

VOL. IV. No. 40.

THE MARINE OBSERVER.

APRIL 1927.

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## TIME.

In the March, 1924 Number "Time" was dealt with.

It was then explained why observations in the Meteorological Log were recorded at the relief of the watch and therefore timed according to Ship's Time; that this was the best method for the purpose intended; also that synchronisation of observations at the coast and in ships at sea reported by Wireless was necessary for the purpose of giving true representation on a chart of weather conditions prevailing. The times of observation for telegraphic reports had been fixed in different countries in all parts of the world before the introduction of Wireless Telegraphy and without regard to ships at sea. Therefore, with observations taken at sea at the same times as those of the nearest coast there are breaks in mid ocean and even along extended coasts.

Frequent representations as to inefficiency of this compromise, involving the use at sea of systems originally intended for the land, have been made by mariners. In the December 1925 Number a system was outlined in principle based on suggestions received from Marine Observers.

In this article stress was laid upon the importance of synchronisation of observations in aid of airship navigation as well as navigation proper, for it was pointed out that if there were discrepancies owing to ships' speed these would be far greater when caused by the greater speeds of aircraft.

Therefore, four equidistant Greenwich Mean Times a day were

suggested for observation in all longitudes both at sea and ashore.

With observation times uniform in all parts of the world, the proposal so often put forward by Mariners that periods in geographical zones for the communication of weather reports by selected ships to all ships and selected stations should be laid down seemed to become less difficult of attainment, and a suggestion towards such a step was included. All this was repeated in our last Number, which was going to press when the report referred to below was received.

Much of what was written was no doubt so apparent to the navigator of experience that some may have considered this to be labouring the obvious. But not only navigators were concerned, for those anxious for general efficiency in all branches of meteorology required all the support which experience could give them.

In "The Marine Observer's Log" of the April 1926 Number, we published a selection of the remarks made by correspondents upon the system outlined in principle, including the support of some very distinguished officers of the Mercantile Service.

Since then the International Meteorological Committee have considered this important matter of Time and Weather Telegraphy. We now learn from a report of the President of the International Commission of Synoptic Weather Information, Lieut.-Colonel E. Gold, D.S.O., F.R.S., late R.E., dated September 17th, 1926, that his Commission have made the following resolutions regarding observation times :—

"XI. That the standard hours for International Meteorological Observations should be 1 hour, 7 hours, 13 hours and 19 hours G.M.T., and that these hours should be adopted wherever possible.

"XII. That if in any region (continent or part of a continent) it was impracticable to adopt these standard hours or any one of these standard hours for the synoptic observations, the hours selected should not vary by more than 1 hour on either side of the standard hours, *i.e.*, any hour selected for synoptic observations should be included in the periods 0 to 2 hours, 6 to 8 hours, 12 to 14 hours, and 18 to 20 hours G.M.T.

"XIII. That in Western Europe the existing hours, 1 hour, 7 hours, 13 hours and 18 hours G.M.T. should be retained. These hours fall within the limits adopted, and no variation from them should be made except by international consent.

"XIV. That as the adopted 19 hours G.M.T. for evening observation is impracticable for Western Europe, and as the observations from the Atlantic form an essential part of the charts for forecasting in Europe, the hours of observation for ships in the Atlantic making synoptic reports should be 1 hour, 7 hours, 13 hours, 18 hours G.M.T.

"XV. That as the chart for 13 hours G.M.T. can already be extended to a great part of the Northern Hemisphere and can be extended to the whole world with less difficulty than a chart for any other hour of observation, efforts should be concentrated on making the map for this hour universally complete.

"XXXVIII. As there exists at the present time a great diversity in the hours of observation in neighbouring countries or countries in nearly the same longitude (Syria 0700; Egypt 0600; Mesopotamia 0400 G.M.T., &c.), and as it appears difficult, at least at the present time, to adhere to the procedure of Resolutions XI and XII regarding the hours of observation, the Commission considers it desirable to unify the hours of morning observation in the countries of the Near East by fixing it at 0400 G.M.T. This will be applicable to Egypt,

Sudan, Cyprus, Palestine, Syria, Mesopotamia and Arabia. It should, however, be continued as a temporary measure only until the International hours can be adopted."

Now the International Meteorological Committee has no power to compel any Meteorological Service to follow its rules; it can only recommend.

In the interests of Wireless and Weather as an Aid to Navigation, let us of the British Corps of Marine Observers and Marine Division use our best influence with all concerned in all parts of the world, and in the British Empire in particular, to bring about the use of the standard hours of observation for Weather Telegraphy recommended in Resolution XI as soon as possible.

Ashore, where watchkeeping is the exception rather than the rule as at sea, the adoption of all these four equidistant times is difficult; therefore, while giving active support to Resolutions XII, XIII, XIV, XV and XXXVIII, let us hope that they may only prove necessary during transition.

To put into practice Resolution XI in all parts of the world ashore will take time, and until the new times are adopted ashore selected ships invited to report to all ships, and ships performing the service of making weather reports to the shore, should carry on using the existing times of observation of the nearest coast.

When these four equidistant times of observation are adopted, there is little doubt that the regulation of transmission and reception of ships' Wireless Weather reports may be made easier at sea and at the coast.

The times of observation for logging the weather in the Meteorological Log remain unaltered, *i.e.*, noon, 4 and 8 p.m., midnight, 4 and 8 a.m. Ship's Time. These have not only proved themselves to be the most convenient to the Mariner, but they are desirable for the general purpose of Marine Meteorology.

MARINE SUPERINTENDENT.

### 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.

### METEOR.

#### North Atlantic.

THE following report has been received from S.S. *Majestic*, Captain A. HOLME, New York to Southampton. Observer, Mr. W. T. FITZGERALD, 3rd Officer:—

"At 8 p.m. A.T.S., 11.20 G.M.T., April 6th, 1926, when the ship was in Latitude 40° 48' N., Longitude 46° 18' W., the most wonderful meteor that any of us had ever seen lit up the sky in the N.E. quadrant.

"At the time the sky was clouded over in parts with A-Cu clouds, and as the meteor, travelling from E. to N., passed behind them the edges of the clouds were turned to a light pink colour.

"It commenced at an altitude of about 50° and disappeared at an altitude of about 15° behind some darker clouds.

"As the night was dark the effect of this light suddenly going out was to some extent the same as vivid, continuous lightning going out suddenly and leaving the observer more or less momentarily blind.

"I may say that the Chief Officer and 4th Officer, who were on watch at the time and are both men of considerable experience in the Atlantic trade, say with me that they have never seen a meteor so brilliant before."

### CURRENT IN THE SKAGERRAK, KATTEGAT AND SOUND.

THE following is an extract from the Meteorological Log of S.S. *Spero*, Captain W. J. NORTON, Hull to Copenhagen. Observer, Mr. T. E. FEA, 2nd Officer:—

"It has been frequently observed that with a fresh or strong easterly wind, when navigating between Kullen and Anholt Island a current sets strongly to the eastward.

"The same set is encountered under above conditions in the vicinity of the Trindelen Light Vessel, but of less strength. In this

vessel we have estimated the set at 2 knots between Kullen and Anholt Knob Light Vessels.

"In the Sound (between Kullen and Elsinore) the current depends on the direction of the wind to a great extent, with easterly winds the current sets northerly and with westerly winds to the southward.

"Between Lappe Grund Light Vessel and Kullen we have experienced a current setting at the rate of 4 knots on March 25th, 1926, and again on April 22nd, 1926, the wind being East, force 4, on the former occasion and East, force 3, on the latter.

"Approaching the Skaw with easterly winds the current sets to the north and west, becoming more westerly as the ship passes Højen, but this current is not strong and ceases west of Hørsals.

"In the Skagerrak our experience has been that the current sets with the prevailing wind (but any westerly set is weak), being easterly with a westerly wind and *vice-versa*.

"On May 2nd when approaching Skaw Light from the westward the ship was set to the southward, but when abeam of the lightship the set was found to be to the north, there appears to be an eddy between Skaw Light Vessel and the point of Grenen Spit.

"With westerly winds the current is less strong and more erratic in direction (except in the Sound), but we have experienced a set to the southward towards Læsø Island when navigating between the Skaw and Trindelen Light Vessel."

### RED DUST AT SEA off

#### The West Coast of Africa.

THE following report has been received from S.S. *Medic*, Captain F. F. SUMMERS, R.N.R., Cape Town to Teneriffe; Observer, Mr. H. J. YATES, 4th Officer:—

"April 9th, 1926, between Latitudes 16°–19° N., Longitude 18° W. (30 miles N. of Cape Verde to Cape Blanco). from Noon to Midnight



a deposit of red sandy slime covered the paintwork in exposed positions.

"The weather was slightly hazy and damp throughout the day. Wind N.W., force 3. Noon, Air Temperature 68°, sea water temperature 69°. Clouds A-St (from the westward).

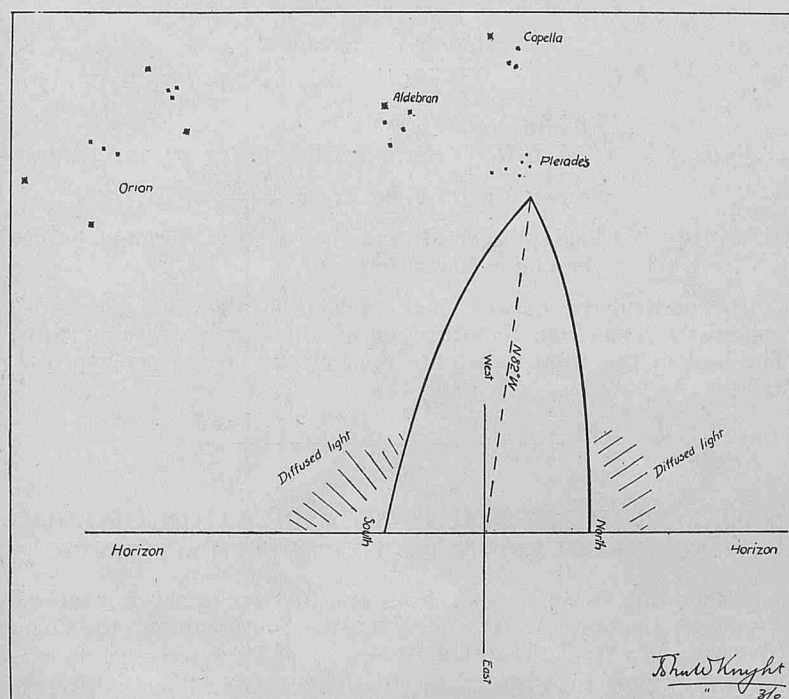
"It will be noticed the wind was not off the land—therefore the presence of the sand deposit seems unusual, and unaccountable for."

NOTE.—Observations received from S.S. *Abinsi*, Captain J. B. WRIGHT, Liverpool to Lagos, indicate that at 8 a.m. on April 9th, 1926, Latitude 11° 16' N., Longitude 17° 22' W., the surface wind was southerly, force 2, while the wind at the height of Cumulus cloud was south-east. This comparatively low upper wind was experienced continuously to the southward for several days. The north-west surface wind observed by S.S. *Medic* on the 9th was also noted by S.S. *Euripides*, Captain T. V. ROBERTS, Capetown to Teneriffe, on the 7th and 8th in Latitudes 12° to 18° N., and by S.S. *Abinsi* on the same dates in Latitudes 14° to 20° N., as a westerly wind. It seems probable, therefore, that the red dust was brought from Africa by the south-easterly wind of moderate altitude, which also reached the surface in Latitude 11° N. The dust, gradually descending, reached a point where it encountered the westerly or north-westerly surface wind, which brought it back from a seaward direction. Observations of all three ships show a westerly counter-trade at high cloud levels.

### ZODIACAL LIGHT.

#### Persian Gulf.

THE following is an extract from the Meteorological Report of S.S. *Barpeta*, Captain G. H. A. DENNE, Karachi to Basra; Observer, Mr. J. W. KNIGHT, 3rd Officer :—



"April 2nd, 1926, 6.10 p.m. A.T.S., Sunset. Soon after the sun had set I observed the bright 'cone' characteristic of the Zodiacal Light. The light was discernable until 7.43 p.m. A.T.S., being brightest at about 6.50 p.m., gradually diminishing in intensity until it disappeared. The angular height of the vertex of the 'cone' remained almost constant and measured 28½° above the horizon, the base being 15° wide at the horizon. The colour of the 'cone' was blue-white and bright enough to obliterate the stars behind it—they were only visible when the light disappeared."

The vertex bore N. 82° W., True.

Latitude 26° 24½' N., Longitude 54° 27' E.

### COUNTER GLOW

#### Off the Madras Coast.

THE following is an extract from the Meteorological Log of S.S. *Risaldar*, Captain G. PARK, Calcutta to Bombay, via Coast Ports :—

"9th April 1926 in Negapatnam Roads at 6 p.m. observed very definite Counter Glow. The sun set behind the anvil cloud 3° above

horizon. Sky light grey usual at sunset. Arcs and lines of Ci. 20° above horizon pointing to S.E. Counter glow commenced definite from my Eastern horizon of a darker shade to the light grey sky. These Counter Glow lines developed until they appeared a clear dark blue and completely blotted out the lines of Ci. My observations re Counter Glows up to this incident were that the lines or rays darkened the Ci and Cu clouds, but not to blot out."

### WATERSPOUT

#### In the North Atlantic.

THE following is an extract from the Meteorological Report of S.S. *Celtic*, Captain G. BERRY, Liverpool to New York; Observer, Mr. J. W. PETERS, 4th Officer :—

"2nd April 1926, 3.24 p.m. A.T.S., Latitude 41° 40' N., Longitude 52° 06' W., at a distance of about three miles from the ship a well-defined waterspout was formed, reaching from heavy Cu-Nb cloud almost to the surface of the sea, which was considerably agitated beneath the spout. At the same time, the wind, which had been west, force 3, shifted to north and freshened, and shortly after the temperature of the water rose from 55° to 60°. At the time, the sky was overcast with Cu-St and Cu-Nb. Weather showery. Barometer 981 m.b. Air 50°."

### AURORA AUSTRALIS.

#### Southern Ocean.

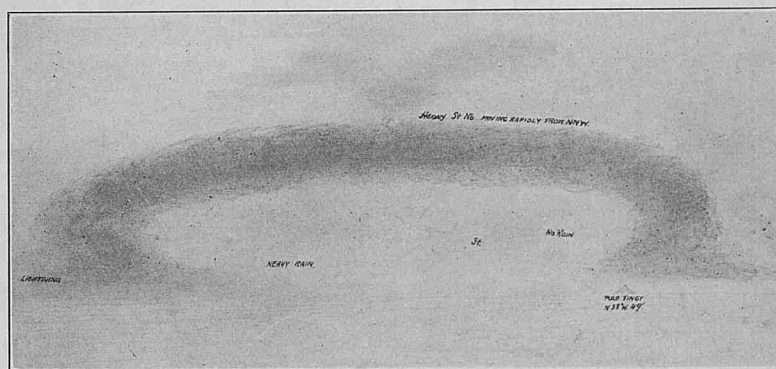
THE following is an extract from the Meteorological Report of S.S. *Port Wellington*, Captain F. FARMER, London to Melbourne, via Cape of Good Hope; Observer, Mr. P. H. PEDRICK :—

"Saturday, April 17th, 1926, 19.45–20.45 A.T.S., Latitude 47° 00' S., Longitude 91° 00' E., observed three patches of Aurora Australis, the brightest patch, which was very intense bore E. by N. from the vessel at an altitude of 30°, the next brightest bore S.W. at an altitude of 16°, and the least bright bore E. by S. at an altitude of 6°. In the East the sky was apparently cloudless, but the patch in the S.W. formed on top of a snow squall which eventually passed over the vessel as a Nimbus cloud and obliterated the patches to eastward. The dominant colour was white. No sensible disturbance of the magnetic compasses was observed."

