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THE MARINE OBSERVER.

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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.

METEOROLOGICAL ANGLING.

With acknowledgments to the *Woodarra* Review.

The Magazine of S.S. "Woodarra," Captain J. V. Reilly, Officers sea-going training ship of the British India Steam Navigation Co.

"OUR Met. Log you'll maybe have noted
Has columns ruled up for 'Remarks,'
A sequence of phrases devoted
To mention of dolphins and sharks,
To herrings both kippered and bloated,
And seagulls and penguins and larks.

"This innocent tropical angling
Has much to commend it I'm sure,
It needs no iniquitous dangling
Of sinuous worms for a lure,
And holds (for all shunners of wangling)
A sport that is manly and pure.
"And now there's a keen competition
For writing the snappiest par,
Relieving much dull repetition
Of antics of thermom. and bar.
The Chief's is the leading position
While mine is the hindmost by far.

" A porpoise's score stands at zero,
A dolphin's is equally small,
The maximum goes to the hero
Who sees things most phenomenal,
Such as I never see, so Oh, Dear, Oh!
My total is nothing at all!

" The Third saw a sting-ray this morning
A-stinging according to plan,
And just as the new day was dawning
The Chief saw a haddock (Finnan).
The youngest Cadet, who needs warning,
Saw sardines (bound West) in a can.

" Disciples of Walton and Cotton
Inclined are to draw the long bow,
A recognised practice, though rotten
To one who has nothing to show;
Especially since I've forgotten
More fish lore than they'll ever know.

" And now I am eagerly chasing
(To bolster my score up a few)
A bevy of mermaidens gracing
A nebular patch on the Blue.
—I saw several porpoises racing—
But what does that matter to you?"

ISAAC.

SWELL.

West Coast Australia.

THE following is an extract from the Meteorological Report of S.S. *Jervis Bay*. Captain W. R. CHAPLIN. Fremantle to Colombo. Observer Mr. R. LAYCOCK, Chief Officer.

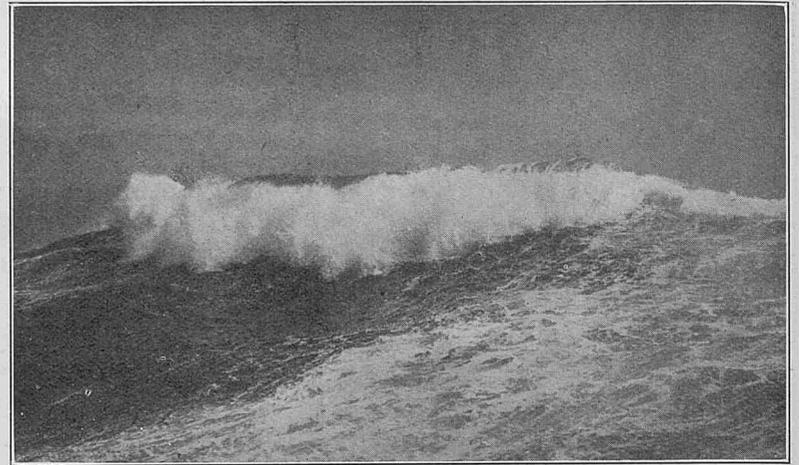
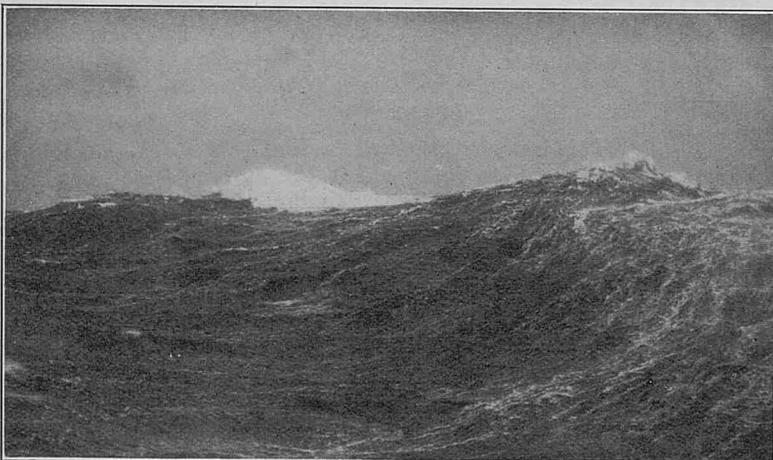
" May 20th, 1926, Sailed from Fremantle, W.A., at 1.40 p.m. (W.A. Standard Time) for Colombo. A heavy Westerly swell was experienced after clearing Rottneest Island, the vessel rolling moderately and regularly, but not sufficiently to warrant taking more than usual precautions. At 11.35 p.m. A.T.S. Latitude $30^{\circ} 21' S.$, Longitude $113^{\circ} 57' E.$ (D.R.) Course 318° , wind S.W. force 4, the ship gave a violent roll to starboard and recovered suddenly to practically upright, with the extraordinary sensation of having dropped bodily several feet. In addition to minor breakages, several substantial fittings collapsed. There was no repetition of this, and the swell gradually subsided during the remainder of the night."

PHOTOGRAPHS OF THE SEA.

Off Coast of Victoria, Australia.

THE accompanying photographs have been received from S.S. *Woodarra*, Captain J. V. REILLY. Cape Town to Melbourne. Observer Mr. H. GOATER.

Taken in Latitude $38^{\circ} 51' S.$, Longitude $139^{\circ} 57' E.$, at noon May 2nd, 1926.



" Barometer 997.9 mb. Temperature, dry bulb 57° , wet bulb 55.7° . Cloud amount 7, St-Cu, Cu-Nb, Cu. Weather c, frequent squalls. Sea W.S.W. 7, swell S.W. by W. heavy. Sea temperature 57° ."

AURORA AUSTRALIS.

Southern Ocean.

THE following is an extract from the Meteorological Report of S.S. *Port Bowen*. Captain W. GILLING. London to Melbourne. Observers Messrs. W. R. JOHNSTON, 2nd Officer, and G. W. HORTON, 4th Officer:—

" May 4th, 1926. At 7.15 p.m. a brightness was observed on the Southern horizon. This brightness which was a kind of white glow gradually formed into the arc as shewn in Fig. 1. The altitude of the

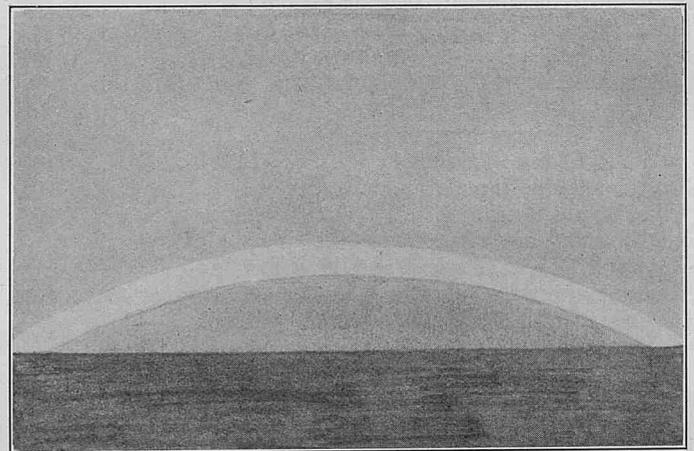


Figure 1.—South (True) $S. 33^{\circ} W.$ (Mag.).

lower limb was approximately $4^{\circ} 30'$ and the centre bore South (True). It extended from about S.S.E. to S.S.W. and faded away at 7.45 p.m. leaving the glow first noticed. The ship was steaming East true on parallel $44^{\circ} 21'$ South and at 11.40 p.m. it was again observed as shewn in Fig. 2. At this time, although the moon had risen, a distinct yellow shade was observed in the rays. The last display occurred at 3.40 a.m. and lasted till 4.10 a.m. The shafts of light continually shot upwards and receded and nearly all the while bands of light rippled upwards and downwards. The colour of the light during this display was bright gold and there was a bright golden glow over everything. The bands of light are difficult to describe, but consisted of wavy ripples almost the same shape as sand ripples on the sea shore. The centre of this display bore $S. 10^{\circ} E.$ True ($S. 23^{\circ} W.$ magnetic) and appeared something like Fig. 3. The clouds appeared black by contrast and with clearly defined edges.

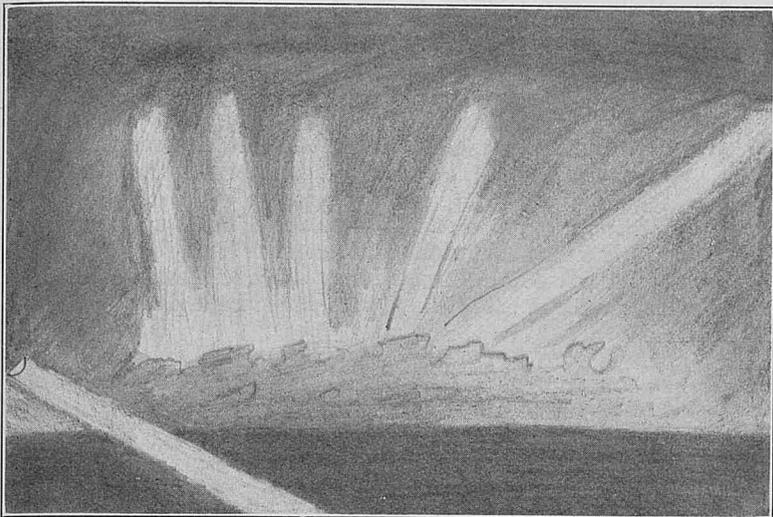


Figure 2.—Moon bearing S. 63° E. (True).

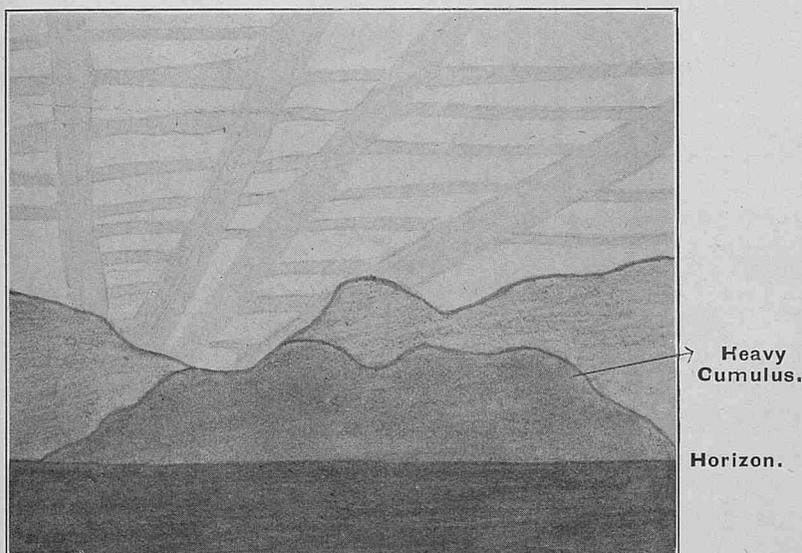


Figure 3.—S. 10° E. (True) S. 23° W. (Mag.).

“Position of ship at 8 p.m. May 4th, Latitude 44° 21' S., Longitude 97° 02' E. Course East, speed 12½ knots.”

AURORA BOREALIS.

North Atlantic.

THE following is an extract from the Meteorological Log of S.S. *Port Albany*. Captain C. A. ROBINSON. London to New York. Observers Mr. E. A. LEAVETT, 2nd Officer, and Mr. W. EASTOE, 3rd Officer.

“May 9th, 1926, 9.30 p.m. Observed Aurora in the form of large sheet of white light covering large portion of sky. 11.40 p.m. Two distinct arcs were visible for period of 15 minutes. May 10th, 0.15 a.m. Aurora took form of numerous rays of light fan shaped varying in altitude from 10° to 50° radiating from a point bearing approximately 350°. The rays having greatest altitude were not continuous.

“1.20 a.m. Horizontal streaks were observed moving rapidly towards zenith and becoming invisible at an altitude of approximately 45°.

“Full effect of Aurora illumination not visible owing to presence of Stratus round horizon. 2.40. Aurora no longer visible owing to sky becoming overcast.

“Position of ship at midnight, Latitude 41° 40' N., Longitude 62° 13' W. Course S. 81° W., speed 12 knots.”

NOTES ON BAY OF BENGAL CYCLONE,

May 19th–22nd, 1926.

The Weather in the Bay of Bengal during the month of May is characterised by the dying winds of the N.E. monsoon being replaced by the gradual extension of the S.W. winds up the Bay.

The existing conditions during this period of transition are especially favourable for the formation of Cyclonic storms, which are generally of great intensity, one out of every three storms occurring in this month containing a calm centre and an inner circle of hurricane winds.

From accounts received, the storm which visited the Bay from May 19th to 22nd was of small extent but of great intensity, its intensity increasing greatly on nearing the land.

On May 19th, indications of a cyclonic circulation were observed in the S.E. of the Bay, which on the 20th developed into a storm moving in a north-easterly direction. At 8 a.m. on this day S.S. *Burma*, Captain J. CATTANACH, from Rangoon to Port Sudan, in Latitude 12° 44' N., Longitude 90° 40' E., logged strong S.E. wind, barometer 1006 mb. (29.70 in.) rough sea and a conspicuous swell from south, overcast sky and heavy rain. *Burma* endeavoured to exchange weather reports with other ships but could get no replies until noon. At the same time S.S. *Risaldar*, Captain G. PARK, from Colombo to Calcutta, in Latitude 16° 26' N., Longitude 85° 41' E., reported wind north, force 2, barometer 1005 mb. (29.68 in.) with every appearance of fine weather. *Risaldar's* barometer, which was a tested mercurial instrument, was then 2 mb. (.06 in.) below normal. Bearings 12 points to the right of wind from position of each ship fixes centre of disturbance in approximately Latitude 13° 30' N., Longitude 88° 45' E., so that *Burma* was then about 120 miles S.E. and *Risaldar* 240 miles N.W. of centre.

Burma's weather gradually became more threatening and at 10 a.m. she “Hove to” keeping the wind on the starboard bow, in order to note the shift of wind. During the day the wind did not appreciably change in direction, but by 3 p.m. had increased to a strong gale with frequent fierce squalls; ship was run to the N.E. keeping the wind on starboard quarter.

At 8 p.m. *Burma* in Latitude 13° 02' N., Longitude 90° 53' E., barometer 1002 mb. (29.59 in.), wind south, force 9, received a weather message from S.S. *Simla* in Latitude 14° 50' N., Longitude 88° 38' E., reporting barometer 1002 mb. (29.59 in.) wind N. by W., force 6, rain, but sky not of a threatening appearance, course E. ½ N. 10 knots. Cross bearings approximately place the storm's centre in Latitude 14° N., Longitude 90° E., *Burma* and *Simla* being situated about 80 miles S.E. and N.W. of centre respectively. With the storm progressing in a N.E'ly direction *Burma*, steaming N.N.E. to avoid closing the Andamans, was running parallel or converging with its track and *Simla*, steaming on a E. ½ N. course, was running into the inner storm area of hurricane winds.

At midnight in Latitude 13° 25' N., Longitude 91° E., *Burma's* wind had increased to force 11, barometer 1001 mb. (29.56 in.). The sea was then running so high that it was decided to “Heave to” but it was 2.45 a.m. on the 21st before this manœuvre could safely be carried out, oil being used with good effect in doing so. The barometer continued to fall until 3 a.m. when it registered 998 mb. (29.47 in.) after which it commenced to rise slowly and at 8 a.m., in Latitude 13° 40' N., Longitude 91° 08' E., was 1002 mb. (29.59 in.), the wind maintaining its force throughout then veered to S.S.W.

Simla's weather gradually grew worse throughout the night, the barometer reaching its lowest at 7 a.m. 994 mb. (29.35 in.). At 8 a.m. she reports the wind N.W. storm force.

In the forenoon of this day *Burma* reports the weather gradually improving, enabling ship to maintain her course, S.W., speed about 2½ knots.

The cyclone continued to move in a N.E'ly direction and crossed the coast between Akyab and Cox's Bazar about midnight on the 22nd causing considerable loss of life and great damage to crops.

CALCUTTA STORM, MAY 24th, 1926.

TOWARDS evening on “Empire Day” a small but intense cyclonic storm passed over Calcutta doing great damage to shipping and small craft in the Docks and on the river Hooghly. The BRITISH INDIA

of the wind. The ship would not answer her helm, lying in the trough of the sea, heading about S.W.

"At about 2.00 p.m. the wind decreased in force as rapidly as it had increased, backing to west, and later, at about 2.30, to S.W. blowing with the force of a gale, 8.

"With the decreasing wind it became possible to bring the ship's head to west, so as to put the sea that had risen, on the bow, but the wind again increasing in violence as it backed to S.W. the ship's head fell off to N.W. and remained on that bearing.

"At about 4.00 p.m. the force of the wind again increased to that of a hurricane, keeping from the direction S.W. or a little to the southward. Although hardly as furious as previously the violence of the wind lasted longer, it being about 5.30 p.m. before it began to ease up. In character the wind was the same, steady in direction but with gusts of great fury. There appeared to be heavy rain also at this time but this is not certain as it was impossible to distinguish, in the clouds of driving spray, whether it were really raining or not, water collected on the hand tasting salt.

"The force of the wind again decreased to that of a gale by about 6.00 p.m., slowly diminishing during the night but maintaining a general S.W.'ly direction.

"The readings of the barometer, apparently marked in millimeters and of which the error is not known, were :—

During the first half of the storm	- - - -	775.5
„ „ decrease in the wind about 2.00 p.m.	- - - -	775.6
„ „ second half	- - - -	775.5
After the passage of the second half, 6.00 p.m.	- - - -	776.5

Slowly rising to, at noon next day - - - - - 777.4
The rise from 775.5 to 776.5 was very rapid.

"The temperature remained normal, about 80° F., during the entire period.

"This storm appeared to be very low as during the passage of the first half the upper clouds and patches of blue sky could be seen through breaks in the lower clouds, the upper clouds being apparently without movement. There were no breaks in the lower clouds during the passage of the second half.

"The usual current setting S.W. was reversed after the storm had passed.

"Except for drift the position of the ship might be regarded as unchanged during the storm.

"Very fine weather prevailed for several days after the storm."

NOTE.—S.S. *Waimana*, Captain C. M. ANDREWS, was the only observing ship in the vicinity at this time. At 8 p.m. May 14th, 1926, *Waimana* was distant S. 10° W., 146 miles from *Carangola* when the former recorded the wind as S.S.E. force 7.

The N.W. and S.W. winds of hurricane force reported were apparently due to the passing of a Λ shaped depression of the type known on this coast as a "Pampero." "Pamperos" are most prevalent during the months of July, August and September but may occur at other times of the year. In summer (December to February) these squalls are less frequent and usually of shorter duration, being then known as "Turbonadas." The wind, however, may be more violent than in the winter "Pamperos."

WIRELESS AND WEATHER, AN AID TO NAVIGATION.

CHAPTER V.

Tropical Revolving Storms.

ON March 16th, 1889, a hurricane visited Samoa in the South Pacific; at this time there lay at anchor in Apia Harbour Her Britannic Majesty's Ship *Calliope*, Captain H. C. KANE, R.N., U.S.A.S. *Trenton*, the flagship of the United States Navy in the South Pacific, U.S.A.S. *Vandalia*, the German ships of War, *Adler*, *Eber*, and *Olga*, and a number of other vessels.

Calliope slipped her anchors and proceeded to sea in the teeth of the hurricane through the reefs, her fore yard passing over *Trenton's* quarter as she passed that ship sinking at her anchors. On return after the hurricane had passed on March 19th, 1889, Captain KANE "Found the harbour perfectly clear, not a craft from the *Trenton* to a schooner afloat in it." Thus many vessels with 130 lives were lost.

"Captain KANE showed in Their Lordships' opinion (quoting from a letter from the Secretary of the Admiralty to the Commander in Chief, Australia) both nerve and decision, in determining to steam to sea in the teeth of a hurricane, which destroyed all the vessels which remained at the anchorage he left; and in conveying to him the thanks of the Admiralty, my Lords desire to express their thorough approval of his skilful seamanship, and of the measures taken by him throughout to secure the safety of his ship."

Meanwhile wireless telegraphy has been invented and come into general use at sea. In March, 1923, just 34 years later, S.S. *Clan Mackay*, Captain J. WATERHOUSE, was anchored in Apia Harbour when he observed the signs of an approaching hurricane, he put to sea and sent out by wireless the first warning, cruised on the outskirts of the disturbance broadcasting the position of the centre with weather conditions at his position, thus giving ships within range valuable information. On return to harbour he found that a very bad hurricane had swept the island.

On the morning of September 8th, 1921, S.S. *Dundrennan*, Captain R. G. SHADFORTH, observed that a hurricane had formed when about 150 miles South of Barbados; he not only took the correct seamanlike action with regard to his own ship by shaping a course to take her away from the vortex in the navigable semi-circle but broadcast a report giving his position, barometer, and wind to "All ships."

This report was intercepted by H.M.S. *Valerian*, Commander H. T. ENGLAND, R.N., as she was anchoring at Carlisle Bay, Barbados, and it enabled him to lay down rough cross bearings with his own position and observations and so to fix the position

of the centre of the storm. The wind commencing to veer indicated that the centre would pass south of Barbados. This information not only enabled Captain ENGLAND to take the correct action as regards his own ship but it proved invaluable in rendering assistance to the Schooner *Lillian J. Barnes*, flying signals of distress, with 200 native immigrants from the Cuban Sugar Plantations on board, and it was probably the originator of Wireless Warnings which were issued later by shore stations of this hurricane which was a very bad one. It is sad to think that H.M.S. *Valerian* has since been lost in a hurricane on 22nd October, 1926. The loss of this ship and S.S. *Eastway* with many fine men should increase our determination to develop at sea Wireless and Weather as an Aid to Navigation in the regions of Tropical Revolving storms; let us see how this may be done.

Modern Cyclone Navigation.

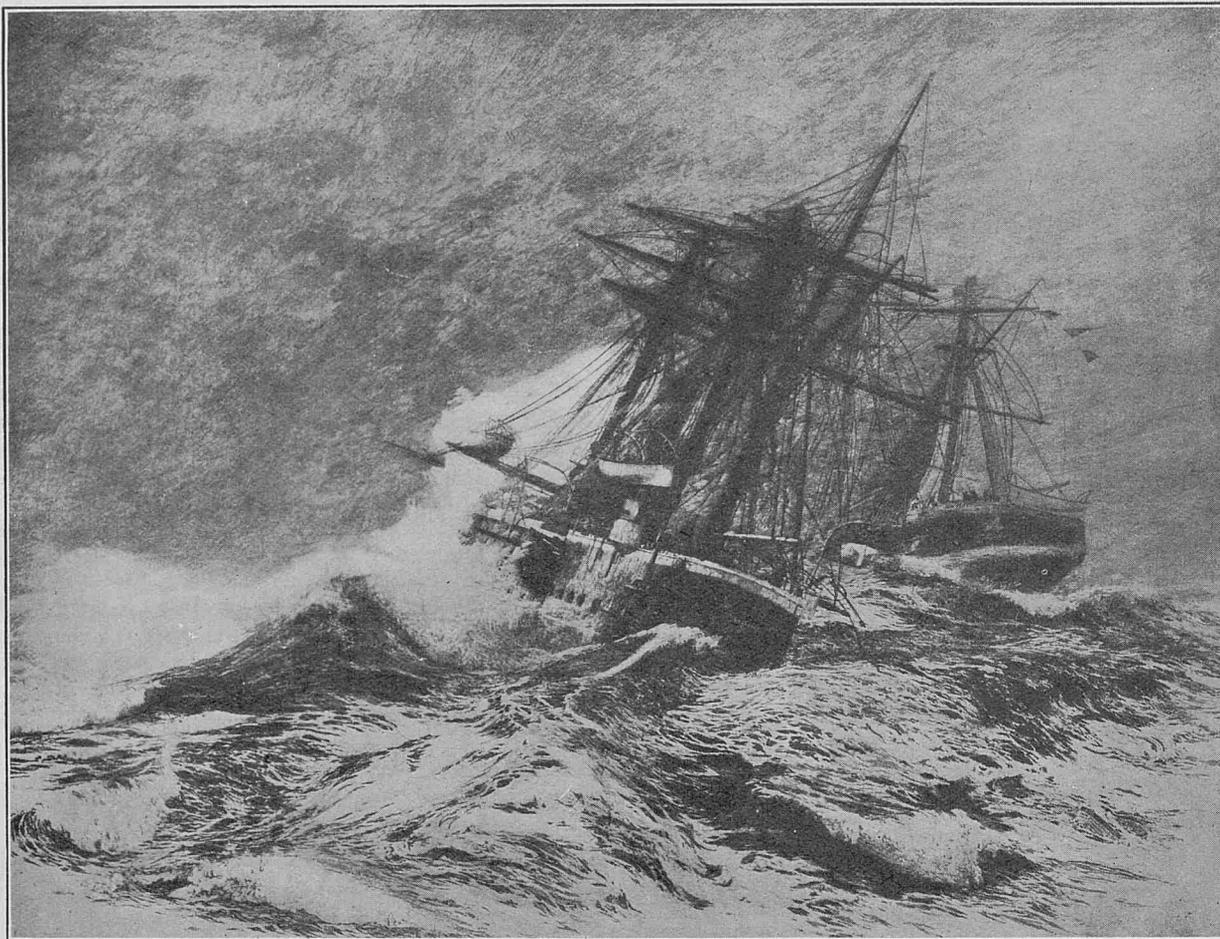
The following examples are compiled from observations returned to the Marine Division and though they do not necessarily represent what was done at the time, they indicate what may be accomplished when all those ships, indicated in the most recent number of "The Marine Observer" as selected ships, make reports to all ships as a matter of daily routine, giving observations made at the same Greenwich Time as those of the nearest coast and when coast station observations are reported by wireless; and suggesting a simple procedure. On August 19th, 1924, S.S. *Parima*, Captain P. J. McCOURT, from Barbados to New York, shortly after clearing the Antilles observed signs that indicated that a tropical revolving storm had formed in her vicinity. She was not one of the ships invited to make routine reports to all ships. She immediately makes the following urgent report :—

C.Q. Urgent.

Weather 1907N 6520W Barometer corrected 29.74 Wind South force 4 overcast heavy confused ESE swell indications Revolving Storm 0900 G.M.T. August nineteenth Parima.

This message would be made on spark and in a ship fitted for C.W. transmission it would be repeated on C.W.

It is intercepted by S.S. *Manistee*, Captain J. M. ISAACSON, from Santa Marta to Rotterdam, distant some 240 miles to the N.E.; by



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.

R.M.S. *Oriana*, Captain E. KITE, Havana to Vigo, a thousand miles to the N.E., and probably many other ships.

Manistee, seeing how near *Parima* is, immediately reciprocates, and makes the following report to all ships :—

C.Q.

Weather 2256N 6304W Barometer corrected 29.89 ESE 8 Overcast squally lightning rain 0900 G.M.T. August nineteenth Manistee.

which is also received in *Parima*, *Oriana* and other ships.

The positions of these two reports are plotted with wind arrow and barometer and according to the rough rule given on page 75, Chapter IV, the bearing of the centre is laid off at the prescribed angle from the direction of the wind. It is a very rough guide at best, but the interception of the two bearings gives us some idea of the position of the Vortex, CHART XV.

According to the published tracks of West Indian hurricanes hereabouts in August hurricanes usually travel W. or N.W. *Parima* is in the after part of the system; she would do well to reduce speed or heave to and let it pass ahead of her or in any case until after the daily routine time for observation when selected ships should make reports and she will have fuller information.

Manistee is steering a safe course and she should hold on so long as the barometer remains steady or rising allowing for diurnal range. The barometer should rise slowly on her course to the N.E. hereabouts according to the trend of the normal isobars given on the North Atlantic Meteorological Chart for August. It is extremely unlikely that the hurricane will recurve in so low a latitude but we cannot say that any track is impossible.

Oriana holds on her course knowing that the routine daily reports in four hours' time will give her fuller information; these reports are of great value to her, they give timely and distant warning which is the most efficient warning.

At 1300 G.M.T., 8 a.m., seventy-fifth meridian time, regular observing ships which have mercurial barometers are invited to take observations and to report them to all ships as soon as convenient and practicable to the westward of the 40th Meridian. A ship in *Oriana's* position on the morning of August 19th, 1924, would probably be able to intercept reports from ships in the positions at which *Ormonde*, *Honorius*, *Parima*, *Manistee*, *Canadian Winner* and *Mercian* are shown to be on CHART XVI under favourable conditions with continuous wave, the range required being 1,400 miles. Assuming *Oriana* receives these reports within two hours, such reports from West India stations as are available, and the Arlington message at 1530 G.M.T. giving American Coast station observations for 1300 G.M.T., by 1800 G.M.T., 1 p.m., 75th meridian time, she will have complete data with which to make CHART XVI. We need not describe in detail how this chart is made, for in constructing the Weather Charts in detail in Chapter II we may learn how to make weather charts in any part of the northern hemisphere at sea.

Now CHART XVI on board any ship in the great area it covers is of great value. Firstly it shows the ships in the stormfield how they are situated with regard to the Vortex. It will be noted that the centre is fixed approximately (but more accurately than the emergency fix at 0900 G.M.T. which is shown to have been too far to the northward) by means of the observations at Inagua and Sombrero Light Houses as well as those taken in *Parima* and *Manistee*, by judgment. The centre is shown to be somewhere about Latitude 20° N. and Longitude 68° W.; this information is of value to all ships. Secondly it gives us the general pressure distribution over the West Indies, Western North Atlantic, and Eastern States, and from this we may gain some idea of the path the hurricane will follow together with the tendency of the barometers reported within the influence of the hurricane.

It is very important, now that it is possible by means of wireless telegraphy to construct a weather chart at sea, that it should be

known more generally amongst seamen that the paths of hurricanes are greatly influenced by the general pressure distribution; their inclination is to follow a direction parallel to the outer isobars of anticyclones, that is they curve round the anticyclone and do not force through it.

