551.515.31 : 551.507.362.2

## THE RAPID DECAY OF A SEVERE CYCLONIC STORM ON 28 OCTOBER 1978 — SATELLITE CLOUD STUDY

A cyclonic storm formed over Bay of Bengal on 25 October 1978 while moving northwestwards and intensified into a severe cyclonic storm (SCS) on 26th evening with an estimated central pressure of 992 mb. It started recurving towards northeast on 27th. But on 28th it rapidly weakened into a depression and subsequently became a low pressure area. One of the causes of such a rapid decay may be the close proximity of the subtropical jet stream (STJ) to the north of the cyclonic storm.

2. TIROS-N visible channel picture taken at 0840 GMT on 26th (Fig.3) located the cloud system centre (CSC) near 16.0°N, 88.0°E and storm intensity of T 3.5. On this day the cirrus outflow to the northeast was more pronounced, indicating that the cloud system was migrating into a field of upper air westerlies. The infra-red picture taken at 2124 GMT on 26th showed an apparent diminution in shape and size of the system and CSC was located near 18.0°N, 88.0°E (Fig 4). The bright oval shaped cloud pattern was the cirrus canopy of the storm. The cirrus outflow from the system centre was still more pronounced and was in the form of bands from 22.0°N, 85.0°E to 27.5°N, 103.0°E. Moderate to strong wind shear in the cirrus outflow layer was indicated by the transverse elements in the cirrus band. An interesting feature is that the 200 mb STJ was running on this day approximately 26.0°N, 90.0°E to 28.0°N, 100.0°E and remained quasi-stationary for the next few days (Fig. 1). The influence of the jet stream was also seen at 300 mb (Fig. 2).

3. D'vorak (1975) has suggested that the presence of unidirectional flow across the top of the cyclone cloud system will adversely affect the growth of the cyclonic storm. This was seen at the cirrus level in the case of tropical storm '*Rose*' on 24 June 1978 at 00 GMT.

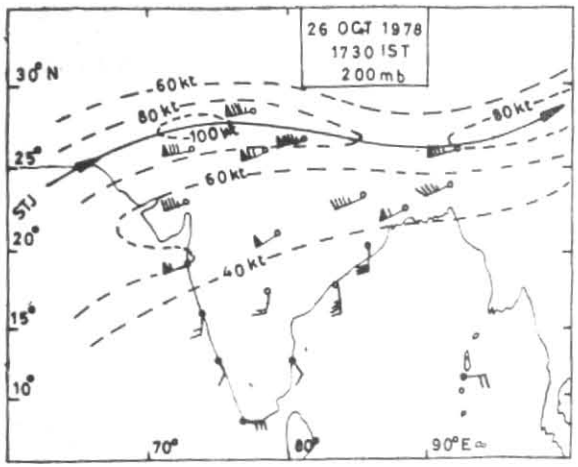


Fig. 1. 200 mb upper air chart of 26 October 1978 (1730 IST)

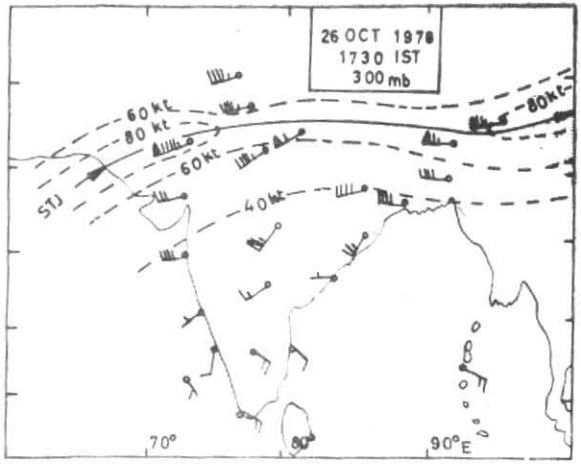


Fig. 2. 300 mb upper air chart of 26 October 1978 (1730 IST)

