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Oral
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The pressing need for accurate forecasting of summer maximum temperature (Tmax) extremes arises from recent trends revealing a surge in both the frequency and severity of extreme heat events across the CONUS. This study delves into the reliability of predicting summer Tmax extremes across the CONUS on a sub-seasonal time scale. It specifically focuses on the NOAA NCEP GEFSv12 reforecast products, which furnish consistent data spanning from 2000 to 2019 with 5 ensemble members daily at 00 UTC, with predictions extending up to 16 days ahead, except on Wednesdays when 11 members are utilized, stretching forecasts up to 35 days. To enhance forecast precision, long-term reanalysis data rectifies biases from these reforecasts. Artificial Neural Networks (ANNs) are proposed as a more precise alternative to conventional bias correction methods, excelling in rapid data processing and learning relationships directly from existing data. A Hybrid statistical post-processing Technique (HPPT) combining ANNs and quantile mapping (QQ) approaches is introduced to predict daily Tmax and extremes across CONUS. This HPPT, leveraging deep learning techniques, is applied to GEFSv12 reforecast data and evaluated against CPC observation. Results demonstrate the HPPT's superior performance, showcasing the lowest bias and Root Mean Square Error, along with the notably high correlation coefficient and Index of Agreement. The HPPT significantly enhances prediction skills across all forecast lead times, outperforming ANN and QQ methods in predicting daily Tmax, including extreme Tmax during summer, on sub-seasonal time scales for both deterministic and ensemble probabilistic forecasts over CONUS.
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