Hourly to seasonal hydrochemical dynamics in lowland and upland UK river-systems: from process inference to progress in hydrochemical modelling

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Model-based assessments of the impacts of environmental change on European freshwater ecosystems are needed to aid informed resource management. This talk will focus on how such model-based assessments can be improved using the latest results from in-situ, continuous sub-daily water quality monitoring in upland and lowland UK river systems. Two catchments in the lowland Thames basin, the Enborne and The Cut, have been instrumented since November 2009 to examine the water quality dynamics using laboratory instruments (Hach-Lange; Micromac) installed in the field to produce hourly measurements of nutrient dynamics. Total Phosphorus and Total Reactive Phosphorus were measured in The Cut and nitrate was measured in the Enborne. These data were supplemented at both sites by nearby flow measurements and data collected using YSI multi-parameter sondes fitted with pH, dissolved oxygen, conductivity and water temperature probes. Experiences of installing and using these in-situ technologies will be described. The observed dynamics evident in these datasets will be compared to those identified at Plynlimon, Wales, which represent the hydrochemical functioning of an upland river-system. Both the lowland and upland data will be interpreted in terms of: the gain in information by sampling at sub-daily frequencies (and what is lost by sampling at lower frequencies); new information derived in terms of hydrochemical functioning; and the implications for progressing hydrochemical models. As part of the discussion, new opportunities from 'lab-on-a-chip' technologies will be described.