Geophysical Research Abstracts
Vol. 19, EGU2017-13852, 2017
EGU General Assembly 2017

What can we learn from soil organic carbon fractions? - analytical options and limitations

Axel Don, Christopher Poeplau, and the SOMfrac Team
Thünen Institute, Institute of Climate-Smart Agriculture, Braunschweig, Germany (axel.don@thuenen.de)

The number of soil organic carbon (SOC) fractionation schemes applied has increased drastically during recent years. All of them are based on the different stabilisation concepts of physical stabilisation requiring physical fractionation or recalcitrance, requiring chemical separation. A major aim of SOM fractionation is the separation of preferably homogeneous pools that are characterized by distinct properties, such as C turnover rates. However, SOM properties including turnover times cover wide range of continuum. Thus, the partitioning of SOM in distinct fractions is challenging. There have been little attempts to evaluate and to compare fractionation schemes and protocols. In 2015 a large international method comparison was started – the SOMFrac ring trial – aiming at new insights in differences between fractionation schemes. Samples from three long-term C3-C4vegetaion change sites were used providing a 13C labeling of the young C4-derived carbon fraction.
No fractionation scheme was able to isolate only young C4-derived carbon but at maximum 76 %. The C4-carbon input reached almost all fractions within a time frame of few decades. Mineral-associated carbon was among the key components to be separated from particulate organic carbon in many fractionation schemes. However, in particular in sandy soils, only chemical oxidation or extraction proved to isolate the most passive fractions. Thus, combining chemical and physical fractionation steps led to the best separation of young and old soil organic carbon pools. We discuss advantages and limitations of different fractionation schemes also in the light of its applicability and workload.