551.533.21 : 551.577(54)

INDIA'S MONSOON RAINFALL RELATED TO MID-LATITUDE ZONAL INDEX

1. Striking fluctuations in the intensity of the southwest monsoon over India are observed in association with some typical synoptic situations. Pisharoty and Desai (1956) concluded that passage of westerly waves across Tibetan Plateau and Himalayas in quick succession led to 'break' monsoon conditions over India, when the rainfall over most parts of the country becomes deficient. According to Ramaswamy (1962, 1965) 'break monsoon' condition occurs in association with low index situations.

In this note, zonal index is measured qualitatively as contour difference between 40° and 60°N averaged over the longitudes 40° to 150°E at 500 mb level. The departure of rainfall is calculated day by day for two periods, 4 to 31 August 1970 and 15 July to 4 August 1972. Relationship between the two quantities is presented in the form of a contingency table.

2. Two periods, one representing strong monsoon conditions for 26 days over the country (from 4 to 31 August 1970) and the other representing weak monsoon conditions over the country for 18 days (from 15 July to 4 August 1972) were studied. The contour values at 500 mb level between Lats. 40° and 60°N from Longs. 40° to 150°E were collected from daily weather charts of Germany (Taglicher Wetterbericht). The daily values of zonal index were then calculated. Departure from normal of the daily rainfall collected from Indian Daily Weather Reports for about 240 stations and the mean daily rainfall departure was calculated.

3. Contingency table for the daily zonal index in metres and the corresponding percentage departure of Indian rainfall from normal is shown in Table 1. Contour differences are as at 00 GMT of the day; rainfall figures are for the period of 24-hr ending at 0300 GMT of the same day. It will be seen that low values of zonal index (50 to 200 m) are associated with deficient rainfall over India, deficiency ranging from 20 to more than 80 per

TABLE 1

Relationship between mid-latitude zonal index at 500 mb and Indian monsoon rainfall

Zonal Index (m)	Percentage departure of rainfall from normal								Total No. of days
	− 80	− 80 to − 60	− 60 to − 40	− 40 to − 20	− 20 to 0	0 to 20	20 to 40	40 to 60	
50–100	–	2	–	–	–	–	–	–	2
100–150	–	3	–	–	–	–	–	–	3
150–200	2	7	2	1	–	–	–	–	12
200–250	1	–	4	–	1	1	2	1	10
250–300	–	–	–	–	2	7	1	–	10
300–350	–	–	–	–	2	3	1	–	6
350–400	–	–	1	–	–	–	–	–	1
Total	3	12	7	1	5	11	4	1	44

cent of the normal rainfall. High values of zonal index (250 to 350 m) are generally associated with normal or above normal rainfall.

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