International Journal of Applied and Pure Science and Agriculture
ISSN Online - 2394-5532 Impact Factor : 4.446 by SJIF ISSN Print - 2394-823X

INTER ANNUAL VARIABILITY OF ONSET DATES OF SOUTH WEST MONSOON OVER KERALA DURING 1975-2013

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Abstract
Using the rainfall from a dense rain gauge network, dates of south west monsoon over South Kerala and North Kerala have been derived on the basis of objective criteria for the years 1975 to 2013. These dates have been compared with onset dates records of Indian Meteorological Department. Statistical analysis of onset dates is presented. According to IMD criteria the normal onset of monsoon over kerala is June 1st but due to the climate variation we are observing early onset as well as late onset of south west monsoon.
Key words: Onset, South West Monsoon, South Kerala, North Kerala, Climate change.

I. INTRODUCTION

Onset dates of south west monsoon over India are a very important event because its activity over the country is very useful to farmers and Indian economy. Under the region of Kerala which experiences first burst of monsoon over the main land [1]. The onset of south west monsoon over the extreme tip of Indian Peninsula and its northward progress across the country is of considerable interest, since agricultural planning and economy of India are very closely linked with south west monsoon. Monsoon first sets in Kerala coast before advancing into the main land of India. Transition from winter to summer type conditions, across peninsula occurs by the middle of March at surface and the transition moves up with time. Monsoon first sets in Kerala coast before advancing into the main land of India. It is therefore important to study activities over south peninsular India during pre-monsoon months to investigate their possible linkage with onset event. Monsoon onset is recognized as a rapid substantial and sustained increase in rainfall. For declaring the onset of monsoon over Kerala, meteorologists generally use the criteria suggested by Anathakrishnan [1]. The reversal of land-sea thermal contrast associated with large temperature increase over the Tibetan Plateau in May-June acts as climate driver of the Indian summer monsoon onset [2]. Indian meteorologists conventionally identify the date of onset over Kerala coast based on sharp increase and characteristic persistency of rainfall [3].

II. DATA AND METHODOLOGY

Onset data for the study has been collected from IMD Pune. In Kerala many small numbers of observatory stations and network of rain guage stations which have been extence from the end of last century. It helps to identify the behaviour of mean monthly rainfall of Kerala utilizing the data from the network in relation to the monsoon onset. The dates of monsoon onset over South and North Kerala were fixed for the individual years from 1975 to 2013. The pooled data were then analysed for various fundamental statistics such as mean (normal) and standard deviation (STDEV).

III. LOCATIONAL DESCRIPTION

3.1 Locational classification of Kerala

On the basis of onset date of south west monsoon Kerala region can be mainly divided into two South Kerala and North Kerala.

3.1.1 South kerala

1. Thiruvanathapuram
2. Kollam
3. Pathanamthitta
4. Alappuzha
5. Ernakulam
6. Trissur
7. Palakkad
8. Idukky
9. Kottayam
10. Malappuram

