EGU21-14616
https://doi.org/10.5194/egusphere-egu21-14616
EGU General Assembly 2021

Molecular Changes in Dissolved Organic Matter After Soil Rewetting

Alice Orme[1,2], Simon Benk[2], Markus Lange[2], Christian Zerfaß[1], Georg Pohnert[1], and Gerd Gleixner[2]
[1]Friedrich Schiller University, Jena, Germany
[2]Max Planck Institute for Biogeochemistry, Jena, Germany

The intensity and occurrence of droughts is projected to increase due to climate change. Dried soils release high concentrations of dissolved organic matter (DOM) into subsurface waters when they are rewet, the so-called rewetting peak. To more accurately predict the role of rewetting of soils after drought on the carbon cycle in a changing climate, it is important to understand the processes behind this DOM release.

The DOM rewetting peak origin is disputed between soil organic matter (SOM) from breakdown of soil particles; accumulated root exudates; and microbial release due to a change in osmotic potential through osmolytes or cell bursting. To better understand the origin of the rewetting DOM peak, we took a rewetting series of soil water samples from different vegetation types between December 2018 and April 2019 for targeted and untargeted metabolomics. Initial results using untargeted ultrahigh-resolution mass spectrometry analysis revealed a clear temporal trend, indicating that vegetation-independent molecular changes occur following rewetting. An increase in O/C and a decrease in H/C over time was observed which is attributed to microbial decomposition, supported by a decrease in m/z over time. We also observed an increase in the content of lipidic compounds ($R > 0.6$) following rewetting. This indicates that cells do not burst upon rewetting and, over time, microbial activity increases, suggesting that the DOM rewetting peak is caused by a lack of decomposition, rather than a high production, of organic matter.