Geophysical Research Abstracts
Vol. 18, EGU2016-18322, 2016
EGU General Assembly 2016

Quantifying consumption rates of dissolved oxygen along bed forms

Fulvio Boano (1), Natalie De Falco (2), and Shai Arnon (2)

(1) Department of Environment, Land and Infrastructure Engineering, Politecnico di Torino, Italy, (2) Zuckerberg Institute for Water Research, The J. Blaustein Institutes for Desert Research, Ben-Gurion University of the Negev, Israel

Streambed interfaces represent hotspots for nutrient transformations because they host different microbial species, and the evaluation of these reaction rates is important to assess the fate of nutrients in riverine environments. In this work we analyze a series of flume experiments on oxygen demand in dune-shaped hyporheic sediments under losing and gaining flow conditions. We employ a new modeling code to quantify oxygen consumption rates from observed vertical profiles of oxygen concentration. The code accounts for transport by molecular diffusion and water advection, and automatically determines the reaction rates that provide the best fit between observed and modeled concentration values. The results show that reaction rates are not uniformly distributed across the streambed, in agreement with the expected behavior predicted by hyporheic exchange theory. Oxygen consumption was found to be highly influenced by the presence of gaining or losing flow conditions, which controlled the delivery of labile DOC to streambed microorganisms.