

SOUTH PACIFIC HURRICANES.

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THE available information of hurricanes in the South Pacific Ocean is very limited, as compared with that of similar storms of the West Indies, China Seas and Indian Ocean. What information there is comes from many varied sources: some is fairly complete, some very fragmentary; but from a survey of the records of recent years there is no reason to suppose that South Pacific hurricanes are less frequent or less violent than those of other tropical seas.

Locality.—Hurricanes have only been reported in the western half of the South Pacific Ocean, extending from North-east and East Australia to the Low Archipelago. They are entirely unknown between the latter islands and the South American coast, and there can be little doubt that they originate amongst the tropical island groups of the Western Pacific, whence the first reports of their appearance are usually received.

The hurricanes of the South Pacific may be divided into two main groups: first, those of the islands between Longitude 160° E. and 140° W.; and, second, the Australian hurricanes, comprising those affecting Queensland, Northern Territory, and the Coral Sea.

TABLE I. shows the number of hurricanes of the first group reported during the various months for the period 1789 to 1922, grouped according to the region in which they were reported.

The table is based on a total of 246 hurricanes, but as some storms affected more than one group of islands, the sum of the monthly figures totals 292.

This list must not be regarded as complete, as doubtless many hurricanes occurred during the period which escaped record. According to DR. S. S. VISHNER, in the *Monthly Review* of the U.S.A., it is estimated that the number of tropical cyclones affecting the island groups averages at least 12 per annum. This estimate is based on a series of years for which the information appears fairly complete. For example, for the New Hebrides, during the 26 years 1867 to 1893, 22 hurricanes are reported, but there is a gap of eight years with no record. On this basis it appears that more than one hurricane is to be expected annually in this group. Again, although TABLE I. mentions only 7 hurricanes from the Low Archipelago, the fact that 4 of these occurred in one 4-year period, and 3 in another 4-year period, suggests that hurricanes are not so infrequent in this group as TABLE I. would seem to show.

TABLE I.

Locality.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March.	Apr.	May.	June.	Totals.
Fiji Islands	—	—	—	—	1	13	21	15	20	4	—	—	74
Tonga Islands	—	—	—	—	3	3	16	7	14	6	1	—	50
Samoa Islands	—	—	—	—	1	6	10	2	8	2	—	—	29
New Hebrides	—	—	—	1	3	1	11	9	9	2	1	—	37
New Caledonia.	1	—	1	2	—	4	11	11	10	—	—	—	40
Norfolk Islands.	—	1	—	2	—	—	4	7	7	2	—	2	25
Low Archipelago.	—	—	1	—	—	—	3	2	1	—	—	—	7
Society Islands.	—	—	1	—	—	3	3	1	—	—	—	—	8
Solomon Islands.	—	—	—	—	—	1	2	1	2	—	—	—	6
Cook Islands	—	—	—	—	—	5	2	5	2	2	—	—	16
Totals ..	1	1	3	5	8	36	83	60	73	18	2	2	292

Season.—The occurrence of hurricanes shows a marked seasonal variation in all tropical seas. In the South Pacific, as shown by TABLE I., the season extends from December to April inclusive, the months of greatest frequency being January to March. Storms sometimes occur in October and November, but very rarely in the remaining months of the year.

The season of the second group of hurricanes, affecting Queensland and Northern Territory, also extends from December to April, as shown by TABLE II., which gives the monthly distribution of 159 recorded hurricanes for the period 1839 to 1922:—

TABLE II.

Locality.	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June
Queensland ..	5	—	4	4	2	8	29	22	29	12	6	6
Northern Territory	—	—	—	—	4	7	7	4	8	2	—	—
Totals ..	5	—	4	4	6	15	36	26	37	14	6	6

Tracks.—The hurricanes of the South Pacific generally follow a parabolic track. They first travel in a south-westerly direction from the equatorial regions, then curve southward, generally between Latitude 15° S. and 25° S., and finally pass away to the south-eastward, losing their intensity, and many becoming merged in the weather systems of the temperate latitudes. There are exceptions to this general direction, but, in the absence of sufficient data, the cause of these irregular tracks has not been fully explained; nor can some of these tracks have been accurately charted, owing to lack of sea observations. CHART A shows the tracks of representative hurricanes selected from the list in TABLE I. Up to the present, between the Equator and Latitude 9° S., no hurricanes have been reported, though it is possible that some originate nearer the Equator.

CHART B shows the tracks of some Australian hurricanes. Nearly all curve in a parabolic track between 15° S. and 25° S., and proceed to the south-eastward, similar to those of the island groups.

Rate of Travel.—The velocity of the progressive movement varies considerably with different hurricanes, and an individual hurricane may move with varying velocities at different stages of its career. Generally it may be said that the speed increases with latitude, except during recurvature. During the early life of a hurricane, the rate of travel is small, but increases to about 200 miles per day as the disturbance passes to the south-westward. On reaching the point of curvature, however, it may move very slowly or remain practically stationary, perhaps for several days; after which the speed will increase to 250 to 350 miles a day, as the storm bears away to the south-eastward. By the time they reach Latitude 30° S. the average speed is over 400 miles per day, and occasionally reaches 500–600 miles per day.

Area.—The area over which the influence of a hurricane is felt varies a good deal. The *average* extent of the storm-field may be taken as from 300 to 400 miles in diameter. In some cases it is less than

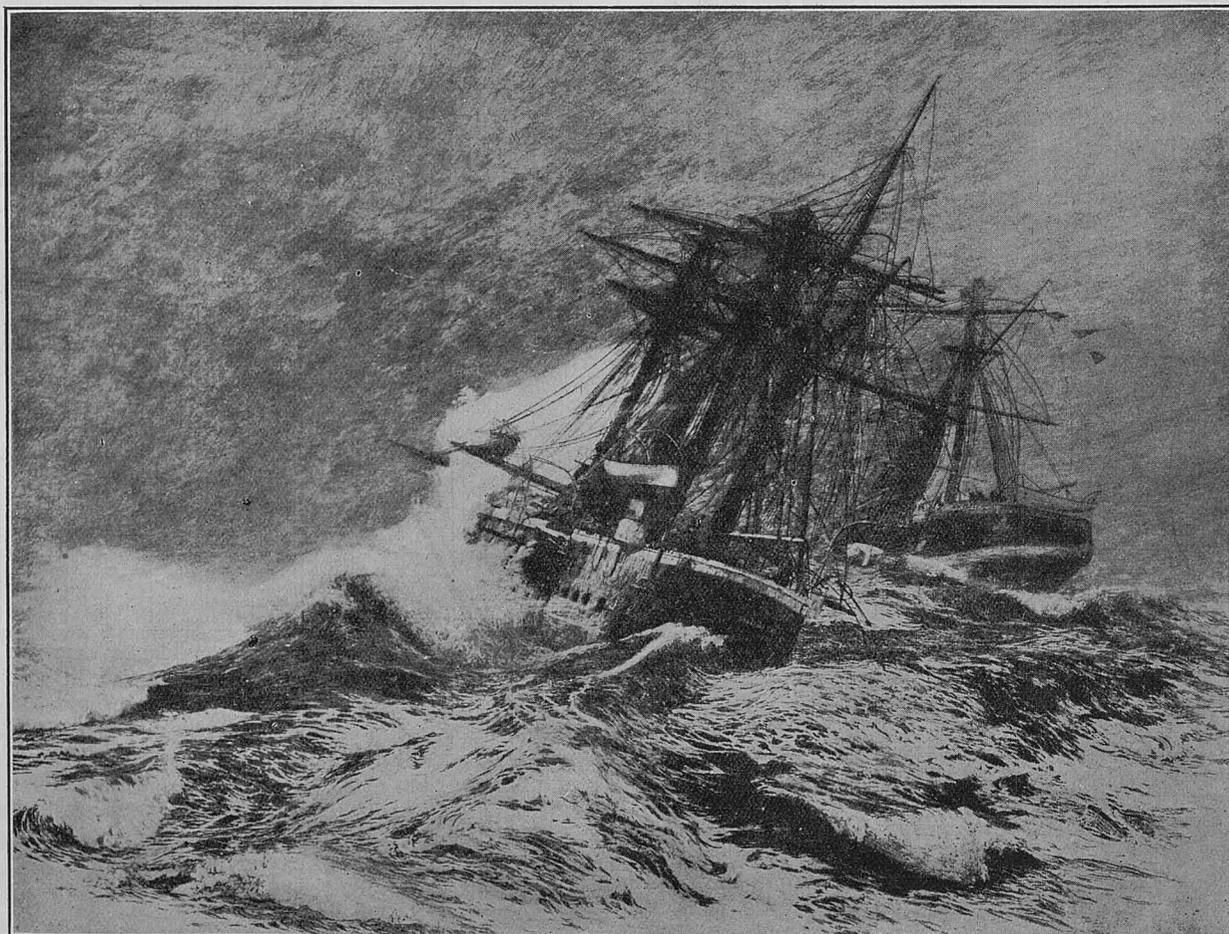
200 miles, and in others it may be as much as 800 miles, or even more. Violent or even strong winds are not to be expected, however, in the outer zones of the storm-field, although the existence of the disturbance may be plainly evident by reason of the indications of the barometer, the formation of cirrus clouds, swell, and other signs.

Duration.—The duration of a hurricane depends, of course, upon its speed of travel at the particular spot where the observer is situated, and upon its extent; also, at sea, upon the course and speed of the ship relative to the storm's movement. In the vicinity of the island groups, where the storms generally recurve, the passage of a storm may occupy 3 or 4 days, the longest duration reported being 6 days in the district round New Caledonia. In higher latitudes, free from the islands, one day on the average covers the passage of the disturbance.

Intensity.—The hurricanes of the South Pacific seem to be quite as violent and destructive as those of other oceans. In spite of the limited information regarding most of the storms given in TABLE I, several of them were noted for their exceptional severity. The best known one is perhaps the "SAMOA" hurricane which visited Apia harbour on 16th March, 1889, when many vessels lying in the harbour were either wrecked or stranded, with a loss of 130 lives. The only vessel to escape was H.M.S. *Calliope*, which steamed out to sea in the teeth of the hurricane.

CAPTAIN J. WATERHOUSE, when in command of s.s. *Clan Mackay*, sent in an account of a hurricane at Apia in March, 1923, which he described as even worse than the one in March, 1889.

Hurricane Warning Stations.—The hurricanes affecting the tropical coast of Queensland are also frequently very destructive, and on several occasions coast towns have been devastated, with much loss of life and shipping. Most of these storms approach from the east, and the Commonwealth Government established, in 1921, at Willis Island, a small islet in the Coral Sea, 250 miles E. by N. of Cairns, a W/T



Escape of H.M.S. *Calliope*

From Apia Harbour, Samoa, on the 16th March, 1889.

Reproduced from an engraving by W. L. WYLLIE, A.R.A., which was presented to the Marine Division of the Meteorological Office by the late Mr. T. E. Allen.

Weather Reporting Station for the purpose of giving timely warning of these disturbances.

The establishment of the station was undertaken by CAPTAIN JOHN K. DAVIS, Commonwealth Director of Navigation, who remained on the island during the hurricane season of 1921 to 1922. Although no hurricanes were recorded during his stay, CAPTAIN DAVIS, from a survey made during the season, concluded that the island was safe for a party to remain during the hurricane season, and the station has been permanently established.

There was also inaugurated, during the year 1921, mainly in the interests of shipping, a scheme for the interchange between Fiji, Samoa, Tonga, New Hebrides, and Norfolk Islands of meteorological information twice daily during the hurricane season. The information from the islands is collected at Suva by CAPTAIN E. W. G. TWENTYMAN, the Harbour Master, who then compiles messages which are broadcasted from Suva W/T Station twice daily. This service has proved of considerable value, and CAPTAIN TWENTYMAN, in a detailed report for the hurricane season 1922-23, says that "this scheme, although only working fairly well, has been a great source of comfort to shipping as well as to all stations concerned." With the inclusion of further stations, advocated by CAPTAIN TWENTYMAN, this service would be improved; and its usefulness would be still further increased if vessels within W/T range of the stations would transmit weather reports regularly as a matter of routine, but especially when in the vicinity of a hurricane.

An exactly similar system of hurricane warning has also been adopted at Apia, and full particulars of these services are given under "Weather Signals."

CAPTAIN TWENTYMAN, in the report referred to above, dealing in detail with the hurricanes experienced during the season 1922-23, quotes the account of a resident of Munia, Fiji, MR. H. H. STEINMETZ, who drew attention to a remarkable feature of the hurricane which passed over that locality on 15th to 16th March, 1923. He says that after the hurricane it was found "that all the breadfruit and giant ornamental trees were either prostrate or mere skeletons, branches as much as two feet in diameter having been literally twisted off close to the trunks." On going over the whole island he "estimated the damage to the coconuts to be at least 50 per cent., consisting of uprooted trees and those with their heads either wholly or partially twisted off."

He also referred to the fact that "every squall that came howling down the valleys left a vacuum surrounding the building, with the result that the permanent portion of the verandah, together with its shutters, as well as the doors and windows of the house, had to withstand a strain outwards as if impelled by some invisible force from the inside. In consequence of this phenomenon, I, while engaged barricading the verandah during the calm, when the first terrible squall put an end to it, was precipitated, together with 45 feet of permanent structure, on to the lawn beneath."

This hurricane appears to have been of exceptional intensity, and considerable damage was done amongst the Eastern Islands of Lau.

CAPTAIN H. P. DOUGLAS, C.M.G., R.N., H.M.S. *Mutine*, in forwarding an account of a West India hurricane which swept over Bermuda in September, 1922, extracts from which were given on the North Atlantic Chart for September, 1923, also drew attention to this curious twisting effect of the wind, stating that many large trees were twisted and entirely destroyed by this action.

Indications of the Approach of a Hurricane.

There are certain more or less well-defined indications of the approach of a hurricane which were given in Chapter VI. of "Wireless and Weather, an Aid to Navigation."

In most tropical seas where hurricanes occur a change in the predominant direction of the surface wind is nearly always the herald of an approaching hurricane. In the South Pacific, however, during the southern summer, there is no well-defined trade wind or monsoon over the hurricane regions. In winter the S.E. trade extends over practically the whole belt from Australia to South America; but this is somewhat disturbed during the summer (which is the hurricane season) between the New Hebrides and the Low Archipelago, where as a rule north-easterly or north-westerly winds alternate with light south-easterly winds and calms. Wind direction is, therefore, not always a sure guide in the South Pacific, although a north-easterly wind should always be regarded with suspicion. In any case, if an observer experiences a freshening wind with an increasing number of

severe gusts and squalls, a falling barometer, and a gloomy threatening appearance of the weather, the near approach of a hurricane is certain.

The following publications have been used in the preparation of this article:—

- "Australian Meteorology" by GRIFFITH TAYLOR. 1920.
- "Tropical Cyclones in South Australia and the South Pacific and Indian Oceans," by STEPHEN S. VISHER, *U.S. Monthly Weather Review*, June, 1922.
- "Die Tropischen Orkane der Südsee" by E. KNIPPING, aus dem *Archiv der Deutschen Seewart.* 1893.

SLIDE-SCALE FOR CORRECTING THE READINGS OF MERCURIAL BAROMETERS.

As no doubt many observers have found to their cost, the labour of correcting a reading of the barometer and reducing it to sea-level is considerable, since it involves the looking up of values in tables and the making of computations. But, as has often been insisted upon, the uncorrected pressure read from a barometer is not suitable for the construction of synoptic charts, for broadcasting to other ships, or for reporting to the Meteorological Office. Before the barometer readings recorded in logs can be used for research work they must also be corrected.

To reduce this labour LIEUT.-COLONEL GOLD, Assistant Director of the Meteorological Office, devised a slide some time ago to be fitted to marine barometers which was so adjusted that the correction and reduction were made by one process only.

Slides of this pattern were attached to a number of barometers and issued to ships making coded W/T reports to the Meteorological Office. They proved very satisfactory and now a further supply of slides is being obtained of a slightly modified pattern. This modified pattern is termed the Mark III. Barometer Slide-scale.

These slides are attached by clips which embrace the cover of the barometer, so that the slides can be fitted to any Kew pattern marine mercurial barometer.

The apparatus consists essentially of a thermometer and a slide worked from a ratchet and pinion. On the slide are engraved scales of height and correction to pressure, while on the fixed part are engraved scales of latitude and temperature, as can be seen in the photograph reproduced here.

To Use the Apparatus.—Revolve the large milled headed screw until height of the instrument above the water-line, indicated on top right-hand scale, coincides with the latitude of the ship (top left-hand scale).

The total correction to be applied to the barometer reading is then read off at the head of the mercury column of the attached thermometer by the scale to the right. The temperature is indicated by the scale to the left.

Barometers with these scales attached should be kept free from exposure to rapid changes of temperature, for these thermometers are rather more exposed than in ordinary barometers.

To test that the thermometer is correctly adjusted when the instrument is first placed in position, set the height scale so that zero height coincides with 45° on the latitude scale. Then read the value of the temperature scale corresponding to zero on the "correction to barometer scale." If this reading of the temperature scale is identical with the standard temperature of the barometer, the apparatus is in correct adjustment.



THE MARINE OBSERVER'S LOG.

It is hoped that these pages will be filled each month with a selection of the contributions of Mariners in manuscript, or remarks from the Logs and Reports of regular Marine Observers.

Responsibility for statements rests with the Contributor.

EXCEPTIONAL VISIBILITY.

THE following is an extract from the Meteorological Log of S.S. *Port Stephens*, Captain I. R. SAWBRIDGE. Observer, Mr. H. G. B. PINKNEY, Wellington to Lyttelton.

"The remarkable visibility during the middle watch on the morning of 2nd November, 1923, seems worthy of remark. On relieving the watch the individual lights of the township of Kaikoura were plainly visible at a distance of 11 miles, while one or two stars showing suddenly below a bank of St.-Cu. ahead were, for the moment, mistaken, both by the Master and myself, for steamers' lights, owing to their clarity and brightness at a remarkably low altitude. An hour and a half afterwards the lights of the steamer *Maori* were clearly seen at an approximate distance of 15 miles. The moon was just rising about this time (last quarter). At 2.30 a.m. the coastline was distinctly visible at a distance of 10 miles, though the sky was overcast at the time, the moon occasionally visible. The wind, from midnight to 2 a.m., was W.S.W. veering to West; 2 a.m. to 4 a.m., West veering to W.N.W., force 1, with occasional calms, except at 0.20 a.m., when for half an hour it reached force 5 from W.S.W. and at 2 a.m. force 4 for a short interval from W/N.

"Instrumental readings, etc., were as follows:—

Time.	Corrected Bar.	Dry Bulb.	Wet Bulb.	Water (Sea).	Clouds.	Weather.
1st Nov. Midt.	1009.8 mbs. (29.82 ins.)	64°·5 F.	54°·3 F.	53° F.	St.-Cu.	O.V.
2nd Nov. 4.0 a.m.	1008.6 mbs. (29.78 ins.)	65°·2 F.	55° F.	52° F.	Ci.-St. St.-Cu.	O.V.

"Remark:—Trace of barogram showed considerable embroidery. Ship's position at 8.56 p.m. 1st Nov. (indicated by the mark on the barogram) Cape Campbell bearing 303°, distant 11 miles. Course from this, 211°, distance 90 miles to 4 a.m. (2nd Nov.)."



CYCLONE IN BAY OF BENGAL.

THE following account of a cyclone, experienced on 13th November, 1923, has been received from s.s. *Graciana*, Captain J. CLARK:—

"Noon 12th Nov.—Wind N.N.E., force 6, Barometer falling slowly 29.92, Thermometer 84°, sky heavily clouded, with clear intervals, Fracto-stratus low-lying round horizon. Passing rain squalls; sea increasing, direction N.E.

"8.0 p.m.—Wind N.N.E., force 6; Barometer 29.84, Thermometer 80°, heavy squalls, with vivid lightning and rain from E.N.E., sky heavily overcast, with stratus clouds and fracto-stratus low-lying. Sea force 6, with considerable swell from E.N.E.

"4.0 a.m. 13th Nov.—Wind unsteady, direction N.E. to E. by N., force 7; heavy squalls, increasing in frequency and strength. Barometer 29.73. Thermometer 81°. Sky overcast, heavy stratus with large quantities of fracto-stratus; sea 7, direction irregular. Swell N.E.

"Noon 13th Nov.—Wind E. by N., force 8, heavy squalls. Barometer 29.64, Thermometer 84°, sky heavily overcast, Latitude 13° 15' N., Longitude 84° 28' E. Short periods of part clear sky, large quantities of fracto-stratus low-lying and travelling at great speed. Sea becoming more confused, swell N.E. Wind and sea rapidly increasing to gale force.

"4.0 p.m.—Wind N.E. by E., force 9; sky densely overcast, frequent heavy squalls with torrential rain, visibility small, sea high and dangerous and becoming more confused. Swell decreased from N.E. Barometer 29.51. Thermometer 82°.

"6.30 p.m.—Wind North, force 4; sea heavily confused and dangerous. Sky broke with patches of clear blue. Fracto-stratus low-lying and scurrying. Swell from N.E., diminished seas running in all directions. Barometer 29.51 (steady), Thermometer 81°.

"8.0 p.m.—Vessel evidently passed over central calm. Wind backed through North to W.S.W. in heavy squall. Sky totally overcast. Squalls attaining hurricane force, continual torrential rain, visibility nil. Sea dangerously confused. Vivid lightning, Barometer 29.60, Thermometer 81°. Position of central calm at 8.0 p.m., Latitude 11° 16' N., Longitude 83° 57' E. Vessel hove to on starboard tack.

"12.0 p.m.—Wind and sea slightly decreased, sea more regular from S.W., high and dangerous. Heavy wind and rain squalls becoming less frequent. Lightning to W.S.W. Barometer 29.58, Thermometer 78°.

"4.0 a.m. 14th Nov.—Wind decreased to force 7, remaining steady from S.W. by W. Barometer 29.63, Thermometer 79°, rising slowly. Sky breaking in places and forming nimbus clouds, with high stratus clouds. Fracto-stratus gradually clearing. Sea regular from W.S.W., force 8, swell from S.S.W.

"8.0 a.m.—Wind S.W., force 7. Sky heavily overcast with occasional breaks. Sea W.S.W., force 7. Barometer 29.77, Thermometer 80°.

"Noon.—Wind S.W., force 7. Sky heavily overcast. Stratus clouds, low-lying strato-cumulus. Occasional heavy rain. Visibility good. Resumed "full speed" and course. Barometer 29.81, Thermometer 81°."

This storm appears, from the Indian Daily Weather Reports, to have moved from the south of the Andaman Isles on November 9th to a position N.E. of Madras on the 15th; it then remained approximately stationary off the coast till the 17th, when it worked along the coast of India to N.E. and finally expended itself in, approximately, Latitude 20° N., Longitude 88° E., on November 20th.

CURRENT.

THE following is an extract from Form 911 of s.s. *Malda*, Captain T. N. GRAY; Observer, Mr. T. R. K. LANGDON, 4th Officer; bound from London to Calcutta:—

"From noon, 17th November, 1923, in Latitude 15° 24' N., Longitude 83° 01' E., to noon, 18th November, in Latitude 18° 39' N., Longitude 86° 19' E., current set N. 52° E. 25. On the 18th November it will be seen that the current set N. 52° E. (T.), whereas at this time of the year a South-westerly set is expected. This was no doubt due to the cyclonic weather prevailing."

COMPARISON OF TEMPERATURES IN PORTABLE AND FIXED SCREENS.

THE following is an extract from the Meteorological Log of cable ship *Colonia*, Captain V. CAMPOS, O.B.E. Observer, Mr. A. S. MUIR.

"Attention is called to the readings of the Dry and Wet bulbs in the portable screen during the nights of 19th to 22nd November, 1923. The portable screen during this period was kept hung up under the upper bridge wing, and had a constant breeze playing upon it. The permanent screen, being placed in the port wing of the bridge, was out of the way of any great draught of wind. During this period it was noticed that the evaporation of the water in the portable screen bottle was very great, amounting to a bottle-full per 24 hours, while the evaporation in the permanent screen bottle was very little. During this period the Northerly winds were very dry."

Date.—19th November, 1923.

Noon Position.—Latitude 43° 39' N., Longitude 18° 32' W.

Time.	Portable Screen.		Fixed Screen.	
	Dry Bulb.	Wet Bulb.	Dry Bulb.	Wet Bulb.
Noon	58·0	57·0	58·5	57·5
4 p.m.	55·0	51·0	55·0	51·0
8 p.m.	55·0	49·0	54·5	49·0
Midnight ...	52·2	46·2	52·2	48·0

Date.—20th November, 1923.

Noon Position.—Latitude 45° 50' N., Longitude 13° 17' W.

Time.	Portable Screen.		Fixed Screen.	
	Dry Bulb.	Wet Bulb.	Dry Bulb.	Wet Bulb.
4 a.m.	51·3	45·7	50·8	46·0
8 a.m.	50·5	45·7	50·0	46·0
Noon	47·5	43·7	48·5	45·0
4 p.m.	47·0	43·3	47·0	43·6
8 p.m.	46·0	42·3	46·5	42·5
Midnight ...	48·5	44·0	47·0	44·0

Date.—21st November, 1923.

Noon Position.—Latitude 48° 27' N., Longitude 7° 28' W.

Time.	Portable Screen.		Fixed Screen.	
	Dry Bulb.	Wet Bulb.	Dry Bulb.	Wet Bulb.
4 a.m.	48·0	43·8	47·5	44·0
8 a.m.	48·0	42·7	47·5	43·5
Noon	48·0	43·0	50·0	45·0
4 p.m.	45·2	42·4	46·0	42·7
8 p.m.	45·6	40·0	45·0	40·0
Midnight ...	44·4	39·2	44·0	39·0

Date.—22nd November, 1923.

Noon Position.—Latitude 50° 37' N., Longitude 0° 17' W.

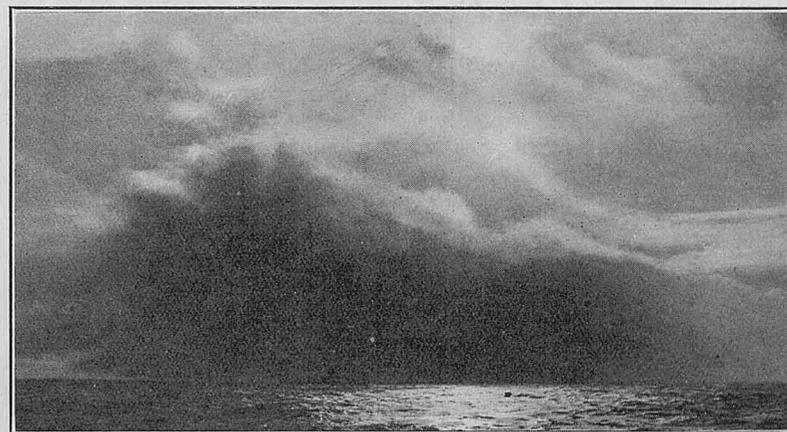
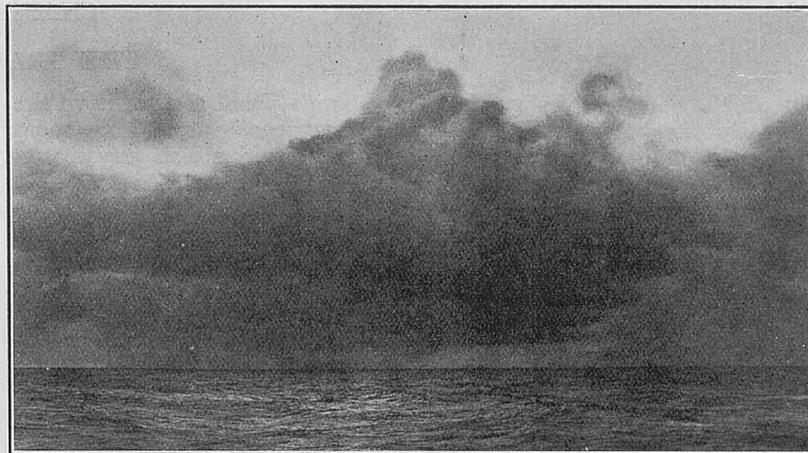
Time.	Portable Screen.		Fixed Screen.	
	Dry Bulb.	Wet Bulb.	Dry Bulb.	Wet Bulb.
4 a.m.	43·6	40·2	43·0	40·0
8 a.m.	40·7	38·5	41·0	38·5
Noon	39·0	38·2	39·0	37·5
4 p.m.	40·5	38·8	40·8	39·0
8 p.m.	40·0	39·0	40·0	38·0
Midnight ...	35·0	34·0	37·0	35·0

METEOR.