### LINE SQUALL.

#### East Indies.

THE following is an extract from the Meteorological Log of S.S. *Elpenor*, Captain G. LESLIE, D.S.C., Singapore to Manila; Observer, Mr. M. ROBERTSON :—



"25th April. 1926, 5.30 p.m., Latitude 1° 39' N., Longitude 104° 38' E.

"Exceptionally well defined line squall. Heavy Stratus and Cu-Nimbus, close packed layers from N.N.W. in crescent formation. Wind northerly force 2, backed to N.W. during passage of squall and freshened, thence veered to N.E. by E. Heavy rain to southward only and occasional lightning."

### REFRACTION.

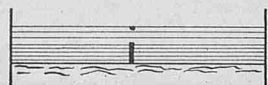
#### Red Sea.

THE following is an extract from the Meteorological Log of S.S. *Chindwin*, Captain C. ESSLEMONT, Suez to Rangoon; Observer,

Mr. J. P. STEWART, 4th Officer:—

"April 3rd, 1926, 7.00 a.m. A.T.S., approaching the Brothers Light (Latitude  $26^{\circ} 19' N.$ , Longitude  $34^{\circ} 51' E.$ ), picked up ahead and altered course to pass 1 mile to westward. Light southerly airs, force 1-2, smooth sea, no swell. Barometer 1006.5 mb. Temperature: dry bulb,  $76^{\circ}$ ; wet bulb,  $69^{\circ} \cdot 5$ ; Sea surface  $74^{\circ}$  Ci/Ci-Cu/Ci-St, amount 7 to 8. Visibility 9.

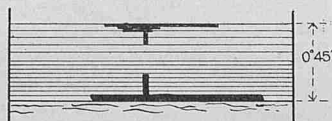
7 a.m. First appearance thus, distance 23 miles.



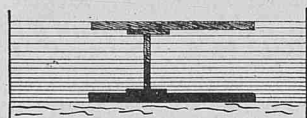
7.15 a.m.



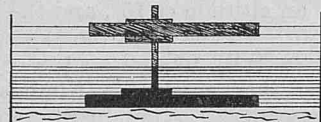
7.20 a.m. All around horizon to an altitude of  $0^{\circ} 45'$  (where there was a distinct line) appeared to be covered in steam and half-way down was twice as dense.



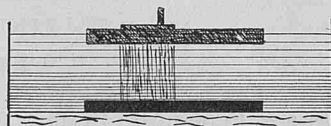
7.25 a.m.



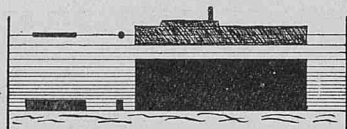
7.28 a.m. Three images. Coast line visible on starboard bow 35 miles, apparently quite normal.



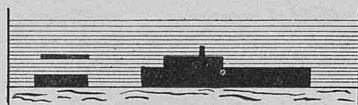
7.30 a.m. Several ships passing were also disturbed.



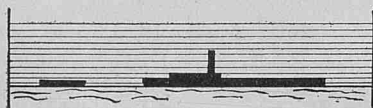
7.35 a.m.



7.38 a.m.



7.45 a.m. Normal."



THE following is an extract from the Meteorological Report of S.S. *Dardanus*, Captain D. T. WILLIAMS, Suez to Penang; Observer, Mr. C. T. MORGAN, 3rd Officer:—

"April 29th, 1926, at 7.30 p.m., when in Latitude  $26^{\circ} 56' N.$ , Longitude  $34^{\circ} 31' E.$ , the Brothers Island Light was observed. The distance then was 40 miles, showing that the refraction must have

been excessive. At first the light appeared to be extremely bright, but after about three minutes it gradually disappeared. It reappeared again shortly afterwards, and continued thus until it eventually disappeared for good at 8.45 p.m."

### SCIROCCO.

THE following is an extract from the Meteorological Report of S.S. *Auditor*, Captain W. T. OWEN, Port Said to Liverpool; Observer, Mr. T. E. STEEL, 3rd Officer:—

"April 13th, 1926, at 8 p.m. A.T.S., when in Latitude  $32^{\circ} 42' N.$  and Longitude  $28^{\circ} 09' E.$  Wind South, force 4; barometer  $29 \cdot 80$ . Air  $70^{\circ} F.$  Sea  $64^{\circ}$ . Cumulus 4/10 moving slowly from south; sea slight and swell also slight, but rather confused. All day we had experienced an extremely undefined and hazy horizon.

"At 8.7 p.m. A.T.S. I observed what appeared to be dark extensive patches on the water—right ahead and extending on each bow—for some distance. At 8.10 (18.20 G.M.T.) wind became exceedingly hot and dry, and veered to W.N.W., force 4-5 at times.

"18.28 G.M.T. Wind backed to the southward again, barometer remained the same, but the air temperature was slightly higher.

18.31 G.M.T. Wind veered W.N.W., force 3.

18.42 " Wind W.N.W., force 2. Air temperature  $71^{\circ} F.$  Horizon much clearer. Barometer  $29 \cdot 82$ .

18.50 " Wind veered N.N.W., force 3. Barometer  $29 \cdot 83$ ; air much cooler.

19.20 " Wind backed W.N.W., force 2; air warmer.

19.27 " " S.W., force 2; " "

19.40 " " veered W.N.W., force 3-4.

19.50 " " " N.N.W., force 3. Fr-Cu.  $\frac{N.W.}{1}$  4/10.

Barometer  $29 \cdot 84$ .

20.40 " Wind N.N.W. force 5. Barometer  $29 \cdot 85$ ; temperature: Air  $67^{\circ} F.$  bc, Fr-Cu.  $\frac{N.W.}{2}$ .

21.00 " Clouds dispersed and heavy dew forming. Wind becoming North, force 5.

"I particularly noticed that each time the wind changed it apparently came from the direction of the dark patches of water. The heat of the wind was quite appreciable, being very oppressive and dry."

### SMOKE FROM FUNNEL AS AN INDICATION OF LOCAL WIND CIRCULATION IN THE NORTH ATLANTIC.

THE following is an extract from the Meteorological Log of S.S. *Ruapehu*, Captain A. W. McKELLAR, Southampton to Colon; Observer, Mr. W. J. GLASSBOROW:—

"April 25th, 1926, 10.45 a.m., Latitude  $31^{\circ} N.$ , Longitude  $50^{\circ} W.$  (approx.), passing under small line squall with three partly-formed waterspouts, wind suddenly backed from S.E. to N.N.W., causing smoke which had left funnel some 5 minutes previously to travel in a circle right back to the ship. Barograph registered a slight 'joggle' at the time."

NOTE.—During this occurrence, according to the Log, the ship was on a course  $238^{\circ}$  (S.  $58^{\circ} W.$ , True), approximate speed 13 knots, and the routine observations were as follows:—

8 a.m. - Wind S.W. by W., force 1. Barometer (corrected)  $1026 \cdot 2$  mb. ( $30 \cdot 30$  in.). Ci. and Cu., 5. Air temperature: dry bulb,  $69^{\circ} F.$ ; wet bulb,  $61^{\circ} F.$  Sea temperature,  $69^{\circ} F.$

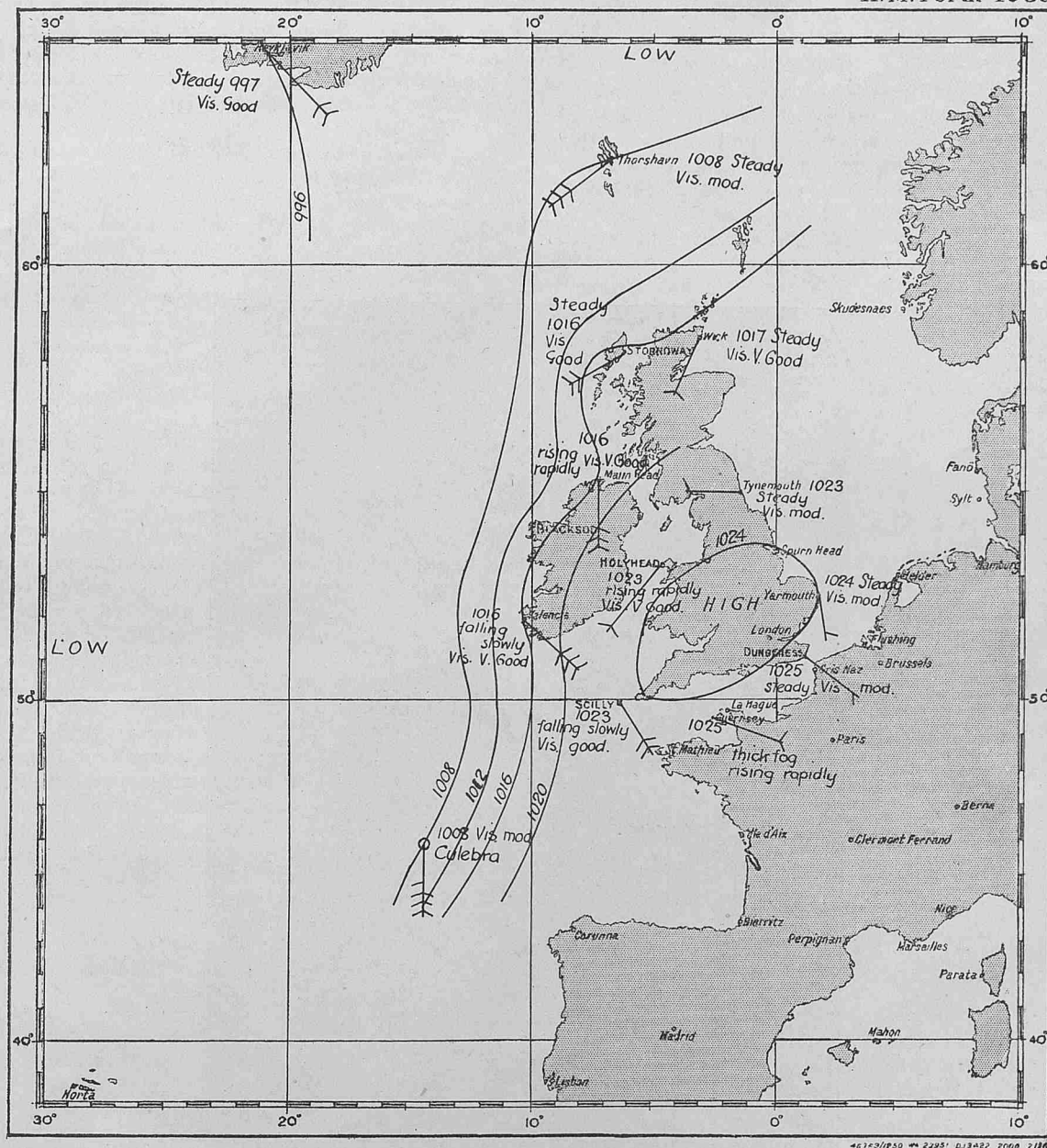
Noon - Wind N. by E., force 2. Barometer, corrected,  $1025 \cdot 6$  mb. ( $30 \cdot 29$  in.). St. and Cu., 10. Air temperature: dry bulb,  $72^{\circ} F.$ ; wet bulb,  $63^{\circ} F.$  Sea temperature,  $70^{\circ} F.$



## COPY OF WEATHER CHART MADE AT SEA.

Copy of Weather Chart by Mr. H. V. Todd. S.S. "Culebra," Captain B. J. Davies. 6 p.m. April 5th, 1926.

A.M. Form 1089.



## CAPTAIN M. H. CLARKE.

THE Obituary last year told of the passing of some fine seamen, and in Captain CLARKE the corps of Marine Observers and Marine Division lost a loyal supporter and warm friend.

MAURICE HARVEY CLARKE was born on April 25th, 1862, at Chelsea; his father, SAMUEL CLARKE, was then practising the law at the Inner Temple.

Educated at the Godolphin Grammar School and at the City of London School, young CLARKE went to sea in 1877 and served his time as an apprentice in the Barque *Agincourt*, owned by Messrs. W. L. DICKSON & Co., of Adelaide, commanded by Captain EDWARD TREVITT and later by Captain HENRY PATCHING.

On April 19th, 1882, *Agincourt* was wrecked at Hamlin Bay, West Australia. During his time in this ship he rescued some men from a boat, adrift and helpless, by swimming with a line through a heavy sea. He won high testimony from both his commanders, who expressed the opinion that he was the making of a fine officer.

After passing for 2nd Mate, CLARKE tried his hand in steam. One year as 3rd Officer in the Persian Gulf trade in S.S. *Malek* and *Gorgi* was enough, and he returned to sail, serving as 2nd Mate of SHAW SAVILL ALBION's Barque *Hudson*, Captain E. J. THOMAS, and

Ship *Enterpe*, Captain G. E. HOYLE, until December, 1885, when he was obliged to take his discharge in New Zealand owing to illness.

According to BASIL LUBBOCK, *Enterpe*, an iron ship built in 1863, was sold to the Chilians, and after trading in the South Pacific went to the ALASKA PACKERS and was still afloat in 1921. She was renamed *Star of India*.

Shipping for the run home as 2nd Officer in S.S. *Norkoorva* of Melbourne, after a spell in England, CLARKE joined the service of Messrs. STEEL YOUNG & Co. on August 25th, 1887, and was 2nd Officer of their steamships *Glendale* and *St. George*. In November, 1887, he was promoted to Chief Officer of S.S. *Oakdale*, and was later transferred to S.S. *Roraima*.

On September 5th, 1889, *Roraima* was caught in a hurricane and wrecked at St. Kitts, West Indies.

This experience was largely responsible for CLARKE's keen interest in Marine Meteorology, which led years afterwards to his becoming agent to the Meteorological Office. His next appointment was Chief Officer of S.S. *Matatua*, of the SHAW SAVILL & ALBION Line, in whose sailing ships he had served four years previously.

He returned to the West Indian trade and was Chief Officer of



CAPTAIN M. H. CLARKE, O.B.E., R.D., R.N.R.  
Chief Nautical Surveyor, Ministry of Industry and Commerce  
of the Irish Free State, 1921-1926.

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SCRUTTON's *New York City*, *Eldorado* and *Godalming*. Having obtained his commission as a Sub-Lieutenant in the Royal Naval Reserve on January 25th, 1893, he performed training in H.M. Ships, including the cruiser *Fox*.

With the prospect of an early command he entered the service of LIVINGSTON CONNER & Co., of West Hartlepool, as Chief Officer, and in January, 1895, was appointed Master of S.S. *Buckminster*, transferring a few months later to S.S. *Azminster*. In this ship he rescued the Master and crew of the Austrian barque *Eimlie* in the North Atlantic.

Having passed for Extra Master in 1899, he qualified for a surveyorship of the Board of Trade, passing first, and was appointed Nautical Surveyor at London on September 6th, 1899. Here he was well known to the officers of London ships for his generous nature, outspoken manner, and manly character.

