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Interactions between inorganic carbon budgets and hydrological conditions in a small order river system draining a peatland catchment.

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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. The capacity of such systems to act as a sink (pCO_2 <1) or source (pCO_2 >1) of atmospheric carbon dioxide is strongly controlled by water chemistry, and changes in this are generally accompanied by changes in discharge.

Here we present dissolved inorganic carbon budgets for a small order river system (NE Scotland) draining soils rich in carbon. Our data spans June 2003 until present, thus incorporating the 2003 European drought. These budgets have been constructed both by direct measurement of dissolved inorganic carbon concentration, and 'forensically' by reconstruction from continuously-logged water chemistry measurements that influence the carbonate equilibria, for example pH.

We have used a nested-catchment sampling matrix, thus have the opportunity to consider the influence of increasing scale on inorganic carbon budgets in this catchment. However, the focus of this presentation will be delineating the influence that changes in discharge and associated changes in river chemistry have on inorganic carbon budgets. From this understanding we can use stream discharge hydrographs to partition this lotic system into periods when it has the capacity to be a source or sink of atmospheric carbon dioxide.

Exploring such relationships is important. Discharge is measured more frequently than

inorganic carbon budgets for lotic systems are quantified. Thus if generic relationships can be established between inorganic carbon budgets and the prevailing discharge regime, we enhance our capacity to advance carbon-focussed models of climatic feedback through incorporation of riverine carbon response.

Accompanying the data in this presentation are stable carbon isotope measurements of the dissolved inorganic carbon pool and oxygen isotope measurements of the dissolved oxygen pool. From such measurements we can consider intra-riverine cycling of such pools, and this data is hoped to be presented in Biogeochemistry session BG2.03.