Geophysical Research Abstracts
Vol. 13, EGU2011-3749-1, 2011
EGU General Assembly 2011

Investigating the Effects of Channel Spatial Variability on Two-Zone Transient Storage Modeling

Noah Schmadel (1), Justin Heavilin (1), Bethany Neilson (1), and Anders Wörman (2)

(1) Civil and Environmental Engineering, Utah Water Research Laboratory, Utah State University, Logan, United States (n.schma@aggiemail.usu.edu), (2) Land and Water Resources Engineering, The Royal Institute of Technology, Stockholm, Sweden

The two-zone temperature and solute (TZTS) transport model separates transient storage into surface and subsurface (hyporheic) storage zones to account for the potentially different residence time distributions and processes that individually influence each zone. Despite this separation of unique storage zones to better represent individual transport processes and storage volumes, the effects of channel spatial heterogeneity on solute transport predictions are not well understood. Analytical solutions were developed for the solute component of the TZTS model to serve as verification of numerical results, aid in interpretation of results, and provide a more efficient and stable means to account for spatial variability in parameters. In a previous effort, the TZTS model was applied to a 6.5 km reach of the Virgin River, a low gradient desert river with sand to gravel substrate, in southwestern Utah, United States. As common among transient storage modeling efforts, parameters, including main channel and surface storage widths, were first estimated using solute tracer data and then fixed constant for the entire study reach. Although reasonable solute transport predictions were provided by the calibrated model, it is important to investigate the significance of neglecting spatial variability in channel geometry on predictions. To address this, we account for spatial variability by first estimating the main channel and surface storage width parameters using information extracted from aerial high resolution multispectral and thermal infrared imagery. Then we use a convolution approach with the TZTS model analytical solutions to incorporate these spatially variable parameters and investigate increased data resolution on solute transport predictions.