Prediction skill of rainstorm events over India in the TIGGE weather prediction models

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Abstract: Extreme rainfall events pose a serious threat of leading to severe floods in many countries worldwide. Therefore, advance prediction of its occurrence and spatial distribution is very essential. In this paper, an analysis has been made to assess the skill of numerical weather prediction models in predicting rainstorms over India. Using gridded daily rainfall data set and objective criteria, 15 rainstorms were identified during the monsoon season (June to September). The analysis was made using three TIGGE (THe Observing System Research and Predictability Experiment (THORPEX) Interactive Grand Global Ensemble) models. The models considered are the European Centre for Medium-Range Weather Forecasts (ECMWF), National Centre for Environmental Prediction (NCEP) and the UK Met Office (UKMO). Verification of the TIGGE models for 43 observed rainstorm days from 15 rainstorm events has been made for the period 2007ï 2015. The comparison reveals that rainstorm events are predictable up to 5 days in advance, however with a bias in spatial distribution and intensity. The statistical parameters like mean error (ME) or Bias, root mean square error (RMSE) and correlation coefficient (CC) have been computed over the rainstorm region using the multi-model ensemble (MME) mean. The study reveals that the spread is large in ECMWF and UKMO followed by the NCEP model. Though the ensemble spread is quite small in NCEP, the ensemble member averages are not well predicted. The rank histograms suggest that the forecasts are under prediction. The modified Contiguous Rain Area (CRA) technique was used to verify the spatial as well as the quantitative skill of the TIGGE models. Overall, the contribution from the displacement and pattern errors to the total RMSE is found to be more in magnitude. The volume error increases from 24 hr forecast to 48 hr forecast in all the three models.