Forecasting of Karnataka monsoon rainfall for the year 2011

Decomposition of monsoon rainfall time series into mutually uncorrelated intrinsic mode functions (IMF) has distinct advantages in empirical forecasting of rainfall quantity ahead of the season[1]. The attractive feature of this approach is its ability to separate out the nonlinear (non-Gaussian) and the linear (Gaussian) parts of the data as uncorrelated narrow-band processes for further modelling. In a previous correspondence we communicated the application of this approach for advance statistical estimation of all India rainfall[2]. The performance of the method on regional scale rainfall data showed lower forecast efficiency due to increase in variance, lack of stationarity and strong non-Gaussianness of the first and second IMF[3]. Recently we have revisited these issues to improve the previous efforts and developed a composite artificial neural network model for the sum of the first two IMF, with the remaining data being linear. It is found that at least 100 year data up to the immediate past year is required to account for non-stationarity in forecasts. Very recently, the official monsoon seasonal data series for subdivisions are updated to include the year 2010 at the website www.tropmet.res.in of the Indian Institute of Tropical Meteorology. This provides an opportunity for us to report our forecast results for the current monsoon season (June–September 2011) for Karnataka categorized into three subdivisions, namely Coastal Karnataka (32-COKNT), North Interior Karnataka (33-NIKNT) and South Interior Karnataka (34-SIKNT). To show the performance of the IMF method, the actual value and our forecast are shown as percentage deviations from the long-term average (LTA), also known as the normal. The mean and standard deviation of the forecast random variable are compared with LTA in Table 1. A comparison between the actual observation and one-step-ahead forecast is shown in Figure 1 in terms of percentage departure from the normal. This figure also shows how the method has performed in the past decade. Because the model accounts only for inter-annual variability, it will not be able to capture strong within-season fluctuations. The year 2005 of SIKNT is a case in point, where the forecast is quantitatively not satisfactory. We hope by analysing monthly time series, instead of seasonal series, reliable statistical forecasts can be provided on regional scale ahead of the season.

Table 1. Long term averages and forecast for 2011

Subdivision	m_R cm (1901–2010)	σ_R cm (1901–2010)	m_f cm Forecast for 2011	σ_f cm Standard error of forecast	Forecast % departure from normal
32-COKNT	286.39	47.53	315.66	15.66	10.2
33-NIKNT	59.83	11.88	57.77	4.23	–3.4
34-SIKNT	50.44	9.77	58.36	3.36	15.7

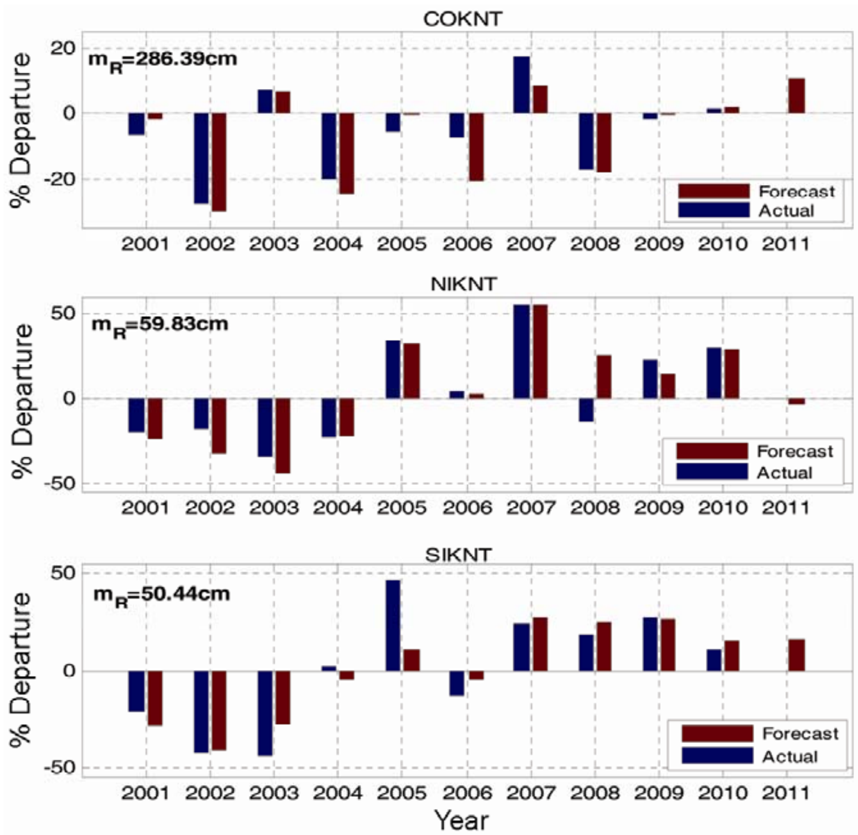

Figure 1. Percentage departure from normal rainfall and one-step-ahead point forecast (2001–2011).

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3. Iyengar, R. N. and Raghu Kanth, S. T. G., *Curr. Sci.*, 2006, **91**, 350–356.

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