His seamanlike interpretation of the regulations concerning boat work, life-saving gear, navigation equipment and the like, gave encouragement to many officers where a rigid following of the book would have damped enthusiasm.

In December, 1909, he was transferred to Southampton, but returned to London in July, 1913, with promotion to Senior Nautical Surveyor.

The *Titanic* disaster in April, 1912, caused a drastic overhauling of all that pertained to safety of life at sea. CLARKE was in his element, and his popularity amongst the officers of the ships of the port did much towards the willing work that was then commenced in the improved training of seamen in boat work which during the Great War was the means of reducing loss of life in Merchant Ships sunk by torpedo, mine and gunfire.

At the outbreak of war he was a Commander on the retired list of the Royal Naval Reserve, and on December 16th, 1914, went to Southampton as a Naval Transport Officer, where he did splendid work, and in March, 1916, was selected for duty on the staff of the Director of Transport at the Admiralty. To quote his own words in an account he gave of transport service during the War to a meeting presided over by Admiral Sir REGINALD TUPPER, Commander-in-Chief of the coast of Ireland, "the secret of running a base successfully was to ask no questions, solicit no orders, but to get on with the job, and then report when it was done."

In September, 1917, he was appointed Principal Officer of the

Board of Trade at Dublin, where he carried out the duties of Naval Transport Officer and was made an acting Captain, R.N.R., being confirmed in that rank and appointed to the Military Order of the British Empire in 1919 in recognition of War Services.

In 1921 the Ministry of Industry and Commerce of the Irish Free State Government took over CLARKE's department, and he continued in that service until he died.

As the Senior Nautical Officer of the Irish Free State Government, he was a Commissioner of the Irish Lights. In Dublin he took an active and leading part in social and public life, being on many committees, including that of the Missions to Seamen and the Council of the Engineering and Scientific Association of Ireland. He was a Governor of the Royal Hibernian Marine School. In June, 1923, having long taken a great interest in the work of the Corps of Marine Observers and seen the advantages to shipping using the ports of Southern Ireland of the Wireless "Weather Shipping" Bulletin which was then being discussed by seamen, Captain CLARKE undertook an agency for the Meteorological Office at Dublin.

When the British Wireless "Weather Shipping" Bulletin was commenced on January 1st, 1924, he was one of the first prominent seamen resident at ports in the British Isles to recognise its utility to the ports, and it was through his good offices that arrangements were made at Dublin and Cork for these messages to be intercepted and posted regularly at the Shipping and Harbour Master's Offices, so that small craft without W/T receiving gear might have first-hand information of weather conditions along the coast and forecasts of wind and visibility in Home Waters before proceeding to sea.

As a Younger Brother of Trinity House, CLARKE was amongst the strongest of the supporters of that grand old Corporation. When his absence was enforced from the annual gathering by his duty in Dublin, as sure as the Wednesday after Trinity Monday came round a telegram would arrive with warm greetings in characteristic style to the Brethren.

He died suddenly on August 8th, 1926, while cycling in the country in the neighbourhood of Dublin. He left a widow, two daughters and a son. As a colleague in Dublin said: "If any man ever wore himself out with hard work, CLARKE did, so thorough in all his ways."

L. A. B. S.

## WIRELESS AND WEATHER—AN AID TO NAVIGATION.

### CHAPTER IV.

#### TROPICAL REVOLVING STORMS.

Of all the uses to which wireless communication may be put by the navigator as regards weather, there is probably none in which it has greater value than in these storms.

The Tropical Revolving Storm is more nearly a perfect vortex than any other cyclone, being of a more compact, intense form; and at sea experience in these storms has taught us more of the Laws of Storms than any other experience.

It will, therefore, be well to briefly summarise these laws and with them the rules which have stood us in such good stead for handling ships.

A Tropical Revolving Storm may be described as an intense whirl in the atmosphere, in which there is usually a calm centre, sometimes called by seamen the vortex; round this region of calm there is a belt of winds of hurricane force beyond which the wind blows in a direction round, but towards, the centre. In the Northern Hemisphere the air circulates in the opposite direction to the hands of a watch; in the Southern Hemisphere the air circulates in the same direction as the hands of a watch.

The area covered by a Tropical Revolving Storm may vary in diameter from 20 miles to some hundreds of miles; the wind in the same part of a storm may vary considerably, at times being hurricane force, at others lulling into little more than a strong breeze. As well as this circular motion, Tropical Revolving Storms have a forward or progressive motion. They frequently originate near the Equator, but seldom within 6° of it. At first moving westward with gradually increasing speed, they often travel round the western edge of the great ocean anti-cyclones, recurving near the Tropics when their progressive speed is reduced. Thence they travel north-east or south-east, according to hemisphere, and eastward, increasing speed,

spreading, and dying out in middle or high latitudes, or they may coalesce with other weather systems of middle or high latitudes. Their tracks often vary, particularly in Monsoon regions, where they are most erratic.

FIGURE 13 shows conjectural tracks of the centre of Tropical Revolving Storms in Northern and Southern latitudes. Tracks of Tropical Revolving Storms which have occurred in all oceans have been published monthly in THE MARINE OBSERVER in 1924 and 1925; they should be carefully studied when entering those regions in cyclone seasons.

FIGURE 14 shows the actual tracks of two hurricanes which occurred in the Western North Atlantic in September, 1921.

FIGURE 15 shows the track as far as it can be laid down with observations available of a cyclone which occurred in the Arabian Sea in November, 1920.

FIGURE 16 shows the average wind circulation in Tropical Revolving Storms in Northern and Southern latitudes, by which the rules for handling ships may be illustrated.

#### Nomenclature, Figure 16.

**Path :** the path along which the centre will probably travel.

**Track :** the track along which the centre has travelled.

**Right Semi-circle :** looking along the path, that half of the storm which lies to the right.

**Left Semi-circle :** looking along the path, that half of the storm which lies to the left.

**Trough :** the line of lowest barometer athwart the path.

**Dangerous Quadrant :** the advance quadrant of that semi-circle

which lies on the side of the path nearest to the normal direction of recurvature, so named because a ship caught in the dangerous quadrant may be blown towards the path over which the ring of hurricane winds and the centre will pass, or the storm may recurve and pass over her. It should be noted that the strongest winds are usually found in rear of the trough, hence it often blows hardest with the first rise of the barometer.

**Navigable Semi-circle:** that semi-circle which lies on the side of the path furthest from the normal direction of recurvature.

**Centre:** at the centre of the storm the barometer is always lowest and there is comparative calm; here the sea is extremely dangerous, running in all directions, and has been described as a "boiling pot."

When the centre approaches a ship she may experience increasing wind with violent squalls, later hurricane force, with mountainous seas; as the centre passes over her the wind drops; when it has passed the wind may come from the opposite point of the compass with renewed and increased violence; as the storm recedes from the position of the ship the wind moderates; this is illustrated by A, A1, A2, etc., shown in the FIGURE. Much rain, thunder and lightning may be experienced. There is often a patch of blue sky over the centre, known as the *Bull's Eye*.

**Vertex:** the most Westerly point reached by the centre when recurvature takes place. Also known as the *Cod* of the Track.

**Angle of Indraft:** the angle which the direction of the wind makes with an isobar.

Thus in North Latitude, if near the centre the wind blows along an isobar and the centre bears 8 points to the right when facing the wind, there is said to be no indraft, or if the wind blows at an angle of 2 points to an isobar, and the centre bears 10 points to the right of an observer facing the wind, the indraft is said to be 2 points. It must, however, be remembered that isobars in these storms are not always circular and therefore the angle of indraft may not conform to the angle of the bearing of the centre, minus 8 points.

Tropical Revolving Storms are known as Cyclones in the Indian Ocean, Hurricanes in the West Indies and South Pacific, and Typhoons in the China Seas.

#### Seasons.

**Hurricanes of the West Indies:** June to November, September being the month of greatest frequency.

**Hurricanes of the North Pacific and Typhoons of the China Seas:** All months of the year, July to October being the months of greatest frequency.

**Hurricanes of the South Pacific:** November to April, months of greatest frequency January to March.

**Cyclones of the Arabian Sea:** April to January, months of greatest frequency June, October and November; storms seldom occur in the month of August.

**Cyclones of the Bay of Bengal:** April to December, September being the month of greatest frequency.

**Cyclones of the South Indian Ocean:** October to July, months of greatest frequency December to April.

#### Precursory Signs.

**Swell.** The action of the violent winds in the right hand rear quadrant of revolving storms in Northern latitudes, or in the left hand rear quadrant in Southern latitudes, blowing mainly in the direction of advance of the system, develops large waves which pass onward as swell. This swell travels to great distances and at a greater speed than the storm. Thus swell frequently gives the first warning of an approaching revolving storm.

FIGURE 15 shows the track of a cyclone which occurred in the Arabian Sea between November 20th and 28th, 1920. On November 20th, at 8 p.m., S.S. *Brodholme*, from Suez to Sabang, was in Latitude  $13^{\circ} 16' N.$ , Longitude  $53^{\circ} 10' E.$ ; the wind was N.N.E., a fresh breeze, weather fine, barometer 1015.6 (29.99 ins.). The only indication of the existence of a disturbance was a heavy easterly swell. At that time the centre was distant about 550 miles to the eastward.

FIGURE 14 shows the tracks of two hurricanes which occurred at the same time in the Atlantic in September, 1921. On September 9th, 1921, at 8 a.m., S.S. *Carmarthenshire*, Captain E. C. WAKEMAN, from

Hull to Galveston, was in Latitude  $29^{\circ} 01' N.$ , Longitude  $63^{\circ} 23' W.$  The barometer was normal for the time of year and conformed to the diurnal range, wind S.S.E. a gentle breeze, with a moderate S.E. swell. By 10 p.m., in Latitude  $28^{\circ} 14' N.$ , Longitude  $66^{\circ} 52' W.$ , the swell had become heavy from the Southward and the barometer

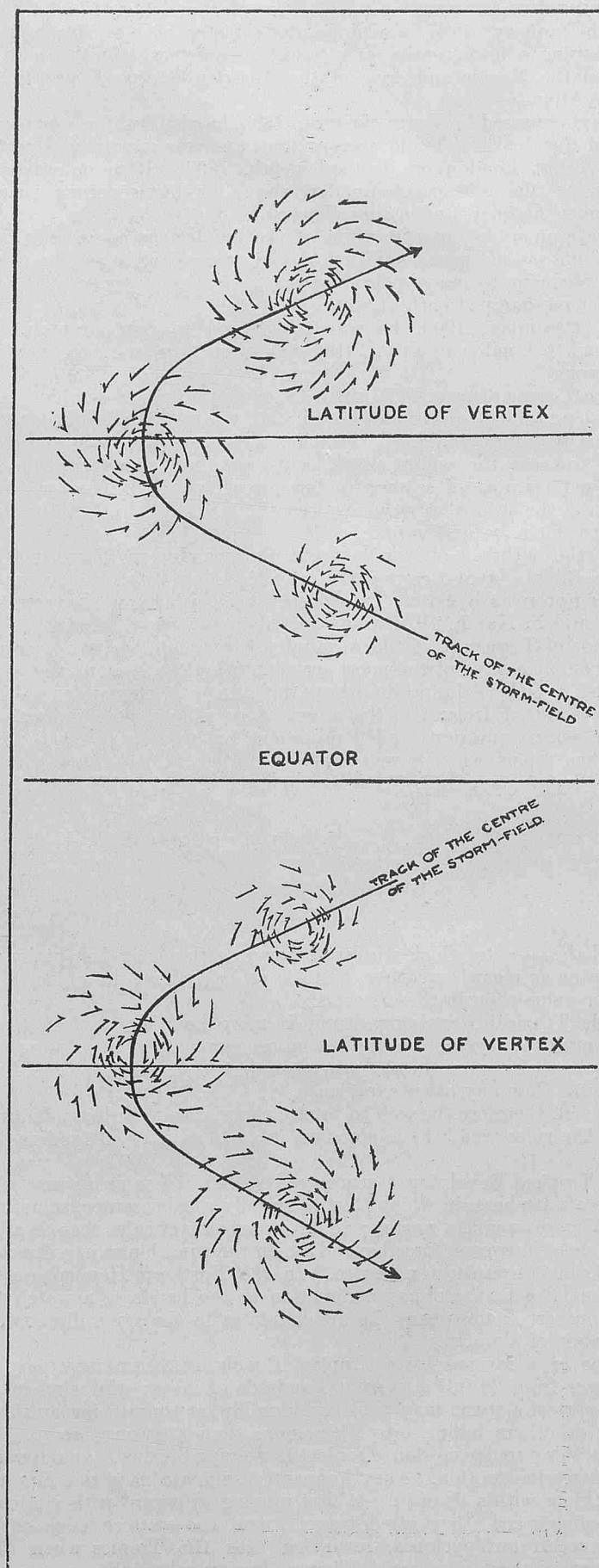


Fig. 13.



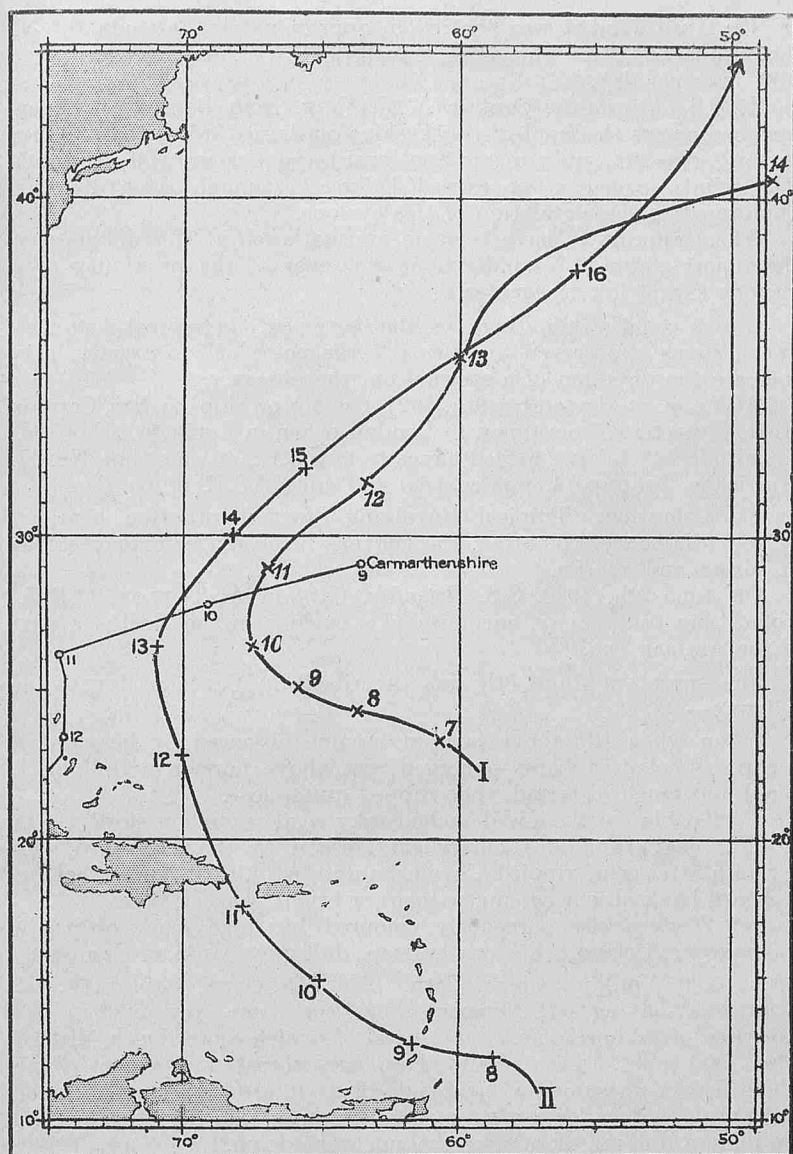


Fig. 14.—Tracks of September Hurricanes, 1921.

