Geophysical Research Abstracts
Vol. 15, EGU2013-3979, 2013
EGU General Assembly 2013

The fate of in-stream carbon

Catherine Moody and Fred Worrall
University of Durham, Earth Science, United Kingdom (c.s.moody@durham.ac.uk)

This study presents a series of experiments investigating rates of photo- and bio-degradation of dissolved organic carbon to CO_2 in unfiltered surface water draining peat-dominated upland catchments in the North Pennines, Peak District and North Wales in the UK. Monthly experiments have been carried out over a range of catchment areas, ranging from 0.2 km^2 to 818 km^2, and over a range of time periods, from 30 hours to 10 days: in total over 2600 degradation experiments have been performed.

Findings suggest that up to 60% of dissolved organic carbon and 50% of the suspended sediment is lost in as little time as 30 hours, with the majority of the degradation occurring within the first 8 hours. Decreased rates of degradation occurred during the night-time, suggesting a diurnal cycle of degradation.

Models of total loss of DOC coupled with estimates of in-stream residence times showed that annual loss rates across a 818 km^2 catchment would be between 48 and 69%, which is in line with estimates from mass balance studies, implying that in-stream DOC degradation represents a large, indirect source of CO_2 emissions from peat and other organic soils.