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Dissolved oxygen and dissolved inorganic carbon cycling in small order rivers: a stable isotope study.

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Small order river systems dominate the continental landmass, draining 90% of the land and providing the most common landscape for transport of runoff and constituents. Here, we present measurements of δ^{13}C of dissolved inorganic carbon ($\delta^{13}C_{DIC}$) and δ^{18}O of dissolved oxygen ($\delta^{18}O_{DO}$) from a small order river system draining a peatland catchment i.e. at the terrestrial-aquatic interface. We chose stable isotope analyses as an analytical tool to identify processes important in shaping the fluvial inorganic carbon load.

Diurnal sample collection, undertaken to consider the influence of changing dominance of photosynthesis and respiration, was carried out almost monthly, for a 14-month period. Additionally, the field sampling programme used a nested-catchment matrix, with sample collection at the 1km^2, 40km^2 and 90 km^2 catchment scale. Our field approach thus allowed consideration of both temporal and spatial controls on DIC and DO cycling (as expressed through isotopic composition).

Our data shows the TIC and DO pools to be dynamic in behaviour, but to respond in a predictable manner to significant environmental influences, such as changing in discharge profile. Catchment scale appears to have little influence on the cycling of these pools.

This presentation will focus on delineating the factors responsible for changing isotopic composition. Complimentary to this study is construction of dissolved inorganic carbon budgets for the same catchment and time-period, from which we can assess when these lotic systems have the potential to be a sink or source of atmospheric CO_2.

This assessment will be placed in the context of the influence of changes in discharge. This data will be presented in session HS18: Interactions between carbon and the hydrological cycle and the climate system.