Geophysical Research Abstracts
Vol. 18, EGU2016-3917-1, 2016
EGU General Assembly 2016

Instream wood as a driver of nutrient attenuation in a lowland sandy stream

Megan Klaar (1,3), Felicity Shelley (2), Phil Blaen (3), Davide Dapelo (4), Mark Trimmer (2), John Bridgeman (4), David Hannah (3), and Stefan Krause (3)

(1) School of Geography, University of Leeds, Leeds, U.K. (M.J.Klaar@leeds.ac.uk), (3) School of Geography, University of Birmingham, Edgbaston, U.K., (2) School of Biological and Chemical Sciences, Queen Mary University London, London, U.K., (4) Department of Civil Engineering, University of Birmingham, Edgbaston, U.K.

Our poster outlines our research to assess the potential of instream wood to enhance nutrient (nitrogen and carbon) attenuating potential in UK lowland rivers. Using cutting-edge distributed temperature sensing, geophysical technologies, novel microbial metabolic activity tracers and 15N isotope tracer applications, we are able to identify how instream wood alters hyporheic exchange fluxes and residence times which control the development and occurrence of biogeochemical hotspots, which facilitate nitrogen removal. Initial results show that instream wood increases surface water downwelling into the hyporheic, creating increased hyporheic mixing. Metabolic tracer, nutrient and modelling data reveal a correlation between these hyporheic exchange flow locations and increased denitrification hotspots. This data in conjunction with ongoing experimentation suggests that instream wood could be used in river basin management and river restoration efforts to improve water quality and hydromorphic integrity within lowland sandy streams. Ongoing work seeks to quantify the efficiency of alternative (stationary and transient) wood designs for controlled alteration and management of hyporheic exchange fluxes and residence times and nutrient turnover in the streambed. Outputs from this project will provide a quantitative understanding of the optimal design and efficiency of instream wood structures for removing excess nitrate from streambed sediments of nutrient impacted lowland rivers. This information will directly impact UK and European river restoration policies and inform decisions of whether wood restoration in UK lowland rivers should be promoted on a national level and how the most efficient strategies should be designed.