Simulation of Indian Monsoon Extreme Rainfall Events During the Decadal Period of 2000-2009 Using a High Resolution Mesoscale Model

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Understanding and prediction of Indian Summer Monsoon (ISM) Rainfall and its variability are an important issue for the research community, public as well as the government. During the ISM period many studies reported the occurrence of extreme rainfall events on certain days, considered to be major disaster events. Prediction of these events is important with accuracy to minimize the loss of life and damage to property. High resolution mesoscale models are the useful tools as they help to improve the forecasting skill on temporal and spatial scales.

In this study, a high resolution Weather Research Forecasting (WRF) model developed by NCEP/NCAR, USA was used, at a resolution of 27 km covering the Indian monsoon region, to simulate the spatial and temporal distribution of rainfall and to further analyze the extreme rainfall events. The model was integrated continuously for five months duration, starting from 1 May to 30 September, for the past 10 years starting from the year 2000 to 2009 using NCEP reanalysis data available at 2.5 degree resolution to provide the initial and boundary conditions.

For each year, the model derived rainfall distribution over different parts of the Indian sub-continent was analyzed and compared with the IMD gridded rainfall data. The area averaged daily rainfall (100km X 100km) for 4 zones over west coast of India, 3 zones over North Eastern parts and 3 zones over central parts of India were computed and compared with the corresponding IMD gridded rainfall data. Statistical analyses, such as RMSE, BIAS, CORRELATION COEFFICIENT, EQUITABLE THREAT SCORE were computed. The model results show very good correlation with the observations and the model was able to simulate the extreme rainfall events.

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