Geophysical Research Abstracts
Vol. 21, EGU2019-14334, 2019
EGU General Assembly 2019

Influence of annelids and the location of organic material on water-stable aggregate distribution

Deborah Linsler, Sarah Bender, Ilka Schmoock, and Martin Potthoff

Göttingen, Centre of Biodiversity and Sustainable Land Use, Göttingen, Germany (deborah.linsler@uni-goettingen.de)

It is well known that annelids such as earthworms and enchytraeids provide ecosystem services concerning soil fertility and sustainability, e.g. by structuring the soil and building stable aggregates, which reduces soil erosion. The objective of this study was to quantify the combined effect of soil annelids and organic matter location on water-stable aggregate size class distribution.

In a microcosm experiment, undisturbed soil columns (30 cm height, 15 cm diameter) were used, which were taken at the long-term field trial “Garte Süd” near Göttingen, Germany, in reduced tillage plots. The soil type of the field trial is a Haplic Luvisol with a silt loam texture. The soil columns were defaunated by freezing before the start of the experiment. As annelids we used (i) the endogeic earthworm species Octolasion cyaneum (four individuals), (ii) the anecic earthworm species Lumbricus terrestris (two individuals) or (iii) a combination of the two enchytraeid species Enchytraeus crypticus and E. christenseni (350 individuals). As organic material we used maize leaves (5 g per column) and either put them on the soil surface (simulation of organic matter location of no-till systems) or in 15 cm soil depth (simulation of organic matter location of conventional tillage systems). All three annelids were combined with both organic matter location treatments. We also included control columns with and without maize leaves, in both cases without annelids. The columns were incubated for three months at a temperature of 10 °C.

First results show that the macroaggregate concentration in the top 10 cm was lowest in the columns without annelids and highest for the soil columns with O. cyaneum. The location of the organic material influenced the aggregate distribution in the soil columns with L. terrestris (more large and less small macroaggregates in the columns with maize leaves at the soil surface in the top soil) and with Enchytraeus (less microaggregates in the columns with maize leaves at the soil surface in the top soil), while having no effect on the columns with O. cyaneum.

Further planned analyses include the measurement of the isotopic signature of the carbon contents in the different aggregate size classes to quantify the maize carbon included in each aggregate size class dependent on the soil annelid species and the organic matter location.