THE following is an extract from Form 911 of s.s. *Canada*, Captain R. G. SMITH. Observer Mr. DRAY, 2nd Officer. Bound from Liverpool to Montreal:—

“On November 8th at 11.30 p.m., in Latitude 53° 24' N., Longitude 50° 44' W., observed a meteor or shooting star from near the zenith to fall west towards the horizon. When near 45°, it struck another meteor or star and either one or the other broke in two and all three fell slowly, and, gradually gaining speed, fell to horizon. At impact the night was as light as day.”

CLOUD PHOTOGRAPHS.



THE accompanying photos were taken on 14th November, 1920, in Latitude 55° 38' N., Longitude 30° 40' W., by Mr. R. A. LEICESTER, s.s. *Pretorian*, Captain J. HALL. Mr. LEICESTER remarks:—

“The photographs will give a little idea as to the type of weather during the afternoon of the above mentioned date. Everything of the worst possible description, sea 10, wind 12, west, the squalls shown being a mixture of rain, hail, snow and sleet.”

SQUALL.

THE following is an extract from the Meteorological Log of s.s. *Orvieto*, Lieutenant-Commander W. S. SHELFORD, R.N.R., Suez to Colombo:—

“At 2.0 a.m., 25th November, 1923, in Latitude 21° 40' N., Longitude 37° 42' E.; from the S.E. a continuous display of very intense flash and forked lightning from before midnight. Heavy threatening appearance to the S.E. at 2.0 a.m.

“2.15 a.m. lightning not so frequent, sudden S.E. squall accompanied with rain and decrease in temperature (wind and rain-water cold).

“2.25 a.m. wind and rain ceased, heavy clouds and lightning passing astern. Blue sky and fine weather ahead.

“3.0 a.m. lightning of great intensity to the N.N.E. and North.”

A similar squall was reported in November, 1921, near this position, an investigation of which was published upon the East Indian Seas Chart for March, 1923, No. 203.

WIRELESS AND WEATHER, AN AID TO NAVIGATION.

CHAPTER XI.

THE TRADE WINDS.

Of all the climates of the Oceans, the Trade Wind regions have the most stable weather conditions; so that averages or normals are more likely to represent the weather a ship will experience in any season than in any other part of the Oceans.

There are, however, considerable variations of wind in the same season, and, if these can be predicted, the navigator is likely to be the gainer, particularly if his is a steamer working to an exacting timetable to fulfil a mail contract.

In this Chapter, much of our information is derived directly from charts of normals and frequencies, and for the methods advocated it is desirable that these charts should be referred to regularly. The notification given of the reprints of the Meteorological Charts of the North Atlantic and East Indian Seas in the May number appears to have escaped the eye of a number of Commanders; as the number of these charts printed is limited, those of the regular Corps of Observers who wish their ships to be supplied with normal and frequency charts would do well to write early, in the terms set out in the notice referred to.

Looking back to Chapter VII. and in reference to Charts XXVI. and XXVII., it will be found that we laid stress upon the fact that the high pressure zones lying roughly between the parallels of 20° and 40° North and South Latitudes are not continuous round the globe.

Generally speaking, the Trade Winds exist between the belts of high pressure and the equatorial zone of low pressure; they also occupy the gaps of less pressure occurring in these High Pressure belts.

The Trade Winds proper being to the Eastward and Southward and Eastward and Northward, according to hemisphere, of the centres of the anti-cyclones, continue round the South-west and North-west sides of the anti-cyclones, always inclining out from the centre. Hence we often get the S.E. Trade in the vicinity of Martin Vaz as a N.E. wind or the N.E. Trade as a S.E. wind, near the West Indies. Readers who served in sailing ships will remember the old joke when squaring in the main yard, outward bound in the South-east Trade.

The Trade Winds form a great part of the general circulation of the atmosphere governed by distribution of pressure. They are due to the difference of pressure in the great anti-cyclones and in the equatorial "low," caused by the distribution of the sun's heat over the earth's surface. In the Atlantic and Pacific Oceans, the Trade Winds continue throughout the year, but in the North Indian Ocean they are replaced by the Monsoons.

The late Captain Campbell Hepworth investigated the Trade Winds of the Atlantic in the following areas:—

North-east Trade, area between Latitude 10° and 30° N. and Longitude 30° W. and the African Coast.

South-east Trade, area contained between the meridian of Greenwich and Longitude 10° E. from Latitude 10° to 30° S., and between the first meridian and Longitude 10° W. from the Equator to Latitude 20° S.

In these areas, which represent the hearts of the Trades of the Atlantic, he found that the N.E. Trades were strongest from January to May, while the S.E. Trade increased in the months of April, June, August and November, decreasing in the intervening months.

The Meteorological Charts of the Indian Ocean show that generally the S.E. trades do not vary much in strength from month to month, but are rather stronger during the prevalence of the S.W. monsoon in the Arabian Sea (June to September) than during the N.E. monsoon. This is due to low pressure being developed over Asia in the Northern Summer and the South Indian Ocean anti-cyclone being intensified.

The South-East Trade continuing across the Equator and turned by the rotation of the earth gradually becomes a S.W. wind. In the Atlantic during July, August and September, the S.E. trade is turned gradually to the right, becoming a S.W. wind North of the equator known as the S.W. monsoon; at this time low pressure has developed over Northern Africa.

The limits of the Trade Winds, as is well known, move North and South after the sun; they are given on the Meteorological Ocean Charts each month.

During the Southern Summer the South East Trade extends considerably to the Southward; at the Cape it is known as the "South-

Easter"; at this time low pressure is developed over the Kalahari Desert, causing a steepening of the barometric gradient near the coast and to seaward. In the Indian Ocean when the Southern limit of the S.E. trade passes South of Cape Leeuwin in the Southern Summer, low pressure has developed over the great sandy desert of Western Australia; at this time South Westerly winds prevail in the Timor Sea, due to the cyclonic circulation of air Northward of this depression.

Referring again to Chapter VII. and "Australian Weather Types," it will be seen that travelling anti-cyclones pass over Australia and that the Antarctic "Lows" to the Southward extend as "As" to the Northward between the anti-cyclones; also tropical "Lows" extend Southward.

Mr. C. STEWART, of the South African Union Weather Service, considers that weather is largely due to anti-cyclones passing Eastward with their associated Λ depressions and secondaries at the Cape, and the behaviour of ships' barometers, and wind and weather experienced along the South Pacific trade route seem to indicate that anti-cyclones are constantly passing Eastward in these Latitudes.

According to Mr. HUNT, the Mean Latitude along which the centres of anti-cyclones pass is about 40° S. in summer and 30° S. in winter.

The variations of force and direction of the "South-Easter" at the Cape in summer and the South East Trade in all oceans and in all seasons near its southern limit may be accounted for by the passage of these moving pressure systems. Further North their effect is diminished and the pressure distribution remains more settled. The prediction of the strength of the S.E. Trade in its heart would be useful to the outward Cape or Australian bound steamer, but if the force and direction of the wind at the southern extension could be predicted it would possibly be still more valuable, for here it is that we are more uncertain, the variations from the normal being more frequent and usually greater.

It is at the southern extension that it is proved what Captain S. T. LECKY termed "steamanship" has been used with good judgment for the passage.

South East Trade in the Indian Ocean and Economy of Coal.

The following are notes taken from my journal when in *Omrah*. This was a lucky voyage and we had a remarkably small coal bill. Unfortunately we did not keep a Meteorological Log, the only voyage during the whole of my time in the Australian Mail Service that we did not do so:—

Colombo to Fremantle.

September 6th, 1913.—10.46 passed Breakwater, set speed 66 revolutions. Light to moderate S.W. breeze and fine clear weather.

September 7th.—Noon, Latitude 4° 10' N., Longitude 81° 30' E. Fresh W.S.W. wind, rather rough sea. Current since 3.8 a.m. Pt. de Galle, S. 34° E., 4 miles.

September 8th.—Noon, Latitude 0° 29' S., Longitude 85° 47' E. Rain in middle and morning watches. Current S. 74° E., 32 miles. P. & O. *Macedonia*, Captain BENNETT, homeward, reported by W/T strong S.E. Trades from Latitude 26° S. to Latitude 6° S.

September 9th.—Noon. Latitude 5° 02' S., Longitude 89° 39' E. Gentle to moderate S.E. trade throughout. Distance to Rottneest 2,181 miles, reduced to 65 revs.

September 10th.—Noon, Latitude 9° 19' S., Longitude 93° 31' E., current S. 68° W., 5 miles. Strong to fresh S.E. trade.

September 11th.—Noon, Latitude 13° 26' S., Longitude 96° 57' E., current S. 40° W., 10 miles. Fresh to moderate S.E. trade. Distance to Rottneest 1,513 miles, reduced to 61 revs.

September 12th.—Noon, Latitude 17° 32' S., Longitude 100° 56' E., current S. 46° E., 15 miles. Gentle S.E. trade until 4 p.m., then gentle S.W. breeze and fine. *Orsova*, Captain HEALY, homeward, reports by W/T moderate to light variable winds from Fremantle. Reduced to 60 revs.

September 13th.—Noon, Latitude 21° 28' S., Longitude 104° 59' E., current N. 80° E., 16 miles. Strong S.W. and Southerly wind, rough sea; fine and clear.

September 14th.—Noon, Latitude 25° 30' S., Longitude 108° 50' E., current N. 73° E., 14 miles. Fresh to gentle Southerly wind.

September 15th.—Noon, Latitude 29° 26' S., Longitude 112° 45' E., Light and variable airs to moderate W. by S. wind. Distance to Rott-
nest, 211 miles.

September 16th.—4.17 a.m. came to an anchor in Gage Roads. 6.17, received signal to proceed into harbour and Health Officer would board inside Breakwater.

Averages for passage.—Actual steaming time, 9 days 3 hours 9 minutes. Distance 3,128 miles. Speed, 14.27 knots. Revs. per minute, 62.34. Apparent slip per cent., 6.2.

Notes from proposed programme worked out in the Mediterranean in consultation with Chief Engineer: Leave Colombo, September 6th midnight. Distance to Fremantle, 3,131 miles; arrive Gage Roads (September 16th) for 6 a.m. medical inspection. Speed required, 14.3 knots, allowing for 9 per cent. slip. Revolutions required, 64.5 (go 15 knots until S.E. Trade).

NOTE.—*Ormond's* normal slip under conditions of loading for 15 knots was 7 per cent.

From this it will be seen that we commenced at nearly four revolutions more than was required for the passage in view of former averages in September, and that for the time of year we had less head wind than usual, with currents as a whole a little favourable.

The weather information received from *Macedonia* near the Equator indicated that from just within the month's average Southern limit, for some days before, the South East Trade had been strong. With this information of *past weather* I judged it expedient next day when we had got the S.E. trade not to make a material reduction of speed, hence the revolutions were only reduced by one.

On September 11th it was found, in the heart of the Trades, that they were not strong and revolutions were reduced to only one above speed required.

Next day on receipt of information of *past weather* from *Orsova* which indicated that the S.E. Trade had been considerably North of the month's average Southern limit, the weather by our own observation at the time appearing to be settled, we reduced another revolution and maintained that speed, arriving with nearly two hours in hand. Had it been possible to forecast only a fresh Trade and the absence of head winds at the end of the passage, rather less coal might have been burned.

In those days our wireless only had a range of up to about 200 miles, whereas now, in numbers of ships of the same class, the range is measured by as many thousands of miles; the utility of the barometer for exact comparison of atmospheric pressure at different places was almost unknown to many of us, the scientific use of charted climatic normals was only popular with few, and making a weather chart at sea was almost unheard of.

Let us see with recent synchronous observations of *present weather*, what it may be possible to do in the future with tested instruments and long range wireless telegraphy, and, though we have not got details of engine speed, or notes of what was at the back of the Commander's mind, in the following examples we will suppose in accord with our practice in these chapters, that all ships shown on the weather charts numbered LX, to LXV, broadcasted and received the reports.

In drawing these charts with so few and widely spaced observations, the normal charts give us an idea of the probable shape of the isobars, and in order that these may be more readily compared with the normals, they are drawn for every two millibars. *Ormonde* wishes to know if the Trade Wind will be strong or moderate, and later if she may expect a head wind approaching Fremantle.

Chart No. LX. Morning, November 7th, 1923.

Ormonde picked up the S.E. Trade at midnight, 5th November, in Latitude 2° S., Longitude 88° E., or about 5° North of the average limit for the month, since when it remained fairly steady.

Pricking off *Ormonde's* position on the monthly chart we find that the normal pressure is 1010 (29.83) there. Her barometer corrected for index error, temperature, height and gravity is 1013 (29.92); according to the table for correcting for diurnal range in the tropics, overleaf, at this time of the year we must subtract 1 mb. = 1012; thus, at *Ormonde's* position, pressure is about 2 mb. above the normal.

Further, comparing this chart with the normal chart we find that over the S.E. portion of the South Indian Ocean pressure is generally about 2 mb. above the average for the month. *Ormonde*, North of the heart of the Trade, has the wind S.E. 4 and *Ormuz*, well within the average Southern limit for the month, has the Trade Wind S.E., force 5. *Ormuz* bears S. 43° 56' E., 1,565 miles from *Ormonde*, and

their barometers differ 5 mb. This tells us little directly, and we must depend upon the isobars as drawn to obtain an idea of the gradient. The distance between the 1014 and 1018 isobars measured approximately at right angles to them, and midway between these ships, is about 540 miles or 9 degrees on the latitude scale.

$5 \text{ mb.} \div 9 = .55 \text{ mb. gradient}$, which according to the table overleaf should produce a wind force of rather less than 4 on the Beaufort scale.

Later, when these ships passed each other, it was proved how well their barometers compared, but we have only been able to place the isobars by the values reported at the positions indicated, approximately, and though on this occasion the gradient agreed with the general force of the wind at the two ships, with so few reports, it cannot be relied upon, as an examination of the daily charts which follow will prove. However, the gradient so obtained gives an indication of the force of the Trade between observation points and so it is useful.

It must be clearly understood that the Table of Calculated Gradients is for straight isobars; in a cyclone the velocity of the wind is affected considerably by the curvature of the isobars.

During the next 24 hours *Ormonde* may expect the Trade to remain steady in direction and force.

We should like to know what the barometer is doing at Carnarvon, for if a tropical "low" is moving South or developing over Western Australia, the wind is likely to veer to the S.W. and freshen with the steepening gradient which would result off the West Coast of Australia.

Ormonde had wind S.E., force 4, throughout the 24 hours, according to her log.

Chart LXI. Morning, November 8th, 1923.

Pressure is still about 2 mb. above normal and the gradient has steepened a little in the heart of the South East Trade. A depression has developed over Western Australia, where the winds are cyclonic. Comparison of the temperatures reported with those of yesterday are interesting in that they show how the air is becoming heated in its passage to the Doldrums, where much of the moisture taken up will be precipitated; possibly it may be found that the relationship of air temperature in the South East Trade and rainfall in the Doldrums may be a guide to wind; this matter is now being investigated in the Doldrums of the Atlantic. In using the barometer tendencies it must be remembered that in the Tropics the barometer is rising at this time of day.

Ormonde may expect the Trade to increase to about force 5.

If the tropical "Low" over Western Australia continues to develop, strong S.W. winds will occur off the North-west Coast of Australia. The barometer tendency at Carnarvon and Perth, if reported, would now be especially valuable.

According to the log the South East Trade increased to force 5 on this day and remained at that force and from the same direction.

Chart LXII. Morning, November 9th, 1923.

The tropical "Low" has moved South and is now centred East of the Leeuwin. Pressure is still over one millibar above normal in the South East Trade. As the depression moves South the anti-cyclone may be expected to move East or spread East, in which case *Ormonde* may expect the South East Trade wind to back a point or two, but with ships so close together within the Trade Wind, we have little to go upon as to force which may be expected; there seems, however, nothing to indicate a material change in force. The wind off the North-west Coast of Australia will probably become more Southerly. *Ormonde* will experience a Westerly set. According to the log, the wind was S.E., force 5, throughout.

Chart LXIII. Morning, November 10th, 1923.

The positions of the ships again enable us to obtain an idea of the gradient in the S.E. Trade, but astern of them both, and from it we should expect about force 5. The chart indicates that *Ormonde* will experience the continuance of the South East Trade nearly as far South as its average Southern limit for the month, which her route cuts near the 30th parallel of South Latitude.

Chart LXIV. Morning, November 11th, 1923, Sunday.

The absence of observations at Australian stations is now felt, for the Eastward passage of Antarctic "Lows" may soon commence to affect the weather considerably. The pressure distribution has probably changed little since yesterday, and probably gentle Southerly winds will be experienced as *Ormonde* proceeds through the Eastern side of the anti-cyclone.

Chart LXV. Morning, November 12th, 1923.

The Λ of an Antarctic "low" has now appeared, centred S.W. of Cape Leeuwin; as it passes Eastward, the wind in the vicinity of the Leeuwin and Rottneest Island will back through West to the South West and moderate, and the gradient at the S.E. side of the anti-cyclone will become less steep. *Ormonde*, therefore, predicts with confidence moderate to light South Westerly winds to Fremantle. According to the log, this forecast was correct.

Though not conclusive, these examples are sufficient to show the possibilities of the method, and if all steamers fitted with long range wireless sets regularly using the three routes, Cape Guardafui to Cape Leeuwin, Colombo to Fremantle and Fremantle to Durban, would broadcast reports of observations once daily, made at the times suggested on page 12, probably material results would be obtained after the practice and experience of the method, which is so essential. The procedure outlined is equally applicable to the Trade Wind regions of the Atlantic and Pacific, though the weather conditions differ owing to distribution of land and sea. It is a far easier matter to work out what should have happened long after the event. But the following example of another experience the writer had in the *Orontes*, with Captain J. F. RUTHVEN, in January, 1907, will illustrate the use of normals; and then we will give experiences in which the value of wireless weather reports in the South East Trade region of the Indian Ocean cannot be questioned.

Table to correct Barometer Pressure for Diurnal Variation in the S.E. Trade Regions within the Tropics.

Ship's Time.	Southern Spring.		Southern Summer.		Southern Autumn.		Southern Winter.	
	mb.	ins.	mb.	ins.	mb.	ins.	mb.	ins.
4 a.m. ...	+0.6	+0.02	+0.7	+0.02	+0.7	+0.02	+0.5	+0.02
8 a.m. ...	-1.0	-0.03	-1.0	-0.03	-0.8	-0.02	-0.9	-0.03
Noon ...	-0.5	-0.02	-0.4	-0.01	-0.4	-0.01	-0.4	-0.01
4 p.m. ...	+1.4	+0.04	+1.3	+0.04	+1.1	+0.03	+1.2	+0.04
8 p.m. ...	-0.0	-0.00	-0.1	-0.00	-0.2	-0.01	-0.2	-0.01
Midnight ...	-0.5	-0.02	-0.4	-0.01	-0.4	-0.01	-0.5	-0.02

The above table was calculated by means of the Hollerith Electric Tabulating and Sorting machine from 15,306 observations of the barometer made by ships keeping Meteorological logs in the years 1921 to 1923 between Latitude 10° and 20° S. in all oceans.

The computation of the values by machine from which this table was constructed, and the construction of the table itself occupied one working day. This could not have been done in under one month by the old system.

This table not only provides the mariner with a fairly reliable average correction for diurnal range *at the relief of the watch* for Latitude 15° S., but affords an example to Marine observers of the possibilities of the new system of data extraction, of which they now commence to reap the benefit.

It will be noted that it differs very little from Captain TOYNBEE'S Table for Latitude 0° to 5° N. in the North Atlantic given in Chapter VI.

Table of Calculated Gradient and Wind Force. For Straight Isobars over the Ocean. Pressure 1,000 mb. Temperature 45° F.

Beaufort Wind Force.	Velocity.	Difference in Pressure in 60 n. miles.				
		Lat. 52°.	Lat. 45°.	Lat. 30°.	Lat. 20°.	Lat. 15°.
2	knots. 4-6	mb. 0.5-0.8	mb. 0.3-0.7	mb. 0.3-0.5	mb. 0.2-0.4	mb. 0.2-0.3
3	7-10	0.8-1.3	0.7-1.2	0.5-0.8	0.4-0.6	0.3-0.4
4	11-16	1.3-1.9	1.2-1.7	0.8-1.2	0.6-0.8	0.4-0.6
5	17-21	1.9-2.6	1.7-2.3	1.2-1.7	0.8-1.1	0.6-0.8
6	22-27	2.6-3.4	2.3-2.9	1.7-2.1	1.1-1.4	0.8-1.0
7	28-33	3.4-4.2	2.9-3.6	2.1-2.6	1.4-1.8	1.0-1.3
8	34-40	4.2-5.0	3.6-4.4	2.6-3.1	1.8-2.1	1.3-1.6
9	41-47	5.0-5.8	4.4-5.2	3.1-3.7	2.1-2.5	1.6-1.9
10	48-55	5.8-6.8	5.2-6.1	3.7-4.3	2.5-2.9	1.9-2.2
11	56-65	6.8-8.0	6.1-7.2	4.3-5.0	2.9-3.5	2.2-2.6
12	Over 65	Over 8.0	Over 7.2	Over 5.0	Over 3.5	Over 2.6

"Orontes" dodges Hurricane Winds of a Cyclone in South East Trade Region.

On this voyage we left Colombo at 11 p.m. on January 21st, 1907, and had the N.E. monsoon until 8 p.m. on January 22nd, in Latitude 1° 13' S., Longitude 86° 34' E.; thence Doldrums until 9 p.m. on January 23rd, in Latitude 6° 06' S., Longitude 91° 23' E., when we picked up the S.E. Trade, commencing with a light shower of rain. The Trade wind was gentle to moderate and light at times, first from S.E. and later from South and S.S.W., with barometer conforming to diurnal range and normal pressure until noon on January 25th, in Latitude 12° 19' S., Longitude 98° 22' E. At 4 p.m. that day the barometer, corrected, was 29.758 inches, or 1007.7 millibars. Correction for diurnal range + 1.3 = 1009, or 1 millibar below the normal isobar on the month's chart. The wind continued from S.S.W. and South, force 3 and 4, until 8 a.m. on January 26th, when the barometer was 4.4 millibars below the normal, allowing for diurnal range; it was now evident that a cyclone might be encountered.

At noon, in Latitude 16° 21' S., Longitude 101° 53' E., the wind freshened to force 5 from S.S.W., and from then onwards it increased and veered gradually, being W.S.W., force 8, at 8 p.m., when Captain RUTHVEN altered course to the Eastward and we passed in rear of the ring of hurricane winds and centre, making a fair wind of the N.W. and Northerly gale, which did not exceed force 10. The wind rapidly moderated and veered to the S.E. again as the storm passed away to the S.W. and the ship receded from it on a South-Easterly course. We had very heavy rain in the first watch, when the ship was nearest to the centre.

When the South East Trade blows into a Cyclone.

In the South Indian Ocean it is not difficult to avoid the intense part of the storm field of a cyclone approached from the North West, for there is not the same temptation as there is to a ship bound to the Northward or Westward, because by passing in rear a ship bound to the South Eastward will benefit by a fair wind.

In this ocean, cyclones often form near the Northern limit of the South East Trade, which, during the months December to April, is also the Southern limit of the N.W. or Middle Monsoon. Now, it is proved by observation that, before cyclones form, there is a reduction of barometric pressure and it is also proved by observation that cyclones in this ocean are not detached whirls of air beyond which light airs prevail, but the winds extend North and South from the centre for hundreds of miles. For this knowledge we are indebted to the great work of Dr. MELDRUM at Mauritius, where, in consultation with Captain WALES, Captain of the Port, he also drew up the rules which were outlined in Chapter VI. A cyclone having formed, it draws its supply of air from the N.W. monsoon to the Northward and the S.E. trade to the Southward, and it is difficult to tell when the increasing S.E. Trade forms part of a cyclone. Dr. MELDRUM also found that in the South Indian Ocean cyclones, North Easterly and Easterly winds often, if not always, blow towards the centre.

Upon Chart LXVI. the track of R.M.S. *Orontes*, Captain J. F. RUTHVEN, is plotted with wind and barometer from the Meteorological Log kept by Mr. J. AVERN, 3rd Officer, who later became Marine Superintendent of the Commonwealth of Australia Line, also the track of a homeward bound steamer, who did not realise that the South East Trade was blowing into a cyclone and passed through the centre, in which were seen great flocks of birds.

This chart also serves to show the great distance covered by the winds to the N.W. and S.E. of the centre, though it should be remembered that the observations covered several days. The advantages of routine reports reciprocated by these two vessels are obvious, but it was not until six years later that wireless was fitted in steamers in the Australian Mail Service, R.M.S. *Otranto* being the first to be so fitted, and it is interesting to note that her first operator is now the General Manager of a great Wireless Service in Australia.

Looking through the logs of vessels which have encountered cyclones in the South Indian Ocean in recent years we have not found a single case of a ship bound to the South-eastward; but we find records in March last year where, of three steamers homeward bound in the South East Trade, two, *Surrey* and *Port Albany*, ran into the hurricane winds of a cyclone, and from the following it would appear that the third, *Tennessee*, did not avoid them; we have no other report regarding *Tennessee*. As reported in the "Marine Observer's Log," March number, page 37, s.s. *Port Lincoln*, Captain C. N. JONES, Port Pirie to Port Said, reported:—

"After having the barometer somewhat high for a considerable period, about March 9th it began to fall—from 29.87 to 29.62

(uncorrected) between 8 p.m., March 8th, and 8 p.m., March 10th—and sky changed from blue and cirrus clouds to overcast, with passing rain, which we assumed to be a great change in weather, or that we were in the vicinity of some disturbance; but it came to be the outskirts of a cyclone. We were in communication by wireless daily with s.s. *Port Albany*, *Surrey* and *Tennessee*, who by their reports appeared to be making heavy weather of it, judging from their positions and day's run, which were all we received."

Port Lincoln's barometer was an aneroid, and comparison made on arrival in London showed that it read .35 inches too low (i.e., index error and correction for height combined + .35 ins.)

On 8th March, at 8 a.m., *Port Lincoln* was in the position indicated on Chart LXVII. and her barometer, corrected and allowing for diurnal range, was .29 in., 9.8 mb. above normal. Examination of the readings of this aneroid barometer, logged, show that they cannot be relied upon for obtaining the departure from the normal, as its error is probably not constant.

On the outskirts of a tropical revolving storm in formation the barometer is frequently unusually high and steady.

In this vicinity two days later, on 10th March at 8 a.m., *Surrey* and *Port Albany*, both with tested mercurial barometers, recorded pressure 5 millibars, .15 in. below normal by the month's chart.

The tracks of s.s. *Port Albany*, Captain C. A. ROBINSON, Fremantle to Suez, and s.s. *Surrey*, Captain C. R. KETTLEWELL, Adelaide to Suez, are plotted on Chart LXVII. with barometer and wind observed every four hours.

Both ships had the South East Trade from 6th March off the S.W. Coast of Australia, which backed to the Northward of East at 4 a.m. on 10th March. Up to midnight on 9th March blue sky and cumulus cloud was logged in both ships; at that time *Surrey* recorded cirrus radiating from N.N.W., the sky became overcast later. Both

ships encountered a confused swell at 4 p.m. on 9th March, which increased from E., E.N.E., and N.E. as the path of the centre and the ships' courses converged.

The cirrus, barometer below normal, and confused swell with wind backing to the Eastward, all gave warning.

At 8 a.m. on 11th March, had routine reports been broadcast, not only would these ships have been confirmed in their anticipation that they were approaching the path of a cyclone, but all others within range would have had early and distant information.

If the bearings of the centre are laid off from the ships' positions at midnight on 11th March in accordance with the average rule given in Chapter VI. it will be seen that they do not fit, the indraft of the Easterly winds being much greater at quite a small distance from the centre.

Port Albany's wireless aerials were carried away, which accounts for the absence of weather reports between these ships.

There can be no doubt that in the absence of several reports of synchronous observations on different sides of a cyclone in the South Indian Ocean when the S.E. Trade increases materially or backs, or the barometer is 3 or more millibars below normal within the Tropics, that it is best to heave to, until, by the veering or backing of the wind the passage of the centre with respect to the ship can be inferred. Even if such reports are received, once the wind circulation of a cyclone has been entered from the S.E. with an Easterly or S.E. wind it is best to heave to, unless very near the line of progression.

Distant reports and careful observation and comparison with normals are the best means of obtaining information for shaping course or regulating speed to avoid the storm field of a cyclone in the Trade Wind regions within which heavy seas may cause damage or straining to decks and hull, or worse.

(To be continued.)

WEATHER SIGNALS.

II.—WIRELESS WEATHER BULLETINS.

AUSTRALIA.

