Assessing groundwater travel times and biogeochemical processes during riverbank filtration under the aspect of river restoration

T. VOGT¹, P. SCHNEIDER¹, S. PETER¹², E. DURISCH-KAISER¹², M. SCHIRMER¹ & O. A. CIRPKA³

¹ Eawag – Swiss Federal Institute of Aquatic Science and Technology, Department Water Resources and Drinking Water, Überlandstrasse 133, 8600 Dübendorf, Switzerland
tobias.vogt@eawag.ch
² ETH Zürich, Institute of Biogeochemistry and Pollutant Dynamics, Universitätsstr. 8, 8092 Zürich, Switzerland
³ University of Tübingen, Center for Applied Geoscience, Sigwartstr. 10, 72076 Tübingen, Germany

Abstract The largest Swiss groundwater reservoirs are located in gravel aquifers of flood plains with channelized rivers. Although the number of river restoration projects is increasing, the effects of river restoration on riverbank filtration and groundwater quality are still under debate. For detailed research on biogeochemical processes during river water infiltration, field data of nutrients or pollutants and advective groundwater travel times to observation and production wells are crucial parameters. We present results of a study on bank filtration at a field site in northeast Switzerland, which is located at a channelized and restored section of the peri-alpine losing River Thur. We analyse time series of electrical conductivity in the river and riparian groundwater wells to quantify mean residence times by means of non-parametric deconvolution and relate the calculated travel times with biogeochemical processes occurring during riverbank filtration.

Key words riverbank filtration; electrical conductivity; time series analysis; non-parametric deconvolution; biogeochemistry