# THE SEVERE NAGAPATTINAM CYCLONE OF 30th NOVEMBER 1952

P. R. KRISHNA RAO AND S. N. SEN
*Regional Meteorological Centre, Madras*

A SEVERE cyclone from the south Bay of Bengal struck the south Tamilnad coast between Nagapattinam and Point Calimere on the afternoon of the 30th November 1952. It caused widespread devastation in the Tanjore District and the adojoining areas of Tiruchirapalli District. About 400 human lives and thousands of livestock are reported to have been lost as a result of the cyclone. High winds which reached hurricane force or more in the inner core of the cyclone uprooted a large number of trees, severely damaged many huts and buildings and destroyed thousands of acres of plantations and gardens. It also caused widespread disruption and dislocation of road, rail, telegraph and other communications in the area. A storm wave swept inland to a distance of 2-5 miles along the coast to the north of the cyclone centre up to Nagapattinam, due to the onshore easterly hurricane winds, causing considerable damage to crops and property. As the coast line running north to south turns sharply at Point Calimere to the west to a distance of about 30 miles, this east-west coastal region experienced a storm wave from the south caused by the southerly hurricane winds after the cyclone had just crossed the coast. The cyclone fortunately struck the coast in the daytime at a time of low tide Otherwise, the storm wave would have caused greater flooding and the damage would have been very much more extensive than it was.

The cyclone originated as a depression in the south Bay of Bengal on the night of the 27th November 1952. It moved west-north-west and intensified rapidly into a severe cyclone which was centred about 500 miles to the east-south-east of Nagapattinam on the morning of the 28th and about 300 miles east-south-east of Nagapattinam on the morning of the 29th. It continued to move west-north-west and was centred about 100 miles due east/east-south-west of Nagapattinam on the morning of the 30th. Moving westwards later, it struck the coast at latitude 10° 30′ N. about 10 miles to the north of Point Calimere and about 20 miles to the south of Nagapattinam on the afternoon of the 30th at about 1-30 p.m. The cyclone moved at an average speed of about 10 m.p.h. up to the morning of the 30th and at a somewhat faster speed (about 12 m.p.h.) later. It weakened after crossing the coast and moved rapidly westwards as a depression On the morning of the 1st December, it lay as a low pressure area over the East Arabian Sea off the Malabar Coast. The track of the cyclone is shown in Fig. 1.

