Uncertainty assessment caused by GCMs selection on hydrologic studies

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Abstract

The present study is aimed to quantifying the uncertainty in the general circulation model (GCM) selection and its impacts on hydrology studies in the basins. For this reason, 13 GCMs was selected among the 26 GCM models of the Fifth Assessment Report (AR5) scenarios. Then, the climate data and hydrologic data with two Representative Concentration Pathways (RCPs) of the best model (INMCM4) and worst model (HadGEM2-AO) were compared to understand the uncertainty associated with GCM models. In order to project the runoff, the Precipitation-Runoff Modelling System (PRMS) was driven to simulate daily river discharge by using daily precipitation, maximum and minimum temperature as inputs of this model. For simulating the discharge, the model has been calibrated and validated for daily data. Root mean square error (RMSE) and Nash-Sutcliffe Efficiency (NSE) were applied as evaluation criteria. Then parameters of the model were applied for the periods 2011-2040, and 2070-2099 to project the future discharge the five large basins of South Korea. Then, uncertainty caused by projected temperature, precipitation and runoff changes were compared in seasonal and annual time scale for two future periods and RCPs compared to the reference period (1976-2005). The findings of this study indicated that more caution will be needed for selecting the GCMs and using the results of the climate change analysis.

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Keywords : GCM selection, Climate change, Uncertainty, PRMS model

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