



Analysing Austrian and Italian stream tracer experiments: can we characterize longitudinal solute transport processes across a range of flow rates?

B. Schmid

Technische Universität Wien, Hydraulic and Water Resources Engineering, Vienna, Austria (schmid@hydro.tuwien.ac.at)

The research reported here is based on extensive data sets from repeat experiments (instantaneous slug releases of salt tracers) performed on the Mödling stream in Lower Austria (south of the Capital Vienna) over the 8 years' period from 2000 to 2007. These Austrian data sets were complemented by stream tracer data from the Torrente Lura, a small stream near Milan in Italy. Both groups of data sets were used to characterize flow rate - dependency of the Transient Storage Model (TSM) parameters on one hand and errors associated with parameter transfer on the other.

The 11 Mödling stream tracer experiments included in this study suggest negative correlation between flow rate and dead zone ratio (dead zone volume per unit stream length divided by main stream volume per unit length). The dispersion coefficient is shown to grow with flow rate, which confirms a previous result for the Torrente Lura (Paoletti et al., 2004). Mean storage zone residence time is distinctly negatively correlated with flow rate.

Using parameter sets (of dispersion coefficients, dead zone ratios and storage zone residence times, resp.) derived from each tracer experiment to compute the breakthrough curves (pollutographs) of all others, it is shown the errors in simulated Mödling peak concentrations remain within a 40% margin, if the ratio of respective flow rates does not exceed 2 : 1. For Torrente Lura, the errors in peak concentrations are somewhat lower. Simulated Torrente Lura concentrations (using parameters from different experiments), thus, tend to be closer to observed values than can be expected for Mödling stream. Differences in geomorphology between Mödling and Lura streams, resp., are believed to play a role in this context.

References

Paoletti, A., Sanfilippo, U. and Innocenti, I. (2004). "Experimental data and modeling of pollutant dynamics in ephemeral streams influenced by transient storage in dead zones." *L'Acqua* 4/2004, 41-52, 2004.