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### INTENSITY OF THE BAY OF BENGAL CYCLONE OF MAY 1990

Sridharan *et al.* (1991) studied the intensity of the Bay of Bengal cyclone of November 1989 based on satellite and radar data. A severe cyclone with a core of hurricane winds over the Bay of Bengal crossed the south Andhra coast at the mouth of river *Krishna* in the evening hours of 9 May 1990. Indian National Satellite INSAT-1B tracked the system from its development and travel in the Bay from 4 to 9 May. Coastal radars at Karaikal, Madras, Machilipatnam and Visakhapatnam tracked the system with high degree of confidence. The track of the system, its central pressure, associated gale force winds and the damage caused by the system in the coastal districts of Andhra Pradesh are discussed in detail in *Mausam* (1991). Intensity of the system has been studied here based on satellite, radar and ship data. Rainfall distribution over coastal Andhra Pradesh in association with the system is also discussed.

2. Table 1 shows the satellite T-number as reported by Meteorological Data Utilisation Centre (MDUC), New Delhi at various timings and the corresponding maximum sustained winds (MSW) according to Mishra (1984). It is seen that the system maintained the hurricane intensity from 00 UTC of 6th till it crossed the coast on 9th evening. The system maintained the highest T-number 6.0 / 6.5 for more than 2 days from 0430 UTC of 7th.

3. Fig. 2 gives the hourly variation of radius of maximum reflectivity (RMR), thickness of the eyewall and the diameter of the eye of the system as reported by Machilipatnam radar. The values of RMR and eyewall thickness remained around 18 km and 12 km respectively indicating thereby that there was no significant change in the intensity of the system from the afternoon of 8th till it crossed the coast on 9th evening (Raghavan *et al.* 1989). The eye diameter remained around 29 km with standard deviation (SD) of 4.9 km.

In practice RMR can be taken to represent radius of maximum winds (RMW) to a good degree of approximation. The measurement of RMW is extremely useful for predicting the height of storm surge at the time of landfall to a sufficient degree of accuracy.

Raghavan (1990) in his study on the structure of tropical cyclones in the Bay of Bengal has indicated the development of "asymmetric double eye" in the case of some deep cyclones and has further described how it is different from the symmetric double eyes seen in some Atlantic hurricanes (Willoughby *et al.* 1982). In the present case both Madras and Machilipatnam radars indicated the presence of double eyewall. Madras radar reported double eyewall first at 13 UTC of 7th, then

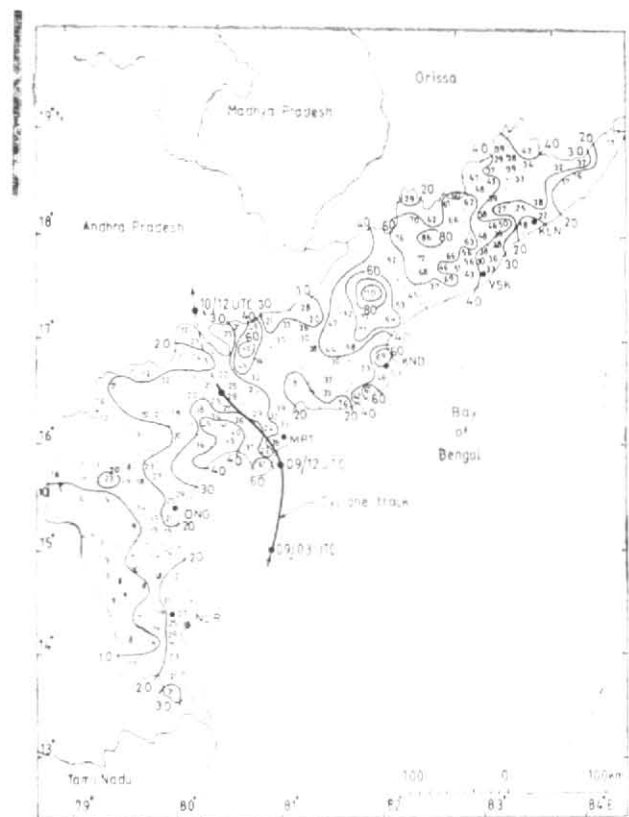


Fig. 1. Cumulative rainfall distribution (cm) over coastal Andhra Pradesh during the period 8-12 May 1990

