Evaluation of Satellite and Reanalysis Precipitation Extremes over West Africa under Climate Change Using Ground-Based Observations

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West Africa's precipitation system is highly variable and strongly influenced by climate change, with significant implications for extreme rainfall events, flooding, and agricultural productivity. Accurate representation of precipitation extremes is a major challenge due to sparse observational networks and uncertainties in satellite and model-based estimates. This ongoing research evaluates the performance of satellite and reanalysis datasets in capturing precipitation extremes over West Africa using ground-based observations from the Global Historical Climatology Network Daily as reference. Daily precipitation dataset was collected from ERA5, GHCN, and climate projections from the Coupled Model Intercomparison Project Phase 6 (HIST, SSP245, and SSP585 scenarios) to account for present and future climate conditions. Performance evaluation using statistical metrics such as bias, correlation coefficient, and root mean square error, as well as extreme precipitation indices including maximum 1-day rainfall (Rx1day), consecutive wet days (CWD), and percentile-based thresholds. Preliminary result shows that satellite and reanalysis datasets are capable of reproducing large-scale precipitation patterns; however, uncertainties are anticipated in representing the intensity, frequency, and spatial distribution of extreme rainfall events, particularly during the West African monsoon. These inconsistencies may vary across climatic zones and are expected to be influenced by projected changes under future climate scenarios.

Keywords: Precipitation extremes, Satellite rainfall, Reanalysis, Climate change, Coupled Model Intercomparison Project Phase 6, West Africa.