Geophysical Research Abstracts
Vol. 21, EGU2019-15082-1, 2019
EGU General Assembly 2019

Analysis of seasonal hindcasts for mean-term hydrological forecasting in the Upper Danube River Basin

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In the last years, seasonal forecasts have become more and more relevant for estimating the climate of the next few months. Although the relative low resolution in climate models is still, among others, an important factor affecting the quality and skill of seasonal forecasts, they may provide valuable information for the proactive management of water resource, e.g. in the context of hydropower production or inland waterways transport.

The aim of seasonal runoff forecasting is to estimate the expected hydrological trends in comparison to a climatological reference or baseline. Here, the climatological reference could be based on the long-term values of (i) observed runoff of the past or (ii) the simulated runoff from the hydrological model of the past with different input data. The hindcast data are used to validate the forecast potential of the respective climate model in comparison with the aforementioned reference data.

A hindcast datasets of precipitation and temperature with 10 ensemble members are used as an input in the hydrological model COSERO to simulate daily runoff. The semi-distributed hydrological model covers the Upper Danube to Vienna and consist of 65 sub-catchments. The hindcasts are provided for a set of start days in the years 2002-2015, each hindcast covering 6 months. We analyse and evaluate these runoff hindcasts, on one side considering runoff values based on direct measurements or simulated runoff from high spatial resolution analysis data (SPARTACUS/HYRAS, 1 km grid spacing), and, on the other hand, compared to simulations obtained from reanalysis data (COSMO-REA6, 6 km grid spacing). Herewith we can identify the impact of spatial resolution of the meteorological input data on the model performance. In general, this procedure allows us to indirectly evaluate the potential of seasonal forecast, since the generation of the hindcast data is based on similar procedures.