



Evidence for abiotic DOC losses in a peatland stream

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Against a background of increasing DOC concentrations in many upland streams in Northern Europe and North America, there is growing interest in understanding not only the regional drivers and local terrestrial influences on stream DOC, but also the potential for in-stream processing and in particular the fate of fluvial C lost from peatlands. All peatlands are sources of DOC, but the amount of C reaching streams can increase if peats erode or if streams become more hydrologically connected to peatland DOC sources. Evidence of DOC processing in headwater streams is scant. In a recent study at an upland site that is characterized by deep (>180cm) peat in the upper third of the catchment, cumulative in-stream DOC losses were estimated at 17-25% of the outlet flux. The instantaneous DOC flux at the catchment outlet on three sampling days during summer was 200 mg/second (lowest flow), 556 mg/second and 4529 mg/second (relatively high flow). DOC concentration near to the stream source varied from 0.13 mg/litre under low flow to 34.2 mg/litre during the highest flow, indicating the importance of variable source area to stream DOC in this catchment. The spatial pattern of DOC loss varied depending on stream flow at the time of sampling, with the largest losses occurring in the upper reaches under relatively high flow conditions. While some downstream changes in DOC concentration and flux could be explained by mixing of tributary waters with different DOC concentrations, sharp losses of DOC in the upper reaches under relatively high flow conditions could not be attributed to mixing. It is proposed that DOC was lost through adsorption to iron oxides coating the stream bed, under conditions where acidic DOC-rich waters sourced from upstream mixed with inputs from a relatively high pH groundwater spring. This study demonstrates that peatland DOC is reactive and that abiotic processes potentially are very important in attenuating stream DOC concentrations in highly organic waters.