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A comparison of three solute transport models using mountain stream tracer experiments

J. R. MANSON¹, S. G. WALLIS², B. O. L. DEMARS³, J. D. MICK⁴, G. M. GÍSLASON⁵,
J. S. ÓLAFSSON⁶, N. FRIBERG⁷

¹Richard Stockton College, New Jersey, USA

²Heriot-Watt University, Edinburgh, UK

³James Hutton Institute, Aberdeen, UK

⁴General Dynamics Information Technology, New Jersey, USA

⁵University of Iceland, Reykjavik, Iceland

⁶Inst. of Freshwater Fisheries, Reykjavik, Iceland

⁷Norwegian Institute for Water Research, Oslo, Norway

ABSTRACT

Stream ecology may be influenced by the temporary trapping of solutes in geomorphologic structures, which is usually quantified by fitting the Transient Storage Model to tracer data. This paper explores the relationships between the parameters of this model and those of two simpler models, namely the Advection-Dispersion Model and the Aggregated Dead Zone model. It is motivated by the possibility of obtaining more reliable transient storage parameter values by correlating them with the parameters of the other models instead of evaluating them directly. Results were obtained by fitting all three models to a set of tracer data from mountain streams, predominantly in Iceland. Some strong correlations were found between some of the parameters of the transient storage model and the advection-dispersion model, but no strong correlations were found between the parameters of the transient storage model and the aggregated dead zone model. For all three models, combinations of the optimized parameters correctly described the bulk movement of the solute cloud, giving confidence in the optimized parameters.