



Persistent effects of anthropogenic soil acidification on soil organic carbon pool in temperate forests across the Czech Republic

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Temperate forest ecosystems store most of the organic carbon in soils (SOC) and changes in the soil carbon stock due to climate change or land management can potentially have a large influence on carbon balance. The most important factors controlling the SOC pool - including climate, soil physical and chemical properties, vegetation, parent material as well as anthropogenic influence (land use) - are generally agreed on a global scale; however, the estimations of SOC pool differ significantly among studies on a regional and local scale due to different sampling protocols and local scale variability. The study evaluating SOC pool in forest floor and mineral soil sampled down to 80 cm depth across forested catchments with variable environmental conditions and soil acidification and eutrophication legacy revealed overlooked historical S deposition factors to control the SOC pool. The average SOC pool of 34 t/ha measured in the forest floor (O horizon) was best predicted by measures of historical S deposition and by forest type (conifer vs. broadleaf forest). Average total SOC pool of 132 t/ha, combining both the carbon pool in mineral soil down to 80 cm and carbon pool in forest floor, was best predicted solely by elevation, representing temperature and precipitation gradient. However, when accounting for coupled SOC pool in forest floor and top most mineral soil (up to 40 cm depth) the natural environmental factors are outweighed by anthropogenic ones (historical S deposition and forest type). This has important implication for understanding of potential SOC pool changes under the ongoing global climate change, especially in regions currently or historically affected by soil acidification caused by acid deposition.