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A CASE STUDY OF A MONSOON DEPRESSION THAT FORMED OVER BANGLADESH IN AUGUST 1983, EXHIBITED SOME INTERESTING CHARACTERISTICS AND FOLLOWED AN UNUSUAL TRACK ACROSS INDIA

A cyclonic circulation formed over north Bay on 1 August from the downward descent of a mid-tropospheric low. The system moved northward and concentrated into a depression over land on 4 August, centred at 0830 IST near 24.0° N, 88.5° E over Bangladesh. On 4 August the depression's circulation at surface was aligned with a cold front embedded in a NE-SW trough over China while at 300 hPa it was aligned with the upper air westerly trough. On 5 August the NE-SW trough over China moved away eastward. The western portion of the axis of seasonal trough at sea level lay close to the foot-hills of Himalayas (Fig. 1). On the satellite cloud imageries of 3-5 August convective cloud bands were observed spiralling into the cyclonic system (Figs. 3a, b, c) even though, it was a low pressure area and depression. On 5 August a convective cloud blob A lay west of Jammu & Kashmir while another blob B lay over Punjab and Haryana. They were associated with the circulations embedded in the monsoon trough at different levels of the lower troposphere.

The cyclonic circulation at 500 hPa and 300 hPa showed a distinct eastward movement between 00 GMT and 12 GMT of 5 August and the northerlies swept the north India at 500 hPa level at 12 GMT of 5 August. At 00 GMT of 6 August, the extra-tropical trough at 300 hPa moved away eastward and was delinked from the depression's circulation. In its rear, the subtropical anticyclone between 500 and 200 hPa intensified and had eastward extension forming the Tibetan High. The northerlies and northeasterlies of 5 August became easterlies around the anticyclone. On the morning NOAA-8 satellite imagery of 6 August the blobs A

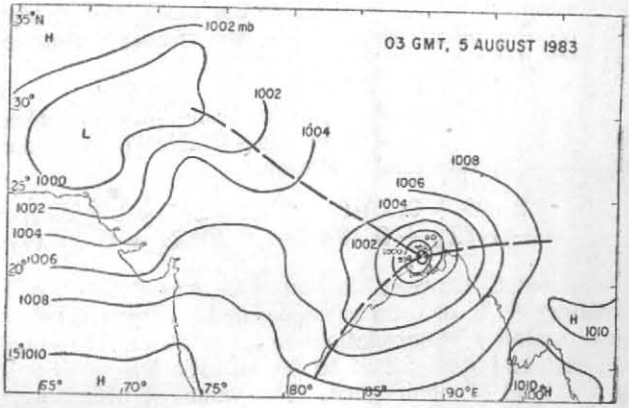

Fig. 1. Surface chart of 5 August 1983

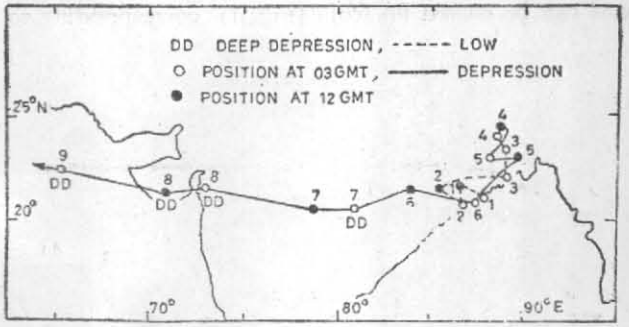

Fig. 2. Life history and track of depression, 4-10 August 1983

and B were displaced southward and have merged. On the whole, it appeared as if the entire quasi-solid body of cloud system stretching west to east had been mechanically pushed southward by the expanding upper air anticyclone (Fig. 3d). With this the monsoon trough and the embedded cyclonic circulations and the depression were also displaced southward. The depression

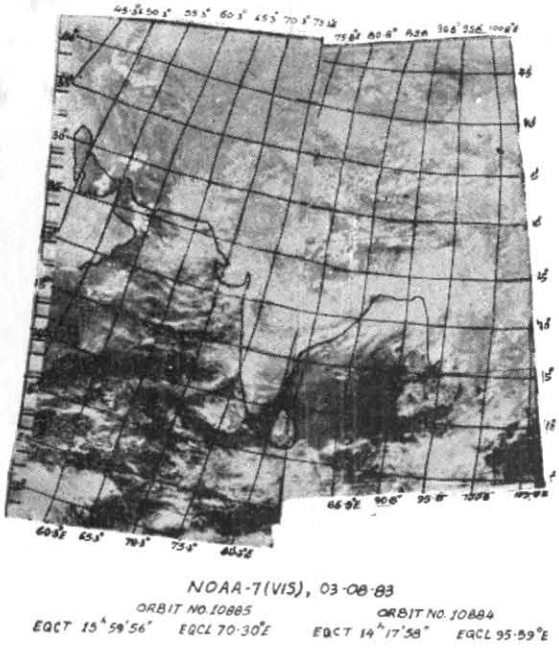

Fig. 3(a)

