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Influence of the quality of climate input on the performance of a MHM for several large catchments

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Macro-scale hydrological models (MHMs) are widely used to forecast water availability and flooding on regional to global scales. These models have attained a high level of process detail and spatio-temporal resolution yet their overall performance remains poor due to their dependence on the climate input. Reanalysis data, such as the ERA40 dataset (ECMWF), currently have spatial and temporal resolutions that make them acceptable as model input. The question is whether the enhanced climate input of the ERA40 dataset can raise the performance of MHMs. To this end, a MHM based on the HBV model was applied to a set of large catchments (>150,000 km^2) representing different physiographic settings. ERA40 climate input was used to evaluate the influence of enhanced climate data through a comparison of baseline scenarios against more advanced versions. Evaluated are the influence of evaporation and snowmelt for which the baseline scenarios consist respectively of the Penman-Montheith potential evapotranspiration and the algorithms of the HBV model. The better estimations of the evapotranspiration are taken directly from the ERA40 dataset. For snowmelt, both the snowmelt of the ERA40 dataset and the value from a detailed snowmelt model fed with ERA40 data were used. For all the simulations, model performance was established against time series of observed discharge in terms of the annual discharge volume, peak discharge volume and the time-to-peak.