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The hyporheic zone - a source or sink for trace metals?

C. Soulsby (1), I.A. Malcolm (2), J. Grant (1) and D. Tetzlaff (1)

(1) Department of Geography and Environment, University of Aberdeen, AB24 3UF, Scotland, UK (e-mail: c.soulsby@abdn.ac.uk), (2) FRS Freshwater Laboratory, Faskally, Pitlochry, PH16 5LB , UK

The marked physical, chemical and biological gradients that characterise the hyporheic zone - together with their dynamic nature - result in complex patterns of trace metal mobilization and retention. Data will be presented for a mountain stream in the Scottish Highlands where physical and biogeochemical influences on trace metal mobilization have been examined in the hyporheic zone. At the study site, hydrological variability has a major influence on the hyporheic environment. Under low flow conditions groundwater discharge dominates. This results in a high pH reducing environment with a stable thermal regime. Under high flow conditions hydraulic gradients reverse and stream water influx can increase the acidity of the hyporheic environment by 1-2 pH units, re-instate oxidising conditions and change the prevailing temperature towards that of ambient atmospheric. In addition, high flows in upland catchments dominated by peaty soils often result in a major influx of dissolved organic carbon. The effects of these hydrological dynamics - and the concomitant biogeochemical changes - on trace metal mobility in the hyporheic zone are examined. Some elements - such as Fe - can become less mobile during high flows as high dissolved oxygen levels cause precipitation, then subsequent release as the influence of groundwater discharge is re-established in the days following an event and reducing conditions return. Other species - such as Al - can be mobilized during events as the pH declines and chelation is facilitated by high levels of dissolved organic carbon. The poster will present the results of field investigations and geochemical modelling studies on the dynamics of hyporheic trace metal mobilization.