Verification of Medium Range Probabilistic Rainfall Forecasts over India

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Abstract: Forecasting rainfall in the tropics is a challenging task further hampered by the uncertainty in the numerical weather prediction (NWP) models. Ensemble prediction systems (EPS) provide an efficient way of handling the inherent uncertainty of these models. Verification of forecasts obtained from an EPS is a necessity, in order to build confidence in using these forecasts. This study deals with the verification of the probabilistic rainfall forecast obtained from the National Centre for Medium Range Weather Forecasting (NCMRWF) Global Ensemble Forecast system (NGEFS) for three monsoon seasons i.e., JJAS 2012, 2013 and 2014. Verification is done based on the Brier Score (BS) and its components (reliability, resolution and uncertainty), Brier Skill Score (BSS), Reliability Diagram, Relative Operating Characteristic (ROC) curve and Area under the ROC (A_{ROC}) curve. Three observation data sets are used (namely, NMSG, CPC-RFE2.0 and TRMM) for verification of forecasts and the statistics are compared.

BS values for verification of NGEFS forecasts using NMSG data are the lowest, indicating that the forecasts have a better match with these observations as compared to both TRMM and CPC-RFE2.0. This is further strengthened by lower reliability, higher resolution and BSS values for verification against this data set. The ROC curve shows that lower rainfall amounts have a higher hit rate, which implies that the model has better skill in predicting these rainfall amounts. Th*e reliabili*ty plots show that the events with lower probabilities were under forecasted and those with higher probabilities were over forecasted. From the current study it can be concluded that even though NGEFS is a coarse resolution EPS, the probabilistic forecast has good skill. This in turn leads to an increased confidence in issuing operational probabilistic forecasts based on NGEFS.