The Commonwealth Meteorological Bureau, at Melbourne, sends soon after noon (local time), daily (Sundays excepted), a report of the weather at sea and an "Ocean Forecast" to the undermentioned W/T stations, which are available for shipping upon request. When severe weather prevails or is expected, the forecasts, &c., are promptly broadcast by the W/T station nearest to the disturbed area. Wave length used in each case is 600 metres (spark):—

W/T Station.	Position (approximate).		Call Sign.
	Latitude.	Longitude.	
Perth	32° 02' S.	115° 50' E.	VIP
Darwin	12° 27' S.	130° 48' E.	VID
Brisbane	27° 25' S.	153° 02' E.	VIB
Sydney	33° 40' S.	151° 00' E.	VIS
Melbourne	37° 50' S.	144° 59' E.	VIM
Hobart (Tasmania)	42° 52' S.	147° 19' E.	VIH
Adelaide	34° 52' S.	138° 31' E.	VIA

Every night (Sundays included) a later report of the weather at sea and an "Ocean Forecast" are broadcast successively by Sydney, Melbourne, Hobart, Adelaide and Perth W/T stations.

Queensland and Coral Sea—"Ocean Forecasts."

At 0630 G.M.T. daily (Sundays excepted) from December to April, the undermentioned stations broadcast on 600 metres wave length (spark) an "Ocean Forecast Message" giving the state of the weather, direction and force of the wind, and the state of the sea at 0500 G.M.T. along the Queensland coast followed by a forecast of probable conditions during the ensuing 24 hours. On Saturdays the forecast of probable conditions will be for the ensuing 48 hours.

W/T Station.	Position (approximate).		Call Sign.
	Latitude.	Longitude.	
Thursday Island	10° 35' S.	142° 13' E.	VII
Cooktown	15° 28' S.	145° 15' E.	VIC
Townsville	19° 15' S.	146° 50' E.	VIT
Rockhampton	23° 24' S.	150° 33' E.	VIR
Brisbane	27° 25' S.	153° 02' E.	VIB

NOTE.—The "Ocean Forecast Message" may be obtained upon request from any Australian W/T station.

Willis Islets W/T Station, approximate Latitude 16° 18' S., Longitude 149° 59' E., call sign CGI, broadcasts a daily meteorological report during the months November to April inclusive, on a wave length of 600 metres (spark).

NEW ZEALAND.

Wellington W/T Station, approximate Latitude 41° 16' S., Longitude 174° 46' E., call sign VIW, transmits on request, daily weather reports concerning the following localities:—Auckland, East Cape, Gisborne, Wanganui, Cape Egmont, Farewell Spit, Greymouth, Cape Campbell, Akaroa Heads and the Bluff. The wave length used is 600 metres (spark).

Auckland W/T Station, approximate Latitude 36° 51' S., Longitude 174° 46' E., call sign VLD, and Awanui W/T station, approximate Latitude 35° 05' S., Longitude 173° 15' E., call sign VLA, transmit on request similar information concerning the following localities:—Cape Maria Van Diemen, Manukau Heads, Auckland, East Cape, Cape Egmont, Wellington, Napier, Farewell Spit, Greymouth and Cape Campbell. The wave length used is 600 metres (spark).

NOTE.—Any charges involved will be debited by the Post and Telegraph Department to the ship concerned.

Wellington and Awanui W/T Stations transmit weather messages, free of charge, at 0900 and 1000 G.M.T. respectively, on a wave length of 600 metres (spark). See also under Apia (Samoa) below.

SOUTH PACIFIC OCEAN ISLANDS.

Samoa.

A scheme is now in operation for the exchange of weather reports between the following W/T stations and islands in the South Pacific, observations for these reports being taken at 0330 and 2030 G.M.T. (civil) :—

W/T Station.	Call Sign.	Position (approximate).	
		Latitude.	Longitude.
Apia (Samoa)	VMG	13° 51' S.	171° 48' W.
Suva (Fiji Is.)	VPD	18° 09' S.	178° 28' E.
Nukualofa (Tonga Is.)	VSB	21° 08' S.	175° 12' W.
Norfolk I.	—	28° 58' S.	168° 03' E.
Vila (New Hebrides) ...	HVW	17° 44' S.	168° 19' W.
Noumea (New Caledonia)	HVV	22° 16' S.	166° 27' E.
Vavau (Tonga Is.) ...	—	—	—
Awanui (New Zealand)	VLA	35° 05' S.	173° 15' E.

Procedure during the Hurricane Season, 1st November to 30th April inclusive.

Apia W/T station collects the reports from the above mentioned stations and, together with its own report, broadcasts the information *en clair*, at 0830 and 2330 G.M.T. (observations of 2030 and 0330 G.M.T. respectively) on a wave length of 2,000 metres (spark).

The following is the procedure for the broadcasting of the reports by Apia W/T station, the actual message consisting of :—

Name of Station from which report emanates, *i.e.*, Apia, Suva, Nukualofa, etc.

Barometer reading (corrected for temperature and height) in inches and hundredths.

Thermometer, dry and wet bulb readings, in whole degrees.

Wind direction (true) and force by Beaufort scale.

State of sky and weather in Beaufort notation.

G.M.T. (civil) at which observations were taken if not in accordance with schedule.

A break sign (— . . . —) separates each report.

Example :—

Apia 3016, 80, 79 E.N.E. 3 bc (break sign).

Suva 3008, 79, 78 E.N.E. 5 or, (break sign).

Nukualofa, etc., etc.

After the reports have been broadcasted by Apia W/T Station on 2,000 metres (spark) they will be repeated in a similar manner by Suva W/T Station on 600 metres.

Interchange of Reports between the various Islands and W/T Stations during the Hurricane Season.

Owing to the inability of some of the islands and stations to inter-communicate direct and having to relay through, the following routine is observed, the reports being transmitted in the form explained above.

Vila exchanges weather reports with Noumea in time to enable the former to transmit both reports to Suva, at a pre-arranged hour.

Suva passes to Apia at 2130 and 0830 G.M.T. (civil) the weather reports from Suva, Norfolk Island, Vila and Noumea, the times for Norfolk Island and Vila being arranged by Suva. Nukualofa sends its weather report, together with that of Vavau, to Apia at 2130 and 0415 G.M.T. (civil).

Awanui passes to Apia the New Zealand barometer readings, wind, and weather, at a time mutually arranged.

At Times other than the Hurricane Season.

The same procedure is followed as in the hurricane season, except that the a.m. observations and times are omitted.

Apia and Suva broadcast the information and use the wave lengths, as explained above, at 0830 G.M.T. (civil) only.

For description of wireless hurricane and storm warnings in connection with the scheme, see under Wireless Storm Warnings, p. 153.

Instructions to Ships, etc.

All ships within 300 miles, or within good wireless communication of any of the shore stations mentioned above, are invited to co-operate in this scheme, more particularly during the hurricane season, when low barometer readings are observed.

Reports should be similar to those sent by shore stations, but are to include in addition the geographical position of the ship and the time when the observations were taken. These reports will be of greater value if the observations are taken at the times laid down for shore stations, viz. :—0330 and 2030 G.M.T. (civil).

As all weather reports between shore stations, or between ship and shore stations, are made in plain language, it is possible for ships to intercept the messages and use the information which they contain for forecasting purposes. Shore stations will always transmit the latest weather report on request.

All ship and shore stations are requested to cease operations while the daily weather reports are being transmitted.

A ship or shore station may broadcast its own warning of a disturbance, if thought necessary.

Fiji Islands.

Suva W/T station, call sign VPD, broadcasts weather bulletins *en clair* twice daily, at 0200 and 0930 G.M.T. (civil) during the hurricane season (from November 1st to April 30th), besides assisting in the Apia scheme. The bulletins contain observations taken at 2100 and 0300 respectively at the under-mentioned places :—

Apia (Samoa), Nukualofa (Tonga Is.), Vila (New Hebrides), Norfolk I., Suva.

The positions of these stations are given opposite.

The name of the observation station precedes each report.

The observations at Vila are taken at 2200 and 1000.

Form of Message :—

Barometer reading (corrected) in inches and hundredths. Dry and wet bulb thermometer readings (in whole degrees Fahrenheit); direction and force of wind (Beaufort scale), state of sky (scale 0–10).

Example :—2990 78 76 SE5 10.

The 0200 bulletin is not sent on Saturdays, Sundays or holidays.

From May 1st to October 31st, the bulletin is only broadcast at 0930, and contains the observations taken at 2100.

NOTE.—Vessels within W/T range of the Fiji Islands are invited to transmit weather reports to Suva W/T station, especially during the hurricane season. The messages should be similar to that indicated above, preceded by the time of observation (G.M.T.) and the latitude and longitude of the ship reporting.

WIRELESS STORM WARNINGS.

AUSTRALIA.

When weather conditions are severe, storm warnings issued by the Commonwealth Meteorological Bureau are broadcast by the Shore W/T Stations.

Australia, N.W. Coast.

Whenever a cyclone is located or expected, special storm warnings are sent to the area likely to be affected, and the warning is also broadcast by the W/T station in the following list nearest to the storm area. The wave length used in each case is 600 metres (spark) :—

W/T Station.	Position (approximate).		Call Sign.
	Latitude.	Longitude.	
Perth	32° 02' S.	115° 50' E.	VIP
Geraldton	28° 46' S.	114° 35' E.	VIN
Broome	18° 00' S.	122° 12' E.	VIO
Wyndham	15° 35' S.	128° 18' E.	VIW
Darwin	12° 27' S.	130° 48' E.	VID

Queensland and Coral Sea, etc.

Arrangements have been made for the issue of cyclone warnings off the coast of Queensland from December to April. The following W/T Stations will broadcast the warnings to all ships:—Thursday Island, call sign VII; Cooktown, call sign VIC; Townsville, call sign VIT; Rockhampton, call sign VIR; Brisbane, call sign VIB. The wave length used is 600 metres spark.

NOTE.—In special cases, information will be given indicating when the next warning will be issued.

Storm warnings are also broadcast, when necessary, by the W/T stations at Sydney, call sign VIS; Melbourne, call sign VIM; Hobart (Tasmania), call sign VIH; Adelaide, call sign VIA. The wave length used is 600 metres (spark).

For approximate positions of above mentioned stations see p. 151.

Willis Islets W/T Station, approximate Latitude 16° 18' S., Longitude 149° 59' E. call sign CGI, broadcasts cyclone warnings during the months November to April inclusive on a wave length of 600 metres (spark).

NEW ZEALAND.

Awanui W/T Station, approximate Latitude 35° 05' S., Longitude 173° 15' E., call sign VLA, broadcasts storm warnings, when necessary, immediately after the weather bulletin at 1000 G.M.T. The wave length used is 600 metres (spark). Hurricane warnings issued by the Apia (Samoa) W/T station are also repeated. See under Apia (Samoa) W/T storm warnings, opposite.

SOUTH PACIFIC OCEAN ISLANDS.

Samoa.

Apia W/T Station, call sign, VMG, broadcasts necessary information concerning hurricanes in addition to the weather bulletins, at 0830 and 2330 G.M.T. (civil) on a wave length of 2,000 metres (spark). The message is sent *en clair*, commencing with the general call to all stations (QST), e.g. :—

“Hurricane centre 200 miles N.W. of Suva at noon, 27th February, Apia time and date, travelling south.”

This message is repeated by Suva (Fiji) W/T station on a wave length of 600 metres and by Awanui (New Zealand) W/T station, call sign VLA immediately after the routine New Zealand weather bulletin at 1000 G.M.T., on a wave length of 600 metres.

Fiji Islands.

Suva W/T Station, call sign VPD, broadcasts warnings during the hurricane season (from November 1st to April 30th) at 0200 and 0930 G.M.T. immediately after the weather bulletin and also at other times when necessary.

The 0200 warning is omitted from May 1st to October 31st. Each warning commences with the call sign for “All Ships” (CQ).

Cook Islands.

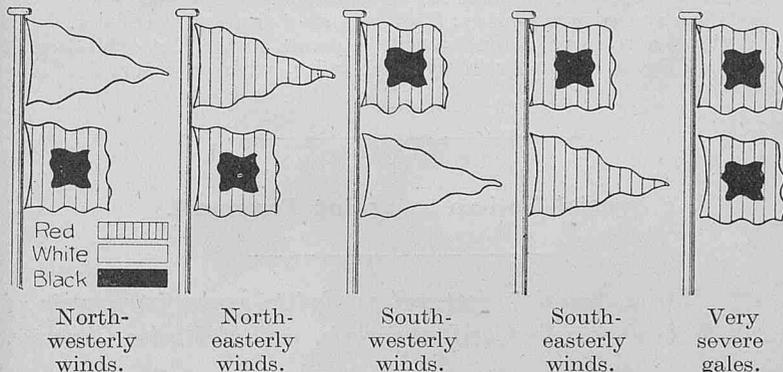
Rarotonga W/T Station, approximate Latitude 21° 12' S., Longitude 159° 48' W., call sign VMR, transmits a message to Apia W/T station, if there are indications at Rarotonga of an atmospheric disturbance, on a wave length of 600 metres (spark). The message is in similar form to the warning broadcast by Apia W/T station and explained above.

III.—VISUAL STORM WARNINGS.

AUSTRALIA.

Victoria.

Wind warnings :—



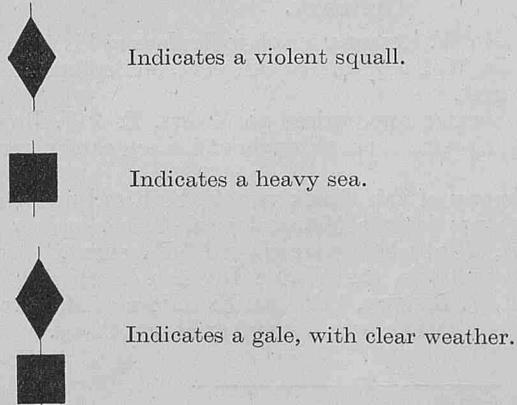
The above signals are exhibited from the yard-arm at Gellibrand pile lighthouse.

New South Wales.

The existence of gales which are likely to endanger shipping will be signalled at the principal telegraph stations on the coast of New South Wales in the following manner, viz. :—

The signal staffs will support two yards, which cross each other at right angles in the direction of the cardinal points of the compass, the yard-arms denoting respectively North, South, East and West; midway between North and East will denote N.E., etc., etc.

Symbols used and their meanings.



New South Wales (continued).



Indicates a gale, with thick weather and rain.

The direction from which the gale is blowing will be indicated by the particular yard-arm between which and the mast-head the signal is suspended.

Place where squall or gale is blowing will be shown by the numerical flag at the mast-head.

Gales that are generally over a large portion of the coast will be indicated by the geometrical figures without the mast-head flags.

At Port Jackson the signals will be shown from South head and from Fort Phillip signal stations. The latter is near the Observatory.

Numerical Flags.—The following flags or pendants are used at the signal stations of New South Wales to indicate the place from which a vessel arrives, and, in connection with storm signals, the place where a gale is blowing :—

1. Red.
 2. Yellow and blue, horizontal, 2 divisions.
 3. Blue, yellow, red, vertical.
 4. Red and white, 4 divisions.
 5. White, with 5 blue crosses.
 6. Blue and yellow, 6 horizontal stripes.
 7. Blue, with 7 white crosses.
 8. Blue and white, 8 triangles.
 9. Red and white, 9 vertical stripes.
 0. Blue, white ball in centre. Substitute White.
- Numeral pendant, Yellow and red, vertical.

Ports represented by Numerical Flags.

10. Torres Strait.	50. Portland Bay.	76. Circular Head.
11. Cleveland Bay.	51. South Australia.	80. Keppel Bay.
37. Wilson Promontory.	52. King George Sound.	81. Port Denison.
40. Sydney.	53. Western Australia.	82. Wollongong.
41. Moreton Bay.	54. Launceston.	83. Wide Bay.
42. Clarence River.	55. Hobart.	84. Port Curtis.
43. Port Macquarie.	56. Gulf of Carpentaria.	88. Port Fairy or Warrnambool.
44. Port Stephens.	61. Shoalhaven.	97. Hawke's Bay.
45. Newcastle.	68. Richmond River.	98. Kiama.
46. Jervis Bay.	70. Macleay River.	99. Wallaroo.
47. Twofold Bay.	72. Gabo Island.	101. Port Mackay.
48. Corner Inlet.	75. Manning River.	
49. Port Phillip.		

NOTE.—Other numbers signify ports outside Australia from which a vessel arrives; they are not inserted as they would not be used for storm signals.

Queensland.

Storm signals are shown from the various stations and ports in Queensland. The signals are made from the quarters of the yards; the balls and cones are of large size and must not be mistaken for tidal signals, which are made from the yard-arms.



Indicates strong winds from S.S.W. or South, through S.E. to E. or E.N.E.



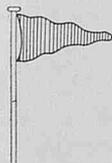
Indicates strong winds from W.N.W. or West, through S.W., to South or S.S.E.



Indicates strong winds from N.N.W. or North, through N.E., to East or E.S.E.



Indicates strong winds from N.N.E., or North, through N.W., to West or W.S.W.



A red pendant indicates that a message has been received at the port from the Commonwealth Meteorological Bureau reporting the suspected development or existence of a dangerous storm or cyclonic disturbance. Details of such message may be obtained from the Postmaster or Harbour Officials at the port or place where this signal is displayed. A red light is shown at Fort Lytton by night.

Where a vessel leaves the port of Brisbane without receiving a Cyclone warning, but observes the Cyclone signal at Fort Lytton, the Lightkeeper at the Pile Light will, if requested, transmit particulars of the message by means of semaphore, morse or megaphone.

NEW ZEALAND.

Storm signals are exhibited from Cape Maria Van Diemen, Tiri Tiri, Matangi Island, East Cape, Cape Campbell, Cape Foulwind, Farewell Spit Lighthouse, Nugget Point and the lighthouses on Stephens and Centre Island. They are not to be considered as covering a distance greater than 200 miles from the place at which they are hoisted, those hoisted with the red pendant below as covering only a distance of 50 miles from the place at which they are hoisted.

Symbols used and their Meanings.



Northerly gales.

Hoisted when strong winds or gales are probable from N., that is, from about N.E., changing through North towards West.

NOTE.—This change of wind is usually followed by strong winds or gales from the Southward.



Westerly gales.

Hoisted when strong winds or gales are probable from W., that is from about N., change through W. towards S.W.

NOTE.—After these gales have moderated the wind generally shifts to N.W. or to N.



Easterly gales.

Hoisted when strong winds or gales are probable from E., that is, from about N., changing towards E. and S.E.

NOTE.—This change of wind denotes a "black North-Easter" and an approaching cyclone.



South-easterly gales.

Hoisted when strong winds or gales are probable from E., changing, through S. towards S.W.

New Zealand (continued).



Southerly gales.

Hoisted when strong winds or gales are probable from about W., changing, through S., towards S.E.



Unusual gales.

Hoisted when strong winds or gales are probable from about S., changing through E. towards N.

MODERATE WEATHER is indicated by the International code signal, but only in reply to enquiry and if meteorological conditions admit.

NOTE.—(1) A red pendant hoisted below any of the above signals indicates that the signal refers to the previous day.

(2) Signals hoisted without the red pendant refer to the day on which they are hoisted.

(3) The red pendant, when hoisted alone, indicates that no information has been received at the station from the Meteorological Office, Wellington.

SOUTH PACIFIC OCEAN ISLANDS.

Fiji Islands.

During the hurricane season (from November 1st to April 30th) storm signals as defined below will be exhibited at the signal station, Suva, and at the Government Wharf, to denote that a dangerous depression in the atmospheric pressure appears to be approaching the group. The signals will be displayed until conditions improve.

Between sunrise and sunset: Two black circles disposed vertically.

Between sunset and sunrise: Two red lights disposed vertically.

At the Wharf, Suva, attention will be drawn to the first exhibition of the signals by a detonator being fired twice, with an interval of one minute.

Special Notices regarding Personnel.

The Marine Superintendent will be glad to receive information of special distinctions gained and retirements, &c., of Marine Observers.

Captain E. W. G. Twentyman.

Captain TWENTYMAN, Harbour Master of Suva, Fiji, reference to whose work in connection with the Hurricane Warning Service is made elsewhere in this number, has recently performed a course in Marine Meteorology at the Meteorological Office while on leave in England. He returns to duty at Suva early in the New Year.

Obituary.

The death of Captain W. ELLERY, which took place at his residence, "Holkar," Orrell Road, Wallasey, in his 85th year, on September 15th, 1924, is noted with regret.

Captain ELLERY became apprenticed to Messrs. T. & J. Brocklebank in 1856 remaining with them throughout his sea career, retiring in 1903.

He commanded many of this firm's vessels, both sail and steam, and was a keen observer for the Meteorological Office, having kept no fewer than 20 logs, all of which were classed "Excellent."

Marine Observers will join the Marine Division in offering their sympathy to Captain W. ELLERY, Principal Examiner of Masters and Mates, who, like his late father, was a member of our Corps.

TRACKS OF SOME ISLAND HURRICANES.

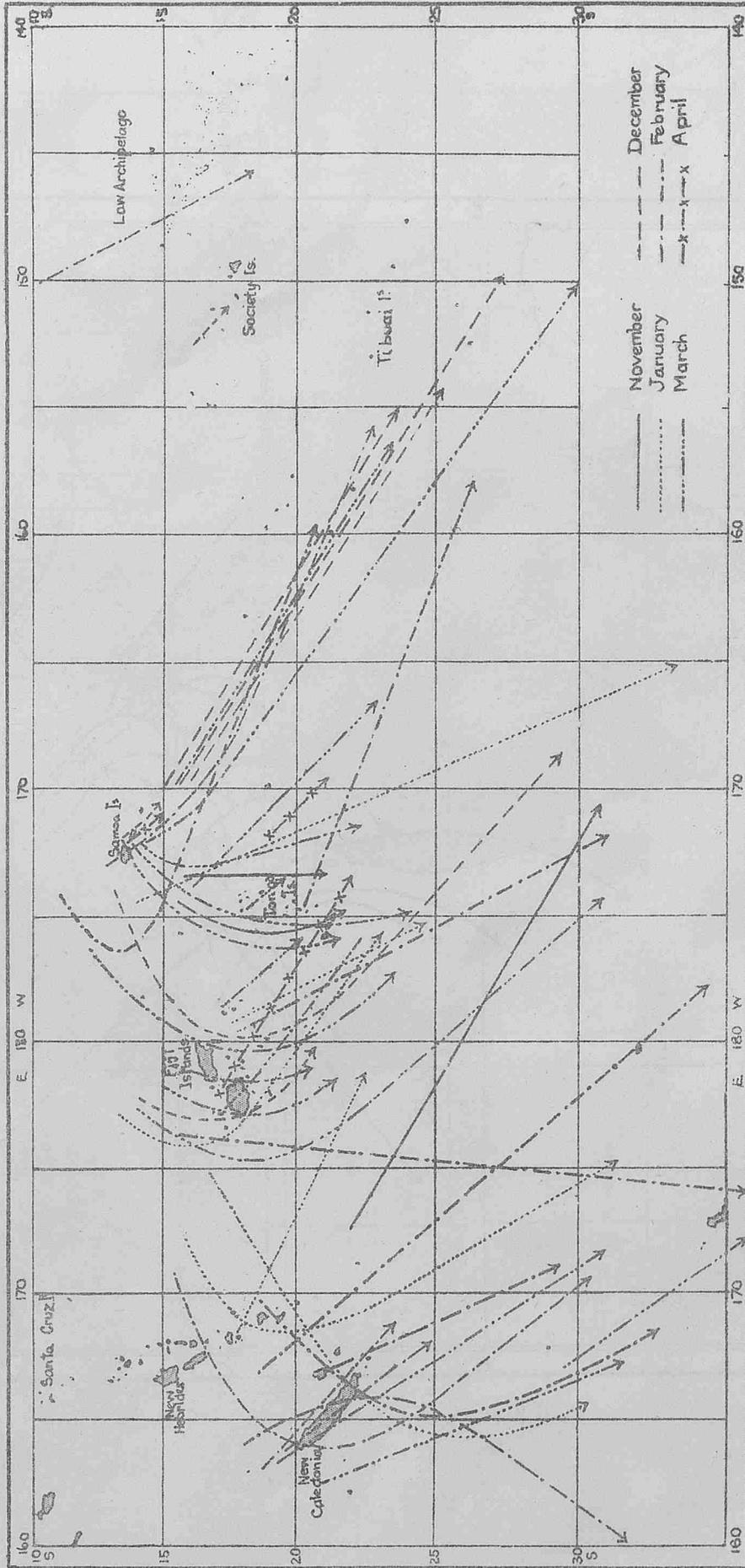


Chart A — "SOUTH PACIFIC HURRICANES."

TRACKS OF SOME QUEENSLAND HURRICANES.

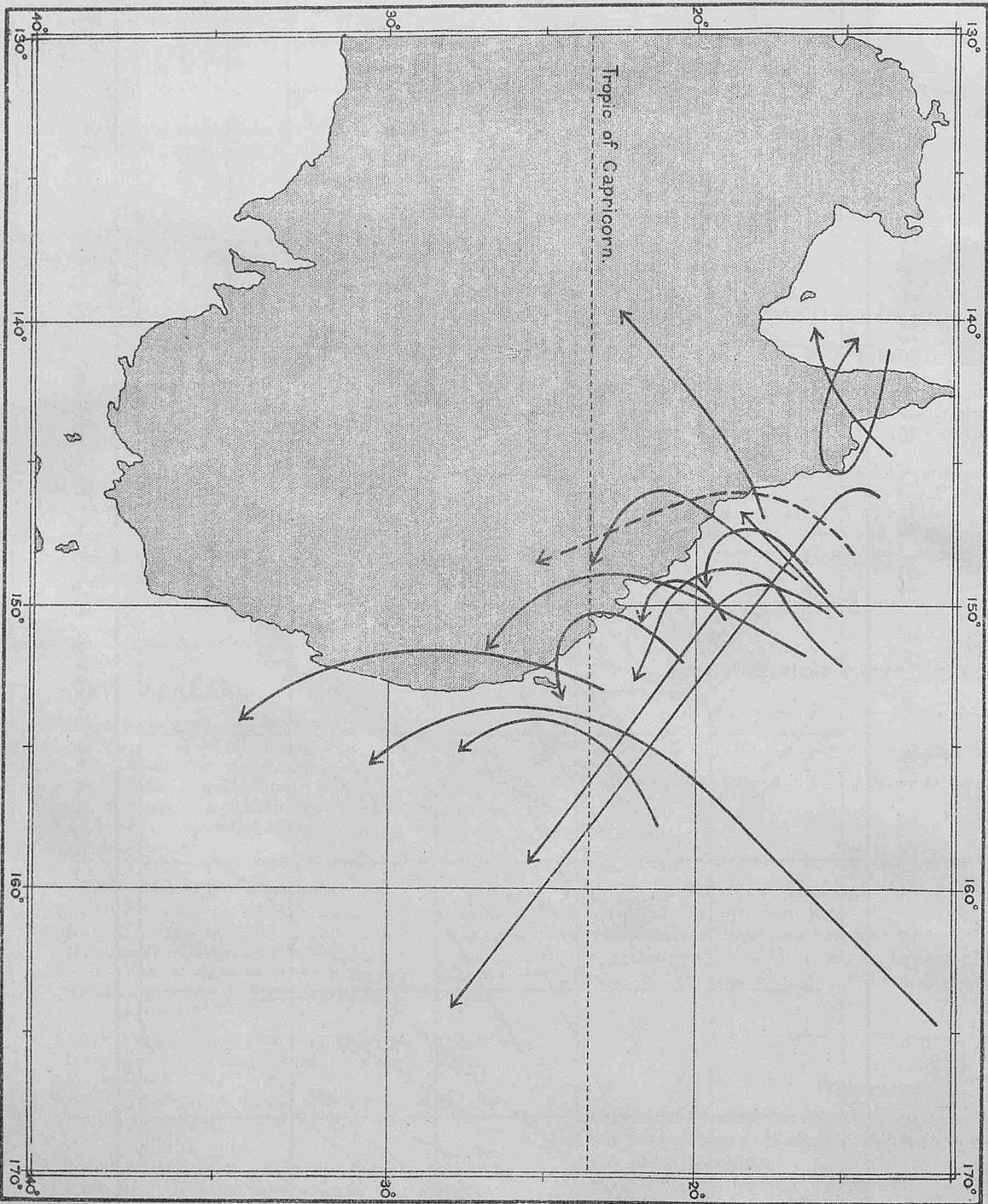


Chart B — "SOUTH PACIFIC HURRICANES."

WEATHER CHART, MORNING OF NOVEMBER 10TH, 1923.