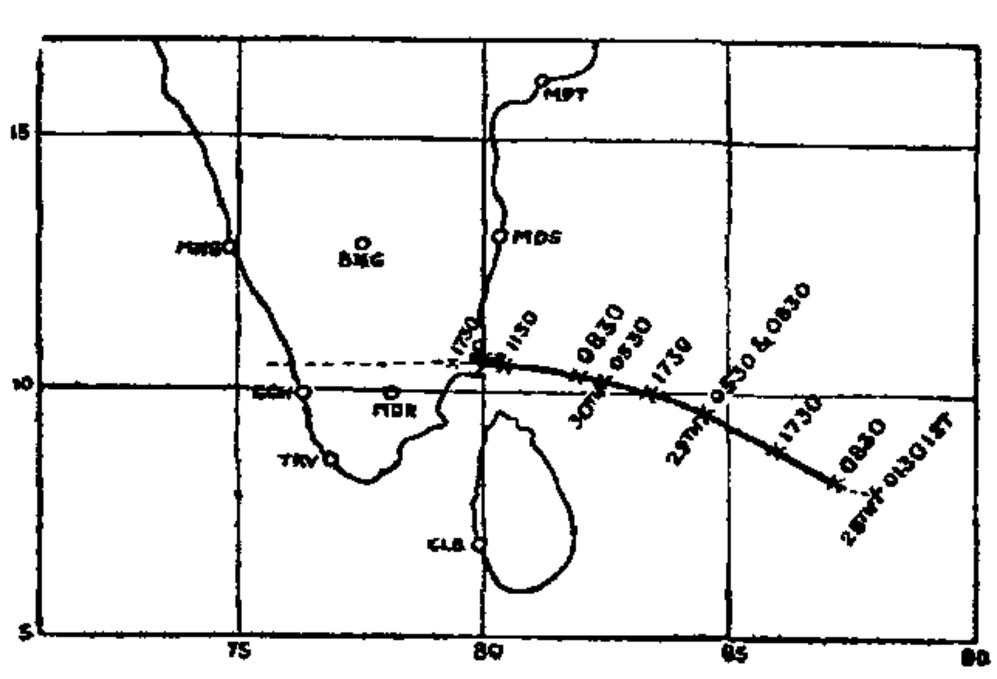


FIG. 1. Track of Nagapattinam Cyclone, November 1952.

## WEATHER REPORTS FROM SHIPS

Reports from *S.S. Worcestershire* (which was sailing from Rangoon to Colombo) on the night of 27th-28th November 1952 gave the first definite indication of the development of the depression. At 0100 G.M.T. of 28th, the ship reported 50 knots (55 m.p.h.) easterly wind with moderate continuous rain at latitude 8° 56′ N., longitude 87° 30′ E., about 60 miles north of the cyclone centre. The lowest pressure recorded in the ship was 990·8 mb. at 2245 G.M.T. of 27th when wind was NE/E, 50 knots, with very rough sea and very heavy swell.

*S. S. Jalagopal,* which left Nagapattinam for Penang on the early morning of the 28th with 1,600 passengers on board, experienced very severe weather in the south-west quadrant of the cyclone on the night of the 28th-29th. She was about 200 miles to the west of the cyclone centre on the 28th evening and about 150 miles to the south on the early morning of the 29th. At 1016 G.M.T. (1546 I.S.T.) on the 28th, the ship which had changed to a south-east course reported at latitude 8° 53′ N., longitude 83° 39′ E., north-west wind, speed 36 knots gusting 45 knots frequently, with continuous heavy rain and visibility half a mile. Barometric pressure was falling steadily, the fall in the previous 3 hours being 3·4 mb. There was a north-westerly swell with period of waves 12 to 13 seconds and height of waves 15′ to 20′. On the 29th morning (00 G.M.T.) when the ship was

at latitude 7° 20′ N. and longitude 84° 48′ E. on a south-south-east course, she reported wind W by N, 50 knots, gusting to hurricane force all night, with continuous heavy rain, visibility nil, heavy sea wth west-north-westerly heavy swell and mean height of waves 25′ to 30′. Barometric pressure was 1006·8 mb. and had been falling steadily in the previous 3 hours. The ship was labouring heavily with a maximum roll of 33°. The Captain of the ship who was interviewed later at Madras stated that extremely rough weather with mountainous seas was experienced on the night of the 28th-29th from 9 p.m. to 6 a.m. as the ship was sailing on a south-south-east course to avoid the cyclone. The ship had a miraculous escape with only a slight damage.

*S. S. Clan Mactavish,* which left Madras on the 29th evening for Colombo, was hardly 50 miles to the north of the storm centre when she reported at 0400 G.M.T. of 30th at latitude 11° 16′ N., longitude 80° 54′ E., easterly wind, force 11 (about 70 m.p.h.), high sea and swell and barometric pressure 993·8 mb.