Our chart indicates that the North Atlantic anticyclone holds to the eastward of Bermuda while there is a high of equal intensity over the land to the westward of New York, and pressure is comparatively high along the U.S.A. Coast. There is a depression N.W. of Sydney, N.B., which extends southward and between this depression and that of the hurricane extending between the anticyclone is a Col, or wide channel of comparative low or intermediate pressure. This indicates the path favourable to the hurricane at the moment. The steady barometer reported at Inagua Light House, which is within the system, *Parima's* slowly rising barometer on a course N. 19° W. at 9 knots, and the rising barometer at Sombrero Light House all confirm a movement of the depression in a N.N.W. direction and so we will assume that the hurricane is travelling N.N.W. at the moment. The action considered correct after the emergency fix at 0900 G.M.T. for *Parima* and *Manistee* is now confirmed. *Oriana* will continue on her course at speed, but watching every sign of the weather and examining every scrap of information received by wireless with more than usual care.

After observation time on August 20th, 1924, CHART XVII is made; it shows us that our estimation was correct for the centre is now in approximately Latitude 23° N., Longitude 70° W., having travelled N.W. by N. 200 miles in the last 24 hours. The general pressure distribution is still favourable to a N.W. path and the barometer tendencies again conform to a N.W. movement. *Parima* is making good way with a fair wind, but it would now be prudent for her to make a considerable reduction of speed for, notwithstanding, that her barometer has risen, this chart shows that she is still too close up with the trough.

Oriana can continue her course and speed for the present, though great vigilance is necessary, for should the pressure distribution change and the hurricane recurve, she may find herself in the Dangerous Quadrant.

On the morning of August 21st, 1924, CHART XVIII shows the position. The centre is now in Latitude 25° N., Longitude 73° W., having travelled N.W. by W. 200 miles.

The pressure distribution is now favourable to a N.N.W. path, and the barometer tendencies reported give some support to a movement in that direction.

The hurricane is now approaching the latitude where recurvature may take place. *Parima* has continued on her course at speed and though the centre has drawn further away on her port beam, she is nearer the trough than yesterday. The storm is spreading and will probably soon begin to travel North and possibly N.E.; she should now "Heave to" and wait until the wind veers to S.S.W., when she could with safety, so long as the barometer does not fall, follow in the wake of the hurricane, keeping her fair wind. However, *Parima* had not received all the reports shown on the chart and therefore she could not make a chart and have complete information. She proceeded at speed, out-distanced the hurricane and arrived at New York on August 24th ahead of it, in which she was very lucky, for on August 22nd the hurricane, at the latitude where recurvature might be expected, was checked in its Northward progress by a HIGH, which kept it nearly stationary with a very slight movement to the westward until August 24th, when it continued its path to the N.N.E.

Oriana is now on the verge of the stormfield near the trough, and with the information this chart gives her, would make a considerable alteration of course to the southward, for on her present course, even with the centre travelling N.N.W. or N., she would experience head gales and heavy seas so close as this course would take her, to the rear of the centre. With such complete information a ship in this position would possibly not only reduce the risk of damage considerably, but add to the comfort of her passengers and crew by making her landfall at Turks Island instead of Abaco, for in the circumstances though distance over the ground would be increased to Havana by about 200 miles, the coal bill might be no more or less than if she continued on her course for Abaco. Time would also probably be saved, so that the suggestion is made for the consideration of commanders. On this occasion, S.W'ly gales with heavy seas prevailed until August 24th to the eastward of Abaco,

while further to the southward and clear of the intense part of the stormfield the winds were moderate. At Inagua, which is inside, and W. by S. of, Turks Island, from August 21st to August 24th, 1924, the greatest force of wind recorded was a "Fresh Breeze" force 5, from S.W.

On this occasion *Oriana* and other ships encountering this hurricane did not have the full assistance which the routine reports addressed to all ships by ships invited to make these reports would provide, so that the application suggested was at that time not possible.

Some years ago the Marine Superintendent of a great shipping company had a proposal put before him in which it was suggested that with proper information steamships in the North Atlantic could avoid bad weather by dodging depressions. Often quite impracticable, if not impossible. In middle and high latitudes where intense depressions sometimes have wind circulations of not less than 1,000 miles in diameter and of this diameter (athwart the line of progression) one-third the distance has been covered by winds of storm and hurricane force, the whole system advancing eastward at the rate of 800 miles or even up to 1,200 miles in a day.

Generally the rate of progression of cyclonic storms within the Tropics and until after recurving does not exceed 12 knots. The highest rate of progression recorded within the Tropics appears to be 20 knots, but that was a typhoon and very exceptional. Then within the Tropics the cyclonic storm is more compact and the winds of hurricane to gale force cover a much smaller area.

Here, with early information by wireless and a weather chart, it may often be possible and expedient to avoid the storm field of a hurricane.

Sea room remains the first essential, for even steam or motor power cannot annul the danger of a lee shore in a hurricane. Once a ship has entered the wind circulation of an intense tropical revolving storm there can be no doubt about it, act according to the rule.

With regard to the paths of hurricanes. The path is influenced by the general pressure distribution, probably for this reason. From the general pressure distribution we can get a very good idea of the general air circulation. Now a hurricane is an eddying whirl in the general air current and is carried along in much the same way that an eddy is carried along in a stream. If the general air current or general wind moves slowly the hurricane within it is moved slowly, and when the general air current moves swiftly the hurricane moves swiftly. It is well then not to think too much in the terms of pressure, but rather of the winds relating to the general pressure distribution. In the Tropics the drift of air, the trade wind, is mainly to the westward from the surface to a great height, while in middle and high latitudes it is to the eastward, the Brave West Winds, which extend to an even greater height.

Therefore observations of the upper air are of very great importance, and certain of His Majesty's ships are undertaking this work, of which we hope Commander L. GARBETT, R.N., Superintendent, Navy Meteorological Services, will continue to tell us yearly in THE MARINE OBSERVER.

Of the works of early investigators of the Laws of Storms probably Sir WILLIAM REID's "Attempt to develop the Laws of Storms" and PIDDINGTON's "Sailors' Horn Book" are the best known amongst seamen.

Reid worked mostly in the West Indies, where he had gained much experience of hurricanes, having been employed as an officer of the Royal Engineers, at Barbados, re-establishing government buildings blown down in 1831. He became Governor of Bermuda in 1839 and later Governor of Barbados, obtaining much valuable information direct from the captains of ships trading to the West Indies. HENRY PIDDINGTON carried out his researches at Calcutta where, after commanding a ship, he was appointed Curator of the Museum of Economic Geology in 1830, he not only had the benefit of REID's early work and the experience of many other seamen in the Indian seas and in all parts of the world, but he thoroughly understood his brother seamen of the time and so was able to gain their attention.

Captain HENRY PIDDINGTON's "Sailors' Horn Book" was first published in 1848, and it held position as the foremost practical text book on tropical storms for more than 30 years. In it is given a chart of the Bay of Bengal and part of the Arabian Sea, showing the tracks of cyclones from 1800 to 1848, and testifying to the enormous amount

of labour he put into the examination of cyclones in this part of the world.

Bay of Bengal.

Having selected our first example from the experiences of ships in West Indian Hurricanes, we cannot do better than follow it up with an example compiled from experience in the Bay of Bengal, where the geographical distribution of land and sea and the meteorological conditions lend themselves more readily to the solution of the problems of cyclone navigation by means of wireless communication than in any part of the world I have navigated or of which the meteorological conditions have been examined in the Marine Division.

The Bay of Bengal which is in fact a sea, is probably provided with more coast stations at which meteorological observations are made daily at the time for telegraphic reports than any other in the regions of tropical revolving storms, and so it is not difficult with ships' observations to assemble sufficient data for the purpose of this demonstration, which cannot be made for Southern tropical seas for the lack of sufficient data at the time of severe cyclones in recent years. A severe cyclone occurred in the Bay of Bengal in the first week of May, 1923.

Let us suppose that at this time the system which is now developing, had been in force and that ships on our list indicated as selected for the purpose and invited to make routine reports to all ships of observations taken at the same time as the nearest coast, which hereabouts is 0230 G.M.T., had done so, also that reports of ships invited to report to shore stations for the Indian Meteorological Office at Simla were intercepted at sea, and that it were possible to receive reports of the coast station observations of barometer, wind and weather such as are made for the coast of the British Isles, but modified to suit the Tropics.

On May 2nd, 1923, S.S. *Macharda*, Captain W. O. TYERS, from Rangoon to Colombo, in Latitude $13^{\circ} 56' N.$, Longitude $92^{\circ} 30' E.$, receives the necessary information and makes CHART XIX; this indicates a cyclonic circulation of the wind with centre of its depression near the centre of the Bay. The barometer being 3 mb. below normal at Diamond Island, 5 mb. below normal at *Macharda's* position and 3 mb. below normal at *Masirah's* position, the probabilities are three to one that a cyclonic storm has formed. All ships which have received the information and made the chart can see that there is probably a cyclone centred in about Latitude $15^{\circ} N.$, Longitude $88^{\circ} E.$

As *Macharda* proceeds on her course the wind veers to S.W., and by 8 p.m., ship's time, the barometer being 7 mb. below normal, *Macharda* knows that a cyclonic storm is centred somewhere to the westward of her position, she proceeds on her course at speed to the S.W. with caution, carefully watching for signs and information by wireless. At this season of the year in rear of a storm the S.W. winds in the South of the Bay increase in strength, the weather becomes more squally and unsettled and cloud increases and shows by its increasing movement indraught of a cyclonic disturbance.

On the morning of May 3rd, 1923, CHART XX is made, the centre of the cyclone can be now approximately fixed as being in about Latitude $15\frac{1}{2}^{\circ} N.$ and Longitude $87^{\circ} E.$ The directions of the coast winds must not be given the same weight as those at sea, because they may be affected by the land, but the barometer observations are of great assistance. *Macharda* is now confident that she is in the rear of and drawing away from the storm. In May the published tracks of storms show that from the vicinity the storm is now in, it may travel N.W., N., or N.N.E.

On May 4th, CHART XXI shows the conditions. The centre can now be located in about Latitude $18\frac{1}{2}^{\circ} N.$, Longitude $88^{\circ} E.$ *Macharda* is now well clear. Had *City of Canterbury* been able to make the previous days' chart when in the Hugli, she would now see that the centre was travelling N. by E. at about 200 miles a day, and therefore being near the trough in the navigable semicircle by continuing on her course for Madras, she would be taking the correct action, *i.e.*, running with the wind abaft the starboard beam. Generally speaking, if on the equatorial side of a cyclone before recurvature, it is safe to decrease your latitude.

CHART XXII shows the conditions as far as they can be charted with the reports from ships available. The cyclone is now, May 5th, 2.30 G.M.T., centred in about Latitude $20^{\circ} N.$, Longitude $89\frac{1}{2}^{\circ} E.$, having travelled about 100 miles N.E. in the last 24 hours. The

tendency of the barometer at Saugar Island, Gopalpur and Akyab stations would be most useful on this chart, for they would give a very good indication of the movement of the system. On the evening of this day S.S. *Okara*, Captain F. SMITH, foundered with all hands, "Due to the fact that her hatches went and she was overwhelmed by a huge sea and this was the result of her being caught in a cyclone on the 4th and 5th May."

CHART XXIII indicates the position of *Okara* at 1224 G.M.T. (6.29 p.m. local time) May 5th, 1923, when S.S. *Angora*, Captain E. DE G. DIAMOND, proceeded towards her in response to distress signals to stand by, with the bearing and distance of each of the ships which returned observations given as a matter of general interest.

CHART XXIV gives the situation of the centre at 0230 G.M.T. on May 6th in about Latitude $20\frac{1}{2}^{\circ} N.$, Longitude $92^{\circ} E.$ and it will be noted that with nearness to the coast the value of the barometer observation at coast stations is increased for the barometer at Akyab is the main guide along with the other reports for fixing the centre. At *Angora's* position the indraught of the wind to the centre is far in excess of the rule.

As Captain G. PARK points out with his great experience of the Bay of Bengal, actual reports when plotted on a chart may teach us more in three days than ten years' conjecture from isolated observation. Now in no case do our charts show the weather reports of a ship ahead of the storm for no observations from ships in that position have been received.

Years ago a question somewhat after the following was put to candidates for Mate and Master's certificates. "You are in a sailing ship having just left the Sandheads and you observe that a cyclone is approaching from the southward; you find that you are in the dangerous quadrant of the stormfield. What would you do?"

This question was put, I believe, to show the candidate that in such a position he would be between the devil and the deep. The deep being the vortex of the storm, if he stood on his course to the southward with the wind which at first would be easterly and therefore on the port beam, contrary to the rule, and the devil being a lee shore, if he conformed to the rule and hove to on the starboard tack, for as the cyclone passed over the ship, though the vortex might clear her, she would later, while still in with the land, experience southerly gales with high seas running on to the coast.

Even a steamer caught in the dangerous quadrant of a cyclone near the head of the Bay of Bengal is in a very dangerous position.

It is easy to be wise after the event and let it be quite clear that no inference is intended with regard to the action of the Captain of the *Okara*, to criticise the late Captain SMITH's action would be contemptible and unseamanlike.

As the Court which investigated the circumstances attending the loss of S.S. *Okara* on May 5th, 1923, stated in their report—"To say that a man has been shown to have been wrong by after-events is a very different thing from saying that he did not act prudently before the event." After four years, reference here to the circumstances attending the loss of this ship, can only be to the good of all, for such a loss brings home to us that cyclone navigation needs improvement, and this experience can now usefully be given to stimulate the co-operation between ships at sea and ships and the shore.

It is known that the following message broadcast by Calcutta W/T Station at 7 p.m. local time, on May 2nd was received by *Okara* before the pilot left, but it cannot be proved and therefore is not known if *Okara* received later cyclone warnings broadcast by coast stations. She may have done so.

"Area squally weather near latitude thirteen, longitude eighty-five, where storm may be forming. Special observations desired."

This message indicates much the conditions which the ships shown on CHART XIX might, with the system suggested, have known the same morning or about ten to eleven hours sooner.

At 7.03 a.m. on May 3rd, local time, Calcutta W/T station broadcast "Area squally weather probably developed into storm about latitude fifteen north, longitude eighty-six east, special observations desired."

At this time *Okara* was probably at sea clear of the Sandhead, and as stated it is not known if she received this message.

Now in home waters since observations at coast stations were broadcast far greater confidence has been placed in the Weather Forecasts and Gale Warnings made by wireless. Supposing that *Okara*

had not only received the above message shortly after 7 a.m., on May 3rd, but that she had been able to intercept ships' reports and receive a report giving the coast station observation and make CHART XX. Surely any seamen then seeing that his own conclusions practically verified those of the meteorological experts ashore, would be in a better position to take the correct action in a position which might well develop into one of great danger.

I have on one occasion only rode out a cyclone in the Hugli in a steamer, and that was sufficient to show that attempting to return from sea to an anchorage at Saugar might be as dangerous as gaining sea room and manœuvring according to the position and movement of a cyclone in the Bay of Bengal as indicated by wireless reports from other ships and weather charts, unless there were ample time to make the anchorage well in advance of the storm.

Hence the need for Cyclone Warnings from a central observatory and the great need of co-operation between ships at sea and ships and the shore in the matter of regular wireless weather reports.

If the centre of the storm is fixed correctly on CHART XXI on May 4th, the ring of hurricane winds which encircles the centre of an intense cyclone was probably small for *City of Canterbury*, then distant only about 100 miles to the westward of the centre, had a moderate breeze, force 4, and according to CHART XXII, on the morning of May 5th, the centre was only distant about 120 miles S.E. of Saugar Island, where a light N.N.E. breeze was reported, and at this time *Okara* made by wireless to *Angora*, "8 a.m., 19° 10' N. 90° 55' E., wind south, force 9, squalls hurricane force, barometer 29.56, wind veering to westward slowly, expect barometer to rise, sea high and confused, overcast." So that she was at the time of our chart about 90 miles S.W. by W. from the centre. Probably on May 4th the diameter of the stormfield with its gales up to hurricane force was not more than 100 miles, it probably increased on May 5th.

Now the dimensions of Tropical Revolving storms is a very important matter in cyclone navigation, and the experiences of ships having the misfortune to get into the centre of a cyclone have enabled us to obtain some fairly accurate measurements.

Dimensions of Hurricane Winds.

On December 2nd, 1922, the American S.S. *Eclipse*, Captain HAWKINS, encountered a cyclone in the Arabian Sea; it travelled 200 miles that day and, estimated by the times logged when it passed over her position, the ring of winds of hurricane force was only 4 miles

thick, while the calm centre was only 4 miles in diameter, thus winds of hurricane force only covered an area of about 12 miles in diameter.

S.S. *Sardinia*, only distant 80 miles from the centre, had a strong breeze, force 6, and barometer 51.4 mb. (1.52 in.) higher than that at the centre, which indicates an intensely steep barometric gradient.

On September 21st, 1922, a West Indian hurricane passed over Bermuda; it had travelled at the rate of 13 knots since the previous day.

Captain H. P. DOUGLAS, C.M.G., R.N. (now Rear-Admiral and Hydrographer of the Navy), in H.M.S. *Mutine*, at Hamilton Harbour, noted the times when the wind attained hurricane force, when it fell calm, when it came away at hurricane force again, and when it fell below hurricane force. The ring of hurricane winds was 15 miles thick in advance of the centre; the centre was about 7 miles in diameter, and the hurricane wind was 19 miles thick in rear. As so frequently happens, the greatest force of wind was in rear of the trough.

This hurricane originated in the Tropics, recurved in about Latitude 25° N., Longitude 66° W., and crossing the Atlantic reached the French coast. On September 25th, 1922, it was centred in Latitude 51½° N., Longitude 17½° W., and had spread to such an extent that its wind circulation had a diameter of about 1,000 miles. At this time observation did not show the extent of the hurricane winds; the system was no longer tropical. Several ships reported wind of that force near the centre.

The Typhoon which did great damage at Hong Kong on August 18th, 1923, from observations made on board the steamships *Yunnan*, *Steel Traveler* and *Chenan*, all of which the centre passed over before reaching Hong Kong, had the following dimensions. On August 16th the calm centre measured 28 miles across. On August 18th the calm centre measured 7 miles in diameter when the ring of hurricane winds was 27 miles thick before the centre and 12 miles thick abaft it. The total diameter of winds of gale force and above was 65 miles in the fore and aft line or along the line of progression, and the average speed at which the Typhoon was travelling was 14 knots.

Now many a fine ship has been damaged or lost in the seas caused by the ring of hurricane winds round the centre. These experiences show that this ring of hurricane wind may often be as small as from 12 to 50 miles in low latitudes, and it is this ring of hurricane winds with the gales surrounding it that should be given as wide a berth as possible.

(To be continued.)

EXPERIMENTING WITH ICEBERGS.

By HOWARD T. BARNES, D.Sc., F.R.S., PROFESSOR OF PHYSICS, MCGILL UNIVERSITY, MONTREAL.

OUR party left Montreal on the "Ocean Limited" the 27th of June, bound for Newfoundland, on the Seventh Iceberg Expedition organised by the writer since 1910. Many years of study and research from Hudson Bay to the south coast of Newfoundland had been fruitful of interesting material. The development of the Microthermometer resulted, which enabled delicate records of temperature effects of icebergs to be obtained, and these had revealed the important fact as early as the first experiments to Hudson Bay and back, that icebergs, when melting, affect the temperature of the sea in an unexpected way. Every iceberg is an hydraulic pump sinking the surrounding sea water by cooling and drawing to itself the warmer surface waters, thereby contributing to its own destruction. The warmer surface layers flow more rapidly to the cold ice surface than do the cooler layers, hence the iceberg becomes the central point for the collection of the hotter surface waters. In approaching an iceberg it very often happens that a sensitive thermometer detects a rise of temperature rather than a fall as is popularly understood. By means of the microthermometer it has been possible to detect this rise for a distance of five miles where there has been a large floating iceberg.

The present experiments had not to do with the further recording of this interesting property of bergs, but rather with a long-planned effort to find some means to control and destroy the immense masses of ice which are so universally feared in the shipping world. Careful observations made on a single iceberg during a previous expedition had shown how Nature operates to crack the ice in order that more rapid

melting can result. It was noted that the interval from darkness to dawn was the time when the greatest cracking was heard and when the largest pieces were thrown off. From my knowledge of the effect of the sunrise on the destruction of river ice even in the coldest weather it was possible to understand how this occurred. While energy of the first light is small it serves to gather force in the ice and cause the cracking from the fact that the ice during the night becomes dry and cold, and offers a surface into which the first light and heat can penetrate, and the disruptive force is found in the large expansion of the ice in the neighbourhood of the freezing point. In reality, a huge iceberg is under terrific strain, and the slightest change of temperature on any part such as that exposed to the returning daylight produces further strains that are responsible for the cracks.

On returning from my expedition in 1924 I determined to try the effect of a very high temperature locally applied to more forcefully set up these strains very much as a hot wire or point can crack a mass of glass. It is a matter of using as high a temperature as possible, since it is not heat in quantity that is wanted, as that is supplied by the sun, but it is the sudden contact of two surfaces as widely separated in temperature as possible. When casting about for some material that would give me a high temperature in the shortest space of time, and which could be convenient to use and transport, I remembered using thermit many years ago in my college lectures to illustrate high temperatures. This material I finally located in New York, and found that it was still being widely used for welding and regeneration of

furnaces and for many other purposes.

When I came to try to interest the Governments to help me try it on an iceberg, I met with no encouragement.

Happily I had the chance I wanted during the winter of 1924-25 on the St. Lawrence when making a study of the ice condition in the International Section for the HYDRO-ELECTRIC POWER COMMISSION of Ontario. Soliciting the interest of the METAL AND THERMIT CORPORATION of New York, and of Dr. HENRY B. FABER, Consulting Chemist of New York, I was able to try out the thermit reaction in ice. The result was very interesting and startling, and showed at once that I was possessed of an exceedingly powerful method for ice control hitherto unthought of. My use of this material the following winter in removing the Allegheny Ice Gorge at Oil City and Franklin has already been described elsewhere.

More than a year ago the METAL AND THERMIT CORPORATION generously donated a ton of thermit for iceberg work, which was sent to Newfoundland. The delay in actually making the tests until the year following came from the fact that my time was fully occupied in preparing a Report for the HYDRO-ELECTRIC POWER COMMISSION during the whole of last summer. When I was free to go I found the icebergs over for the season.

My plans had to be made for the following spring, and consequently with high hopes and enthusiasm my little party started out on its great adventure the latter part of June. It was the culmination of years of study and two years of patient waiting during which each step in the development of thermit in ice had to be proved to a doubting public. At one time a change of plan was made in order to join the UNIVERSITY OF MICHIGAN Greenland expedition, but as this was practically abandoned this summer my original plan was reverted to.

Our party consisted of my brother, WILFRED M. BARNES, A.R.C.A., who had been with me in 1912 for the purpose of studying the colour of icebergs, and whose skill as a painter of skies made him especially useful in looking after the photographs and in making sketches in colour of the icebergs for future studies; my eldest son, WILLIAM H. BARNES, Demonstrator in Chemistry at MCGILL UNIVERSITY, who was in charge of the chemical examination of the icebergs and the air collected from the melting ice; Mr. C. A. BERRY, of Waterloo, Quebec, inventor of the explosive Bermit, and skilled in all use of fuses and mine laying, who came to help both in the thermit application as well as to try his new explosive in combination with the thermit.

Thus our party, with baggage and equipment, journeyed with comfort to North Sydney, where we boarded the palatial new steamer of the Newfoundland Government Railway, the *Caribou*, and an all-night's trip took us to Port-aux-Basque, where we joined the narrow-gauge Railway of the Newfoundland Government for Notre Dame Jt. There we changed to another train, and a short ride took us to Lewisporte, a thriving fishing village. There we were met by motor launches, and a forty-mile trip northwestward took us up into Notre Dame Bay to the twin islands of Twillingate.

Here we were most comfortably located for the two weeks during which we made experiments. The NOTRE DAME BAY MEMORIAL HOSPITAL is located here, planned, equipped and directed by Dr. CHARLES E. PARSONS, and fathered by Dr. GRENFELL himself, who paid us a delightful visit during the first week of our stay. Having the convenience of the modern and finely-appointed hospital made it possible for us to do efficient and rapid work. We were also very comfortable and happy, which is essential to getting reliable scientific data.

Northward from Twillingate extends the Arctic current straight as the crow flies to the coast of Greenland, and many times we were thankful that we could find such an ideal place to work with every modern comfort, instead of being in a constant struggle with difficult conditions in Greenland.

Icebergs in great numbers and of all sizes and shapes drift into Twillingate harbour, and we had at least forty-three within a few hours' trip for our experiments. From the lighthouse we could count 250 icebergs within a day's trip going and coming.

Such was our good fortune as we assembled and unpacked our material for the commencement of our long-cherished experiments. Much time was taken up in visiting the various icebergs and making careful surveys of them and getting photographs both by the ordinary camera and the colour camera.

A long storm of three days kept us close to shore, but during that time much progress was made with the chemical work on pieces of iceberg ice broken off, and from floating growlers gathered up and conveyed to the hospital laboratory.

We found the merchants and fisherfolk of Twillingate most kind, but terribly afraid of the bergs, and they made earnest efforts to dissuade us from going near them. When they found that we were planning to go on them to work they thought we were doomed, and no doubt prepared themselves for the worst. The delightful personalities of these people, all descendants of early Scotch, English and Irish settlers of the country of two or three hundred years ago, was most pleasing. I assured them that my long experience with icebergs enabled me to judge their moods and caprices with accuracy, and that really we were in no danger. I further told them that this work was the result of a long hope that was now materialising of such desire that I personally was quite ready if necessary to suffer the consequence of what they termed my foolhardiness with the loss of my life if in consequence I could prove to a doubting world that icebergs could be controlled and destroyed by human means. I had suffered so much adverse criticism from eminent officials and even scientists of Europe and America that I expected the same from these people. Instead I had the kindest treatment and help with a full understanding and appreciation of my efforts to destroy what to them was the worst pest and most dangerous visitation to the fishing villages of the East coast. To call an iceberg beautiful was to them unheard of, and they failed to enthuse over the beautiful colours.

Before starting the work on the bergs I carefully gathered all the material to safeguard us in the experiments. This was the construction of a suitable scaling ladder, the use of lifebelts, the construction of stout alpine axes, and the use of heavy calked lumberman's boots, and heavy boat hooks.

Two boats were chartered, one a fast motor cruiser, the *Honeymoon*, owned by Captain LILY, and the other a strong dory, manned by Captain ELIAS YOUNG, both men well versed in the navigation of those waters. The cruiser took the dory in tow, and carried us to the berg to be experimented with when our equipment and tools were transferred to the dory, and we rowed up to the spot selected to land on the ice. In every case the cruiser stood by, and one of the party detailed to carefully watch the berg to detect the smallest trace of movement. The cruiser's whistle was to be the danger signal for us to make a hasty retreat. The movements of an iceberg are so slow even when one starts to turn over that ample time is had for getting off, which we never had to do because we were always correct in our judgment of the stable bergs. Even had one turned ample warning is given by the falling of some large mass of ice from a protruding ledge or overhanging cliff.

We safeguarded our retreat in every case, and were satisfied that in no case were we in any real danger. We had adventures, but always our equipment was adequate to protect us, and the dory proved my safety on one occasion when the sides of the biggest berg we were working on slipped into the sea on either side of the scaling ladder and the flat-bottom dory into which I had just stepped from the latter rode over the masses of ice and withstood the tidal wave of the falling ice with perfect safety, giving me no cause to fear.

A second adventure which proved more uncomfortable than dangerous befell Mr. BERRY. When scaling the walls of the highest cliffs of our largest berg he slipped on the water-covered ice and slid 600 feet down the side of the berg over a high ridge and into a valley where he managed to get the spikes on his left heel into the ice about two feet from the edge, where he might have had the thrill of slipping into the sea to be picked up by the dory after a cold sea-water bath. As it was, the coating of flowing ice water saturated his clothes. But even this mishap was unnecessary had the alpine axe not been left behind.

Adventures on the bergs are quite as thrilling as glacier climbing in the mountains, knowing that there are no railings around the ledge. It is uncomfortably hot on the bergs during the day, due to the heat glare from the ice.

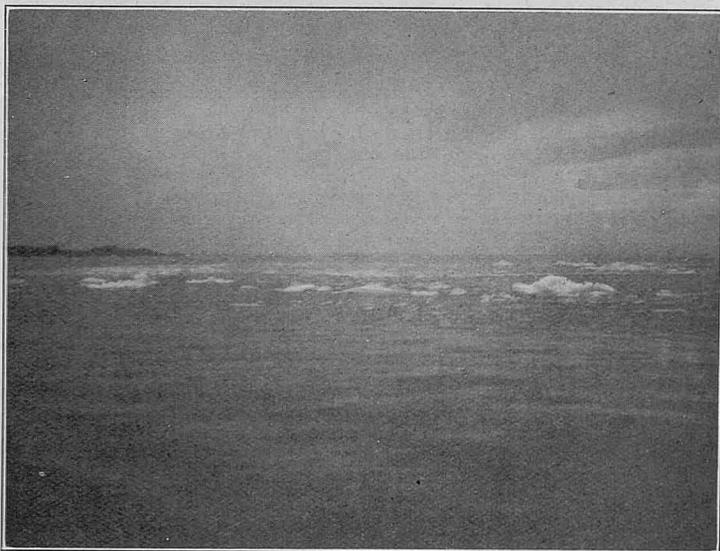
Sometimes one finds the most beautiful effects in the bergs which are not ever seen from the outside. Our big berg gave us this during its final stages of passing away. In the interior we found a lake 200 feet long and 100 feet wide and 4 feet deep, of perfect green. In the centre of the lake was a mound of white ice shaped like an ice-cream cone, on which our imagination erected a fountain and placed flowers. Around the lake was a three-foot border of blue, and towering above that were cliffs 50 feet high of perfectly white ice glistening in the sun with dazzling splendour from their coating of running water. Pillars of this porcelain ice were in marked contrast to the beautiful colouring in and around the lake. On the other side of the lake was a beach rising gently to a height of 30 feet from the water and hiding all

view of this fairyland from those in the boats. The whole isolated fairy world was afloat in the currents drifting slowly outward.

