



## **Estimation of Van Genuchten and preferential flow parameters by inverse modelling for large scale vertical flow constructed wetlands**

U. Maier

University of Tübingen, Center for Applied Geoscience, Tübingen, Germany (uli.maier@uni-tuebingen.de)

Background of this study is the attempt to predict the capability of vertical flow constructed wetlands for cleanup of contaminated groundwater. Constructed wetlands have been used for waste water treatment for decades and they provide a promising cost-efficient tool for large scale contaminated groundwater remediation. Vertical soil filters are one type of such constructed wetlands, where water flows vertically under alternating unsaturated conditions (intermittent load). The present study focusses on the model and calibration of unsaturated water flow at two different vertical soil filters. Flow data used for the calibration correspond to measurements performed in two vertical filters used for sewage water treatment at a research pilot treatment plant. Numerical simulations were performed using the code MIN3P, in which variably saturated flow is based on the Richards equation. Soil hydraulic functions based on van Genuchten coefficients and preferential flow characteristics were obtained by calibrating the model to measured data using evolution strategies with covariance matrix adaptation (CMA-ES). The presented inverse modelling procedure not only provides best fit parameterizations for separate and joint model objectives, but also utilizes the information from multiple re-starts of the optimization algorithm to determine suitable parameter ranges and reveal potential correlations. The sequential automatic calibration is both straightforward and efficient even if different complex objective functions are considered.