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Regional projection of Temperature for the 21st Century over the Eastern India

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Global as well as regional climate has changed due to human activities like land use changes, production of industrial effluents and other developmental activities of the society. The consequences of these changes have a massive impact on atmospheric events like precipitation, temperature etc. The rainfall and temperature are intrinsic parameters of hydrologic cycle. Consequently, these are also the major driving factors of change in hydrologic response due to climate change. Future temperature information is required at regional and basin scales for climate change studies. Therefore, in present study, daily maximum (Tmax) and minimum (Tmin) temperatures scenarios were developed from Multi-GCM ensemble (CanESM2, IPSL-CM5A-LR, MPI-ESM-LR, and CNRM-CM5 GCMs) using bias correction and spatial downscaling (BCSD) method at station scale for Kangsabati reservoir catchment and command, West Bengal, India. Subsequently, temperature intensity and frequency indices like extremes of maximum and minimum temperatures, consecutive hot days, consecutive cold days, and warming nights were analyzed. The GCM data for all the requisite variables corresponding to historic run (1971-2005) and future climate (2006-2100) were used under Representative Concentration Pathway (RCP4.5 and RCP8.5) emission scenarios. The results indicate significant increase in maximum and minimum temperatures in all seasons (pre-monsoon, monsoon, and post-monsoon), with the most significant increase occurring in pre-monsoon season, and for all the stations of the study area. The warming tendencies of maximum and minimum temperatures over the Kangsabati command area are projected as 0.20 and 0.22 °C/decade under RCP4.5, and 0.54 and 0.59 °C/decade under RCP8.5 for 2011-2100 period, respectively. Further, it is found that the temperature intensity and frequency indices will increase (maximum value of Tmax and Tmin, and minimum value of Tmax and Tmin, consecutive hot days, and warming nights) while consecutive cold days index will decrease in for both RCP8.5 and RCP4.5 scenarios. This may result in increase in evapotranspiration and heat stress to crops in Kangsabati command under future warming scenarios.