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Variations of soil organic C following land use change on deep-loess hillsopes in China

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Land use change is a key factor driving changes in soil organic C (SOC) around the world. However, the changes in SOC following land use changes have not been fully elucidated, especially for deep soils (> 100 cm). Thus, we investigated the variations of SOC under different land uses on hillslopes of the Loess Plateau in China based on datasets in the 0-100 cm. And we quantified the contribution of deep-layer SOC (200-1800 cm) to that of whole soil profiles (0-1800 cm). The results showed that in shallow profiles (0-100 cm) land uses significantly ($P<0.05$) influenced the distribution of SOC contents and stocks in surface layer (0-20 cm) but not subsurface layers (20-100 cm). Pearson correlation analysis indicated that soil texture fractions and total N were significantly ($P<0.05$ or 0.01) correlated with SOC content, which may have masked effects of land use change on SOC. In deep profiles (0-1800 cm), SOC stock generally decreased with soil depth; the mean SOC stock, as a proportion of the amount in the 0-100 cm, declined from 87.6% in the 200-300 cm to 32.7% in the 1700-1800 cm. But deep soils showed high SOC sequestration capacity. The SOC accumulated in the 100-1800 m equaled 90.6, 91.6, 87.5, and 88.6% of amounts in the top 100 cm under cropland, 7-yr-old grassland, 30-yr-old grassland, and jujube orchard, respectively. The results provide insights into SOC dynamics following land use changes and stressed the importance of deep-layer SOC in estimating total SOC inventory in deep loess soils.