

Future projections of rainfall over North-East Bangladesh: Bayesian Model Averaging of Regional Climate Models

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Abstract: Climate change has the potential to strongly impact the diverse agricultural production of north-east Bangladesh. Previous studies have considered future climate change in this region using the results from the Coupled Model Inter-comparison Project 3 (CMIP3). The present study is heavily influenced by the two new data sources at our disposal. Firstly, we have spoken directly with the people in northeast Bangladesh. Their stories tell us that not only is the monsoon rainfall important, but also the pre-monsoon or summer rainfall between March-May. Secondly, we have access to regional climate model output initiated using the results from the Coupled Model Inter-comparison Project 5 (CMIP5). These sources of information enable us to update previous projections for northeast Bangladesh and to tailor the analysis to the people's expectations.

In this study, we assess the rainfall changes in the 2050s and 2080s using data from eight CORDEX-South Asia regional climate model simulations. These simulations were run using the CMIP5 models following representative concentration pathways 4.5 and 8.5. Our results are based on the mean of the model ensembles for both the monsoon and pre-monsoon seasons. We calculate this mean using the Bayesian Model average (BMA) method. The results from the BMA calculations for the 2050's, and 2080's are compared to the baseline period of 1971-2005. The results show that we can expect increasing pre-monsoon and monsoon rainfall with both increased frequency and intensity of extreme rainfall events.

Keywords: *Bayesian model averaging, CMIP5, CORDEX-South Asia RCM, RCP. Climate change, rainfall, extremes.*