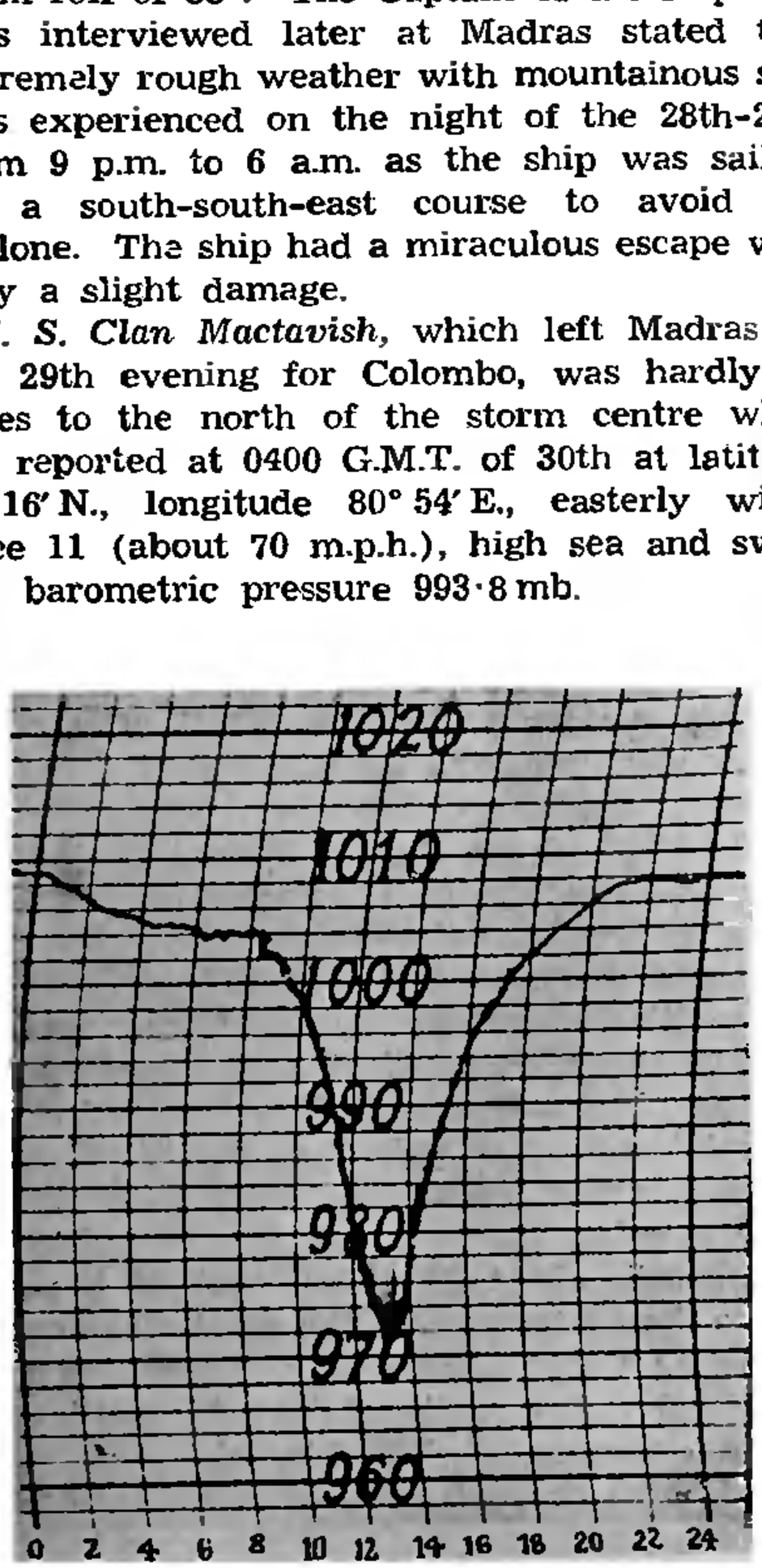


FIG. 2. Barogram of Nagapattinam, 30th Nov. 1952.