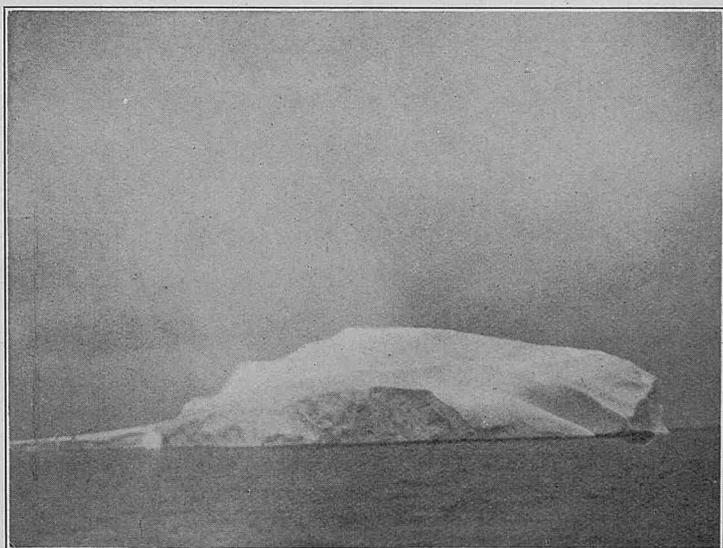
The experiments with thermit were conducted on three bergs. The biggest one we could find was treated first with a hundred pound charge let into the ice about 3 feet. The result of firing was the emission of flame and fire to a height of 125 feet or more with a great explosion of the ice and the throwing off of great masses of ice from the sides and ends of the main plateau treated. This iceberg was, we estimated, from our survey, 500 feet long by as many wide, and its mountainous cliffs rose on one side to a height of between 75 to 100 feet with a second plateau 60 feet up. These measurements were made all from the water-line, and no estimate was made of the mass under the water. The whole berg was stable, and oscillating very slightly from the swell with a period of from four to five minutes. As anticipated, the effect of the intense heat in direct contact with the hard ice was to send a temperature wave into the mass which produced a great deal of cracking and visible disruption apart from the explosive shock of the dissociated ice itself. This cracking went on all the evening after we returned to the village, and could be distinctly heard out at sea five miles away. Toward the early morning a very loud report resulted which woke many of the people of Twillingate, and when we visited the berg the next day we found the great bulk of the interior had come away. The day following witnessed the full effect of the cracking when the whole plateau on which the charge had been fired split and came away almost across the thermit hole. The disintegrating effect of the heat treatment can be seen by comparing photographs 1 and 5, which were taken before and after the charge of thermit was set off. The whole berg could have been broken up had we placed more heat charges in at different points. As it was, about a third of the ice was



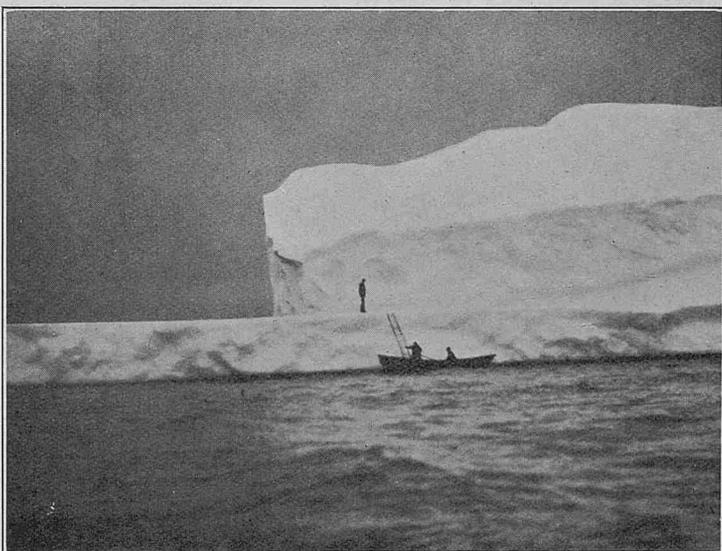
3. First explosion due to thermit.



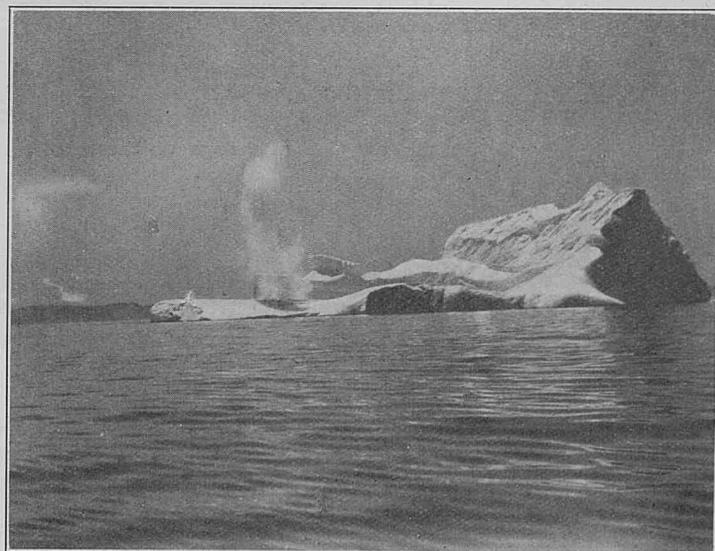
4. Fragments dislodged by explosion.



1. First iceberg treated.



2. Method of landing.



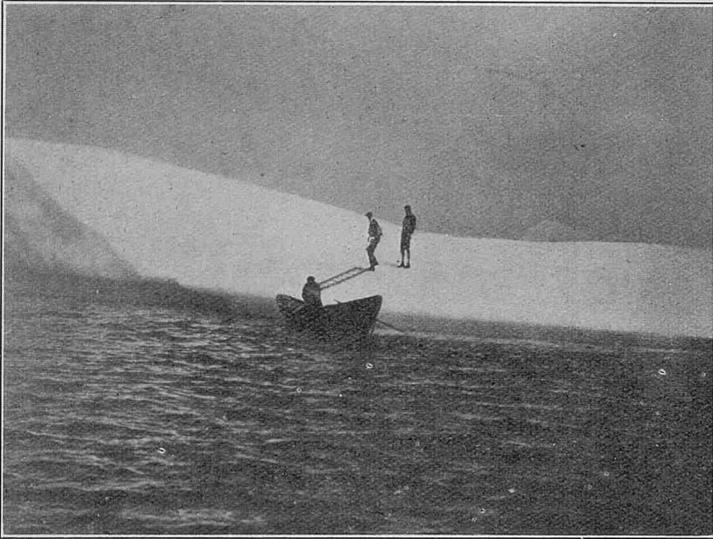
5. Iceberg 2 days after treatment, rapidly going to pieces.

broken off, and the whole berg turned through 45 degrees through the lightening of the side treated.

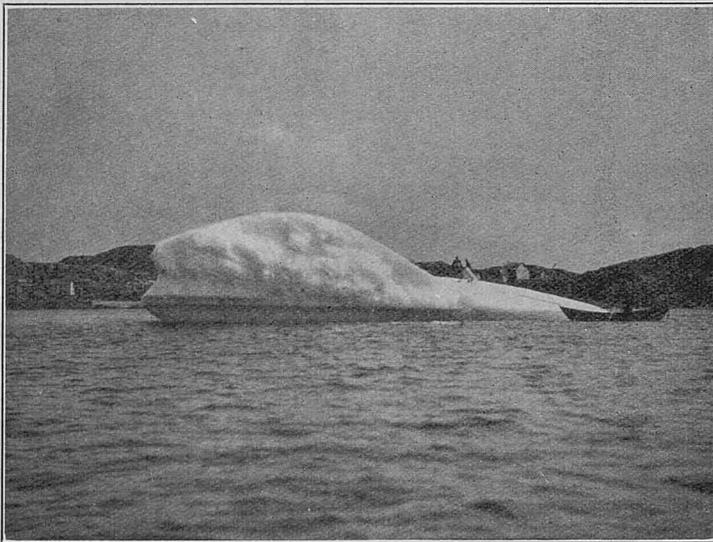
On the last day two charges of the high explosive Bermit was set off on the berg illustrated in photograph 5 which pulverized the ice surface a great deal. The second berg treated was a small one aground in Jenkins Cove in the harbour. Photograph 8 shows firing the charge on this mass. 500 pounds placed about 4 feet in the ice was

fired at sundown in order to allow the people of Twillingate an opportunity to see the spectacle of the burning and disrupting ice. The whole thing was a most wonderful sight when the mighty charge fired and roared, lighting up the iceberg and surrounding hills like Vesuvius in eruption. Flames and molten thermit and ice were shot upwards

100 feet or more by the explosion which followed. Much of this berg was disrupted, but the full effect of the big charge was lost into the air. As before, the real change in the berg did not take place until the next day, when most of the off side nearly through the thermit hole came away. For two days after, this berg continued to break away



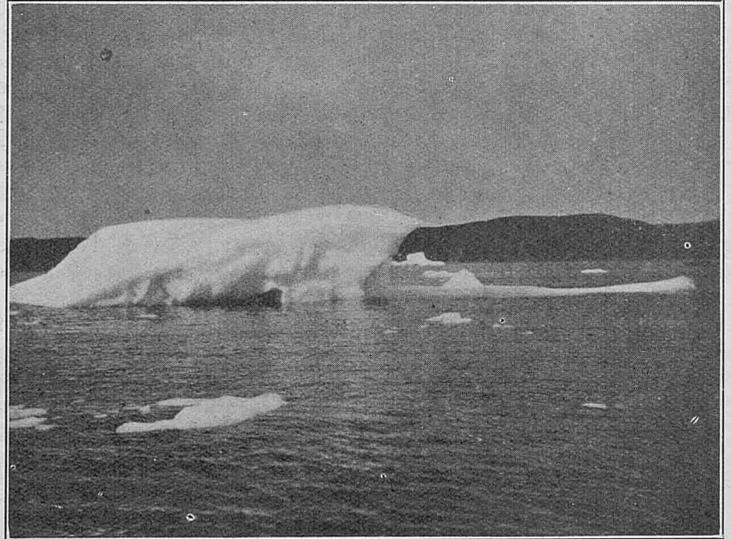
6. Second iceberg to be treated. Landing crew preparing for the charge.



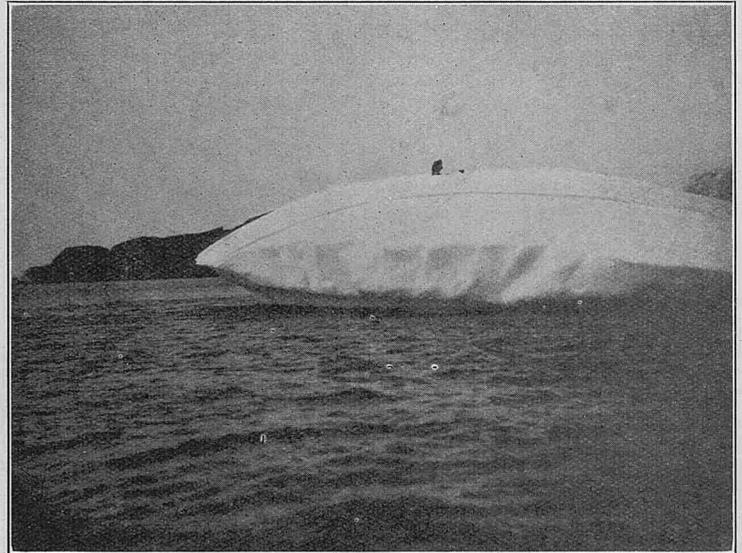
7. Dragging up the big can for a charge of thermit.



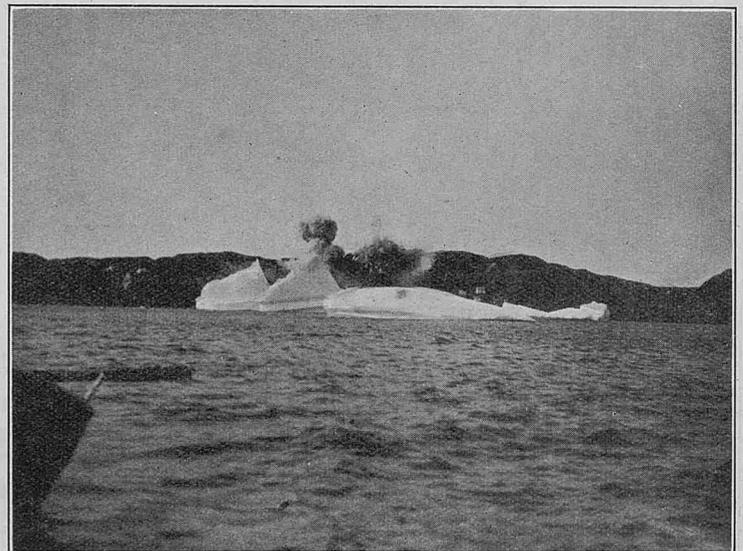
8. Explosion of ice due to 500 pounds of thermit.



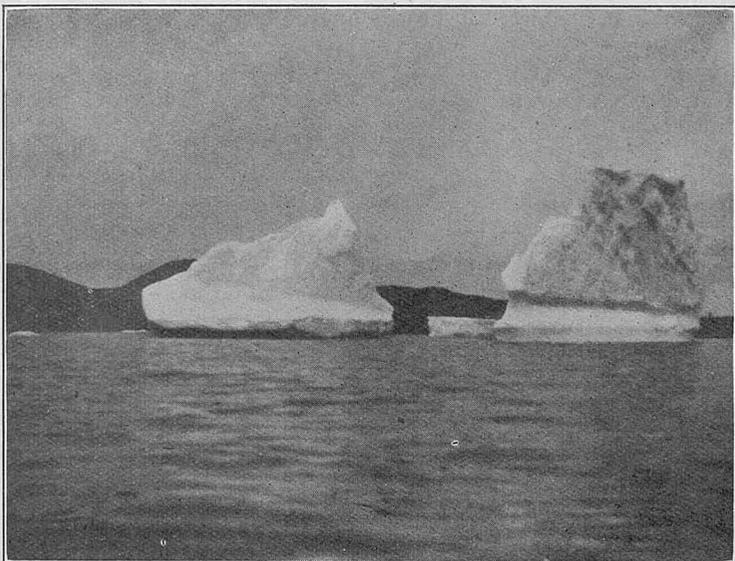
9. Broken iceberg the next morning going to pieces.



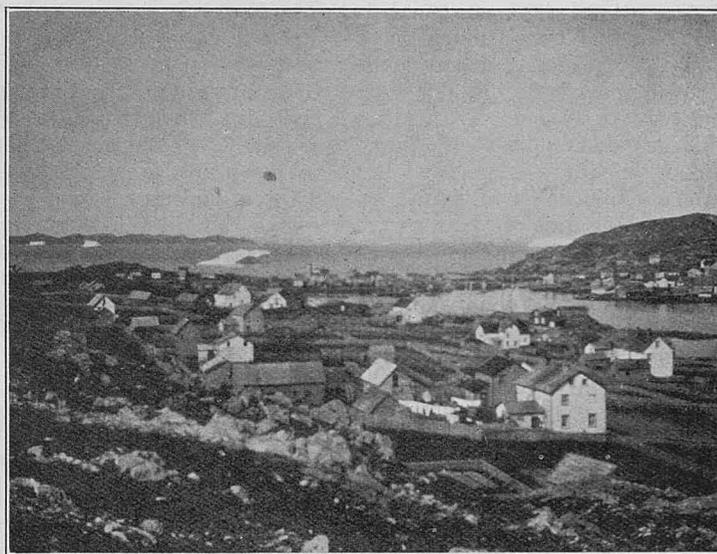
10. The last iceberg treated. Setting the fuse.



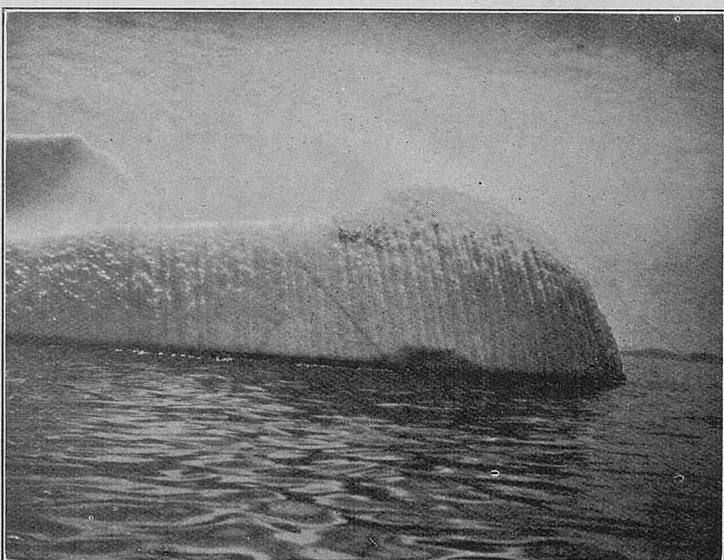
11. Explosion of the ice due to a 100 pound charge.



12. Berg gone the next day. Photo taken on site where the iceberg rested the evening before.



14. Twillingate Harbour with icebergs in distance.



13. Fragment found floating in vicinity proving the berg was broken up. Hole for thermit down on the water line.

and rolled from one side to the other shifting its position as it was lightened by breaking masses.

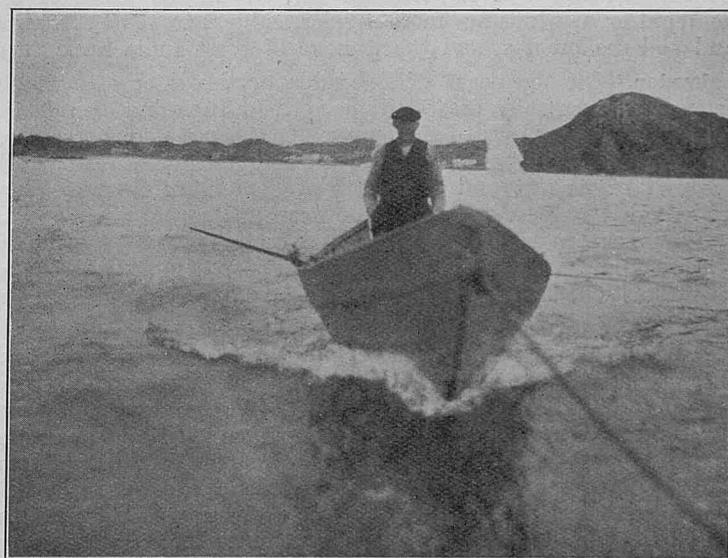
The third berg treated was a small one of the mushroom type outside the harbour but aground off the shore of the North Island. The berg was roughly 100 feet in diameter and almost round with a central cup shaped dome. On the summit of this were planted two charges of thermit, the first of 60 pounds and a second charge of 100 pounds. Explosions came in both cases but no visible sign of disrupting ice. On returning the next morning this berg could not be found for it had fallen away along the thermit hole becoming honey-combed with cracks. A floating fragment was identified by marks of the molten thermit and the hole blown out by the reaction which was now on the water line half hidden under the surface. Three other bergs close by were still in place.

There is no doubt of the disrupting action of the high temperature of the thermit and another time means shall be found to sink the charge down 50 or 100 feet into the ice, which can be easily done by means of a rock drill in a very few minutes. Indeed the bergs can be drilled from a boat without going on them where such is impracticable.

In regard to the chemical tests of the ice we have found several interesting points. In the first place the ice is white because of the air in the interstices in little bubbles that remind one of badly frozen artificial ice. This air has been pressed into the ice by the weight of the accumulating snowflakes over Greenland. When the ice is broken off from the glacier it weathers quickly from the heat of the sun all over its exposed surface to a depth of a few inches to several feet. Every piece of ice that falls off effervesces with a loud noise and some of our samples of air were collected in bottles directly in the seawater by



15. The chemist of the party bringing up fragments of ice to extract the air.



16. Landing dory, in tow.

inverting a full bottle and letting the air from the growlers displace the water in the bottle.

When pieces of this ice are placed in hot water they sound like frying bacon on account of the escaping air. It is interesting to record from our measurements that from 1/6th to 1/10th of the volume of an

iceberg consists of air, hence the density of a berg is such as to make it float out of the water much more than ordinary ice. Books on geography and Natural History should be corrected in the statement that 9/10ths of a berg is under water. It is not so at all, and many bergs float with as much as 1/3rd their mass out of water.

This air when analysed was found to be similar to our atmosphere and hence we can conclude that there has been no change in the air over the earth since these first snow-flakes were laid on the ice cap of Greenland thousands of years ago, before the time of the Egyptians.

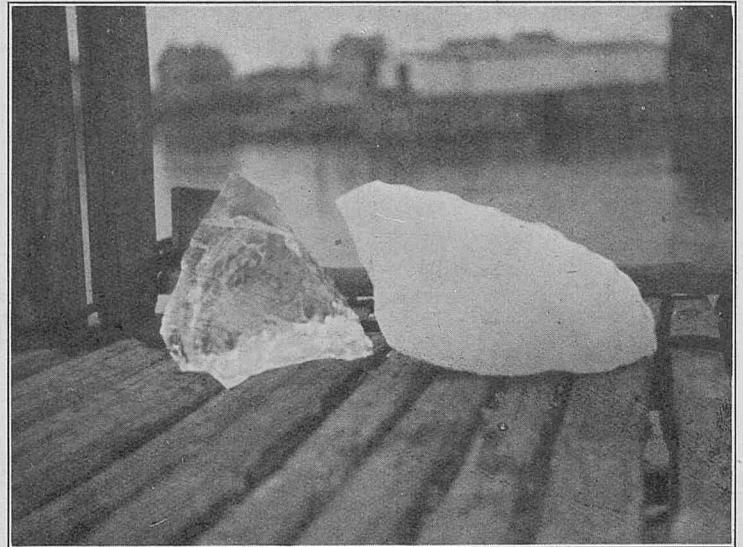
The colour of the blue veins in the bergs is wonderful and we found this due to the lack of air in these veins. The natural colour of ice is a deep blue but only when very pure. Small traces of foreign molecular matter give colours ranging from green to yellow and purple. The iceberg ice itself is of absolute purity, our measurements giving us less solid content than distilled water which means none at all, and hence it is easy to see how wonderful the deep blues of the berg are seen from these veins because these have been cracks in the glacier which have filled with melted icewater and refrozen, thereby eliminating all the air and leaving ice of the greatest purity. Careful colour photographs of these blue veins were taken, as well as the green ice, which is ice full of the air but not separated by weathering in the form of visible bubbles.

Many of the physical and chemical properties of icebergs have had to be omitted, but we hope that more work can be done next year, as soon as funds can be found.

Many various shapes of bergs were studied, but no berg keeps its shape for many days at a time and hence it is practically useless to invent distinctive names for icebergs, except in a general way. The following types have been recorded, however, and most of them photographed on this trip: mountainous, sugar loaf, island, hollow or

dry dock, twin, triplet, mushroom, animal cracker, pinnacled, castle, arched, knobby, skeleton, streaked, cavernous, man-of-war, dovecot, sandwich and growler.

Our party returned by the same route to Montreal and were thoroughly satisfied with the results.



17. Fragments of ice from iceberg. Left piece clear of air from blue veins. Right piece with air enclosed.

LOCAL WINDS, ATLANTIC OCEAN.

II.—EAST COAST OF NORTH AMERICA.

NORTHWARD of Latitude 30° to 35° N., in summer, the prevailing winds off the east coast of North America are dependent on the North Atlantic anticyclone centred near the Azores and the low mean pressure centred near the entrance to Davis Strait. In winter, the low pressure area is near Iceland and the direction of the wind is largely governed by the anticyclone situated over the central part of North America. The prevailing winds are, however, both in summer and winter, frequently interrupted by the changes in pressure particularly the passage of low pressure areas which often deepen considerably in their passage over the sea to the southward and eastward of Newfoundland where there are great differences in the temperature of the sea occasioned by the Gulf Stream and Labrador Current.

To the southward of Latitude 30° N., within the limits of the Trade Wind area, winds are more regular, subject to the alternation of land and sea breezes, and the passage of West India hurricanes.

Labrador.—On the coast of Labrador north-westerly to south-westerly winds generally prevail from April to June and also during the navigable season July to November. In August strong squalls of short duration blow from the northward and north-westward; while at the end of August and beginning of September thunderstorms occur, heralded by heavy clouds to the westward.

Gales, associated with low pressure areas on tracks to the southward, are frequent and very violent. They generally commence from an easterly direction, backing through north to north-west or west, and at times last two or three days.

Newfoundland.—On the east and south coasts of Newfoundland, westerly winds, which usually decrease in force at sunset, prevail throughout the greater part of the year; but frequent and rapid changes, both in direction and force, are experienced on all parts of the coast. In summer south-easterly winds are frequent and bring a great deal of fog; while winds from between west and north are generally accompanied by clear weather. At the entrances of most of the harbours, the wind is often very changeable in direction with frequent and violent squalls.

In Belle Isle Strait, the normal direction of the wind is either easterly or westerly through the Strait, whatever its direction outside.

Gulf and River of St. Lawrence.—In the Gulf of St. Lawrence easterly or south-easterly winds, which often persist for weeks, prevail in spring. Owing to the high land on either side of the river valley,

these south-easterly winds of the Gulf change their direction as they blow up the estuary, becoming E.S.E. between Anticosti and the south shore, E.N.E. above Point de Monts, and N.E.'ly above Green Island.

As the summer advances light south-westerly winds become more frequent and may be said to be the prevailing winds during the summer in all parts of the Gulf and River. After September winds from the northward of west become more common and in winter often blow with great force, accompanied by violent squalls of rain, snow or hail.

Nova Scotia and Bay of Fundy.—During the summer months, April to October, the prevailing winds are from south-west, while in winter strong northerly to north-westerly winds predominate. These winds are, however, often interrupted by the passage of depressions, in the same way as those of Newfoundland and the Gulf of St. Lawrence.

Gales do not often occur in early summer, but during the West India hurricane season, the tracks of those storms occasionally pass over Nova Scotia or New Brunswick causing gales of great strength.

In the Bay of Fundy the S.W. winds of summer bring a great deal of fog, while north-westerly winds are associated with dry clear weather.

United States Coast, Maine to Florida.—From Maine to Cape Hatteras the winds in general are very changeable at all seasons, but the prevailing direction in summer is from the S.W. and in winter from between N.W. and N.E. There are frequent storms in winter, usually commencing from S.E. and accompanied by rain and a falling barometer. Later the wind either backs through N.E. to N.W. or veers through S.W. to N.W. according to whether the track of the depression crosses to the southward or northward of the observer's position. South-easterly or easterly winds in spring and summer are generally accompanied by dense fogs, which clear if the wind veers to S.W. or comes off the land.

From Cape Hatteras to Florida winds are generally south-westerly, except from September to February, when they are north-easterly. Severe and sudden squalls from the N.W. with thunder, are common during the summer months; but the principal disturbing influence on the winds of this coast is that the ordinary track of the West India hurricanes lies along the coast. Gales are experienced during the winter due to the passage of depressions centred to the northward, the wind veering from south through West to N.W.

Florida Strait lies within the region of the north-east trades, but these winds do not blow with the same regularity over the Strait as over the open ocean. The prevailing winds are, however, from the eastward during the whole year, being from S.E. in summer and from N.E. in winter. The Strait is liable to violent hurricanes during the West India hurricane season, while in winter heavy "Northers" are frequent.

Gulf of Mexico.—In the Gulf of Mexico and in a less degree off the coast of Central America as far east as Colon, there occur between the months of October and April sudden and generally violent winds from a northerly direction, which are associated with the continental anticyclone, and are known as "Northers." The principal characteristics of the northers are the suddenness of their approach, the frequent absence of the ordinary signs of bad weather (the barometer being scarcely any guide) and the great fall of temperature that invariably accompanies them. They blow most frequently from November to February, with intervals of from four to six days between them. They commence with the appearance of dark masses of cloud in the west, followed by the wind coming from that direction, which soon reaches the force of a strong gale. The wind quickly veers to N.W. and N., with clear weather, and may remain between these points for two or three days, after which it will veer to N.E. and blow itself out.

On the west coast of Florida, during the summer, the trade wind blows from S.E. during the morning followed by a sea breeze from a S.W.'ly direction during the afternoon. In autumn and winter, north-westerly to north-easterly winds prevail, which as the spring advances become gradually more easterly, until with the approach of summer they assume a south-easterly direction.

On the Alabama and Louisiana coasts the trade wind from a N.E.'ly to S.E.'ly direction prevails during the day, from April to July; and towards evening veers to S.W. These S.W.'ly winds are very squally during the hurricane season, from August to October, and are known as "Virazones." From November to March northerly gales may be expected.

From Galveston to Tampico, during the summer, the trade wind blows freshly from S.S.E. to S.E. during the day; while a land breeze, called the "Terral" blows generally from about midnight to 9 a.m. In winter N.'ly and N.N.W.'ly winds prevail, interrupted from time to time by S.E.'ly winds.

On the coast of Vera Cruz the trade wind from E.S.E. to E. prevails from March to September, interrupted at times from the middle of May until the end of July by calms, with thick weather, and occasionally by short but severe squalls. At night the wind usually comes off the land from S. to S.W. Should the land breeze come from N.W. accompanied by drizzling rain, it is usually followed next day by N.'ly

to N.E.'ly winds, known locally as "Vendavales," which extend 60 to 90 miles from the coast. Squalls occur most frequently from July to October, the heaviest squalls coming from the East. During the months October to February, the trade wind is interrupted by "Northers."