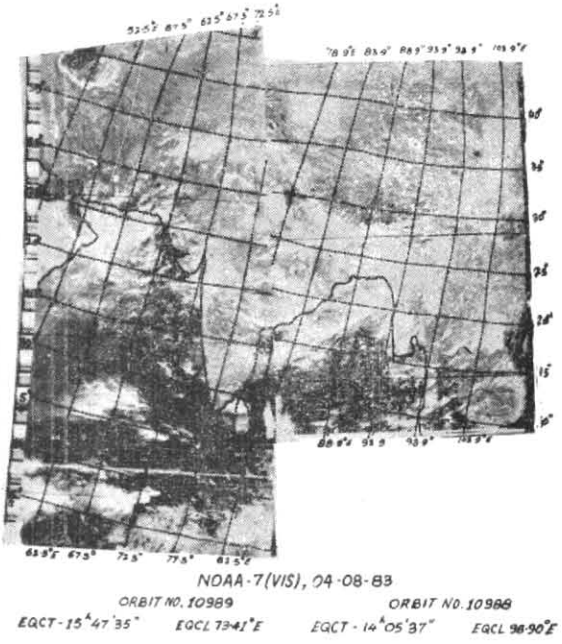

Fig. 3(b)

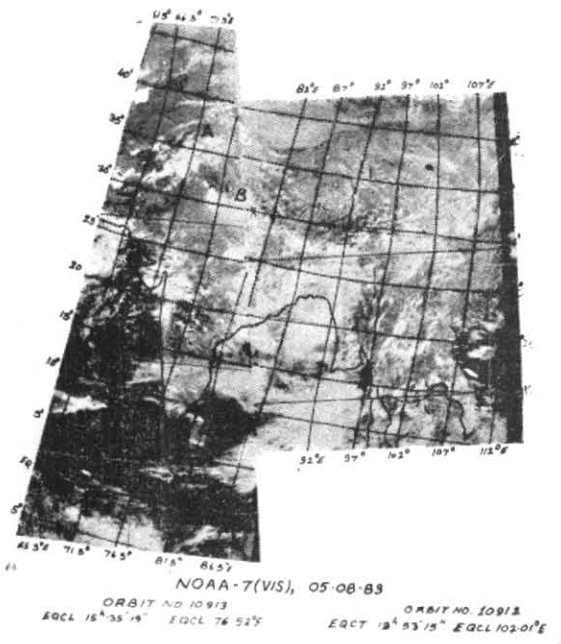

Fig. 3(c)

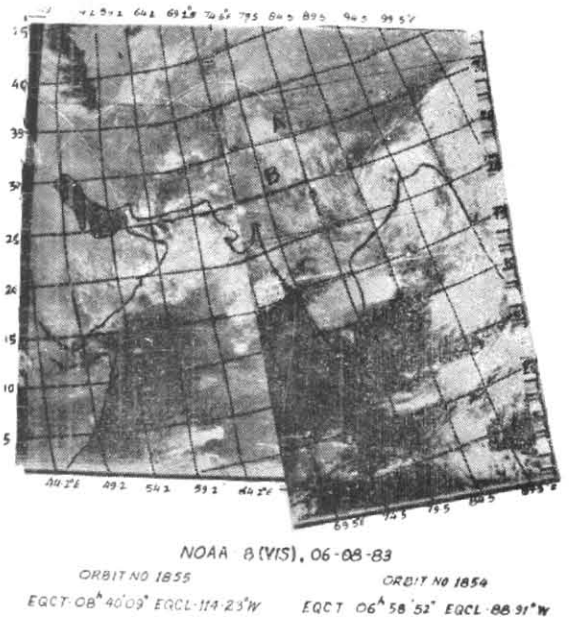

Fig. 3(d)

Figs. 3(a-d). NOAA-7 & 8 (VIS) imageries

in turn fell in the southeast sector of the strong anticyclone and was steered by the northeasterlies of this anticyclone towards southsouthwest forming a loop. It lay at 0830 IST of 6 August over north Orissa and adjoining NW Bay centred near Balasore. This was an interesting observation on the expansion of Tibetan High and southward displacement of the monsoon trough from its break monsoon conditions. The revival of monsoon, thus, occurred even before the break conditions could actually materialize. The system which was a deep depression moved westward and lay over southeast Madhya Pradesh and adjoining Vidarbha with its centre at 0830 IST of 7 August about 100 km east of Brahmapuri. It moved westward rapidly under the influence of the easterly steering current south of the Tibetan High and lay centred close to Broach at 0830 IST of 8 August. Thereafter, it moved away westnorthwestward across Arabian Sea and lay over Arabia Peninsula as low on 11 August. The track of the depression is shown in Fig. 2. A similar event occurred earlier between 13 August and 21 August 1926. (*Tracks of Storms & Depressions*, India Met. Dep. 1979).

To conclude, two interesting observations have been made in this study: (*i*) The development and organisation of cloudiness have so far been associated with the first formation of troughs and embedded cyclonic circulations in the lower and middle tropospheric levels or the troughs and low pressure areas at sea surface level. In the present case a new phenomenon is noticed in which the cloud systems have been pushed southward enblock by the northerlies in the rear of a westerly trough, to be followed by the circulation systems, (*ii*) The vortex *cum* spiral features are normally associated with the intense tropical cyclone where the inflow and outflow characteristics are well developed. In this case they have been observed even at depression stage. This may be a characteristic monsoon feature for Indian region.

Reference

India Met. Dep., 1979, *Tracks of Storms and Depressions in the Bay of Bengal and the Arabian Sea*, 1877-1970.

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