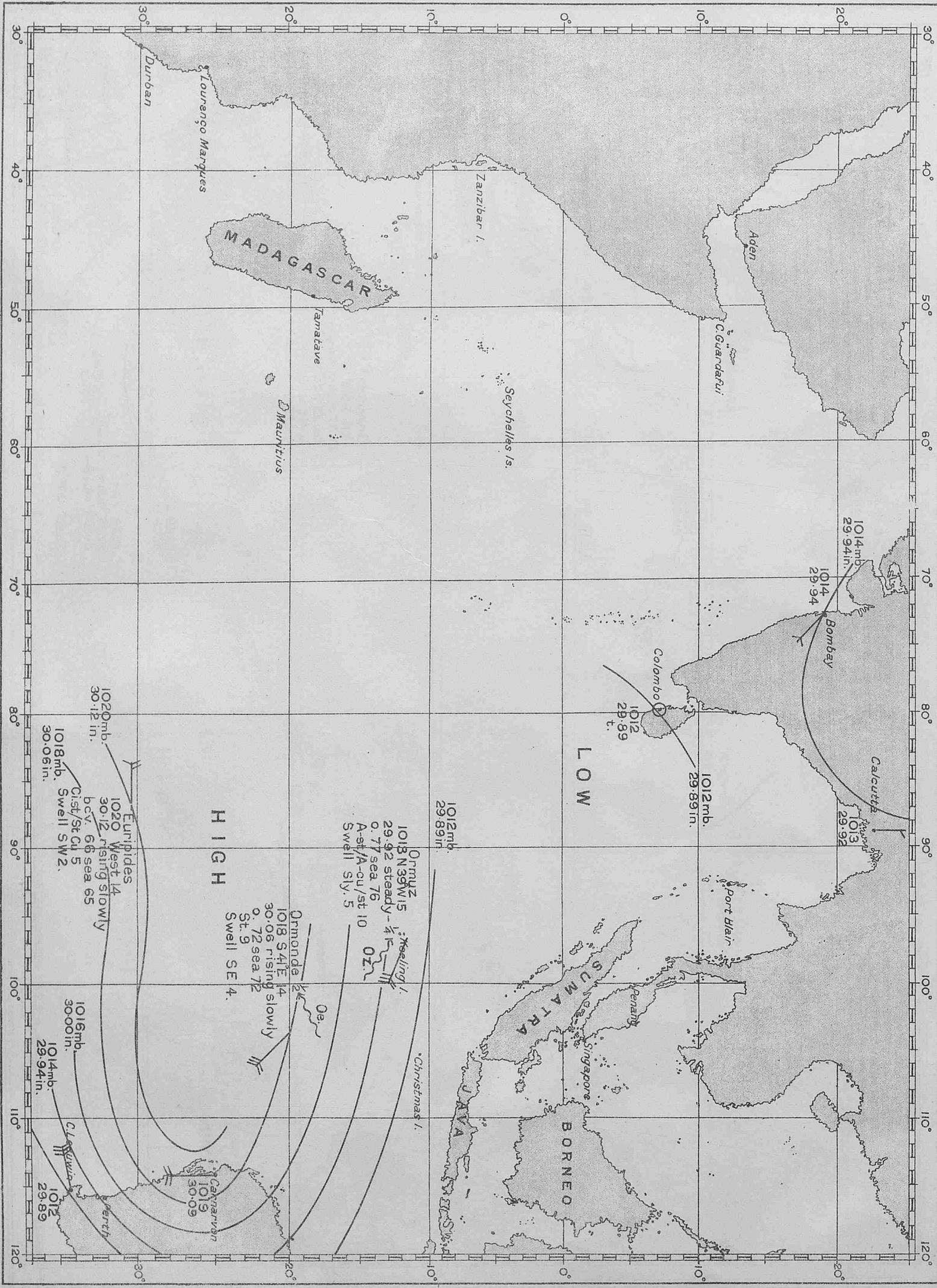


Chart LXIII—"WIRELESS AND WEATHER."

WEATHER CHART, MORNING OF NOVEMBER 11TH, 1923.

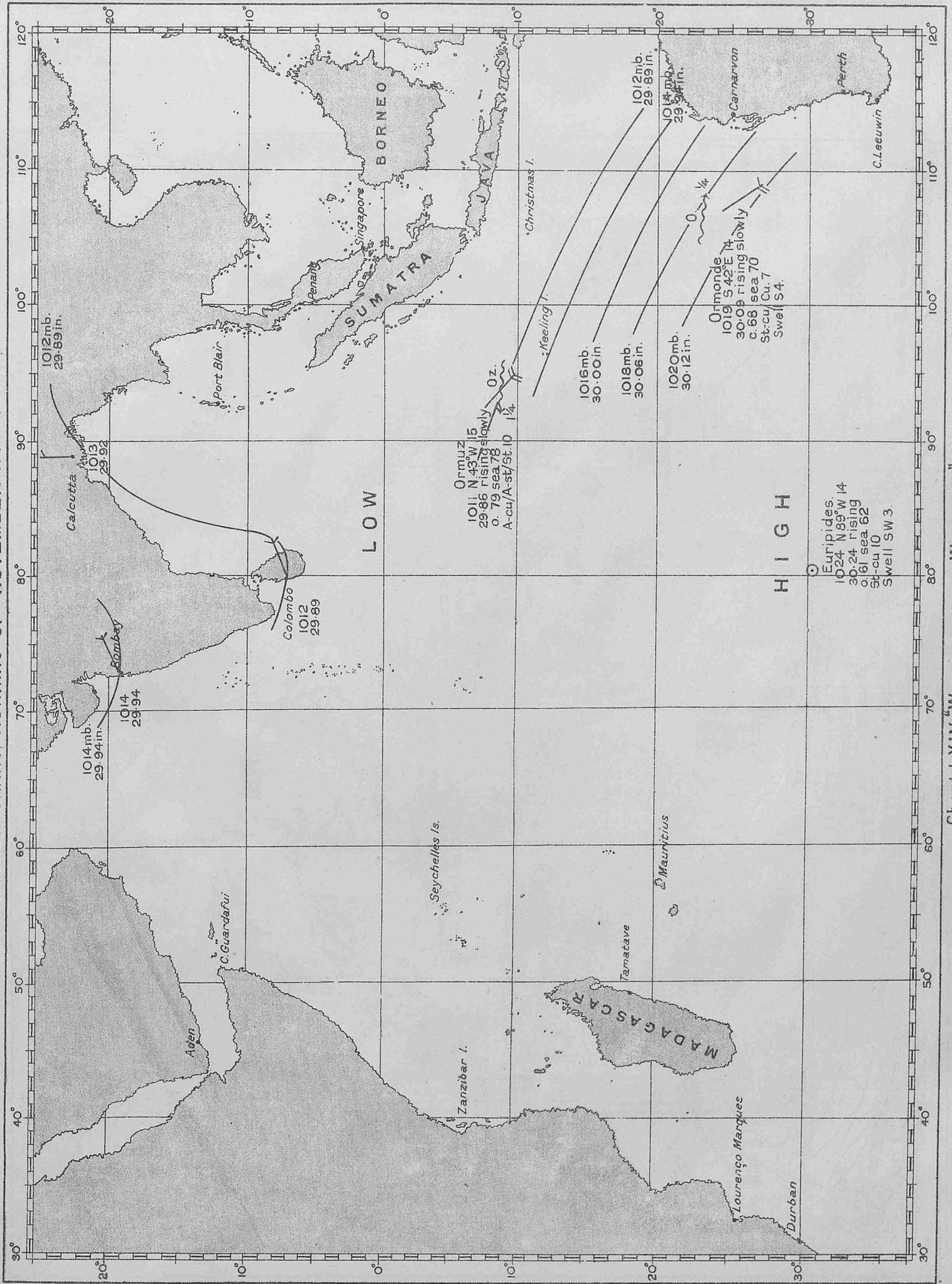


Chart LXIV-WIRELESS AND WEATHER.

WEATHER CHART, MORNING OF NOVEMBER 12TH, 1923.

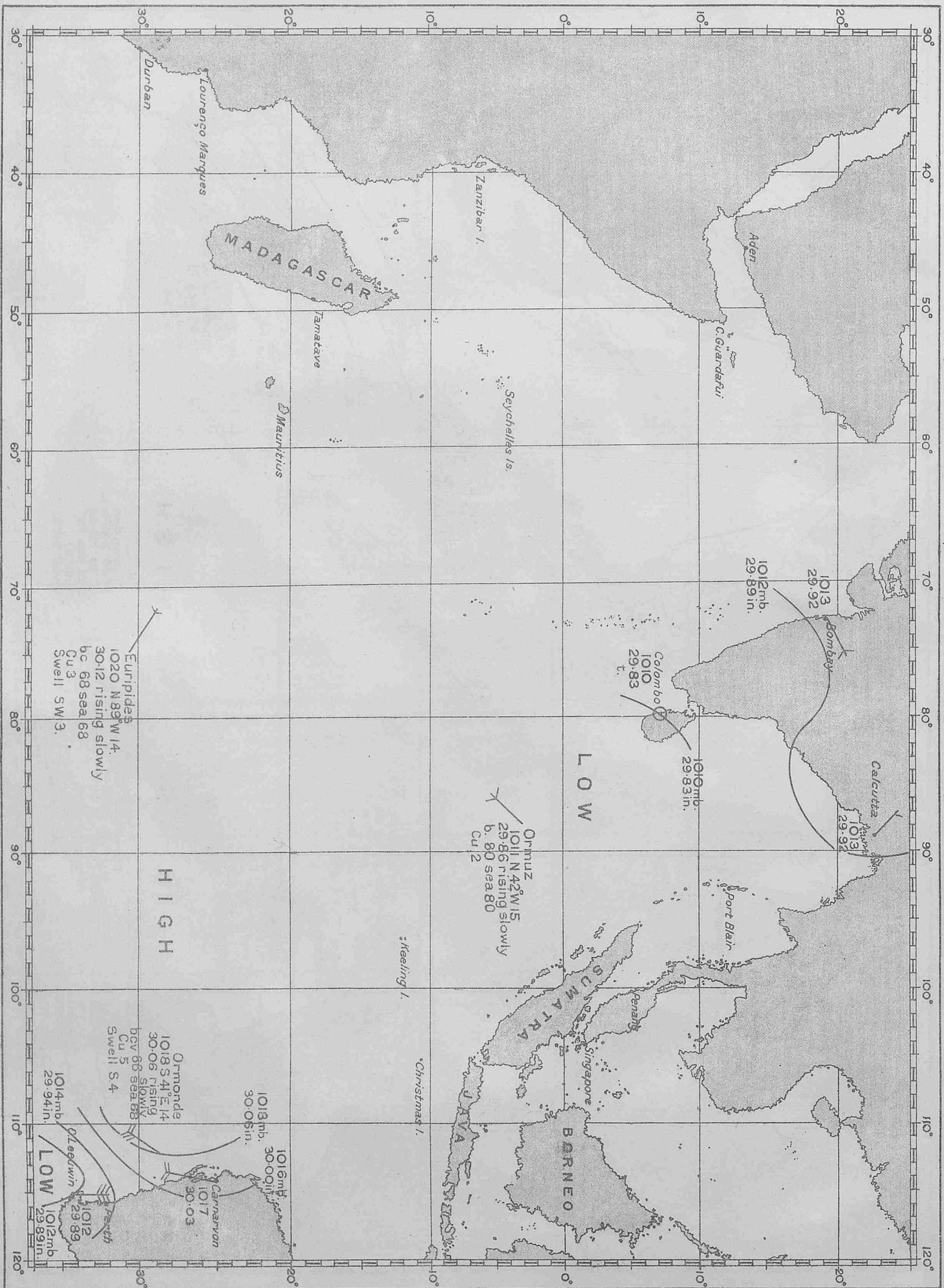


Chart LXV—"WIRELESS AND WEATHER."

CYCLONE IN S.E. TRADE REGION OF THE INDIAN OCEAN - FEBRUARY 1904.

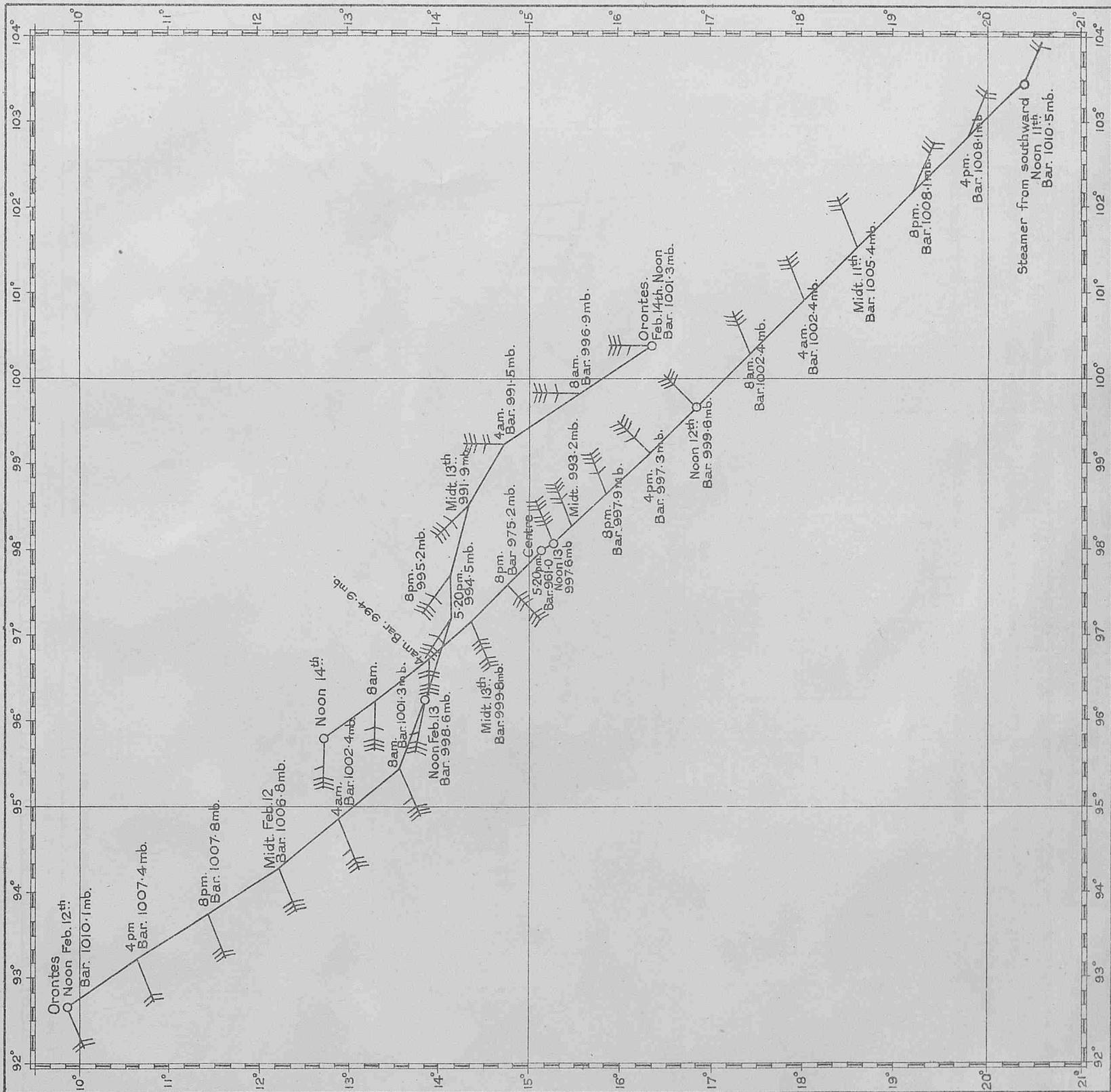
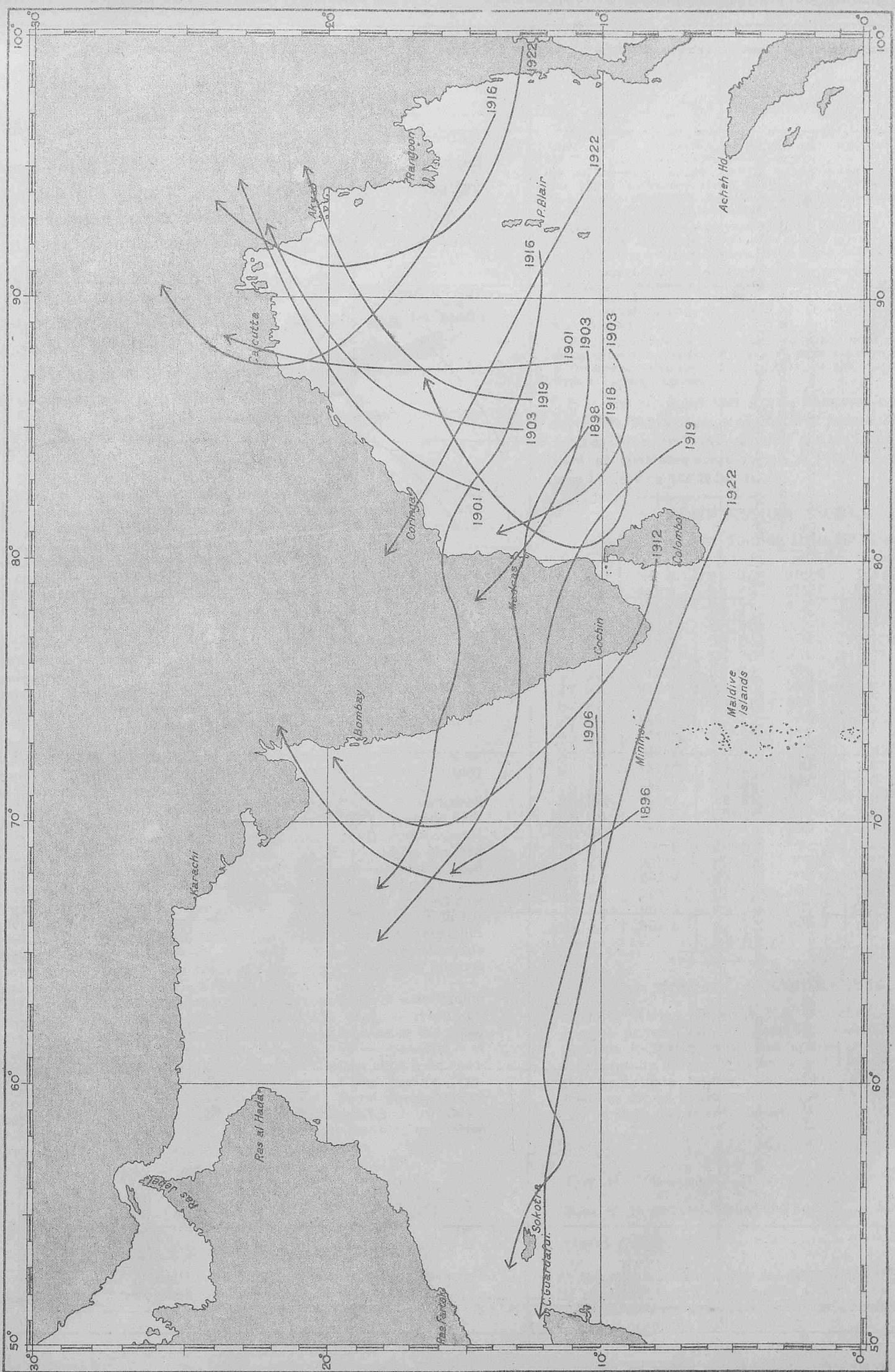


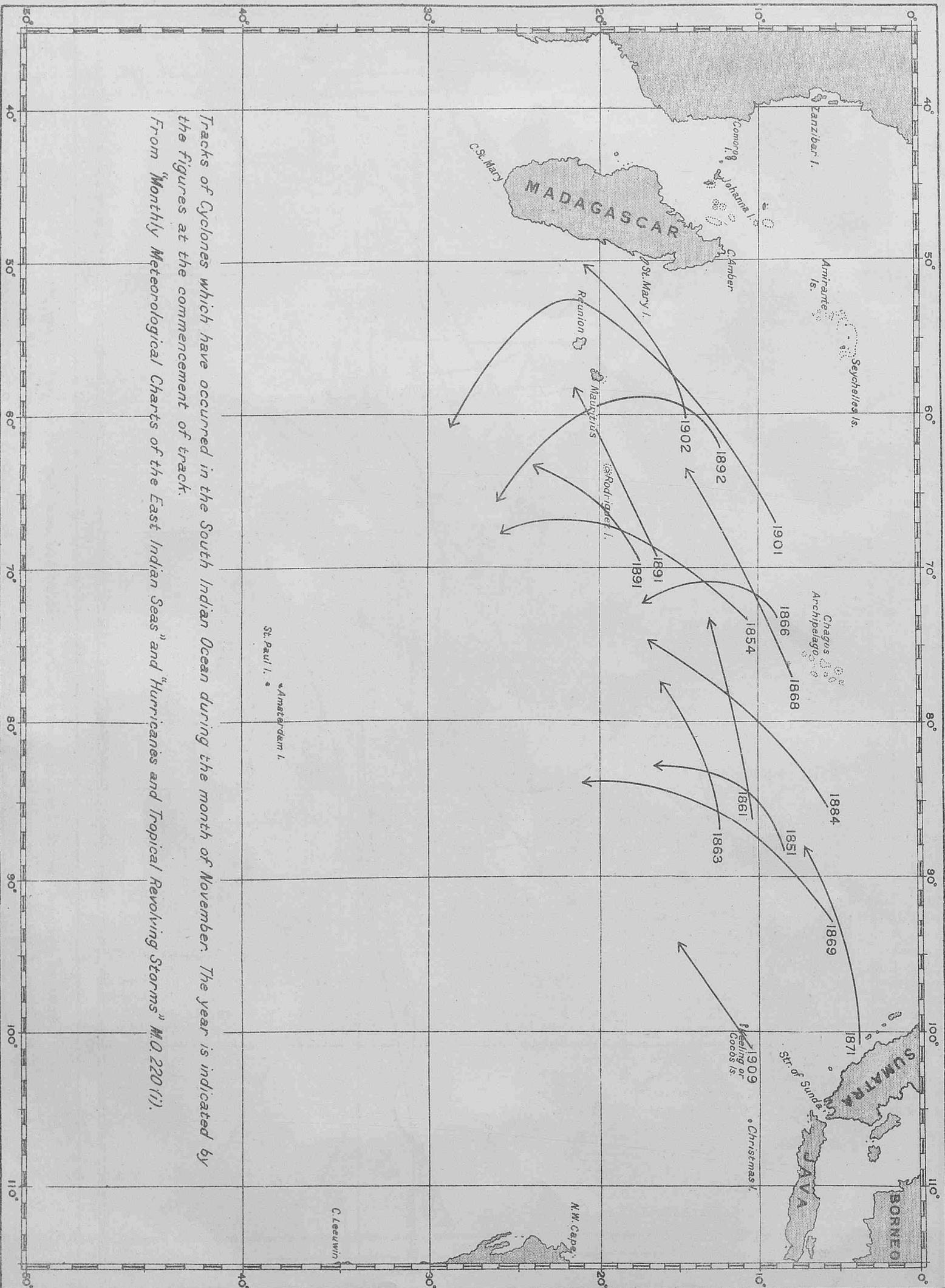
Chart 1171 W. M. S. 11

CYCLONE TRACKS OF THE ARABIAN SEA AND BAY OF BENGAL.



Tracks of cyclones which have occurred in the Arabian Sea and Bay of Bengal during the month of November. The year is indicated by the figures at commencement of track.
 From "Monthly Meteorological Chart of the East Indian Seas" and "U.S.A. Pilot Chart of the Indian Ocean" for November 1923

SOUTH INDIAN OCEAN CYCLONES.



Tracks of Cyclones which have occurred in the South Indian Ocean during the month of November. The year is indicated by the figures at the commencement of track.

From "Monthly Meteorological Charts of the East Indian Seas" and "Hurricanes and Tropical Revolving Storms" M.O. 220 (1).

NOTICES.

IMPORTANT.

With a view to promoting the interest and usefulness of this Journal, Marine Observers are requested to send in when possible accounts of interesting experiences, remarks upon special phenomena observed, and matters of interest, especially those which affect navigation.

A page for additional remarks will be found at the end of the Meteorological Log, or these can be made separately in manuscript.

Photographs, sketches and weather charts will be most welcome.

CURRENT OBSERVATION.

It is very desirable that good current data should be recorded. Spaces are provided for current experienced throughout the day and for current determined at shorter intervals in Meteorological Logs, while Form 911 (late 121) provides for either or both.

Generally the difference between the *Dead Reckoning Position* at noon, reckoned from previous noon, and the *observed position* has been accepted as attributable to a single current for the whole 24 hours.

It is necessary to make careful distinction between *Dead Reckoning Position* and *Estimated Position*, the former being the position as reckoned from the last fix by courses steered and distances run, corrected for all known errors and disturbances *except* current. When a fix cannot be obtained, an estimation for current (when one is known generally to exist) is sometimes applied to the D.R.; the result may then be conveniently termed the *Estimated Position*.

If this estimated position is given in the Meteorological Log or Form 911 (late 121), it should be clearly stated, otherwise it may be misleading.

Currents of varying velocity and direction may be experienced along the track made in 24 hours; therefore, when reliable fixes such as by Stellar observations at twilight are obtained, the current should be determined for the intervals, and all should be checked with the noon to noon result. Each of these currents determined at shorter intervals than 24 hours should be entered in the Meteorological Log in the appropriate column, and the time and latitude and longitude of each observation position should be given in the latitude and longitude columns. The times given on Form 911 (late 121) indicate the interval. The period of short interval currents should usually not be less than, say, six hours. The best interval is probably from twilight to twilight.

It is desirable that whenever possible two methods of ascertaining the distance run through the water should be used, as recent investigation goes to show that with one means of measuring the speed the inclination has been to credit the ship. When possible it is recommended that both patent log and revolutions should be used.

For working out the set and drift of current the position *from* as well as the position *to* must always be *fixes*. Some observers have used an *estimated position from*, which makes the set and drift false. The same remarks apply to course allowances for set; the latter are naturally necessary to make an *estimated course*.

Vacancy for a Port Meteorological Officer.

With reference to the notice which appeared in the September number under this heading, applications are now closed.

THE BAROMETER.

Before barometer readings are compared with the normal isobars shown on the Meteorological Ocean Charts, transmitted by W/T or plotted on Weather Charts, mercurial barometers should be corrected for height, gravity, temperature and index error, for which tables are given on pp. 80 to 83 and 84 to 86 of the Marine Observer's Handbook. A table for converting inches to millibars is also given below.

Aneroids require to be corrected for height and index error only. They should be frequently compared, as the mechanism is liable to get out of adjustment without detection.

Readings of the barometer should be entered in the Meteorological Log as read—*i.e.*, uncorrected—and the attached thermometer should also be recorded. A column is now also given for the corrected reading, and it will be of great assistance if this is also completed.

While a difference from the pressure values shown on the charts does not necessarily mean unusual weather, when there is a divergence the mariner should be on the alert, particularly within cyclone regions.

It is strongly urged that Marine Observers, whether using Official or Ship's Barometers, for W/T reports, Meteorological Logs or Forms 911, will complete and send in the Blue Post Card, at least once every voyage, so that an effectual check may be kept on the index error.

CONVERSION TABLE.

To Convert Inches into Millibars.

Inch.	mb.	Inch.	mb.	Inch.	mb.
27.50	931.2	28.65	970.2	29.85	1,010.8
27.55	932.9	28.70	971.9	29.90	1,012.5
27.60	934.6	28.75	973.6	29.95	1,014.2
27.65	936.3	28.80	975.3	30.00	1,015.9
27.70	938.0	28.85	976.9	30.05	1,017.6
27.75	939.7	28.90	978.6	30.10	1,019.3
27.80	941.4	28.95	980.3	30.15	1,021.0
27.85	943.1	29.00	982.0	30.20	1,022.7
27.90	944.8	29.05	983.7	30.25	1,024.4
27.95	946.5	29.10	985.4	30.30	1,026.1
28.00	948.2	29.15	987.1	30.35	1,027.7
28.05	949.9	29.20	988.8	30.40	1,029.4
28.10	951.6	29.25	990.5	30.45	1,031.1
28.15	953.2	29.30	992.2	30.50	1,032.8
28.20	954.9	29.35	993.9	30.55	1,034.5
28.25	956.6	29.40	995.6	30.60	1,036.2
28.30	958.3	29.45	997.3	30.65	1,037.9
28.35	960.0	29.50	999.0	30.70	1,039.6
28.40	961.7	29.55	1,000.7	30.75	1,041.3
28.45	963.4	29.60	1,002.4	30.80	1,043.0
28.50	965.1	29.65	1,004.0	30.85	1,044.7
28.55	966.8	29.70	1,005.7	30.90	1,046.4
28.60	968.5	29.75	1,007.4	30.95	1,048.1
		29.80	1,009.1		

POSTAL ARRANGEMENTS.

The "Marine Observer" is published, when circumstances permit, on the first Wednesday of the month previous to that to which the number refers.

If captains of observing ships will forward to the Office the particulars required hereunder, endeavour will be made as far as mails permit to post the latest number for use on their homeward passage.

S.S..... Captain.....

Port of Call.....

Date of Homeward Departure.....

Postal Address.....

