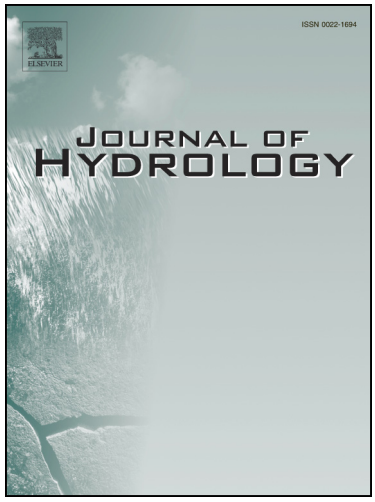

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Evaluation of data driven models for river suspended sediment concentration modeling

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Abstract

Using eight-year data series from hydrometric stations located in Arkansas, Delaware and Idaho (USA), the ability of artificial neural network (ANN) and support vector regression (SVR) models to forecast/estimate daily suspended sediment concentrations ($[SS]_d$) was evaluated and compared to that of traditional multiple linear regression (MLR) and sediment rating curve (SRC) models. Three different ANN model algorithms were tested [gradient descent, conjugate gradient and Broyden-Fletcher-Goldfarb-Shanno (BFGS)], along with four different SVR model kernels [linear, polynomial, sigmoid and Radial Basis Function (RBF)]. The reliability of the applied models was evaluated based on the statistical performance criteria of root mean square error (RMSE), Pearson's correlation coefficient (PCC) and Nash-Sutcliffe model efficiency coefficient (NSE). Based on RMSE values, and averaged across the three hydrometric stations, the ANN and SVR models showed, respectively, 23% and 18% improvements in forecasting and 18% and 15% improvements in estimation over traditional models. The use of the BFGS training algorithm for ANN, and the RBF kernel function for SVR models are recommended as useful options for simulating hydrological phenomena.

Keywords: *Hydrometric station, heuristic models, kernel function, SVR, ANN*

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