



Arsenic dynamics in a contaminated headwater peatland catchment

James Rothwell (1), Judy Barrett (2), Kevin Taylor (1), Dave Polya (1), Steve Boult (1), Martin Evans (1), and Tim Allott (1)

(1) The University of Manchester, United Kingdom (james.rothwell@manchester.ac.uk), (2) Manchester Metropolitan University, United Kingdom

Ombrotrophic peatlands can be contaminated with anthropogenically derived, atmospherically deposited arsenic. Past studies have demonstrated that previously deposited arsenic has the potential to be mobilised from peatland soils to surface waters under certain physical and biogeochemical conditions. However, there is a lack of information on the physical and chemical speciation of arsenic in waters draining these organic-rich systems. Information on the form and distribution of arsenic in peatland waters is crucial for assessing the mobility, fate and toxicity of legacy arsenic in ombrotrophic peatlands. This paper reports results from a small catchment study assessing the fluvial transport of legacy arsenic in the ombrotrophic peatlands of the Peak District National Park, UK. A monitoring programme is ongoing, but the evidence to date reveals that methylated organic arsenic species are prevalent in peat drainage waters, with arsenic (III) the dominant inorganic species. Stream waters with low iron/carbon ratios and those characterised by dissolved organic matter with low molecular weight (i.e. fulvic acids) tend to be associated with a greater proportion of arsenic in the fine fraction (< 50 kDa). The results reveal that the quantity and quality of dissolved organic matter plays a key role in governing arsenic distribution and transport within the stream. The monitoring data suggests that the release of arsenic from the peat to stream is controlled by the reductive dissolution of iron oxides and the methylation of inorganic arsenic.