

Letter to the Editor

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VISUAL AND RADARSCOPE OBSERVATIONS OF A FUNNEL CLOUD

1. Thunderstorms, even squalls, are not uncommon at Agartala Airport in late monsoon and early post monsoon period. But a well developed funnel cloud which is a rarity even in premonsoon season is quite unexpected during this season. The authors have recently observed such clouds on two occasions at this place. On 23 September 1968 a funnel cloud was observed to N/NE of the station. It could be seen only for about three minutes after which the funnel shrank and merged with the main cloud. The second funnel was observed on 29 October 1968 in the west of the station and persisted for nearly 20 min. During this period the cloud underwent many changes in shape but all attempts to photograph it were foiled due to insufficient light. Some interesting radarscope photographs could however, be taken.

2. On 29 October nearly at 1230 IST the sky was overcast with *Sc*, *Cu*, *Ac* and *Cb* clouds. On the radarscope, however, some scattered *Cb* cells were observed within a radius of 50 miles. Nearly 15 min. later the sector of the sky from south to north became dark and it was thought that a storm might hit the station from this direction. While keeping a watch on the approaching weather, it was suddenly observed that some thing like a tail was emerging out of the base of the thick black cloud to the west of the station. This was presently recognised as a funnel cloud in its forming stage (Fig. 1 a). The funnel rapidly increased in length (Fig. 1 b). Between the time of the two sketches the funnel was rapidly and alternately growing and shrinking. After about five minutes it appeared as if three quarter of the funnel got detached from the main cloud and was drifting away towards the right of the observer, *i.e.*, towards W/NW of the station. But within a few seconds the detached portion came flying back and joined the parent cloud and again started growing in length (Fig. 1 c). The funnel, however, gradually became like a thick dark cylinder extending from the cloud with its bottom portion disappearing behind the line of trees. The funnel had apparently extended upto the ground (Fig. 1 d). Since the whole phenomenon occurred nearly five miles away in an area which lies in East Pakistan, it could not be ascer-

tained whether the cylindrical spout extended up to the ground or whether it caused any damage. Attempts at photography having failed the shapes of the cloud at various stages have been described with the help of sketches which needless to say only closely resemble the actuals observed.

3. The observing radar was Bendix WTR-1 working on 3-cm wave band with a peak power output of 20 kw. The beam width is 2.9° both vertical and horizontal and the maximum range is 150 n. miles. It is equipped with PPI-scope only. The antenna can be tilted from -5 to $+5$ deg.

The radar observation at 1230 IST showed some scattered *Cb* cells around the station. Half an hour later these cells had combined together and appeared as a thick squall line extending from W/NW to NE of the station (Fig. 2a). While the observation was in progress a protuberance could be seen just emerging out from the cell (Fig. 2 b). The visual observations taken simultaneously indicated that the funnel by then had changed into cylindrical shape (Fig. 1 d). A continuous radar watch was kept thereafter. The protuberance gradually became the predominant feature and bent in the form of an open circle in the west from 260° to 300° with its centre at a distance of nearly five nautical miles from Agartala Airport (Fig. 2c). Later on, the rain bands obscured the view of the cloud and the echo also lost its characteristics.

4. A funnel cloud has been defined as "the cloudy manifestation of a more or less intense vortex" (WMO 1956). On one end of the scale of intensity are the destructive tornadoes, generally associated with severe local storms. On the other end are the relatively harmless funnels found under shallow cumuli. Intensity of the present funnel was a matter of speculation because ground observations from its vicinity were unobtainable. Observations made at Agartala Airport, however, provided quite a few indications. Though the phenomenon was less than 5 n. miles away, the barograph at the station showed no change from its normal diurnal pattern. The weather experienced at the station was mild thunderstorm followed by light rain. The level of atmospherics in the wireless receivers of local W/T cabin was normal. All these indicated a phenomenon of weaker type whereas the well-defined visual form and strong radar echo were