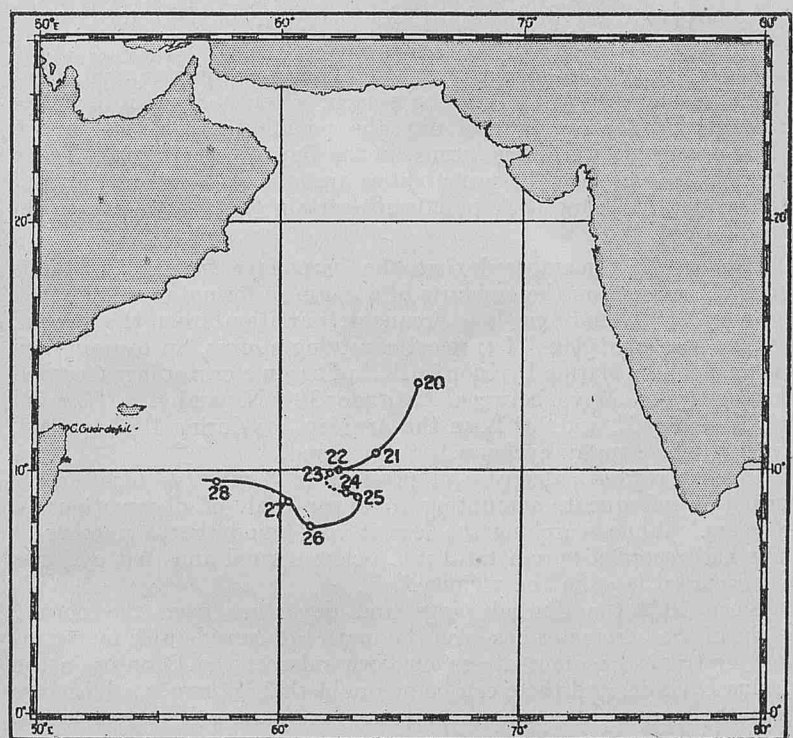


Fig. 15.—Track of Cyclone with noon positions, November 20–28, 1920.

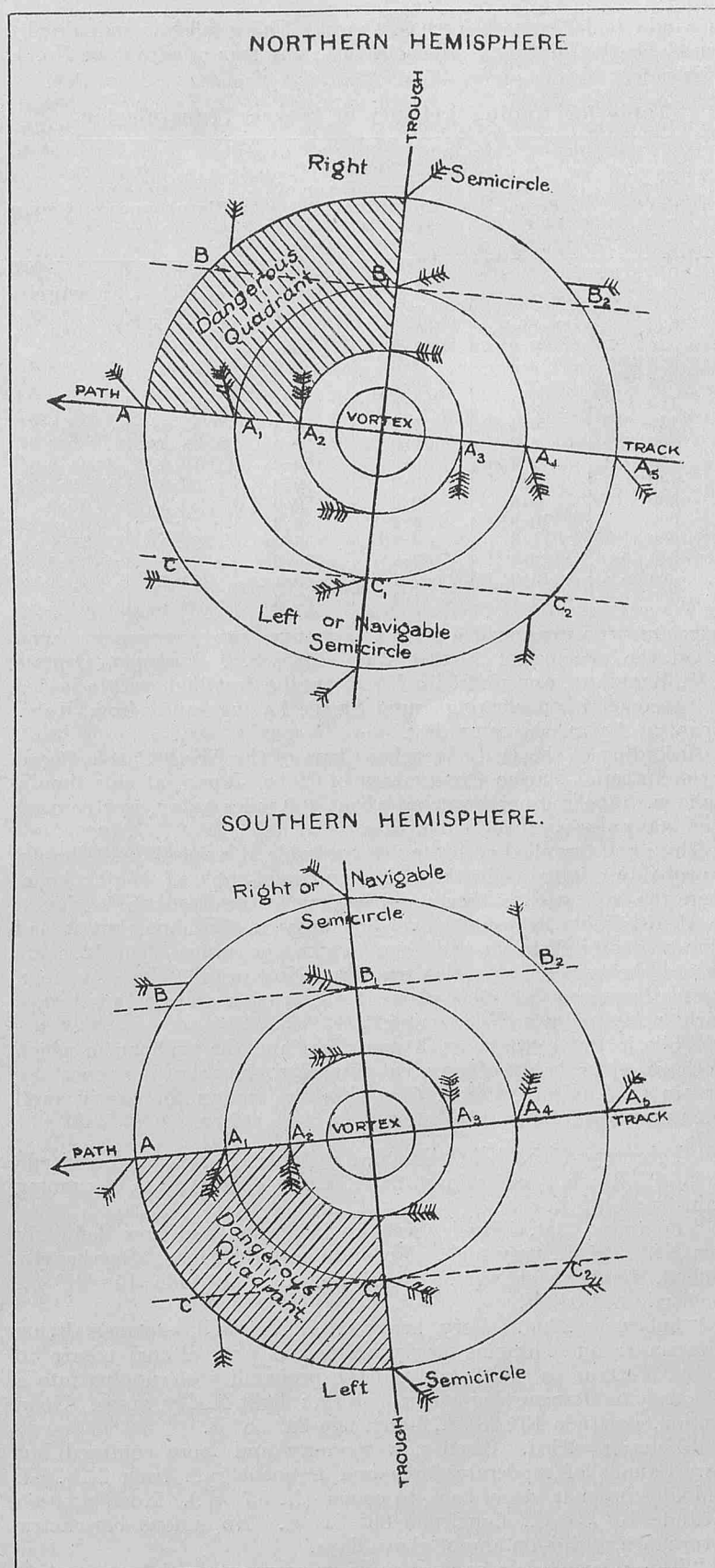


Fig. 16.

had fallen slightly, with the wind a gentle South-Easterly breeze. At this time a hurricane was centred some 900 miles to the Southward of *Carmarthenshire* in the Carribean Sea, of which she had received information by wireless. Had the period and length of the swell been taken it would have been shown by the table on page 72 that even if the swell could clear the Islands it could not have reached *Carmarthenshire* in the time from No. II. Hurricane.

The swell indicated the presence of No. I. Hurricane, the centre of which was distant within 100 miles to the Southward at 10 p.m. on September 9th. She passed ahead of No. I. Hurricane, experiencing

its wind circulation with force 5 at most. This swell was undoubtedly caused by the Southerly winds in the right rear quadrant of No. I. Hurricane.

Table for finding Velocity of Waves Transmission.

Wavelength in Deep Sea.	Wave Period.	Velocity of Transmission of Individual Waves in Deep Sea.		Velocity of Transmission of the Disturbance or Group in Deep Sea.	
		Feet per Second.	Nautical Miles per Hour.	Feet per Second.	Nautical Miles per Hour.
25	2.2	11.3	6.7	5.7	3.4
50	3.1	16.0	9.5	8.0	4.8
75	3.8	19.6	11.6	9.8	5.8
100	4.4	22.6	13.4	11.3	6.7
150	5.4	27.7	16.4	13.9	8.2
200	6.3	32.0	19.0	16.0	9.5
300	7.7	39.2	23.2	19.6	11.6
400	8.9	45.2	26.8	22.6	13.4
500	9.9	50.6	30.0	25.3	15.0
600	10.9	55.4	32.8	27.7	16.4
700	11.8	59.8	35.4	29.9	17.7
800	12.6	63.8	37.8	31.9	18.9
900	13.3	67.7	40.1	33.9	20.1
1,000	14.1	71.4	42.3	35.7	21.2

On the evening of August 15th, 1925, S.S. *Dardanus*, Captain D. T. WILLIAMS, experienced a S.S.E. swell 8 feet high with a period of 9 seconds when clearing Isumi Strait, having sailed from Kobe, Japan, at 4 p.m. the same day.

According to the Daily Weather Chart of the North Pacific Ocean of the Imperial Marine Observatory of Kobe, Japan, at this time a typhoon, travelling northward at about 200 miles a day, was centred some 300 miles south of Isumi Strait.

This swell travelled according to our table at a speed of  $13\frac{1}{2}$  knots. It probably originated in the right-hand semi-circle of the typhoon, where the wind was southerly and bearing to the Eastward of South.

At  $13\frac{1}{2}$  knots it would travel 300 miles in 22 hours, but it had come a greater distance and been in existence more than 22 hours because the typhoon was also travelling Northward. The typhoon eventually passed over this place of observation and the swell gave nearly a day and a half's warning.

While in this case the swell was slight and the typhoon in which it originated probably of no great intensity, the following report by Captain C. J. HIGGINS, S.S. *Glan Malcolm*, shows the heavy swell which may reach beyond the stormfield of a cyclone.

"February 20th, 1925. Noon, Latitude  $17^{\circ} 48' S.$ , Longitude  $91^{\circ} 23' E.$ , 3 p.m. Indications of a N.W. swell observed to be running against rough S.E. sea.

"February 21st. Swell gradually increasing and now definitely from N.W. P.M., very high. Moderate easterly winds. Sky heavily clouded, frequent showers. Noon position, Latitude  $15^{\circ} 21' S.$ , Longitude  $88^{\circ} 04' E.$

"February 22nd. Very heavy W.N.W. swell, steamer diving bows under and shipping heavy water. 5 p.m. altered course to N.  $10^{\circ} W.$  True to avoid seas and the probability of running into a stationary or slow moving cyclonic storm: light N.E.'ly winds. Noon position, Latitude  $13^{\circ} 23' S.$ , Longitude  $84^{\circ} 58' E.$

"February 23rd. Swell now westerly and more confused but less. Squalls of moderate force and frequent rain from N.N.W.: gradually brought vessel back to course (N.  $55^{\circ} W.$ ). Noon position Latitude  $10^{\circ} 35' S.$ , Longitude  $83^{\circ} 21' E.$  No serious barometric disturbance at ship on any of above days.

"The following is a copy of radio message received from Captain SCOTT of the S.S. *Bradford City* on 23rd showing weather he had encountered:—

"'Noon. Lat.  $10^{\circ} 02' S.$ , Long.  $82^{\circ} 37' E.$  Past two days we have had gales between S.E., S.W., and N.W. with heavy seas now moderating. Bound Sabang from Durban.'"

The following example is useful in that it shows that observations recorded indicate that there may be exceptions to the rule.

In April, 1922, a number of steamers were in a cyclone in the Arabian Sea in which the wind reached hurricane force near the centre. For the first four days of its known existence, April 18th to 22nd, it moved little.

On April 22nd it was centred in approximately Latitude  $10^{\circ} N.$ , Longitude  $69^{\circ} E.$ ; whence it travelled N.N.W. at not more than 100 miles per day.

R.M.S. *Macedonia*, Captain A. F. VINE, from Bombay to Aden, steamed across the front of this cyclone on April 23rd, its centre then distant some 400 miles to the Southward and Eastward of her track. The winds logged never exceeded force 3 though their direction conformed to the circulation of this cyclone.

There appears to have been no unusual swell at this distance, as the report stated "No indications whatever of the proximity of a cyclone except low barometer."

**Cirrus clouds** originating over the vortex extend to great distances. When cirrus is observed forming a V the point of convergence may indicate the direction of a storm from the observer.

At 8 a.m. on September 9th, 1921, the Motor Ship *La Paz*, Captain C. H. CHRISTIAN, from Colon to London, when in Latitude  $20^{\circ} 00' N.$ , Longitude  $64^{\circ} 45' W.$ , logged cirrus from S.S.E., at this time No. II. Hurricane, FIGURE 14, was centred 400 miles S.S.E. of *La Paz*.

**Sky Colouring.** Tropical Revolving Storms are often heralded by remarkable sky colouring, the heavens being red or copper colour at sunset and sunrise.

On June 9th, 1920, S.S. *Rotenfels*, Captain A. TAYLOR, O.B.E., from Basra to Bombay, encountered a cyclone in the Northern part of the Arabian Sea.

The sunset of June 8th was described by Captain TAYLOR as follows:—

"Sun when  $10^{\circ}$  above horizon became obscured by heavy dull coppery coloured bank—emerged just above horizon a dull brick red and much distorted, then dipped quite clear.

"To the North, low detached inky scud travelling slowly from N.E., heavy Cumulus clouds on horizon to the Eastward. In zenith streaks of rippled Cirro-Cumulus just tinted copper colour. Above bank obscuring sun, patches of bright peacock blue.

"Western sky gorgeously coloured by huge bank of bright coppery red cloud. Eastern horizon, dull grey banks of Cumulus."

At 6.30 p.m. on August 24th, 1924, S.S. *Orari*, Captain F. W. ROBINSON, having left Newport News, the same day was on the outskirts of a hurricane, the centre of which bore South distant about 300 miles. They observed an ugly threatening sunset. The whole heavens assumed a lurid red colour intermingled with orange and purple lasting for a matter of ten minutes, the sky to windward retaining a dull red glow after the sun went down.

**The Barometer.** Apart from the fall of the barometer at any place over which a tropical cyclone passes there are precursory signs which are of very great importance.

According to Sir JOHN ELIOT, for many years Director-General of Observatories in India:—

"In the Bay of Bengal. If the reduced barometer reading is, at any time during the cyclone season, a tenth of an inch below the normal for the time of day, the possibilities are two to one that a cyclonic storm has formed in the Bay; if the decrease below normal is 0.15 inch the probabilities are at least three to one, and if two-tenths below it is practically certain that a cyclonic storm has formed."

It must be remembered that the barometer frequently stands above the normal on the outskirts of a storm in formation.

In order to find out how frequent, variation from the normal pressure was in regions of tropical revolving storms, an examination was made in the Marine Division in 1922 of barometer readings recorded four-hourly in May, between Latitude  $10^{\circ} N.$  and  $12^{\circ} N.$ , and Longitude  $60^{\circ} E.$  and  $70^{\circ} E.$  in the Arabian Sea during 1857 to 1905, a region where many cyclones have occurred.

In that region a decrease of pressure of 3 mb. ( $\frac{1}{10}$  inch) below normal is infrequent, amounting to 6 per cent. of observations in 48 years. While searching the logs it was found that a number of ships had recorded barometer 3 mb. below normal and that cyclones had occurred later in the vicinity.

Since 1922 the diurnal range and departure from the normal height of the barometer has been the matter of considerable investigation for tropical regions at sea on both sides of the Equator in the Marine Division, and there can be no doubt that if there is a departure from the normal atmospheric pressure for the time of day of 3 mb. ( $\frac{1}{10}$  inch) or more, the mariner may expect that a cyclone has formed or is forming in the vicinity and he should be on the alert



for other signs.

The following tables give the correction for diurnal variation in atmospheric pressure over the ocean between Latitude 10° to 20° N. and Latitude 10° and 20° S. for all longitudes. They are constructed from a great many observations for the years 1921 to 1924, and may be used for our purpose for all tropical regions with sufficient accuracy.

