

## A satellite study of the Orissa cyclonic storm of October 1967

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**ABSTRACT.** A cyclonic storm hit Orissa coast on 9 October 1967. This cyclonic storm, of small extent, appeared to be quite intense and had many notable features, which are discussed in this paper with the help of the cloud cover photographs obtained from the ESSA-3 satellite.

### 1. Brief history of the storm

Figs. 1(a) through 1(f) show the ESSA-3 satellite pictures of the cloud cover from 6 through 11 October 1967. As the total area viewed by the satellite was different on each day, the storm area appears in different parts in each of these pictures. In the present study, we are concerned with the area between Lat.  $15^{\circ}$  to  $25^{\circ}$ N and Long.  $85^{\circ}$  to  $95^{\circ}$ E. In Fig. 2, the satellite pictures only for this area (extracted from those in Fig. 1) have been presented for ease of reference. A careful study of the satellite data and relevant synoptic charts indicates that the system originated as a low pressure area in the north Andaman Sea on 6 October 1967. Moving northwest, the disturbance approached Orissa coast and by 9 October 1967, it had intensified into a cyclonic storm of very small extent. From the reports of the local people in respect of the damage and winds, it appears that after crossing the coast between Puri and Paradeep at about 04 GMT, the storm moved northnorthwest for about 40 km inland reaching the vicinity of Marsaghai at about 11 GMT. Thereafter it curved to a northeasterly direction and affected the Orissa coast.

### 2. Discussion of special features of the storm

#### 2.1. Satellite evidence of the cyclogenesis and subsequent development

The development of this storm, as seen in the satellite pictures, was almost like a text-book illustration of the model of cyclone development as suggested by Anderson *et al.* (1966) in the W.M.O. Technical Note No. 75. Fig. 2(a) pertaining to 0650 GMT of 6 October 1967 clearly shows an elongated dense cloud mass positioned off Arakan coast indicating the possible presence of an easterly wave along the axis of which the elongated bright

cloud mass was oriented. The position after 24 hours is shown in Fig. 2(b) when the cloud picture seems to have assumed the familiar crescent shape which, as per typical pattern, was broad towards the equator and became thin as it curved upward. The maximum surface wind at this stage should be of the order of 20 to 30 knots and the system would have already become a "depression". During the next 24 hours, the depression seems to have intensified and the associated cloud pattern became more organised as seen in Fig. 2(c) in which banded structure was evident. Most probably it had become a "storm" by then. It is interesting to note that thus far (8 October 1967), the entire Orissa State and the neighbouring districts remained entirely cloud free. The next 24 hours up to the morning of 9 October 1967 saw further intensification and tight organization of the storm which was affecting the Orissa coast by 0727 GMT as seen in Fig. 2(d). The maximum fury was on 9 October 1967 because by the morning of 10 October 1967 the storm had loosened its organization and the banded structure seems to have been lost in Fig. 2(e). The sequence of events described above can be better followed by referring to Fig. 3 where the cloud systems pertaining to the Orissa cyclonic storm alone have been traced at intervals of approximately 24 hours.

#### 2.2. Size of the cyclonic storm

The storm appears to have been most intense on 9 October 1967 as judged from the sequence presented in the ESSA-3 pictures in Figs. 1 and 2. Although the picture in Fig. 2(d) indicates the size of the overcast associated with the storm to be of the order of  $2.5^{\circ}$  latitude (about 275 km) diameter, the area of the storm containing winds of hurricane force was perhaps not larger than 50 km in dia-

