model accuracy was tested on an independent validation dataset. Both approaches provide SOC maps having a satisfactory level of accuracy (RMSE= 1.5 – 4.9 g kg-1; RPD= 1.4 – 1.7) and the inter comparison did not show differences in terms of RMSE and RPD both in loam belt and Luxembourg area. Thus, the bottom-up approach based on APEX data provided high resolution SOC maps over two large areas showing the within and between field SOC variability.