

Title: Compound Climate Extremes Under the Future Climate Change Scenarios: A Case Study of Chattogram City, Bangladesh(Article)

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Abstract

Waterlogging during the monsoon and water shortness during the pre-monsoon are increasingly affecting the socio-economic condition of Chattogram City. It is suspected that, climate change will lead frequent occurrence of compound climate extremes in future, which may result in greater destructions compared to those caused by individual extremes alone. Hence, it is of particular interest to predict the future climate more precisely. In this study our effort was to improve the understanding the effects of climate change on future compound climate extremes, the trends, variabilities and seasonal patterns. Here, we have evaluated CMIP5 and CMIP6 models from the high resolution bias corrected CORDEX data, and the best performing data sets (CanESM2, CSIRO and GFDL) were selected for the future climate change analysis. Using both RCP 4.5 and RCP 8.5 scenarios for 2021–

2060, and 2061–2099 period, significant upward trends were projected for the daily maximum and minimum temperatures. However, rainfall pattern showed more complex criteria for the future. The current study revealed that the warm and cold spell, as well as the wet and dry spell characteristics will be altered in the future. The joint analysis of future temperature and rainfall anomalies using copulas revealed two folds effects of climate change on the local hydrology. Projected decrease of rainfall while increase of temperature during the pre-monsoon season will potentially cause water scarcity. On the other hand, increase of extreme rainfall during the monsoon will complicate the waterlogging problems in Chattogram region. In this study, we have identified the time and the extent of combined temperature and rainfall anomalies, that can amplify the adverse impact on the hydro-climatology of Chattogram City. The insights gained from this study are crucial for effectively addressing and managing the complex future hydroclimatic challenges in this region. © 2025 Royal Meteorological Society.

Author keywords

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