Evaluating the utility of IPCC AR4 GCMs for watershed application in South Korea

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Understanding the uncertainty of climate models in space and time is necessary to help water resources managers and hydrologists in the selection of appropriate model for a specific application. In this paper, we use three separate methods to evaluate and compare the utility of 14 climate models for 7 basins on the South Korean Peninsula. On the one hand, the method of probabilistic uncertainty analysis is used to evaluate the capability of a General Circulation Model (GCM) in recognizing the extreme events by using an estimator. On the other hand, we use the statistical tests to examine the capability of a GCM in simulating quantitatively of each event by using the theories of correlation coefficient and root mean squared error. The results show that, for the first method, the larger size window is more significant in comparison with a smaller one, especially for monthly time scale. In addition, we find that, there are several GCMs showing good results for the probabilistic uncertainty test but poor results for the statistical test and conversely. Therefore, for an application of specific watershed and season, it is necessary to select the appropriate climate model for future water resources management. The results indicated quite clearly that, it is not easy to select an optimal climate model which can satisfy both applications using precipitation and temperature projections.