When this information is not given the "Marine Observer" is addressed to the Commanding Officer, s.s..... c/o the owners, and captains are requested to make their own arrangements for forwarding.

ICE CHART.

WESTERN NORTH ATLANTIC.

LETTERS OF TRANSATLANTIC TRACKS INDICATE

- (C) From 1st September to 31st January, inclusive.
- (E) From 15th November to 14th February.
- (G) From opening of Straits of Belle Isle to 14th November.

These routes are liable to alteration when, owing to abnormal ice conditions, it is considered advisable by the steamship lines who are parties to the Track agreement.

ROUTE NOTICES.

For latest information *re* Tracks see front page of Ice Chart published with April Marine Observer.

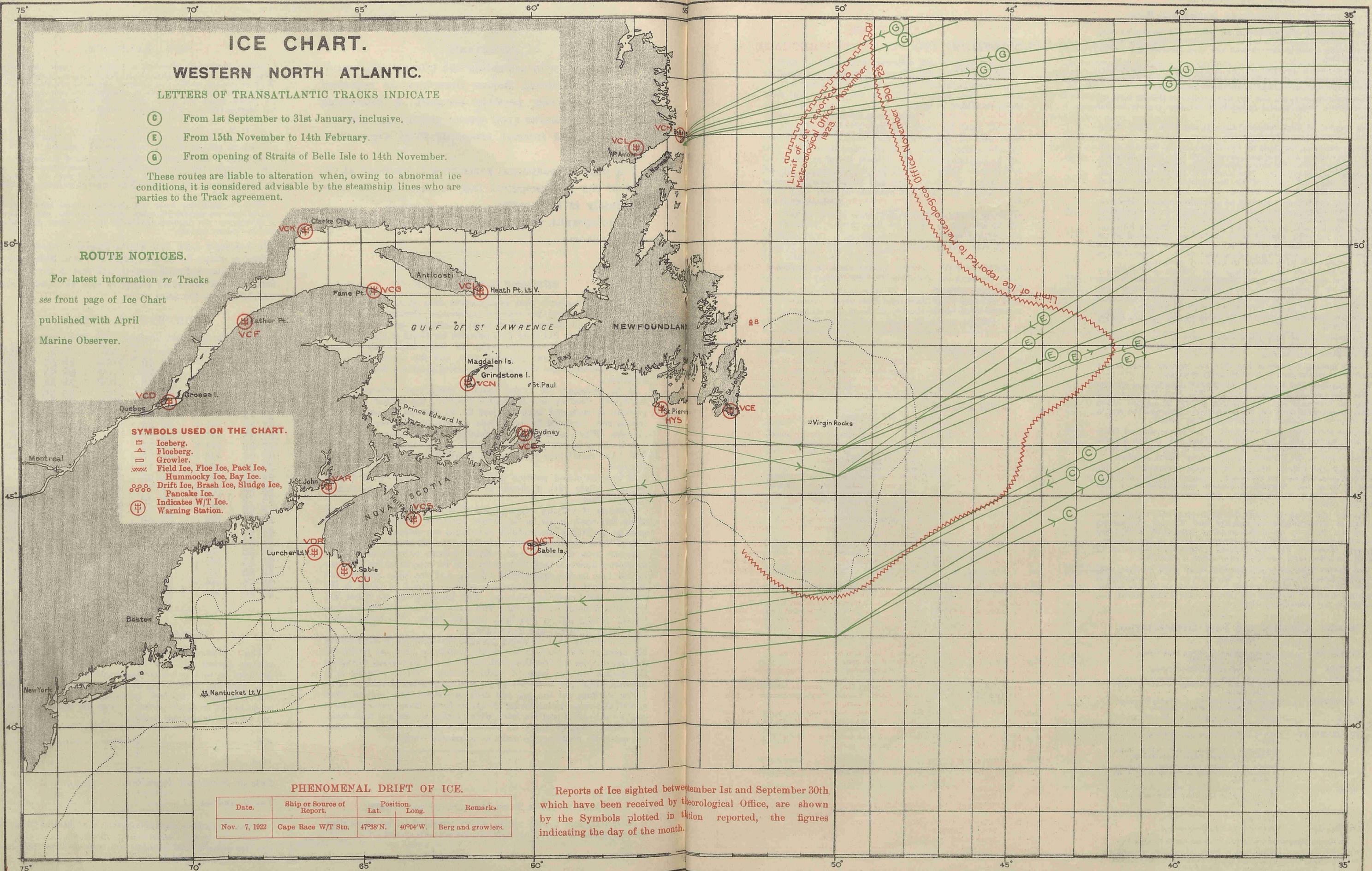
SYMBOLS USED ON THE CHART.

- ▣ Iceberg.
- △ Floeberg.
- ▲ Growler.
- ⋯ Field Ice, Floe Ice, Pack Ice, Hummocky Ice, Bay Ice.
- Drift Ice, Brash Ice, Sludge Ice, Pancake Ice.
- ⊕ Indicates W/T Ice Warning Station.

PHENOMENAL DRIFT OF ICE.

Date.	Ship or Source of Report.	Position.	Remarks.
		Lat. Long.	
Nov. 7, 1922	Cape Race W/T Stn.	47°38'N. 40°04'W.	Berg and growlers.

Reports of Ice sighted between September 1st and September 30th which have been received by the Meteorological Office, are shown by the Symbols plotted in this position reported, the figures indicating the day of the month.



Co-operation of Shipowners, Masters and Mates.

The Director of the Meteorological Office is authorised to lend tested Instruments to Captains of British-owned ships who undertake to make 4 hourly observations and keep Meteorological Logs for the Office.

The instruments supplied for this purpose are one barometer, four thermometers with screen, two hydrometers and in some cases a Barograph and rain gauge is added to the equipment.

Tested instruments are also lent to a number of British Atlantic Liners which make special coded W/T weather reports to the Office.

The number of ships co-operating with the M.O. using official tested instruments on loan is limited.

Vessels observing regularly for the Meteorological Office to which office instruments are not lent, keep Form 911, Ships Meteorological Report, using the ship's instruments, the barometer being compared with Standards. The number of ships regularly contributing approved forms of all descriptions to the Marine Division is limited to 500.

Captains and Officers who wish to co-operate with the Meteorological Office should apply *by letter* to The Director, Meteorological Office, Air Ministry, Kingsway, London, W.C.2; or *in person* between the hours of 10 a.m. and 4 p.m., to the Marine Superintendent at the same address or to any of the gentlemen whose names and addresses are given below acting as agents at the respective ports. A waiting list is kept of the names of ships whose commanders have offered to regularly co-operate.

Marine Observers (*i.e.*, Captains and Officers who regularly observe for the Meteorological Office) will greatly assist if they will send in Meteorological Logs immediately on completion through the Port Meteorological Officer or Agent, at the same time notifying him of any possible instrumental defects.

Defective instruments will then be replaced and new Log Books, etc., provided.

In London and at base ports where there is not an Agency, notification of defects should be sent to headquarters on arrival, with the Meteorological Log.

Vessels making voyages of less than two months' duration are requested to retain their logs until nearly filled up.

W/T Registers and Forms 911 should in all cases be sent directly to the Meteorological Office, London. The Port Meteorological Officer at Liverpool and the Visiting Officer in London board vessels co-operating with the Meteorological Office, and the agents visit ships at their ports when circumstances permit.

Postage abroad incurred on behalf of the Meteorological Office in returning logs will be refunded. Postage from British Empire ports need not be prepaid, if the envelope is marked O.H.M.S., and addressed to the Director, Meteorological Office, London.

Captains and Officers whether they observe regularly for the Meteorological Office or not are urged to report exceptional phenomena in air or sea. Reports of weather experienced in or near Tropical Cyclones or hurricanes, also abnormal currents are specially desired.

Masters who wish to assist in developing the rapid interchange of Meteorological information and Weather Forecasting at sea can do so by using the standard form of W/T Weather Report suggested in "Weather Signals," given in this Journal, January Number. For this purpose a mercurial barometer of which the index error has been ascertained is essential.

The Marine Observer is sent monthly to all ships regularly contributing Logs, Forms and W/T Registers to the Meteorological Office. It is hoped that each ship will preserve *all* her copies. Personal copies of Numbers are sent to those whose special contributions are published in them.

Marine Agencies and Port Meteorological Officers.

LIVERPOOL	..	(Port Meteorological Office), Dock Office. Telephone No.: Bank 8969.
CARDIFF	..	Captain T. Johnston, Technical College.
LEITH	..	Captains G. Black and C. G. Bonner, V.C., D.S.C., Leith Salvage and Towage Co., Ltd., 2, Commercial Street.
THE CLYDE	..	Captain M. Corrance, Board of Trade Surveyor's Office, 73, Robertson Street, Glasgow.
HULL	..	Captain Geo. B. Sturdy, c/o Mr. W. Hakes, Commercial Road.
SOUTHAMPTON	..	Captain D. Forbes, Nautical Academy, 1, Albion Place.
TYNE	..	Commander E. S. Macleod, R.D., R.N.R., Board of Trade Surveyor's Office, North Shields.
DUBLIN	..	{ Captain M. H. Clarke, Chief Surveyor, Ministry of Industry and Commerce, Marine Department, 27, Eden Quay.
HONG KONG	..	Lieut.-Commander C. R. H. Harvey, O.B.E., R.N., Superintendent, Admiralty Chart and Chrono- meter Depot.
VANCOUVER	..	T. S. H. Shearman, Esq., Room 40, Post Office Building.
AUSTRALIA	..	The Commonwealth Meteorologist.

The Deputy Directors of Navigation act as sub-agents as follows:—

SYDNEY	..	Captain G. D. Williams, D.S.O., Customs House.
MELBOURNE	..	Captain L. J. Bolger, Electricity Commissioners Building, 22, William Street.
FREMANTLE	..	Captain J. J. Airey, Dalgety's Buildings.

LATE PRESS.

DERELICTS AND FLOATING WRECKAGE.

Date.	Position.		Description.
	Latitude.	Longitude.	
BALTIC.			
15.9.24	59°00'N.	22°00'E.	Floating wreck, dangerous to navigation.
16.9.24	59°20'N.	23°17'E.	s.v. <i>Andreas</i> reported as derelict.
20.9.24	9 mls. S.E. of Kall- badan House. Light		Partly submerged wreckage.
NORTH SEA.			
4.9.24	51°17'N.	2°34'E.	Floating object, dangerous to navigation.
10.9.24	55°45'N.	5°15'E.	Iron foremast, wooden topmast, and four wooden derricks attached.
14.9.24	53°32'N.	0°20'E.	Floating wreckage, apparently ship's bottom, about 80 feet long.
20.9.24	5 mls. N. (mag.) from Shipwash Light Vessel.		Large black conical buoy.
20.9.24	53°35'N.	4°11'E.	Floating wreck, with mast about 7 feet above water.
20.9.24	53°11'N.	1°15'E.	Spar, projecting 15 to 20 feet above water attached to wreck.
21.9.24	54°34'N.	0°27'W.	Motor boat <i>Iona</i> , abandoned in sinking condition. Dangerous to navigation.
ENGLISH CHANNEL.			
2.9.24	1 mile from Royal Sovereign Light Vessel.		Submerged object struck by steamer.
14.9.24	7 miles, S.45°E., of Portland Bill.		Wreckage.
IRISH CHANNEL.			
16.9.24	20 miles N.N.W. of Bar Light Vessel.		Submerged wreckage, with mast attached, pro- jecting about 10 feet above water.
17.9.24	53°29'N.	4°58'W.	Overtaken large spherical buoy, with attached wire, and partly submerged smaller buoy, all adrift. Very dangerous to navigation.
NORTH ATLANTIC.			
1.9.24	39°38'N.	73°54'W.	Large raft, consisting of two cylindrical iron tanks about 30 feet long.
1.9.24	36°16'N.	73°28'W.	Piece of wooden scow, projecting about 17 feet out of water.
1.9.24	33°37'N.	77°25'W.	Spar, unpainted in upright position, projecting about 10 feet out of water.
1.9.24	33°00'N.	78°22'W.	Large tree trunk.
2.9.24	34°16'N.	12°55'W.	Wreck of schooner adrift, 150 feet long, 10 feet out of water, no masts standing. Dangerous to navi- gation. Probably the <i>Governor Parr</i> .
3.9.24	49°51'N.	18°07'W.	Buoy adrift, marked "FP", red painted lattice work, with chime, whistle and lantern, not operating. Dangerous to navigation.
3.9.24	25°43'N.	75°14'W.	About 100 pieces of floating lumber, approximately 25 feet long.
4.9.24	40°48'N.	72°24'W.	Piece of wreckage about 30 feet long and 20 feet wide, having the appearance of a raft awash.
6.9.24	39°14'N.	74°15'W.	Wreckage awash, about 30 feet long and 15 feet wide, having appearance of part of schooner's deck.
6.9.24	26°10'N.	74°04'W.	Steamer's empty lifeboat, damaged, letters of name " <i>Misuph</i> " visible, remaining letters obscured.
7.9.24	50°24'N.	5°53'W.	Wreckage, with mast about 10 feet above water.
7.9.24	45°01'N.	20°56'W.	Stump of lowermast, 15-20 feet above water, apparently attached to wreckage and dangerous to navigation.
12.9.24	34°30'N.	45°20'W.	Drifting wooden vessel, keel to the sun, dangerous to navigation.
15.9.24	49°46'N.	18°04'W.	Big black buoy with red superstructure.
15.9.24	42°31'N.	65°25'W.	Derelict, 10 feet above water.
17.9.24	50°47'N.	5°00'W.	Probably a spar buoy, drifting, dangerous to navi- gation.
17.9.24	51°25'N.	9°10'W.	Heavy wreckage, drifting, dangerous to navigation.
18.9.24	49°19'N.	8°38'W.	Large black conical buoy, projecting 6 feet. Dangerous to navigation.
18.9.24	54°37'N.	21°09'W.	Red conical buoy, surmounted by lamp staff and blue bunting and marked "4 D" in white letters. Dangerous to navigation.
21.9.24	49°45'N.	9°42'W.	Red conical buoy marked with white X.
24.9.24	49°14'N.	7°31'W.	Red conical buoy adrift.
GULF OF MEXICO			
2.9.24	11 miles E½N. of American Shoal Light House, Florida Reefs.		Log, about 30 feet long and 2½ feet diameter.
3.9.24	16°31'N.	87°21'W.	Large logs, in area covered with driftwood which extended about 13 miles to S.
18.9.24	13 miles 80° (true) from Tampico Breakwater.		Small craft awash.

LIST OF VOLUNTARY OBSERVING SHIPS.

The following is a complete list of ships regularly contributing observations to the Meteorological Office.

The names of the Captains and Officers, as ascertained from logs and reports received, are given with the date and description of last log, register or report received up to the time of going to press.

Marine Observers are requested to take this as complete and grateful acknowledgment for the work they have contributed, as it has been found necessary to reduce as far as possible the correspondence of the Marine Superintendent, which was largely composed of letters acknowledging logs and reports, in order that more time may be devoted to obtaining results from the data received.

Only in special cases will individual letters be sent.

Excellent awards will be made at the end of the financial year. The names of Commanders and Officers gaining these awards will be published in a special list in "The Marine Observer."

Ships not contributing logs or reports within a reasonable period will automatically be removed from the list and the free issue of the "Marine Observer" discontinued; it is, therefore, earnestly requested that changes of service, probable periods of lay up or transfer of Commanders may be notified whenever possible.

A waiting list is kept of the names of vessels whose Commanders have offered to regularly co-operate.

The number of voluntary observing ships is limited to a maximum total of 500.

Commanders are requested to point out any errors which may occur in the list.

Unless otherwise stated, vessels on the following list are s.s.

M.L. = Equipped with tested Instruments for keeping Meteorological Log.

W.T. = Equipped with tested Instruments for making coded W/T reports to the Meteorological Office, London.

No. = Keeps Ship's Meteorological Report Form 911 with ship's instruments.

C.C. = Equipped with tested Instruments for making Cross Channel Telegraphic Reports to the Meteorological Office, London.

The numbers which appear before the names of ships equipped for making coded W/T reports to the Meteorological Office, London, are used for the purpose of identification when the observations are re-transmitted in synoptic messages by Wireless or Cable.

Name of Vessel.	Captain.	Observing Officers.	Official Meteorological Equipment.	Line.	Last Log, Register, or Report Contributed.	Date Received.
<i>Aba</i> ...	Hughes, J. ...	G. P. Williams ...	No.	Elder Dempster ...	Form 911 26.6.24 to 1.8.24 ...	6.8.24.
<i>Abinsi</i> ...	Wright, J. B. ...	V. Baddeley ...	"	Elder Dempster ...	" 12.12.23 to 18.1.24...	25.1.24.
<i>Actor</i> ...	Haylett, E. ...	G. Kent ...	"	Harrison ...	" 19.1.24 to 7.3.24 ...	1.4.24.
<i>Adda</i> ...	Toft, J. T. ...	J. E. Wood, E. H. Gatward ...	"	Elder Dempster ...	" 12.6.24 to 18.7.24 ...	21.7.24.
50 <i>Adriatic</i> ...	Beadnell, F. E., Commr., R.N.R.	J. Collins, R. Hawkins, J. Farrell ...	W.T.	White Star ...	W.T.Reg. 17.8.24 to 6.9.24 ...	10.9.24.
<i>Agapenor</i> ...	Ramsay, J. ...	J. P. Makepeace ...	No.	A. Holt ...	Form 911 16.8.24 to 7.9.24 ...	10.9.24.
<i>Alban</i> ...	Whayman, W. R. ...	R. Griffiths ...	"	Booth ...	" 24.7.24 to 21.8.24 ...	4.9.24.
<i>Albania</i> ...	Irving, R. B. ...	C. B. Osborne ...	"	Cunard ...	" 21.2.24 to 15.4.24 ...	22.4.24.
<i>Algerian Prince</i> ...	Rowlands, D. ...	G. Potts ...	"	Prince ...	" 3.8.24 to 1.9.24 ...	4.9.24.
<i>Alipore</i> ...	Gordon, L. M., R.D., Commr., R.N.R.	H. D. Case ...	"	P. and O. ...	" 24.7.24 to 6.8.24 ...	11.8.24.
<i>Almanzora</i> ...	Mackenzie, G. A. ...	A. P. Portsmouth ...	"	R.M.S.P. ...	" 24.4.24 to 15.6.24 ...	14.7.24.
<i>Alondra</i> ...	J. Prendergast ...	H. Martin ...	"	Yeoward ...	" 13.6.24 to 28.7.24 ...	30.7.24.
<i>Ampelco</i> ...	Verstichelen, A. ...	E. Suret ...	"	American Petroleum... L.M. & S. Rly.	" 9.8.24 to 31.8.24 ...	6.9.24.
<i>Anglia</i> ...	Sorge, P. ...	W. H. Hughes ...	C.C.	Telegraphic Report	" 26.5.24 to 27.7.24 ...	6.8.24.
<i>Antilochus</i> ...	Sprott, E. J. ...	J. J. Daniel ...	No.	A. Holt ...	Form 911 11.4.24 ...	11.4.24.
<i>Appam</i> ...	Yardley, H. A. ...	...	M.L.	Elder Dempster ...	Form 911 22.1.24 to 16.4.24 ...	23.4.24.
30 <i>Aquitania</i> ...	Millsom, H. ... Charles, Sir J. T. W. K.B.E., C.B., R.D., Commadore, R.N.R.	J. L. Croasdaile, P. O. Davis, J. Locke.	W.T.	Cunard ...	Met. Log. 23.1.24 to 22.6.24 ...	8.7.24.
<i>Arafura</i> ...	Gordon, A. S. ...	H. Jeans ...	No.	Eastern and Australian R.M.S.P. ...	W.T. Reg. 27.7.24 to 11.8.24 ...	18.8.24.
<i>Araua</i> ...	Moir, A. G. ...	R. Jones ...	"	Union Castle ...	" 17.8.24 to 1.9.24 ...	4.9.24.
<i>Armada Castle</i> ...	George, J., O.B.E.	L. G. May ...	"	Form 911 1.8.24 to 18.8.24 ...	9.9.24.	
<i>Arracan</i> ...	Willis, M. ...	R. MacInnes, H. Poole, D. Frame, A. Olding.	M.L.	P. Henderson ...	Met. Log. 26.1.24 to 24.4.24 ...	5.5.24.
<i>Arundel</i> ...	Short, H. ...	Mr. Hill ...	C.C.	Southern Rly. ...	Telegraphic Report 7.9.24 ...	7.9.24.
<i>Arundel Castle</i> ...	Hague, J. W., Commr., R.N.R.	C. Colburn, G. Blaiklock, C. Williams, F. Granger.	M.L.	Union Castle ...	Met. Log. 2.5.24 to 31.8.24 ...	6.9.24.
<i>Assyria</i> ...	Erskine, R. ...	J. Hamilton ...	No.	Anchor ...	Form 911 5.7.24 to 28.7.24 ...	15.8.24.
<i>Astronomer</i> ...	Booth, W. M. ...	E. S. Machon, W. Weatherall, J. Jackson.	M.L.	Harrison ...	Met. Log. 20.3.24 to 10.6.24 ...	19.6.24.
<i>Athenic</i> ...	Jones, J. L. ...	W. Hill ...	No.	White Star ...	Form 911 5.7.24 to 15.8.24 ...	16.8.24.
<i>Atsuta Maru</i> ...	Saito, B. ...	S. Mizogucki ...	"	Nippon Yusen Kaisha Harrison ...	" 27.5.24 to 29.6.24 ...	1.7.24.
<i>Auditor</i> ...	Owen, W. F. ...	J. Harnden ...	"	Glen & Co. ...	" 3.7.24 to 22.7.24 ...	5.8.24.
<i>Auldmuir</i> ...	Ramsay, J. D. ...	P. D. Thompson ...	"	Cunard ...	Form 911 9.7.24 to 26.7.24 ...	1.8.24.
<i>Ausonia</i> ...	Gibbons, G., R.D., Commr., R.N.R.	A. T. Hamer ...	"	Anchor ...	" 20.7.24 to 10.8.24 ...	23.8.24.
<i>Author</i> ...	Kinlock, R. ...	A. Goddard ...	"	Harrison ...	" 29.8.23 to 7.10.23 ...	12.10.23.
<i>Ballena</i> ...	Pape, E. R. ...	W. Webster ...	"	P.S.N. Co. ...	" 19.9.23 to 11.10.23...	15.10.23.
51 <i>Baltic</i> ...	Roberts, J., C.B.E., D.S.O., R.D., Capt., R.N.R.	E. S. Bell, E. A. A. Crowley, J. Law.	W.T.	White Star ...	W.T. Reg. 3.8.24 to 23.8.24 ...	26.8.24.
<i>Bambra</i> ...	Wyles, W. S. ...	H. W. Norris, J. E. Turner, J. Eggleston, W. Walters.	M.L.	State Service, Australia	Form 911 3.8.24 to 23.8.24 ...	27.8.24.
<i>Bampton Castle</i> ...	Buckeridge, G. ... Swiney, W. A. ...	F. Norfolk, L. C. Chapman, H. A. Deller, E. Crocker, C. B. Hoggan.	"	Union Castle ...	Met. Log. 27.2.24 to 25.6.24 ...	12.8.24.
<i>Banbury Castle</i> ...	...	C. C. Page ...	No.	Turnbull Martin ...	" 21.2.23 to 3.5.23 ...	28.1.24.
<i>Banffshire</i> ...	Wynne, R. H. ...	L. W. Evans ...	"	Commonwealth Govt. Hogarth & Sons ...	" 2.9.23 to 9.12.23 ...	...
<i>Barambah</i> ...	Mayne, W. ...	T. Swann ...	"	His Majesty's Ship ...	Form 911 23.7.24 to 13.8.24 ...	18.8.24.
<i>Baron Cawdor</i> ...	Ballie, T. ...	A. Campbell ...	"	...	" 27.5.24 to 16.6.24 ...	8.9.24.
<i>Beaufort</i> ...	Rice, W. V., D.S.O., D.S.C., Commr., R.N.	H. M. S. Forbes ...	M.L.	...	" 4.6.24 to 2.7.24 ...	8.9.24.
59 <i>Belgenland</i> ...	Bradshaw, J. ...	C. J. Murray, J. M. Appleby, W. E. Hesketh.	W.T.	Red Star ...	Met. Log. 18.3.24 to 1.7.24 ...	16.8.24.
<i>Beltai, Ketch</i> ...	Algarsson, G. ...	J. B. Hewson ...	No.	Algarsson Expedition, 1924.	" 21.9.23 to 21.4.24 ...	27.5.24.
<i>Benalder</i> ...	Cole, J. H., D.S.C. ...	A. K. Watson ...	"	Ben Line ...	Form 911 14.6.24 to 13.7.24 ...	22.7.24.