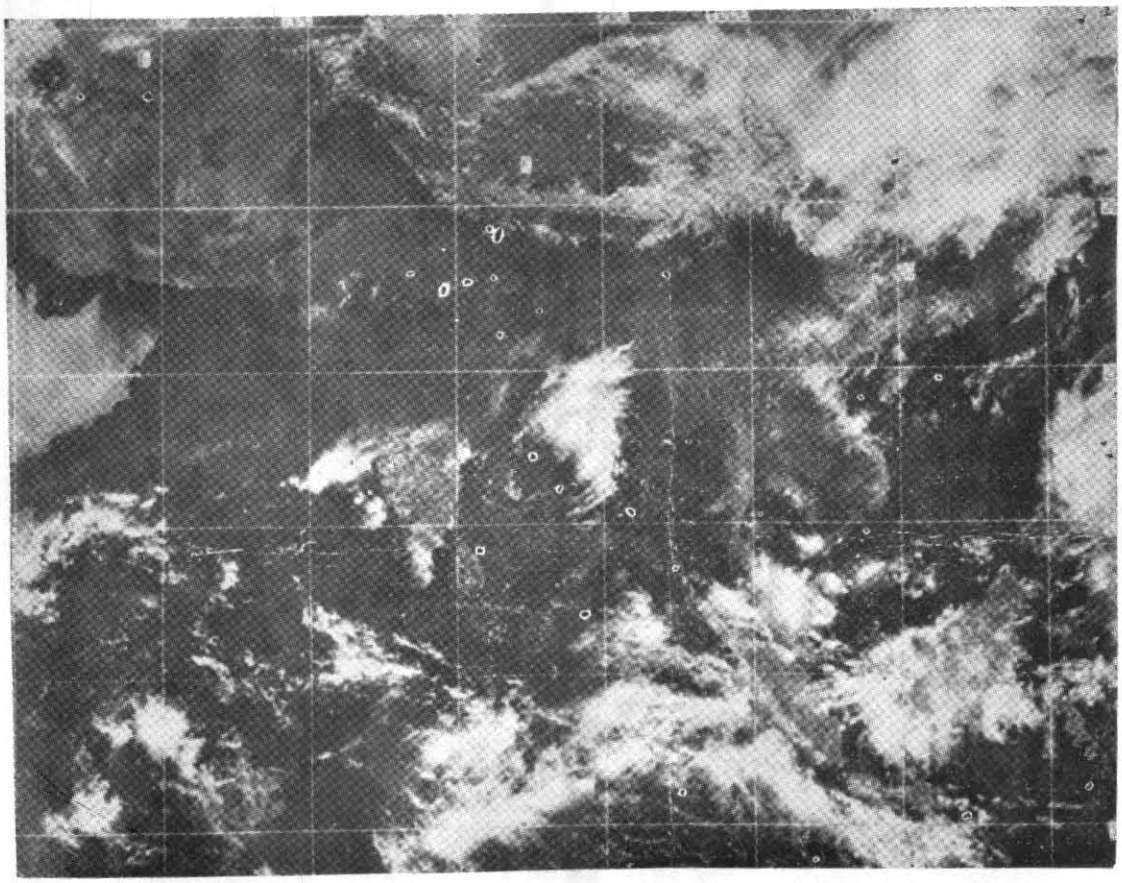

Fig. 3. TIROS-N (VIS) of 26 October 1978 (0840 GMT)

