

## MESO-SCALE ACCENTUATIONS IN THE INDIAN SOUTHWEST MONSOON FIELD CONSEQUENTING EXCEPTIONALLY HEAVY RAINS

1. Three typical situations when exceptionally heavy rains occurred in a small area around (i) Sheopurkalan-Shivpuri of Madhya Pradesh between 9 and 11 July 1968, (ii) Budaon-Bareilly of Uttar Pradesh between 21 and 23 September 1969 and (iii) Patna and around of Bihar between 18 and 20 September 1967 are discussed here.

The type of precipitation during these exceptionally heavy falls had been mainly steady, from thick altostratus and nimbostratus deck and not necessarily convective. Sheopurkalan reported 28 cm on 11 July 1968, Budaon 27 cm on 23 September 1969.

2. (i) *Sheopurkalan-Shivpuri of Madhya Pradesh between 9 and 11 July 1968* — On 9 July 1968 the monsoon trough extended northwest-southeast from Pakistan to the northwest angle of Bay with an embedded low in northwest Madhya Pradesh and adjoining Uttar Pradesh. On the 10th, as can be seen in the 0300 GMT chart (Fig. 1), a portion of the embedded low of previous day suddenly accentuated into a depression of small extent in the area around Sheopurkalan-Shivpuri of northwest Madhya Pradesh (Fig. 1). The depression abruptly weakened to a low pressure area on the 11th.

(ii) *Budaon-Bareilly of Uttar Pradesh between 21 and 24 September 1969* — On 21 September 1969 a depression was moving northwestwards across Vidarbha which weakened into a low pressure area over north Madhya Pradesh and adjoining Uttar Pradesh on the 22nd, thus lying embedded in the

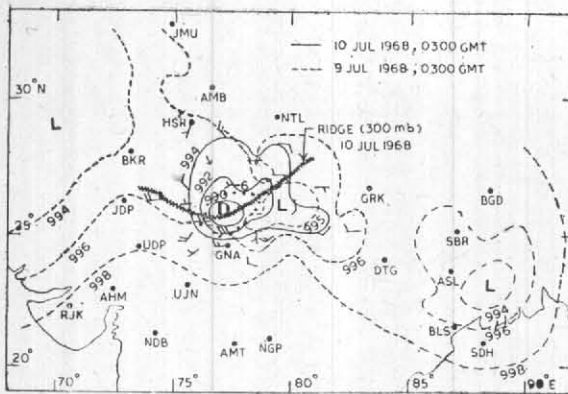


Fig. 1

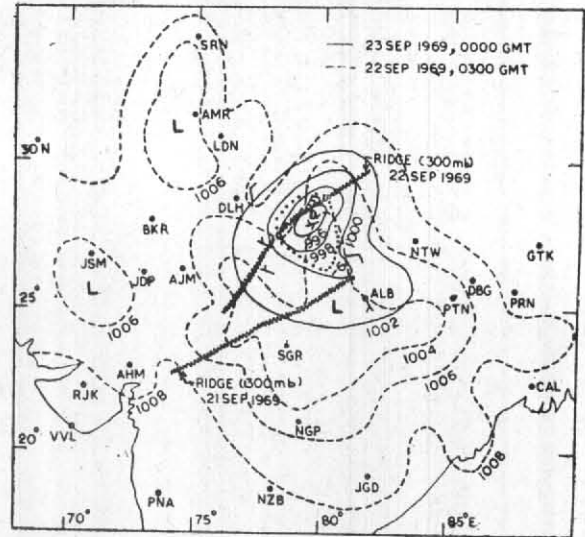


Fig. 2

monsoon trough extending from Pakistan to the northwest Bay. On the 23rd (0000 GMT) a portion of this embedded low suddenly accentuated into a depression of small extent in the area around Budaon-Bareilly of Uttar Pradesh (Fig. 2). On the 24th this depression weakened abruptly to a low pressure area and moved away northeastwards.

3. *Discussions* --- In the case of Sheopurkalan-Shivpuri it is seen that except for Jhansi reporting a rainfall of 20 cm on 8th, rainfall in general increased enormously between the 9th and 11th in that area and also in the eastern outskirts. The amount of rainfall at Sheopurkalan rose suddenly to 28 cm on the 11th. Rainfall later decreased abruptly all around.

In the case of Budaon-Bareilly, rainfall increased between 22 and 23 September 1969 around Bareilly, when Budaon, 40-50 km southwest of Bareilly, reported 27.4 cm of rainfall on 23 September against that of 18.3 cm of Bareilly on the same day. The type of rainfall in this case also had been mainly steady with hardly any thundery reports from

neighbouring stations. Pilibhit near the Himalayas recorded 33.3 cm of rainfall on the 24th.

It can be seen that on all the occasions a pre-existing surface low was embedded in the monsoon trough which was accentuated by the upper anticyclonic shear zone, the ridge line passing through the area. The shear zone being narrow, west-east oriented, a fraction of the underlying low could be favourably superimposed. The associated synoptic situation was similar to that found by Sengupta (1971) with the shear zone having formed in the event of interaction between the easterly and westerly wave troughs and subsequent fracture of the common axis, while discussing the heavy rainfall around Patna.

4. The author expresses his heartfelt thanks to the appreciations and encouragements extended by S/Shri M.S.V. Rao and N. Sen Roy, the Meteorologists at that time, in connection with this work. The author also thanks the Directors of Calcutta and Delhi regions for supplying some data of their regions.

S. SENGUPTA

*Meteorological Office, Nagpur*

4 May 1970

#### REFERENCES

- |              |      |   |
|--------------|------|---|
| Riel, H.     | 1954 | <i>Tropical Meteorology</i> , Chap. 11, p. 335. |
| Sengupta, S. | 1971 | <i>Indian J. Met. Geophys.</i> , 22, 4, p. 599. |