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Rainfall–runoff modelling with data driven techniques: constraints and proper implementation

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Abstract Data driven models (DDMs) are widely recognized as being an important tool for decision support systems. Nonlinear time series techniques are widely applied in hydrological process analysis. DDMs are primarily based on observations and therefore they are sensitive to the strong autocorrelation of observed time series data. This constraint may worsen the forecasting accuracy. In this study, we address the effect of autoregressive components on nonlinear time series forecasting. The performance of Artificial Neural Networks (ANNs) and linear stochastic models in predicting runoff have been investigated for different time intervals. Adjacent differencing provides much better results with refined data and this is significant in extended forecasting horizons. We found that ANN performs slightly better than the linear models. This is because a single ANN model is not sufficient to predict all runoff generation instances.

Key words rainfall–runoff modelling; artificial neural networks; linear stochastic models; forecasting accuracy; data time interval