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Quantification of functional soil organic carbon pools for different soil units and land uses in southeast Germany (Bavaria)

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Soil organic carbon (SOC) can be divided in different functional pools according to their degree of stabilization and corresponding turnover times. A quantification of these functional SOC pools for different soil types and land uses would allow an estimation of future SOC stocks and potential SOC sources/sinks under changing land uses and climactic conditions. In this study, functional SOC pools were determined for all relevant soil units and major land uses within the state of Bavaria in southeast Germany. For each of the 33 major soil units within Bavaria, representative soil profiles under the main land uses cropland, grassland and forest were selected to fully cover the range of environmental conditions that control SOC storage. Each soil horizon down to the parent material at the 99 locations was fractionated according to the method of Zimmermann et al. (2007). This approach isolates five SOC fractions (particulate organic matter, dissolved organic carbon, sand- and aggregate-associated SOC, silt- and clay-associated SOC and a chemically resistant SOC fraction) using a combined physical and chemical fractionation. These fractions are related to three functional SOC pools with specific turnover rates (labile, intermediate, stable). With this approach, the amount of active, intermediate and passive SOC for both top- and subsoils was determined for important soil units and land uses in Bavaria that can further be used for regionalization and modelling.