On the coast of Yucatan, between Cape Catoche and Campeche, the North-east trade generally prevails, but is interrupted during the dry season, October to April by "Northers." Sea and land breezes are experienced, the sea breeze setting in gradually from between N.N.W. and N.E. at about 10 or 11 a.m., and blowing freshly by noon. Between 4 p.m. and sunset, it veers round to the eastward, and by midnight the land wind is blowing moderately from the S.E., continuing from that direction until the morning, when it falls calm, and is followed again by the sea breeze. These changes in direction extend to a distance of 40 miles off shore. In June, however, within 8 or 9 miles of the coast, the land wind will sometimes come off in a heavy squall during the afternoon, but it seldom lasts long.

Central America.—On the east coast of Yucatan the N.E. trade prevails from February to May; from June to August the wind is more southerly, but at times blows freshly from a westerly direction. From September to February westerly winds with frequent rain squalls prevail, while from November to February northerly gales are experienced.

On the coast of the Republic of Honduras the regular trade wind prevails from January to June, but is liable to interruption from "Northers" during January and February. From July to September the wind generally comes from the S.E., with calms and heavy squalls from S.W.; while from October to December the winds blow from between S.W. and N.W. frequently with heavy gales from these directions or from north.

On the Mosquito Coast during the dry season December to May, the N.E. trade blows practically the whole time; while during the rainy season June to November S.E.'ly winds prevail. The weather at this season is extremely uncertain; the wind is generally fresh, and often heavy squalls from S.W. are experienced, with torrential rain, thunder and lightning.

On the Panama coast from March to June, within a few miles of the shore, land and sea breezes alternate, the former generally preponderating, and coming off from S.W. and West, not directly from the land. In the later months of the year fresh westerly winds prevail, while between November and February, "Northers" occasionally reach this coast, although their force is considerably modified after passing to the southward of the islands off the Mosquito Coast.

(To be continued.)

WEATHER SIGNALS.

II. WIRELESS WEATHER SIGNALS.

WIRELESS WEATHER BULLETINS.
PORTUGAL.

Containing observations from Madeira and Azores.

C.W. Issues.

Monsanto W/T Station, approximate Latitude 38° 44' N., Longitude 9° 11' W., call sign CTV, broadcasts weather bulletins in code at the following times:—

0835 G.M.T. (containing observations of 0700 G.M.T., taken at the undermentioned stations, and also ships' observations).

1435 G.M.T. (containing observations of 1300 G.M.T. taken at the undermentioned stations, and also ships' observations).

1935 G.M.T. (containing observations of 1800 G.M.T. taken at the undermentioned stations, and also ships' observations).

Wavelength 3,000 metres C.W.

Indicator Figures.	Stations.	Position (Approx.)	
		Lat.	Long.
01	Oporto	41° 12' N.	8° 43' W.
02	Coimbra	40° 12' N.	8° 25' W.
03	Burlings Lt.	39° 25' N.	9° 30' W.
04	Lisbon	38° 44' N.	9° 11' W.
05	St. Vincent Lt.	37° 01' N.	9° 00' W.
06	Faro	37° 01' N.	7° 56' W.

Indicator Figures.	Stations.	Position (Approx.)	
		Lat.	Long.
07	S. Lorenzo	32° 43' N.	16° 39' W.
08	Pargo	32° 48' N.	17° 16' W.
09	P. Delgada	37° 44' N.	25° 40' W.
10	Angra	38° 39' N.	27° 14' W.
11	Horta	38° 32' N.	28° 38' W.
12	Flores	39° 27' N.	30° 08' W.
13	Alverca	38° 54' N.	9° 01' W.

The bulletins are divided into two parts, Part I containing the land stations' observations, and Part II those from ships. They commence with the words "Météo Portugal." Code used, New International.

0835, 1435 and 1935 G.M.T. bulletins.

Expressed by symbols as follows:—

Part I.—InIn BBBDD FwwTT cbWVH followed by three groups which refer to observations of cloud, rainfall and swell.

InIn = Indicator figures of observation station.
BBB = Barometric pressure (corrected) in millimetres and tenths initial 7 omitted. To convert to mbs. and ins. see Table XV, p. 57, Vol. IV, No. 39, of this Journal.

DD = Wind direction, true, from Table III, p. 19, Vol. IV, No. 37, of this Journal.

F = Wind force by Beaufort scale.

ww = Present weather, from Table V, p. 19, Vol. IV, No. 37, of this Journal.

- TT = Air temperature in whole degrees Centigrade. To convert to Faht., see Table XVII, p. 58, Vol. IV, No. 39, of this Journal.
- c = Characteristic of barometer tendency during the 3 hours previous to the time of observations, Table XXVI.
- b = Amount of barometric tendency during the 3 hours previous to the time of observations, in half-millimetres.
- W = Past weather, from Table XI, p. 21, Vol. IV, No. 37, of this Journal.
- V = Visibility from Table XX, p. 58, Vol. IV, No. 39, of this Journal.
- H = Humidity of the air, Table XXVII.

Part II.—Ships' observations, preceded by the word "Navires"—PQLLL 111GG BBDDF wvwKd. For meanings and method of decode of these symbols, see groups 1-4 and named "International Weather," of "Decode Form" p. 18, Vol. IV, No. 37, of this Journal. Barometric pressure is given in whole millimetres, initial 7 omitted. (See Table XVII, p. 58, Vol. IV, No. 39, of this Journal to convert to mbs. and ins.)

Monsanto W/T Station also transmits a weather message at 1130 and 2300 G.M.T. *en clair*, in Portuguese and English, on a wavelength of 1,000 metres (spark) and 2,400 metres (R/T), giving:—

A statement of weather conditions and also a forecast for the next 24 hours for the coast of Portugal, Azores, Madeira, Straits of Gibraltar and the Bay of Biscay.

MEDITERRANEAN SEA (WESTERN PORTION).

C.W. Issue—Land Stations' and Ships' Observations.

Marignane W/T Station, approximate Latitude 43° 27' N., Longitude 5° 13' E., call sign FNM, transmits weather bulletins in code at 0840, 1440 and 1940 G.M.T. on a wavelength of 1,525 metres (C.W.). The bulletins are in two parts.

Part I, commences with the words "Météo Méditerranée," and contains the 0700, 1300 and 1800 G.M.T. observations respectively of the following land stations:—

Indicator Figures.	Station.	Position (Approx.)	
		Lat.	Long.
022	Genoa	44° 23' N.	8° 55' E.
030	Mahon	39° 54' N.	4° 16' E.
047	Oran	35° 42' N.	0° 41' W.
049	Malta	35° 53' N.	14° 31' E.
053	Bizerta	37° 16' N.	9° 52' E.
064	Barcelona	41° 23' N.	2° 09' E.
086	Valencia	39° 28' N.	0° 22' W.
087	Cap Béar	42° 32' N.	3° 05' E.
088	Cette	43° 25' N.	3° 40' E.
089	Montpelier	43° 37' N.	3° 59' E.
090	Marignane	43° 27' N.	5° 13' E.
091	Toulon	43° 07' N.	5° 53' E.
092	Antibes	43° 35' N.	7° 07' E.
093	I. du Levant	43° 05' N.	6° 30' E.
094	Cuers	43° 15' N.	6° 01' E.
095	Ajaccio	41° 55' N.	8° 44' E.
096	Cap Corse	43° 01' N.	9° 25' E.
097	Iles Sanguinaires	41° 52' N.	8° 36' E.
098	Pertusato	41° 22' N.	9° 11' E.
099	Algiers	36° 45' N.	3° 03' E.
100	Cap Falcon	35° 47' N.	0° 48' W.
101	Croisette	43° 14' N.	5° 21' E.
102	St. Raphael	43° 25' N.	6° 45' E.
103	Tarente	40° 28' N.	17° 15' E.
105	Tunis (El Aouina)	36° 46' N.	10° 10' E.

Code used:—Mostly New International, expressed by symbols as follows:—

I_nI_nI_n BBDDF PTTcN bbSV₁

- I_nI_nI_n = Indicator figures of observation station.
- BB = Barometric pressure (corrected) in whole millibars, initial 9 or 10 omitted. To convert to ins., see Table XIII, p. 21, Vol. IV, No. 37, of this Journal.
- DD = Wind direction, true, from Table III, p. 19, Vol. IV, No. 37 of this Journal.
- F = Wind force by Beaufort scale.
- P = Present weather. Table XXIX.
- TT = Air temperature in whole degrees Centigrade. To convert to Faht. see Table XVII, p. 58, Vol. IV, No. 39 of this Journal.

- c = Characteristic of barometer tendency during 3 hours previous to observation from Table XXVI.
- N = Cloud amount from Table X, p. 21, Vol. IV, No. 37 of this Journal.
- bb = Amount of barometric tendency during 3 hours previous to observation in half millibars.
- S = State of the sea and swell, Table XXVIII.
- V₁ = Visibility seawards, from Table XX, p. 58, Vol. IV, No. 39 of this Journal.

Part II, ships' observations, 0840 and 1440 G.M.T., bulletins only, commences with the word "Navires"; code used mostly New International, expressed by symbols as follows:—

PQLLL 111GG BBDDF PP₁VSN A₁nA₂bb

in which the first three groups have the same meanings as Groups 1 to 3 of that part named "International Weather" on the "Decode Form," p. 18, Vol. IV, No. 37 of this Journal.

Remaining groups as follows:—

- P = Present weather. Table XXIX.
- P₁ = Past weather. Table XXIX.
- V = Visibility, from Table XX, p. 58, Vol. IV, No. 39 of this Journal.
- S = State of sea and swell. Table XXVIII.
- N = Cloud amount. Table X, p. 21, Vol. IV, No. 37 of this Journal.
- A₁ = Form of low cloud. Table XXX.
- n = Amount of low cloud.
- A₂ = Form of upper cloud. Table XXXI.
- bb = Barometer tendency during 3 hours previous to observation in half millibars, 50 being added when the tendency is negative.

- NOTE.—(1) Missing observations from land stations are replaced by X's.
- (2) When there are no ships' observations for transmission the words "Navires Nil," will be sent.

EGYPT.

Containing European Land Stations' observations.

C.W. Issue.

Ismalia W/T Station, Latitude 30° 36' N., Longitude 32° 15' E., Call Sign GHK, broadcasts a weather bulletin in code at 1100 G.M.T., containing observations made at the following stations:—

Wavelength 5,400 metres (C.W.).

Indicator Figures.	Station.	Lat. Long.	
		N.	E.
		(approximate).	
02	Aboukir	31° 18'	30° 06'
03	Amman	31 57	35 57
05	Heliopolis	30 05	31 22
07	Abu-Sueir	30 35	32 09
11	Ramleh	31 53	34 53
12	Baghdad	33 17	44 29
13	Mosul	36 20	43 08
14	Shaibah	30 26	47 41
18	Ramadi	33 25	43 17
19	Kirkuk	35 28	44 22
28	Sollum	31 34	25 12
32	Q. Gebali	29 20	30 38
37	Tor	28 13	33 37

Observations of 0600 G.M.T.

Observations from selected stations in the following list are also broadcast:—

Indicator Figures.	Station.	Lat. Long.	
		N.	E.
		(approximate).	
24	Candia	35° 20'	25° 08'
26	Limassol	34 41	33 04
27	Siwa	29 12	25 29
29	Mersa Matruh	31 22	27 14
33	Asyut	27 11	31 13
34	Aswan	24 02	32 53
39	Haifa	32 48	34 59

Observations of 0600 G.M.T.

Indicator Figures.	Station.	Lat. N.	Long. E.	(approximate).
21	Malta	35° 53'	14° 31'	} 0700 G.M.T.
22	Rome	41 54	12 27	
23	Kiev	50 27	30 30	
25	Athens	37 57	23 43	} 0700 Local Time (Russian).
30	Koursk	51 45	36 12	
35	Sevastopol	44 37	33 31	} 0600 G.M.T.
36	Odessa	46 29	30 44	
38	Tzaritzyn	48 42	44 31	
41	Kerch	45 21	36 29	
42	Stavropol	45 03	41 39	
47	Batoum	41 40	41 38	
49	Petrovsk	43 00	47 30	
50	Baku	40 21	49 51	
58	Krasnovodsk	40 00	52 59	
59	Askhabad	37 57	58 23	
61	Tunis	36 46	10 10	} 0700 Local Time (Russian).
62	Bizerta	37 16	9 52	
63	Sfax	34 44	10 45	
64	London	51 21	0 07W.	
65	Paris	48 56	2 26E.	
66	Prague	50 05	14 26E.	
67	Bordeaux	44 50	0 42W.	
68	Lyons	45 45	4 55E.	
69	Budapest	47 29	19 03	
70	Perpignan	42 43	2 54		} 0700 G.M.T.
71	Milan	45 28	9 11	
72	Zagreb	45 49	15 58	
73	Belgrade	44 47	20 28	
74	Bucharest	44 25	26 05	
75	Genoa	44 23	8 55	
76	Florence	43 47	11 14	
77	Ancona	43 37	13 31	
78	Sofia	42 42	23 20	
79	Maddalena	41 15	9 25	
80	Taranto	40 28	17 15	} 0700 G.M.T.
81	Corfu	39 35	19 55	
82	Messina	38 12	15 33	} 0600 G.M.T.
83	Tripoli	32 54	13 12	
84	Benghasi	32 05	20 06	} 0700 G.M.T.

Code. New International, in two five-figure groups for each station, expressed by symbols as follows:—

$l_n l_n$ BBB DDFww

where

- $l_n l_n$ = Indicator figures of observation station.
- BBB = Barometric pressure (corrected) in millibars and tenths, initial 9 or 10 omitted.
- DD = Wind direction, true, from Table III, p. 19, Vol. IV, No. 37 of this Journal.
- F = Wind force by Beaufort scale.
- ww = Present weather, from Table V, p. 19, Vol. IV, No. 37, of this Journal.

NEW INTERNATIONAL CODE, WEATHER TELEGRAPHY TABLES.

Table XXVI.

c.—Characteristic of Barometer tendency during last 3 hours.

Code Figure.	Description	Interpretation
0 = 0 or +	Steady or rising	} The barometer is now higher than, or the same as, 3 hours ago.
1 = + 0	Rising then steady	
2 = + -	Rising then falling	
3 = - + or 0 +	Falling or steady then rising	
4 = Unsteady +	Unsteady but rising	} The barometer is now lower than, or the same as, 3 hours ago.
5 = -	Falling	
6 = - 0	Falling then steady	
7 = - +	Falling then rising	
8 = 0 - or + -	Steady or rising then falling.	
9 = Unsteady -	Unsteady but falling	

Table XXVII.

H.—Relative humidity.

Code Figure.	Relative Humidity
0	95 to 100 per cent.
9	90 „ 94 „
8	80 „ 89 „
7	70 „ 79 „
6	60 „ 69 „
5	50 „ 59 „
4	40 „ 49 „
3	30 „ 39 „
2	20 „ 29 „
1	10 „ 19 „

Table XXVIII.

S.—State of Sea and Swell (Coast Stations).

Code Figure.	State of Sea and Swell
0	No swell
1	Moderate swell
2	Heavy swell
3	No swell
4	Moderate swell
5	Heavy swell
6	Rather rough sea.
7	Rough sea.
8	Very rough sea.
9	Mountainous sea.

SPECIAL WEATHER TELEGRAPHY TABLES, NOT NEW INTERNATIONAL CODE

Table XXIX.

P Present Weather, or P₁ Past Weather.

Code Figure.	Description
0	Present weather determined by amount of cloud.
1	Continuous rain or drizzle.
2	Continuous snow.
3	Rain showers, intermittent rain or hail showers.
4	Snow showers.
5	Thunderstorm (with or without squall).
6	Squall (or line squall), or rain and hail, or heavy rain showers.
7	Squall, wind very strong at or near the surface.
8	Thick mist or fog; visibility below 1,000 metres (1,100 yards).
9	Mist or fog of appreciable vertical thickness.

Table XXX.

A₁—Form of Low Cloud.

Code Figure.	Description
0	No low cloud.
1	St. or Fr.-St. or both
2	Cu. or Fr.-Cu. or both.
3	St. and Cu. or St. and St. Cu.
4	St.-Cu alone.
5	Nb. and Cu.
6	Cu.-Nb. and Cu.
7	Nb. and Cu.-Nb.
8	Cu.-Nb. alone.
9	Nb. alone.

Table XXXI.

A₂—Form of Upper Cloud.

Code Figure.	Description
0	No high or middle cloud observable.
1	Ci. alone.
2	Ci.-Cu. alone or Ci.-Cu. and Ci
3	Ci.-St. alone or Ci.-St. and Ci.
4	Cirro-cloud and A.-Cu.
5	Cirro-cloud and A.-St.
6	Cirro-cloud and A.-Cu. and A.-St.
7	A.-Cu. alone visible.
8	A.-Cu. and A.-St.
9	A.-St. (uniform, or alone visible).

WIRELESS STORM WARNINGS.

MEDITERRANEAN SEA (WESTERN PORTION).

Oran-Ain-el-Turck, Algeria, W/T Station, approximate Latitude 35° 45' N., Longitude 0° 45' W., call sign FUK, broadcasts storm warnings when necessary at 1400 G.M.T. on a wave length of 1,350 metres (spark). The direction of the centre of the cyclonic depression is transmitted *en clair*.

Marignane W/T Station broadcasts storm warnings when necessary on a wavelength of 1,525 metres (C.W.).

III. WIRELESS TIME SIGNALS.

PORTUGAL.

Spark and C.W. Issues.

Monsanto W/T Station, Latitude 38° 43' 47" N., Longitude 9° 11' 17" W., call sign CTV, broadcasts time signals three times daily

according to the following procedure :—

(1) Wavelength 600 metres (spk.).

G.M.T.		Signal.
h m s	h m s	C.Q. Time Signal from Lisbon Observatory (in Portuguese).
9.28.00 to	9.28.39	--- (MST) repeated 12 times.
9.29.32	9.29.37	---
9.29.40	9.29.46	. . . . .
9.29.50	9.29.57	---
9.30.00		. (Time signal).

(2) Wavelength 3,070 metres (C.W.).

G.M.T.		Signal.
h m s	h m s	C.Q. Time Signal from Lisbon Observatory (in Portuguese).
9.38.00 to	9.38.39	--- (M.S.T.) repeated 12 times.
9.39.32	9.39.37	---
9.39.40	9.39.46	. . . . .
9.39.50	9.39.57	---
9.40.00		. (Time Signal).

(3) Wavelength 3,000 metres (C.W.).

G.M.T.		Signal.
h m s	h m s	C.Q. Time Signal from Lisbon Observatory (in Portuguese).
9.59.00 to	9.59.49	--- (MST) (repeated 15 times).
10.00.00	10.04.59	A series of continuous dots at every second, omitting the 60th.
10.05.00		. (Time signal).
10.06.00	10.10.59	A series of continuous dots at every second, omitting the 60th.
10.11.00		. (Time signal).
10.12.00	10.16.59	A series of continuous dots at every second, omitting the 60th.
10.17.00		. (Time signal).

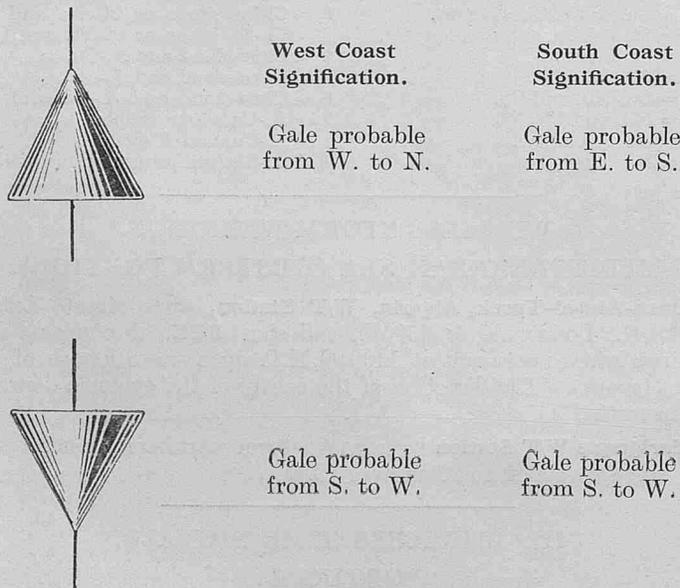
The above time signal is not broadcast without previous warning.

NOTE.—The time signals are controlled from Lisbon Observatory (Latitude 38° 42' 30.5" N., Longitude 9° 11' 10.2" W.). The duration of a dot = 1/7 sec. and that of a dash 3/7 sec.

IV. VISUAL GALE WARNINGS.

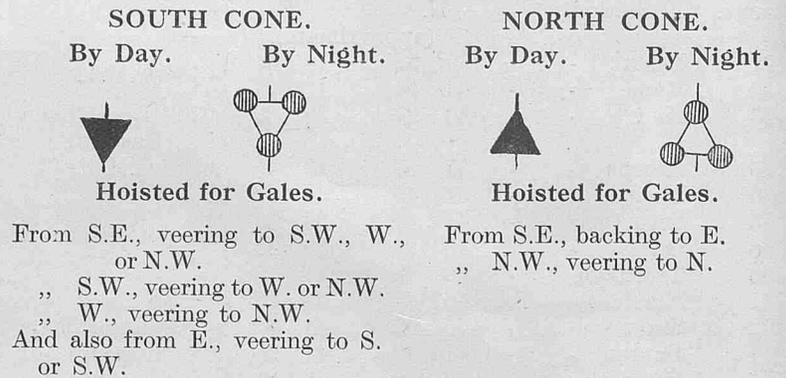
PORTUGAL, WEST AND SOUTH COASTS.

The following system of storm signals is in use at semaphore stations and port offices on the coast of Portugal :—

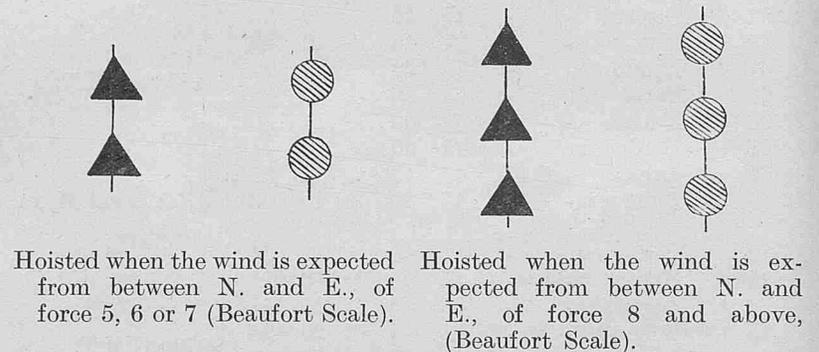


By night, at the port offices, the cone is replaced by three red lights in the form of a triangle.

MALTA.



MODERATE "GREGALE."		STRONG "GREGALE."	
By Day.	By Night.	By Day.	By Night.



When one of these signals is hoisted it indicates that information has been received by the station exhibiting the signal, that a gale or "gregale" is expected in the vicinity of Malta.

Station :—Castille Signal Station.



GREAT BRITAIN AND IRELAND—AMENDMENT.

Wireless Gale Warnings.

To come into force May 1, 1927.

PAGE 41, VOLUME IV, No. 38—"Wireless Gale Warnings Spark Issues." Delete 16th, 17th and 18th lines from bottom and substitute :—

Should the warning be broadcast during the period when one-operator ships do not keep watch it will be repeated in the next watch-keeping period for one-operator ships at either of the following times :—

- | | |
|----------------------|-----------------------------------|
| Wick - | } 0800, 1200, 1600 or 2000 G.M.T. |
| Land's End - | |
| Seaforth - | |
| Malin Head - | |
| Cullercoats - | } 0818, 1218, 1618 or 2018 G.M.T. |
| Niton - | |
| Fishguard - | |
| Valentia (Ireland) - | |

Gale warnings broadcast at 0800, 0818, 2000 or 2018 G.M.T. will follow the navigational warning, if one is broadcast.

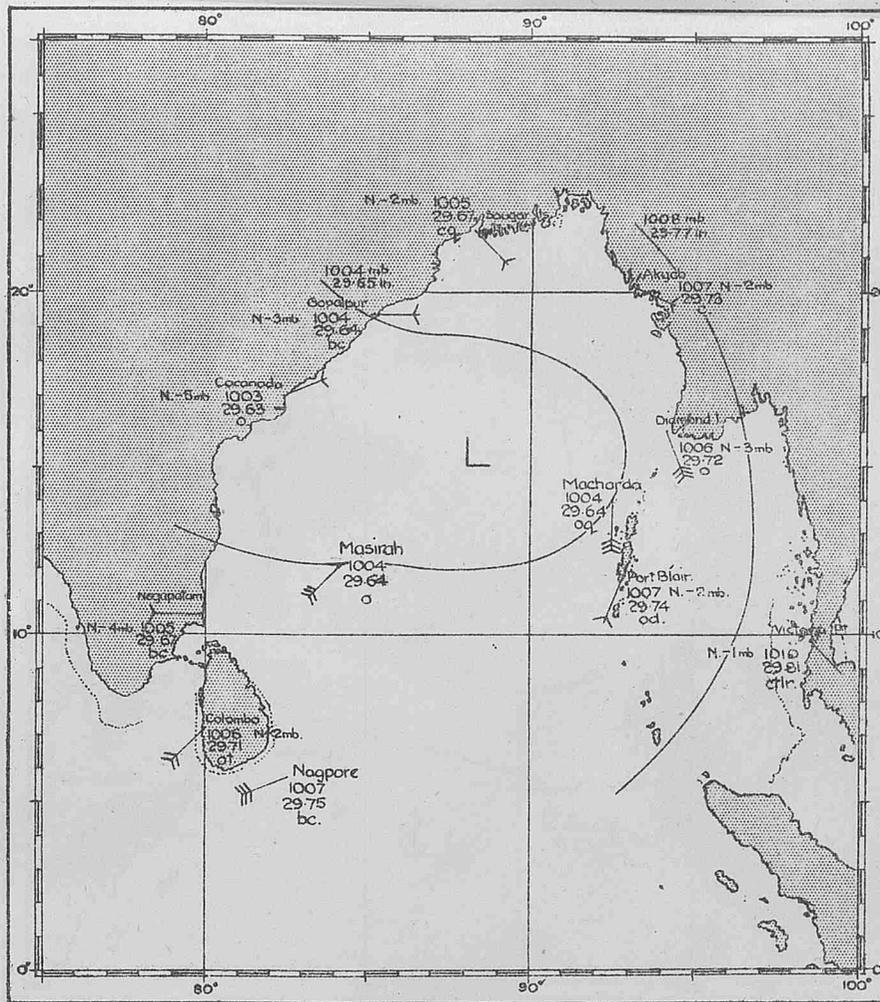


Chart XIX.—“Wireless and Weather.”

Weather Chart, Morning of May 3rd, 1923.

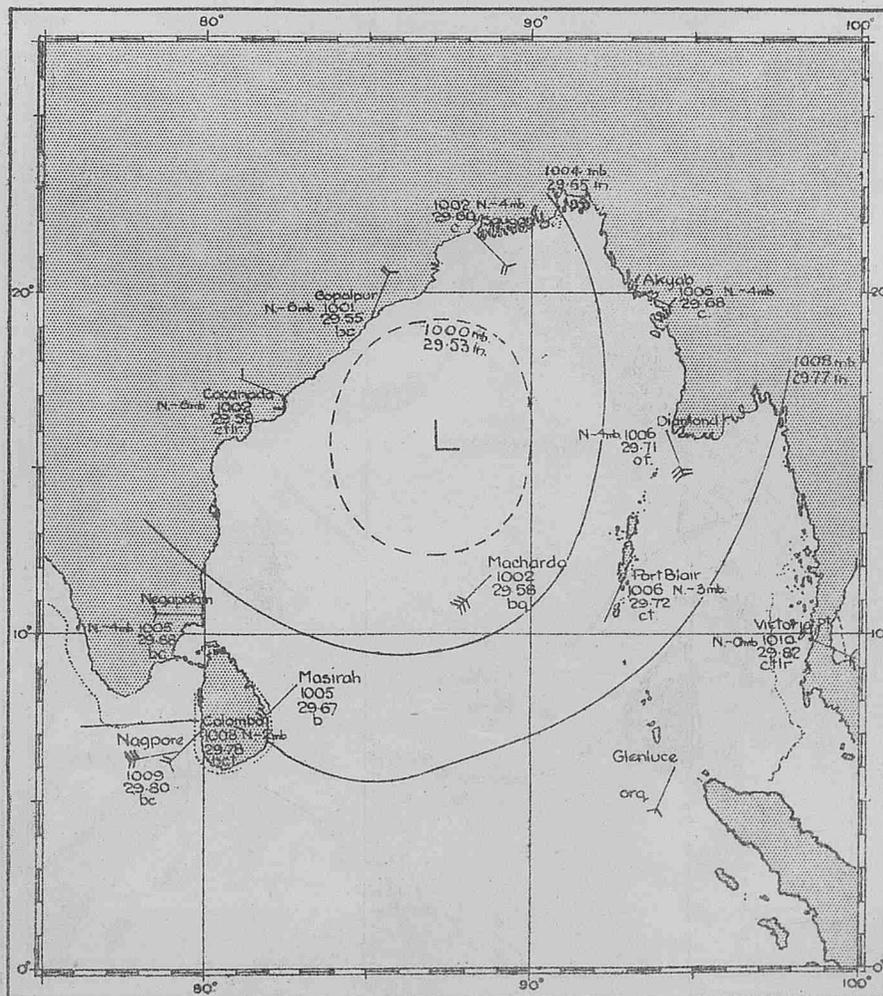


Chart XX.—“Wireless and Weather.”