Name of Vessel.	Captain.	Observing Officers.	Official Meteorological Equipment.	Line.	Last Log, Register, or Report Contributed.	Date Received.
<i>Bengloe</i> ...	McCorquodale, A. ...	G. M. Duff ...	No.	Ben Line ...	Form 911 2.8.24 to 14.8.24 ...	23.8.24.
<i>31 Berengaria</i> ...	Irvine, W. R. D., R.D. Capt., R.N.R.	G. H. Jones, R. F. Bovey, W. C. A. Robson.	W.T.	Cunard ...	W.T. Reg. 3.8.24 to 18.8.24 ...	22.8.24.
<i>Bernini</i> ...	Evans, W. ...	H. L. Rudd ...	No.	Lampart & Holt	Form 911 24.8.24 to 8.9.24 ...	10.9.24.
<i>Berrima</i> ...	Hussey Cooper, E. M., R.D., Commr., R.N.R.	C. C. Smith ...	"	P. & O. Branch	" 23.5.24 to 5.8.24 ...	4.9.24.
<i>Bolingbroke</i> ...	Stewart, A. ...	E. Laurence, R. Woods, J. S. Liddell.	M.L.	Canadian Pacific	Met. Log. 13.7.24 to 1.8.24 ...	16.8.24.
<i>Borda</i> ...	Holland, R. ...	" " " " " "	No.	P. & O. Branch	Form 911 27.3.24 to 4.5.24 ...	11.8.24.
<i>Bothwell</i> ...	Carr Jones, D. J. ...	S. W. Keay ...	"	Canadian Pacific	" 27.7.24 to 26.8.24 ...	8.9.24.
<i>Brandon</i> ...	Freer, A., R.D., Commr., R.N.R.	J. Mackenzie ...	"	" "	" 21.10.23 to 20.11.23	27.11.23.
<i>Brecon</i> ...	McDonald, J. ...	N. B. Glennie, W. W. J. Evans, W. J. P. Roberts.	M.L.	" "	Met. Log. 20.9.23 to 6.5.24 ...	8.5.24.
<i>Brenda</i> ...	Murdoch, R. G. ...	A. M. Adams ...	No.	Scottish Fishery Board	Form 911 1.8.24 to 31.8.24 ...	4.9.24.
<i>Brighton</i> ...	Hill, A. ...	Mr. Munton ...	C.C.	Southern Railway	Telegraphic Report 11.9.24 ...	11.9.24.
<i>British Engineer</i> ...	Piper, H. C. ...	E. L. Miller ...	No.	British Tankers	Form 911 26.6.24 to 3.9.24 ...	5.9.24.
<i>British Lantern</i> ...	Taylor, R. J. ...	R. B. Page ...	"	" "	" 9.7.24 to 13.8.24 ...	18.8.24.
<i>Browning</i> ...	Connorton, C. A. ...	G. F. V. Peck ...	"	Lampart & Holt	" 26.4.24 to 23.5.24 ...	27.5.24.
<i>Bruyere</i> ...	Heasley, W. S. ...	A. C. Kennedy ...	"	" "	" 25.4.24 to 30.6.24 ...	17.7.24.
<i>Cabotia</i> ...	Lawson, P. ...	T. G. Menzies ...	No.	Anchor Donaldson	Form 911 3.8.24 to 3.9.24 ...	10.9.24.
<i>Cambria C.S.</i> ...	Wightman, H. G. E., D.S.C.	E. N. L. Staples ...	M.L.	Eastern Tel. Co.	Met. Log. 1.12.23 to 28.3.24 ...	23.4.24.
<i>Cambria</i> ...	" " " " " "	V. S. Phillips ...	C.C.	L.M. & S. Rly.	Telegraphic Report 11.9.24 ...	11.9.24.
<i>Camito</i> ...	Scudamore, J. H. H., D. S. C., R. D., Commr., R.N.R.	D. A. Jack, R. M. Cossantine, S. Borrie.	M.L.	Elders & Fyfes	Met. Log. 2.3.24 to 28.6.24 ...	2.7.24.
<i>Canada</i> ...	Jones, T. ...	F. W. Laws ...	No.	White Star-Dominion	Form 911 9.8.24 to 30.8.24 ...	1.9.24.
<i>Canadian Inventor</i> ...	Roberts, R. P. ...	S. M. Holinden ...	"	Canadian Govt. Mer- chant Marine.	" 16.12.23 to 6.2.24 ...	24.3.24.
<i>Canadian Scottish</i> ...	Harris G. W. ...	S. Fieldhouse ...	"	" " "	" 22.12.23 to 26.2.24 ...	21.5.24.
<i>Canadian Skir- misher.</i> ...	Millar, W. H. ...	J. Moller ...	"	" " "	" 17.5.24 to 19.6.24 ...	24.6.24.
<i>Canadian Winner</i> ...	Hocking, N. P. ...	R. D. Ranns ...	"	" " "	" 31.3.24 to 19.5.24 ...	18.6.24.
<i>Carlow Castle</i> ...	Harvey, H. B. ...	L. H. Stevens ...	"	Union Castle	" 13.6.24 to 10.7.24 ...	28.7.24.
<i>35 Carmania</i> ...	McNeil, S. G. S., R.D., Capt., R.N.R.	J. V. Hallwood, R. Allen, T. A. O. Ellis.	W.T.	Cunard ...	W.T. Reg. 8.8.24 to 27.8.24 ...	1.9.24.
<i>34 Caronia</i> ...	Diggle, E. G., R.D., Capt., R.N.R.	D. W. Sorrell, J. A. Quarrie, E. R. Taylor.	W.T.	Cunard ...	Form 911 8.8.24 to 27.8.24 ...	1.9.24.
<i>Cassandra</i> ...	Mitchell, W. E. ...	G. M. Sime ...	No.	Anchor Donaldson	W.T. Reg. 27.7.24 to 13.8.24 ...	15.8.24.
<i>52 Cedric</i> ...	Marshall, W., D.S.O., R.D., Capt., R.N.R.	A. E. Weller, J. A. Heenan, A. E. Harvey.	W.T.	White Star ...	Form 911 1.5.24 to 25.5.24 ...	27.5.24.
<i>53 Celtic</i> ...	Holme, A. ...	R. S. Walker, G. T. Kavanagh, D. W. Chamberlain.	W.T.	" " "	W.T. Reg. 28.7.24 to 15.8.24 ...	19.8.24.
<i>Ceramic</i> ...	Symons, J. ...	H. Williams ...	No.	" " "	Form 911 27.7.24 to 16.8.24 ...	19.8.24.
<i>Changsha</i> ...	Gambrill, F. C. ...	A. M. Frame, F. G. Strat- ford, H. Lishman, L. H. Baillie.	M.L.	Yuill & Co. ...	W.T. Reg. 11.8.24 to 31.8.24 ...	3.9.24.
<i>Charon</i> ...	Sturrock, — ...	" " " " " "	No.	" " "	Form 911 10.8.24 to 30.8.24 ...	2.9.24.
<i>Chignecto</i> ...	Green, J. ...	A. F. Walker ...	"	" " "	Met. Log. 27.1.24 to 21.5.24 ...	26.5.24.
<i>China</i> ...	King, A., D.S.C. ...	E. Cox Walker ...	"	Dalgety & Co. ...	" 17.11.23 to 22.4.24 ...	2.8.24.
<i>Chindwara</i> ...	Brisley, P. L. ...	A. G. Earl ...	"	R.M.S.P. Co. ...	Form 911 19.1.24 to 26.2.24 ...	7.4.24.
<i>Chindwin</i> ...	Esslemont, C. ...	J. Summers, W. Wilson, C. Owen.	M.L.	P. & O. ...	" 9.4.24 to 20.5.24 ...	26.5.24.
<i>Chinhua</i> ...	Byers, G. ...	Messrs. Shinn, Graybrook, Stringer, Taylor.	"	British India ...	Met. Log. 17.6.24 to 26.7.24 ...	22.8.24.
<i>City of Alexandria</i> ...	Bedford, G. B. ...	T. C. Higgins ...	No.	P. Henderson	Met. Log. 16.5.24 to 3.8.24 ...	12.8.24.
<i>City of Baroda</i> ...	" " " " " "	A. V. Radcliffe, R. J. Witton, A. B. Carson.	M.L.	China Nav. Co. ...	" 22.2.24 to 3.7.24 ...	4.9.24.
<i>City of Batavia</i> ...	Nancollas, H. E. ...	S. J. Nash ...	No.	Ellerman ...	Met. Log. 20.6.23 to 15.9.23 ...	4.10.23.
<i>City of Benares</i> ...	McArthur, J. ...	A. A. Fullerton ...	"	" " "	Form 911 4.7.24 to 31.7.24 ...	18.8.24.
<i>City of Brisbane</i> ...	Pine, R. ...	W. Robinson ...	"	" " "	" 12.6.24 to 4.7.24 ...	18.8.24.
<i>City of Canterbury</i> ...	Bremner, D. M. ...	A. M. Hamilton ...	"	" " "	" 23.11.23 to 14.12.23	12.2.24.
<i>City of Chester</i> ...	Teague, R. E. ...	F. C. Wilson ...	M.L.	" " "	" 7.5.24 to 15.7.24 ...	6.8.24.
<i>City of Dunkirk</i> ...	Seaborne, F. O. ...	W. Leadbeater ...	No.	" " "	Met. Log. 22.12.23 to 4.4.24 ...	8.4.24.
<i>City of Edinburgh</i> ...	Spencer, H. ...	E. V. Henday ...	"	" " "	Form 911 21.9.23 to 4.10.23 ...	17.10.23.
<i>City of London</i> ...	Martin, G. ...	C. Inglis ...	"	" " "	" 31.5.24 to 28.7.24 ...	26.8.24.
<i>City of Marseilles</i> ...	Brown, G. ...	G. M. Womersley ...	"	" " "	" 3.4.24 to 29.4.24 ...	8.5.24.
<i>City of Newcastle</i> ...	Oliver, R. E., D.S.C.	C. Paton ...	"	" " "	" 23.2.24 to 12.3.24 ...	17.3.24.
<i>City of Rangoon</i> ...	Williams, T. L. ...	W. Ibbotson, S. L. Hoare, T. A. Dexter.	M.L.	" " "	Met. Log. 26.9.23 to 22.10.23 ...	31.10.23.
<i>City of Valencia</i> ...	Williamson, W. A., R.D., Lieut- Commr. R.N.R.	J. J. McTigue ...	No.	" " "	Met. Log. 25.4.23 to 9.8.23 ...	16.8.23.
<i>City of Yokohama</i> ...	Jinks, J. W. ...	" " " " " "	"	" " "	Form 911 27.1.24 to 3.4.24 ...	7.4.24.
<i>Clan Buchanan</i> ...	George, L. S. ...	P. G. de Gruchy ...	"	" " "	" 2.7.24 to 19.7.24 ...	5.8.24.
<i>Clan Lindsay</i> ...	Baker, C. W. ...	S. J. Shennan ...	"	Clan ...	" 11.10.23 to 10.1.24 ...	14.1.24.
<i>Clan Macbeth</i> ...	Young, A. H., R.D., Lieut-Commr., R.N.R.	T. Lund ...	"	" " "	" 17.5.24 to 27.5.24 ...	30.5.24.
<i>Clan Macgillivray</i> ...	West, W. F. ...	P. G. de Gruchy ...	"	" " "	" 28.7.24 to 8.8.24 ...	1.9.24.
<i>Clan Macindoe</i> ...	Miller, W. ...	F. G. Darnborough ...	"	" " "	" 19.7.24 to 18.8.24 ...	8.9.24.
<i>Clan Mackellar</i> ...	T. Forreth ...	G. W. Banbury, E. N. Stewart	"	" " "	" 23.6.24 to 13.7.24 ...	11.8.24.
<i>Clan Mackenzie</i> ...	Young, G. ...	W. G. Arthur, J. M. Lorimer	"	" " "	" 9.7.24 to 27.7.24 ...	8.9.24.
<i>Clan Mackinnon</i> ...	Mackie, R. W. ...	W. S. Holden ...	M.L.	" " "	" 10.5.24 to 10.6.24 ...	12.6.24.
<i>Clan Macnaughton</i> ...	Gray, J. N. ...	A. G. Storkey, F. Burnes ...	No.	" " "	Met. Log. 9.4.24 to 3.8.24 ...	2.9.24.
<i>Clan Macphee</i> ...	Gourlay, J. B. ...	P. H. Aydon, W. D. E. Camp- bell, F. Buckley, — Carter.	M.L.	" " "	Form 911 19.1.24 to 24.2.24 ...	26.2.24.
<i>Clan Mactaggart</i> ...	Gray, J. N. ...	J. H. Malpas, W. S. Henderson	No.	" " "	Met. Log. 26.1.24 to 12.6.24 ...	8.8.24.
<i>Clan Macnicar</i> ...	Phillips, G. P. ...	L. S. Murrin ...	"	" " "	Form 911 23.5.24 to 21.6.24 ...	28.7.24.
<i>Clan Malcolm</i> ...	Higgins, C. J. ...	T. G. Young, A. Cameron ...	M.L.	" " "	" 3.8.24 to 15.8.24 ...	25.8.24.
<i>Clan Morrison</i> ...	Porterfield, W. M. ...	D. A. Evans ...	No.	" " "	Met. Log. 22.12.24 to 31.3.24 ...	3.4.24.
<i>Clan Murdoch</i> ...	Pagan, J. C. ...	C. E. Abbey, C. W. Thomas	"	" " "	Form 911 6.7.24 to 26.7.24 ...	1.9.24.
<i>Clan Ranald</i> ...	Henderson, C. W. ...	P. J. Green ...	"	" " "	" 17.8.24 to 24.8.24 ...	28.8.24.
<i>Clan Ross</i> ...	Christian, W. G. M. ...	S. M. Werry Easterbrook ...	"	" " "	" 8.12.23 to 22.1.24 ...	28.1.24.
<i>Clan Sinclair</i> ...	Neill, G. A. ...	F. B. Parker ...	"	" " "	" 3.8.23 to 8.10.23 ...	19.10.23.
<i>Clan Stuart</i> ...	Stenson, F. J. R. D., Commr. R.N.R.	R. P. Jackson ...	"	" " "	" 29.7.24 to 19.8.24 ...	9.9.24.
<i>Clan Urquhart</i> ...	Gibb, A. F. W. ...	R. H. Law ...	"	" " "	" 10.7.24 to 6.8.24 ...	11.8.24.
<i>Colonia, C.S.</i> ...	Campos, V., O.B.E., Lt.-Commr. R.N.R.	S. A. Garnham, A. S. Muir, W. E. Allen, S. Hall.	M.L.	Telegraph Construction & Maintenance.	Met. Log. 5.6.24 to 27.6.24 ...	28.7.24.
<i>Colonial</i> ...	Barrow, R. K. ...	A. V. Jones ...	No.	Harrison ...	Met. Log. 27.10.23 to 22.11.23	26.11.23.

LIST OF VOLUNTARY OBSERVING SHIPS

Name of Vessel.	Captain.	Observing Officers.	Official Meteorological Equipment.	Line.	Last Log, Register, or Report Contributed.	Date Received.
<i>Colonian</i> ...	Gittins, R. P. ...	J. Crangle ...	No.	Leyland ...	Form 911 9.7.24 to 5.8.24 ...	13.8.24.
<i>Columba</i> ...	Gemmell, W. ...	S. G. Taylor ...	"	Anchor ...	" 26.7.24 to 16.8.24 ...	22.8.24.
<i>Comino</i> ...	Nuttall, E. L. ...	A. McVicar ...	"	Furness Withy ...	" 7.3.24 to 13.4.24 ...	5.5.24.
<i>Cooco</i> ...	Festa, M. ...	C. Keen ...	"	Commonwealth Govt. ...	" 16.7.24 to 5.8.24 ...	25.8.24.
<i>Corinthia</i> ...	Hart, F. ...	W. T. Fitzgerald, M. Bennett, F. G. Rogers.	M.L.	White Star ...	Met. Log. 29.12.23 to 8.4.24 ...	12.5.24.
<i>Cornish City</i> ...	Bowen, T. S. ...	G. S. Dawes ...	No.	Reardon Smith ...	Form 911 8.1.24 to 16.2.24 ...	7.4.24.
<i>Cornwall</i> ...	Robertson, H. W. ...	W. W. Glover ...	"	Dowie, J. & Co. ...	" 25.5.24 to 30.6.24 ...	7.8.24.
<i>Crawford Castle</i> ...	Sinclair, G. ...	J. C. Brown ...	"	Union Castle ...	" 9.5.24 to 11.8.24 ...	15.8.24.
<i>Culebra</i> ...	Mackay, A. S. ...	... ..	M.L.	R.M.S.P. Co. ...	... ..	...
<i>Cuthbert</i> ...	Reynolds, W. H. B. ...	A. B. Fasting, K. S. Munro ...	No.	Booth ...	Form 911 22.5.24 to 5.8.24 ...	23.8.24.
<i>Cyclops</i> ...	Cosker, W. ...	R. W. Ellis ...	"	A. Holt ...	" 20.6.24 to 24.8.24 ...	4.9.24.
<i>Dardanus</i> ...	Shaw, A. T. ...	... ..	No.	A. Holt ...	" 10.8.24 to 19.8.24 ...	27.8.24.
<i>Darian</i> ...	Masters, W. ...	A. S. Holland ...	"	Leyland ...	" 10.8.24 to 21.8.24 ...	1.9.24.
<i>Dario</i> ...	Smith, W. E., D.S.O., R.D., Capt., R.N.R.	H. D. Jackman ...	"	R.M.S.P. Co. ...	" 12.7.24 to 6.9.24 ...	10.9.24.
<i>Daytonian</i> ...	Walker, C. J., D.S.C.	W. T. Godwin ...	"	Leyland ...	" 15.8.24 to 25.8.24 ...	10.9.24.
<i>Delta</i> ...	Brooks, C., D.S.O., R.D., Commr., R.N.R.	J. O. V. Young ...	"	P. & O. ...	" 28.6.24 to 8.8.24 ...	13.8.24.
<i>Demerara</i> ...	Hill, T. A. ...	A. Hambly ...	"	R.M.S.P. Co. ...	" 20.5.24 to 12.7.24 ...	14.7.24.
<i>Demosthenes</i> ...	Williams, W. J. ...	R. A. Alcock ...	"	Aberdeen ...	" 2.7.24 to 21.8.24 ...	2.9.24.
<i>Desado</i> ...	Wakeman, E. C. ...	W. Scott, D. L. Neilson ...	"	R.M.S.P. Co. ...	" 29.6.24 to 24.8.24 ...	28.8.24.
<i>Desna</i> ...	Adam, C., R.D., Commr., R.N.R.	H. D. Jackman ...	"	"	" 3.5.24 to 28.6.24 ...	1.7.24.
<i>Deucalion</i> ...	Findlay, J. ...	P. W. Savery, O. Thomas ...	"	A. Holt ...	" 23.6.24 to 22.7.24 ...	28.7.24.
<i>Devon</i> ...	Gardner, H. W. ...	A. Bell ...	"	New Zealand S.S. Co. ...	" 20.12.23 to 11.5.24 ...	4.6.24.
<i>Dieppe</i> ...	Marmery, S. ...	Mr. Parsons ...	C.C.	Southern Railway ...	Telegraphic Report. 12.9.24 ...	12.9.24.
<i>Digby</i> ...	Chambers, F. W., D.S.C.	J. Pascoe, J. W. Murphy, W. P. Paterson.	M.L.	Furness Withy ...	Met. Log. 2.10.23 to 8.4.24 ...	22.4.24.
<i>Dimboola</i> ...	Roy, C. M. ...	G. N. Baker ...	No.	Melbourne S.S. Co. ...	Form 911 4.7.24 to 30.7.24 ...	8.9.24.
<i>Discoverer</i> ...	King, J. T. ...	J. Stanhope ...	"	Harrison ...	" 8.1.24 to 8.4.24 ...	14.4.24.
<i>Dogra</i> ...	Hartock, L. ...	E. C. Akers ...	"	Asiatic S.N. Co. ...	" 26.6.24 to 10.7.24 ...	5.8.24.
<i>Domala, M.V.</i> ...	Whittingham, W. E., O.B.E., R.D., Commr. R.N.R.	C. E. Merchant ...	"	British India ...	" 12.1.24 to 6.2.24 ...	18.3.24.
<i>Doric</i> ...	Davies, J. ...	A. Thompson ...	"	White Star ...	" 20.7.24 to 6.9.24 ...	8.9.24.
<i>Doric Star</i> ...	Thomas, R. T. ...	A. S. Menzies ...	"	Blue Star ...	... ..	...
<i>Dorington Court</i> ...	Isaacs, W. A. ...	E. V. Quickenden ...	"	Haldin & Co. ...	Form 911 26.6.24 to 16.7.24 ...	21.7.24.
<i>Dorset</i> ...	... ..	Kettlewell, C. R. ...	M.L.	New Zealand S.S. Co. ...	... ..	...
<i>Dromore Castle</i> ...	Linklater, H. ...	S. S. Smith ...	No.	Union Castle ...	Form 911 20.3.24 to 9.4.24 ...	6.5.24.
<i>Dryden</i> ...	Knight, R. A. ...	G. D. Oldfield ...	"	Lampert & Holt ...	" 28.10.23 to 2.1.24 ...	18.2.24.
<i>Dundrum Castle</i> ...	Mumford, C. E. ...	H. Bunn ...	"	Union Castle ...	... ..	...
<i>Duendes</i> ...	Pape, E. R. ...	... ..	"	Pacific S.N. Co. ...	Form 911 20.7.24 to 13.8.24 ...	22.8.24.
<i>Duffield</i> ...	... ..	T. S. Robertson ...	"	Hunting & Sons ...	... ..	...
<i>Duquesa</i> ...	G. Jarvis ...	D. Thornton, C. Shane, A. Bradbury.	"	Furness Withy ...	" 25.5.24 to 24.7.24 ...	29.7.24.
<i>Durenda</i> ...	Wilson, W. ...	W. H. Creese ...	"	British India ...	" 27.4.24 to 21.5.24 ...	7.8.24.
<i>Eastern</i> ...	Smith, G. L. ...	H. Murray, G. Munro, E. S. Birrell.	M.L.	Eastern and Australian ...	Met. Log. 27.8.23 to 3.5.24 ...	2.8.24.
<i>Ebani</i> ...	Faill, — ...	W. McKeown ...	No.	Elder Dempster ...	... ..	...
<i>Edinburgh Castle</i> ...	Strong, H., R.D., Commr. R.N.R.	... ..	M.L.	Union Castle ...	Met. Log. 30.11.23 to 24.3.24 ...	14.4.24.
<i>Eemland</i> ...	Van Noppen, C. D. ...	T. Doornbosch ...	No.	Holland Lloyd ...	Form 911 1.7.24 to 1.8.24 ...	18.8.24.
<i>Egori</i> ...	McDowall, J. ...	K. Redmore ...	"	Elder Dempster ...	" 25.11.23 to 10.12.23 ...	12.12.23.
<i>El Cordobes</i> ...	Noton, F. G. ...	N. H. Oldham ...	"	British & Argentine S.N. Co. ...	" 6.6.24 to 4.7.24 ...	8.7.24.
<i>Elmina</i> ...	Millson, H. E. ...	W. McKeown, J. H. Hall, C. H. Turner.	M.L.	Elder Dempster ...	Met. Log. 1.3.24 to 30.8.24 ...	8.9.24.
<i>El Paraguay</i> ...	Ellis, F., D.S.C. ...	W. E. Williams ...	No.	Houlder Bros. ...	Form 911 8.6.24 to 31.7.24 ...	6.8.24.
<i>Elpenor</i> ...	Evans, D. L. ...	P. E. Wright, C. Mock ...	M.L.	A. Holt ...	Met. Log. 31.12.23 to 19.4.24 ...	24.4.24.
<i>Elysia</i> ...	Kinnaird, J. ...	A. Grant ...	No.	Anchor ...	Form 911 16.2.24 to 8.3.24 ...	1.4.24.
<i>Empress of Asia</i> ...	Douglas, L. D., R.D., Lt. Commr., R.N.R.	F. C. Stratford, R. J. Hickey, M. Blyth.	M.L.	Canadian Pacific ...	Met. Log. 8.2.24 to 24.5.24 ...	20.6.24.
<i>Empress of Australia</i> ...	Robinson, S., C.B.E., R.D., Commr., R.N.R.	... ..	M.L.	"	" 1.6.23 to 9.3.24 ...	7.4.24.
<i>Empress of Canada</i> ...	Hopcraft, D. ...	... ..	"	"	"	"
<i>Empress of France</i> ...	Halley, A. J. ...	... ..	"	"	"	"
<i>Empress of Russia</i> ...	Robinson, S., C.B.E., R.D., Commr., R.N.R.	W. S. Halliday ...	M.L.	"	Met. Log. 4.1.24 to 22.5.24 ...	7.7.24.
<i>Empress of Scotland</i> ...	Griffiths, E. ...	R. V. Everett, A. S. Phillips, B. Grant.	M.L.	"	" 13.6.23 to 17.11.23 ...	21.11.23.
<i>Empress of Russia</i> ...	Hosken, A. J. ...	A. B. Smith, A. M. Barff, S. H. Blyth, J. P. Napier, C. S. Morris, R. H. Graham.	M.L.	"	" 27.12.23 to 20.4.24 ...	26.5.24.
<i>Empress of Scotland</i> ...	Gillies, J., C.B.E. ...	... ..	M.L.	"	"	"
<i>Endeavour</i> ...	Nares, J. D., D.S.O., Capt., R.N.	H. Exton Turner ...	M.L.	His Majesty's Ship ...	Met. Log. 23.10.23 to 19.2.24 ...	14.6.24.
<i>Essequibo</i> ...	Duncan, E. E. ...	G. Pattison ...	No.	R.M.S.P. Co. ...	Form 911 23.5.24 to 29.7.24 ...	2.9.24.
<i>Eumaeus</i> ...	Power, J. ...	E. R. Pritchard ...	"	A. Holt ...	" 21.7.24 to 3.8.24 ...	25.8.24.
<i>Euripides</i> ...	Collins, P. J., O.B.E.	H. S. Cox, A. R. Payne, F. Fuller.	M.L.	Aberdeen ...	Met. Log. 4.1.24 to 27.4.24 ...	12.5.24.
<i>Eurybates</i> ...	Lloyd, R. ...	J. A. Havard ...	No.	A. Holt ...	Form 911 31.5.24 to 30.6.24 ...	5.8.24.
<i>Explorer</i> ...	Lamont, A. ...	Scientific Staff ...	M.L.	Scottish Fishery Board ...	Met. Log. 23.2.24 to 5.6.24 ...	23.6.24.
<i>Fitzroy</i> ...	Woodhouse, A. F. B., Lt. Commr., R.N.	C. W. Sabine, H. P. L. Tennent	M.L.	His Majesty's Ship ...	" 26.3.24 to 23.7.24 ...	6.8.24.
<i>Flandria</i> ...	Silk, H. V., Lt. Commr. R.N.	... ..	"	"	"	"
<i>Flinders</i> ...	Veldkamp, G. J. ...	W. G. Ton ...	No.	Holland Lloyd ...	Form 911 16.5.24 to 29.6.24 ...	7.7.24.
<i>Francisco</i> ...	Henderson, D. A., Lt. Commr. R.N.	A. B. Foulston, K. F. Boxall	M.L.	His Majesty's Ship ...	Met. Log. 28.3.24 to 25.7.24 ...	7.8.24.
<i>Francisco</i> ...	Wilkins, J., O.B.E.	F. D. Shaw ...	No.	Ellerman Wilson ...	Form 911 30.7.24 to 16.9.24 ...	11.9.24.
<i>Francel</i> ...	Gathey, E. ...	H. J. Prout ...	"	Royal Fleet Auxiliary ...	" 20.6.23 to 15.9.23 ...	27.11.23.
<i>Frankenfels</i> ...	Cartmer, G. E., O.B.E.	J. W. Allingham, J. H. A. Mackie, J. Garmory.	M.L.	India Office Shipping ...	Met. Log. 23.1.24 to 2.5.24 ...	8.5.24.
<i>Freienfels</i> ...	Cleugh, J. W. ...	C. F. Bennett, H. Wilson, R. Soper.	"	"	" 8.4.24 to 8.7.24 ...	13.8.24.
<i>Freya</i> ...	Angus, W. ...	J. Murray ...	No.	Scottish Fishery Board ...	Form 911 1.8.24 to 8.8.24 ...	23.8.24.

