

Monsoon Onset over Kerala and Pre Monsoon Rainfall Peak

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Abstract: In the present study, we have used the pentad Global Precipitation Climatology Project (GPCP) estimate, which is a blended product of microwave, infrared and in-situ gauge data for the region bounded by 8° - 13° N; 70° - 95° E, from 1st March to 31st May for the years 1979 to 2001. The monsoon onset dates over Kerala, as declared by India Meteorological Department has been used in the present study. For each year, the midday of the pentad with the rainfall peak was looked for in the period from 1st April to 10th May and identified as the Pre Monsoon Rainfall Peak (PMRP). The analysis showed that PMRP exists about seven pentads prior to the onset of the monsoon over Kerala coast. The correlation between PMRP date and the monsoon onset date over Kerala was found to be 0.72 which was statistically significant. Thus, we feel that the pre monsoon rainfall estimate, from the satellite data can be used for predicting the monsoon onset over Kerala coast. The results and the methodology used are briefly presented.

Key words: Pre monsoon, rainfall, Onset, Kerala coast, Satellite data

1. Introduction

The summer monsoon (June to September) rainfall contributes to about 60-90% of the mean annual rainfall for most of the meteorological subdivisions of the Indian sub-continent. The Indian economy and agriculture are primarily dependent on this monsoon rainfall.

One monsoon defers from another one in several aspects, the most important three aspects are the following:

- Onset of monsoon over Kerala Coast
- Quantum of monsoon rainfall
- Monsoon activity within the monsoon life cycle (onset, active, weak, break, withdrawal conditions)

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In the present article we are basically dealing only with the first aspect, namely the monsoon onset over Kerala coast (MOK).

2. Data and Methodology

The Global Precipitation Climatology Project (GPCP) was established by the World Climate Research Program (WCRP (1986), Arkin and Xie, 1994) in 1986 to address the problem of quantifying the distribution of precipitation over the whole globe. The general approach of the project is to combine the precipitation information available from each source into a final merged product, taking advantage of the strengths of each type of data. The microwave estimates are based on the Special Sensor Microwave/Imager (SSM/I) data from the Defense Meteorological Satellite Program (DMSP, U.S) and the infrared estimates are primarily obtained from geostationary satellites operated by U.S, Europe and Japan and secondarily from polar orbiting satellites (Huffman et al., 1997). The data from the Indian National Satellite (INSAT), which is a geostationary satellite, has not gone into this dataset. The gauge data are assembled and analyzed by the Global Precipitation Climatology Centre (GPCC) of the Deutscher Wetterdienst.

We have analysed the pentad values of the GPCP data for the period of months from 1st March to 31st May for the years 1979 to 2001 and identified the Pre Monsoon Rainfall Peak (PMRP) for the area bounded by the region 8°N – 13°N ; 70° - 90°E.

3. Results and Discussion

Joseph and Pillai (1988) using the weekly rainfall data of the meteorological subdivisions south of 13°N from 1 March to 31 May for the years 1960 to 1984 have found that there is a Pre Monsoon Rainfall Peak about six weeks prior to the onset of summer monsoon over Kerala. An analysis of the PMRP and the onset dates yielded a correlation coefficient of 0.87, which was statistically significant. In the present study, we have used GPCP data which is well distributed in both space and time as compared to Joseph and Pillai (1988) as they have only one value for the meteorological subdivision for one week, here we have one value for each of the 2.5° X 2.5° latitude and longitude grid for every pentad.

Our present analysis yielded a correlation coefficient of 0.72 between the PMRP values obtained from the satellite data and the monsoon onset dates for the period 1979 to 2001. The maximum difference between the MOK and the estimated MOK was for the years, 1983 (9 days), 1979 (8 days) and 1988 (-8 days) and 2001 (-6 days).

4. Conclusion

The Pre Monsoon Rainfall Peak exists about seven pentads prior to the onset of monsoon over Kerala. Further, it can be seen from the above study that the satellite derived rainfall estimate has a potential to predict the monsoon onset over

Kerala. The correlation coefficient between the observed monsoon onset over Kerala and the estimated MOK is 0.72 which is highly statistically significant. The most interesting aspect is that no INSAT or land or island station data from the Indian subcontinent has gone into GPCP.

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