

Evaluation of CORDEX South Asia Regional Climate Models and their ensemble mean in simulating rainfall of North-East region of Bangladesh using Bayesian approach

^{1,2}MD. Abul Basher,³A.K.M Saiful Islam,⁴Mathew Stiller-Reeve

This paper investigated the performance of Regional Climate Models (RCMs) used in Coordinated Regional Climate Downscaling Experiment over South Asia (CORDEX South Asia) domain in simulating rainfall of North-East region of Bangladesh for the period of 1975 to 2005. The simulated rainfall for individual model as well as for multi model ensemble mean were evaluated against observed data using Bayesian approach. In this approach, the probability distribution function (PDF) of ensemble mean is as the weighted average of conditional probability distribution function of individual model, where the weights are posterior probabilities of the models generating the forecasts and reflect the forecasts' relative contributions to predictive skill ranging from 0 to 1. The Bayesian method is applied on seasonal volume of rainfall to obtain weighting factor for each model for different season. Finally the weighted sum of all model provided the multi model ensemble mean. It is found that no particular model is performing better in every seasons of the year. The ESM and the CSM4 model is performing relatively better than others during winter (DJF) season while during pre-monsoon (MAM) the ACCESS, the CNRM5 and the GFDL model is comparatively better than others. During monsoon (JJAS), the MPI is performing far better than rest of all who's the weighting factor is 0.7. The ACCES is worst in depicting the post monsoon (ON) rainfall and rest of the model has almost equal contribution in generating ensemble mean. It is observed that multi model ensemble model mean estimated by Bayesian approach has lesser centered root mean square error (RMSE) and higher correlation with observed data than the contributing models for all four season. Among the four seasons, during monsoon, the multi model ensemble mean has relatively higher RMSE which meaning that the contributing models are relatively poor in simulating monsoon rainfall.

KEY WORDS: CORDEX, Regional Climate Model, Bayesian Approach, Predictive skill, Probability Distribution Function, Centered root mean square error.

¹Institute of Water and Flood Management, Bangladesh University of Engineering and Technology

²Sub-Divisional Engineer, Bangladesh Water Development Board

³Professor, Institute of Water and Flood Management, Bangladesh University of Engineering and Technology

⁴Uni Research Climate/Bjerknes Centre for Climate Research, Bergen, Norway