Geophysical Research Abstracts
Vol. 16, EGU2014-3364-1, 2014
EGU General Assembly 2014

Organo-mineral complexation alters carbon and nitrogen cycling in stream microbial assemblages

William Ross Hunter (1), Wolfgang Wanek (2), Judith Prommer (2), Maria Mooshammer (2), and Tom Battin (1)

(1) Universität Wien, Department of Limnology and Bio-Oceanography, Vienna, Austria (william.hunter@univie.ac.at), (2) Universität Wien, Department of Microbiology and Ecosystem Science, Vienna, Austria

Inland waters are of global biogeochemical importance receiving carbon inputs of ~ 4.8 Pg C y^{-1}. Of this 12 % is buried, 18 % transported to the oceans, and 70 % supports aquatic secondary production. However, the mechanisms that determine the fate of organic matter (OM) in these systems are poorly defined. One important aspect is the formation of organo-mineral complexes in aquatic systems and their potential as a route for OM transport and burial vs. microbial utilization as organic carbon (C) and nitrogen (N) sources. Organo-mineral particles form by sorption of dissolved OM to freshly eroded mineral surfaces and may contribute to ecosystem-scale particulate OM fluxes. We tested the availability of mineral-sorbed OM as a C & N source for streamwater microbial assemblages and streambed biofilms. Organo-mineral particles were constructed *in vitro* by sorption of ^{13}C:^{15}N-labelled amino acids to hydrated kaolin particles, and microbial degradation of these particles compared with equivalent doses of ^{13}C:^{15}N-labelled free amino acids. Experiments were conducted in 120 ml mesocosms over 7 days using biofilms and streamwater sampled from the Oberer Seebach stream (Austria), tracing assimilation and mineralization of ^{13}C and ^{15}N labels from mineral-sorbed and dissolved amino acids.

Here we present data on the effects of organo-mineral sorption upon amino acid mineralization and its C:N stoichiometry. Organo-mineral sorption had a significant effect upon microbial activity, restricting C and N mineralization by both the biofilm and streamwater treatments. Distinct differences in community response were observed, with both dissolved and mineral-stabilized amino acids playing an enhanced role in the metabolism of the streamwater microbial community. Mineral-sorption of amino acids differentially affected C & N mineralization and reduced the C:N ratio of the dissolved amino acid pool. The present study demonstrates that organo-mineral complexes restrict microbial degradation of OM and may, consequently, alter the carbon and nitrogen cycling dynamics within aquatic ecosystems.