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Discrete wavelet transform coupled with ANN for daily discharge forecasting into Três Marias reservoir

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Abstract This paper proposes the use of discrete wavelet transform (DWT) to remove the high-frequency components (details) of an original signal, because the noises generally present in time series (e.g. streamflow records) may influence the prediction quality. Cleaner signals could then be used as inputs to an artificial neural network (ANN) in order to improve the model performance of daily discharge forecasting. Wavelet analysis provides useful decompositions of original time series in high and low frequency components. The present application uses the Coiflet wavelets to decompose hydrological data, as there have been few reports in the literature. Finally, the proposed technique is tested using the inflow records to the Três Marias reservoir in São Francisco River basin, Brazil. This transformed signal is used as input for an ANN model to forecast inflows seven days ahead, and the error *RMSE* decreased by more than 50% (i.e. from 454.2828 to 200.0483).

Key words wavelet; ANN; forecasting