



Rates and fates of fluvial carbon loss from eroding peatlands

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Upland peatlands are major stores of carbon, containing in the UK almost half of total terrestrial carbon storage. Stable intact peatlands sequester carbon, however physical instability of peatland systems can lead to significant dynamic change in the carbon budget. This paper for the first time examines in detail the downstream variability in the quality and quantity of fluvial carbon flux downstream of an eroding peatland. Data are presented from 10 stream monitoring sites monitored over a two year period in the severely eroded peatlands of the southern Pennines, U.K. POC and DOC flux from the system are 78 and 28 g C m⁻² a⁻¹ respectively at headwater sites declining to values of circa 13 g C m⁻² a⁻¹ for both parameters at catchment scales of 25 km². Downstream the ratio of POC to doc declines consistently from 4:1 to close to unity. The reduction in POC concentrations is in part due to dilution, and potentially to sediment deposition within the fluvial system. However, novel image based organic particle size data shows that the downstream increase in DOC flux correlates with a decrease in POC particle size. This raises the possibility that physical disaggregation of particulate material beyond the arbitrary particle size threshold defining DOC is a process contributing to rapid POC-DOC transformations within the fluvial system. This process provides a link between POC flux and the release of climatically active carbon via photolysis of DOC.