

Improving Short to Medium Range Precipitation

Forecasts in India using Analog Approach

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Abstract

Reliable and accurate precipitation forecasts are needed for various disaster management and mitigation purposes such as flood prevention and warning, agriculture and irrigation scheduling, municipal water supply, reservoir management and drought management and mitigation. Precipitation forecasts from the state-of-the-art numerical weather prediction models (NWP) exhibit systematic biases and hence needs to be post-processed before being used for further applications. In this study, a simple analog method is implemented to post-process and downscale short to medium range precipitation forecasts from the Global Ensemble Forecast System (GEFS) forecasts for the entire Indian sub-continent. The analog method uses the current forecast information and searches for closely related forecasts within a specified search window in the hindcast data to produce an ensemble of precipitation forecasts. The analog forecasts from the GEFS data were evaluated against the observed gridded precipitation data from the Indian Meteorological Department using both deterministic and probabilistic matrices namely the Root Mean Squared Error (RMSE) and Brier Skill Scores (BSS), respectively. Further, the optimum window size and number of analogs at different lead times were also evaluated for the Indian region. Results found that the analog post-processing method considerably improves short range (1-3 day) GEFS forecasts over India. Comparison with raw GEFS forecasts across different regions suggest that the analog method was able to provide skillful precipitation forecasts in the Mahanadi region and the Indo gangetic plains. Seasonal analysis also showed that the analog method performed particularly well during the summer season. Further results suggest that lesser number of analogs are sufficient for generation of skillful short lead time forecasts while more number of analogs only slightly improve the forecast skill.