Performance of NCUM global weather modeling system in predicting the extreme rainfall events over the central India during the Indian summer monsoon 2016

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Abstract: Indian summer monsoon shows predominant intraseasonal variability with extremes such as droughts and floods being a part of its natural variability. In this aspect, forecast from the National Centre for Medium Range Weather Forecasting (NCMRWF) based global model (NCUM) with 17 km horizontal resolution is examined to understand the synoptic features associated with the heavy rainfall events during 2016 summer monsoon over central India. As 2016 monsoon brought anomalous rainfall over central India resulting flood in many parts of east and west Madhya Pradesh, the analyses concentrate on two active phases of summer monsoon i.e. 2nd July 2016 to 13th July 2016 and 2nd August 2016 to 7th August 2016. The frequencies of occurrence of such extreme events are compared with the observations and it is found that the model has a reasonable skill while simulating these extreme events with a less bias and a high correlation. However, NCUM could successfully forecast several extreme rainfall events with a lead time of 5 days (up to Day-5 forecast) and the spatial correlation indicate that the forecast skill of the NCUM is reasonable for Day-1(correlation is 0.8), and the skill decreases very fast by Day-5 as the correlation coefficient shows very less (0.3). Also, NCMRWF analysis and model forecast at 850hPa and 500hPa level for wind and moisture transport are used in this study to examine the huge amount of moisture with stronger winds are transported from Arabian Sea and Bay of Bengal to the Indian land region leading to the extreme rainfall events.