Geophysical Research Abstracts
Vol. 19, EGU2017-18653, 2017
EGU General Assembly 2017

Interactions between extracellular polymeric substances and clay minerals affect soil aggregation

Cordula Vogel (1), Stephanie Rehschuh (1), Folasade Kemi Olagoke (1), Marc Redmile Gordon (2), and Karsten Kalbiltz (1)

(1) Technische Universität München, Chair of Soil Science, Department Ecology and Ecosystem Management, Freising-Weihenstephan, Germany (cordula.vogel@wzw.tum.de), (2) Sustainable Soil and Grassland Systems, Rothamsted Research, West Common, AL5 2JQ , Harpenden

Soil aggregation is crucial for carbon (C) sequestration and microbial processes have been recognised as important control of aggregate turnover (formation, stability, and destruction). However, how microorganisms contribute to these processes is still a matter of debate. An enthralling mechanism determining aggregate turnover and therefore C sequestration may be the excretion of extracellular polymeric substances (EPS) as microbial glue, but effects of EPS on aggregation is largely unknown. Moreover, interdependencies between important aggregation factors like the amount of fine-sized particles (clay content), the decomposability of organic matter and the microbial community (size and composition, as well as the excretion of EPS) are still poorly understood. Therefore, we studied the complex interactions between these factors and their role in aggregate turnover. It was hypothesized that an increase in microbial activity, induced by the input of organic substrates, will stimulate EPS production and therefore the formation and stability of aggregates. To test this hypothesis, an incubation experiment has been conducted across a gradient of clay content (montmorillonite) and substrate decomposability (starch and glucose) as main drivers of the microbial activity. A combination of aggregate separation and stability tests were applied. This results will be examined with respect to the obtained microbial parameters (amount and composition of EPS, CO_2 emission, microbial biomass, phospholipid fatty acid), to disentangle the mechanisms and factors controlling aggregate turnover affected by soil microorganisms. This study is expected to provide insights on the role of EPS in the stability of aggregates. Thus, the results of this study will provide an improved understanding of the underlying processes of aggregate turnover in soils, which is necessary to implement strategies for enhanced C sequestration in agricultural soils.