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Generation of Multi-model Ensemble Scenario Based on Hierarchical Bayesian Model

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Climate scenarios and associated applications in hydrologic studies have become an important research area and public interest during the last decades. Many agencies are developing climate models to simulate the current climate and its future changes under several greenhouse gas scenarios. Existing methods for climate change projections are generally based on multiple model ensembles of global circulation model (GCM), and a probabilistic approach considering the multiple models. This study proposes a Hierarchical Bayesian model for the distribution of precipitation and temperature for the 20th century and for the projected scenarios for the 21st century, the proposed model is mainly used to assess the uncertainties and develop multi-model ensemble climate change scenarios for control and scenario periods. The model combines observed rainfall and temperature data for the control period with different GCMs. This study was based on the existing works that are regarded one of the benchmarks for bias correction and model combination in this context. This model was extended in the framework of a Hierarchical Bayesian model (HBM) to simultaneously consider biases between the models and observations over the historical period and trends in the observations and models out to the end of the 21st century in line with the different multi-model simulations from the IPCC RCP scenarios.