Skill of short- to medium-range monsoon rainfall forecasts from two global models over India for hydro-meteorological applications

Satya Prakash, Ashis K. Mitra, I. M. Momin, and E. N. Rajagopal
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Abstract: The South Asian region is dominated by summer monsoon rainfall which, in many epochs is associated with severe floods leading to socio-economic losses. In India, areas with high   population are exposed to heavy rainfall events and associated risks. Indian monsoon rainfall   simulation and prediction at various space and time scales are challenging scientific tasks for the weather/climate modelling community. Skilful short- and medium-range predictions of rainfall from global numerical models during the monsoon are highly desirable for various hydro meteorological applications, including flood forecasting. In recent years, higher resolution global advanced assimilation-forecast systems have resulted in improved medium-range rainfall forecasts. These model rainfall forecasts potentially could be used in hydro-meteorological applications including water-related disaster management/planning. In this study, deterministic rainfall forecasts from two state-of-the-art global models (NCEP and Met Office) are evaluated against observed rainfall for the Indian monsoon season. Objective skill scores such as mean, bias, correlation coefficient, mean absolute error, and root-mean-square error from Day 1 through Day 5 are examined for the monsoon season over India and at seven major river basins within India for 2013. It is seen that both the models have useful skill for different regions and basins. For the Indus and Krishna basins, even the Day 5 forecasts are seen to be skilful. It is seen that the Met Office Day 5 forecasts are generally more skilful at all seven river basins. Finally, rainfall forecasts from the latest higher resolution Met Office global Unified Model (implemented in July 2014) are compared with its immediate predecessor to document any further improvement during monsoon period over India. It is seen that, in medium-range, the newer version of Met Office model simulates Indian monsoon rainfall more realistically with much reduced biases in the core monsoon trough region.