Geophysical Research Abstracts
Vol. 21, EGU2019-15182, 2019
EGU General Assembly 2019

Lower surface soil C turnover rate along a latitudinal solar radiation gradient in semi-arid grassland of Argentina

Valerie F. Schwab (1), Gerd Gleixner (1), Ulf-Niklas Meyer (2), Jana Tischer (3), and Susan E. Trumbore (1)

(1) Max-Planck-Institute , Biogeochemistry, Germany (vschwab@bgc-jena.mpg.de), (2) University of Münster, Münster , Germany, (3) University of Basel, Basel, Switzerland

Understanding mechanisms, causes and consequences of climatic changes is one of the major challenges of today's environmental research. There is a large quantity of carbon stored as soil organic carbon (SOC) in terrestrial ecosystems, but the mechanisms controlling the SOC turnover rate are still poorly constrained. It has been postulated that higher temperatures may lead to more vegetation growth and enhanced SOC storage. Conversely, higher temperatures could also reduce SOC in soils by amplified decomposition. Also, studies on the effects of drought or lower precipitation rate on SOC turnover have shown conflicting results.

We investigated SOC ages and turnover rates at different depths of soils collected in semi-arid Patagonian grassland along a 4000 km latitudinal transect characterized by increasing mean annual temperature (MAT; 4.1 to 13.3 °C) and solar irradiance (SI; 108 to 194 Wm-2) but similar precipitation rate (∼ 200 mm). SI and MAT were inversely correlated with carbon content, carbon stock and carbon turnover rate in surface soil (0 to 5 cm), suggesting that beside temperature, photo degradation is an important control on the surface carbon balance in these water-limited ecosystems. The effects of SI and temperature decreased with depth and were insignificant below 10 cm. Between 5 and 10 cm, the age of the SOC correlated with the illite content. As along the transect, the illite content inversely correlated to mean annual relative humidity, we suggested that aridity/temperature increases the age of deeper SOC by favoring its stabilization on clay mineral (illite).