### Weather at Nagapattinam

The weather at Nagapattinam was overcast with low clouds and raining from the midnight of the 29th and 2″ of rain occurred up to 0730 a.m. of 30th. The wind was N. to NE. By 10 a.m. the wind increased to force 6-7 (30 m.p.h.) still from north to north-east and sky was overcast with driving rain. Sea when visible was very confused with mountainous waves. By 11 a.m. wind was gale force 9 (50 m.p.h.) and from then onwards it increased to hurricane force, still from the north-east. At about 1 p.m. it veered to east and according to the report of the local Port Officer the storm was at its climax at about 1-30 p.m. when the port was struck by a storm wave of great force which was estimated to be about 4′ in height. The storm wave caused much damage in and around the port. At about 2-30 p.m., the wind veered to south-east and continued to blow with hurricane force until about 4-30 p.m. when it showed signs of abating. By 1800 hours the wind had become moderate and the sky had cleared considerably. Nagapattinam Observatory measured a wind speed of 50 m.p.h. at 1130 hours on the 30th after which the wind instrument got damaged

### Barogram of Nagapattinam

The barogram of Nagapattinam Observatory reproduced in Fig. 2 reveals some very interesting features about the cyclone. The lowest pressure reached was about 970 mb. at about 1-30 p.m. on the 30th. This was about 40 mb. below the pressure 24 hours earlier which was about the normal pressure. The pressure began falling rapidly from 10 a.m. and fell by 29 mb. from 999 to 970 mb. in about 3 hours' time. The most rapid fall of pressure was 14 mb. from 11-30 a.m. to 12-40 p.m., a period of 1 hour and 10 minutes, which works out to a rate of fall of 12 mb. per hour. With the estimated speed of movement of the cyclone, *viz.*, 12 m.p.h., the steepest pressure gradient in the inner area of the cyclone, as it passed Nagapattinam, works out to 1 millibar per mile. This was at a distance of about 20 miles from the centre. The gradient of 1 mb. per mile agrees with the average pressure gradient in typhoons with minimum pressure of 960 to 973 mb. given by Deppermann.[1] The steepest rate of pressure fall on record at the centre of an Indian cyclone was 25 mb. per hour in the False Point cyclone[2] of 5th November 1891 which had the lowest pressure of 949 mb. With a speed of movement of 10 m.p.h., the steepest pressure gradient in that cyclone works out to 2·5 mb. per mile, while in the present Nagapattinam cyclone it is estimated to be 1 mb. per mile at a distance of 20 miles from the centre and about 10 miles from the periphery of the "Eye".

Another interesting feature shown by the Nagapattinam barogram is the rapid fluctuation of pressure at the time of minimum pressure exhibiting pronounced "pumping" over the central region of the cylone. The maximum amplitude of the fluctuations was as large as 7 mb., the pressure fluctuating between 970 and 977 mb

### The Eye of the Cyclone

The Nagapattinam cyclone had a pronounced *Eye* or calm centre as should be expected in a cyclone with such steep pressure gradient. In this connection, a summary of weather at Point Calimere reported by the Keeper-in-Charge of the Light House there is given below :—

"On the whole day of the 29th November, the sky was almost clear with some passing clouds. There was no rain. The wind direction was NE. Towards midnight the sky began to overcast with heavy clouds and very chilly NW wind. This continued until 7 a.m. of 30th with intermittent drizzling. After that, the force of the wind and rainfall increased gradually. At 9 a.m. the wind from the same direction increased to gale force mingled with moderate rain. This lasted up to 1 p.m. After that, the wind and rain suddenly stopped ; sky began to clear with bright sunshine. The air was *dead calm.* Suddenly at about 1-45 p.m. some rumbling noise resembling distant approaching train was heard from south with whitish high waves in the sea. At 1-45 p.m. the wind at a force of about 75 to 80 miles an hour struck the coast from the south. The trees and roofs of the building began to fall down on the first impact itself. This lasted up to 4 p.m. and then onwards the force of wind decreased gradually. During the period of the cyclone there was very little rain in our part and should, in my estimate, be under 2" on the whole."

