Spatiotemporal changes of soil organic matter content in cropland of Northeast China during 1985 and 2005

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Soil is a vital non-renewable natural resource which plays many essential roles in terrestrial ecosystems. The productive capacity of soils in particular, underlies the foundation of the well-being of humanity on Earth. Soil organic matter (SOM) content is one of the most important indicators of soil quality and hence the productive capacity of soils. In this study, we assessed the spatiotemporal changes of cropland SOM content in Northeast China (NEC) using direct measurements of 2005 and survey data of 1985. We also analysed the driving forces behind the SOM content change. The spatial distribution map of SOM content in 1985 was rasterized from the polygon map of SOM classes using the centre-point conversion method, while the SOM content map in 2005 was first derived from 750 samples through kriging interpolation and then grouped into the same SOM classes as in 1985. Our results showed that SOM content decreased in 39% of all the cropland in NEC, while increase in SOM content was only detected in 16% of the cropland. SOM remained unchanged in nearly half (i.e. 45%) of the cropland. These results suggest that cropland SOM content tended to decline over a period of 20 years in NEC. Our results also revealed that cropping intensity and fertilizer application were the two most important factors driving SOM change between 1985 and 2005. Overall, results from this research provided novel details of the spatiotemporal patterns of cropland SOM content change in NEC which was not revealed in earlier assessments. The datasets presented here can be used not only as baselines for the calibration of process-based carbon budget models, but also to identify regional soil quality hotspots and to guide spatial-explicit soil management practices.