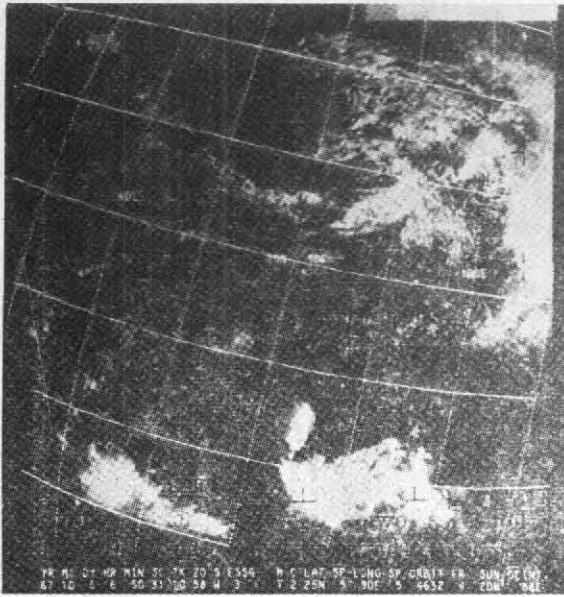


Fig. 1(a). 6 October 1967

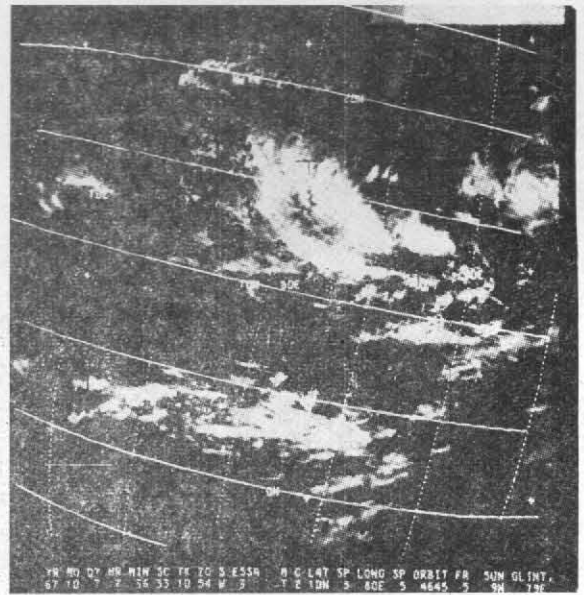


Fig. 1(b). 7 October 1967

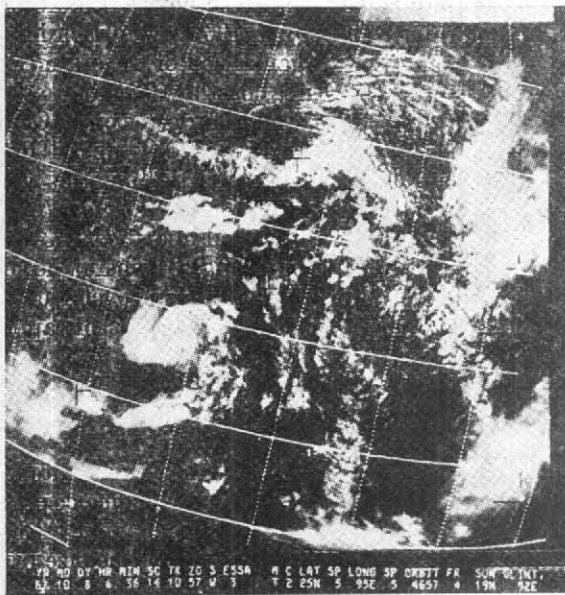


Fig. 1(c). 8 October 1967

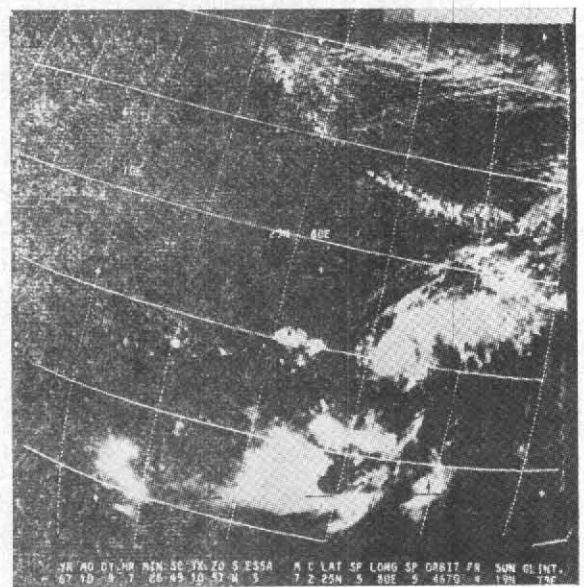


