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Finding hot-spots and hot- moments of DOC concentrations in two streams feeding a drinking water reservoir

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The flux of dissolved organic carbon (DOC) derived from soils is a significant term in terrestrial carbon budgets and as a result a dominant link between terrestrial and aquatic ecosystems. Since surface waters are a main source of drinking water, increasing DOC concentrations are a cause of concern across Europe. As they can transport contaminants and negatively affect drinking water treatment processes. Downstream DOC concentrations are the sum of headwater inputs, in combination with progressive downstream alterations by inflowing water with its own DOC concentrations. Better knowledge of spatial and temporal delivery of DOC in catchments is required to understand the mechanisms behind reported long term changes in DOC fluxes from soils to surface waters.
The aim of this study is to identify where and when increased DOC concentrations occur within two catchments in the Harz-mountains, having different land-use, feeding a drinking water reservoir. The Hassel and Rappbode catchments are approximately equal in size. However, they differ in their land-use. The Hassel catchment has a considerable contribution of arable land compared to the Rappbode catchment which is mainly forested.
We combined both standard synoptic sampling (biweekly) with high frequency UV-Vis analysis of DOC concentrations and its chemical composition in streams waters during one complete hydrological year. Through the synoptic sampling we obtain spatially detailed information about the (sub)catchments DOC export, whereas, the continuous UV-Vis measurements provided detailed information on the DOC-discharge behavior during different hydrological conditions.
Results from the sampling and monitoring will be presented. We found DOC exports to be largest in the agricultural dominated catchment. However, temporal variability in DOC export was higher than the spatial variability within both catchments. We presume that it is likely that DOC exports are mainly driven by inputs from the riparian soils which are present along the entire stream reach. The DOC-discharge relationships show a fast increase in DOC concentrations in response to a hydrological event. Although, after several consecutive small discharge events we found a depletion of the DOC released to the stream. Furthermore, the DOC-concentration relationships revealed different patterns during snowmelt and summer high flow. Melting of snow first leads to a rapid increase in DOC concentration, followed by a dilution and again an increase in DOC concentrations as a result of thawing which enables leaching from the soil. During summer high flow situation, soil wetting leads to leaching followed by depletion.