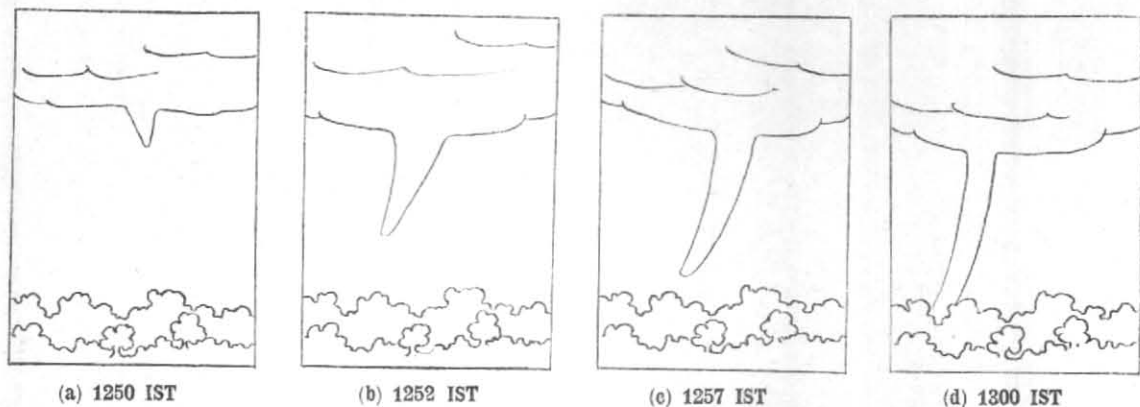


Fig. 1. Sketches of the various stages of the funnel cloud as observed on 29 October 1968

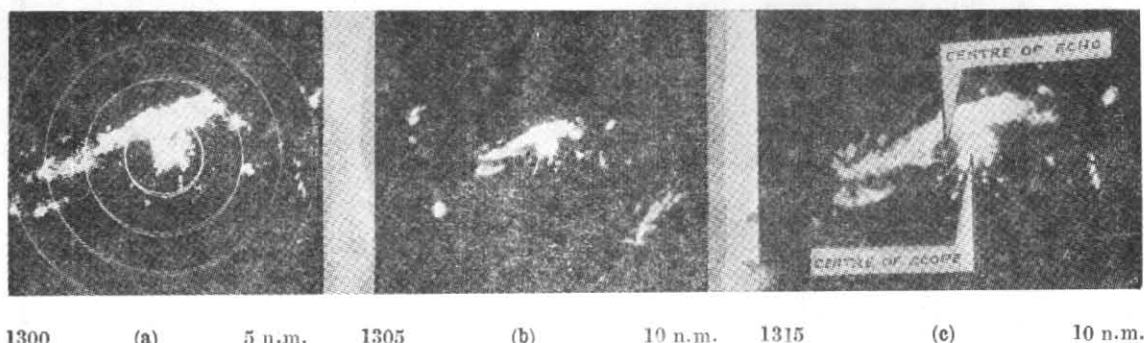


Fig. 2. PPI presentations of the storm detecting radar at Agartala Airport on 29 October 1968

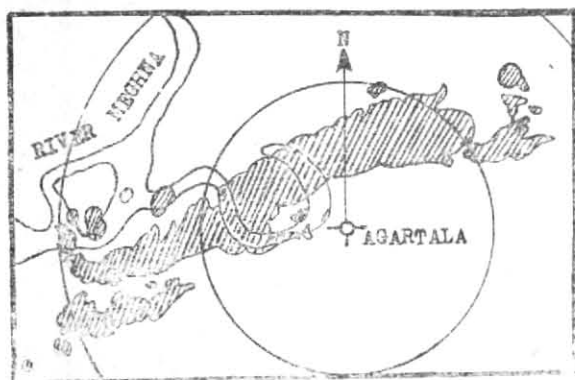


Fig. 3. Radarscope of Fig. 2 (c) superimposed on the map of Agartala and neighbourhood

apparently contra indications. But there are reports of waterspouts having been spawned by quite shallow clouds (Golden 1968), which in other words mean that even weak vortices can produce visible funnels over water surfaces. In case of this funnel a wide channel of a river lying to the west

of the station could have provided the water surface. Indeed when the radarscope was superimposed on a map of the neighbourhood the protuberance in the echo was found to lie mostly over this channel (see Fig. 3). Waterspouts are also known to produce strong echoes at close range and the remarkably circular shape of this protuberance fits well with the available description of waterspout echoes (WMO 1966). Moreover, waterspout echoes are supposed to be caused by heavy spray at the foot of the spout. In case of a funnel extending downwards from the cloud the echo, therefore, should form only after the funnel has reached down to the water surface. The protuberance in this case did emerge only after the funnel had apparently reached the ground level.

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REFERENCES

Golden, J. H.
WMO

- 1968 *Weather*, 23, 3, pp. 103-114.
1956 *International Cloud Atlas*, 1, p. 18.
1966 *Tech. Note*, 78, 193, TP. 99, pp. 40-41.