

L E T T E R S

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SOME CLIMATOLOGICAL FEATURES OF ONSET DATES OF SOUTHWEST MONSOON OVER KERALA & 3 METEOROLOGICAL SUBDIVISIONS OF THE NE INDIA

1. Onset of South West (SW) monsoon over any region of India is the most spectacular event since it marks the commencement of the monsoon rains. For a given year, the onset dates for various meteorological subdivisions are determined on operational basis taking into consideration the increase in rainfall and moisture, decrease in maximum temperature, overall change in flow pattern and prevalence of what is known as monsoonish weather. Subsequently, after the monsoon season, these onset dates as obtained on operational mode are re-examined on hindsight to finalise the onset dates of a particular year over various meteorological subdivisions. These final dates of monsoon are also published in Mausam as isochrone maps (e.g. Jayanthi, *et al.*, 2005). The onset dates for Kerala and 3 meteorological subdivisions of the North East (NE) India from 1941 to 2000 have been used in this study to bring out major features of their variability and trend. The features of onset dates have been studied by splitting the data set into two time slots, of 30 years each, viz., 1941-70 and 1971-2000.

2. The onset dates over Kerala and 3 meteorological subdivisions of the NE India from 1941 to 2000 have been collected from Indian Daily Weather Reports (IDWR), Weekly Weather Reports (WWR) and various monsoon reports published by the India Meteorological Department. The mean onset dates along with their standard deviation have been calculated for the period of study in two 30 years' blocks of data, from 1941 to 1970 and from 1971 to 2000. These mean dates have been compared with the existing normal along with significant test for deviations. The standard deviations calculated and the mean onset dates for the last century have been obtained.

2.1. Significant test for trend analyses have been carried out employing Mann-Kendall and Spearman rank statistics. Decadal variations have been studied after obtaining the decadal means. Epochal variations have been obtained by utilizing both 11-years' running mean and by least square fitting of sixth order polynomial.

3. Table 1, shows the difference of mean onset dates and standard deviations and the results of trend analyses over Kerala and 3 sub-divisions of the NE India.

TABLE 1

Difference of mean onset of SW monsoon from normal, their standard deviation and trend

Sub-divisions	Difference [days of mean from existing normal (1941-2000)]		Standard deviation (days)		Trend (1941-2000)
	1941-1970	1971-2000	1941-1970	1971-2000	
	2. Arunachal Pradesh	1	1	8	
3. Assam & Meghalaya	4**	3**	7	6	D*
4. Naga, Mani. Mizo.& Trp.	5**	2*	7	6	D**
34. Kerala	1	2	8	6	I

* & ** : Significant at 5% & 1%, respectively.
D & I : Decreasing & increasing, respectively.

Results of decadal and epochal variations are shown in Fig. 1.

These graphics indicate a sharper decreasing values of onset dates with earlier onset over the NE India as than that over Kerala. Generally, the decreasing trend and lower mean values of onset dates are statistically significant (Table 1). The standard deviation is slightly higher in the first half of the study period than the second half indicating higher variability in the first half. Examination of the polynomials and decadal mean values suggest a periodicity of about 30 years over all the meteorological sub-divisions. This is in conformity with earlier studies by Thapliyal and Kulshreshtha (1991), Hasternath and Greicher (1993), Krishnamurthy and Goswami (2000), Rajendra Kumar and Dash (2001), Mazumdar *et al.* (2001) etc. reporting the presence of 30 years' periodicity in various monsoon parameters.

3.1. For India as a whole, onset of monsoon starts from Andaman & Nicobar Islands. But the onset over Kerala receives wider attention, since this region is considered to be the entry point for the monsoon to the mainland of the country. In last decade, 1991-2000, it is seen that more frequent (4 occasions) onset occurred over NE India earlier than that over Kerala. It may be mentioned that the 50 years' period from 1941 to 1990, monsoon arrived over NE India earlier than Kerala on only one occasion (1972). This increased frequency of onset over NE India before Kerala is, perhaps, because of

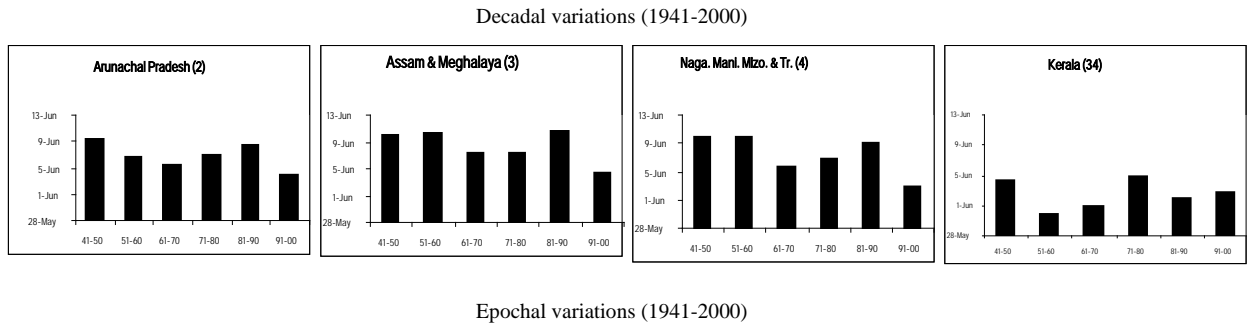


Fig. 1. Results of decadal & epochal variations (1941-2000)

the decreasing trend of onset dates in the northern parts and increasing trend over the southern parts and a very small difference of a few days in the normal onset dates between these regions. If these trends continue, onset over NE India may assume greater importance than that of Kerala in future. It may be mentioned that trend analyses of sea surface temperature show significant increasing trend during June over North Bay of Bengal (Sinha Ray *et.al.* 2000).

4. Analyses of onset dates over Kerala, Arunachal Pradesh, Assam & Meghalaya, Nagaland, Manipur, Mizoram & Tripura from 1941 to 2000 show that:

(i) In general the monsoon onset has been slightly later than normal during the period of study.

(ii) The first half of the study period (1941-1970) show more variability than the second half (1971-2000).

(iii) Decadal and epochal variations are similar with lower values in 50s/60s and higher values in 70s/80s with a general increasing trend in early 40s, 60s and early 70s and decreasing trend in late 40s, 50s and 80s and 90s. Such variations also reveal a periodicity of about 30 years over these subdivisions.

(iv) Decreasing trend is seen since seventies over Kerala but the same is from eighties over the NE India.

(v) Of late the gradient of decreasing trend is higher over the NE India than over Kerala. If such trend

continues the frequency of onset occurring over the NE India before that over Kerala may increase in future.

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(7 March 2008)
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