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Quantifying the spatial and temporal variability of groundwater-lake exchange

N. Volze (1), C. Neumann (1), C.T. Green (2), S. Tyler (3) and J.H. Fleckenstein (1)

(1) Department of Hydrology, University of Bayreuth, Germany (nina_volze@web.de), (2) US Geological Survey, Menlo Park, USA, (3) Department of Geological Science and Engineering, University of Nevada, Reno, USA

A reliable quantification of exchange fluxes between groundwater and surface water is not only important for water management but also to better understand biogeochemical processes at the groundwater-surface water interface. In acidic mine lakes from former open pit lignite mining in Eastern Germany a strong influence of the magnitude of groundwater inflow on the release of acidity at the groundwater-lake interface was found (Knorr and Blodau 2006). In a joint project at an acidic mine lake in Eastern Germany the variability of groundwater-lake exchange and its effects on the biogeochemical release of acidity at the groundwater-lake interface are investigated. In the presented study several different methods are employed and tested to better quantify the spatial and temporal variability of groundwater-lake exchange rates. Besides classical methods such as mini-piezometers and seepage meters temperature measurements are used to qualitatively describe and quantify groundwater-lake exchange rates. To map thermal anomalies at the groundwater-lake interface distributed temperature sensing (DTS) using fiber optics will be employed. Vertical temperature profiles and thermographs at different depth below the lake bed are used to invert flux rates based on numerical simulations of flow and heat transport.

Knorr, K.H. and Blodau, C. (2006) Altered groundwater inflow remobilizes acidity from sediments of an iron rich and acidic lake, Environmental Science and Technology 40: 2944-2950.