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Letters to the Editor

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A STUDY OF TWENTY YEARS TEMPERATURE DATA OF INDIAN STATIONS AT 700, 500 AND 300 MB FOR JUNE ASSOCIATED WITH BREAK MONSOON IN JULY

Twenty years (1961-1980) temperature data of Indian stations for June at 700, 500 and 300 mb are studied. It is observed that, in June, at 300 mb there is a weak thermal high along 25°N over India; it is distorted in the years having long break monsoon in July by intrusion of cold air from south over central India.

2. Long break-monsoon spells during July and August have been one of the main causes of large scale monsoon rainfall deficiencies. Rao (1962), Ramamurthi *et al.* (1965), Raman *et al.* (1965), Ramaswamy (1965) and Ramamurthy (1969) have given the details of the flow patterns during break monsoon period. George Alexander *et al.* (1978) constructed the anomaly charts of wind and thermal fields by removing the long term climatological mean monsoon from daily observations. They showed that a couple of days prior to the beginning of break monsoon an anomaly ridge extends from Peninsular India to Malaysia in the lower and middle troposphere. In the upper troposphere an anomaly trough (with below normal temperature) is seen to the northwest of India. Joseph (1978) found that during the years of long break monsoon spells like 1965, 1966, 1972, the sub-tropical westerlies of the upper troposphere seem to protrude more southwards into the area immediately west of India during the monsoon season. This feature was prevailing right from preceding winter.

In the present study we have compared the composite of temperature field, at 300 mb level, for the month of June of (*i*) the years having long spells of break monsoon in July and (*ii*) the years having no break monsoon, with the mean temperature field of 20 years (1961-1980).

3. *Data*—*"Monthly climatic data for the world"* published by Environmental Services, Department of Commerce, Washington, USA, is the source of data. The composite of mean temperature field for June at 300 mb level for 3 break monsoon years, *viz.*, 1966, 1972, 1979; for 3 non-break monsoon years, *viz.*, 1967, 1968, 1976 and for the years 1961-1980 have been prepared and are shown in Fig. 1.

Similarly the composition of mean flow patterns at 300 mb for the month of June for break (1966, 1972, 1979) and non-break monsoon years (1967, 1968, 1976) and for the years 1961-1980 have been prepared and are shown in Fig. 2.

4. *Discussion*—'Break in monsoon' is referred to a synoptic situation when the monsoon trough is located close to the foot of the Himalayas which leads to striking decrease of rainfall over most of the country but increase along the Himalayas and parts of northeast India and southern Peninsula.

There was long break monsoon from 2 to 11 July in 1966, from 17 July to 4 August in 1972 and in 1979 break was from 17 to 23 July. In the years 1966, 1972 and 1979 failure of monsoon rains occurred. The years 1967, 1968 and 1976 were having no break monsoon conditions and they had good monsoon rains.

4.1. *Temperature field in June*

Fig. 1 shows that at 300 mb on an average based on 20 years data (1961-1980), there is a weak thermal high over India along 25° N in the month of June. The temperature is decreasing towards north as well as towards south of 25° N. The temperature gradient is, however, less southwards than northwards. At 500 mb and 700 mb levels (not presented here) also this weak high is persisting but it is weaker.

At 300 mb level, the average temperature field for the years having break monsoon in July, appears to be quite distorted as compared to the twenty

