



Impact of errors in the initial hydrologic conditions on seasonal hydrological predictions: the role of catchment properties

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Ensemble-based forecasting is a popular approach to seasonal hydrological forecasting, forcing the hydrological model with an ensemble of historical meteorological forcings (Ensemble Streamflow Prediction, ESP) or with ensemble forecasts produced by one or more dynamic climate models (multi-model approach). The aim of this work is to analyze the role of initial hydrologic conditions and seasonal climate forecast skill on the accuracy of seasonal hydrologic predictions as a function of catchment properties.

The modelling chain includes the Integrated Catchment-scale HYdrological Model (ICHYMOD) and multi-model ensemble climate predictions produced by the combination of two climate forecast systems: the NCEP CFSv2 and the ECMWF SEAS5. The climate forecasts are bias-corrected and verified against observational weather data.

The hydro-climatic prediction system is applied in two catchments in the upper Adige river basin (Eastern Italian Alps): the Gadera catchment at Mantana (area: 390 km², elevation range: 810–3050 m a.s.l.) and the Passirio catchment at Merano (area: 402 km², elevation range: 360–3500 m a.s.l.). The catchments are diverse in terms of orography and soil/groundwater storage capacity. The Gadera catchment is characterized by prevailing carbonate rocks and significant karst processes, implying high permeability, whereas the Passirio basin is characterized by more metamorphic formations, implying less permeable conditions. The diversity in catchment properties translates in differential parameterization of the subsurface processes in the hydrological model and in a differential impact of the initial hydrologic conditions on the seasonal runoff predictions.