

Changes of Organic Carbon Quantity and Quality in Temperate Forest Soils

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Climate change will have profound impacts on organic matter stocks and thus on the functionality of soils. Soil organic carbon (SOC) content in soil is mainly regulated by the fluxes of organic matter which are highly associated with the aboveground and root litter production and their decompositions into CO² by soil microorganism. The predicted rising temperatures in Bavaria might lead to an increased decomposition and release of soil carbon into the atmosphere, which would deteriorate a number of important soil functions.

Here, we present an assessment of SOC stocks in three temperate forest sites over the last 30 years. Soil to a depth of 30 cm was analysed with density fractionation to evaluate SOC stocks and distribution in different pools. Additionally, tree-aboveground organic carbon (OC) stocks were measured to assess their influence on SOC. SOC stocks decreased between 1988 and 2004 and increased between 2004 and 2016. OC changes of litter + O layer and mineral soil differed. Highest changes of SOC occurred in the light fractions, followed by the mineral fractions. Tree-aboveground biomass, stand composition, and changing climate had an influence on SOC stocks. Precipitation change was correlated with the litter + O layer OC stocks. Further studies on the changes of each SOC fraction and the influence of other edaphic factors are needed to better understand the changes in SOC stocks and quality.