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THE FIRST STORM TRACKED BY MACHILIPATNAM CDR

1. For strengthening the cyclone warning network on the east coast of the country one 'S' Band radar from Enterprise Electronic Corporation of USA was installed at Machilipatnam in early 1981. Regular observations from this radar were started from 1 Oct. 1981. The specifications of this radar are given below :

Peak Power : 500 KW, P. R. F. : 250

Frequency : 2870 MHz, Pulse width : 2.2 us

Receiver : Logarithmic and linear, : I. F. : 30 MHz

Alongwith other usual units like Antenna, Trans/Receiver, Servo, A-Indicator, PPI, RHI and Pressursing Unit, this radar also consists of a Photographic Repeater Scope, Digital Video Integrator and Processor and a Recorder. The repeater scope employs a 7-inch CRT and provides a Plan Position Indicator (PPI) type of display. On the display an elevation strobe is also present which causes the CRT sweep to brighten at that point on the bearing ring which corresponds to the elevation angle of the antenna. On the photographs date, time, frame No., selected range, Log or Lin mode of receiver are obtainable. Photographs may be had at alternate rotation of sweep or one photograph in 1 minute to one in 90 minutes.

Digital Video Integrator and Processor assembly takes the log video and processes it into size levels of video representing specific rainfall rate within the capability of displaying either one or the combination of video in three separate intensity from black to gray to white in six level two cycle format.

The Kennedy recorder model 9000 is a synchronous digital magnetic tape unit that, with proper external formatting control is capable of reading and writing IBM compatible tapes and is used in applications requiring high reliability at moderate tape speeds. The recorder control wire wrap provides the timing and control for recording data on magnetic tape. Recorded data consists of radar video, antenna angle, mode of operation, date and time, azimuth error and parity error. This composite data is clocked in and temporarily stored in memory. The data is then clocked out and stored on magnetic tape. The assembly also provides control for reading data from the recorder system.

The cyclonic storm that formed over Bay during 1-2 May 1982 was the first storm tracked by 'S' band radar at Machilipatnam. The storm was monitored entirely by radars and satellite. This communication describes the observations taken by CDR, Machilipatnam. The movement of storm and its associated spiral bands have also been shown.

2. *Brief history of the storm* — A feeble low pressure formed over southwest Bay off Tamilnadu-Sri Lanka coast on the morning of 29 April 1982. It became well marked during the early morning of 1 May and lay centred in southwest and adjoining west central Bay, off the south Andhra coast. The 03 GMT observation of CDR Madras showed that there was some tendency to form cloud bands. However, the coastal observations did not indicate the presence of any significant system. By 0430 GMT, five spiral bands could be clearly identified by CDR Madras. The 06 GMT observation of CDR Madras indicated that the system was becoming intense. NOAA-7 picture taken at 1412 IST confirmed that a cyclonic storm had formed in west central Bay.

06 GMT observation of CDR Machilipatnam also confirmed formation of storm and it could definitely track the system from 09 GMT of 1 May. Both the radar data have shown that the system was moving in a northnortheasterly direction. Even though the system was as far away as 200 km from Machilipatnam it could be tracked continuously from 0900 to 2200 GMT by CDR Machilipatnam. During this time the system had moved from 15 deg. N, 82.5 deg. E to 15.8 deg. N, 83.2 deg. E. By 2nd morning the system became a severe cyclonic storm centred near 17.4 deg. N, 84.0 deg. E. The NOAA-7 picture (IR) that night (0212 IST of 3rd) showed that the system further intensified into severe cyclonic storm with a core of hurricane winds. Its position at 1800 GMT of 2nd was near 17.5 deg. N, 84.5 deg. E and at 0300 GMT of 3rd it lay centred near 17.5 deg. N, 86.5 deg. E.

From 3rd morning onwards the system moved in easterly direction till 4th morning. At this stage the Burmese storm warning radar at Kyaukpyu could get this storm within field and continuously monitored till it crossed the Burma coast just south of GWA late on 4th evening.

