



Estimating Sources and Fluxes of Dissolved and Particulate Organic Matter in UK Rivers

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Over the past two centuries, pools and fluxes of carbon, nitrogen and phosphorus in UK ecosystems have been altered by intensification of agriculture, land use change and atmospheric pollution leading to acidification and eutrophication of surface waters. In addition to this, climate change is now also predicted to substantially impact these systems.

The CEH Long Term Large Scale (LTLS) project therefore aims to simulate the pools and fluxes of carbon, nitrogen and phosphorus and their stoichiometry during the cycling process. Through the N14C model, simulations of the release of C, N and P through drainage water and erosion processes will be predicted using historical climate data, which will be tested using contemporary data.

For present data, water from four UK catchments (Ribble, Wiltshire Avon, Conwy, Dee) were collected at the tidal limit of each river, which included a combination of high and low flow samples predicted using 5 day forecasts and local weather station data. These samples were filtered, centrifuged and sent to the NERC radiocarbon facility for analysis by accelerator mass spectrometry (AMS) to obtain both PO14C and DO14C data.

Radiocarbon enables a unique and dynamic way of estimating long term turnover rates of organic matter, and has proven to be an invaluable tool for measuring upland terrestrial and aquatic systems. It has however, been scarcely used in larger, lowland river systems.

Since the riverine organic matter captured is likely to have originated from terrestrial and riparian sources, the radiocarbon data will be a rigorous test of the model's ability to simulate the coupling of erosion and leaching processes, and stoichiometric relationships between C:N:P.