

## **Short-Range Prediction of Monsoon Precipitation by NCMRWF Regional Unified Model with explicit convection**

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**Abstract:** There are increasing efforts towards the prediction of high impact weather systems and understanding of related dynamical and physical processes. High resolution numerical model simulations can be used directly to model the impact at fine-scale details. Improvement in forecast accuracy can help in disaster management planning and execution. National Centre for Medium Range Weather Forecasting (NCMRWF) has implemented high resolution regional unified modelling system with explicit convection embedded within coarser resolution global model with parameterized convection. The models configurations are based on UK Met Office Unified seamless Modelling system. Recent Land use/ Land cover data (2012-2013) obtained from Indian Space Research Organisation (ISRO) are also used in model simulations. Results based on short range forecast of both the Global and Regional models over India for a month indicate that convection permitting simulations by the high resolution Regional model is able to reduce the dry bias over southern parts of West Coast and monsoon trough zone with more intense rainfall mainly towards northern parts of monsoon trough zone. Regional model with explicit convection has significantly improved the phase of the diurnal cycle of rainfall as compared to the global model. Results from two monsoon depression cases during study period show substantial improvement in details of rainfall pattern. Many categories in rainfall defined for operational forecast purposes by Indian forecasters are also well represented in case of convection permitting high resolution simulations. For the statistics of number of days within a range of rain categories between -No-Rain to -Heavy Rain, the regional model is outperforming the global model in all the ranges. In the very heavy and extremely heavy categories, the regional simulations show overestimation of rainfall days. Global model with parameterized convection have tendency to overestimate the light rainfall days and underestimate the heavy rain days compared to the observation data.

**Keywords:** Indian monsoon, diurnal rainfall, extreme rainfall, seamless weather prediction, convection-permitting simulations, GPM, ISRO Lu/Lc