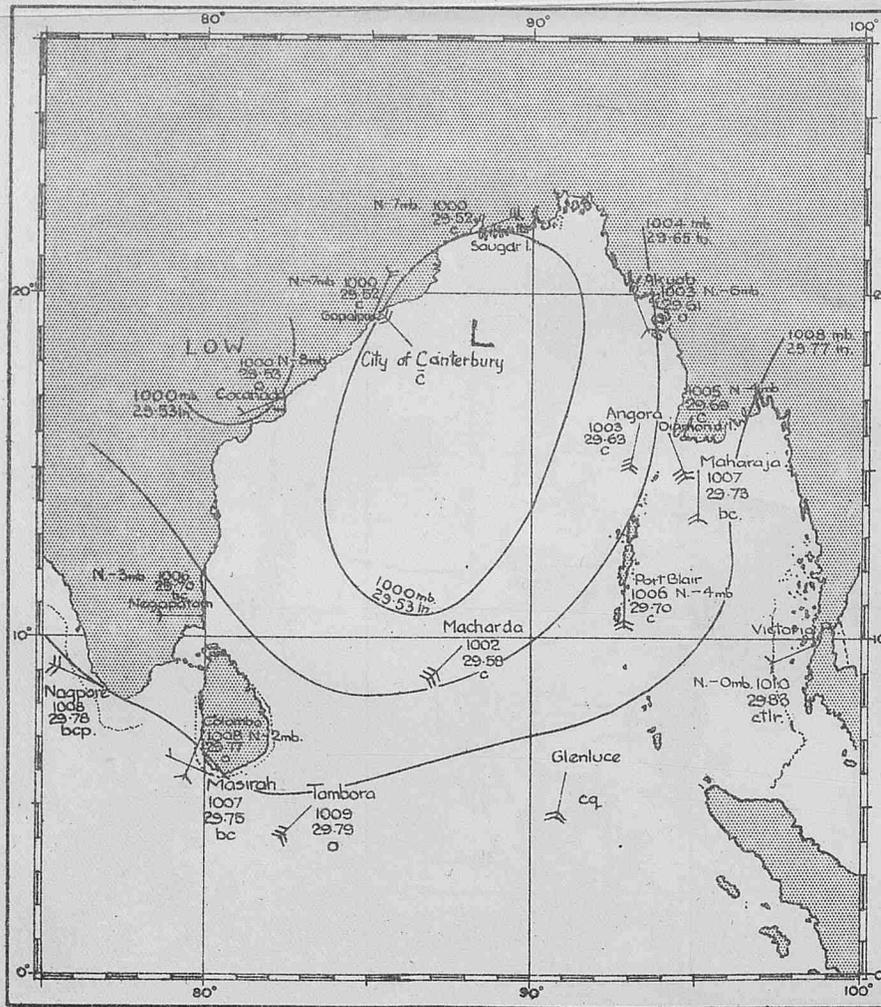


Chart XXI—"Wireless and Weather."

Weather Chart, Morning of May 5th., 1923.

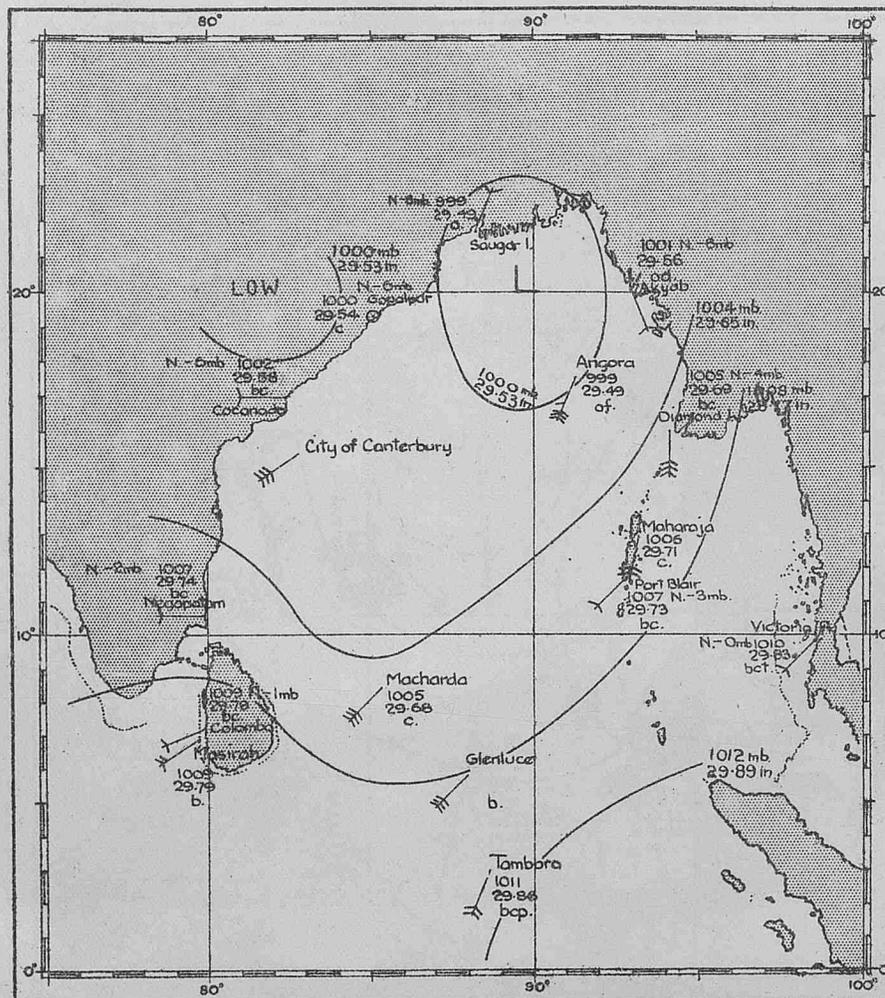


Chart XXII—"Wireless and Weather."

Positions with bearings and distances from "Okara."

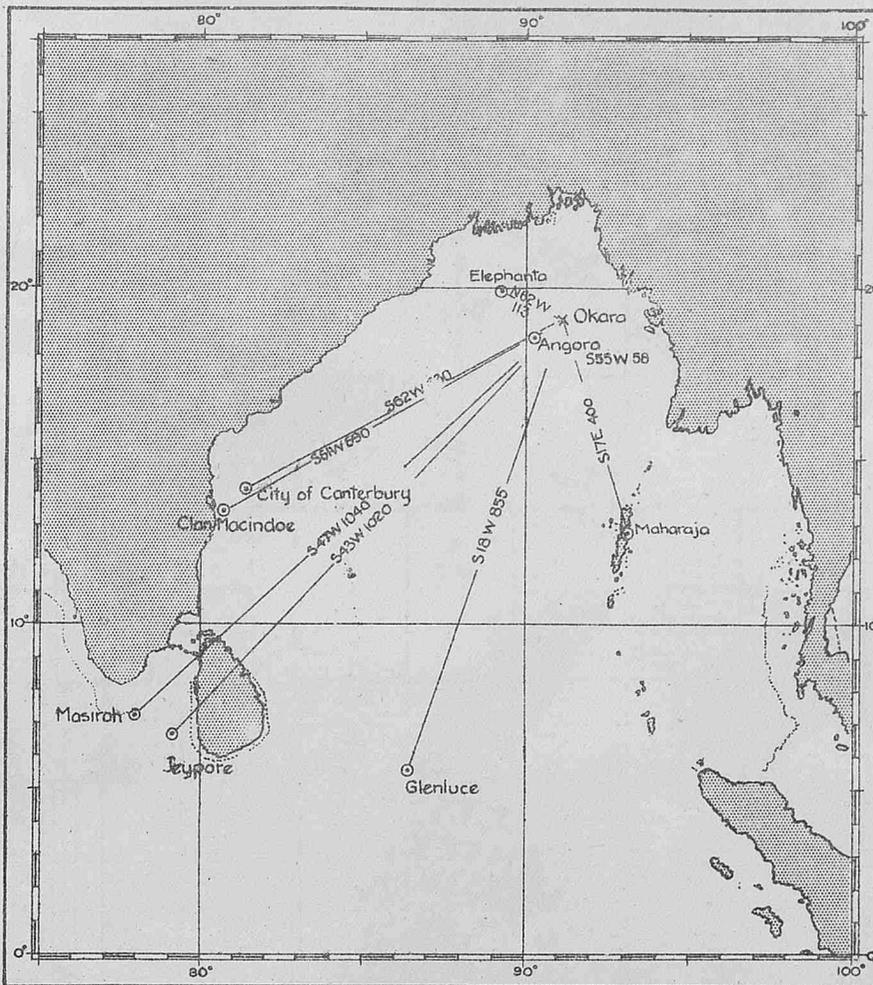


Chart XXIII—"Wireless and Weather."

Weather Chart, Morning of May 6th, 1923.

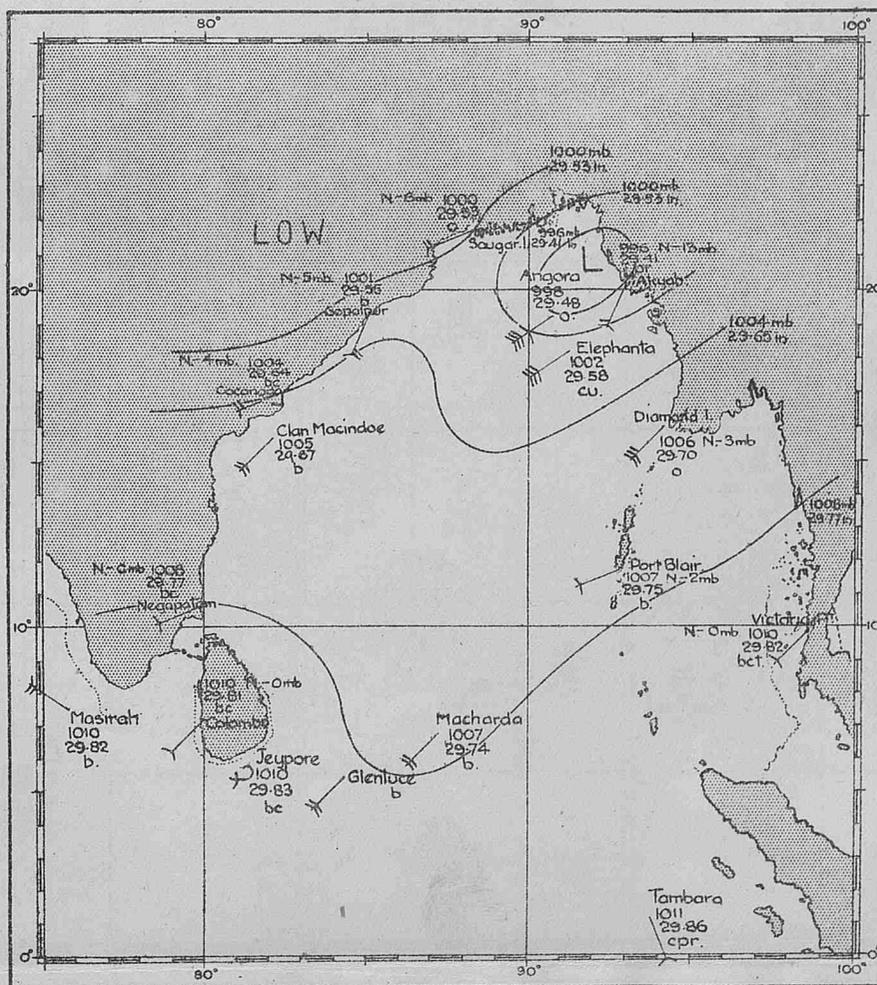


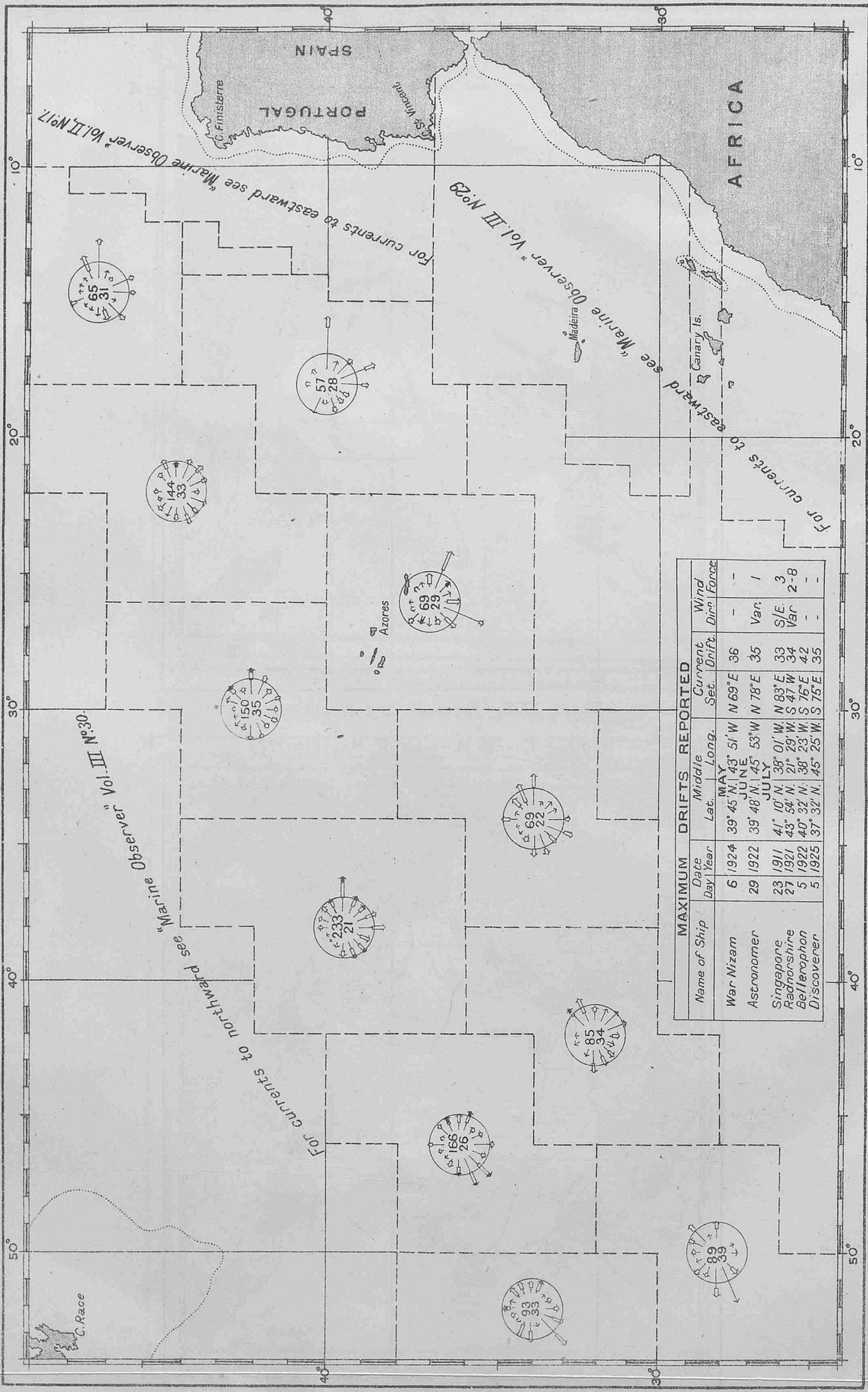
Chart XXIV—"Wireless and Weather."

CURRENTS ON THE TRACKS TO AND FROM THE WEST INDIES AND PANAMA.
(EASTERN PORTION)

Vol. IV. No. 41.

MAY, JUNE, AND JULY.

Observations of ships regularly observing for British Meteorological Office 1910-1925.



EXPLANATION OF CURRENT ROSES

The current roses are drawn from observations within the pecked lines.
 Arrows flow with the current, length represents frequency, thickness strength.

6-12 miles per day
 13-24 " " " " " "
 25-48 " " " " " "
 49-72 " " " " " "
 73 " " " " " " and above

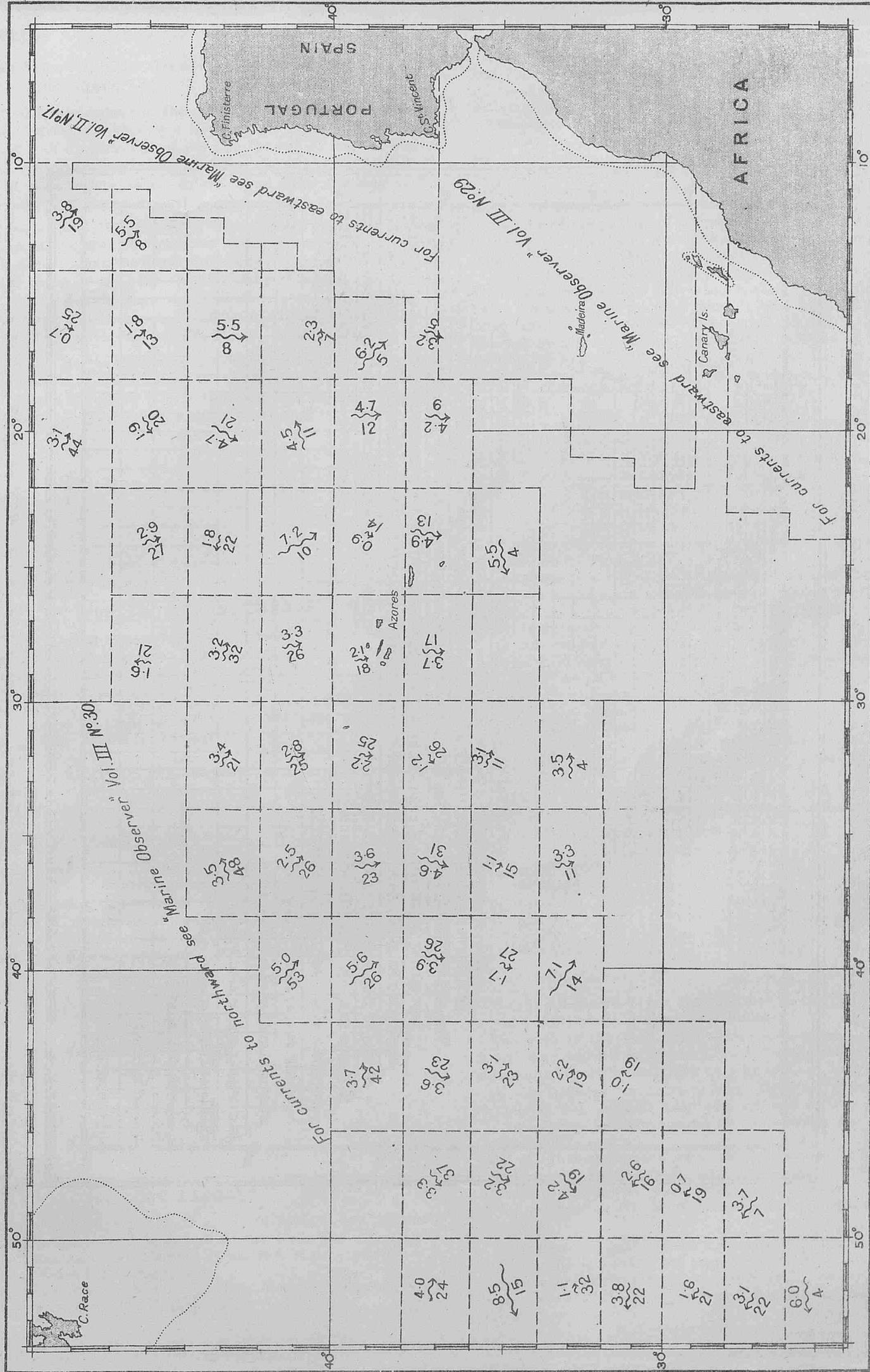
Distance from tail of arrow to circle represents 5%. Scale 0 10 20 30 40 50%

The upper figure in centre of rose gives total number of observations, the lower figure the frequency of currents less than 6 miles per day.

CURRENTS ON THE TRACKS TO AND FROM THE WEST INDIES AND PANAMA. (EASTERN PORTION)

MAY, JUNE AND JULY.

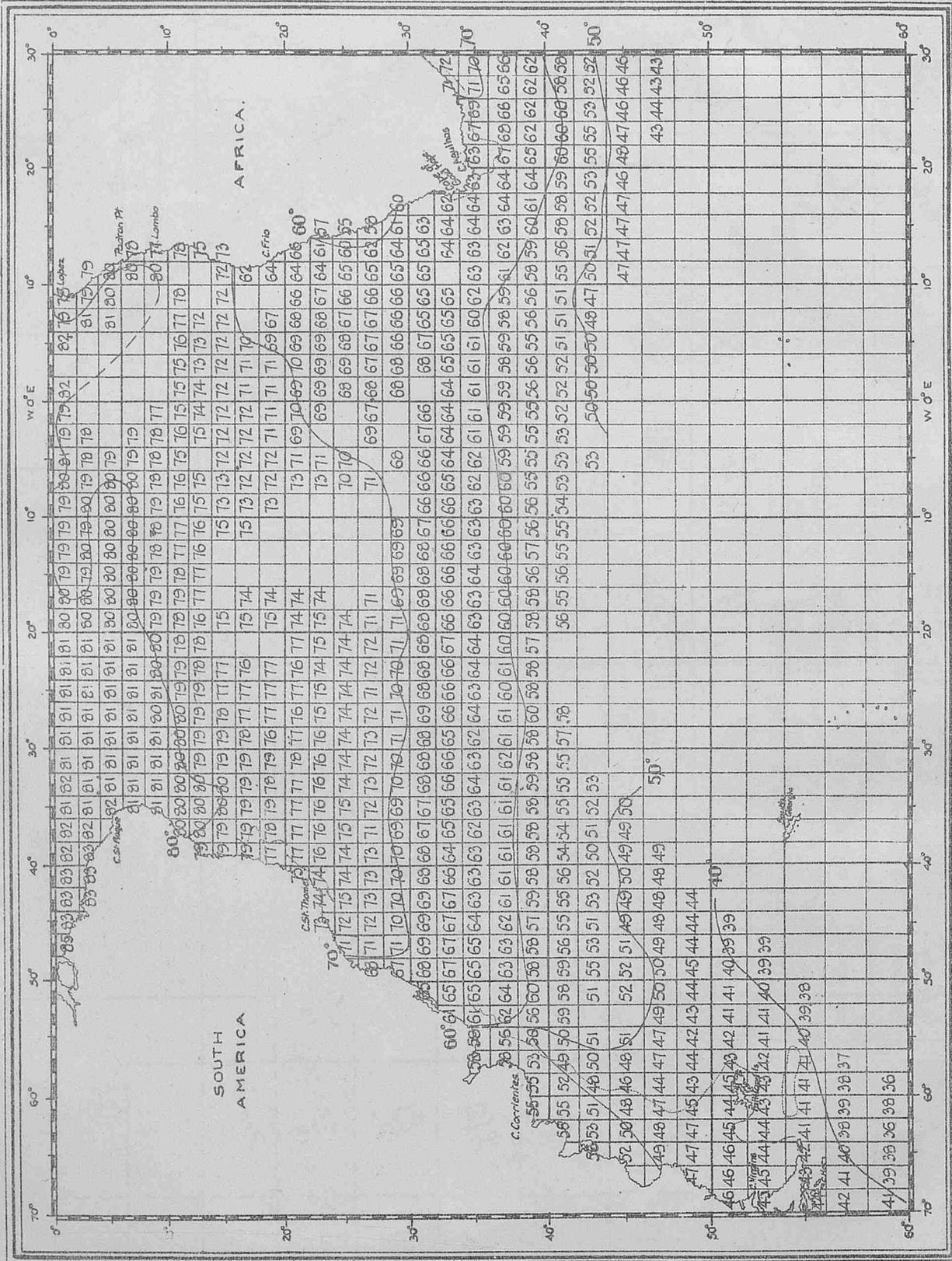
Observations of ships regularly observing for British Meteorological Office 1910-1925.



EXPLANATION OF CURRENT ARROWS.

The arrows flow with the current and represent the resultant of currents observed within the pecked lines.
 The centre of each arrow lies in the mean position of observation. The figures above the arrows give the velocity of current in miles per day; the figures below the arrows the number of observations.

SOUTH ATLANTIC.
MEAN SEA SURFACE TEMPERATURES FOR MONTH OF MAY,



Computed from observations of British ships during the years 1855 to 1899 except to the Southward and Eastward of Latitude 30° South and Longitude 10° East where the observations are for the years 1855 to 1878.

WIRELESS AND WEATHER AN AID TO NAVIGATION.

The serial chapters under this heading are being revised and published in the 1927 MARINE OBSERVER as a second edition.

As proved by the entries at the end of the Meteorological Log and in the new edition of the Ship's Meteorological Report Form 911 a large number of Commanders of ships on the list of Regular Marine Observers are making Wireless Weather reports regularly to "All Ships" of observations taken at the same time as those of the nearest coast.

The Commanders of all the ships whose names appear in the list at the end of the MARINE OBSERVER with the letters M. L., M. or W. T. after their names in the fourth column are selected ships, and are invited to make these reports once daily as a matter of routine to "All Ships" for the general benefit of shipping and seamen. A sample message will be found in "Weather Signals," page 17, and in Chapter I, page 15, of Vol. IV, No. 37, of this Journal.

The Corps of Marine Observers are requested to bring this system to the notice of Commanders and Officers who do not belong to the regular Corps of Voluntary Marine Observers and to show them how they may gain by the unselfish work of our Corps.

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 REPORTS.

Commanders of ships in the Trans-North Atlantic and Southern Ocean Trades are earnestly requested to have the Ice Report Form 912 completed and returned at the end of each passage. A nil return is desired if no ice is seen.

These forms are supplied with THE MARINE OBSERVER each month to regular observing ships in these Trades.

INTERNATIONAL ICE PATROL SERVICE.

For the purpose of carrying on the International Ice Observations and Ice Patrol Service provided for by the International Convention for the Safety of Life at Sea, London, 1913-14, the U.S. Coast Guard cutters "Tampa" and "Modoc" have been detailed for this service.

The object of the Ice Patrol Service is to locate icebergs and field ice nearest to the North Atlantic Lane Routes. It will be the duty of the patrol vessels to determine the southerly, easterly, and westerly limits of the ice and to keep in touch with these fields as they move to the southward, in order that radio messages may be sent out daily, giving the whereabouts of the ice, particularly the ice that may be in the immediate vicinity of the regular North Atlantic Lane Routes.

During the months of **March, April, May, and June**, and as much longer as necessary these two vessels will alternate on patrol.

Having located the ice, the patrol vessel will send daily radiograms and broadcasts as stated below, each broadcast being repeated twice, with an interval of 2 minutes between each repeat. Each broadcast will be preceded by the general call "QST" on 600 metres (500 kilocycles) wave length, immediately followed by the ice broadcast on the wave length specified, as follows:

G. M. T.	Time	75th meridian	Wave length (metres)	Frequency (in kilocycles)
0000		7.00 p. m.	1,713	175
1100		6.00 a. m.	706	425
1200		7.00 a. m.	1,713	175
2300		6.00 p. m.	706	425

At 0030 (G. M. T.), 7.30 p.m., 75th meridian time, a radiogram will be sent to the Hydrographic Office, Washington, D.C., through land radio stations, defining the ice danger zone, its southern limits, or other definite ice news, while other messages will be sent during the night if any later information is obtained by the patrol vessel. The telegraphic address of the Hydrographic Office is "Hydrographic, Washington, D.C."

Ice information will be given by radio at any time to any ship with which the patrol vessel can communicate. Such information will be furnished as regular radio traffic (without charge) on commercial traffic frequencies (wave lengths).

Ice information broadcasts will be given in as plain, concise English as practicable and will state in the following order--

- (a) Position of patrol vessel.
- (b) Location and description of ice.
- (c) Other data.

The Ice Patrol vessels' general radio call letters are NIDK. This is a special call for the vessel actually on patrol, and should not be confused with the regular radio call letters assigned to the individual vessels.

The radio messages from the patrol vessel and from other sources will be given publicity by the Hydrographic Office as follows:--

- (a) By radio broadcast from--

Station	G. M. T.	75th meridian standard time	Wave length (metres)
Arlington.....	{ 1530 10300	10.30 a. m. } 10.00 p. m. }	2,677, A. C. W. tube.
Annapolis.....	2200	5.00 p. m.	17,130 C.W.
Boston.....	{ 1600 2200	11.00 a. m. } 5.00 p. m. }	2,939, T. D. tube.
New York.....	{ 1530 2200	10.30 a. m. } 5.00 p. m. }	2,776, T. D. tube.
Norfolk.....	{ 1545 2100	10.45 a. m. } 4.00 p. m. }	2,883, tube.

- (b) All reports of ice are published in the Daily Memorandum and the weekly Hydrographic Bulletin.

The work of the U.S. Coast Guard cutters engaged on this Ice Patrol duty will be greatly facilitated if the principal trans-Atlantic steamships report the following data by radio to the patrol vessels:--

- (a) Icebergs or obstructions sighted, giving date, time (G. M. T.), latitude, longitude, set, and drift; and in case it is an iceberg, the temperature of the water at the time should be included.

- (b) Surface temperature of the sea water every four hours when between latitude 39° N. and 48° N., and between longitudes 43° W. and 58° W., when bound either east or west, giving time of observation (G. M. T.), the latitude, longitude, course, and speed.

These data will facilitate the drawing of a temperature curve which will be useful in locating the branches of the Labrador Current.

It is requested that radio operators desist, as far as practicable, from operating at the above times in order to lessen radio interference.

ICE CHART.

WESTERN NORTH ATLANTIC.

LETTERS OF TRANSATLANTIC TRACKS INDICATE.

NOTE.—In case of necessity owing to extreme southerly drift of ice, operative dates will be fixed for Track A.

- (B) From 1st March to 31st August, inclusive.
 - (E) From 11th April to 15th May, or until the Cape Race route clear of ice.
 - (F) From 16th May to Opening of Belle Isle route.
- Westbound, on approaching Cape Race steer a course to pass 10 miles S. of Cape Race.
- Eastbound, steer from position 25 miles S. of Cape Race.
- 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 pages 78-9, Vol. IV, No. 40, of this Journal.

SYMBOLS USED ON THE CHART.

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

Reports of Ice sighted between March 1st and March 31st, 1927, which have been received by the Meteorological Office, are shown by the Symbols plotted in the indicating the day of the month.