TABLE 1

Satellite T-number at various times and the corresponding maximum sustained wind speed (MSW) of the severe cyclonic storm with a core of hurricane winds

Date	Time (UTC)	T-Number	MSW (kmph)
5 May 1990	0300	2.5	64
	1000	3.0	83
6 May 1990	0000	4.0	121
	0600	4.5	143
	2000	5.0	167
7 May 1990	0200	5.5	189
	0430	6.0	213
	2100	6.5	235
9 May 1990	0000	6.0	213
	1200	5.5	189

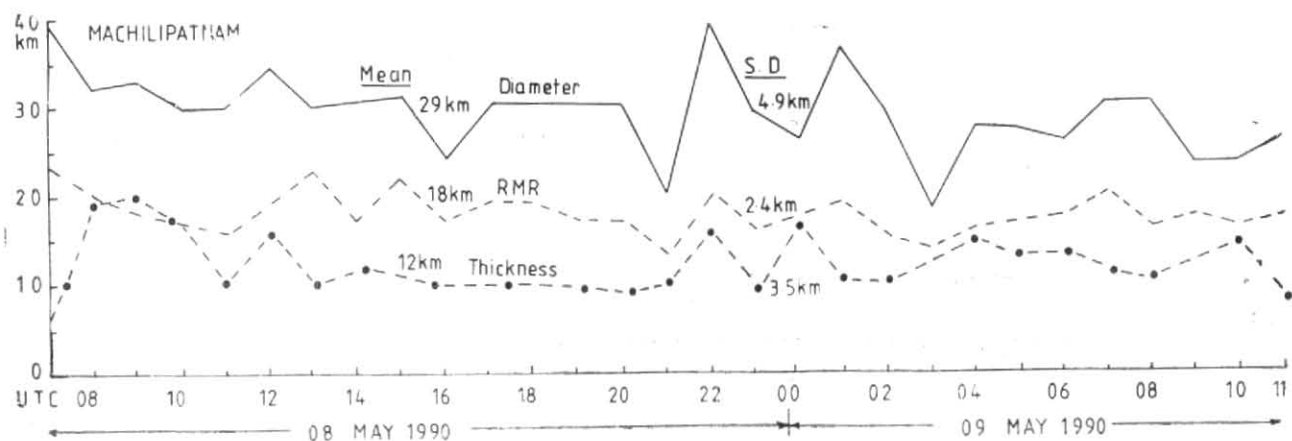


Fig. 2. Hourly variation of RMR, thickness of eyewall and diameter of the eye

frequently between 06 and 18 UTC of 8th and Machilipatnam radar reported double eyewall between 09 UTC of 8th and 07 UTC of 9th indicating thereby that the system was an intense one.

4. Captain of the ship "Viswamohini" reported that the ship went into the inner storm field and recorded the lowest pressure of 912 hPa at 12 UTC on 8th. The captain further estimated the maximum wind to be around 150 kt (280 kmph) in the inner storm field. At this hour the satellite T-number was 6.5 and both Madras and Machilipatnam radars reported double eyewall. Based on ship "Viswamohini" observation and using the formula of Mishra and Gupta (1976) the satellite T-number arrived at is 7.0 which is slightly higher than the peak intensity reported by MDUC based on satellite cloud imagery.

5. Cumulative rainfall distribution (cm) in association with the system during the period 8 to 12 May over coastal Andhra Pradesh is shown in Fig. 1. Track of the cyclone is superimposed on the rainfall map to get a clearer picture. It is seen that the peak rainfall of 110 cm occurred in east Godavari district (Yeleswaram). A secondary peak of 86 cm is seen in Visakhapatnam district (Paderu). Both these peaks are far to the right of the track. It is further seen that close to the track Reddigudem (Krishna district) reported a peak rainfall of 79 cm and Nagayalanka (Krishna district) reported a secondary peak of 61 cm just to the left of the track.

The monthly normal rainfall over coastal Andhra Pradesh for May is 5 cm and the region received about 7 times this rainfall during the period of 5 days between 8th and 12th. The relatively slow movement of the storm

average speed being around 10 kmph, its travel almost parallel and close to the coast for more than 2 days before crossing the coast on 9th evening and the system remaining as depression for more than 36 hours after crossing the coast, perhaps, lead to substantial incursion of moisture over the coastal area and thus resulted in copious rainfall over this area.

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