

# Bias Correction of Global Ensemble Forecast System (GEFS) Precipitation Forecasts using AI/ML

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Accurate estimation of the extreme precipitation events is a significant hydrological challenge for water resource management. The conventional precipitation bias correction methods have limited abilities to provide accurate predictions of extreme precipitation events due to the lack of understanding of local hydrological effects and the limited availability of reliable observational data. The accelerating development of modern Deep Learning (DL) based models has attracted substantial attention as an alternative approach to process-based modeling for the water research applications. This study aims at improving Global Ensemble Forecast System (GEFS) precipitation forecasts using Deep Learning (DL) to support extreme hydrological events (e.g., heavy rainfall and flooding) over multiple complex terrain. We selected West Africa as an initial study area with an availability of 23 years (2000–2023) of precipitation data to assess the DL-based approach. The DL technique provides significant improvements in generating bias corrected GEFS weekly forecasts by substantially reducing systematic and random error. This bias correction approach can support the accurate characterization of error in predicting extreme precipitation, which is essential in the development of flood flow prediction algorithms. An expansion of this effort globally is discussed.