Name of Vessel.	Captain.	Observing Officers.	Official Meteorological Equipment.	Line.	Last Log Register, or Report Contributed.	Date Received.
<i>Gallie</i> ...	Summers, F. F., R.D., Commr. R.N.R.	W. G. O. Jones ...	No.	White Star ...	Met. Log. 11.4.24 to 24.5.24 ...	27.5.24.
<i>Gallymore</i> ...	Ledsome, J. S. ...	N. Goubrough ...	"	Furness Withy ...	Form 911 24.6.24 to 5.7.24 ...	11.7.24.
<i>Garret</i> ...	Visser, C. W. ...	S. de Boo ...	"	Rotterdam Lloyd ...	" 18.7.24 to 29.8.24 ...	8.9.24.
<i>Gascoyne</i> ...	Mills, A. ...	P. G. Collins ...	"	Dalgety & Co. ...	" 16.3.24 to 28.5.24 ...	15.7.24.
<i>Gebria</i> ...	Kolkman, J. M. ...	" ...	"	Holland Lloyd ...	" 10.7.24 to 5.9.24 ...	8.9.24.
<i>Gladiator</i> ...	Ruffell, — ...	D. H. Bryant, W. E. Shotton ...	"	Harrison ...	" 7.1.24 to 8.3.24 ...	12.3.24.
<i>Glenamoy, M.V.</i> ...	Anzier, J. ...	L. C. Riggs ...	"	Glen Line ...	" 15.4.24 to 11.5.24 ...	18.8.24.
<i>Glenapp, M.V.</i> ...	Ingram, T. T. ...	F. Poate ...	"	" ...	" 4.7.24 to 21.7.24 ...	31.7.24.
<i>Glenluce, M.V.</i> ...	Barkley, F. ...	J. D. Richards ...	"	" ...	" 28.7.24 to 4.8.24 ...	9.9.24.
<i>Glenishane</i> ...	Roberts, W. E. ...	" ...	"	" ...	" 10.2.24 to 21.6.24 ...	16.9.24.
<i>Gloucestershire</i> ...	Robin, E. ...	T. E. Field ...	"	Bibby ...	" 21.6.24 to 31.8.24 ...	2.9.24.
<i>Gorgon</i> ...	Hughes, J. W. ...	W. E. Crompton ...	"	Dalgety & Co. ...	" 13.7.24 to 27.7.24 ...	8.9.24.
<i>Gourko</i> ...	Montgomery, H. ...	" ...	M.L.	Ellerman Wilson ...	" ...	"
<i>Haliartus</i> ...	Marsh, L. V. ...	W. H. Upton ...	No.	R. P. Houston ...	Form 911 16.8.23 to 3.10.23 ...	20.11.23.
<i>Harmonides</i> ...	Hughes, W. J. ...	R. P. Davies ...	"	" ...	" 13.6.24 to 17.7.24 ...	21.7.24.
<i>Harmony, Auxy.</i> ...	Jackson, J. C. ...	A. W. Bush ...	"	Moravian Mission ...	" 15.11.23 to 3.12.23 ...	19.12.23.
<i>Hatarana</i> ...	Mardon, T. T. ...	J. L. Durkee, F. Wells, E. B. ...	M.L.	British India ...	" 12.9.23 to 26.3.24 ...	22.4.24.
<i>Hauraki, M.V.</i> ...	Woodget, H. T. ...	Heath, E. C. McGuinness ...	"	" ...	" ...	"
<i>Henry Holmes, C.S.</i> ...	Showman, A. C. ...	D. McLeish ...	No.	Union S.S. Co., N.Z. ...	" 27.10.23 to 4.1.24 ...	11.2.24.
	Geeve, G. E. ...	E. Hislop Tucker ...	"	W. I. & Panama Tele- graph Co. ...	" 29.6.24 to 31.7.24 ...	18.8.24.
<i>Herald</i> ...	Harvey, J. R., Commr., R.N.	W. C. Jenks ...	M.L.	His Majesty's Ship ...	Met. Log. 7.2.24 to 5.6.24 ...	11.8.24.
<i>Herefordshire</i> ...	Stanley, W. ...	P. Flood, G. Whitworth, G. Holdsworth ...	"	Bibby ...	Met. Log. 1.3.24 to 19.8.24 ...	8.9.24.
<i>Herschel</i> ...	Carey, W. J. ...	S. C. Smith ...	No.	Lampport & Holt ...	Form 911 24.5.24 to 29.7.24 ...	4.8.24.
<i>Hibernia</i> ...	Tanner ...	R. Woodall ...	C.C.	L.M. & S. Rly. ...	Telegraphic Report. 6.9.24 ...	6.9.24.
<i>Highland Enterprise</i> ...	Pond, R. H. ...	D. E. S. Webster ...	No.	Nelson ...	Form 911 29.3.24 to 12.6.24 ...	8.7.24.
<i>" Glen</i> ...	Jones, T. J. ...	H. H. Thomas ...	"	" ...	" 6.4.24 to 26.4.24 ...	20.5.24.
<i>" Heather</i> ...	Powell, G. A. ...	G. Watson, R. Sinclair Davies, J. C. Morton ...	M.L.	" ...	Met. Log. 23.12.22 to 22.3.23 ...	28.3.23.
<i>" Laddie</i> ...	Alford, C. ...	G. L. Goodman ...	No.	" ...	Form 911 17.3.24 to 6.4.24 ...	6.6.24.
<i>" Piper</i> ...	Collings, D. ...	A. S. Jones, J. S. Collins, J. H. Cables ...	M.L.	" ...	Met. Log. 4.2.24 to 23.6.24 ...	2.7.24.
<i>" Pride</i> ...	Robinson, R. H. ...	H. McKinnon, H. Devlin, R. B. Soanes ...	"	" ...	" 18.1.24 to 19.3.24 ...	8.4.24.
<i>" Rover</i> ...	Ashby Graves, F. ...	F. W. Harvey, S. G. King, F. Abbott ...	"	" ...	" 8.5.24 to 8.7.24 ...	5.8.24.
<i>" Warrior</i> ...	Brooke, W. ...	W. T. Breen ...	No.	" ...	Form 911 12.3.24 to 2.5.24 ...	8.5.24.
<i>Hildebrand</i> ...	Maddrell, J. ...	R. S. H. Goodier ...	"	Booth ...	" 15.7.24 to 28.8.24 ...	2.9.24.
<i>Hobsons Bay</i> ...	Kydd, O. J. ...	J. E. Williams, E. Bailie, O. J. Edwards ...	M.L.	Commonwealth Govt. ...	Met. Log. 25.3.24 to 5.7.24 ...	14.7.24.
<i>Holbein</i> ...	Gough, W. A. ...	G. P. Kitto ...	No.	Lampport & Holt ...	Form 911 20.5.24 to 29.8.24 ...	8.9.24.
<i>54 Homeric</i> ...	Metcalfe, G. R., Lt.- Commr., R.N.R.	H. Clark, H. Yates, A. Griffiths ...	W.T.	White Star ...	W.T. Reg. 31.7.24 to 15.8.24 ...	19.8.24.
					22.8.24 to 5.9.24 ...	9.9.24.
					Form 911 27.9.23 to 13.10.23 ...	16.10.23.
					" 31.5.24 to 26.6.24 ...	28.7.24.
<i>Honorius</i> ...	Samuels, C. ...	J. E. Martin, W. G. Idde ...	No.	R. P. Houston ...	" 15.7.24 to 5.8.24 ...	15.8.24.
<i>Huanchaco</i> ...	Redyard, A. ...	A. G. Litherland ...	"	Pacific S.N. Co. ...	" 23.6.24 to 11.7.24 ...	22.7.24.
<i>Hubert</i> ...	Evans, T. G. ...	C. C. Beal ...	"	Booth ...	" 31.8.23 to 8.3.24 ...	15.3.24.
<i>Hurunui</i> ...	Burton Davies, J. ...	Mr. Oxnard, J. Carpenter, Mr. Newington ...	M.L.	New Zealand S.S. Co. ...	Met. Log. ...	"
<i>Iber</i> ...	Langdon, C. ...	" ...	C.C.	G.W. Railway ...	Telegraphic Report. 8.9.24 ...	8.9.24.
<i>Ikala</i> ...	Meetham, J. T. ...	E. Lightfoot ...	No.	J. H. Welsford & Co. ...	Form 911 7.8.24 to 17.8.24 ...	9.9.24.
<i>Intaba</i> ...	Gibbings, W. A. ...	T. B. Littlechild ...	"	Harrison ...	" 3.6.24 to 17.6.24 ...	23.6.24.
<i>Intombi</i> ...	Worthington, B. ...	J. Richardson ...	"	" ...	" 22.2.24 to 23.3.24 ...	26.3.24.
<i>Ionic Star</i> ...	Wilson, G. ...	J. Sinclair ...	"	" ...	" 29.1.24 to 26.3.24 ...	29.3.24.
<i>Iroquois</i> ...	Tinson, C. W., O.B.E., Commr., R.N.	G. A. Gould ...	M.L.	Blue Star ...	Met. Log. 17.3.24 to 14.7.24 ...	26.8.24.
				His Majesty's Ship ...	" ...	"
<i>Ixion</i> ...	Baetens, F. ...	A. K. Sanderson ...	No.	A. Holt ...	Form 911 5.6.24 to 22.6.24 ...	18.8.24.
<i>John Pender, C.S.</i> ...	Gibson, L., M.B.E. Benson, C. W. ...	B. C. Farrow ...	No.	Eastern Tel. Co. ...	" 25.5.24 to 6.7.24 ...	15.7.24.
<i>Junin</i> ...		R. D. Eckford ...	"	Pacific S.N. Co. ...	" 1.5.24 to 30.5.24 ...	3.6.24.
<i>Kaikoura</i> ...	Downton, M. ...	L. H. Whitfield, N. Ander- son, J. Hopkins ...	M.L.	New Zealand S.S. Co. ...	Met. Log. 17.9.23 to 31.3.24 ...	19.5.24.
<i>Kaisar-i-Hind</i> ...	Manley, G. ...	F. D. Forbes ...	No.	P. & O. ...	Form 911 19.7.24 to 12.8.24 ...	8.9.24.
<i>Kamo Maru</i> ...	Okano, Y. ...	F. Takaku ...	"	Nippon Yusen Kaisha ...	" 4.5.24 to 3.6.24 ...	12.6.24.
<i>Kangaroo</i> ...	Norris, H. C. ...	C. M. C. Clayton, R. J. Sinclair F. Humble ...	M.L.	State Service Australia ...	Met. Log. 6.11.23 to 19.2.24 ...	23.4.24.
<i>Karoo</i> ...	Robinson, T. ...	H. J. Perrett ...	No.	Ellerman Bucknall ...	Form 911 2.6.24 to 16.6.24 ...	25.6.24.
<i>Kashima Maru</i> ...	Shinomiyama, T. ...	M. Takada ...	"	Nippon Yusen Kaisha ...	" 2.1.24 to 9.2.24 ...	14.3.24.
<i>Kashmir</i> ...	Bartlett, E. B., O.B.E.	F. Hopkins ...	"	P. & O. ...	" 24.5.24 to 30.6.24 ...	3.7.24.
<i>Kellett</i> ...	Haselfoot, F. E. B., D.S.O., Commr., R.N.	E. H. B. Baker ...	M.L.	His Majesty's Ship ...	Met. Log. 1.4.24 to 29.7.24 ...	22.8.24.
<i>Kenilworth Castle</i> ...	Millard, L. A. ...	A. E. Denn, W. M. Tomkins ...	M.L.	Union Castle ...	" 28.12.23 to 28.4.24 ...	8.5.24.
<i>Khiva</i> ...	Redhead, C. M., D.S.O., R.D., Capt., R.N.R.	L. Fraser, A. L. Hill, R. G. Freeman ...	M.L.	P. & O. ...	" 28.3.24 to 6.7.24 ...	10.7.24.
<i>Khyber</i> ...	Pinckney, L. D., O.B.E.	N. B. S. Hewett ...	No.	" ...	Form 911 6.4.24 to 11.5.24 ...	14.5.24.
<i>Kia Ora</i> ...	Thurston, H. P. ...	A. E. Lockhart ...	"	Shaw Savill & Albion ...	" 18.3.24 to 2.5.24 ...	9.5.24.
<i>Kinderdijk</i> ...	Jochems, A. B. ...	A. Stenger ...	"	Holland America ...	" 27.3.24 to 3.5.24 ...	8.5.24.
<i>Kitano Maru</i> ...	Kamada, N. ...	R. Nakane ...	"	Nippon Yusen Kaisha ...	" 8.4.24 to 2.5.24 ...	11.6.24.
<i>Knight Companion</i> ...	Beale, H. E. ...	J. H. Brown, W. Borrows ...	"	A. Holt ...	" 4.7.24 to 17.7.24 ...	18.8.24.
<i>Kovno</i> ...	Casson, D. H., R.D., Commr., R.N.R.	E. R. Massam, L. Griffiths, J. Sanders, T. Fea ...	M.L.	Ellerman Wilson ...	Met. Log. 16.12.23 to 22.7.24 ...	2.9.24.
<i>Kyogle</i> ...	Coalstad, C. ...	C. B. Odman, E. W. Hughes ...	No.	Commonwealth Light- house Service ...	" ...	"
<i>Lady Brenda</i> ...	Young, W. J. ...	B. I. Brind ...	"	Dawson ...	Form 911 25.9.23 to 4.10.23 ...	13.10.23.
<i>Lady Denison Pen- der, C.S.</i> ...	West, G. W. ...	A. G. Watts ...	"	Eastern Tel. Co. ...	" 26.5.24 to 15.6.24 ...	5.8.24.
<i>Laguna</i> ...	Mander, F. ...	F. W. Parker ...	"	Pacific S.N. Co. ...	Form 911 22.3.24 to 14.4.24 ...	28.4.24.
<i>Lalande</i> ...	Bambra, W. A. ...	N. Webster ...	"	Lampport & Holt ...	" 17.7.24 to 3.8.24 ...	27.8.24.
<i>Lancashire</i> ...	Beckett, F. W. ...	T. L. Owen ...	"	Bibby ...	" 12.4.24 to 27.6.24 ...	7.7.24.
<i>Laomedon</i> ...	Smith, A. H. ...	A. J. Barclay ...	"	A. Holt ...	" 5.4.24 to 18.7.24 ...	25.7.24.
<i>La Paz, M.V.</i> ...	Ross, J. ...	R. D. Collister ...	"	Pacific S.N. Co. ...	" 15.6.24 to 3.7.24 ...	5.8.24.

LIST OF VOLUNTARY OBSERVING SHIPS

Name of Vessel.	Captain.	Observing Officers.	Official Meteorological Equipment.	Line.	Last Log, Register, or Report Contributed.	Date Received.
Laplace	Davies, G. W.	A. Hughes I. O. Jones	No.	Lampport & Holt	Form 911 20.1.24 to 27.3.24	7.4.24.
55 Lapland	Howell, T.	C. K. Knapp, G. H. Bowyer, A. Mather.	W.T.	Red Star	W.T. Reg. 7.7.24 to 26.7.24	31.7.24.
Lassell, M.V.	Turner, J. E.	A. T. Crilly	No.	Lampport & Holt	Form 911 7.7.24 to 26.7.24	31.7.24.
Leicestershire	De Legh, P.	W. Whiteside, P. H. Potter, R. Arkieson, D. Sharrock.	M.L.	Bibby	Met. Log. 5.8.23 to 24.10.23	27.11.23.
Leitrim	Robertson, A.	H. C. Roberts	No.	Dowie, J., & Co.	" 30.7.24 to 15.8.24	6.9.24.
Levant, C.S.	West, G. W.	"	"	Eastern Tel. Co.	" 26.11.23 to 16.12.23	30.12.23.
Ling Nam	Waterson, W. H. V.	"	No.	Chungbwa Nav. Co.	Form 911 27.10.23 to 12.1.24	22.4.24.
Llanstephan Castle	Wilford, T. H.	W. F. Malden	"	Union Castle	" 19.3.24 to 10.4.24	22.4.24.
Loch Katrine	Matthews, G. P.	C. Noakes	"	R.M.S.P. Co.	" 25.4.24 to 1.8.24	13.8.24.
London Commerce	Young, H. J., D.S.C.	P. G. Leverett	"	Furness Withy	" 14.6.24 to 15.7.24	22.7.24.
Loreto, M.V.	Barkley, E.	F. Binnion	"	Pacific S.N. Co.	" 18.5.24 to 7.6.24	12.6.24.
Losada M.V.	Meldrum, G. W.	A. H. Turner	"	"	" 5.7.24 to 24.7.24	25.8.24.
Macedonia	Potter, H. W., R.D., Commr., R.N.R.	J. B. Buggi	No.	P. & O.	Form 911 6.7.24 to 14.7.24	28.7.24.
Macharda	Cochran, G.	W. Moore	"	Brocklebank	" 1.5.24 to 25.7.24	18.8.24.
Mahama	Kershaw, W. A. R.	F. M. Smith, R. Batley	"	Shaw Savill & Albion	" 16.5.24 to 1.7.24	8.7.24.
Maharaja	Peet, T. M.	E. Childs	"	Asiatic S.N. Co.	" 5.5.24 to 19.7.24	12.8.24.
Maharaj	Rowe J. P.	C. Shaw L. Robertson, R. G. Widdon.	M.L.	Brocklebank	Met. Log. 26.1.24 to 26.5.24	23.6.24.
Maimyo	Richardson, T.	R. A. L. Williams	No.	"	Form 911 4.7.24 to 17.7.24	11.8.24.
Maine	Seymour, H.	S. C. Skinner	"	Atlantic Transport	" 7.6.24 to 26.6.24	13.8.24.
58 Majestic	Hayes, Sir B. F., K.C.M.G. D.S.O., R.D., Commadore, R.N.R.	A. F. Butcher, W. W. Pearson	W.T.	White Star	W.T. Reg. 7.8.24 to 21.8.24	25.8.24.
					Form 911 7.8.24 to 21.8.24	27.8.24.
Makambo	Butler, E.	F. C. Ree	M.L.	Burns Philp	Met. Log. 26.9.23 to 29.1.24	7.7.24.
	Griffiths, G. I.	"	"	"	"	"
Makura	Crawford, R.	G. O. Knaggs	M.L.	Canadian-Australasian	" 8.3.24 to 26.6.24	22.7.24.
	Barlow, A. E.	"	"	"	"	"
Malancha	Whitham, F.	F. Boulding	No.	Brocklebank	Form 911 9.7.24 to 19.7.24	29.7.24.
Malda	Gray, T. N.	W. Hunt	"	British India	" 19.7.24 to 10.8.24	1.9.24.
Manchester Corporation.	Everest J. E.	L. H. Moorhouse	"	Manchester Liners	" 5.7.24 to 4.8.24	8.8.24.
Manchester Mariner	Riley, J. E.	C. E. Stocker, J. F. Fisher, F. Stockton.	M.L.	"	Met. Log. 28.7.23 to 29.2.24	19.3.24.
Manchester Merchant.	Barclay J.	A. H. Boyd, A. E. Ricketts...	No.	"	Form 911 21.6.24 to 9.8.24	23.8.24.
Mandasor	Kershaw, R. W.	W. Baxter	"	Brocklebank	" 1.12.23 to 7.1.24	28.1.24.
Manhattan	Hutchison J. G.	S. K. Hawkins	"	Atlantic Transport	" 25.5.24 to 1.8.24	11.8.24.
Manipur	Scurr, T. W.	G. W. Barker	"	Brocklebank	" 4.6.24 to 4.9.24	5.9.24.
Manistee	Isaacson, J. M.	F. McColm, H. E. Lees, L. C. Bach, H. C. Slater.	M.L.	Elders & Fyffes	Met. Log. 22.3.24 to 20.7.24	24.7.24.
Marella	Mortimer S.	Burdis, Pemberton, Thompson	M.L.	Burns Philp	" 12.7.23 to 22.11.23	3.3.24.
Marengo	Bean, A.	W. G. Pearce, G. B. Bray, E. Wood.	M.L.	Ellerman Wilson	" 22.5.24 to 28.8.24	3.9.24.
Margha	Milne, R. A., R.D., Commr., R.N.R.	J. Strachan, P. Wright, R. E. Tarran, D. Johnstone.	M.L.	British India	Met. Log. 17.2.24 to 7.5.24	15.5.24.
Marglen	Griffiths, J. N.	A. Pennington	No.	Canadian Pacific	Form 911 16.2.24 to 7.3.24	11.3.24.
27 Marloch	Hamilton, G.	"	W.T.	"	"	"
Maryland	Pollard, F. W., D.S.O., R.D., Commr., R.N.R.	F. T. Good	No.	Atlantic Transport	" 19.3.24 to 23.4.24	8.5.24.
Masirah	Thowless, E.	R. C. Baker	"	Brocklebank	Form 911 4.4.24 to 25.4.24	26.5.24.
Massilia	Henderson, J. L.	E. Richardson	"	Anchor	" 9.7.24 to 7.9.24	10.9.24.
Matakana	Bosdet, V. J.	J. J. Finn, J. W. Hart	"	Shaw, Savill & Albion	" 31.12.23 to 24.4.24	29.4.24.
Mataram	"	"	"	Burns Philp & Co.	"	"
Matheran	Cornish, N. P.	G. B. Smith, E. Boulding, D. Hunter, G. E. Thomas.	M.L.	Brocklebank	Met. Log. 20.2.24 to 19.5.24	12.6.24.
Mathara	Hanna, R. G.	H. H. Armstrong	No.	"	Form 911 3.8.24 to 13.8.24	27.8.24.
Matiana	Langlands, D. H.	W. G. E. D. Rawlingson	"	British India	" 28.12.23 to 21.1.24	1.2.24.
Matina	Henderson, J.	"	M.L.	Elders & Fyffes	Met. Log. 3.9.23 to 28.5.24	31.5.24.
	Roston, A. H., C.B.E., R.D., A.-d.-C., Capt., R.N.R.	J. A. Myles, P. A. Morgan, D. Forbes.	W.T.	Cunard	W.T. Reg. 10.8.24 to 25.8.24	28.8.24.
32 Mauretania					Form 911 1.6.24 to 16.6.24	18.6.24.
56 Megantic	Berry, G.	H. J. C. Day, R. Conway	W.T.	White Star	W.T. Reg. 26.7.24 to 15.8.24	19.8.24.
22 Melita	Clews, A. H.	C. Draper, W. Bacon	W.T.	Canadian Pacific	" 11.8.24 to 13.8.24	16.8.24.
Memnon	Salter, G. H.	E. D. Potts, T. L. Jallot	No.	A. Holt	Form 911 11.7.24 to 30.7.24	25.8.24.
Menominee	Finch, E.	N. Seymour	"	Atlantic Transport	" 10.7.24 to 11.8.24	14.8.24.
Mercian	Carnon, J. R.	W. R. C. Baker	"	Leyland	" 21.7.24 to 26.8.24	9.9.24.
21 Metagama	Henderson, W.	B. Leslie, R. Jackson, A. Mansey, A. E. Piggott.	W.T.	Canadian Pacific	W.T. Reg. 14.6.24 to 27.8.24	1.9.24.
Miami	Maxwell Brown, W. E.	E. Lowndes	No.	Elders & Fyffes	Form 911 19.5.24 to 21.6.24	24.6.24.
Michigan	Tribe, A. E.	L. A. Williams	"	Atlantic Transport	" 11.6.24 to 20.6.24	25.6.24.
Minderoo	Richardson, E.	B. J. Bennie, W. J. McPhedron, J. H. Oxten.	M.L.	West Australia Nav. Co.	Met. Log. 30.12.23 to 12.6.24	27.8.24.
Minna	Mackenzie, G. G.	D. Rattray	No.	Scottish Fishery Board	Form 911 21.7.24 to 18.8.24	22.8.24.
23 Minnedosa	Sibbons, H.	E. V. Glennie, D. I. C. Robertson, H. Scallon.	W.T.	Canadian Pacific	W.T. Reg. 9.8.24 to 27.8.24	29.8.24.
					Form 911 8.8.24 to 27.8.24	29.8.24.
Minnetonka	Gates, T. F.	H. E. McCartney	No.	Atlantic Transport	" 27.7.24 to 16.8.24	19.8.24.
Minnevaska	Claret, F.	W. S. Mackie	"	"	" 11.8.24 to 30.8.24	2.9.24.
Mirror, C.S.	Sherwood, C. A.	C. E. F. St. John	"	Eastern Tel. Co.	" 12.4.24 to 25.5.24	12.8.24.
Mississippi, M.V.	Wylie, J. T. J.	G. Batchelor	"	Atlantic Transport	" 6.4.24 to 18.4.24	22.4.24.
Moena	Morzer Bruyns, M. F.	P. de Viels	"	Nederland	" 24.6.24 to 11.7.24	5.8.24.
Moldavia	Burleigh, C. W., D.S.O., R.D., Capt., R.N.R.	E. T. Ferraby	"	P. & O.	" 5.5.24 to 29.6.24	14.7.24.
Mongolian Prince	Durrant, G. D.	R. S. Bibby	No.	Prince	Form 911 25.3.24 to 27.5.24	2.6.24.
Monkbarns, Ship	Davies, W.	M. B. Glasier	"	J. Stewart & Co.	" 13.10.23 to 20.11.23	21.1.24.
24 Montclair	Rennie, A., O.B.E.	H. McFadyen	W.T.	Canadian Pacific	W.T. Reg. 16.8.24 to 4.9.24	9.9.24.
25 Montclare	Webster, G. S., R.D., Commr., R.N.R.	R. Fegan, G. F. Hutchings, A. Phillips.	W.T.	"	" 2.8.24 to 21.8.24	25.8.24.
Montlaurier	Turnbull, J., C.B.E., R.D., Capt., R.N.R.	H. H. Davies	No.	"	Form 911 25.6.24 to 13.8.24	16.8.24.
26 Montrose	Landy, E.	D. Loram, T. Beck	W.T.	"	W.T. Reg. 26.7.24 to 14.8.24	19.8.24.
					Form 911 26.7.24 to 14.8.24	18.8.24.
20 Montroyal	Latta, R. G.	R. W. Jones, F. E. Williams	"	"	" 11.7.24 to 31.7.24	5.8.24.
					W.T. Reg. 10.8.24 to 27.8.24	1.9.24.

Name of Vessel.	Captain.	Observing Officers.	Official Meteorological Equipment.	Line.	Last Log, Register, or Report Contributed.	Date Received.
<i>Morvada</i> ...	Mills, T. L., O.B.E., R.D., Commr., R.N.R.	J. Norris, C. L. Hazeldine ...	M.L.	British India ...	Met. Log. 5.1.24 to 24.7.24 ...	11.9.24.
<i>Mulbera</i> ...	Steadman, W. R. ...	E. Holland, C. Cox ...	No.	British India ...	Form 911 9.8.24 to 20.8.24 ...	1.9.24.
<i>Nagara</i> ...	Turner, E. A. ...	C. K. Brown ...	"	R.M.S.P. Co. ...	" 2.5.24 to 25.6.24 ...	30.6.24.
<i>Napierian</i> ...	Kerruish, W. ...	T. Griffiths ...	"	Leyland ...	" 14.2.24 to 26.2.24 ...	14.3.24.
<i>Nardana</i> ...	Brown, H. ...	S. C. T. Smith ...	"	British India ...	" 27.4.24 to 26.5.24 ...	11.7.24.
<i>Nariva</i> ...	Buret, T. J. C. ...	H. M. S. Laidlaw, C. Waterhouse, E. N. Giller.	M.L.	R.M.S.P. Co. ...	Met. Log. 21.6.24 to 17.8.24 ...	21.8.24.
<i>Nascopie</i> ...	Smellie, T. F. ...	P. Lloyd, R. J. Summers, R. S. Mott.	M.L.	Hudson's Bay Co. ...	" 15.6.23 to 24.10.23...	31.10.23.
<i>Navarino</i> ...	Crichton, J. S. ...	J. Annam ...	No.	Glen & Co. ...	Form 911 13.12.23 to 12.1.24...	22.1.24.
<i>Navasota</i> ...	Willan, F. G. L., R.D., Commr., R.N.R.	W. A. Delap ...	"	R.M.S.P. Co. ...	" 23.6.24 to 20.8.24 ...	28.8.24.
<i>Nawab</i> ...	Smith J. F. ...	... ..	"	Asiatic S.N. Co. ...	" 22.6.24 to 12.7.24 ...	5.8.24.
<i>Nebraska</i> ...	Collins, A. R. D., O.B.E., R.D., Lt.-Commr., R.N.R.	A. F. Walker ...	"	R.M.S.P. Co. ...	" 15.3.24 to 21.4.24 ...	5.5.24.
<i>Nellore</i> ...	Murray, F. S., R.D., Lt. - Commr., R.N.R.	G. E. Owen ...	"	P. & O. ...	" 27.7.24 to 16.8.24 ...	9.9.24.
<i>Nestor</i> ...	Owen, R. D., O.B.E.	O. V. Jones ...	"	A. Holt ...	" 10.7.24 to 22.8.24 ...	1.9.24.
<i>Nevasa</i> ...	Swanson, C. J. ...	E. C. T. West ...	"	British India ...	" 12.10.23 to 21.12.23 ...	4.1.24.
<i>Newby Hall</i> ...	Kendall, J. W. ...	E. J. Myles, C. H. Webb, T. A. Dexter.	M.L.	Ellerman ...	Met. Log. 4.7.23 to 24.1.24 ...	4.3.24.
<i>Niagara</i> ...	Rolls, J. T. ...	N. G. Buxton, O. C. Bray, R. B. Denniston, T. A. Macpherson, V. V. Bray.	M.L.	Canadian-Australian...	" 29.2.24 to 18.7.24 ...	16.8.24.
<i>Ningchow</i> ...	Wilson, C. A. ...	R. A. Hannay ...	No.	A. Holt ...	Form 911 21.6.24 to 18.8.24 ...	22.8.24.
<i>Nore</i> ...	Randall H. W. R.D., Capt., R.N.R.	J. C. Ablewhite R. W. Mackie, H. C. Slinn.	M.L.	P. & O. ...	Met. Log. 6.3.24 to 25.5.24 ...	29.5.24.
<i>Norman</i> ...	Morton Betts, W. ...	D. A. Hodgson ...	No.	Union Castle	Form 911 13.4.24 to 1.5.24 ...	29.5.24.
<i>Norna</i> ...	Wright, J. ...	P. M. Small ...	"	Scottish Fishery Board	" 1.8.24 to 31.8.24 ...	5.9.24.
<i>Norseman, C.S.</i> ...	Barter, H. O., R.D., Commr., R.N.R.	... ..	M.L.	Western Tel. Co. ...	Met. Log. 11.9.23 to 28.3.24 ...	7.7.24.
<i>Nortonian</i> ...	McCormick, J. ...	C. R. Stevens ...	No.	Leyland ...	Form 911 20.4.24 to 22.5.24 ...	29.5.24.
<i>Nubian</i> ...	Watmough, T. M. ...	J. Williams ...	"	Leyland ...	" 15.6.24 to 17.8.24 ...	22.8.24.
<i>Nyanza</i> ...	Carpendale, F. W. J.	F. Aheir, C. H. Hand, F. Ardern.	M.L.	P. & O. ...	Met. Log. 11.2.24 to 6.5.24 ...	12.5.24.
<i>Oaklands Grange</i> ...	Routledge, R. ...	E. A. Inslay ...	No.	Houlder Bros. ...	Form 911 15.2.24 to 3.5.24 ...	16.5.24.
<i>Odland I.</i> ...	Villiamsen ...	H. Svendgaard ...	"	Hannevig Bros. ...	" 19.12.23 to 2.1.24 ...	4.1.24.
<i>42 Ohio</i> ...	Lainson, W. H. ...	W. Paine, C. K. Brown, G. C. Clairmonte.	W.T.	R.M.S.P. Co. ...	Met. Log. 18.5.23 to 2.12.23 ...	13.12.23.
<i>Olympia</i> ...	Duncan, A. R. ...	D. R. Urquhart, G. Lynas, F. McIntyre.	M.L.	Anchor ...	" 30.4.24 to 11.7.24 ...	28.7.24.
<i>57 Olympic</i> ...	Howarth, F. B., Commr., R.N.R.	J. C. M. Boyce, G. W. Couch, C. J. Warltire.	W.T.	White Star ...	W.T. Reg. 14.8.24 to 27.8.24 ... Form 911 13.8.24 to 28.8.24 ...	1.9.24. 1.9.24.
<i>Onitsha</i> ...	Williams, T. E. ...	D. Rollo ...	No.	Elder Dempster ...	Form 911 1.9.23 to 21.9.23 ...	20.11.23.
<i>Oranlian</i> ...	Hoskins, W. ...	T. Miller ...	"	Leyland ...	" 4.2.24 to 29.3.24 ...	2.4.24.
<i>Orari</i> ...	Robinson, F. W. ...	R. Newman, T. Breen, F. Longheed, G. Lant, H. Farrant.	M.L.	New Zealand S.S. Co. ...	Met. Log. 22.11.23 to 11.5.24...	16.5.24.
<i>40 Orbita</i> ...	Parker, W. H., C.B.E., R.D., Capt., R.N.R.	R. V. Rutley, O. S. Thomas, C. H. Milward.	W.T.	R.M.S.P. Co. ...	W.T. Reg. 3.8.24 to 24.8.24 ... Form 911 2.8.24 to 24.8.24 ...	29.8.24. 27.8.24.
<i>Orcoma</i> ...	Pleignier, H. T. S. ...	G. B. Wardale, L. Jones, C. H. Denton.	M.L.	Pacific S.N. Co. ...	Met. Log. 22.5.24 to 8.8.24 ...	21.8.24.
<i>41 Orduna</i> ...	Warner, G. E., R.D., Commr., R.N.R.	S. Robbins, J. Vivian, J. S. Wrake, A. A. Martin.	W.T.	R.M.S.P. Co. ...	W.T. Reg. 27.6.24 to 13.7.24 ... Form 911 22.6.24 to 13.7.24 ...	16.7.24. 16.7.24.
<i>Oriana</i> ...	Christian, G. H. ...	G. Pattison, Mason, G. F. Nicholson, Cruikshank.	M.L.	Pacific S.N. Co. ...	Met. Log. 26.1.23 to 14.8.23 ...	18.8.23.
<i>Orita</i> ...	Dominy, R. H., C.B.E., Commr., R.N.R.	H. S. Roberts, J. S. Wardman.	M.L.	" "	Met. Log. 26.12.23 to 2.6.24 ...	5.6.24.
<i>Ormonde</i> ...	Douglas, H. P., C.M.G., Capt., R.N.	A. M. Hughes ...	M.L.	His Majesty's Ship ...	Met. Log. 4.3.24 to 23.6.24 ...	10.7.24.
<i>Ormonde</i> ...	Staunton, H. G., C.B.E., R.D., Commr., R.N.R.	T. G. McGregor, N. Savage, F. J. L. Butler, F. Firmstone	M.L.	Orient ...	Met. Log. 2.3.24 to 15.6.24 ...	28.6.24.
<i>Ormuz</i> ...	James L. V., D.S.C.	G. A. Moir, J. C. K. Dowding, I. E. G. Goldsworthy N. A. Whinfield.	M.L.	" ...	Met. Log. 25.5.24 to 28.8.24 ...	2.9.24.
<i>Oroya</i> ...	Chittenden, A. ...	S. Lewis ...	No.	Pacific S.N. Co. ...	Form 911 1.5.24 to 7.7.24 ...	15.7.24.
<i>Orsova</i> ...	Matheson, C. G., D.S.O., R.D., Commr., R.N.R.	C. Fox, J. C. Jackson, C. V. Dodgson, P. P. Murphy.	M.L.	Orient ...	Met. Log. 3.2.24 to 20.5.24 ...	30.5.24.
<i>Ortega</i> ...	Christian, C. H. ...	D. W. Hutchison ...	No.	Pacific S.N. Co. ...	Form 911 12.6.24 to 5.7.24 ...	26.8.24.
<i>Orvieto</i> ...	Shelford, W. S., Lt.-Commr., R.N.R.	C. G. Thorne, A. J. Baxter, G. E. Martin, A. O. H. O'Brien, M. C. Lester.	M.L.	Orient ...	Met. Log. 30.3.24 to 2.7.24...	7.7.24.
<i>Osterley</i> ...	Cameron, E. P. ...	F. G. Goodman, E. Hatch, L. A. Keeble.	M.L.	" ...	" 27.4.24 to 30.7.24 ...	6.8.24.
<i>Othello</i> ...	Pearson, Z. C. ...	E. G. H. Huddleston ...	No.	Ellerman Wilson ...	Form 911 23.5.24 to 12.7.24 ...	18.7.24.
<i>Oliva</i> ...	Elford, H. E. ...	V. R. Bowling ...	"	Shaw, Savill & Albion	" 29.6.24 to 18.7.24 ...	25.8.24.
<i>Ovid</i> ...	Groom, A. C. B. ...	... ..	"	Shakespeare Shipping Co.	" 8.6.24 to 7.7.24 ...	8.8.24.
<i>Pacific Shipper, M.V.</i> ...	Newman, G. ...	F. H. Perry ...	"	Furness Withy ...	"	"
<i>Pakeha</i> ...	W. P. Clifton Mogg	M. F. Armitage ...	"	Shaw, Savill & Albion	Form 911 1.7.24 to 10.8.24 ...	15.8.24.
<i>Paparaoa</i> ...	Ashworth, F. ...	E. H. Hopkins ...	"	New Zealand S.S. Co.	" 25.3.24 to 10.5.24 ...	14.5.24.
<i>Paris</i> ...	Cook, C. L. ...	Mr. Biles ...	C.C.	Southern Ry. ...	Telegraphic Report, 19.2.24 ...	19.2.24.
<i>Patia</i> ...	Bostock, R. J. ...	W. McIlwaine ...	No.	Elders & Ryffes ...	Form 911 6.7.24 to 12.8.24 ...	15.8.24.
<i>Patrol, C.S.</i> ...	Welsh, T. K. ...	H. A. Davison, B. L. Vinden, A. T. Morrell.	M.L.	Eastern Extension (A. & C.) Telegraph Co. ...	Met. Log. 11.2.24 to 13.7.24 ...	25.8.24.
<i>Persic</i> ...	Davies, E. ...	H. Williams ...	No.	White Star ...	Form 911 20.7.24 to 9.8.24 ...	2.9.24.
<i>Peshawur</i> ...	Hester, C. W., R.D., Commr., R.N.R.	C. E. Arundel ...	M.L.	P. & O. ...	Met. Log. 13.3.24 to 13.5.24 ...	19.5.24.
<i>Philadelphian</i> ...	Baker, J. A. ...	G. W. B. Lloyd ...	No.	Leyland ...	Form 911 7.2.24 to 22.4.24 ...	24.4.24.
<i>Polyphemus</i> ...	Hatfield, J. ...	F. Silva ...	"	A. Holt ...	" 27.5.24 to 23.7.24 ...	25.8.24.
<i>Poona</i> ...	Cherry, W. G. W. ...	F. J. Ablewhite ...	"	P. & O. ...	" 21.4.24 to 3.5.24 ...	13.6.24.

