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Hybrid deterministic – stochastic forecasting of monthly river flows of the Váh River

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Flows of the Váh River and its tributaries are predominantly fed by snowmelt in the spring and convective precipitation in the summer. Therefore their regime properties exhibit seasonal patterns. Moreover the left and right side tributaries of the Váh River spring in different physiographic conditions in the High and Low Tatry Mountains. This provided justification for the application of nonlinear regime switching models for forecasting of these time series. In the study the forecasting performance of regime switching nonlinear time series models was evaluated with respect to their capabilities of forecasting monthly flows of the Váh River at Liptovský Mikuláš in Slovakia. A water balance scheme was set up for the reservoir inflow, which consists of the linear combination of the measured tributary flows weighted by catchment area attributed to each tributary with measured flows according to the similarity of their physiographic conditions. SETAR type regime switching models were identified for each tributary and for the Váh River at Liptovský Mikuláš, respectively. Partial flow forecasts of the tributary flows by regime switching model were combined by the water balance model to a composed forecast of monthly flows in Liptovský Mikuláš. This hybrid (deterministic-SETAR) composed forecast, which preserves the specific regime of the tributaries and the water balance in the catchments, was compared with forecast of the SETAR model for the Váh River.