3. *Machilipatnam CDR observations* — The cyclonic storm, 1-2 May 1982, had its origin in Bay of Bengal about 200 km eastsoutheast of Machilipatnam. On 1 May 1982 during routine observation at 06 GMT broken line, solid mass echoes were present on radarscope at Machilipatnam thus supporting the observations of CDR Madras.

At 09 GMT on 1 May well organised spiral bands and a part of the eye wall was seen in radarscope as shown in Fig. 1. The centre of the storm was near 15.0 deg. N, 82.5 deg. E. At 11 GMT although the eye was not closed but clear bands were seen (Fig. 2). The centre was fixed at Lat. 15.1 deg. N, Long. 82.6 deg. E. At 20 GMT the organization of bands was still better and the centre of the storm could be fixed at Lat. 15.8 deg. N, Long. 83.0 deg. E (Fig. 3). At 21 GMT the centre of the storm could be located at Lat. 15.9 deg. N, Long. 83.0 deg. E (Fig. 4). Photographs at 04 and 10 GMT of 2 May (Figs. 5 & 6) show the associated bands when the storm was about 350 km (10 GMT) away from Machilipatnam. As is evident from photographs the system initially had

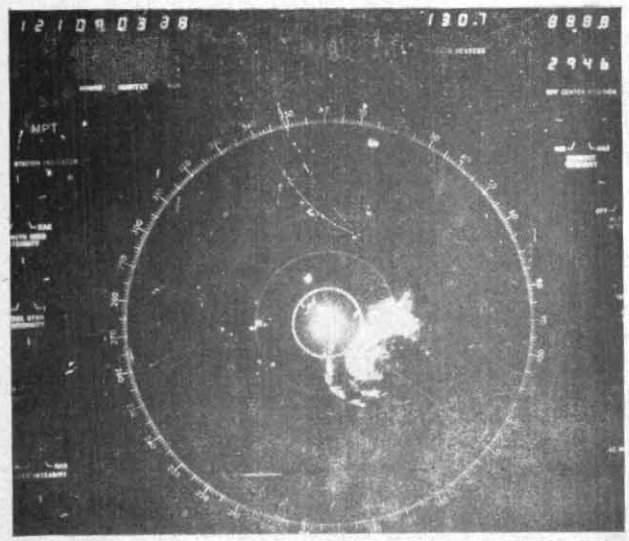


Fig. 1. 09 GMT

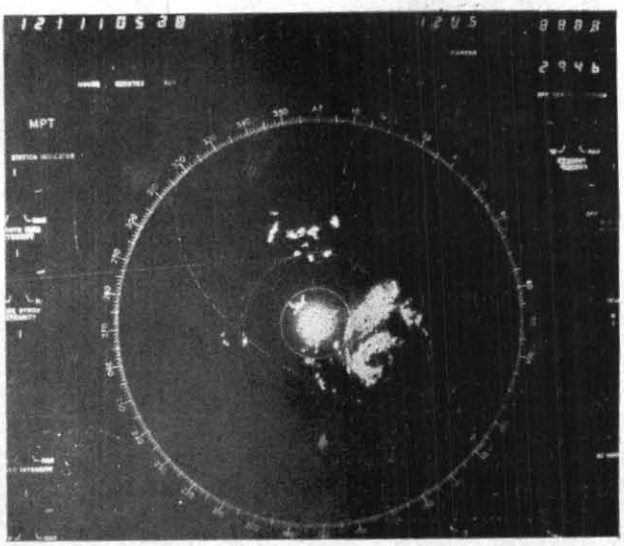


Fig. 2. 11 GMT

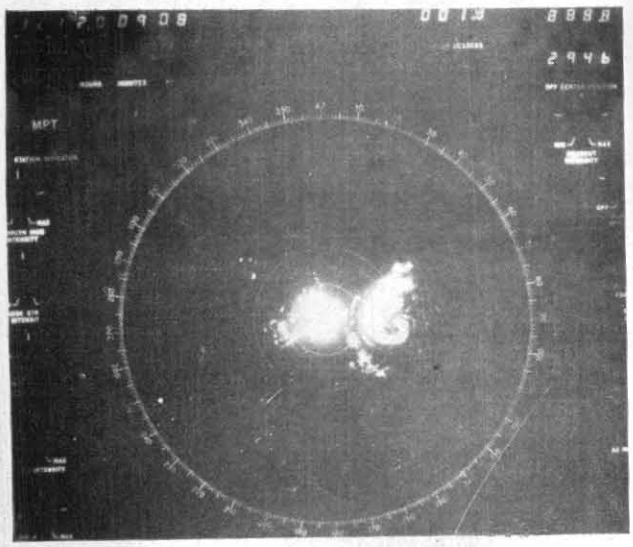


Fig. 3. 20 GMT

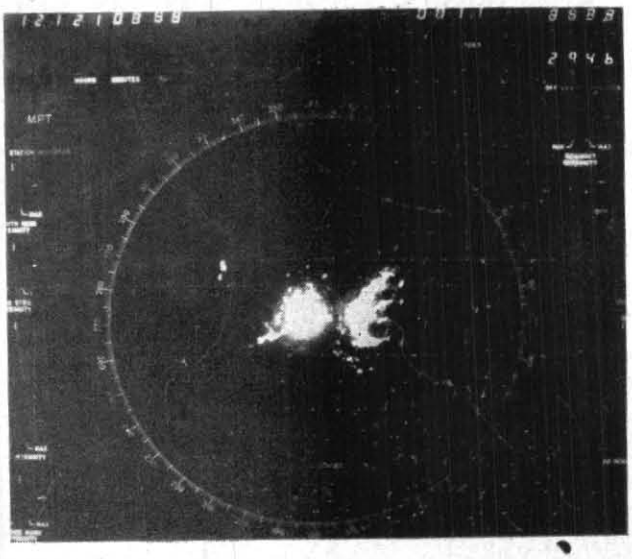


Fig. 4. 21 GMT

Note : Range—500 km and range rings at an interval of 100 km. Digits on top left hand side indicate Julian date in three figures (*e.g.*, 121 means May 1st). Other six digits indicate time in hr, min & sec (in GMT)