Mr. S. Gasper of the Regional Meteorological Centre, Madras, who visited the cyclone-affected areas, gathered information of similar experience of "Calm" conditions for sometime in the midst of the cyclone at Tiruthuraipundi, about 20 miles to the south-south-west of Nagapattinam and 22 miles to the north-west of Point Calimere, and also at Vedaranyam, about 6 miles to the north of Point Calimere. The Tahsildar at Tiruthuraipundi had recorded that heavy rains and northerly gales commenced at 0900 I.S.T. on the 30th and continued uninterrupted till 1415 hours Thereafter, there was sudden cessation of rain and wind but the sky remained overcast. After about an hour of calm condition, hurricane winds recommenced from the opposite direction with heavy rain. At Vedaranyam, the Deputy Tahsildar had recorded similar observation with the difference that the lull in weather commenced at 1300 hours and lasted for about 45 minutes. Nagapattinam did not experience any calm condition or reversal of wind direction. The Eye did not, therefore, pass through Nagapattinam.

The calm condition commenced at 1300 hours at Point Calimere and Vedaranyam and at 1415 hours at Tiruthuraipundi. Considering that the cyclone moved due west across the coast and that Tiruthuraipundi is about 15 miles due west of the coast, the approximate speed of movement of the cyclone works out to be 12 m.p.h., agreeing with the speed estimated from the positions of the cyclone centre as located on the synoptic weather charts. As the duration of the calm over Point Calimere was about 45 minutes, it means that a chord of about 9 miles of the "Eye" passed over that station. Similarly, a 12-mile chord passed over Tiruthuraipundi. On this basis, the position of the "Eye" at the time of the cyclone centre crossing the coast is indicated in Fig. 3. Assuming the Eye to be circular, its diameter works out to be about 20 miles. Even though the average diameter of the "Eye" of tropical cyclones is believed to be 10-15 miles, "Eyes" having diameters of 20-30 miles have also been observed in intense storms. A diameter of 40 miles has been recently reported[3] from actual aircraft exploration of the "Eye" of a severe typhoon in the China Seas in August 1951 with a central pressure of 895 mb. A severe cyclone at the head of the Bay of Bengal on the 27th May 1936 had an "Eye" of about 20 miles diameter with a central pressure of 979 mb. The estimated diameter of the "Eye" of the recent Nagapattinam cyclone is, therefore, consistent with its severity as indicated by the steep pressure gradient and a central pressure of 970 mb. It is interesting to note that the "Eye" of the cyclone became obliterated in a short distance after crossing the coast as it was not felt at Pattukottai, about 35 miles west of the point where the centre crossed the coast. The cyclone moved as a deep depression whose centre passed about 25 miles south of Tiruchirapalli. The micro-barogram of Tiruchirapalli (not reproduced here) showed a fall of pressure of 18 mb. between 10-30 a.m. and 7-30 p.m., the fall being steepest between 5-30 p.m. and 7-30 p.m. The lowest pressure recorded at Tiruchirapalli was 979 mb. at 7-30 p.m.

### Winds in the Cyclone

The cyclone was a very severe and concentrated one with a comparatively small core of hurricane winds around the calm centre ("Eye") Nagapattinam had hurricane winds for about 5½ hours from 11 a.m. to 4-30 p.m. Assuming that the core of hurricane winds was circular

and the speed of movement of the cyclone was 12 m.p.h. when it struck the coast, a chord 66 miles ($12 \times 5\frac{1}{2}$) long of the inner core must have passed through Nagapattinam. From this, it is estimated that the radius of the core of hurricane winds was about 38 miles. As the radius of the "Eye" was about 10 miles, the annulas of hurricane winds around the "Eye" was about 30 miles wide. The diameter of the core of hurricane winds including the "Eye" was therefore about 80 miles. The extent of the core is also shown in Fig. 3.