Fig 1(d). 9 October 1967

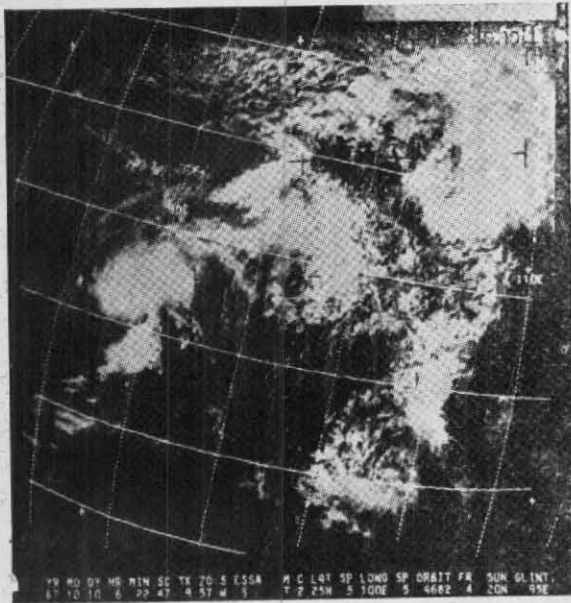


Fig. 1(e). 10 October 1967

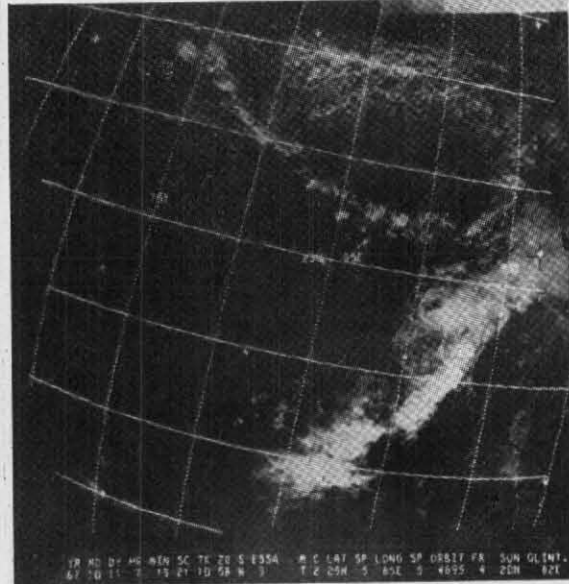
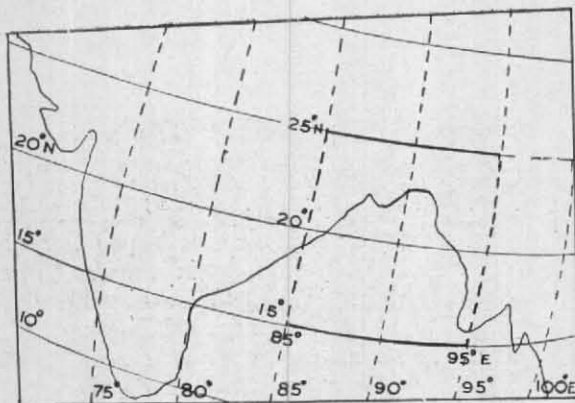
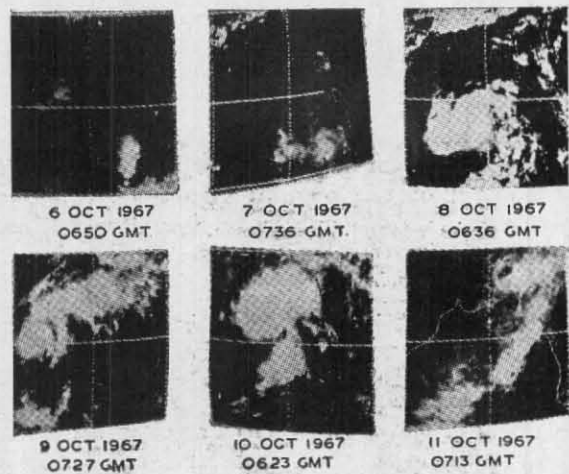