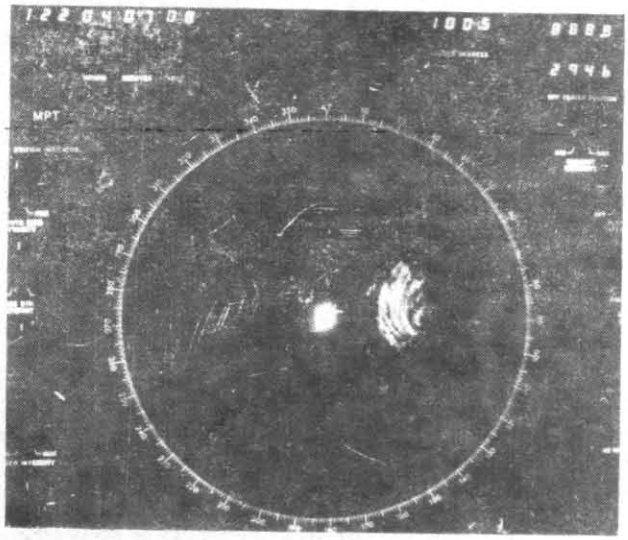


Fig. 5. 04 GMT

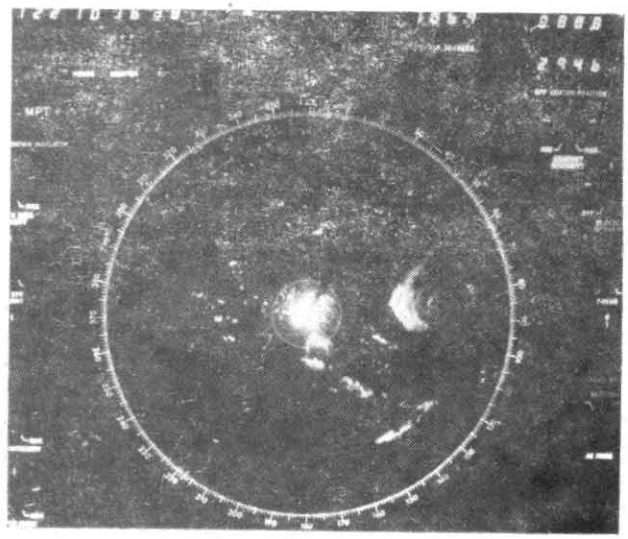
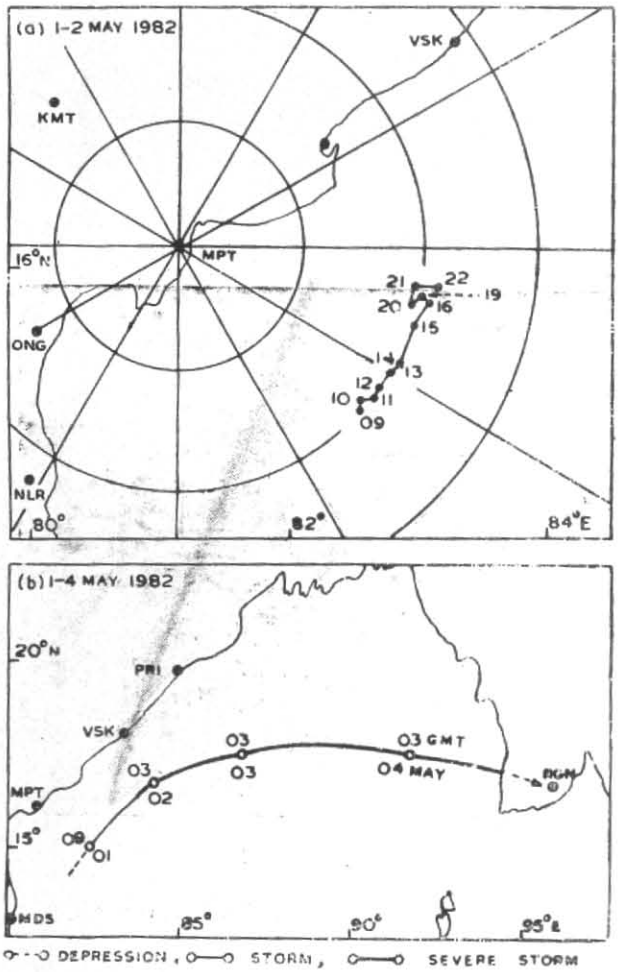


Fig 6. 10 GMT

Note : Range—500 km and range rings at an interval of 100 km. Digits on top left hand side indicate Julian date in three figures (*e.g.*, 121 means May 1st) other sex digits indicate interval time in hr, min & sec (in GMT)



Figs. 7 (a&b). Radar track of cyclone : (a) 1-2 May 1982 & (b) Track of cyclonic storm, 1-4 May 1982

northnortheasterly direction and later easterly. The centre of the storm was well within the range of radar at Machilipatnam and hence reported with fair confidence.

4. The interesting feature of this storm is that conventional observations, *i.e.*, surface observations from the coastal stations and ships could not have detected the storm throughout its life cycle till it actually started affecting Burma coast.

The movement of the storm as reported by Machilipatnam CDR is shown in Fig. 7(a) and as reported by ACWC Madras is shown in Fig. 7(b). The diameter of the eye was assessed to be approximately 40 km. The height of echoes was about 8 km which is low for convective clouds associated with cyclonic storms.

5. The authors are extremely grateful to Dr. N. S. Bhaskara Rao, Regional Director, Madras for his kind and valuable guidance on this work. The authors wish to record sincere thanks to Mr. U. Thu Ta, Director General of Observatories, Meteorological Services, Burma, Rangoon for permitting to refer the radar track of the storm by Storm Warning Radar at Kyaukpyu.

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