Geophysical Research Abstracts
Vol. 20, EGU2018-3524-8, 2018
EGU General Assembly 2018


# Study on hyporheic exchange and solute transport across river bed-to-bank continuum under transient hydrological conditions

Dongsheng Liu (1,3), Jian Zhao (1), Woo-Hyun Jeon (2), Jin-Yong Lee (2), Erik Nixdorf (3), Thomas Kalbacher (3), and Holger Weiß (3)

(1) College of Water Conservancy and Hydropower Engineering, Hohai University, China, (2) Department of Geology, Kangwon National University, Chuncheon 200-701, Korea, (3) Department of Environmental informatics, Helmholtz Centre for Environmental Research – UFZ, Leipzig 04318, Germany

The water exchange and reactive solute transport in the hyporheic zone during a single flood wave depend on some featured parameters such as wave peak ($A$), wave period ($T$), peak type ($r$), and peak position ($t_p$). In order to clarify the detail and significances of these variables, a 2-D flow and transport model of the bed-to-bank continuum was developed and calibrated against the observations in-situ measurements of the Inbuk stream, Korea, where rainfall floods are frequent during the moist seasons. The numerical results showed that the response of groundwater level to the flood came faster from the lateral, and produced a greater exchange volume and, subsequently, an adequate reaction in this direction. Parameters affected the reactive efficiency (solute consumption as fraction of influx) of both the aerobic respiration and the denitrification in different degree. Specifically, the $A$ was the greatest followed by $T$ and $r$, and the $t_p$ was the smallest. The above method is applied to a larger scale basin of Selke river in German, with a continuous mountain range at the left side and a lake at the right side with a certain distance. The groundwater flow and hydrochemical processes in the mountain-river-lake cross section are investigated under the coexistence of river stage fluctuation, groundwater gradient, and topography.