Tables to correct Barometric Pressure for Diurnal Variation.

Lat. 10° to 20° N. in all Longitudes at Sea.

Ship's Time.	Northern Spring.		Northern Summer.		Northern Autumn.		Northern Winter.	
	Mbs.	Ins.	Mbs.	Ins.	Mbs.	Ins.	Mbs.	Ins.
4 a.m. -	+ 0.8	+ .02	+ 0.7	+ .02	+ 0.8	+ .02	+ 0.3	+ .01
8 a.m. -	- 1.1	- .03	- 0.9	- .03	- 0.9	- .03	- 0.9	- .03
Noon -	- 0.9	- .03	- 0.6	- .02	- 0.7	- .02	- 0.6	- .02
4 p.m. -	+ 1.3	+ .04	+ 1.2	+ .04	+ 1.3	+ .04	+ 1.4	+ .04
8 p.m. -	+ 0.1	.00	+ 0.1	.00	- 0.1	.00	0.0	.00
Midnight -	- 0.4	- .01	- 0.3	- .01	- 0.3	- .01	- 0.2	- .01

Lat. 10° to 20° S. in all Longitudes at Sea.

Ship's Time.	Southern Spring.		Southern Summer.		Southern Autumn.		Southern Winter.	
	Mbs.	Ins.	Mbs.	Ins.	Mbs.	Ins.	Mbs.	Ins.
4 a.m. -	+ 0.6	+ .02	+ 0.7	+ .02	+ 0.7	+ .02	+ 0.5	+ .02
8 a.m. -	- 1.0	- .03	- 1.0	- .03	- 0.8	- .02	- 0.9	- .03
Noon -	- 0.5	- .02	- 0.4	- .01	- 0.4	- .01	- 0.4	- .01
4 p.m. -	+ 1.4	+ .04	+ 1.3	+ .04	+ 1.1	+ .03	+ 1.2	+ .04
8 p.m. -	- 0.0	.00	- 0.1	.00	- 0.2	- .01	- 0.2	- .01
Midnight -	- 0.5	- .02	- 0.4	- .01	- 0.4	- .01	- 0.5	- .02

It should be clearly understood that the absolute pressure, *i.e.*, the barometer reading corrected for index error, temperature, height and gravity only, as explained in Chapter I should be reported by wireless or logged; this correction for the diurnal range should be applied by the receiver of a wireless report or to his own barometer observation for comparison with the normal atmospheric pressure as given on the Ocean Meteorological Chart for the month. *On no account should this correction be applied before entry in the log or for use in a report.*

We have been taught for many years in order to pass the Board of Trade examination for Master and Mate that "a cessation of the diurnal range may fortell a tropical revolving storm."

Now the diurnal range of the barometer is due to atmospheric pressure waves which sweep regularly round the earth from east to west, being at a maximum in the tropics where they are clearly

indicated by the rise and fall of the barometer. That they cease when there are violent atmospheric disturbances is not proved by observation, for if hourly barometer readings are plotted and a curve drawn through them, it would be found that the diurnal range continues right into a cyclone, though when the gradient is steep or the storm is passing quickly over the place of observation this range is masked by the rapid fall of the mercury.

As there are some who still cling to the belief in this old fallacy, *i.e.*, that "a cessation of the diurnal range foretells a tropical revolving storm" it will be well to give three experiences—one of the present Principal Examiner of Masters and Mates, one of my own, and one of Captain R. H. DOMINY, C.B.E., who is still at sea and an active member of the Corps of Marine Observers.

In FIGURE 17 are plotted the observations of wind and barometer observed in S.S. *Mahratta*, Captain W. ELLERY, on June 23rd to 25th, 1907 from Calcutta to Colombo. At this time *Mahratta* was in the after part of the stormfield of a cyclone off the coast of Bengal which travelled north and passed near Calcutta at about midnight on June 24th, 1907. The observations were logged from after the pilot left at the Eastern Channel.

It will be noted that the diurnal range continued.

FIGURE 18 is constructed with the observations in a Meteorological Log in my own handwriting and in which I took many of the observations, so that I can personally guarantee its accuracy. It was kept on board R.M.S. *Orontes*, Captain J. F. RUTHVEN, from whom and in which ship there is no one I have learnt more of the scientific side of a seaman's duties.

We were making the passage from Colombo to Fremantle in January, 1907, and experienced the S.E. trade which sprang up, as so often happens with a shower of rain, in the Indian Ocean, at 9 p.m. on January 23rd when six degrees south of the Equator. The S.E. trade was steady, gentle to moderate, until midnight on 25th when it fell light and veered to south, the diurnal range being well marked. After noon on January 25th the barometer, still continuing to show the diurnal range, fell below the normal and remained below normal to the extent of just over 2 mb. for the time of day at each recorded observation until 4 a.m. on January 26th.

At 8 a.m. on January 26th it was 3.3 mb. below normal.

Now at 8 a.m. and until about 10 a.m. in the tropics the barometer is rising, but if the approach or development of a depression causes a reduction in the atmospheric pressure then, although the crest of the wave in the pressure of the atmosphere is also approaching, the reduction of pressure due to the depression may be greatest, and when this happens the net result is a fall of the barometer during the period when it would be normally rising. The diurnal range had not ceased, but the barometer was now steadily falling from its normal height in this locality.

At 8 a.m. on January 26th, 1907, this departure from the normal of 3.3 mb. was a distinct warning, and to wait longer to see if the barometer would rise as it should was unnecessary. The fall from normal

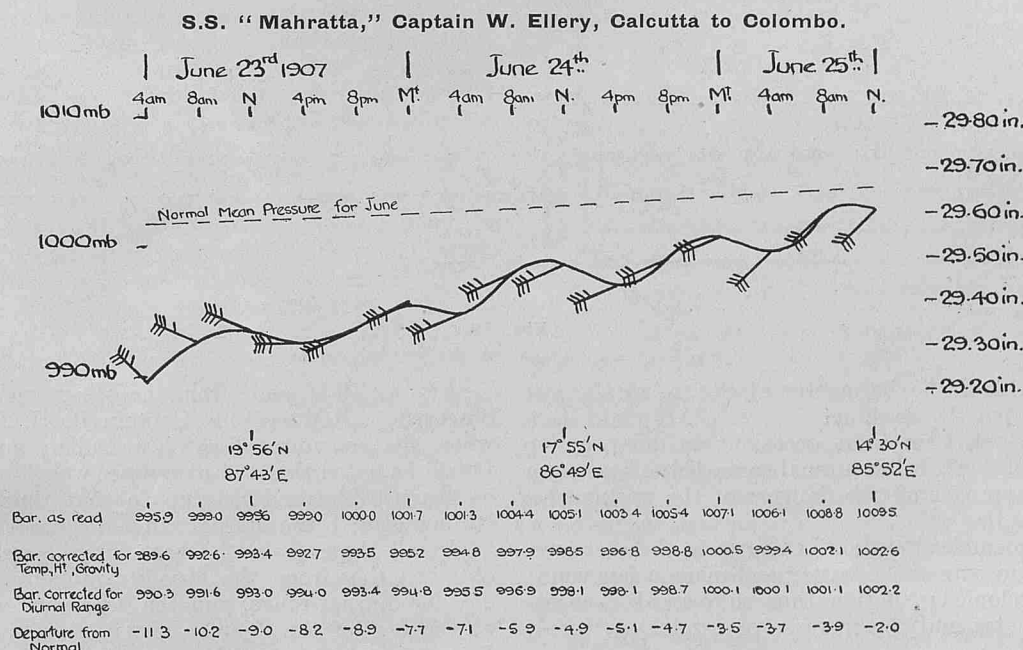


Fig. 17.

## R.M.S. "Orontes," Captain J. F. Ruthven, Colombo to Fremantle.

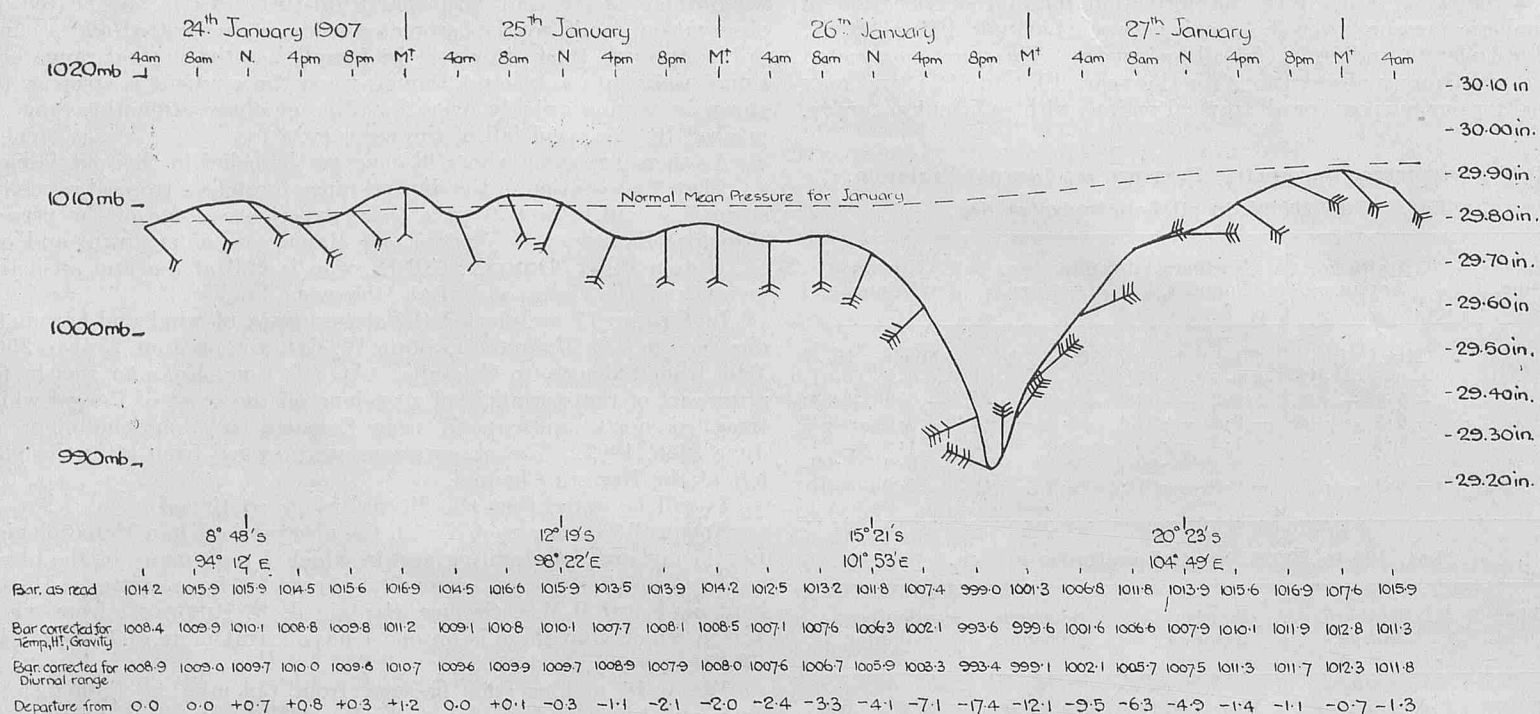


Fig. 18.

## R.M.S. "Orita," Captain R. H. Dominy, Havana to Vigo.

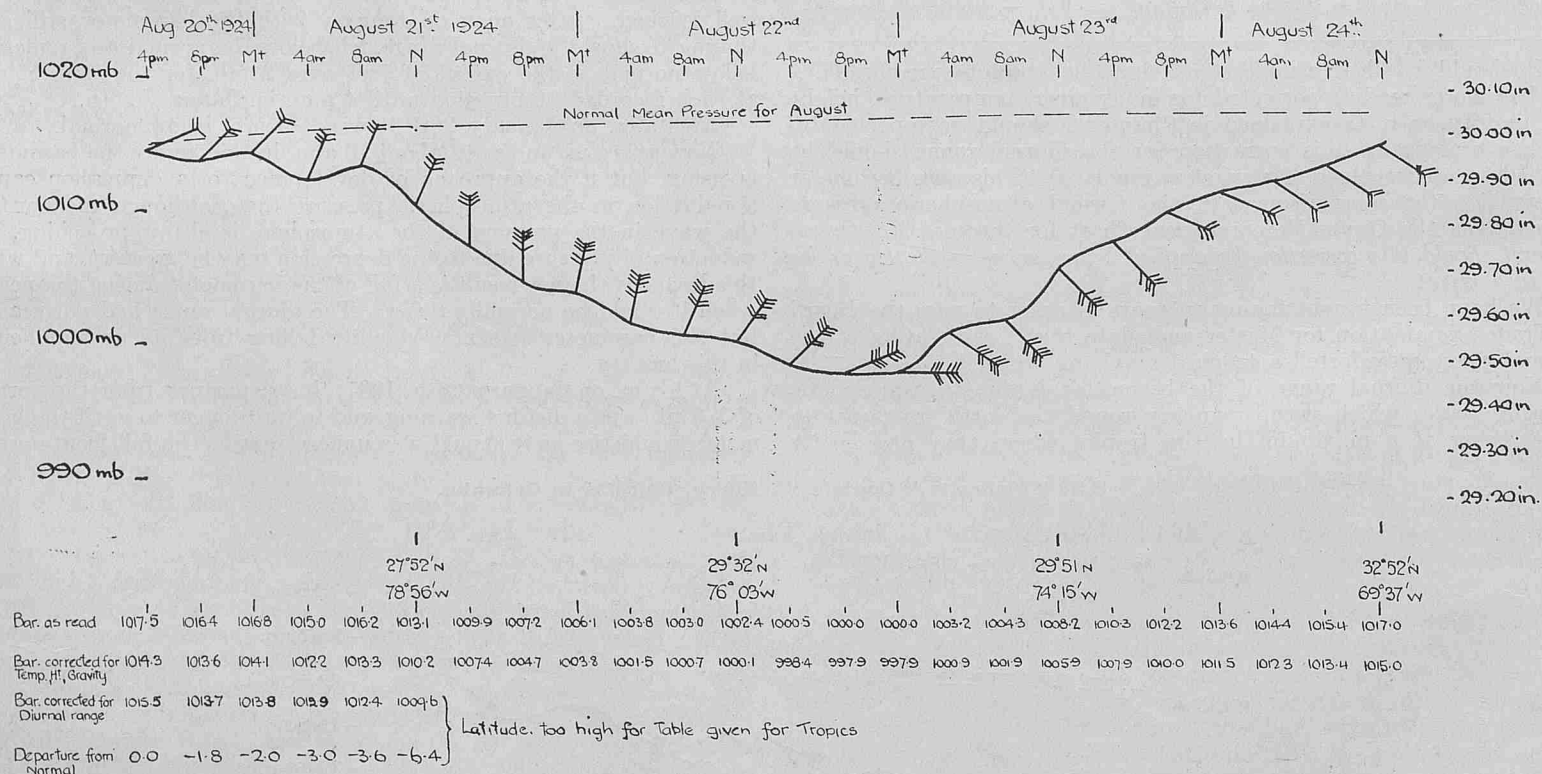


Fig. 19.

and not the relative height of the barometer at 8 a.m. to the last reading at 4 a.m. constituted the warning.

