Geophysical Research Abstracts
Vol. 17, EGU2015-13136-1, 2015
EGU General Assembly 2015

Inferring DOC export mechanisms from high-frequency, instream UV-VIS concentration measurements

Marieke Oosterwoud, Andreas Musolff, Toralf Keller, and Jan Fleckenstein
Helmholtz Centre for Environmental Research - UFZ, Hydrogeology, Leipzig, Germany (marieke.oosterwoud@ufz.de)

The flux of soil-derived dissolved organic carbon (DOC) is a significant term in terrestrial carbon budgets and, as a result, a dominant link between terrestrial and aquatic ecosystems. Concentrations of dissolved organic carbon in streams and rivers have been increasing in many parts of the world. Providers of drinking water from surface water reservoirs are increasingly facing problems as elevated DOC concentrations cause higher costs for removal and potentially to toxic by-products during chlorination. Mitigating these problems requires a mechanistic understanding of the controls and dynamics of DOC export from catchments.
High frequency measurements using UV-vis absorbance as a proxy for DOC concentrations allow for improved evaluation of DOC concentration-discharge relationships in catchments. In addition, several UV-vis absorbance proxies (both single and multiple wavelength) can be used as an indicator of DOC quality. These relationships allow quantification of net DOC export, and may additionally provide new insights into the mechanisms that control DOC export dynamics.
We aimed to evaluate the response and interaction of DOC concentrations and quality between a riparian zone soil and stream under different hydrological conditions. UV-vis sensors were installed in both the riparian soil and stream of two headwater catchments, the Hassel and Rappbode, in the Harz Mountains in Germany. The two headwater catchments are approximately equal in size, however, differ in their land-use. The Hassel catchment is dominated by agricultural land-use, whereas the Rappbode catchment is mainly forested.
The DOC concentration-discharge relationships show intricate hysteretic behavior, which differs between locations and shifts in time. The rich data-set will allow for a characterization of space and time patterns of DOC export as well as changes in its quality, providing valuable new insights into the hydrologic mechanisms that govern the delivery of DOC to streams.