PHENOMENAL DRIFTS OF ICE.

Date.	Ship or Source of Report.	Position.		Remarks.
		Lat.	Long.	
May —, 1891	"A vessel" ...	34° N.	70° W.	Berg.
" —, 1891	S.S. Rentrew...	49° N.	34° W.	3 small pieces of ice.
" 20, 1907	S.S. Lord Lands-downe.	36°20' N.	45°10' W.	2 small pieces, 6 ft. by 6 ft. and 12 ft. by 4 ft. out of water.
" 6, 1908	S.S. Oceano	150-200 miles N. of Bermuda.		Pieces.
" 27, 1909	S.S. Reventazon	32°28' N.	44°10' W.	60 ft. long, 10 ft. high
" 15, 1911	S.S. Camillo ...	10 miles E. of Nantucket Shoal L.V.		Small berg.
" 11, 1914	S.S. Indradeo	42°18' N.	62°43' W.	Large slabs of field ice and growlers 100-150 ft. long. 5 ft. out of water.
" 17, 1915	S.S. Pola	38°16' N.	61°50' W.	Some field ice.
" 15, 1920	U.S. Hydrographic Bulletin.	45°11' N.	36°42' W.	Berg.

Limit of Ice reported to Meteorological Office MAY 1901-1922

March 1st and March 31st, the Meteorological Office, are shown position reported, the figures

MARINE METEOROLOGY.

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, Ship's 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, but the log should be returned in all cases at least twice yearly.

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.

Ships on the List of Voluntary Observers to the Meteorological Office which have a mercurial barometer are indicated by the letters M.L., W.T. and M.

These are selected ships for reporting weather observations made at specified times by W/T to "All Ships," and they are invited to perform this service, which is for the benefit of all shipping fitted for W/T reception.

For sample weather report message see pages 15 and 17 of Vol. IV. No. 37.

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. A suitable cover may be obtained from H.M. Stationery Office, price 2s.

LATE PRESS.

DERELICTS AND FLOATING WRECKAGE.

Date.	Position.		Description.
	Latitude.	Longitude.	
ENGLISH CHANNEL.			
4.3.27	51°02'N.	1°21'E.	Submerged obstruction.
9.3.27	50°17'N.	2°40'W.	Submerged obstruction.
NORTH ATLANTIC.			
1.3.27	40°10'N.	61°10'W.	Red gas and whistle buoy, showing red flashing light marked S.W. Ledge.
1.3.27	37°30'N.	73°40'W.	Apparently part of deck house of schooner and stump of mast projecting 4 feet out of water.
1.3.27	39°50'N.	61°15'W.	Waterlogged derelict schooner, one mast standing.
2.3.27	36°48'N.	74°16'W.	Wooden vessel, 50 feet long, 30 feet wide, awash.
3.3.27	About 1½ m. 10°(T.) from Fenwick Is. Shoal Lt.V.		Half of hull of wooden barge, end up, projecting 10 feet out of water.
3.3.27	43°39'N.	58°43'W.	Spar, projecting 2 feet out of water, apparently vessel's topmast, attached to submerged obstruction.
3.3.27	36°43'N.	75°30'W.	Barge <i>Bangor</i> adrift.
4.3.27	37°47'N.	74°51'W.	Bottom of wooden vessel, about 200 feet long, floating upright.
4.3.27	35°02'N.	75°18'W.	Spar projecting about 3 feet out of water, apparently attached to submerged wreckage.
5.3.27	36°16'N.	75°39'W.	Pieces of wreckage, apparently part of schooner's cabin.
5.3.27	32°13'N.	78°05'W.	Wreckage of schooner, bow showing 4 feet out of water, stern submerged, spars and rigging attached.
5.3.27	37°—'N.	74°30'W.	Derelict, 70 feet long, stumps of two masts showing.
6.3.27	15 m. S'wd of C. Blanco.		Mast projecting 10 feet out of water, apparently attached to a submerged obstruction.
7.3.27	43°49'N.	60°38'W.	Spar 20 feet out of water, apparently attached to submerged wreckage.
7.3.27	37°58'N.	74°47'W.	Wreckage awash, about 100 feet long.
7.3.27	37°37'N.	70°20'W.	Wreckage projecting 6 feet out of water.
8.3.27	42°22'N.	64°51'W.	Spar, 18 inches diameter, 3 feet out of water, wreckage in vicinity.
8.3.27	37°—'N.	69°—'W.	Sch. <i>Jessie G. Noyes</i> abandoned.
9.3.27	49°02'N.	7°06'W.	Uprturned boat, about 30 feet long.
9.3.27	40°14'N.	70°18'W.	Spar, 10 feet out of water, apparently attached to submerged wreckage.
9.3.27	36°42'N.	72°46'W.	Wreckage, 60 feet long, 30 feet wide, frames showing 8 feet out of water.
10.3.27	36°00'N.	13°00'W.	Submerged obstruction.
10.3.27	53°57'N.	19°46'W.	Floating cylinder resembling pontoon 25 feet by 4 feet.
12.3.27	48°12'N.	27°59'W.	Red conical gas buoy.
12.3.27	41°48'N.	58°00'W.	Derelict schooner foremast and foretopmast standing, hull well out of water.
13.3.27	37°06'N.	75°41'W.	Large, heavy spar.
13.3.27	37°34'N.	74°24'W.	Piece of wreckage about 40 feet long.
15.3.27	41°02'N.	71°38'W.	Motor boat or skiff partly submerged.
17.3.27	35°43'N.	72°14'W.	White vessel about 98 feet long, bottom up.
17.3.27	33°44'N.	72°21'W.	Lumber laden derelict Sch. <i>G. J. Cherry</i> , <i>afire</i> .
20.3.27	3½ m. S. Lizard.	(mag.) of	Log about 20 feet long, dangerous.
NORTH PACIFIC.			
2.3.27	41°47'N.	124°35'W.	Log about 40 feet long, partly submerged.
4.3.27	48°27'N.	124°47'W.	Partly submerged object.
6.3.27	29°30'N.	116°30'W.	Wooden obstruction 25 feet long, 6 feet wide, 4 feet deep.
8.3.27	42°15'N.	124°40'W.	Large log 90 feet long, 5 feet diameter.

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Agents (contd.).

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LEITH ... Captains G. BLACK and C. G. BONNER, V.C., D.S.C., Leith Salvage and Towage Co., Ltd., 2, Commercial Street.

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TYNE ... Captain J. J. MCEWAN, Marine School, South Shields.

VANCOUVER, British Columbia. Mr. T. S. H. SHEARMAN, Room 40, Post Office Building.

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. Letter M after No. indicates ship's barometer Mercurial; A. ship's barometer Aneroid.

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. Received up to 18.3.27.	Date Received.
<i>Aba</i> ...	Hughes, J. ...	S. J. Bristowe, O. E. Jones, C. Spark.	M.L.	Elder Dempster ...	Met. Log. 13.10.26 to 12.3.27...	17.3.27.
<i>Abinsi</i> ...	Millson, H. E. ...	E. W. Bascombe ...	No. A.	"Holt" ...	Form 911 29.12.26 to 23.2.27...	3.3.27.
<i>Achilles</i> ...	Wilson, C. A. ...		M.L.	A. Harrison ...	Met. Log ...	10.1.27.
<i>Actor</i> ...	Haylett, E. ...	A. Frew, J. McKay, J. D. Greeves.	M.L.		Met. Log 29.8.26 to 4.12.26 ...	10.1.27.
<i>Ada</i> ...	Toft, J. T. ...		No. M.	Elder Dempster ...	Form 911 27.10.26 to 3.12.26...	7.12.26.
<i>50 Adriatic</i> ...	Beadnell, F. E., Capt., R.N.R.	R. G. Roberts, O. V. Lucas ...	W.T.	White Star ...	W.T. Reg. 26.12.26 to 12.1.27... " 12.2.27 to 2.3.27 ... " 7.1.27 to 18.2.27 ... Form 911 18.10.26 to 6.11.26...	14.2.27. 9.3.27. 22.2.27. 9.11.26.
<i>Aeneas</i> ...	Wallace, W. K. ...	J. M. Anderson, J. Weir ...	No. A.	A. Holt ...	" 7.1.27 to 18.2.27 ...	22.2.27.
<i>Agapenor</i> ...	Ramsay, J. ...		" A.		" 12.12.26 to 4.3.27 ...	11.3.27.
<i>Aidan</i> ...	Pym, J. ...	J. Whayman ...	" A.	Booth ...	" 13.2.27 to 24.2.27 ...	14.3.27.
<i>Alban</i> ...	Whayman, W. ...		" A.	" ...	" 11.12.26 to 23.12.26	3.2.27.
<i>Albania</i> ...	Gronow, S. ...	L. Harper ...	" A.	Cunard ...	" 29.8.26 to 22.9.26 ...	24.9.26.
<i>Alipore</i> ...	Harrison, R., D.S.O., R.D., Captain, R.N.R.	D. A. C. Butler ...	" M.	P. and O. ...	" 30.12.26 to 17.2.27...	7.3.27.
<i>Almanzora</i> ...	Wakeman, E. C. ...	J. C. Blake ...	" A.	R.M.S.P. ...	" 18.1.27 to 25.2.27 ...	2.3.27.
<i>Alondra</i> ...	Prendergast, J. J. ...	H. Peters ...	" A.	Yeoward ...	" 29.1.27 to 19.2.27 ...	22.2.27.
<i>Ampelco</i> ...	Vandenkerckhove, A. ...	A. Vandenbulck ...	" A.	American Petroleum... Blue Star ...	" 6.11.26 to 14.2.27 ...	5.3.27.
<i>Anfalucia</i> ...	Thomas, R. J. ...		" M.			
<i>Anchises</i> ...	Woodgett, R. J. ...	W. Anderson ...	No. A.	A. Holt ...		
<i>Andes</i> ...	Parker, W. H., C.B.E., R.D., R.N.R.		No.	R.M.S.P. Co. ...		
<i>Antilochus</i> ...	Dunlop, S. K. ...	R. W. Trethewey ...	No. A.	A. Holt ...	" 10.12.26 to 25.1.27...	11.3.27.
<i>Aorangi</i> ...	Crawford, R. ...	G. H. Kime, H. A. Titchfield, E. Anderson, C. Holdaway.	M.L.	Canadian-Australasian	Met. Log. 25.8.26 to 9.12.26 ...	10.1.27.
<i>30 Aquitania</i> ...	Showman, A. C. ... Charles, Sir J. T. W., K.B.E., C.B., R.D., Commodore, R.N.R.	J. L. Croasdaile, J. Locke, D. MacLean.	W.T.	Cunard ...	W.T. Reg. 27.1.27 to 10.2.27 ... " 17.2.27 to 3.3.27 ...	14.2.27. 7.3.27.
<i>62 Arabic</i> ...	Harvey, H. ...	W. F. Jackman, J. M. Appleby, W. Jenkins.	"	White Star ...	" 24.1.27 to 13.2.27 ...	16.2.27.
<i>Arafura</i> ...	Gordon, A. S. ...	J. T. Heddle, G. C. Smith, O. B. Godfrey, R. Lloyd Harry.	M.L.	Eastern and Australian	Met. Log. 30.6.26 to 26.10.26...	29.12.26.
<i>Arava</i> ...	Summers, W. G. ...		M.L.	Shaw, Savill and Albion		
<i>Archimedes</i> ...	Downs, E. B. ...	J. M. Edgar ...	No. A.	Lampport & Holt ...	Form 911 22.3.26 to 9.6.26 ...	16.7.26.
<i>Argyllshire</i> ...	Wallace, J. ...	J. McCrone ...	No. M.	Federal ...	" 17.1.27 to 4.2.27 ...	28.2.27.
<i>Ariguani</i> ...	Soudamore, J. H. H., D.S.C., R.D., Commr., R.N.R.	S. A. Sapworth, G. McKee, W. E. Butcher, J. W. Kendall.	M.L.	Elders & Fyfes	Met. Log. 14.8.26 to 12.12.26	18.12.26.
<i>Armada Castle</i> ...	Millard, A. ...	A. B. Connor, G. D. Pinnick, L. May.	"	Union Castle ...	Met. Log. 17.4.26 to 10.10.26	30.10.26.
<i>Arracan</i> ...	Willis, M. ...	R. McInnes, M. S. Stuart, C. C. Weir.	"	P. Henderson ...	" 4.1.26 to 11.4.26 ...	26.4.26.
<i>Arundel</i> ...	Short, H. ...	Mr. Hill ...	C.C.	Southern Rly. ...	Telegraphic Report 17.3.27	17.3.27.
<i>Arundel Castle</i> ...	George, J., O.B.E. ...	C. S. Keen ...	No. A.	Union Castle	Form 911 14.1.27 to 6.3.27 ...	8.3.27.
<i>Astronomer</i> ...	Richards, J. ...	A. Brown, J. Glen, — Thompson.	M.L.	Harrison ...	Met. Log. 15.8.26 to 25.12.26	1.1.27.
<i>Athenic</i> ...	Davies, E. ...	W. Hill ...	No. A.	White Star ...	Form 911 29.1.27 to 7.3.27 ...	11.3.27.
<i>Atreus</i> ...	Salter, G. H. ...	F. A. Brown ...	" A.	A. Holt ...	" 2.1.27 to 30.1.27 ...	7.3.27.
<i>Aisuta Maru</i> ...	Shibutami, S. ...	K. Murazumi ...	" A.	Nippon Yusen Kaisha	" 11.12.26 to 12.1.27...	19.1.27.
<i>Auditor</i> ...	Owen, W. T. ...	T. E. Steel ...	" M.	Harrison ...	" 3.2.27 to 15.2.27 ...	28.2.27.
<i>Ausonia</i> ...	Stafford, W., D.S.C., R.D., Lt.-Commr., R.N.R.	E. R. B. Freeman ...	" A.	Cunard ...	" 19.2.27 to 28.2.27 ...	3.3.27.
<i>Avon</i> ...	Hannam, F. S. ...	E. S. Dunch ...	" M.	R.M.S.P. ...	" 10.11.26 to 20.1.27...	8.2.27.
<i>Balfour</i> ...	McQueen, D. S. ...	W. P. Philips ...	No. A.	Canadian Pacific ...	" 10.1.27 to 14.2.27 ...	18.2.27.

Name of Vessel.	Captain.	Observing Officers.	Official Meteorological Equipment.	Line.	Last Log, Register, or Report Contributed. Received up to 18.3.27.	Date Received.
Balarald ...	Townshend, W. P., Commr., R.N.R.	F. Ward, E. Cowell, J. Davis, E. Alexander.	M.L.	P. & O. Branch ...	Met. Log. 2.7.26 to 7.11.26 ...	20.11.26.
51 Baltic ...	White, E. R., Commr., R.N.R.	D. K. Crawford, J. Law, H. R. Wilkinson.	W.T.	White Star ...	W.T. Reg. 25.1.27 to 12.2.27 ... 21.2.27 to 13.3.27 ... Form 911 24.1.27 to 12.3.27 ...	16.2.27. 14.3.27. 15.3.27.
Bambra ...	Turner, J. E. ...	H. W. Norris, E. Hutchison, J. Humble, H. Griffiths.	M.L.	State Service, Australia	Met. Log. 16.11.26 to 22.1.27...	2.3.27.
Bampton Castle ...	Hutchings, A. H. ...	J. W. S. Brooks ...	No. A.	Union Castle ...	Form 911 24.7.26 to 26.12.26...	10.1.27.
Banbury Castle ...	Singeisen, E. A., D.S.C., R.D., Capt., R.N.R.	C. G. Cuthbertson ...	" A.	" ...	" 24.11.26 to 27.12.26	31.12.26.
Banffshire ...	Wynne, R. H. ...	W. F. Lockhead ...	" A.	Turnbull Martin ...	" 18.1.27 to 6.2.27 ...	23.2.27.
Baradine ...	Rollo, W. ...	" ...	M.L.	P. & O. Branch ...	" ...	" ...
Baron Murray ...	Edgar, J. E. ...	W. P. G. Arthur, H. Thompson	No. A.	Hogarth & Sons ...	" 8.5.26 to 10.6.26 ...	21.9.26.
Barpeta ...	Strachan, J. ...	W. P. Page ...	" M.	British India ...	" 5.1.27 to 2.2.27 ...	21.2.27.
Barrabool ...	Rhodes, H. R. ...	F. S. Bowman ...	" M.	P. & O. Branch ...	" 29.1.27 to 10.2.27 ...	8.3.27.
Baychimo ...	Cornwall, S. A. ...	E. J. Hankin ...	" A.	Hudson's Bay Co. ...	" 17.10.26 to 1.12.26 ...	8.12.26.
Baymaud ...	Foellmer, G. ...	" ...	" M.	" ...	" ...	" ...
59 Belgeland ...	Howell, T. ...	C. Murray, J. Cross ...	W.T.	Red Star ...	W.T. Reg. 4.10.26 to 23.10.26... Form 911 4.10.26 to 23.10.26...	26.10.26. 26.10.26.
Beltana ...	Allin, C. H. C. ...	D. H. Moulton ...	No. M.	P. & O. Branch ...	" ...	" ...
Benalder ...	Cole, J. H., D.S.C. ...	L. H. Smith ...	No. A.	Ben Line ...	" 3.1.27 to 5.2.27 ...	11.3.27.
Bendigo ...	Nicholl, R. N. C. ...	J. Young ...	" M.	P. & O. Branch ...	" 13.11.26 to 25.12.26	21.2.27.
Benefactor ...	O'Connor, T. ...	A. Watson ...	No. M.	Harrison ...	" ...	" ...
31 Berengaria ...	Roston, Sir A. H., K.B.E., R.D., Capt., R.N.R.	J. A. Myles, W. C. A. Robson, E. W. Connell ...	W.T.	Cunard ...	W.T. Reg. 30.12.26 to 13.1.27	17.1.27.
Berrima ...	Short, C. E. ...	T. Ferguson ...	No. M.	P. & O. Branch ...	Form 911 4.8.26 to 5.12.26 ...	7.12.26.
Berwyn ...	McCombie, G. ...	D. Dunn ...	" A.	Canadian Pacific ...	" 3.1.27 to 15.1.27 ...	24.1.27.
Bintang ...	Morzer Bruyns, M. F. ...	M. C. Altius ...	" M.	Nederland ...	" 31.12.26 to 21.1.27...	23.2.27.
Bogota ...	Good, W. J. ...	W. Billington ...	" A.	R.M.S.P. Co. ...	" 21.5.26 to 19.9.26 ...	21.9.26.
Bolingbroke ...	Dotz, J. F. ... McQueen, D. Murray, M. F.	C. A. Mott ...	M.L.	Canadian Pacific ...	Met. Log. 23.1.26 to 31.8.26 ...	3.9.26.
Borda ...	Holland, R. ...	" ...	No. M.	P. & O. Branch ...	Form 911 1.1.27 to 23.1.27 ...	1.2.27.
Bothwell ...	Rothwell, A. J. ...	" ...	" A.	Canadian Pacific ...	" 19.11.26 to 26.12.26	13.1.27.
Brandon ...	Sargent, A. H., R.D., Lt.-Commr., R.N.R.	T. Beck ...	" A.	" ...	" 25.7.26 to 25.8.26 ...	27.8.26.
Brecon ...	Prentice, W. ...	" ...	" A.	" ...	" 22.12.26 to 22.1.27	25.1.27.
Brenda ...	Lamont, A. ...	J. McMillan ...	" A.	Scottish Fishery Board ...	" 1.2.27 to 28.2.27 ...	4.3.27.
Brighton ...	Hill, A. ...	Mr. Munton ...	C.C.	Southern Railway ...	Telegraphic Report 12.3.27 ...	12.3.27.
British Advocate ...	Taylor, R. J. ...	M. Kennedy ...	No. M.	British Tankers ...	Form 911 12.10.26 to 13.11.26	23.12.26.
British Engineer ...	Joures, T. W. ...	E. L. W. Evans ...	" M.	" ...	" 26.1.26 to 9.3.26 ...	12.4.26.
British Soldier ...	Putt, R. O. ...	H. J. Crangis ...	" A.	" ...	" 17.11.26 to 10.12.26	3.1.27.
Bronze ...	Crapper, J. S. ...	W. Jones, C. E. Legg ...	" A.	Lampert & Holt ...	" 15.1.27 to 10.2.27 ...	15.2.27.
Browning ...	Connorton, W. A. ...	A. B. Murray ...	" A.	" ...	" 29.3.26 to 1.7.26 ...	5.7.26.
Burma ...	Reid, R. B. ...	J. Henderson ...	" A.	Henderson ...	" 24.7.26 to 10.10.26...	29.10.26.
Cambria C.S. ...	Sherwood, C. A., D.S.C.	A. J. English, B. C. Farrow, C. F. St. John.	M.L.	Eastern Tel. Co. ...	Met. Log. 9.9.26 to 25.1.27 ...	23.2.27.
Cambria ...	Telfer, J. E., O.B.E.	V. S. Phillips ...	C.C.	L.M. & S. Rly. ...	Telegraphic Report 12.3.27 ...	12.3.27.
Cameroon ...	Gemmell, W. ...	W. Black ...	No. A.	Anchor ...	Form 911 12.2.27 to 20.2.27 ...	1.3.27.
Camrota ...	Forrester, W. T., O.B.E.	W. T. Broome, P. C. Congdon, F. Dudgeon, C. N. Schofield.	M.L.	Elders & Fyffes ...	Met. Log. 21.6.26 to 16.10.26...	30.10.26.
Canadian Importer ...	McCulloch ...	C. R. Randle ...	No. A.	Canadian Govt. Mercantile Marine.	Form 911 18.11.26 to 4.1.27 ...	10.1.27.
Canadian Inventor ...	Boulton, F. W. ...	D. Grey ...	" A.	" ...	" 5.9.26 to 14.12.26 ...	21.2.27.
Canadian Miller ...	McConechy, W. T. ...	C. E. Moore, H. Ruegg ...	" A.	" ...	" 14.3.26 to 23.6.26 ...	15.7.26.
Canadian Scottish ...	Wallace, C. ...	J. T. White, E. A. Mullock...	" A.	" ...	" 11.12.26 to 20.1.27	14.2.27.
Canadian Skirmisher ...	Millar, W. H. ...	" ...	" A.	" ...	" 19.11.26 to 5.1.27 ...	11.1.27.
Canadian Winner ...	Bisset, C. R. ...	R. Girling, J. Cochrane ...	" M.	" ...	" 16.11.26 to 21.12.26	9.2.27.
35 Carmania ...	Brown, F. G., R.D., Capt., R.N.R.	L. R. Simpson, W. M. Stewart, P. L. Williams.	W.T.	Cunard ...	W.T. Reg. 21.2.27 to 12.3.27 ... Form 911 25.7.26 to 13.8.26 ...	14.3.27. 20.8.26.
Carnarvon Castle ...	Hague, J. W., Commr., R.N.R.	S. Colbourne, H. A. Causton, G. Gorrings, H. Iddees.	M.L.	Union Castle ...	Met. Log. 18.7.26 to 12.12.26...	21.12.26.
34 Caronia ...	Hossack, W. H., R.D., Capt., R.N.R.	M. Boston, H. G. Hay, D. Butler.	W.T.	Cunard ...	W.T. Reg. 8.2.27 to 27.2.27 ... Form 911 7.2.27 to 27.2.27 ...	7.3.27. 8.3.27.
Casanare ...	" ...	" ...	No.	Elders & Fyffes ...	" ...	" ...
Cavina ...	Riseley, A. D. ...	" ...	" A.	" ...	" ...	" ...
52 Cedric ...	Hickson, V. W., Lt.-Commr., R.N.R.	E. A. A. Crowley, S. S. Fieldwood.	W.T.	White Star ...	W.T. Reg. 31.1.27 to 20.2.27 ... Form 911 31.1.27 to 20.2.27 ...	22.2.27. 22.2.27.
53 Celtic ...	Berry, G. ...	F. Pratt, A. Thompson, J. Peters.	"	" ...	W.T. Reg. 17.1.27 to 6.2.27 ... Form 911 16.1.27 to 6.2.27 ...	10.2.27. 10.2.27.
Centaur ...	Rose, A. F. ...	L. Johnstone ...	No. M.	A. Holt & Co. ...	" 22.12.26 to 2.2.27 ...	14.3.27.
Ceramic ...	Roberts, J., C.B.E., D.S.O., R.D., Capt., R.N.R.	" ...	" A.	White Star ...	" 30.1.27 to 16.2.37 ...	8.3.27.
Change ...	Gambrill, F. C. ...	J. Thomas, D. D. Tyer, J. A. Allan, - Johnson.	M.L.	Yuill & Co... ...	Met. Log. 18.8.26 to 10.12.26...	27.1.27.
China ...	Furlong, G. H. S., R.D., Capt., R.N.R.	M. K. Stone ...	No. M.	P. & O. ...	Form 911 8.10.26 to 27.10.26...	15.11.26.
Chindwara ...	Brooks, E. G. ...	J. J. Smith ...	" M.	British India ...	" 20.11.26 to 28.11.26	29.12.26.
Chindwin ...	Esslemont, C. ...	J. P. Stewart ...	" A.	Henderson ...	" 2.10.26 to 21.12.26...	14.1.27.
City of Baroda ...	McMillan, J. ...	A. Beaton, E. H. Routledge, H. C. Snow.	M.L.	Ellerman ...	Met. Log. 22.7.26 to 2.1.27 ...	4.3.27.
City of Benares ...	Anderson, W. W. ...	C. G. Inglis ...	No. A.	" ...	Form 911 14.12.26 to 9.1.27 ...	24.1.27.
City of Brisbane ...	Seaborne, F. O., D.S.C.	R. W. May ...	" A.	" ...	" 29.10.26 to 11.12.26	20.12.26.
City of Canterbury ...	Brenner, D. M. ...	W. F. Munro ...	" A.	" ...	" 19.12.26 to 15.1.27...	14.2.27.
City of Carlisle ...	Mordue, J. A. ...	" ...	" A.	" ...	" 22.10.26 to 21.1.27...	21.2.27.
City of Chester ...	Letton, F. W. ...	H. Asher, W. Speakman, H. A. Hazell.	M.L.	" ...	Met. Log. 21.9.26 to 5.2.27 ...	23.2.27.
City of Edinburgh ...	Wyper, J. ...	N. G. Fraser ...	No. M.	" ...	Form 911 7.1.27 to 14.2.27 ...	7.3.27.
City of Hong Kong ...	Walton, H. L., O.B.E., R.D., Commr., R.N.R.	S. J. Nash ...	" A.	" ...	" 7.11.26 to 9.12.26 ...	3.1.27.
City of London ...	Parker, F. W., R.D., Commr., R.N.R.	K. M. Nicholson ...	" A.	" ...	" 24.10.26 to 15.1.27...	20.1.27.
City of Rangoon ...	Jones, P. ...	A. Gibb ...	M.L.	" ...	Met. Log. 4.9.26 to 4.12.26 ...	15.12.26.
City of Venice ...	Lee, A. ...	W. Aitken ...	No. A.	" ...	Form 911 18.2.27 to 24.2.27 ...	11.3.27.
City of Yokohama ...	McDonald, W. D. ...	W. N. M. Faichney ...	" A.	" ...	" 16.11.26 to 1.1.27 ...	21.1.27.
Clan Alpine ...	Lennox, W. J. ...	G. Short ...	" A.	Clan ...	" 15.12.26 to 27.1.27...	14.3.27.
Clan Lamont ...	Urquhart, P., D.S.C.	P. de Gruchy ...	" A.	" ...	" 10.12.26 to 5.1.27 ...	13.1.27.