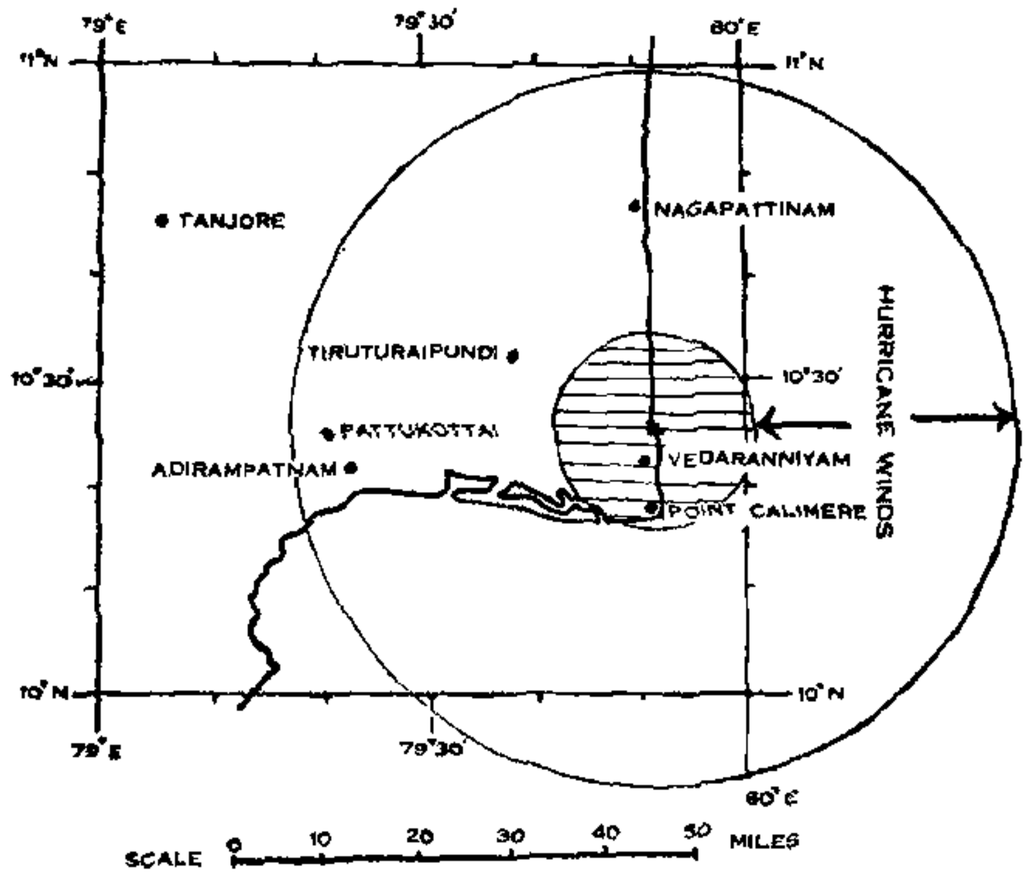


FIG. 3. Dimensions of the 'Eye' (Hatched Circle) and Region of Hurricane Winds at the time of Cyclone Crossing the Coast.

The highest wind speed reached in the cyclone can only be estimated indirectly as there was no instrumental record From the severe nature of the damage caused, *viz.*, bending of telegraph poles, uprooting of big trees, snapping of the trunks of trees of 4′ to 5′ diameters, shaking and collapses of strong buildings and roofs, etc., it has been estimated by some that wind speed may have reached 150 m.p.h. in gusts, while the lowest estimate is 80 to 90 m.p.h. From the very steep pressure gradient and the magnitude of the pumping of the barometric pressure at Nagapattinam as indicated by the barogram, it would appear that the wind must have reached a speed of over 100 m.p.h. and 150 m.p.h. in gusts may not be an overestimate. In the Masulipatam Cyclone of October 1949[4] in which the central pressure was 977 mb. and the pressure gradient in the core of hurricane winds as estimated from Masulipatam barogram was only 1 mb. in 51 miles, an estimated wind speed of about 100 m.p.h. was reached. It should be remarked that the area of hurricane winds need not necessarily be circular. In fact, it is known[5] that in westward-moving tropical cyclones in the northern hemisphere, gales and hurricanes extend further to the north than to the south, which appears to have been the case in the Nagapattinam cyclone. The area of gales extended up to Madras, about 200 miles to the north of the centre. Towards the south, however, gales were experienced at Jaffna about 80 miles to the south of the cyclone centre, but not at Pamban, about 120 miles to the south-south-west. Tiruchirapalli, situated about 80 miles to the west of Nagapattinam, experienced gales after 3 p.m. and the strongest winds, about 50 to 60 m.p.h., were experienced at 7 p.m. to 8 p.m.