It is quite conceivable that on some occasions to delay action when there is a departure of 3 mb. below normal to see if the barometer rises again might mean approaching the dangers of the vortex of a cyclone.

In this case by quite a small alteration of course to the eastward, Captain RUTHVEN passed in rear of the vortex and made a fair wind of the N.E. gales in the cyclonic circulation, thus, so to speak, "checking the fall of the barometer and the increase of wind by a timely touch of the helm."

FIGURE 19 is made from the observations of wind and barometer observed in R.M.S. *Orita*, Captain R. H. DOMINY, Havana to Vigo, when she encountered a West Indian hurricane in August, 1924. It will be noted that the barometer was 3 mb. below normal at 4 a.m. on August 21st and that up to that time the rise and fall of the barometer with the diurnal range of pressure is clearly shown.

In all these cases the barometer as read, the absolute pressure obtained therefrom, the absolute pressure corrected for the time of day for diurnal range, and the departure from the normal are given at the foot of the figure. The positions of the ships are also given for noon each day and the normal pressure for the month at the place



is shown by a peaked line in the figure.

Let us see how the normal is obtained in this instance. Referring to the Meteorological Chart of the North Atlantic for August it will be noted that the isobar 1016 (30·00) passes N.W. by W. through *Orita's* 8 a.m. position on August 21st while the 1014 (29·94) isobar passes to the westward just north of Jamaica and across the Mosquito Coast. Thus by interpolation the exact normals may be obtained at each position along *Orita's* track, and under normal conditions the barometer corrected for diurnal range would have risen slowly as she proceeded to the northward, where on the average the barometer is higher.

That there may not be a departure of 3 mb. ( $\frac{1}{10}$  inch) below the normal in a vicinity where a cyclone has formed or is forming is true; proof of which was given in the cyclone reported by the steamships *Clan Macindoe*, *Clan Macfadyen*, *Titan*, *Mantua* and *Glenishane*, on November 24th, 1925, in the Bay of Bengal. On this occasion neither the coast station observations published in the Indian daily weather report nor the mercurial barometer readings in ships' meteorological logs revealed an appreciable departure below the normal, and a cyclone developed before 6.30 a.m. on November 24th, 1925, in the Southern part of the Bay of Bengal and was in existence until the morning of November 28th when it filled in near Madras.

Again on May 19th, 1926, S.S. *Risaldar*, Captain G. PARK, who has made a special study of cyclones, recorded barometer readings less than 2 mb. below normal, and logged every appearance of fine weather as he proceeded from Colombo towards Calcutta. At this time a cyclone had formed in the S.E. portion of the Bay, and on May 21st S.S. *Burma* experienced winds of storm force in its rear to the westward of the Andamans.

This cyclone wrought great havoc at Akyab on May 23rd, 1926, and on Empire Day hurricane winds visited Calcutta doing damage at Kidderpore Dock.

As there may be no precursory signs sufficiently distinct to observe at sea, there is all the more reason for the invitation to regular observing ships, shown on our list to have the equipment, to report daily as a matter of routine by wireless to all ships so that a weather chart may be made upon which the collective information will be less likely to fail in giving evidence of tropical revolving storms.

### Rules for Handling Ships.

Young officers will do well to reproduce the storm cards given in CHAPTER I on tracing paper, as it is most necessary to thoroughly understand why the wind veers, backs, or retains one direction for a time in a cyclonic storm when a ship is hove to and nearly stationary, or when she is proceeding at speed. FIGURE 16 will help us here.

In the Northern hemisphere let *B* be the position of a ship hove to; if this is indicated by a dark spot on a sheet of white paper, and the transparent card drawn across it from right to left representing a revolving storm moving west, the shifts of wind will conform to the arrows at *B. 1* and *B. 2*, that is, the wind *veers*.\*

Replace the spot at *B. 2* by a small piece of lead attached to the end of a piece of twine, with the left hand draw the lead to the left, at the same time moving the storm card over the lead in the same direction, but slower than the lead; it will be noted that the wind will *back*.\* This represents a ship sailing or steaming in the same direction but faster than the storm. The exercise may be carried out to represent every conceivable example and will be far more useful than learning any rules by heart.

Similarly, if values be assigned to the isobars represented by the circles on the card, the behaviour of the barometer in a cyclonic storm retaining the same gradients may be understood.

Having mastered this it will be a simple matter to grasp the following rules which were laid down for sailing ships. When there is reason to believe that a revolving storm is approaching, it is

\* The terms Veer and Back are used in accordance with those laid down by the International Meteorological Conference for both Hemispheres.

i.e., *Veering*. West to North to East to South.

*Backing*. West to South to East to North.

Formerly at sea we used these terms in the sense that the wind *veered* when the shifts were with the sun and that it *backed* when the shifts were against the sun.

Thus shifts from East to West through South in the Northern hemisphere were termed veering, while in the Southern hemisphere they were termed backing.

The old terms should not be used for they will only cause confusion, since International Agreement has been obtained.

necessary to know, first, the bearing of the vortex, and second, which semicircle the ship is in.

In order to ascertain these it is necessary for a single observer to be stationary. Therefore, *heave to*, assuming that you are in the dangerous quadrant.

In North Latitude *heave to* on the Starboard Tack. In South Latitude *heave to* on the Port Tack.

Derived from average indraft and Buys Ballot's Law, the following rule for finding the bearing of the centre was laid down in the Barometer Manual.

"Face the wind and the centre will bear 12 points to the right in the Northern hemisphere at the commencement of the storm; when the barometer has fallen 10 mb. ( $\frac{3}{10}$  inch), 10 points to the right; and when the barometer has fallen 20 mb. ( $\frac{6}{10}$  inch) or more, 8 points to the right.

"In the Southern hemisphere, facing the wind, the centre bears 12 points to the left at the commencement of the storm; when the barometer has fallen 10 mb. ( $\frac{3}{10}$  inch), 10 points to the left; and when the barometer has fallen 20 mb. ( $\frac{6}{10}$  inch) or more, 8 points to the left."

There are known to be variations from this rule; for instance, Dr. MELDRUM found from a great many observations in the South Indian Ocean, that north-easterly, and easterly winds often blow almost directly towards the centre in the region of Mauritius.

Individual examples cannot be taken for establishing rules, but examples are useful in that, if they do not prove the amount of indraft on their occasions, they illustrate the need for caution in accepting the rule, and the need for carefully recorded observations of wind direction, position and barometer, also time, for the purpose of establishing rules by averages.

At 5.20 p.m. on February 13th, 1904, a steamer was in the centre of a cyclone in the South Indian Ocean. R.M.S. *Orontes*, Captain J. F. RUTHVEN, at this time was 75 miles distant, bearing N.W.  $\frac{1}{2}$  N. and logged wind N.W. by W., her barometer having fallen 12 mb. since she entered the outskirts of the storm. The dead reckoning positions of both ships were carefully checked, working both backward and forward from celestial fixes, and have been plotted in FIGURE 20, which shows the number of points the centre lay to the left of the direction facing the wind, also the theoretical bearing by Rule.

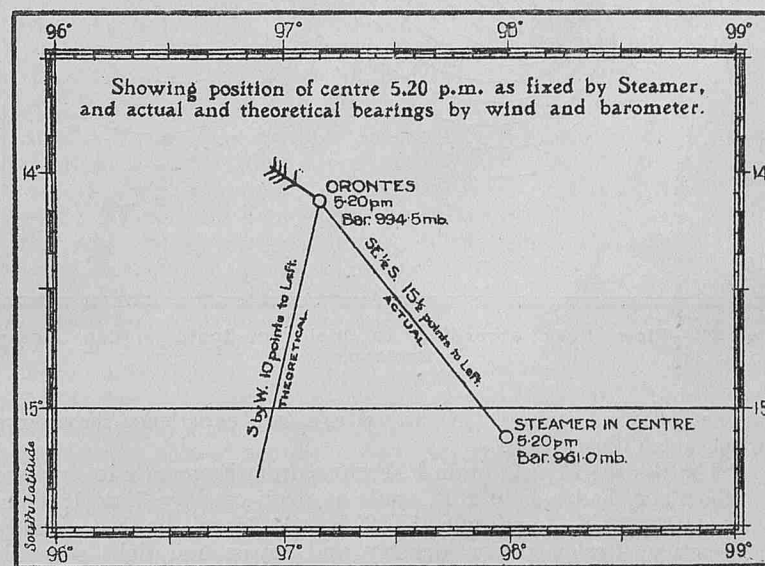


Fig. 20.—Cyclone, S. Indian Ocean, February 13th, 1904.

Another example has been given in CHAPTER III, with special reference to time.

**In the Northern Hemisphere.** Having hove to on the starboard tack if the wind veers, the ship is in the right semicircle; remain hove to, as the wind shifts she will come up and head the sea.

If the wind remains steady in direction and increasing in force with falling barometer, the ship is near, or on the path, run with the wind on the starboard quarter; this will take the ship into the left or navigable semicircle. If the wind backs, the ship is in the left semicircle, run with the wind on the starboard quarter until the barometer rises.

**In the Southern Hemisphere.** Having hove to on the port

tack, if the wind backs the ship is in the left semicircle, remain hove to, as the wind shifts she will come up and head the sea.

If the wind remains steady in direction and increasing in force with falling barometer, the ship is near or on the path, run with the wind on the port quarter; this will take the ship into the right or navigable semicircle.

In the South Indian Ocean on the southern side of a cyclone there is a strong S.E. wind. It is therefore difficult to tell when the S.E. Trade forms part of a cyclone.

In the South Indian Ocean if the S.E. Trade increases to a gale it is wise to heave to and watch the barometer. If the wind shifts to the south or east the passage of the centre with respect to the ship may be inferred.

If the wind shifts from S.E. towards south, run with the wind on the port quarter in a direction northward of west.

If the wind remains steady and increases in force and the barometer falls, it is probable that the ship is on the path of the storm, a most dangerous position. In such case when the barometer has fallen 20 mb. ( $\frac{6}{10}$  inch) the bearing of the centre may be nearly 8 points from the wind direction, and it is best to run to the northward of west, keeping the wind well out on the port quarter.

By running to the North-Westward with a South-Easterly wind before the barometer has fallen 20 mb. you may be heading direct for the centre, because in these cyclones South-Easterly winds, except close to the centre, have a great indraft. An examination of FIGURE 21, which gives, according to MELDRUM, flow lines of wind which are mainly conjectural but are supported by observation, will make the reasons for the rules for the South Indian Ocean clear.

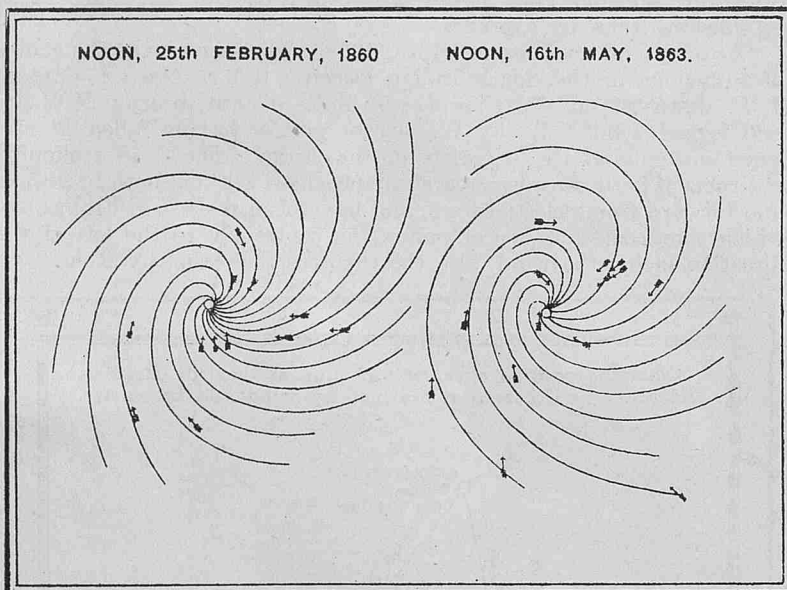


Fig. 21.—Flow lines according to Meldrum—South Indian Ocean Cyclone.

The following example in the writer's own experience may serve further as an illustration.

"The Barque *Peri*, Captain F. FISHER, from Fremantle to London, via the Cape, had a light S.E. trade at noon on May 31st, 1898, in Latitude 17° 59' S., Longitude 77° 53' E. At 2 p.m. the trade, steady in direction, freshened considerably and royals and light staysails were furled, by 2.30 p.m. the wind increased to a moderate gale, force 7, all hands were called and sail was shortened to lower topsails and fore topmast staysail.

"In the first dog watch the wind steady from S.E. had increased somewhat, and the weather looked dirty, the fore topsail and fore topmast staysail were stowed and the ship hove to on the port tack.

"At about four bells in the first dog watch the wind moderated a little but soon increased to a strong gale, veered a little, and there

were frequent showers. During the second dog watch the wind was from S.E. by S., force 9, squally with rain. At about eight bells the fore lower topsail and fore topmast staysail were set, the yards squared in, and the ship kept away with the wind on the port quarter, steering W.N.W. The foresail reefed and upper topsails were next set, but when an attempt was made to sheet home the main topgallant sail, it blew to ribbons.

"During the first watch the wind veered. By midnight a whole gale was blowing with heavy squalls and high sea and the wind had veered to S.S.W. From midnight the wind moderated and the weather improved.

"On June 2nd, 1898, at noon in Latitude 19° 13' S., Longitude 72° 39' E., we had a moderate trade wind with passing showers. That day we spoke the Ship *Aristomene* from Chittagong to Dundee, and she reported having lost a complete suit of sails and sustained other damage on May 31st in Latitude 16° S., Longitude 80° E., and that she was putting into Mauritius for repairs."

Years afterwards, in examining the records of the Alfred Observatory, Mauritius, the following entry was found:

"Ship *Aristomene*, May 30th to 31st, 1898, Latitude 16° 42' S., Longitude 79° 07' E., to Latitude 17° 08' S., Longitude 77° 17' E., wind force 11. Variable from S.E., sudden shift to S.S.W. and S.W., terrific squalls with high dangerous sea."

Now, at noon on May 31st, *Peri* was S.E. by S. 62 miles from *Aristomene*: later the ships were probably nearer together. From the fact that *Aristomene* had a sudden shift of wind from S.E. to S.S.W. it may be inferred that she was in the right semicircle at that time.

Her course for rounding the Cape was E.S.E., and it seems likely that this cyclone had recurved and was travelling in a South-Easterly direction.

By heaving to with a strong South-Easterly wind and waiting until the barometer had fallen, Captain FISHER was able to obtain a more reliable bearing of the centre, and also to establish that he was near the path of the storm. By running to the northward of West with the wind on the port quarter he avoided the centre and the strongest winds and heaviest seas, and made a fair wind of it.

The foregoing rules were laid down for sailing ships based upon much experience and the result of many researches. This experience was probably the most valuable contribution which is ever likely to be made to Marine Meteorology, for it embodied examples whereby it was first found that the wind circulated round a calm centre. There were cases where ships scudding before the wind made several complete circles. Probably the most notorious cases being those of the Brig *Charles Heddle* in February 1845, and the Ship *Earl Dalhousie* in May 1863, in the South Indian Ocean.

