



Impact of managed moorland burning on DOC concentrations in soil solutions and stream waters

Sheila Palmer (1), Catherine Wearing (1), Kerrylyn Johnson (1,2), Joseph Holden (1), and Lee Brown (1)

(1) University of Leeds, Geography, Leeds, United Kingdom (s.m.palmer@leeds.ac.uk, +44 (0)113 3433308), (2) School of Environmental Science, Murdoch University, 90 South St, Murdoch 6150, Western Australia (Kerrylyn.Johnston@murdoch.edu.au)

In the UK uplands, prescribed burning of moorland vegetation is a common practice to maintain suitable habitats for game birds. Many of these landscapes are in catchments covered by significant deposits of blanket peat (typically one metre or more in depth). There is growing interest in the effect of land management on the stability of these peatland carbon stores, and their contribution to dissolved and particulate organic carbon in surface waters (DOC and POC, respectively) and subsequent effects on stream biogeochemistry and ecology. Yet there are surprisingly few published catchment-scale studies on the effect of moorland burning on DOC and POC. As part of the EMBER project, stream chemistry data were collected approximately monthly in ten upland blanket peat catchments in the UK, five of which acted as controls and were not subject to burning. The other five catchments were subject to a history of prescribed burning, typically in small patches (300-900 m²) in rotations of 8-25 years. Soil solution DOC was also monitored at four depths at two intensively studied sites (one regularly burned and one control). At the two intensive sites, soil solution DOC was considerably higher at the burned site, particularly in surface solutions where concentrations in excess of 100 mg/L were recorded on several occasions (median 37 mg/L over 18 months). The high soil solution DOC concentrations at the burned site occurred in the most recently burned plots (less than 2 years prior to start of sampling) and the lowest DOC concentrations were observed in plots burned 15-25 years previously. On average, median stream DOC and POC concentrations were approximately 43% and 35% higher respectively in burned catchments relative to control catchments. All streams exhibited peak DOC in late summer/early autumn with higher peak DOC concentrations in burned catchments (20-66 mg/L) compared to control catchments (18-54 mg/L). During winter months, DOC concentrations were low in control catchments (typically less than 15 mg/L) but were highly variable in burned catchments (9-40 mg/L), implying some instability of peat carbon stores and/or fluctuation in source. The results offer strong evidence for an impact of burning on the delivery of DOC to streams, possibly through increased surface run-off from bare or partially vegetated patches.