### Air Masses Involved in the Cyclone

It is seen from the weather charts that the Nagapattinam cyclone originated as a depression in the south Bay on the inter-tropical front between Tropical Maritime (Tm) and Equatorial Maritime (Em) air. The Tm air was, however, conspicuously weak throughout the period of the cyclone. This cyclone apparently provides another instance of formation of a depression by the interaction of two air masses and of its rapid intensification with the development of a "Triple Point" when the depression moved westwards into the field of the Tropical Continental (Tc) current. There was clear indication that there was appreciable strengthening of northerly Tc air over the entire peninsula prior to the cyclone approaching the coast. There being no strengthening of the Tm air, Tm-Tc warm front or discontinuity was weak or inactive and the air masses involved in the cyclone were mainly Em and Tc. As such, the distribution of rainfall in this cyclone was somewhat like that in the south-west monsoon cyclones with the heavy rain in the south-west quadrant of the storm. Heavy rain exceeding 6" was reported by a number of stations within a belt of about 12 miles to the south of the storm track during the 24 hours ending 0830 hours I.S.T. of 1st December, principal amounts being Agastiyampalli (near Point Calimere) 9·1" and Alangudi 15·0". The lack of Tm air appears to have been responsible for the comparatively less rainfall to the north of the storm track and also for the short spell of heavy rain caused by this cyclone.

### Previous Severe Cyclones which Struck near Nagapattinam

Examination of past records shows that in the last 62 years (1891-1952), 6 cyclones have

struck the coast near Nagapattinam in the north-east monsoon season October-December. Of these, 3 cyclones in November 1935, November 1939 and November 1952, have been severe. The severe cyclone of November 1935 had a track almost identical with that of the November 1952 cyclone. It struck the coast just to the south of Nagapattinam in the early hours of the 15th November 1935 and lay as a deep depression near Tiruchirapalli on the morning of the 15th. Thereafter, it moved rapidly westwards into the Arabian Sea by the next morning. It caused widespread heavy rain in south-east Madras where railway and other communications were considerably dislocated. Nagapattinam suffered considerable damage and thousands of trees were uprooted in the coastal districts. *"The Hindu"* of 19th November 1935 stated that "the storm which swept over Vedaranyam and Agastyampalli and Point Calimere on the 14th instant was one of the severest that was ever experienced within the last 40 years and it has played great havoc in this part of the country resulting in the loss of human lives and countless cattle and damage to a thousand houses". Both the 1935 and 1939 cyclones were very much less deep and had less steep pressure gradients than the 1952 one, but caused more rain. A comparison of the structure and movement of these two previous Nagapattinam cyclones and of the Masulipatam cyclone of October 1949 with the present one is expected to reveal some interesting features.

A detailed technical study is being made and it is intended to publish the results in a paper in the *Indian Journal of Meteorology and Geophysics* in due course.

---

1. Deppermann, C. E., "Some characteristics of Philippine Typhoons" (1939), Manila—referred to on p. 88, of *Compendium of Meteorology*, 1952. 2. Eliot, Sir John, *Cyclone Memoirs*, No. V, 1893, 81. 3. Simpson, R. H., *Bull. Amer. Mete. Soc.*, 1952, **33**, No. 7, 286. 4. Sen, S. N. and George, C A., *Indian Journal of Meteorology and Geophysics*, 1952, **3**, No. 4, 264. 5 Dunn, G. E., *Compendium of Meteorology*, 1952, 889.