These rules are of great value to steamers. With wireless telegraphy it may often happen that by obtaining reports from ships in the vicinity of a Tropical Revolving Storm, commanders may be in a position to avoid them altogether.

However, there may not be reporting ships in the wind circulation of a Tropical Revolving Storm, from whose observations the centre may be fixed, and direction of movement determined; while pressure of circumstances or absence of sea room may render such a course often impossible.

Warnings by wireless telegraphy giving the position and probable movement of storms are made by many Weather Offices, but it should always be remembered that these can only be reliable, if reliable information from the vicinity of the storm is available at the Weather Office. Hence the need for reports to shore stations as well as to "All Ships."

Once a ship enters the wind circulation of a storm her commander will be best guided by his own observations, and reports from other ships in the vicinity, and in the next Chapter examples will be given where commanders have in recent years proved the soundness of this system. We shall also show how to use a Weather Chart, and how advantageous these are in Cyclone Navigation.

(To be continued.)

NOTE.—Plates produced by Lithographic process, including Charts and other large diagrams, will be found in each number after "Weather Signals."



## ICE IN THE WESTERN NORTH ATLANTIC.

PREPARED IN THE MARINE DIVISION BY J. HENNESSY, SENIOR NAUTICAL ASSISTANT.

THE following monthly summary of Ice conditions in the Western North Atlantic during 1926 is compiled from Ice reports returned by ships of the Voluntary Observing Fleet using the Trans-North Atlantic routes and from the Bulletins issued by the International Ice Patrol Service.

The accompanying Chart shows the monthly limits within which reports of ice have been received by the Meteorological Office during the year 1926, also the monthly limits reached by ice over the period 1901-1926. The limits defined by this chart are obtained from the reports of vessels, the majority of which are following tracks specially laid down to avoid ice as far as possible. Ice may therefore exist outside the limits shown on the chart.

Commanders of ships passing through the Ice regions are earnestly requested to continue to return Ice Report (Form 912) regularly. A "Nil" return is desired if no ice is seen.

## Ice Conditions in 1926.

**January** :—No ice reported during the month.

**February** :—During the latter half of the month extensive fields of ice made their appearance in the Western North Atlantic, causing great menace to shipping, especially off the North East Coast of Nova Scotia. S.S. *Thyra* was held fast in the ice off Louisberg, and S.S. *Beothic* was jammed in the ice for over two weeks outside Sydney, N.B.

Ice was reported extending for 25 miles off Liscomb and several vessels sustained damage in navigating a heavy field between the 13th and 18th of the month extending from Latitude 44° 46' N., Longitude 58° 57' W., to Latitude 44° 40' N., Longitude 60° 28' W., in a north and south direction as far as could be seen.

On the 13th light floes were reported in Latitude 47° 50' N., Longitude 47° 50' W., and heavy slob ice from Latitude 47° 39' N., Longitude 51° 25' W., to St. Johns. On the 27th patches of field ice and growlers were reported between the 46th and 47th parallels and the 47th and 49th meridians.

**March** :—Large fields of heavy ice were reported throughout the month between the 46th and 50th parallels and the 46th and 50th meridians. Heavy field ice was also reported on the 21st and 23rd east of Sable Island, between Latitude 44° and 45° N., Longitude 57° and 59° W.

The first berg of the season was reported on March 11th together with four growlers in Latitude 48° 34' N., Longitude 46° 15' W. On the 19th and 20th four large bergs, three small bergs and numerous growlers were reported between Latitudes 45° 54' and 45° 10' North and Longitudes 46° 30' and 48° 09' West.

On the 25th the U.S.C.G. Cutter *Tampa* sailed from Boston for the Grand Banks to take up International Ice Patrol duties.

On March 26th and 30th, bergs were reported in Latitude 45° 08' N., Longitude 48° 12' W., and Latitude 46° 10' N., Longitude 47° 24' W., respectively.

**April** :—In the River St. Lawrence, from Montreal to Lake St. Peter, solid ice existed on the 12th, eastward to Quebec the channel was open. In the Gulf of St. Lawrence from Quebec to Fame Point, no ice; elsewhere, heavy closed packed ice.

On April 25th navigation of the St. Lawrence was opened by the arrival of six Trans-Atlantic liners at Quebec. On the 29th Montreal harbour was reported clear, but Lake St. Peter was not expected to clear for two or three days.

Towards the end of the month heavy fields of Gulf ice were met and navigated with difficulty by ships approaching Cabot Straits. On the 26th a medium sized berg was reported in Latitude 46° 10' N., Longitude 57° 56' W. The Gulf of St. Lawrence Ice Patrol was taken up this month by the Canadian Government ice breaker *Mikula*.

In the Western North Atlantic, Copenhagen, reported on April 7th : "Few Icebergs south of Cape Farewell on the 59th parallel" and on the 29th "Ice free 50 miles off shore of Cape Farewell. In Julianehab Bay ice limit 60 miles off shore, in edge packed ice."

In the vicinity of the Grand Banks heavy and extensive ice fields were reported throughout the month between the 44th and 49th parallels and the 45th and 50th meridians. Numerous bergs were also reported between Latitudes 44° 06' and 47° 40' N., Longitudes

44° 03' and 48° 08' W.

On the 24th, Belle Isle reported "Heavy close packed ice everywhere. Eighty-seven bergs and numerous growlers in sight."

An abnormal drift was reported on the 16th when the Trawler *Orizaba* sighted a piece of ice about 40 feet long and three feet high in Latitude 61° 03' N., Longitude 10° 30' W.

**May** :—On May 2nd *Montcalm*, bound for Montreal, reported that she met the Gulf ice when 100 miles east of Cape Ray. From 20 miles east to 20 miles west of Cape Ray closely packed ice with some very heavy pieces. Several ships arriving at Montreal early in the month sustained damage in navigating the ice.

On May 12th the Canadian Signal Service reported scattered ice in the vicinity of Cabot Straits and Magdalen Islands not interfering with navigation. After this date no further ice was reported in the Gulf excepting in the vicinity of Belle Isle Straits, where on the 19th heavy close packed ice, 110 bergs and numerous growlers were reported.

In the Western North Atlantic during the first half of the month extensive fields of ice were reported between the 44th and 49th parallels and the 46th and 49th meridians. On May 11th, *Montcalm* entered a heavy ice field in Latitude 47° 42' N., Longitude 47° 25' W. Within the field were numerous bergs and growlers, some of the field being too heavy and hummocked for the ship to force. Field was cleared in Latitude 47° 56' N., Longitude 47° 57' W.

No reports of field ice were received after the 15th of the month.

Throughout the month numerous reports of bergs were received within the limits of Latitudes 40° 50' and 50° 30' North, Longitudes 43° and 53° West. Ships navigating on tracks "E" and "F" reported large numbers of bergs. In the second half of the month the bergs drifted south of the Tail of the Bank. On the 21st, four bergs were reported aground on the Tail, and on the 22nd the Ice Patrol Cutter sighted 20 bergs between Latitudes 42° 27' and 43° 10' North, Longitudes 49° 10' and 50° 27' West. This ice was situated in the heart of the Arctic discharge and was moving westward at 0.6 knots. On the 26th, six bergs were sighted in the vicinity of Latitude 42° 25' North, Longitude 50° 00' West, and the Patrol advised ships to keep south of the 42nd parallel between the 49th and 51st meridians. On May 30th, ice was reported in Latitude 40° 50' N. Longitude 47° 47' W.

**June** :—No ice was reported in the Gulf of St. Lawrence other than in Belle Isle Straits, where on the 11th the Canadian Signal Service reported numerous bergs and growlers, heavy close packed ice at Pt. Amour and heavy open ice at Belle Isle.

On June 1st Copenhagen reported "Ice free 5 miles off Cape Farewell, ice belt 5 miles off Angmagsalik."

In the Western North Atlantic the limits in which bergs were reported during the month lay between the 41st and 53rd parallels and the 44th and 54th meridians.

At the beginning of the month, owing to the southerly drift of ice south of the Tail, ships were ordered to operate on Track "A." Towards the end of the month all the ice in this area and northward along the east side of the Bank had dissipated, and at midnight on June 30th the International Ice Patrol was discontinued for the season.

On June 25th an abnormal drift of ice was reported by S.S. *Baxtergate*, who passed close to a piece of ice about 30 feet long 15 feet wide showing 3 feet above water in Latitude 30° 20' N., Longitude 62° 33' W. The temperature of the water was 80° F. This is the most southerly drift yet recorded.

Ice continued to menace the Northern routes throughout the month. On June 22nd, *Cameronia*, from New York to Glasgow, experienced unusual visibility between Latitude 46° 19' N., Longitude 53° 10' W., and Latitude 48° 17' N., Longitude 48° 29' W. Icebergs and passing vessels were observed at great distances and extraordinarily distorted. A berg was observed almost right ahead at an altitude of 3° having the shape of a single pillar. From the time it was first observed until abeam a distance of 44 miles was steamed. This berg was fixed in Latitude 47° 37' N., Longitude 49° 57' W., and by measurement found to be 150 feet high, 350 feet long, conical in shape, having a short pointed peak.

On the Belle Isle route S.S. *Leicester* reported on June 14th four bergs in Latitude 52° 38' N., Longitude 51° 30' W., thence for 30 miles



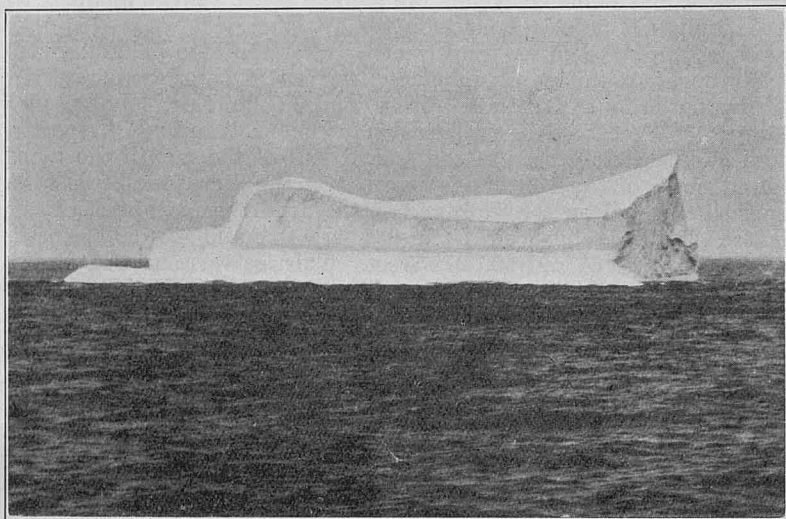
towards Belle Isle heavy drift ice, growlers and bergs. For the last 80 miles towards Belle Isle occasional bergs and growlers. On the track immediately off Belle Isle numerous bergs. In forcing the ice, *Leicester* sustained heavy damage setting in plates and frames forward, causing the fore peak and No. 1 hold to flood. Due to the fine seamanship displayed by Captain A. ROY, the ship safely made St. Johns with bows submerged to the hawse pipes and fore main deck awash to the hatch coamings.

**July** :—A phenomenal drift of ice was reported on the 10th, when the S.S. *Chelatos* sighted two pieces of ice in Latitude  $42^{\circ} 42' N.$ , Longitude  $36^{\circ} 45' W.$

On the same date a large berg was reported East of the Tail of the Bank in Latitude  $43^{\circ} 20' N.$ , Longitude  $48^{\circ} 24' W.$  Other than the above two reports, no ice was observed during the month south of the 46th parallel.

Frequent reports of ice on the Cape Race routes were received and ships navigating the Belle Isle tracks report them prevalent with ice West of the 50th meridian; several ships sighting as many as 160 bergs and growlers. Within the Straits, *Minnedosa* on the 22nd, sighted 30 bergs north and south of the track between Belle Isle and Cape Norman, seventy bergs north of Belle Isle and along the north shore, thirty bergs in the vicinity of the track between Cape Norman and Pt. Amour.

Below is reproduced a photograph of a berg taken by Mr. H. S. KNIGHT, S.S. *Montclare* (Captain G. S. WEBSTER, R.N.R.) off Belle Isle on July 29th, 1926.



**August** :—A few reports of ice were received during the month between Latitudes  $44^{\circ} 40'$  and  $51^{\circ} N.$ , and Longitudes  $47^{\circ}$  and  $50^{\circ} W.$

North of Latitude  $51^{\circ} N.$  and west of Longitude  $50^{\circ} W.$  on the Belle Isle route ships continue to report large numbers of bergs both North and South of the tracks as far west as Greenly Island.

**September** :—No ice was reported during the month south of Latitude  $47^{\circ} 40' N.$ , and only a few reports of ice on the Cape Race Tracks west of the 49th meridian were received.

Within the Belle Isle Straits and on the tracks east to the 50th meridian large numbers of bergs are still reported. The Moravian Mission ship *Harmony* reported numerous bergs along the Labrador coast from Belle Isle Straits to Latitude  $58^{\circ} N.$

**October** :—Ice was reported during the month on the Cape Race Tracks between the 47th and 50th meridians. Within the Belle Isle Straits and on the routes east of the 50th meridian far less ice was reported this month than during the preceding months.

On October 8th, *Harmony*, bound from St. Johns to Hebron, Labrador, sighted five bergs in the vicinity of Latitude  $50^{\circ} 06' N.$ , Longitude  $53^{\circ} 07' W.$ , and between October 10th and 28th 47 bergs from Latitude  $53^{\circ} 25' N.$ , Longitude  $54^{\circ} 54' W.$ , to Latitude  $58^{\circ} 00' N.$ , Longitude  $62^{\circ} 04' W.$

**November** :—South of the 51st parallel only one berg was reported during the month when, on the 3rd, *Ohio*, in Latitude  $47^{\circ} 26' N.$ , Longitude  $47^{\circ} 52' W.$ , passed a large berg. On the Belle Isle route occasional bergs were sighted west of the 52nd meridian.

Between the 3rd and 24th of the month, *Harmony*, bound from Hebron to St. Johns, sighted 19 bergs between the 58th and 55th parallels. South of this, no ice was seen.

**December** :—During the first part of the month several vessels with the assistance of ice-breakers had great difficulty in making the sea owing to the freeze up of the River St. Lawrence. On the 15th the Canadian Signal Service reported :—

“Montreal to Sorel no ice in sight. Eastward to Lake St. Peter river solid. Three Rivers to Cap des Rosiers light open ice inshore and light open ice distant. Belle Isle, berg in sight, other points no ice in sight.”

In the Western North Atlantic bergs were sighted on the 30th and 31st on the Cape Race routes between Latitudes  $47^{\circ} 59'$  and  $47^{\circ} 35' N.$ , Longitudes  $47^{\circ} 31'$  and  $51^{\circ} 19' W.$

### North Atlantic Tracks.

During the past year certain alterations have been made in the operative dates of the North Atlantic Tracks laid down by the Track Convention. These are now as follows :—

Admiralty Route Charts showing the tracks are published in two sections :—

**Chart No. 2058b showing Lane Routes South of Ireland and English Channel.**

**Chart No. 2058c showing Lane Routes North of Ireland.**

The section of the routes running through the ice region in operation for the month is shown on the ICE CHART published with each number of THE MARINE OBSERVER.

### North Atlantic Lane Routes, United States.

#### Track “A” (extra Southern).

Track “A” will only be brought into use when necessity arises.