LIST OF VOLUNTARY OBSERVING SHIPS

Name of Vessel.	Captain.	Observing Officers.	Official Meteorological Equipment.	Line.	Last Log, Register, or Report Contributed. Received up to 18.3.27.	Date Received.
<i>Clan Lindsay</i> ...	Worthington, J. H.	J. Hall ...	No. A.	Clan ...	Form 911 19.12.26 to 2.1.27 ...	17.1.27.
<i>Clan Macbeth</i> ...	Young, A. H., R.D., Lieut. - Commr. R.N.R.	J. M. Lorimer ...	" A.	" ...	" 16.1.27 to 9.2.27 ...	28.2.27.
<i>Clan Macfadyen</i> ...	Stenson, F. J., R.D., Capt., R.N.R.	H. M. Wavell ...	" A.	" ...	" 25.1.27 to 16.2.27 ...	14.3.27.
<i>Clan Macgillivray</i> ...	West, W. F. ...	J. H. Johnson ...	" A.	" ...	" 28.11.26 to 14.1.27 ...	7.3.27.
<i>Clan Macindoe</i> ...	Low, A. ...	J. G. Ballie ...	" A.	" ...	" 8.1.27 to 1.2.27 ...	21.2.27.
<i>Clan Mackellar</i> ...	Smith, W. P. ...	J. K. Thomas ...	" A.	" ...	" 12.2.27 to 23.2.27 ...	3.3.27.
<i>Clan Macwilliam</i> ...	McCormish, A. B. ...	W. F. Isaac, S. Y. Strange, J. W. Innes.	M.L.	" ...	Met. Log. 21.8.26 to 27.11.26 ...	2.12.26.
<i>Clan Macphee</i> ...	Gourlay, J. B. ...	D. S. Rae, J. O. Woodall, J. J. Millar.	"	" ...	" 6.9.25 to 14.5.26 ...	24.6.26.
<i>Clan Macnaughton</i> ...	Simpson, A. W. ...	F. Cossar ...	No. A.	" ...	Form 911 1.12.26 to 26.12.26 ...	31.12.26.
<i>Clan Macnagart</i> ...	Mee F. T. ...	F. B. Fairweather ...	" A.	" ...	" 24.10.26 to 25.11.26 ...	3.12.26.
<i>Clan Macwhirter</i> ...	Waterhouse, J. ...	R. W. Roberts ...	M.L.	" ...	" 26.11.26 to 12.12.26 ...	17.12.26.
<i>Clan Macwilliam</i> ...	Williamson, A. ...	T. B. Cranwill ...	No. A.	" ...	" 28.8.26 to 9.10.26 ...	30.10.26.
<i>Clan Malcolm</i> ...	Neill, G. A. ...	S. M. Werrey Easterbrook, H. V. Wightman, H. M. Macrone	M.L.	" ...	Met. Log. 5.5.26 to 5.9.26 ...	25.9.26.
<i>Clan Morrison</i> ...	Porterfield, W. M. ...	L. C. Higgins ...	No. A.	" ...	Form 911 4.10.26 to 4.1.27 ...	24.1.27.
<i>Clan Murdoch</i> ...	Miller, W. ...	P. McMillan ...	" A.	" ...	" 27.6.26 to 25.7.26 ...	26.10.26.
<i>Clan Ramsay</i> ...	Laird, C. ...	J. B. Templeman ...	" A.	" ...	" 14.2.27 to 22.2.27 ...	2.3.27.
<i>Clan Ross</i> ...	Smith, W. P. ...	D. B. Edgar ...	" A.	" ...	" 8.12.26 to 21.12.26 ...	13.1.27.
<i>Clan Sinclair</i> ...	George, L. S. ...	N. Macleod ...	" A.	" ...	" 24.1.27 to 10.2.27 ...	5.3.27.
<i>Clan Urquhart</i> ...	Baker, E. W. ...	E. A. Hewson ...	" A.	" ...	" 10.1.27 to 4.2.27 ...	28.2.27.
<i>Colonia, C.S.</i> ...	Carlton, G. F., O.B.E., Commr., R.N.R.	W. E. Allen, W. F. Anderson, F. B. Bolingbroke.	M.L.	Telegraph Construction & Maintenance.	Met. Log. 4.12.26 to 25.2.27 ...	8.3.27.
<i>Colombian</i> ...	Gittins, R. P. ...	T. A. Schofield Miller ...	No. A.	Leyland ...	Form 911 1.1.27 to 31.1.27 ...	8.2.27.
<i>Comorin</i> ...	Borland, J. Mc. I., C.B., D.S.O., R.D., Capt., R.N.R.	C. L. Hayward ...	" M.	P. & O. ...	" 6.11.26 to 15.1.27 ...	7.2.27.
<i>Concordia</i> ...	Telfer, J. H. ...	T. Philip, J. McIntosh, S. R. McNie.	M.L.	Anchor Donaldson ...	Met. Log. 3.9.26 to 14.1.27 ...	24.1.27.
<i>Corinthic</i> ...	Hart, F. ...	E. Burt, J. Warltire, V. Evans.	"	White Star ...	" 17.7.26 to 30.10.26 ...	8.11.26.
<i>Cornwall</i> ...	Haines, F. P. ...	H. S. White ...	No. A.	Federal ...	Form 911 19.12.26 to 31.12.26 ...	17.1.27.
<i>Craftsman</i> ...	Gibbins, W. ...	J. Williams ...	" A.	Harrison ...	" 23.12.26 to 10.3.27 ...	14.3.27.
<i>Crawford Castle</i> ...	Morgan, A. O., R.D., Commr., R.N.R.	J. E. R. Wilford ...	" A.	Union Castle ...	" 9.11.26 to 16.12.26 ...	29.12.26.
<i>Cristales</i> ...	Isaacson, J. M. ...	S. Browne, R. Southerland, D. M. Baker, J. M. Hampshire.	M.L.	Elders & Fyfes ...	Met. Log. 25.7.26 to 4.12.26 ...	14.12.26.
<i>Culebra</i> ...	Mackay, A. S., R.D., Commr., R.N.R.	P. Cooper, H. V. Todd, J. W. Smith, F. G. Dawson.	"	R.M.S.P. Co. ...	" 16.7.26 to 4.12.26 ...	13.12.26.
<i>Cumberland</i> ...	Deith, G. T. ...	J. D. Marks ...	No. A.	Federal ...	Form 911 7.8.26 to 8.1.27 ...	9.2.27.
<i>Cuthbert</i> ...	Lee, O. J. P. ...	C. C. Beal ...	" A.	Booth ...	" 20.10.26 to 3.11.26 ...	10.11.26.
<i>Cyclops</i> ...	Cosker, W. ...	J. R. C. Evans ...	" A.	A. Holt ...	" 15.11.26 to 5.1.27 ...	9.2.27.
<i>Dardanus</i> ...	Williams, D. T. ...	C. F. Morgan ...	" M.	" ...	" 9.12.26 to 14.2.27 ...	26.2.27.
<i>Darian</i> ...	Masters, W. ...	A. S. Holland ...	" A.	Leyland ...	" 2.1.27 to 3.2.27 ...	7.2.27.
<i>Darro</i> ...	Matthews, G. P. ...	W. Halder Campe ...	" M.	R.M.S.P. Co. ...	" 8.1.27 to 4.3.27 ...	7.3.27.
<i>Demerara</i> ...	Willan, F. C. L. ...	J. R. Baty ...	" M.	" ...	" 24.12.26 to 19.2.27 ...	23.2.27.
<i>Demosthenes</i> ...	Orriss, F. A. ...	" ...	" M.	Aberdeen ...	" 29.11.26 to 18.12.26 ...	24.1.27.
<i>Deseado</i> ...	Shillito, B., R.D., Commr., R.N.R.	A. Barff ...	" M.	R.M.S.P. Co. ...	" 23.1.27 to 14.2.27 ...	11.3.27.
<i>Desna</i> ...	Green, J. ...	A. F. Walker ...	" M.	" ...	" 3.12.26 to 19.1.27 ...	31.1.27.
<i>Deucalion</i> ...	Findlay, J. ...	R. Wilson ...	" A.	A. Holt ...	" 5.12.26 to 11.1.27 ...	7.2.27.
<i>Neppe</i> ...	Marmery, S. ...	Mr. Parsons ...	C.O.	Southern Railway ...	Telegraphic Report 14.1.27 ...	14.1.27.
<i>Dimboola</i> ...	Roy, C. M. ...	" ...	No. A.	Melbourne S.S. Co. ...	Form 911 24.12.26 to 18.1.27 ...	21.2.27.
<i>Discoverer</i> ...	Ling, J. T. ...	C. C. Heaton ...	" M.	Harrison ...	" 26.6.26 to 19.8.26 ...	21.9.26.
<i>Discovery, R.R.S.</i> ...	Stenhouse, J. R., D.S.O., D.S.C., O.B.E., R.D., Commr., R.N.R.	T. W. Goodchild ...	M.L.	Discovery Expedition ...	Met. Log. 8.5.26 to 11.7.26 ...	30.9.26.
<i>Domala, M.V.</i> ...	Kitson, A. G. ...	J. G. Wallace ...	No. M.	British India ...	Form 911 1.12.26 to 3.2.27 ...	16.3.27.
<i>Dominia, C.S.</i> ...	Campos, V., O.B.E., Lt.-Commr., R.N.R.	S. A. Garnham, C. Bullock, L. J. Hegarty, R. Johnson, G. Kavanagh, J. A. Heenan, J. Clarke.	M.L.	Telegraph Construction and Maintenance.	Met. Log. 11.9.26 to 4.2.27 ...	25.2.27.
<i>61 Doric</i> ...	Bolton, S., D.S.C., R.D., R.N.R.	L. McDermott ...	W.T.	White Star ...	Form 911 1.10.26 to 24.10.26 ...	27.10.26.
<i>Doric Star</i> ...	Thomas, R. T. ...	E. W. Blomberg ...	No. A.	Blue Star ...	W.T. Reg. 12.12.26 to 29.1.27 ...	7.2.27.
<i>Dorington Court</i> ...	Clarke, E. J. ...	D. H. McDougall ...	" A.	Haldin & Co. ...	Form 911 22.11.26 to 20.12.26 ...	10.1.27.
<i>Dromore Castle</i> ...	Vincent, E. S., R.D., Commr., R.N.R.	" ...	" A.	Union Castle ...	" 20.8.26 to 27.9.26 ...	4.10.26.
<i>Dryden</i> ...	Major, T. W. ...	G. Major ...	" M.	Lampert & Holt ...	" 18.6.26 to 6.11.26 ...	10.11.26.
<i>Duenas</i> ...	Pape, E. R. ...	W. Billington ...	" M.	" ...	" 11.1.27 to 4.2.27 ...	16.2.27.
<i>Dunaff Head</i> ...	Butt, H. L., R.D., Commr., R.N.R.	F. S. Napier ...	" A.	P.S.N. Co. ...	" 19.1.27 to 16.2.27 ...	21.2.27.
<i>Dunrum Castle</i> ...	Weller, H. E. ...	" ...	" A.	Ulster S.S. Co. ...	" 4.12.26 to 13.1.27 ...	25.1.27.
<i>Dunrobin</i> ...	Ramsay, J. D. ...	C. H. Kendall ...	" A.	Union Castle ...	" 27.1.27 to 24.2.27 ...	14.3.27.
<i>Duquesa</i> ...	Ellis, F., D.S.C. ...	E. W. Denman ...	" M.	Glen & Co. ...	" 29.1.27 to 14.2.27 ...	17.3.27.
<i>Edinburgh Castle</i> ...	Wilford, T. H. ...	" ...	No.	Furness Withy ...	" 8.1.27 to 3.3.27 ...	11.3.27.
<i>Egyptian Prince</i> ...	Ord, T. ...	W. R. Holt ...	No. A.	Union Castle ...	Met. Log. 8.1.26 to 24.1.26 ...	29.5.26.
<i>Elmina</i> ...	Williams, T. E. ...	J. A. McGough, G. Shorter, E. Moger.	M.L.	Prince ...	Form 911 10.8.26 to 18.10.26 ...	22.10.26.
<i>El Paraguayo</i> ...	Smith, F. C. ...	G. Fletcher ...	No. M.	Elder Dempster ...	Met. Log. 2.6.26 to 5.10.26 ...	11.10.26.
<i>Elyenor</i> ...	Gordon, A. L. ...	M. Robertson, C. Kavanagh ...	M.L.	Houlder Bros. ...	Form 911 2.1.27 to 27.2.27 ...	4.3.27.
<i>Elysia</i> ...	Duncan, A. R. ...	A. Laidlaw, C. Jenkins, J. A. C. A. Leitch	"	A. Holt ...	Met. Log. 11.10.26 to 7.2.27 ...	10.2.27.
<i>Empress of Asia</i> ...	Lovegrove, A. V. R., D.S.O., R.D., Capt., R.N.R.	R. H. Foley, L. Johnston, L. C. Hogg, W. T. Miller.	"	Anchor ...	" 15.10.26 to 26.12.26 ...	10.1.27.
<i>Empress of Canada</i> ...	Robinson, S., C.B.E., R.D., Commr., R.N.R.	H. C. Halliday ...	"	Canadian Pacific ...	" 16.9.26 to 23.1.27 ...	2.3.27.
<i>Empress of France</i> ...	Griffiths, E. ...	E. Roberts, W. Ewens, O. F. Pennington, W. Pickersgill.	"	" ...	" 10.6.26 to 20.9.26 ...	20.10.26.
<i>Empress of Russia</i> ...	Hosken, A. J. ...	J. H. Reid ...	"	" ...	" 1.5.26 to 3.11.26 ...	8.11.26.
<i>Empress of Scotland</i> ...	Latta, R. G. ...	M. McLellan, W. Bacon, F. G. Hutchings.	"	" ...	" 19.8.26 to 29.11.26 ...	21.2.27.
	Stuart, R.N., V.C., D.S.O.	"	"	" ...	" 15.5.26 to 13.10.26 ...	28.10.26.

Name of Vessel.	Captain.	Observing Officers.	Official Meteorological Equipment.	Line.	Last Log, Register, or Report Contributed. Received up to 18.3.27.	Date Received.
<i>Endeavour</i> ...	Commr. S. A. Geary-Hill, D.S.O., R.N.	R. M. Southern, G. S. Norrington, E. V. B. Baker, E. H. B. Baker, J. Torlesse.	M.L.	His Majesty's Ship ...	Form 911 3.3.26 to 30.6.26 ...	17.7.26.
<i>Essequibo</i> ...	Kite, E. ...	...	No. M.	R.M.S.P. Co. ...	" 30.12.26 to 14.2.27 ...	28.2.27.
<i>Eumaeus</i> ...	Elford, W. J. ...	...	No. A.	A. Holt ...	" 27.11.26 to 29.12.26 ...	5.1.27.
<i>Eurypides</i> ...	Collins, P. J., O.B.E.	H. S. Cox, K. D. Fisher, P. Longdon.	M.L.	Aberdeen ...	Met. Log. 18.7.26 to 22.11.26...	29.11.26.
<i>Euryades</i> ...	Stewart, J. R. ...	...	No. A.	A. Holt ...	Form 911 13.12.26 to 1.1.27 ...	7.2.27.
<i>Explorer</i> ...	Allan, J. ...	A. Stout, F. Sheekey ...	" A.	Scottish Fishery Board	" 1.2.27 to 25.2.27 ...	2.3.27.
<i>Ferndale</i> ...	Daniel, F. ...	D. Jones, E. F. Pemble ...	No. M.	Commonwealth Govt.	" 25.12.26 to 13.1.27...	21.2.27.
<i>Flandria</i> ...	Maars, L. ...	T. Doornbosch ...	No. M.	Holland Lloyd ...	" 3.12.26 to 27.1.27 ...	31.1.27.
<i>Francisco</i> ...	Scales, H. ...	J. C. Nettleship ...	No. A.	Ellerman Wilson ...	" 22.1.27 to 4.3.27 ...	17.3.27.
<i>Freya</i> ...	Angus, W. ...	J. M. Murray ...	" A.	Scottish Fishery Board	" 1.2.27 to 28.2.27 ...	7.3.27.
<i>Gaika</i> ...	Whitfield, G. J. ...	...	" A.	Union Castle ...	" 30.11.26 to 21.12.26 ...	29.12.26.
<i>Galtymore</i> ...	Southerland, E. ...	T. Smyth ...	No. M.	Furber Withy ...	" 19.1.27 to 28.1.27 ...	16.2.27.
<i>Garret</i> ...	Visser, C. w. ...	C. J. Vandenboom ...	" M.	Rotterdam Lloyd ...	" 28.1.27 to 11.2.27 ...	24.2.27.
<i>Garth Castle</i> ...	Jackson, C. R. ...	W. S. J. Aldous ...	No. A.	Union Castle ...	" 1.2.27 to 11.3.27 ...	15.3.27.
<i>Getria</i> ...	Veldkamp, G. J. ...	T. van der Mast ...	No. M.	Holland Lloyd ...	" 19.2.27 to 10.3.27 ...	14.3.27.
<i>Geranium</i> ...	Bennett, H. T., D.S.O., Commr. R.A.N.	...	M.L.	His Majesty's Australian Ship	...	...
<i>Glenamoy, M.V.</i> ...	Homan, C. E. ...	R. H. Bishop ...	No. A.	Glen Line ...	Form 911 8.1.27 to 26.1.27 ...	28.2.27.
<i>Glengarry</i> ...	Angier, J. ...	...	No.	" ...	" ...	" ...
<i>Glenluce</i> ...	Kennett, W. H. ...	J. Hall ...	No. A.	" ...	Form 911 7.2.27 to 19.2.27 ...	28.2.27.
<i>Glenshane</i> ...	Beer, E. ...	R. A. Dale ...	" A.	" ...	" 27.9.26 to 9.1.27 ...	13.1.27.
<i>Gloucestershire</i> ...	Robin, E. ...	...	" A.	Bibby ...	" 4.12.26 to 12.2.27 ...	17.2.27.
<i>Gorgon</i> ...	Hughes, J. W. ...	A. E. Bowit ...	M.L.	A. Holt & Co. ...	" 30.9.26 to 17.10.26...	22.11.26.
<i>Halesius</i> ...	...	...	No. A.	R. P. Houston ...	...	...
<i>Haliartius</i> ...	Marsh, L. V. ...	W. H. Upton ...	" A.	R. P. Houston ...	Form 911 19.12.26 to 31.1.27...	21.2.27.
<i>Harmonides</i> ...	Hughes, W. F. ...	S. S. Davidson ...	" A.	" ...	" 29.1.27 to 19.2.27 ...	17.3.27.
<i>Harmony, Auxy.</i> ...	Jackson, J. C. ...	A. W. Bush ...	" A.	Moravian Mission ...	" 25.12.26 to 6.1.27 ...	19.1.27.
<i>Hatarana</i> ...	{ Denne, G. H. A. ... Beeble, T. S. ...	{ F. Wells, C. Parkes, W. T. Barnes.	M.L.	British India ...	" 12.6.25 to 27.2.26 ...	29.3.26.
<i>Hatimura</i> ...	Lane, S. R., R.D., Capt. R.N.R.	...	No. M.	British India ...	...	...
<i>Hawaki, M.V.</i> ...	Frew, J. D. ...	...	M.L.	Union S.S. Co. N.Z....	Form 911 22.6.26 to 11.7.26 ...	20.9.26.
<i>Henry Holmes, C.S.</i> ...	Bicker Caarten, A.	M. A. Green ...	No. M.	W. I. & Panama Telegraph Co.	" 22.12.26 to 10.1.27...	15.2.27.
<i>Herald</i> ...	Silk, H. V., Lieut-Commr., R.N.	D. G. V. Williams ...	M.L.	His Majesty's Ship ...	Met. Log. 4.9.26 to 30.11.26 ...	27.1.27.
<i>Herefordshire</i> ...	Mann, R. P. ...	H. R. Mackay ...	No. A.	Bibby ...	Form 911 21.8.26 to 29.1.27 ...	7.2.27.
<i>Herminius</i> ...	Roberts, T. V. ...	G. P. McCraith ...	" A.	Shaw, Savill & Albion	" 25.9.26 to 11.10.26...	22.11.26.
<i>Herschel</i> ...	Watson, W. W. ...	J. F. Maurey ...	" A.	Lampport & Holt ...	" 18.11.26 to 30.11.26 ...	17.12.26.
<i>Hertford</i> ...	Urquhart, D. ...	A. Robertson ...	" A.	Federal ...	" 18.3.26 to 7.9.26 ...	4.10.26.
<i>Hibernia</i> ...	Tanner, E. B., O.B.E.	R. Woodall ...	C.C.	L.M. & S. Rly. ...	Telegraphic Report, 18.3.27 ...	18.3.27.
<i>Highland Glen</i> ...	Jones, T. J. ...	W. Jealous ...	No. A.	Nelson ...	Form 911 29.3.26 to 26.5.26 ...	31.5.26.
<i>" Heather</i> ...	Powell, G. A. ...	J. H. Pitton, J. Hardy ...	" A.	" ...	" 13.12.25 to 24.6.26 ...	14.7.26.
<i>" Laddie</i> ...	Alford, C. ...	E. F. Smart ...	" A.	" ...	" 23.11.26 to 14.1.27 ...	24.1.27.
<i>" Piper</i> ...	Collings, D. ...	J. S. Collins, S. E. Jackson	M.L.	" ...	Met. Log. 25.4.26 to 16.9.26 ...	23.9.26.
<i>" Pride</i> ...	Robinson, R. H. ...	W. Williams ...	No. A.	" ...	Form 911 30.7.26 to 2.10.26 ...	7.10.26.
<i>" Prince</i> ...	Brown, J. B. ...	S. A. Wheaton ...	" A.	Prince ...	" 27.1.27 to 11.2.27 ...	24.2.27.
<i>" Rover</i> ...	Ashby Graves, F. ...	C. C. Legg ...	" A.	Nelson ...	" 10.11.26 to 1.1.27 ...	14.1.27.
<i>" Warrior</i> ...	Robinson, R. H. ...	J. O. Simons ...	" M.	" ...	" 25.3.26 to 19.5.26 ...	26.5.26.
<i>Hildebrand</i> ...	Maddrell, J. ...	A. Allan ...	" A.	Booth ...	" 24.11.26 to 7.1.27 ...	25.1.27.
<i>Hobsons Bay</i> ...	Kydd, O. J. ...	R. Pearce, A. Badman, T. Morrison, H. Hendy.	M.L.	Commonwealth Govt.	Met. Log. 3.8.26 to 17.12.26...	23.12.26.
<i>Holbein</i> ...	Gough, W. A. ...	H. L. Rudd ...	No. A.	Lampport & Holt ...	Form 911 31.10.26 to 8.12.26...	3.1.27.
<i>54 Homeric</i> ...	Holme, A. ...	A. S. Dyer, H. G. Morgan, S. B. Morfee.	W.T.	White Star ...	W.T. Reg. 14.1.27 to 28.1.27 ...	8.2.27.
<i>Hororata</i> ...	Holland, E. ...	E. R. Kemp, F. Malcouronne	No. A.	New Zealand S.S. Co.	Form 911 1.9.26 to 3.1.27 ...	5.1.27.
<i>Hubert</i> ...	Pym, J. H. ...	S. G. Edwards ...	" A.	Booth ...	" 21.9.26 to 29.11.26...	14.12.26.
<i>Huntingdon</i> ...	Ashworth, W. ...	R. Cox ...	" A.	Federal ...	" 25.1.27 to 2.3.27 ...	5.3.27.
<i>Hurunui</i> ...	Burton Davies, J. ...	J. Oxnard, L. C. Hill, L. Cann, K. Goldsworthy.	M.L.	New Zealand S.S. Co.	Met. Log. 10.10.26 to 18.11.26	26.11.26.
<i>Ingoma</i> ...	Barrow, R. K. ...	D. G. Russell ...	No. M.	Harrison ...	Form 911 17.12.26 to 28.1.27...	2.2.27.
<i>Iris, C.S.</i> ...	Hughes, H. R. ...	W. Oliver, D. Bruce, D. Macdonald, T. Vickers.	M.L.	Pacific Cable Board ...	Met. Log. 23.1.26 to 25.4.26 ...	5.10.26.
<i>Iroquois</i> ...	Jackson, A. L., Commr., R.N.	H. L. Jenkins ...	"	His Majesty's Ship ...	" 24.8.26 to 3.12.26 ...	15.2.27.
<i>Izion</i> ...	Reed, G. C. ...	C. W. R. Murphy ...	No. A.	A. Holt ...	Form 911 29.11.26 to 9.1.27 ...	28.2.27.
<i>Japanese Prince</i> ...	Naylor, E. ...	W. Venn ...	" A.	Prince ...	" 21.12.26 to 6.1.27 ...	24.1.27.
<i>Jervis Bay</i> ...	Chaplin, W. R. ...	R. W. Laycock ...	" M.	Commonwealth Govt.	" 14.12.26 to 22.2.27...	7.3.27.
<i>John Pender, C.S.</i> ...	Smythe, T. W. ...	H. W. Milne ...	" A.	Eastern Tel. Co. ...	" 8.9.26 to 25.9.26 ...	25.10.26.
<i>Justin</i> ...	Lee, O. J. P. ...	R. C. Holmes ...	" A.	Booth ...	" 15.1.27 to 26.1.27 ...	7.2.27.
<i>Kaiser-i-Hind</i> ...	Manley, G. ...	A. H. Cole ...	" M.	P. & O. ...	" 12.12.26 to 1.2.27 ...	4.2.27.
<i>Kamo Maru</i> ...	Shiratori, S. ...	M. Tamura ...	" A.	Nippon Yusen Kaisha	" 12.11.26 to 15.12.26...	3.1.27.
<i>Kangaroo</i> ...	Norris, H. C. ...	V. J. Denton, H. W. Norris,	M.L.	State Service Australia	Met. Log. 25.7.26 to 13.11.26...	21.12.26.
<i>Karapara</i> ...	Sinclair, R. J. ...	E. Hutchinson, H. Griffiths.	"	" ...	" ...	" ...
<i>Kashmir</i> ...	Miller, A. C. ...	J. W. Knight ...	No. M.	British India ...	Form 911 24.11.26 to 7.1.27 ...	24.1.27.
<i>Kenilworth Castle</i> ...	Stringer, R. H., O.B.E., R.D., Commr., R.N.R.	J. H. Anderson ...	" M.	P. & O. ...	" 23.1.27 to 27.2.27 ...	1.3.27.
<i>Kent</i> ...	Chave, Sir B., K.B.E.	H. L. Iddes, T. M. Gordon ...	M.L.	Union Castle ...	Met. Log. 17.1.26 to 11.7.26 ...	15.7.26.
<i>Khiva</i> ...	Attwood, J. ...	Owen, S. ...	"	" ...	" ...	" ...
<i>Khyber</i> ...	Downton, M. M. ...	F. M. Knight ...	No. A.	New Zealand S.S. Co.	Form 911 28.7.26 to 31.8.26 ...	8.9.26.
<i>Kia Ora</i> ...	Cooper, C. P. ...	G. W. Wood ...	M.L.	P. & O. ...	Met. Log. 17.10.26 to 31.1.27 ...	3.2.27.
<i>Knight Companion</i> ...	Hester, C. W., R.D., Commr., R.N.R.	C. B. Roche, E. J. Parry, H. D. Case, G. S. B. Collard.	"	P. & O. ...	Form 911 27.8.26 to 8.12.26 ...	13.12.26.
<i>Kovno</i> ...	McIntosh, A. ...	E. A. Hickling, J. Launson	No. M.	Shaw Savill & Albion	Met. Log. 21.6.26 to 15.12.26...	30.12.26.
<i>Kueiyang</i> ...	Reed, G. C. ...	J. J. Daniel ...	" M.	A. Holt ...	Form 911 26.9.26 to 9.11.26 ...	13.11.26.
<i>Kyogle</i> ...	Dossor, W. A. ...	H. Redfern, A. Snowdon, A. Hebblewhite.	M.L.	Ellerman Wilson ...	Met. Log. 12.6.26 to 26.11.26	27.11.26.
<i>37 Laconia</i> ...	Byers, G. ...	W. McDonald, T. Hackett ...	"	China Nav. Co. ...	" 25.3.26 to 4.8.26 ...	27.9.26.
	Coalstad, C. ...	E. W. Hughes, C. B. Odman	No. A.	Commonwealth Light-house Service.	Form 911 26.11.26 to 19.12.26	7.2.27.
	Britten, E. T. ...	T. Parry, J. Ashcroft, J. W. Caunce.	W.T.	Cunard ...	{ W.T. Reg. 17.1.27 to 22.1.27 ... Form 911. 16.1.27 to 23.1.27 ...	{ 10.2.27. 9.2.27.