Fig. 1(f). 11 October 1967

ESSA-3 Satellite pictures of cloud cover



Area of the satellite pictures depicted in (a) to (f)



(a) to (f). Satellite pictures during 6-11 October 1967

Fig. 2

meter because the main damage due to this storm was confined to a track about 30 km wide and the neighbouring observatories within about 50 to 60 km of the track recorded calm or light wind. On the morning of 9 October 1967, when the cyclonic storm was crossing the coast the surface

wind at Puri at a distance of about 60 km from the place where the storm crossed coast was reported calm. Thus the storm appeared to be of a relatively small extent. While no accurate assessment of its size is available, this storm was perhaps one of the smallest cyclonic storms on record.

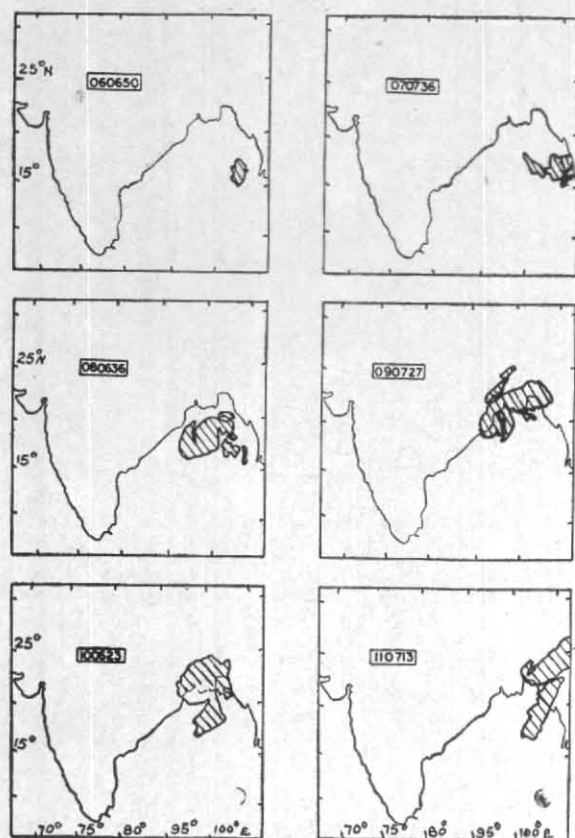


Fig. 3

It may be of interest to note that Sarma and Bedekar (1962) reported a 'midget' cyclone over Madras City but that system was short lived and less intense and retained storm intensity only for few hours.

### 2.3. Estimated maximum sustained wind speed

As mentioned above, the diameter of the general overcast in the case of this storm on 9 October 1967 may be taken as  $2.5^\circ$  latitude. The classification for the satellite observed cloud cover of cyclonic storms as given by Anderson *et al.* (1966) and the latest updated nomograms given by Hubert and Timchalk (1969) can be utilized to estimate the maximum sustained wind speed associated with this cyclonic storm. In Fig. 2(d), although the pattern centre is apparent, the 'eye' is not visible and there is no evidence of cirrus outflow. This storm, therefore, appears to fall somewhere between the categories 2 and 3 as given by Anderson *et al.* (1966). This applied to the nomogram of Hubert and Timchalk (1969) indicates the maximum sustained wind speed of the order of 55 to 70 knots.

### Acknowledgement

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### DISCUSSION

(Presented by M. G. Gupta)

DR. P. KOTESWARAM pointed out the case of the midget cyclone of 1960, which affected Madras and could not be detected with conventional data.

DR. K. R. SAHA: Are you justified in assuming that the finger like extension from the main patch developed into a low pressure area and not the big patch itself? Did you have sufficient data to draw two lows over the west Bay?

SHRI M. G. GUPTA: On the next day the area of interest falls at the edge of the picture. It is the author's guess that the small patch alone developed into a micro-cyclone. Conventional data were available to draw two separate lows.