LIST OF VOLUNTARY OBSERVING SHIPS

Name of Vessel.	Captain.	Observing Officers.	Official Meteorological Equipment.	Line.	Last Log, Register, or Report Contributed.	Date Received.
<i>Port Albany</i> ...	Robinson, C. A. ...	G. L. Hazlewood, W. B. Craig, A. G. Newbury, W. Eastoe.	M.L.	Commonwealth & Dominion.	Met. Log. 18.10.23 to 19.3.24...	4.1.24.
„ <i>Augusta</i> ...	Brown, A. H. Harris, G. T. C. Sawbridge, I. R. Renaut, F. A. ...	R. C. Carter, C. F. Coate, H. Stone.	M.L.	„ „ „	„ 13.10.23 to 24.3.24...	7.4.24.
„ <i>Caroline</i> ...	Van den Bergh, C. ...	P. H. Pedrick, T. Copeland, E. Fenton.	M.L.	„ „ „	„ 22.12.24 to 19.7.24...	23.7.24.
„ <i>Curtis</i> ...	Jack, J. ...	A. G. Rhind ...	No.	„ „ „	„ „ „	„
„ <i>Darwin</i> ...	Stickland, A. E. ...	E. T. N. Lawrey, E. W. R. Young.	„	„ „ „	Form 911 31.5.24 to 10.7.24 ...	23.8.24.
„ <i>Hacking Hunter</i> ...	Cottell, S. C. ...	Rowland Hill ... A. Cooper, C. F. Post, J. H. Bower.	M.L.	„ „ „	Met. Log. 31.5.24 to 2.6.24 ... 16.11.23 to 18.3.24...	30.7.24. 21.3.24.
„ <i>Lyttelton</i> ...	Ferris, J. ...	W. L. Lynd, J. Buchan, H. M. Post, G. H. Harvey.	M.L.	„ „ „	„ 19.9.23 to 23.11.23...	3.6.24.
„ <i>Melbourne</i> ...	Kearney, F. J. ...	D. G. H. Bradley, J. A. Fairbairn, C. Newton.	M.L.	„ „ „	„ 13.3.24 to 25.7.24 ...	6.8.24.
„ <i>Nicholson</i> ...	Hoad, A. C. ...	E. A. Leavett, C. R. Townshend, G. G. Langford.	M.L.	„ „ „	„ 12.3.24 to 14.8.24 ...	9.9.24.
„ <i>Pirie</i> ...	Higgs, W. G. ...	H. C. Jeffery, E. E. Roswell, R. S. Stannard, L. J. Brice.	M.L.	„ „ „	„ 9.2.24 to 22.6.24...	26.6.24.
„ <i>Sydney</i> ...	Lea, W. H. ...	H. E. Higgs, A. W. Sams, C. Groves, A. M. Stanton.	M.L.	„ „ „	„ 9.12.23 to 27.4.24 ...	8.5.24.
„ <i>Victor</i> ...	Swan, L. H. ...	E. G. Fullick, R. T. R. Tomsett, W. Pickup.	M.L.	„ „ „	„ 12.4.24 to 22.8.24 ...	28.8.24.
<i>President Jackson</i> ...	Griffith, J. ...	E. Walker ...	No.	Pacific S.S. Co. ...	Form 911 17.6.24 to 18.7.24 ...	8.9.24.
<i>Protesilaus</i> ...	Wilkinson, H. ...	E. P. Gault, D. Reid, A. Woolfenden, F. Smith.	M.L.	A. Holt ...	Met. Log. 3.4.24 to 15.6.24 ...	22.7.24.
<i>Pyrrhus</i> ...	Elford, W. J. ...	W. Owen ...	No.	„ „ „	Form 911 19.7.24 to 5.8.24 ...	4.9.24.
<i>Regina</i> ...	Smith, R. G. ...	A. Hulme ...	No.	White Star-Dominion	Form 911 3.8.24 to 23.8.24 ...	26.8.24.
<i>Reindeer</i> ...	Mulhall, W. ...	„ „ „	C.C.	G.W. Railway ...	Telegraphic Report. 11.9.24 ...	11.9.24.
<i>Rhodesian Transport.</i>	Fowler, W. H. ...	A. E. Warburton ...	No.	Houlder Bros. ...	Form 911 19.2.24 to 29.5.24 ...	11.6.24.
<i>Rialto</i> ...	Mordue, J. A. ...	„ „ „	„	Ellerman Bucknall ...	„ 11.6.24 to 29.6.24 ...	31.7.24.
<i>Rimutaka</i> ...	Hemming, F. A. ...	H. Horwood, R. S. Cox, O. M. Watts.	M.L.	New Zealand S.S. Co.	Met. Log. 9.3.24 to 26.8.24 ...	4.9.24.
<i>Risaldar</i> ...	Park, G. ...	„ „ „	„	Asiatic S.N. Co. ...	„ „ „	„
<i>Romney</i> ...	Leicester, F. S. ...	W. H. Underhill, E. King ...	No.	Lamport & Holt ...	Form 911 18.4.24 to 16.7.24 ...	21.7.24.
<i>Royal Fusilier</i> ...	Dawson, J. ...	J. Fraser ...	„	London & Edinburgh S.S. Co.	„ 27.7.24 to 21.8.24 ...	23.8.24.
<i>Royal Transport...</i>	Dove, J. ...	R. Martin ...	„	Houlder Bros. ...	„ 14.5.24 to 24.8.24 ...	27.8.24.
<i>Ruapehu</i> ...	Holland, E. A. ...	J. D. Tooms, G. Kinnett, P. J. Connolly, F. Cooke.	M.L.	New Zealand S.S. Co.	Met. Log. 6.11.23 to 7.3.24 ...	13.3.24.
<i>Sachem</i> ...	Furneaux, S. ...	C. Waldron, E. Sainty ...	No.	Furness Withy ...	Form 911 2.8.24 to 7.9.24 ...	10.9.24.
<i>Salaga</i> ...	Sola, P., D.S.O. ...	F. A. Elston ...	„	Elder Dempster ...	„ 12.7.24 to 24.7.24 ...	13.8.24.
<i>Samaria</i> ...	Horsburgh, G., O.B.E. ...	R. P. Cambell ...	„	Cunard ...	„ 21.7.24 to 10.8.24 ...	15.8.24.
<i>Sandown Castle</i> ...	Jackson, C. R. ...	G. H. Mayhew ...	„	Union Castle ...	„ 14.6.24 to 10.7.24 ...	29.7.24.
<i>Sardinia</i> ...	Cadiz, F. G., D.S.C. ...	A. F. Wiles ...	„	P. & O. ...	„ 1.1.24 to 21.1.24 ...	4.2.24.
10 <i>Saturnia</i> ...	Black, J. ...	T. Ure ...	W.T.	Anchor Donaldson ...	W.T. Reg. 2.8.24 to 23.8.24 ...	27.8.24.
<i>Saxoleine</i> ...	Biddick, F. ...	S. Wood ...	No.	Hunting & Son ...	Form 911 2.8.24 to 23.8.24 ...	26.8.24.
<i>Saxon</i> ...	Stanley, W. F., R.D., Commr., R.N.R.	R. S. W. Harris ...	„	Union Castle ...	„ 29.7.24 to 15.8.24 ...	20.8.24.
<i>Saxonia</i> ...	Brown, A. T. ...	H. A. D. Waterhouse ...	„	Cunard ...	„ 3.6.24 to 30.6.24 ...	7.7.24.
<i>Scholar</i> ...	O'Connor, T. ...	A. L. Cresswell ...	„	Harrison ...	„ 14.7.24 to 3.9.24 ...	9.9.24.
<i>Scientist</i> ...	Hansen, W. A. ...	D. G. Russell ...	„	„ „ „	„ 21.5.24 to 9.8.24 ...	12.8.24.
<i>Scindia</i> ...	Smart, R. W. ...	H. D. Campsie ...	„	Anchor ...	„ 15.3.24 to 28.5.24 ...	3.6.24.
<i>Scotia</i> ...	Telfer ...	O. W. L. Jones ...	C.C.	L.M. & S. Rly.	Telegraphic Report 5.9.24 ...	5.9.24.
<i>Scottish Bard</i> ...	McDonnell, S. ...	W. H. Campbell ...	No.	Tankers, Ltd.	Form 911 25.8.23 to 14.9.23 ...	1.10.23.
<i>Scottish Borderer</i> ...	Thompson, F. ...	G. F. Widger ...	„	„ „ „	„ 12.6.24 to 13.7.24 ...	21.7.24.
33 <i>Scythia</i> ...	Prothero, W. ...	T. Parry, G. Overton, W. Cox.	W.T.	Cunard ...	W.T. Reg. 11.8.24 to 31.8.24 ...	3.9.24.
<i>Sheafidart</i> ...	„ „ „	T. B. Griffiths ...	No.	Kaitani Mining Administration.	„ „ „	„
<i>Sheaf Mount</i> ...	Groves, C. V. ...	C. A. Goold ...	„	Souter, W. A. ...	„ 17.8.24 to 26.8.24 ...	1.9.24.
<i>Sheaf Spear</i> ...	Whitfield, G. A., O.B.E.	A. E. Harvey, W. H. Grise-wood.	M.L.	„ „ „	Met. Log. 29.1.24 to 9.7.24 ...	29.7.24.
<i>Sticilia</i> ...	Davis, H. C., D.S.C., R.D., Commr., R.N.R.	R. Rowe ...	No.	P. & O. ...	Form 911 7.6.24 to 29.6.24 ...	21.7.24.
<i>Socrates</i> ...	James, F. R. ...	E. R. Hartley ...	„	Lamport & Holt ...	„ 14.6.24 to 4.7.24 ...	29.7.24.
<i>Soekaboemi</i> ...	Ruhaak, G. H. ...	W. N. de Wijn ...	„	Rotterdam Lloyd ...	„ 25.6.24 to 19.7.24 ...	28.7.24.
<i>Somerset</i> ...	Broughton, C. ...	E. Burton, W. Dickinson, D. Macdonald, C. H. Landfield.	M.L.	New Zealand S.S. Co.	Met. Log. 5.3.24 to 4.9.24 ...	10.9.24.
<i>Somersetshire</i> ...	Adamson, B. W. ...	„ „ „	M.L.	Bibby ...	„ „ „	„
<i>Somme</i> ...	Miles, F. R., Commr., R.N.R.	B. K. Berry, C. C. Prosser, D. P. Larham.	M.L.	R.M.S.P. Co. ...	Met. Log. 24.4.23 to 28.11.23...	17.12.23.
<i>Songster</i> ...	Thompson, W. ...	W. F. O'Neill ...	M.L.	Harrison ...	„ 13.10.23 to 5.11.23...	19.2.24.
<i>Spectator</i> ...	Owen, W. F. ...	A. M. Dick ...	No.	„ „ „	Form 911 2.1.24 to 18.4.24 ...	22.4.24.
<i>Spero</i> ...	French, H. E. ...	E. A. Gould, G. Mussared, R. Higginbottom, J. Rutherford.	M.L.	Ellerman Wilson ...	Met. Log. 23.2.24 to 9.8.24 ...	19.8.24.
<i>Stephan, C.S.</i> ...	Carlton, G. F., O.B.E., Commr., R.N.R.	J. Matthews, F. B. Bolingbroke, W. E. Allen.	M.L.	Telegraph Construction & Maintenance.	„ 14.5.24 to 17.6.24 ...	20.6.24.
<i>Surrey</i> ...	Field, H. E. B. ...	G. W. Allard, S. E. Hoblyn, R. R. Bennett.	M.L.	Federal ...	„ 12.1.24 to 6.6.24 ...	11.6.24.
<i>Sussex</i> ...	Upton, E. C. S. ...	W. A. Ewington ...	No.	„ „ „	Form 911 3.4.24 to 8.5.24 ...	13.6.24.
<i>St. Albans</i> ...	„ „ „	„ „ „	„	„ „ „	„ „ „	„
<i>St. George</i> ...	Blair, D., O.B.E., R.D., Commr., R.N.R.	„ „ „	M.L.	Eastern and Australian Scientific Expeditionary Research Assoon.	„ „ „	„
<i>St. Patrick</i> ...	Bearpark, E. W. ...	W. P. Baker ...	No.	Rankin Gilmour ...	Form 911 30.6.24 to 28.7.24...	18.8.24.
<i>Tainui</i> ...	Hartman, W. H. ...	J. Dickson ...	„	Shaw, Savill & Albion	„ 4.4.24 to 9.5.24 ...	14.5.24.
<i>Tairoa</i> ...	Summers, W. G. ...	S. A. Bannister ...	„	„ „ „	„ 26.5.24 to 4.7.24 ...	23.8.24.
<i>Taiyuan</i> ...	Hamilton, H. E. ...	T. M. Young, W. Bailley, D. D. Tyer.	M.L.	Yuill & Co. ...	Met. Log. 22.2.24 to 6.7.24 ...	4.9.24.
<i>Talhybius</i> ...	Beswick, W. ...	D. Rees ...	No.	A. Holt ...	Form 911 4.3.24 to 11.4.24 ...	14.4.24.
<i>Tambora</i> ...	Ruhaak, H. G. ...	H. Van Manen ...	„	Rotterdam Lloyd ...	„ 3.7.24 to 21.8.24 ...	2.9.24.

Name of Vessel.	Captain.	Observing Officers.	Official Meteorological Equipment.	Line.	Last Log, Register, or Report Contributed.	Date Received.
<i>Teiresias</i> ...	Reynard, J. G. ...	H. Humphreys ...	No.	A. Holt ...	Form 911 15.1.24 to 5.4.24 ...	22.4.24.
<i>Teucer</i> ...	Hodgson, R. N. ...	G. Lancaster ...	"	" ...	" 24.7.24 to 8.8.24 ...	26.8.24.
<i>Themistocles</i> ...	Jernyn, W. M. ...	R. H. Harrison ...	"	Aberdeen ...	" 28.3.24 to 21.7.24 ...	28.7.24.
<i>Theseus</i> ...	Batt, A. E. ...	J. R. Clement Evans ...	"	A. Holt ...	" 2.7.24 to 11.7.24 ...	17.7.24.
<i>Titan</i> ...	Ireland, T. R. ...	J. P. Williams, A. C. H. Jones D. J. Davies, C. Taylor.	M.L.	" ...	Met. Log. 2.11.23 to 8.3.24 ...	12.3.24.
<i>Tolmie</i> , S.F.Bqtne.	Stewart, J. C. ...	E. F. Collins R. E. Smith ...	No.	B. C. Mills, Tug and Barge Co.	Form 911 10.2.24 to 17.4.24 ...	3.6.24.
<i>Tottori Maru</i> ...	Mataukura, B. ...	K. H. Kubota ...	"	Nippon Yusen Kaisha	" 2.5.24 to 22.5.24 ...	23.6.24.
<i>Transmitter</i> , C.S.	Jones, L. T., M.B.E.	S. P. Sheldon ...	"	Eastern Tel. Co. ...	" 7.12.23 to 2.2.24 ...	18.2.24.
<i>Traveller</i> ...	Worthington, B. ...	A. Robertson ...	"	Harrison ...	" 19.6.24 to 18.7.24 ...	22.7.24.
<i>Tredenham</i> ...	Evans, J. O. ...	C. Warren ...	"	Hain S.S. Co. ...	" 25.6.24 to 22.7.24 ...	28.7.24.
<i>Trematon</i> ...	Hicks, F. H. ...	J. Christopher, D. Thomas, F. J. Webb.	M.L.	" ...	Met. Log. 28.8.22 to 30.3.23 ...	18.4.23.
<i>Tuscania</i> ...	Bone, D. W. ...	T. S. Nixon ...	No.	Anchor ...	Form 911 16.7.24 to 23.8.24 ...	29.8.24.
<i>Tyndareus</i> ...	Adcock, F. ...	D. L. Hoare ...	"	A. Holt ...	" 17.5.24 to 22.8.24 ...	10.9.24.
<i>Ulimaroa</i> ...	Wyllie, W. J. ...	R. A. Dance ...	"	Huddart Parker, Ltd.	" 11.5.24 to 8.6.24 ...	7.8.24.
<i>Ulysses</i> ...	McHutcheon, W. ...	T. R. Phillips ...	"	A. Holt ...	" 28.6.24 to 16.7.24 ...	25.8.24.
<i>Umtali</i> ...	Rogers, W. G. ...	W. H. Foster ...	"	Bullard King ...	" 9.5.24 to 16.8.24 ...	18.8.24.
<i>Valacia</i> ...	Doyle, M. ...	J. W. Caunce ...	"	Cunard ...	" 5.6.24 to 12.6.24 ...	17.6.24.
<i>Valdura</i> ...	Mitchell, A. ...	H. J. Maughan, J. Anderson, A. M. S. Well.	M.L.	Gow Harrison ...	Met. Log. 10.1.24 to 18.6.24 ...	22.8.24.
<i>Valemore</i> ...	Griffiths, J. ...	H. Miller ...	No.	Furness Withy ...	Form 911 22.11.23 to 29.12.23	30.12.23.
<i>Vardulia</i> ...	Townley, J. C. ...	J. E. Deans ...	"	Cunard ...	" 11.8.24 to 20.8.24 ...	2.9.24.
<i>Vasconia</i> ...	Inch, F. ...	E. Gleave ...	"	" ...	" 30.6.24 to 30.7.24 ...	5.8.24.
<i>Vellavia</i> ...	Fear, E. T. C. ...	H. H. Kidwell ...	"	" ...	" 30.3.24 to 11.4.24 ...	22.4.24.
<i>Ventura de Lar-rinaga</i> .	Keay, W. S. ...	H. J. Kay ...	"	Larrinaga ...	" 7.5.24 to 3.7.24 ...	14.7.24.
<i>Verbania</i> ...	Hatcher, W. H. ...	J. G. Wiseman ...	"	Cunard ...	" 13.7.24 to 15.8.24 ...	16.8.24.
<i>Verentia</i> ...	Stafford, W., D.S.C., R.D., Lt.-Commr., R.N.R.	A. F. Watts ...	"	" ...	" 7.7.24 to 5.8.24 ...	14.8.24.
<i>Victoria</i> ...	Fisher, F. T. ...	J. Males, E. Peacock, J. Archer	M.L.	China-Australia ...	Met. Log. 3.9.23 to 16.2.24 ...	2.8.24.
<i>Vigilant</i> ...	Simpson, E. S. S. ...	J. Hunter ...	No.	Scottish Fishery Board	Form 911 20.7.24 to 15.8.24 ...	20.8.24.
<i>Waiotapu</i> ...	Brown, T. F. S. ...	B. S. Cave ...	No.	Canadian-Australasian	Form 911 10.6.24 to 1.7.24 ...	11.8.24.
<i>Walmer Castle</i> ...	Chave, Sir B., K.B.E.	C. Ayles ...	"	Union Castle ...	" 27.6.24 to 18.8.24 ...	19.8.24.
<i>Wangaratta</i> ...	Scutt, W. ...	T. W. Wordingham, M. Chant, K. M. Morrison.	M.L.	British India ...	Met. Log. 14.1.24 to 20.5.24 ...	27.5.24.
<i>Warfeld</i> ...	Steel, R. ...	E. V. Wilkinson ...	No.	" ...	Form 911 3.6.24 to 13.7.24 ...	26.8.24.
<i>War Nizam</i> ...	Putt, R. O. ...	E. R. Clark ...	"	British Tankers ...	" 25.5.24 to 12.7.24 ...	21.7.24.
<i>Welshman</i> ...	Rollerson, W. ...	W. A. Fletcher ...	"	White Star-Dominion	" 24.7.24 to 18.8.24 ...	26.8.24.
<i>Winifredian</i> ...	Harrocks, W. ...	A. R. Rose ...	"	Leyland ...	" 1.6.24 to 6.7.24 ...	14.7.24.
<i>Woodarra</i> ...	Reilly, J. V. ...	L. D. Graham, A. V. Fisher, L. C. Comber, J. Wallace.	M.L.	British India ...	Met. Log. 3.4.24 to 22.6.24 ...	2.8.24.
<i>Yorkshire</i> ...	Millson, G. C. ...	E. Jones ...	No.	Bibby ...	Form 911 3.5.24 to 7.7.24 ...	15.7.24.
<i>Zeeland</i> ...	Thomas, A. J. ...	W. F. Jackman ...	No.	Red Star ...	Form 911 15.8.24 to 5.9.24 ...	8.9.24.
<i>Conway</i> , H.M.S.	Broadbent, H. W., R.D. Capt., R.N.R.	The Senior Cadets ...	Cadets' M.L.	" ...	Cadets' Met. Log. 4.5.24 to 19.7.24	31.7.24.
<i>Pangbourne Nautical College</i> .	Tracy, A. F. G., Commr., R.N.	" ...	"	" ...	Cadets' Met. Log. 12.5.24 to 26.7.24	29.7.24.
<i>Worcester</i> , H.M.S.	Sayer M. B., O.B.E., R.D., Capt., R.N.R.	" ...	"	" ...	Cadets' Met. Log. 9.5.24 to 30.7.24	13.8.24.
<i>Abaco</i> ...	" ...	The Keepers ...	Lighthouse Register.	" ...	Lighthouse Register 2.1.24 to 6.7.24	13.8.24.
<i>Cay Lobos</i> ...	" ...	" ...	"	" ...	Lighthouse Register 1.1.24 to 30.6.24	13.8.24.
<i>Double Headed Shot</i> ...	" ...	" ...	"	" ...	Lighthouse Register 1.6.24 to 30.6.24	5.9.24.
<i>Inagua</i> ...	" ...	" ...	"	" ...	Lighthouse Register 8.1.24 to 9.7.24	13.8.24.
<i>Sombrero</i> ...	" ...	" ...	"	" ...	Lighthouse Register 1.1.24 to 30.6.24	6.8.24.
<i>Waiting Island</i> ...	" ...	" ...	"	" ...	Lighthouse Register 1.1.24 to 30.6.24	13.8.24.
<i>Cape Pembroke</i> (Falkland Is.).	" ...	" ...	"	" ...	Lighthouse Register 1.7.23 to 31.12.23	3.3.24.

LIST OF SHIPS CO-OPERATING THROUGH THE METEOROLOGICAL OFFICE WITH THE
MINISTRY OF AGRICULTURE AND FISHERIES (FISHERIES LABORATORY, LOWESTOFT)
IN THE COLLECTION OF WATER SAMPLES, ETC.

Name of Vessel.	Captain.	Observing Officer.	Line.	Last Case of Water Samples, Reports, etc., Received.	Date Received.
<i>Alban</i> ...	Whayman, W. R. ...	R. Griffiths ...	Booth ...	Water Samples ...	23.4.24.
<i>Hildebrand</i> ...	Maddrell, J. ...	R. S. Hulme Goodier ...	" ...	" ...	9.7.24.
<i>Patia</i> ...	Bostock, R. J. ...	W. McIlwaine ...	Elder & Fyffes ...	" ...	28.8.24.
<i>Tortuguero</i> ...	Martin ...	H. H. Dunning ...	" ...	" ...	24.7.24.