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A multimodel approach to interannual and seasonal prediction of Danube discharge anomalies

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Interannual and seasonal predictability of Danube river discharge is investigated using three model types: 1) time series models 2) linear regression models of discharge with large-scale climate mode indices and 3) models based on stable teleconnections. All models are calibrated using discharge and climatic data for the period 1901-1977 and validated for the period 1978-2008 .
Various time series models, like autoregressive (AR), moving average (MA), autoregressive and moving average (ARMA) or singular spectrum analysis and autoregressive moving average (SSA+ARMA) models have been calibrated and their skills evaluated. The best results were obtained using SSA+ARMA models. SSA+ARMA models proved to have the highest forecast skill also for other European rivers (Gamiz-Fortis et al. 2008).
Multiple linear regression models using large-scale climatic mode indices as predictors have a higher forecast skill than the time series models. The best predictors for Danube discharge are the North Atlantic Oscillation (NAO) and the East Atlantic/Western Russia patterns during winter and spring. Other patterns, like Polar/Eurasian or Tropical Northern Hemisphere (TNH) are good predictors for summer and autumn discharge.
Based on stable teleconnection approach (Ionita et al. 2008) we construct prediction models through a combination of sea surface temperature (SST), temperature (T) and precipitation (PP) from the regions where discharge and SST, T and PP variations are stable correlated. Forecast skills of these models are higher than forecast skills of the time series and multiple regression models.
The models calibrated and validated in our study can be used for operational prediction of interannual and seasonal Danube discharge anomalies.

References

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