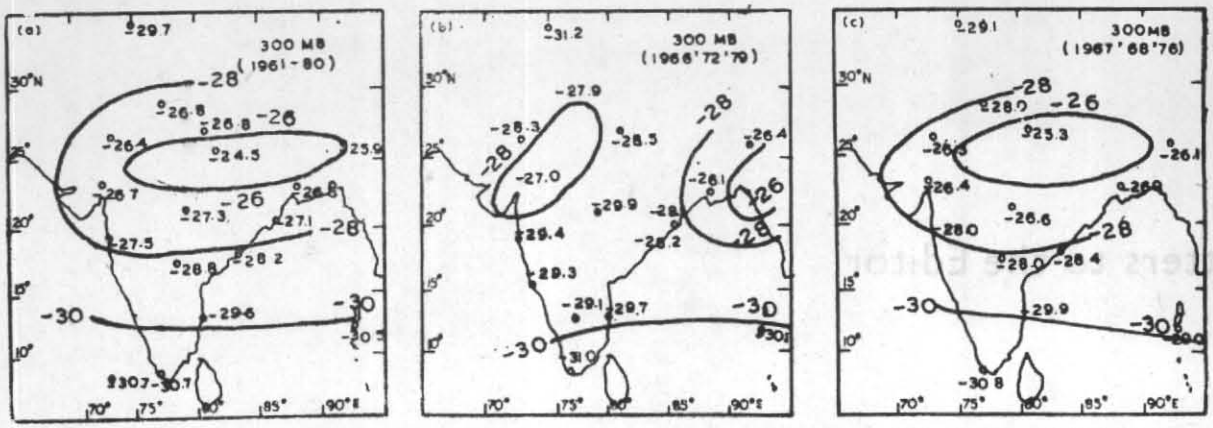

Fig. 1. Mean monthy temperature field for June at 300 mb for the years, (a) 1961-'80, 1966, '72, '79 and 1967, '68, '76

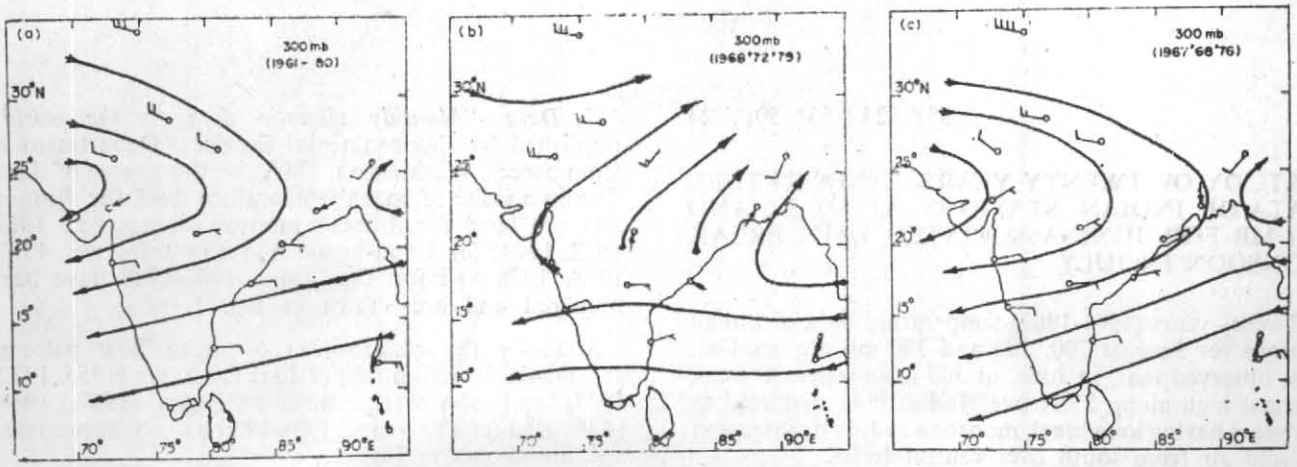

Fig. 2. Mean circulation for June at 300 mb for the years, (a) 1961-80, (b) 1966, '72, '79 and (c) 1967, '68, '76

years mean temperature field. The years having no break monsoon in July are having almost the same pattern of temperature field at 300 mb level as that of twenty years mean temperature field. No significant difference is observed between the patterns of temperature fields (not presented here) at 700 and 500 mb levels whether the year is having break monsoon or not. In the month of May, there is no significant difference in temperature field patterns even at 700, 500 and 300 mb levels whether the year has break monsoon or not. The only noticeable feature is that break monsoon years are having lower temperature than that of twenty years mean temperature at 300 mb level.

5. *Flow pattern at* 300 *mb in June*

Significant difference appears in the wind flow for the break monsoon and non-break monsoon groups of the years. Anticyclone, while extends from east normally to 85°E (Rao 1976), extends to 90° E for non-break group, but to 70°E for the break monsoon group of years. Twenty years average (1961-1980) wind for Nagpur at 300 mb is 2.7 m/s, 087° while it is 1.0 m/s, 240° for the years having break monsoon, 1.6 m/s, 075° for the years having no break monsoon. Nagpur wind shows an advection of cold air from south over central India in the years having break monsoon.

6. In June, at 300 mb there is a weak thermal high along 25°N over India. It is distorted in the years having long break monsoon in July by the intrusion of cold air from south over central India.

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