Geophysical Research Abstracts
Vol. 16, EGU2014-5404, 2014
EGU General Assembly 2014


# Assessing scales of spatial & temporal variability in radiocarbon contents of soil organic carbon

Tessa Sophia van der Voort (1), Xiaojuan Feng (1,2), Frank Hagedorn (3), and Timothy Eglinton (1)

(1) Institute of Geology, ETH Zürich, Sonneggstrasse 5, 8092 Zürich, Switzerland, (2) Institute of Botany, Chinese Academy of Sciences, 20 Nanxincun Xiangshan, Tuzilou 218 Beijing 100093, China, (3) Swiss Federal Research Institute WSL, Forest soils and biogeochemistry, Zürcherstrasse 111, 8903 Birmensdorf, Switzerland

Soil organic matter (SOM) forms the largest terrestrial reservoir of carbon outside of sedimentary rocks and it provides the fundamental reservoir for nutrients that sustains vegetation and the microbial communities. With ongoing changes in land-use and climate, SOM is also subject to change, with potentially major consequences for soil as a resource and for global biogeochemical cycles. Radiocarbon is a powerful tool for assessing SOM dynamics and is increasingly used in studies of carbon turnover. However, due to the nature of the measurement, comprehensive 14C studies of soils systems are rare. In particular, information on spatial variability in the radiocarbon contents of soils is limited. The present study aims to develop and apply a comprehensive four-dimensional approach to explore heterogeneity in bulk SOM 14C, with a broader goal of assessing controls on organic matter stability and vulnerability in soils across Switzerland. Focusing on range of Swiss soil types, we examine lateral variability in 14C over plot (decimeter to meter) to regional scales, vertical variability from surface to deeper soil horizons, and temporal variability by comparing present-day with archived (legacy) samples. Preliminary results show that there are large differences in SOM 14C age across small lateral and vertical distances within soil systems. Ultimately, studies of bulk variability will be followed up with analyses of SOM sub-fractions, including 14C measurements at the molecular level. Investigating 14C variability over various space and time domains may shed light on the scales of processes that dictate the composition and vulnerability of SOM, and provide valuable constraints on models of SOM turnover.