3.1.2 North Kerala

1. Kozhikode
2. Wayanadu
3. Kannur
4. Kasargode

IV. RESULT AND DISCUSSION

4.1 Inter annual variability of onset dates of south west monsoon over Kerala during 1975 to 2013

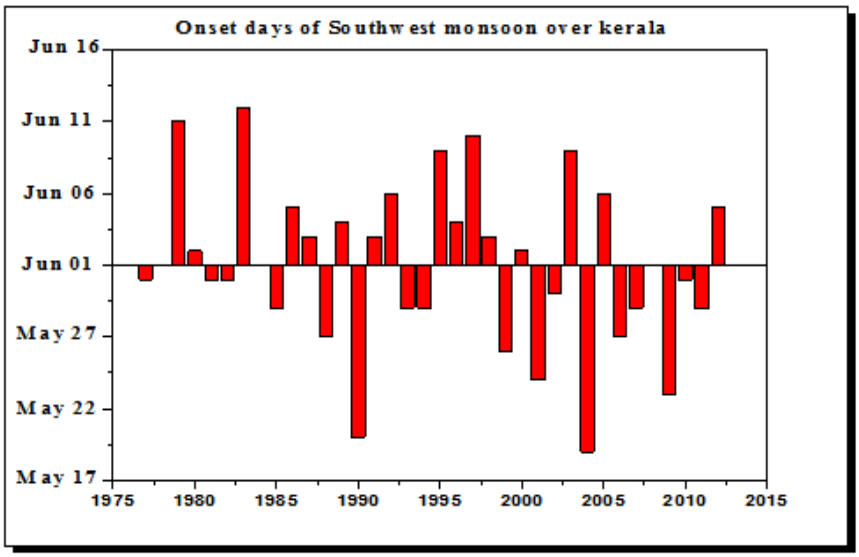

Figure1. Inter annual variability of onset date over Kerala

Figure1, shows the inter annual variability of onset date of south west monsoon over Kerala. The Onset data are taken by Indian Meteorological Department during 38 year period of 1975 to 2013. The mean onset date is June 1st and standard deviation of 5.5 days. From this analysis it is clearly evident that 2004 shows an early onset of 19th May and 1983 shows the maximum delayed onset as on 12th June. It is clearly seen that during 1975, 1976, 1984 and 2008 monsoon onset is as June 1st, but after that there is typical variation on the onset days. In the figure it is shown that 1978, 1979,1980, 1983,1984, 1986, 1989, 1991, 1992, 1995, 1997, 1998, 2000, 2003, 2005, 2012, and 2013 these years shows late onset of monsoon over Kerala. Similary 1977, 1981,1982,1985,1988, 1990, 1993, 1994, 1999, 2001, 2002, 2004, 2006, 2007, 2009 and 2011 these years shows early onset of monsoon. South west monsoon sets in Kerala normaly on June 1st standard deviation is 8days. Long range prediction of onset date is important in view of its relavance in agricultural planning [4]. Based on the analysis of sea- surface temperature field hypothesized that the delay of monsoon onset is due to warm anomalies over the equatorial central Pacific Ocean causing a delay in the shifting of convection from the equatorial Western Pacific to the north Indian Ocean [5] .

4.1.2 Mean and Standard deviation of Onset dates from 1975 to 2013

Table 1. Mean and standard deviation of onset dates

Parameter	South kerala	North kerala	IMD
Mean date	May 29	June 2	May 31
Standard deviation	6	5.5	6.7
Earliest Onset date	18 May	20May	19 May
Latest Onset date	12 June	16 June	12 June

From table 1, it is clear that the thirty eight year onset dates of mean and standard deviation. The earliest date of south west monsoon is 18 May 2004 and North Kerala is 20 May 1990. Here IMD recorded the earliest onset date is 19 May 2004. Similarly, the latest onset date recorded the South Kerala is 12th June 1983 and North Kerala16th June 1983, IMD recorded the latest onset date is 12th June on 1983.

4.1.3 Out of 38 Years (1975-2013) number of onset years in 3- day interval

Table 2 Number of Onset years in 3 day interval

Interval	South Kerala	North Kerala	IMD	Interval	South Kerala	North Kerala	IMD
May 17-19	2	0	1	June 1-3	6	5	7
20-22	0	1	1	4-6	5	9	5
23-25	3	2	2	7-9	2	3	1
26-28	9	3	4	10-12	2	3	2
29-31	7	6	12	13-15	0	1	1
				16-18	0	1	0
Total	21	12	21		15	22	16

Table 2, gives the number of onset years in 3- day intervals for South and North Kerala through May and June. For the 38-year period the onset dates are equally distributed between May and June for South Kerala & North Kerala the corresponding numbers are in the ratio 3:5.

V. CONCLUSION

Onset days of South west monsoon over Kerala is clearly evident that 2004 shows an early onset of 19th May and 1983 shows the maximum delayed onset as on 12th June. It is clearly seen that during 1975, 1976, 1984 and 2008 monsoon onset is as June 1st, but after that there is typical variation on the onset days. According to IMD criteria the normal onset of monsoon over Kerala is June 1st but due to the climate variation we are observing early onset as well as late onset of South West monsoon. Out of 38 year study only 10.5% of the total period fall under normal onset of the monsoon and remaining 89.5% falls under abnormal onset of monsoon.

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