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Kommission IV: Bodenfruchtbarkeit und Pflanzenernährung

Landnutzung und Kohlenstoffhaushalt

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## Titel
Assessment of soil organic matter supply: Challenges and opportunities

## Abstract
Soil organic matter (SOM) is recognized as an important factor for sustainable land use. Several analyzing techniques were focused on fractionation of soil organic carbon (SOC), on carbon sequestration, soil functions, or other approaches.
We combined SOC fractionation with studies on carbon sequestration. Thermogravimetry (TG, recording of mass losses during heating up of soil samples) was selected as a supplemental method to standard analyzing techniques for soils. TG provides recording of thermal mass losses in dependency on temperature what facilitate fractionation together with SOM content determination via mass losses on ignition (MLI). Autocorrelation analyses of TG data enable to assess the carbon sequestration processes.
After a gentle sample preparation, more than 370 soil samples in eight sample sets were analyzed from different types of soils and regions of origin.
The results extend literature data by revealing quantifiable interrelations between content of SOM, SOC and clay with a coefficient of determination around 0.98. Deviations from the relationship become lower during incubation experiments, with increasing sampling depth, and with decreasing organic fertilization in plots of long term agriculture field experiments etc. We explained these results with changing quantities of extraneous (mostly fresh) organic residues not affected by soil carbon content regulation. These organic residues seems to be quantifiable via difference between measured MLI and the MLI calculated from content of SOC and clay both determined by standard methods.
The practical use of found interrelation implies an acceptance of traditional definition of soil and SOM as products of long term ecosystem succession with content regulation as a unifying over regions soil feature. In contrast, the more common and simplified understanding of soil as carbon containing mineral substrates supports public recognition of soils. However, it does not facilitate the comparison of results from different regions and studies about soils.
We conclude from these considerations about obligatory distinction between following types of organic carbon as an essential precondition for assessment of SOM supply: 1. SOC (or humus) as a product of long term carbon regulation processes, 2. fresh organic residues, and carbon of 3. geologic (turf, coal, graphite, diamond, …) or 4. anthropogenic origin (black carbon in ashes, cinder, soot, asphalt).