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Fractionating German agricultural soils to assess if the mineral associated carbon fraction saturates

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Soil organic carbon (SOC) saturation is generally defined as soil's unique limit to stabilize C, which is dependent on soil physio-chemical characteristics. It is claimed that if once the mineral fraction is saturated, no additional carbon input leads to mineral-associated organic carbon (MAOC) accrual. However, the capacity of a specific soil to store MAOC may depend on many factors, and experimental evidence of actual saturation is scarce. Earlier defined saturation points appear to be statistically biased since especially agricultural soils with high SOC contents are rare so that the strong linear relationship between MAOC and total SOC becomes less clear at higher SOC contents.

To assess, whether the amount of MAOC saturates at a certain point, we used the opportunity of a comprehensive soil archive. From a total of 3104 topsoil samples collected during the German Agricultural Soil Inventory, we took a systematic random sample (n=190) with a wide range in SOC (0.54 - 11.7 %) and clay content (3-77%). We thereby ensured, that an equal number of samples were selected in each SOC content class, which were defined in steps of 1% SOC to ensure an unbiased evaluation of a potential saturation point. Those soils are being fractionated into Particulate Organic Carbon (POC) and MAOC. Firstly, soils are subjected to ultrasonic dispersion followed by particle size separation via wet sieving (50 μm). SOC and total nitrogen will be determined in each sample. The first results of this study will be presented, which will shed more light on an important aspect of SOC dynamics.