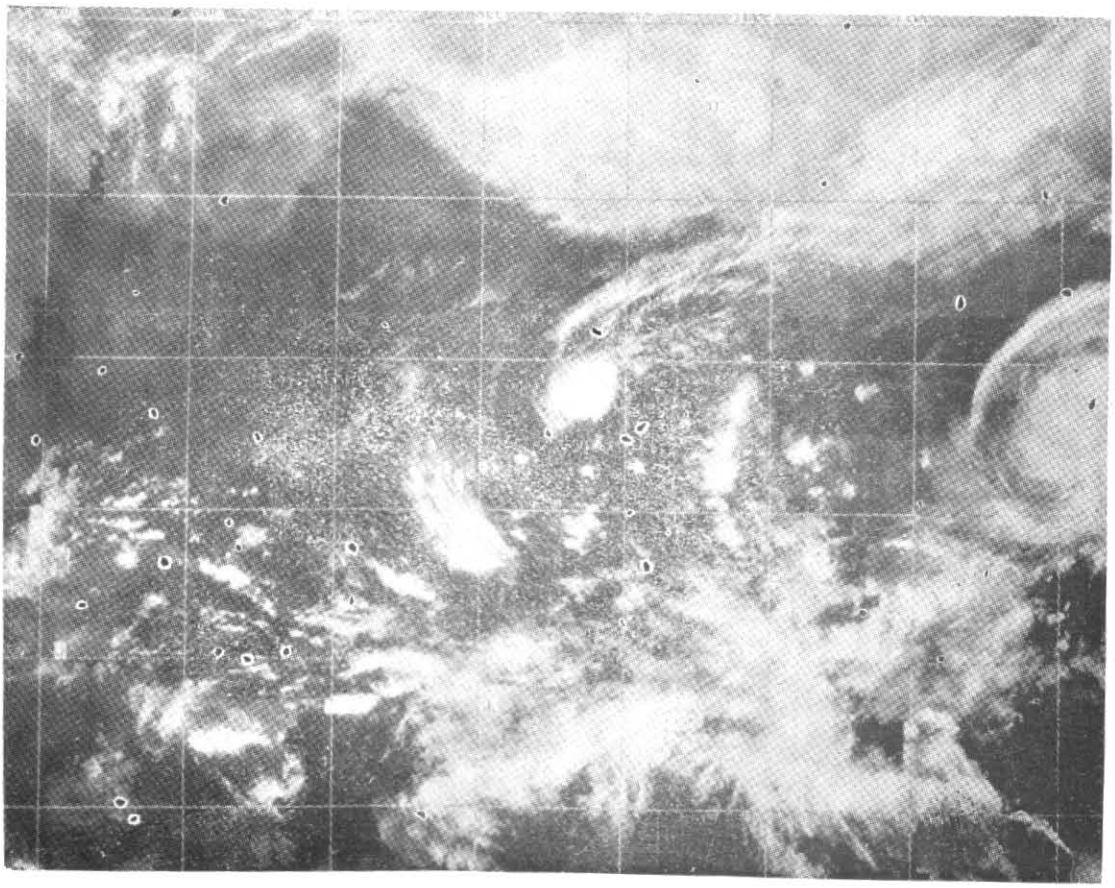

Fig. 4. TIROS-N (IR) of 26 October 1978 (2124 GMT)

TABLE 1

Air temperature at 0300 GMT of few coastal stations during 25-28 October 1978

| Station | Air Temp. (°C) during Oct 78 | | | |
|---|---|---|---|---|
| | 25 (°C) | 26 (°C) | 27 (°C) | 28 (°C) |
| Calcutta | 28 | 28 | 29 | 28 |
| Sand Heads | 29 | 29 | 29 | — |
| Balasore | 25 | 26 | 25 | 25 |
| Paradip | 27 | 27 | 26 | 26 |
| Puri | 26 | 27 | 25 | 24 |
| Gopalpur | 26 | 26 | 25 | 24 |
| Kalingapattanam | 29 | 29 | — | 25 |

In the present case an increasing unidirectional flow aloft, approximately at the cirrus level, is revealed by an increase in cirrus streamers very close to the cloud system since 26th evening (Fig. 4) and also from the flow at 300 mb and 200 mb levels (Figs. 1 & 2). This leads to increased vertical wind shear and weakening of the warm core. The presence of large vertical wind shear is evident from the presence of transverse elements in the cirrus band as seen from Fig. 4.

4. Another indication of future decay in the imagery appeared to be the suppression of convective clouds in advance of the cyclone due to the presence of a comparatively stable environment which acted adversely to the growth of the system. The surface air temperature of a few coastal stations are given in Table 1. From this table it is evident that there was a gradual cooling of the surface air, as the storm progressed northwestwards which, perhaps, made the environment more stable. Absence of convective clouds in the northwest sector as noticed in the satellite pictures since 26th supports this. Presence of a stable environment acted as an obstruction towards storm development and the convective clouds diminish ahead of the cyclone when this occurs. An elongation of cloud system in a direction perpendicular to the path of the storm may occur under such situation.

5. It, therefore, appears that an unfavourable environment in advance of the SCS noticed in the satellite imagery of 26th when the cloud system became elongated in a direction perpendicular to the cyclone's direction of motion, together with large vertical wind shear in the proximity of a jet core were responsible for the rapid decay of the SCS on sea on 28th.

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