LIST OF VOLUNTARY OBSERVING SHIPS

v

Name of Vessel.	Captain.	Observing Officers.	Official Meteorological Equipment.	Line.	Last Log, Register, or Report Contributed. Received up to 18.3.27.	Date Received
Lady Denison Pender, C.S.	West, G. W.	F. Lawrence	No. A.	Eastern Tel. Co.	Form 911 9.5.26 to 7.7.26	7.8.26.
Laguna	Pattison, G. H.	...	" A.	Pacific S.N. Co.	Met. Log. 7.11.26 to 24.11.26	14.12.26.
Lahore	Kirkwood, J. H.	...	" M.	P. & O.	27.11.26 to 31.12.26	5.1.27.
Lalande	Dawson, E. N.	W. G. Stevenson	No. A.	Lampport & Holt	Form 911 25.9.26 to 29.10.26	16.11.26.
Lancashire	Hamill, H.	A. E. Warburton	" A.	Bibby	1.1.27 to 13.3.27	16.3.27.
36 Lancastria	de Legh, P.	F. Holdsworth	" W.T.	Cunard	W.T. Reg. 7.11.26 to 27.11.26	1.12.26.
Lantaro, M.V.	Malin, R. G., Lt-Commr., R.N.R.	R. P. Campbell, L. R. Sharp, F. G. Russell	No. A.	Pacific S.N. Co.	Form 911 18.1.27 to 23.2.27	26.2.27.
Laomedon	Barkley, E.	...	No. A.	A. Holt	9.12.26 to 3.3.27	11.3.27.
La Paz, M.V.	Beswick, W., D.S.C., Lt-Commr., R.N.R.	A. Yarwood	" M.	Pacific S.N. Co.	2.12.26 to 18.12.26	7.1.27.
Laplace	Benson, C. W.	...	" A.	Lampport & Holt	7.8.26 to 13.10.26	18.10.26.
55 Lapland	Shaw, W.	A. L. Murray, R. D. Cottam	W.T.	Red Star	Met. Log. 1.1.26 to 8.5.26	17.5.26.
Leicestershire	Thomas, A. J.	E. Cornellie, J. C. Flett	M.L.	Bibby	W.T. Reg. 3.1.27 to 23.1.27	31.1.27.
Leighton, M.V.	English, G. L.	J. Cullen, W. A. Kent, D. Y. Sharrock, J. D. Archer	No. A.	Lampport & Holt	Form 911 2.1.27 to 23.1.27	31.1.27.
Leitrim	Lindesay, J. M.	J. T. A. Thomson	" A.	Dowie, J., & Co.	Met. Log. 30.10.26 to 10.1.27	13.1.27.
Llandaff Castle	Robertson, A.	H. G. Letts	No. M.	Union Castle	Form 911 17.8.26 to 20.11.26	13.12.26.
Loch Katrine	Morton Betts, W.	...	" A.	R.M.S.P. Co.	18.11.26 to 5.12.26	14.2.27.
London Commerce	Buret, T. J. C.	...	" A.	Furness Withy	Form 911 17.10.26 to 4.1.27	2.2.27.
London Importer	Young, H. J., D.S.C.	...	M.L.	Ulster S.S. Co.	Met. Log. 3.10.26 to 24.12.26	24.1.27.
Lord Antrim	Williamson, J. M.	J. S. Williams, W. Stanley	No. A.	Pacific S.N. Co.	Form 911 1.2.27 to 16.2.27	18.2.27.
Loriga, M.V.	Jarvis, F. E.	L. G. Kirwan	" A.	"	8.1.27 to 25.1.27	14.2.27.
Losada, M.V.	Clapham, E. C.	R. W. Gill	" M.	"	4.12.26 to 29.12.26	31.12.26.
	Ross, J.	E. Baxter				
Macedonia	Potter, H. W., R.D., Commr., R.N.R.	E. Lee	" M.	P. & O.	30.1.27 to 13.2.27	1.3.27.
Macharda	Tyers, W. O.	D. M. Fulton	" M.	Brocklebank	20.1.27 to 3.2.27	28.2.27.
Mahana	Kershaw, W. A. R.	F. M. Smith, H. C. Smith, J. C. K. Rogers	" A.	Shaw, Savill & Albion	Met. Log. 15.4.26 to 10.8.26	30.8.26.
Maharaja	Hinton, J. C.	H. A. Hartley	" M.	Asiatic S.N. Co.	Form 911 30.11.26 to 14.12.26	15.2.27.
Mahia	Williams, G.	R. Naef	" M.L.	Shaw, Savill & Albion	20.3.26 to 23.6.26	15.7.26.
Maihar	Rowe, J. P.	C. Shaw, H. T. Scoins, G. Henshaw	No. A.	Burns Philp	Form 911 9.7.26 to 1.12.26	6.12.26.
Maimyo	Scurr, T. W.	H. M. Drummond	" M.L.	White Star	W.T. Reg. 20.1.27 to 3.2.27	7.2.27.
Maiwara	Brown, T. M.	W. T. Fitzgerald, J. Paine	" M.L.	Burns Philp	Met. Log. 26.6.26 to 6.10.26	29.12.26.
58 Majestic	Metcalfe, G. R.	W. O. L. Wilding	"	Canadian-Australasian	9.9.26 to 20.1.27	7.2.27.
Makambo	McLean, J.	O. C. Bray, W. J. Weber, L. P. Bourke	No. M.	Brocklebank	Form 911 8.9.26 to 22.9.26	25.9.26.
Makura	Brown, T. M.	...	" M.	British India	29.7.26 to 12.8.26	28.9.26.
Malabar	Davey, A. H.	...	" M.	P. & O.	20.1.27 to 24.2.27	5.3.27.
Malakuta	Mawson, J.	...	" A.	Shaw, Savill & Albion	Form 911 23.12.26 to 6.2.27	17.2.27.
Malancha	Adamson, F. L.	J. H. Round	" M.	Manchester Liners	29.1.27 to 4.3.27	11.3.27.
Malda	Sharpe, G.	R. Humble	" M.	"	13.1.27 to 25.1.27	28.1.27.
Maloja	Gray, T. N.	W. S. Donald, A. A. Parker	" M.	"	31.7.26 to 10.2.27	9.3.27.
Mamari	Warner, S. C.	...	" A.	"	26.6.26 to 11.8.26	20.8.26.
Manchester Brigade	Falconer, H.	P. Campbell	" A.	"	15.11.26 to 7.1.27	13.1.27.
Manchester Corporation	Stott, C. H.	J. Shaw	" A.	"	Met. Log. 24.7.26 to 16.11.26	29.11.26.
Manchester Hero	Everest, J. E.	W. L. Lavers	No. A.	"	Form 911 6.1.27 to 4.2.27	8.3.27.
Manchester Merchant	Riley, J. E.	J. H. Emmitt, H. Anderton, B. M. Brown	" M.	"	2.1.27 to 21.1.27	15.2.27.
Manchester Regiment	Struss, F. D.	E. W. Jeffries	" M.	"	24.4.26 to 17.5.26	20.5.26.
Manchester Shipper	Foale, J. R.	R. H. Walker	" M.L.	"	Met. Log. 2.4.25 to 25.8.25	1.12.25.
Manipur	Dormer, A. E.	H. Swindells	"	"	14.1.27 to 21.2.27	16.3.27.
Mantua	Cochran, G. N.	R. Penston, K. Leadbetter	"	"	24.10.26 to 21.1.27	26.1.27.
Marburn	Randell, G. G.	D. B. Leader	No. A.	Burns Philp & Co.	Form 911 15.9.26 to 6.10.26	15.11.26.
Marella	Stewart, A.	R. H. W. Jackson	" M.	Brocklebank	12.9.26 to 13.10.26	16.11.26.
Marengo	Mortimer, S.	J. A. Street	" M.L.	Shaw, Savill & Albion	Met. Log. 1.2.27 to 13.3.27	18.3.27.
Margha	Williams, J. C., R.D., Commr., R.N.R.	F. Barnard, H. Bryon, J. Ford	"	"	Form 911 26.12.26 to 20.1.27	28.2.27.
Marsina	Milne, R. A., R.D., Commr., R.N.R.	P. Wright, H. E. Evans, R. M. Wyatt, E. H. Rabey	"	"	Met. Log. 6.11.26 to 20.2.27	9.3.27.
Masirah	Rothery, S.	H. C. Tarrington	" M.	"	Met. Log. 5.9.26 to 31.12.26	5.1.27.
Matakana	Mallett, R.	A. E. Evans	" M.L.	"	Form 911 30.12.26 to 23.1.27	28.1.27.
Mataram	Thurston, H. P.	J. Hart, J. Dickson, G. E. Lindsay	"	"	4.6.26 to 9.7.26	23.8.26.
Mataroa	Voy, W.	V. V. Edmonds	No. A.	"	W.T. Reg. 10.10.26 to 24.10.26	15.11.26.
Matheran	Kershaw, W. A. R.	T. T. Oliver, J. J. Nicoll, J. C. K. Rogers	"	"	31.10.26 to 15.11.26	17.11.26.
Matiana	Hanna, R. G.	H. H. Armstrong, H. Willington, J. Richardson	"	"	21.11.26 to 5.12.26	10.12.26.
Matigani	Green, F. V.	J. M. Brown	No. M.	"	Form 911 2.5.26 to 28.6.26	7.7.26.
32 Mauretania	Davey, A. H.	C. G. Eustace	" M.	"	18.12.26 to 7.1.27	14.2.27.
Media	Diggle, E. G., R.D., Capt., R.N.R.	E. R. Taylor, J. A. Quarrie, G. Duguid	W.T.	"	W.T. Reg. 6.12.26 to 26.12.26	29.12.26.
Medic	Mallett, R.	S. C. Cramb	No. A.	T. & J. Brocklebank	Form 911 19.2.27 to 9.3.27	14.3.27.
Megantic	Jones, W. H.	W. Nicoll	" A.	"	Form 911 5.11.26 to 19.12.26	6.1.27.
22 Melita	Trant, E. L., R.D., Commr., R.N.R.	H. A. Billiard, R. Conway, J. C. Boyce	" A.	"	W.T. Reg. 25.12.26 to 14.1.27	18.1.27.
Memnon	Notley, A. H.	J. Shearer, N. J. P. Roberts	W.T.	Canadian Pacific	19.2.27 to 9.3.27	14.3.27.
21 Metagama	Melling, C. F.	L. S. Evans	No. A.	A. Holt	Form 911 5.11.26 to 19.12.26	6.1.27.
Middlesex	Freer, A. Commr., R.N.R.	R. Walker, A. Mansey	W.T.	Canadian Pacific	W.T. Reg. 25.12.26 to 14.1.27	18.1.27.
Minderoo	Macrae, A. B.	...	No. M.	Federal	Met. Log. 2.5.26 to 4.10.26	1.12.26.
Minna	Richardson, E.	B. J. Bennie, W. J. McPhedran, J. H. Oxtan	" A.	West Australia Nav. Co.	Form 911 29.1.27 to 14.3.27	17.3.27.
23 Minnedosa	Mackenzie, G. G.	J. H. Hennessey	" A.	Scottish Fishery Board	W.T. Reg. 4.12.26 to 22.12.26	30.12.26.
Minnesota	Griffiths, J. N.	J. P. Dobson, F. W. Roberts	W.T.	Canadian Pacific	31.1.27 to 19.2.27	22.2.27.
Minnetonka	Gates, T. F., C.B.E.	H. E. McCartney	No. M.	H.M. Transport	Form 911 17.2.27 to 7.3.27	14.3.27.
Minnewaska	Claret, F. H., C.B.E., Commr., R.N.R.	A. R. Stevens	" M.	"	"	"
Mirror, C.S.	Gibson, L.	A. G. Watts	" M.	Eastern Tel. Co.	8.10.26 to 14.10.26	4.11.26.
Mississippi	Wylie, J. T. J.	C. H. Denton	" A.	Atlantic Transport	14.1.27 to 23.2.27	1.3.27.

Name of Vessel.	Captain.	Observing Officers.	Official Meteorological Equipment.	Line.	Last Log, Register, or Report Contributed. Received up to 18.3.27.	Date Received.
<i>Moldavia</i> ...	Burleigh, C. W., D.S.O., R.D., Capt., R.N.R.	R. H. Maskell ...	No. M.	P. & O. ...	Form 911 5.12.26 to 23.12.26...	19.1.27.
<i>Mongolian Prince</i> ...	Edwards, W. ...	V. E. Palmer ...	" A.	Prince ...	" 21.12.26 to 6.3.27 ...	17.3.27.
24 <i>Montcalm</i> ...	Hamilton, G. ...	H. McFadyen ...	W.T.	Canadian Pacific ...	W.T. Reg. 1.1.27 to 21.1.27 ...	24.1.27.
25 <i>Montclare</i> ...	Webster, G. S., R.D., Lt.-Commr. R.N.R.	E. Shergold, A. Mansey, R. W. Jackson.	W.T.	Canadian Pacific ...	W.T. Reg. 14.2.27 to 4.3.27 ...	7.3.27.
<i>Montferland</i> ...	Van Noppen, C. D.	W. Slooten ...	No. M.	Holland Lloyd ...	Form 911 16.10.26 to 4.11.26...	9.11.26.
27 <i>Montmairn</i> ...	Turnbull, J., A.D.C., C.B.E., R.D., Capt., R.N.R.	F. E. Williams, L. Hammersley, N. A. Goater, J. Roche.	W.T.	Canadian Pacific ...	Form 911 5.8.26 to 6.11.26 ...	17.11.26.
26 <i>Montrose</i> ...	Landy, E. ...	A. Watt, F. Hutchings ...	"	" " ...	" 23.1.27 to 11.2.27 ...	16.2.27.
20 <i>Montroyal</i> ...	Griffiths, E., Lieut.-Commr. R.N.R.	H. Tudor ...	"	" " ...	" 20.2.27 to 10.3.27 ...	14.3.27.
<i>Moresby</i> ...	Edgell, J. A., O.B.E., Capt., R.N.	W. H. Martin ...	M.L.	His Majesty's Australian Ship.	Form 911 21.11.26 to 12.12.26 ...	15.12.26.
<i>Morvada</i> ...	Mills, T. L., O.B.E., R.D., Commr., R.N.R.	A. J. Norris ...	No. M.	British India ...	Met. Log. 17.7.26 to 22.7.26 ...	26.7.26.
<i>Mulbera</i> ...	Steadman, W. R. ...	E. H. Spriggs ...	" M.	" ...	Form 911 7.11.26 to 27.1.27 ...	24.1.27.
<i>Nagara</i> ...	Foster, E. ...	E. Hewitt ...	" M.	R.M.S.P. Co. ...	" 28.1.27 to 9.3.27 ...	14.3.27.
<i>Nagoya</i> ...	Davis, H. C., D.S.C., R.D., Commr., R.N.R.	L. Porter, T. A. Sargeant ...	" M.	P. & O. ...	" 9.12.26 to 28.12.26 ...	3.1.27.
<i>Naldera</i> ...	Coldwell, G. J. ...	W. F. Laughland ...	No. M.	" ...	" 3.10.26 to 19.12.26 ...	29.12.26.
<i>Nellore</i> ...	Hignett, A. H., R.D., Lt.-Commr., R.N.R.	S. H. Baldwin ...	" M.	" ...	" 21.7.26 to 9.1.27 ...	31.1.27.
<i>Nerbudda</i> ...	Williams, B. ...	" ...	No. M.	British India ...	" ...	" ...
<i>Nestor</i> ...	Houghton, G. K. ...	D. W. Stroud, O. C. Williams, N. Anderson.	M.L.	A. Holt ...	Met. Log. 15.8.26 to 18.12.26 ...	29.12.26.
<i>Newby Hall</i> ...	Butler, J. ...	D. F. Galloway, A. W. Wise, D. T. Smith.	"	Ellerman ...	" 22.6.26 to 15.10.26 ...	27.10.26.
<i>Newfoundland</i> ...	Westgarth, W. A., D.S.C.	R. F. Handley, E. Saintry, S. Moore.	"	Furness Withy ...	" 19.8.26 to 3.12.26 ...	14.12.26.
<i>Niagara</i> ...	Showman, A. C. ...	A. P. Cousin, D. McKenzie, T. Haulton.	"	Canadian-Australian ...	Met. Log. 2.6.26 to 16.9.26 ...	8.10.26.
<i>Ningchow</i> ...	Mawson, J. ...	Christie, W. ...	No. A.	A. Holt ...	Form 911 13.10.26 to 30.12.26 ...	10.1.27.
<i>Norfolk</i> ...	Mead, G. F. ...	J. W. Pring ...	" A.	Federal ...	" 13.1.27 to 24.1.27 ...	7.2.27.
<i>Norna</i> ...	Wright, J. W. ...	" ...	" A.	Scottish Fishery Board ...	" 1.2.27 to 22.2.27 ...	1.3.27.
<i>Norseman, C.S.</i> ...	Barter, H. O., R.N., Commr., R.N.R.	R. W. Greenfield ...	" M.	Western Tel. Co. ...	" 24.1.27 to 3.2.27 ...	26.2.27.
<i>Northwestern Miller</i> ...	Nuttall, E. L. ...	" ...	" A.	Furness Withy ...	" 20.11.26 to 23.12.26 ...	29.12.26.
<i>Nova Scotia</i> ...	Furmeaux, S. ...	W. P. Paterson ...	" A.	" ...	" 8.9.26 to 4.10.26 ...	18.10.26.
<i>Noushera</i> ...	Rowe, S. N. ...	T. E. C. Earl ...	" M.	British India ...	" ...	" ...
<i>Nubian</i> ...	Watmough, T. M. ...	" ...	" A.	Leyland ...	Form 911 28.12.26 to 10.1.27 ...	14.1.27.
<i>Oaklands Grange</i> ...	St. Clair, C., D.S.C.	E. J. Longheed, G. T. Hurst	" A.	Houlder Bros. ...	" 14.1.27 to 11.2.27 ...	17.2.27.
57 <i>Olympic</i> ...	Marshall, W., C.B., D.S.O., A.-d.-C., R.D., Capt., R.N.R.	A. Fisher, H. J. C. Day, R. Crangle, A. E. Weller.	W.T.	White Star ...	W.T. Reg. 4.2.27 to 17.2.27 ...	21.2.27.
<i>Orama</i> ...	Shelford, W. S., Lieut.-Commr., R.N.R.	T. Fox Russell, C. K. Blake, H. Tanner.	M.L.	Orient ...	Form 911 24.2.27 to 10.3.27 ...	15.3.27.
<i>Oranian</i> ...	Hoskins, W. ...	W. Lawton ...	No. A.	Leyland ...	Met. Log. 14.11.26 to 15.2.27 ...	25.2.27.
<i>Orbita</i> ...	" ...	" ...	"	" ...	Form 911 11.9.26 to 13.11.26 ...	26.11.26.
<i>Orcoma</i> ...	Dominy, R. H., C.B.E., Commr., R.N.R.	T. Naylor, G. Gerety, T. Mitchell.	M.L.	R.M.S.P. Co. ...	Form 911 18.11.26 to 4.2.27 ...	22.2.27.
<i>Orduna</i> ...	Smith, W. E., D.S.O., R.D., Capt., R.N.R.	H. G. Whittle, S. Robbins, J. E. P. Matthews, D. P. Larham.	No.	R.M.S.P. Co. ...	W.T. Reg. 5.9.26 to 26.9.26 ...	4.10.26.
<i>Orestes</i> ...	Hanney, T. W. ...	F. T. Berry ...	No. A.	A. Holt ...	Form 911 4.9.26 to 27.9.26 ...	4.10.26.
<i>Orita</i> ...	Splatt, W. A. ...	C. C. N. Gibson, D. W. Hutchinson, G. R. Bubb, J. L. Jones.	M.L.	Pacific S.N. Co. ...	" 12.12.26 to 14.1.27 ...	14.2.27.
<i>Ormonde</i> ...	Wyatt, A. G. N., Lieut. Commr., R.N.	A. M. Hughes ...	"	His Majesty's Ship ...	Met. Log. 22.6.26 to 29.11.26 ...	20.12.26.
<i>Ormonde</i> ...	James, L. V., D.S.C.	" ...	No. M.	Orient ...	" 7.9.26 to 17.11.26 ...	1.12.26.
<i>Oronsay</i> ...	Owens, A. L., R.D., Lt.-Commr., R.N.R.	J. C. K. Dowding, E. Hatch, R. Galpin, R. S. Hawker.	M.L.	" ...	Met. Log. 11.9.26 to 19.1.27 ...	24.1.27.
<i>Oroya</i> ...	Duncan, E. E. ...	G. Lewis ...	No. M.	Pacific S.N. Co. ...	" ...	" ...
<i>Orsova</i> ...	Cameron, E. P., R.D., Commr., R.N.R.	L. J. Vesty, W. Elliott, J. F. Castle-Bartley.	M.L.	Orient ...	Form 911 28.10.26 to 4.1.27 ...	10.1.27.
<i>Ortega</i> ...	Barkley, E. ...	G. M. Rice ...	No. M.	Pacific S.N. Co. ...	Met. Log. 22.8.26 to 24.11.26 ...	4.12.26.
<i>Orvieto</i> ...	Matheson, C. G., D.S.O., R.D., Capt., R.N.R.	A. Hawker, G. L. Carter, J. L. Skilling, T. L. Shurrock.	M.L.	Orient ...	Form 911 29.9.26 to 15.11.26 ...	24.11.26.
<i>Osterley</i> ...	Hayes, I. J. ...	S. Burnnand ...	No. A.	" ...	Met. Log. 5.9.26 to 9.12.26 ...	14.12.26.
<i>Otaki</i> ...	McNish, R. ...	C. R. Brown ...	" A.	New Zealand S.S. Co. ...	Form 911 1.11.26 to 3.2.27 ...	8.2.27.
<i>Otrira</i> ...	Wood, C. ...	D. N. MacGregor ...	" M.	Shaw, Savill & Albion ...	" 24.12.26 to 7.2.27 ...	10.2.27.
<i>Otranto</i> ...	Staunton, H. G., C.B.E., R.D.	S. Myers ...	" M.	Orient ...	" 15.12.26 to 29.1.27 ...	2.2.27.
<i>Oxfordshire</i> ...	Crumplin, W. E. ...	T. W. Coyne ...	" A.	Bibby Bros. ...	" 22.11.26 to 22.12.26 ...	31.12.26.
<i>Pacific Shipper, M.V.</i> ...	Newman, G. W. A.	G. Davis ...	" A.	Furness Withy ...	" 18.12.26 to 24.2.27 ...	3.3.27.
<i>Pacurare</i> ...	Harvey, A. E. ...	M. C. Cruickshank ...	" A.	Elders & Fyffes ...	" 24.12.26 to 21.1.27 ...	18.2.27.
<i>Pakeha</i> ...	W. P. Clifton Mogg	E. T. Baker, R. E. Nicholson, A. J. Tillot.	M.L.	Shaw, Savill & Albion ...	Met. Log. 3.8.26 to 16.8.26 ...	8.9.26.
<i>Pareora</i> ...	Evans, J. O. ...	N. Turner ...	No. A.	Hain S.S. Co. ...	Met. Log. 27.5.26 to 12.10.26 ...	18.10.26.
<i>Paris</i> ...	Cook, C. L. ...	Mr. Biles ...	C.C.	Southern Ry. ...	Form 911 25.10.26 to 7.11.26 ...	9.11.26.
<i>Patia</i> ...	Makepeace, S. ...	J. Kinsley ...	No. A.	Elders & Fyffes ...	Telegraphic Report. 15.10.26 ...	15.10.26.
<i>Patrician</i> ...	Pugh, R. H. ...	H. W. Stanley ...	" M.	Harrison ...	Form 911 27.12.26 to 28.1.27 ...	14.2.27.
<i>Patrol, C.S.</i> ...	Welsh, T. K. ...	J. S. Browne ...	No.	Eastern Extension (A. & C.) Telegraph Co. ...	" 11.6.26 to 28.9.26 ...	23.11.26.
<i>Peshawur</i> ...	Wilding, H. G. ...	J. C. Mellonie, J. K. Crone, R. G. Wood.	M.L.	P. & O. ...	Met. Log. 18.10.26 to 15.11.26 ...	9.2.27.
<i>Piako</i> ...	Kettlewell, C. R. ...	" ...	No. A.	New Zealand S.S. Co. ...	Met. Log. 30.10.26 to 6.3.27 ...	18.3.27.
<i>Polycaep</i> ...	Evans, T. G. ...	C. W. Smethurst ...	" A.	Booth ...	Form 911 30.1.27 to 13.2.27 ...	26.2.27.
<i>Port Adelaide</i> ...	Hayter, S. W. ...	R. W. Linklater, E. N. Rogerson, L. Porter.	M.L.	Commonwealth & Dominion.	Met. Log. 14.8.26 to 18.12.26 ...	29.12.26.

Name of Vessel.	Captain.	Observing Officers.	Official Meteorological Equipment.	Line.	Last Log, Register, or Report Contributed. Received up to 18.3.27.	Date Received.
<i>Telamon</i> ...	Duggan, C. ...	G. Bevan ...	No. A.	A. Holt ...	Form 911 20.4.26 to 21.6.26 ...	3.7.26.
<i>Teucer</i> ...	Hodgson, R. N. ...	R. S. Young ...	" A.	" ...	" 3.12.26 to 23.12.26...	17.1.27.
<i>Themistocles</i> ...	Jernyn, W. M. ...	R. J. Buckland ...	" M.	Aberdeen ...	" 8.12.26 to 13.1.27 ...	25.1.27.
<i>Theseus</i> ...	Jones, E. ...	W. A. Fyffe ...	" A.	A. Holt ...	" 30.1.27 to 21.2.27 ...	14.3.27.
<i>Titan</i> ...	Wilkinson, T. G. ...	D. MacTavish, G. W. Best, C. G. Bailey.	M.L.	" ...	Met. Log. 27.8.26 to 12.2.27 ...	23.2.27.
<i>Tongariro</i> ...	White Parsons, V.C. ...	J. J. Youngs ...	No. M.	New Zealand S.S. Co. Anchor ...	Form 911 8.1.27 to 15.2.27 ...	21.2.27.
<i>Transylvania</i> ...	Bone, D. W. ...	P. Middleton ...	" A.	" ...	" 28.11.26 to 18.12.26	30.12.26.
<i>Traveller</i> ...	Worthington, B. ...	" ...	" M.	T. & J. Harrison ...	" 23.12.26 to 8.1.27 ...	17.1.27.
<i>Trematon</i> ...	Evans, B. ...	R. Gregory, J. Toms, J. Bell.	M.L.	Hain S.S. Co. ...	" ...	" ...
<i>Turakina</i> ...	Hamilton, E. S. ...	A. N. Marshall, G. S. Shepherd	No. M.	New Zealand S.S. Co. Anchor ...	Form 911 27.9.26 to 5.1.27 ...	28.1.27.
<i>Tuscania</i> ...	Smart, R. W. ...	J. Hamilton ...	" A.	" ...	" 29.1.27 to 20.2.27 ...	24.2.27.
<i>Tyndareus</i> ...	Scott, J. R. ...	A. G. Phillips, F. Howe, A. R. McDavid.	M.L.	A. Holt ...	Met. Log. 1.7.26 to 22.11.26 ...	10.1.27.
<i>Ulimaroa</i> ...	Wylie, W. J. ...	" ...	No. M.	Huddart Parker, Ltd. A. Holt ...	Form 911 20.11.26 to 20.12.26	15.2.27.
<i>Ulysses</i> ...	McHutchon, W. ...	E. C. Radford ...	" A.	" ...	" 18.12.26 to 30.1.27...	3.2.27.
<i>Urvolosi</i> ...	Barnes, E. W. ...	R. L. B. Ryde ...	" A.	Bullard King ...	" 23.1.27 to 4.2.27 ...	14.2.27.
<i>Valacia</i> ...	Inch, F. ...	G. Meggitt ...	" M.	Cunard ...	" 25.11.26 to 2.1.27 ...	15.2.27.
<i>Vardulia</i> ...	Fear, E. T. C. ...	L. D. W. Rand ...	" A.	" ...	" 18.10.26 to 28.12.26	24.1.27.
<i>Verbana</i> ...	Pooley, T. S. M. ...	A. F. Watts ...	" A.	" ...	" 23.5.26 to 3.8.26 ...	13.12.26.
<i>Vigilant</i> ...	Simpson, E. S. S. ...	M. Jamieson ...	" A.	Scottish Fishery Board	" 1.2.27 to 24.2.27 ...	4.3.27.
<i>Waiotapu</i> ...	Norton, A. ...	S. A. Smith ...	" M.	Canadian-Australasian Union S.S. Co. of N.Z.	Met. Log. 6.11.26 to 10.12.26 ...	29.12.26.
<i>Wairuna</i> ...	Whyborn, H. S. ...	R. Howie, G. H. George, A. W. Rabbitts.	M.L.	" ...	" 19.6.26 to 25.9.26 ...	29.12.26.
<i>Walmer Castle</i> ...	Chave, Sir B., K.B.E.	H. A. Deller ...	No. A.	Union Castle ...	Form 911 7.5.26 to 23.5.26 ...	7.6.26.
<i>Wangaratta</i> ...	Scutt, W. ...	T. W. Wordingham, S. R. Millard, K. M. Morrison, A. G. Brooks.	M.L.	British India ...	Met. Log. 18.9.26 to 1.2.27 ...	7.2.27.
<i>Warfield</i> ...	Steel, R. ...	C. M. Quick ...	No. A.	" ...	Form 911 11.2.27 to 4.3.27 ...	11.3.27.
<i>War Nizam</i> ...	Moncrieff, T. ...	J. Row ...	" A.	British Tankers ...	" 13.1.27 to 17.2.27 ...	1.3.27.
<i>Welshman</i> ...	Rollerson, W. ...	J. Mendus ...	" M.	White Star-Dominion Falkland Islands Government.	" 22.10.26 to 14.11.26	26.11.26.
<i>William Scoresby, R.S.S.</i> ...	Mercer, G. M., D.S.O., Lt.-Commr., R.N.R.	" ...	"	" ...	" ...	" ...
<i>Windsor Castle</i> ...	Strong, H., R.D., Commr., R.N.R.	F. Wilbraham, C. L. Lovegrove, J. Montgomery, F. Norfolk.	No. A.	Union Castle ...	Met. Log. 1.6.26 to 20.9.26 ...	2.10.26.
<i>Winifredian</i> ...	Harrocks, W. ...	" ...	No. M.	Leyland ...	Form 911 20.12.26 to 25.1.27...	11.2.27.
<i>Wonganelia</i> ...	Suffern, H. ...	G. F. Phillips ...	"	W. Crossby & Sons ...	" 18.11.26 to 4.12.26...	10.1.27.
<i>Woodarra</i> ...	Hudson, H. T. ...	L. D. Graham, G. Hyland, H. Goater, J. Wallace.	M.L.	British India ...	Met. Log. 20.3.26 to 8.9.26 ...	15.9.26.
<i>Yorkshire</i> ...	Millson, G. E. ...	F. C. Holdsworth ...	No. A.	Bibby ...	Form 911 9.10.26 to 16.12.26...	29.12.26.
<i>Conway H.M.S.</i> ...	Broadbent, H. W., R.D. Capt., R.N.R.	The Senior Cadets...	Cadets' M.L.	" ...	Cadets' Met. Log. 19.9.26 to 13.12.26	18.12.26.
<i>Pangbourne Nautical College.</i> ...	Tracy, A. F. G., Commr., R.N.	" ...	"	" ...	Cadets' Met. Log. 20.9.26 to 11.12.26	20.12.26.
<i>Worcester, H.M.S.</i> ...	Sayer, M. B., O.B.E., R.D., Capt., R.N.R.	" ...	"	" ...	Cadets' Met. Log. 24.9.26 to 15.12.26	17.12.26.
<i>Abaco</i> ...	" ...	The Keepers ...	Lighthouse Register.	" ...	Lighthouse Register 1.1.26 to 30.6.26	26.10.26.
<i>Cay Lobos</i> ...	" ...	" ...	"	" ...	Lighthouse Register 1.1.26 to 30.6.26	26.10.26.
<i>Double Headed Shot</i> ...	" ...	" ...	"	" ...	Lighthouse Register 1.1.26 to 30.6.26	26.10.26.
<i>Inagua</i> ...	" ...	" ...	"	" ...	Lighthouse Register 1.1.26 to 30.6.26	26.10.26.
<i>Sombrero</i> ...	" ...	" ...	"	" ...	Lighthouse Register 1.7.26 to 31.12.26	1.2.27.
<i>Watling Island</i> ...	" ...	" ...	"	" ...	Lighthouse Register 17.1.26 to 20.7.26	10.11.26.
<i>Cape Pembroke (Falkland Is.)</i> ...	" ...	" ...	"	" ...	Lighthouse Register 1.7.26 to 31.12.26	24.2.27.

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 up to 23.2.27.	Date Received.
<i>Darro</i> ...	Matthews, G. P. ...	W. Halder-Campe ...	R.M.S.P. Co. ...	Water Samples ...	4.1.27.
<i>Deseado</i> ...	Shillitoe, B. ...	F. F. Wheeler ...	" ...	" ...	13.1.27.
<i>Hildebrand</i> ...	Maddrell, J. ...	A. Allan ...	Booth ...	" ...	14.1.27.
<i>Mancanares</i> ...	Edwards H. ...	W. E. A. Duff... ..	Elders & Fyffes ...	" ...	3.1.27.
<i>Reventazon</i> ...	Jack, D. A. ...	L. C. Bach ...	" ...	" ...	21.2.27.

May, M.O., 1927.