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# Comparison of the hydrological impact driven by RCM-, GCM- and NCEP- simulated and bias corrected precipitation

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Statistical downscaling methods are a common tool to compensate for the gaps between large-scale climate model simulations and station-scale observations. This study evaluates the performance of the raw precipitation from National Centers for Environmental Prediction (NCEP), outputs of Global Climate Model (GCM)-NorESM and corresponding Regional Climate Model (RCM)-the East Asian regional climate model driven by WRF model driven with NorESM. Meanwhile, their bias-corrected series by four different bias correction methods are simultaneously evaluated in order to find whether NCEP with observation coupled or RCM with modified spatial distribution of surface climate can have a better performance than GCM on analyzing hydrological impact. The Xin'anjiang lumped hydrological model is used to assess the hydrological impacts by simulating the streamflows in Xiangjiang basin with the corresponding observed, model-simulated and bias-corrected precipitation as input. The results show that hydrological simulations using the RCM and NCEP historical precipitation do not have a better agreement with observed runoff than using raw GCM data as input in this case study. However, when the raw precipitation of climate models is bias-corrected, an obvious improvement is obtained from all the climate models, and the bias-corrected RCM precipitation gives the best fitness in the runoff simulations. Comparing different bias correction methods with the same climate model, the method with occurrence and intensity adjustment outperforms other methods in the runoff simulation. It can be inferred that without bias correction, it can be hardly concluded that NCEP or RCM brings an improvement of precipitation simulation from GCM for driving hydrological models. However, the RCM precipitation corrected by a proper bias correction method provides better runoff simulation results over other climate datasets.