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Impact of future climate change on hydrology from multiple climate scenarios in the Haihe River basin, northern China

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Climate change might lead to a significant impact on hydrological cycle and water resources system. The impact of future climate change on streamflow, evapotranspiration, and soil water are assessed by the Variable Infiltration Capacity (VIC) model using four GCMs as the inputs, in the Haihe River basin. Based on the model parameters calibration in 15 catchments in and around the HRB and parameters regionalization, the hydrological simulation for the whole HRB denotes good performance of the VIC model. Therefore, the VIC model is used as the assessment tool. Taking the period 1961–1990 as a baseline, the outputs from the GCMs indicate that the HRB will become warmer and wetter in the 21st century. There might be an increasing trend for the streamflow and evapotranspiration in the HRB under future climate change scenarios. For example, in 2020s the streamflow might increase by 28%. Monthly, the highest and lowest increasing trends for streamflow (evapotranspiration) are in summer (winter) and spring (summer), respectively. Spatially, the increasing trends for streamflow and evapotranspiration in the north HRB are higher than that in the south HRB. However there is not a clear temporal and spatial distribution of relative change for the soil water in the HRB. Due to the uncertainty from the climate scenarios, an important issue should be focused, that there is a great uncertainty for the impact on hydrological variables.