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Elucidating sources of dissolved organic carbon in the riparian zone of a small, forested catchment

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Dissolved organic carbon (DOC) constitutes the biggest portion of carbon that is exported from soils. During the last decades, widespread increases in DOC concentrations of surface waters have been observed, affecting ecosystem functioning, carbon storage and drinking water treatment. However, the hydrological controls on DOC mobilization are still not completely understood.

We sampled two different topographical positions within a headwater catchment in the Bavarian Forest National Park: at a steep hillslope (880 m.a.s.l.) and in a flat and wide riparian zone (770 m.a.s.l.). By using piezometers, pore water samplers (peepers) and in-stream spectrometric devices we measured DOC concentrations as well as DOC absorbance (A_{254}/A_{365} and $SUVA_{254}$) and fluorescence characteristics (fluorescence and freshness indices) in soil water, shallow ground water and stream water. We used these parameters to characterize different DOC sources at the interface between the soils being important for DOC production processes and the stream being responsible for the transport of large amounts of DOC during precipitation events. Our aim is to gain further insights into the relative importance of the DOC sources during baseflow and precipitation events and the corresponding hydrological processes responsible for DOC export.

We found differences between the DOC quality parameters at the hillslope and in the flat riparian zone indicating the accumulation of less decomposed DOC in the downstream part of the catchment. High DOC concentrations (up to 80 mg L^{-1}) were found in soil water from cascading sequences of small ponds in the riparian zone that fill up temporarily during periods of high catchment wetness. The increase of in-stream DOC concentrations during events was accompanied by changing DOC characteristics at both locations, for example increasing freshness index values. As the freshness index values were approaching the values found in the DOC-rich ponds in the riparian zone, these ponds seem to be important DOC sources during events. Our preliminary results point to a change of mobilization processes and flow pathways during events.