Geophysical Research Abstracts
Vol. 14, EGU2012-12713, 2012
EGU General Assembly 2012

Interactions between recalcitrant and labile organic carbon in streams - Can stream biofilms mediate a priming effect?

M. M. Bengtsson (1), K. Wagner (1), E. R. Herberg (1), N. R. Burns (1), W. Wanek (2), and T. J. Battin (1)

(1) Department of Limnology, University of Vienna, Vienna, Austria (mia.bengtsson@univie.ac.at), (2) Department of Terrestrial Ecosystem Research, University of Vienna, Vienna, Austria

Inland waters - such as streams, rivers and lakes - are increasingly recognized as important components in the global carbon cycle. Dissolved organic carbon (DOC) in these systems is diverse in structure, origin and reactivity, and a fraction of it is regarded as recalcitrant to microbial degradation. In soils, degradation of recalcitrant carbon is often controlled by the availability of labile carbon sources. This is linked to the priming effect (PE). Mounting evidence suggests that PE is also important in aquatic ecosystems but there are so far very few studies addressing this topic. Biofilms are vital components of aquatic ecosystems. In stream biofilms, heterotrophic bacteria and algae coexist in close proximity, exposing the bacteria to both recalcitrant DOC of terrestrial origin and labile organic carbon from the algae. We hypothesize that this makes stream biofilms hotspots for PE. We used plug-flow bioreactors inoculated with natural stream biofilm bacterial communities to test the potential of a priming effect in aquatic ecosystems. The bioreactors were amended with an isotope-labeled plant extract serving as a model of recalcitrant DOC in streams. Labile carbon sources, in the form of glucose and an algal extract were added to induce PE. Nitrate and phosphate were also added to assess the role of these inorganic nutrients on carbon uptake. Microbial uptake of the different carbon sources was monitored by measuring the concentrations and isotopic ratios of respired CO_2, biomass and DOC. Our results suggest that the priming effect plays a role in stream carbon cycling and that it is potentially an important process in other aquatic ecosystems.