#### Westbound.

Steer from Fastnet or Bishop Rock on Great Circle Course but nothing South, to cross the meridian of  $47^{\circ} 00' W.$  in Latitude  $40^{\circ} 30' N.$ , thence by either rhumb line or Great Circle to *Boston Light Vessel* or to a position south of *Nantucket Light Vessel*.

#### Eastbound.

From the position of  $70^{\circ} 00' W.$  and  $40^{\circ} 10' N.$  or from Boston steer by rhumb line to cross the meridian of  $47^{\circ} 00' W.$  in Latitude  $39^{\circ} 30' N.$ , and from this last position nothing North of the Great Circle to Fastnet or Bishop Rock.

#### Track “B” (Southern).

**Westbound.**—From March 1st to August 31st (both days inclusive).

Steer from Fastnet or Bishop Rock on Great Circle Course but nothing South, to cross the meridian of  $47^{\circ} 00' W.$  in Latitude  $41^{\circ} 30' N.$ , thence by either rhumb line or Great Circle to *Boston Light Vessel* or to a position south of *Nantucket Light Vessel*.

**Eastbound.**—From March 1st to August 31st (both days inclusive).

From the position of  $70^{\circ} 00' W.$  and  $40^{\circ} 10' N.$  or from Boston steer by rhumb line, to cross the meridian of  $47^{\circ} 00' W.$  in Latitude  $40^{\circ} 30' N.$ , and from this last position nothing North of the Great Circle to Fastnet or Bishop Rock.

**Note.**—In case of necessity, owing to extreme southerly drift of ice, operative dates would be fixed for Track “A.” In the event of ice not becoming a serious menace to Track “B” during the ice season, Track “A” would not therefore function.

#### Track “C” (Northern).

**Westbound** :—From September 1st to February 28th (both days inclusive).

Steer from Fastnet or Bishop Rock on Great Circle Course but nothing South, to cross the meridian of  $50^{\circ} 00' W.$  in Latitude  $43^{\circ} 00' N.$ , thence by either rhumb line or Great Circle to *Boston Light Vessel* or to a position South of *Nantucket Light Vessel*.

**Eastbound** :—From September 1st to February 28th (both days inclusive).

From the position of  $70^{\circ} 00' W.$  in  $40^{\circ} 10' N.$ , or from Boston steer by rhumb line, to cross the meridian of  $50^{\circ} 00' W.$  in Latitude  $42^{\circ} 00' N.$ , and from this last position nothing North of the Great Circle to Fastnet or Bishop Rock.

### General Instructions.

Vessels bound to or from United States ports calling at Halifax



have the option of following either the Canadian or United States Seasonal Tracks to or from that port passing 40 miles south of Sable Island Westbound and 60 miles south of Sable Island Eastbound when proceeding on U.S. Tracks or 20 miles south of Sable Island Eastbound when proceeding on Canadian Tracks.

Vessels bound direct to Portland (Maine) may follow the Canadian Seasonal Tracks.

When courses are changed at the intersections of meridians any time before or after noon Commanders must note in their Logs both distances to and from the meridians that the ship has sailed from noon to noon and not the distance from the position at noon the day before to the position at noon the day after the meridian is crossed.

The date on which tracks change is to apply to the meridian of the Fastnet for Westbound steamers and the meridian of 70° 00' W. for Eastbound vessels.

Communications on General Track matters between the British Lines will pass through the Cunard Line. The Holland America Line will communicate with the Continental Lines excepting that during the Ice Season the Cunard Line will communicate direct with all lines.

With regard to proposals for changes in tracks owing to prevalence of ice, the Cunard and White Star Lines in Liverpool will confer and decide dates on which changes are to become operative, advising lines by telegraph. Lines undertake to give immediate instructions to their steamers in accordance with such advices.

#### North Atlantic Lane Routes, Canada.

##### Track "D."

From 15th February to 10th April (both days inclusive):—

**Westbound:**—Steer from Fastnet, Inishtrahull or 10 miles south of the Bishop Rock on Great Circle Course, to cross the meridian of 47° W. in Latitude 42° N., thence to Halifax or other Port passing not less than 40 miles south of Sable Island.

**Eastbound:**—Steer from Halifax or other Port to pass 20 miles south of Sable Island to Longitude 47° W., in Latitude 43° N., thence on the Great Circle Course to the Fastnet, Inishtrahull or 10 miles south of the Bishop Rock.

##### Track "E."

From April 11th to May 15th or until the Cape Race route clear of ice, and December 1st to February 14th.

**Westbound:**—Steer from the Fastnet, Inishtrahull or 10 miles south of the Bishop Rock on the Great Circle Course, to the meridian of 50° W., in 45° 55' N., thence to Halifax or the Gulf of St. Lawrence.

NOTE.—The DONALDSON LINE reserve the right to cross Longitude

45° West in Latitude 45° North on this track.

**Eastbound:**—Steer from Halifax or the Gulf of St. Lawrence to cross the meridian of 50° W. in Latitude 45° 25' N., thence on the Great Circle Course to the Fastnet, Inishtrahull, or 10 miles south of the Bishop Rock.

##### Track "F."

From May 16th to the opening of Belle Isle Route, and to November 30th when not using the Belle Isle Route.

**Westbound:**—Steer from Fastnet, Inishtrahull, or 10 miles south of the Bishop Rock on a course 10 miles North of the Great Circle Track until approaching Cape Race, then steer a course to pass 10 miles south of Cape Race thence to the St. Lawrence.

**Eastbound:**—Steer from position 25 miles south of Cape Race on a course 10 miles south of the Great Circle Track until approaching Fastnet, Inishtrahull, or 10 miles south of Bishop Rock.

##### Track "G."

Belle Isle Route—From the opening of the Straits of Belle Isle to November 14th.

**Westbound:**—Steer from Fastnet, Inishtrahull or 10 miles south of Bishop Rock on a course 10 miles north of the Great Circle Track until approaching Belle Isle.

**Eastbound:**—Steer from Belle Isle on a course 10 miles south of the Great Circle Track until approaching Fastnet, Inishtrahull, or 10 miles south of the Bishop Rock.

#### General Instructions.

Vessels bound to or from U.S. Ports from or to the North of Ireland have the option of following the Canadian Seasonal Tracks D. E. and F., remaining on Track F. during the operative dates of Track G.

On Tracks E. and F., vessels passing 40 miles south of Sable Island, Westbound, thence to position south of Nantucket and Eastbound, from position 40° 10' N. in 70° 00' West, to position 60 miles South of Sable Island.

On Track D., Westbound, proceeding by rhumb line from position 42° 00' N. in 47° 00' W. to position south of Nantucket, and, Eastbound, from position 40° 10' N. in 70° 00' W. to position 43° 00' N. in 47° 00' W.

Commanders on encountering ice have permission to deviate from these tracks and after the end of October to leave the Belle Isle for the more southerly route at their discretion according to weather conditions.

The Lines have the option of continuing the use of the Belle Isle Route after November 14th should they wish to do so.

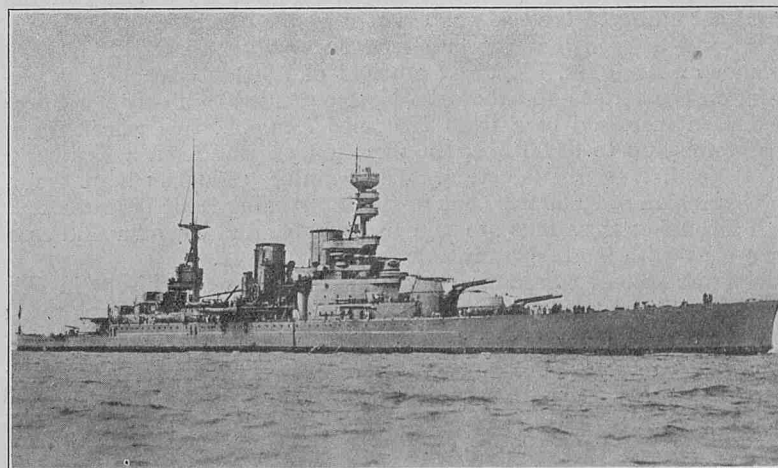
#### UPPER AIR OBSERVATIONS OVER THE SEA.

By COMMANDER L. G. GARBETT, R.N. (Retired), SUPERINTENDENT, NAVAL METEOROLOGICAL SERVICE.

In a previous article I briefly referred to upper air observations which had been obtained from H.M.S. *Repulse*. These observations have now all been plotted and discussed, and a few remarks on them may be of interest to readers of THE MARINE OBSERVER.

H.M.S. *Repulse* is a battle cruiser of 26,500 tons, and it will be remembered that she conveyed H.R.H. THE PRINCE OF WALES on his historic voyage to Africa and South America. It was on this occasion that the observations were taken. This cruise afforded an excellent opportunity for obtaining observations of pilot balloons, and the Navigating Officer, Lieut.-Commander W. TENNANT, R.N. (now Commander W. TENNANT, M.V.O., R.N.) being a keen observer, there was no difficulty in obtaining his co-operation. The equipment provided consisted of 20 rubber balloons, 800 c.f. of hydrogen and a balloon filler. The balloons were of a larger size than those used on shore and when inflated measured 150 inches in circumference. The balloons require careful treatment and are usually sent to ships in air-tight tins, and it is necessary to keep them in an even temperature or else they soon deteriorate and develop pin holes. It is worthy of note that in the case of the balloons supplied to the *Repulse*, a record was obtained for each one supplied.

The hydrogen was supplied in 200 c.f. cylinders. Each balloon



H.M.S. *Repulse*.

takes about 20 c.f. to inflate it sufficiently to give it the required free lift to rise at 700 ft. per minute. A rapid rise of ascent is necessary



in order to obtain vertical height before the balloon has got too far away horizontally.

The balloon filler is used when inflating the balloon and is connected by rubber tubing to the cylinder at the one end and to the balloon at the other. It is so designed that the weight of the filler is equal to the required free lift of the balloon. When the balloon lifts the filler off the deck the balloon is sufficiently inflated and the supply of hydrogen is shut off.

The usual method of observation at sea is as follows:—The balloon is released from a convenient position on the lee side of the ship and its altitude and bearing observed each minute by means of a sextant and gyro compass, a stop watch being used for timing. The balloon travels upwards at the same time as it is being carried along in the horizontal stream of air in which it finds itself. As mentioned in the preceding paragraph its rate of ascent depends on its weight and free lift, which in this case were adjusted to give a rate of ascent of 700 feet per minute. The height of the balloon can be ascertained at any time by noting the number of minutes that have elapsed since the time of starting. From the data obtained in this way the velocity and direction of the horizontal current are found at any time either by a graphical method or by means of pilot balloon slide rule.

The methods of obtaining pilot balloon observations on shore are simple by comparison with those used at sea. In the former case theodolites are used with telescopes of high power and a steady platform is always obtainable, whereas at sea a sextant telescope of low power has usually to be relied on for obtaining the altitude, and, for the azimuth, often only the naked eye. The eye, too, has to be removed from the sextant telescope each time an observation is taken, which makes it exceedingly difficult to recover the balloon again. The DOUGLAS-APPLEYARD Arcless Sextant, used for observing angles in surveying, minimises this latter difficulty to some extent. The maximum height of observation obtained with a sextant would seldom exceed 8,000 feet, but with the development of the Mirror Theodolite, which was described in THE MARINE OBSERVER for May 1925, it is hoped that much greater heights will eventually be obtainable.

The average height of observations obtained in H.M.S. *Repulse* was 5,000 feet and the maximum just over 8,000 feet. In view of the many difficulties encountered this was an encouraging performance, for it must be noted that the ship was seldom steaming less than 14 knots; she was frequently steaming into the wind when the balloon naturally picked up horizontal distance very rapidly, a large number of days were cloudy with clouds as low as 3,000 feet which hid the balloons, and the balloons always started in the same direction as the smoke and heat from the funnels, the smoke often spoiling what would otherwise have been a good record.

FIGURE 1 shows the positions in which the observations were taken and are numbered 1–15, together with the dates on which they were obtained. The isobars drawn on the southern portion of the Chart represent the mean pressure, and, so far as the Eastern half is concerned, probably give a reasonable representation of the pressures from day to day. Wind roses corresponding to the numbers 1–15 in FIGURE 1 are given in FIGURE 2. The figures at the end of each arrow represent thousands of feet above the sea, the length of the arrow from the circumference of the circle, gives the velocity of the wind according to the scale at the foot of the diagram.

It will be seen that the first record was obtained off the Canary Islands on April 1st, 1925, and a height of 7,000 feet reached, it was calm on the surface and the calm layer extended to nearly 2,000 feet and then increased to a light breeze of 7 m.p.h., this velocity was maintained up to 6,000 feet, the direction varying from a Northerly to a North-Westerly direction. The counter trade has been found in this region at 9,000 feet, but in the intervening layer between that and 2,000 feet the winds are said to be feeble and irregular and as a rule back with increasing altitude from N.E. to N.

In the second record the height reached was 5,500 feet; in this case the surface wind was blowing at 15 m.p.h. from the Northward; this had veered to the Eastward on reaching 3,000 feet with varying velocity, and then backed to the northward again, decreasing to 10 m.p.h. In the region of C. de Verde Island, in which vicinity this record was taken, the counter trade has been found at 6,000 feet, and if this second record had extended to that height or slightly higher it is probable that the counter trade would have been reached, for the backing of the wind again after attaining a height of 3,000 feet might be taken as an indication that the N.W.'ly relay usually found below the counter trade was being approached.

No. 3 record, which is the last obtained in the North Atlantic,

shows a steady S.W.'ly wind at 10 m.p.h. up to 4,000 feet, the limit of the observations.

The depth of the N.E. trade does not usually exceed 3,500 feet, but there are daily variations, and it has occasionally been found to extend much higher; for instance, in July, 1902, TEISSERENC DE BORT found that the wind near Teneriffe retained a N. to N.N.E.'ly direction up to 33,000 feet. The height at which the counter trade is reached is very variable, but it has been determined that as the Equator is approached its altitude decreases, so that while in the neighbourhood of the Canaries it blows at 9,000 feet, at C. de Verde it is found at 5,500 feet.

In the South Atlantic 12 records were obtained, several of which are of particular interest. The observations have been plotted on sheets of glass. Each sheet represents a thousand feet, and they have been bound together in forming a model which gives a clear representative view of the results of the observations. The model was exhibited at the British Association Meeting at Southampton in August last. So far as one voyage is concerned the *Repulse's* track across the South Atlantic might have been planned for Meteorology, as it circumnavigates the northern side of the high pressure area and then cuts across it.

In the eight cases of S.E.'ly wind on the surface, the reversal is only shown in Nos. 4 and 7; the counter trade was not reached in the other cases owing to it apparently being at a greater height. No. 4, which was taken on the 27th April, compares very favourably with No. 7 observed three months later: the counter trade in both records is shown at about 3,000 feet. In No. 4 the wind on the surface is 150°, 8 m.p.h., at 1,000 feet it shifts to 226° and at 3,000 feet has obtained a N.W.'ly direction; there is very little change in velocity up to that height, but above that level it steadily increases, reaching a speed of 25 m.p.h. at 5,000 feet. In No. 7 the wind on the surface was 120° at 14 m.p.h., at 2,000 feet it had veered to 140° and decreasing to a light breeze at 3,000 feet, gradually increasing to 18 m.p.h. at 5,000 feet from a N. by W. direction.

The surface of separation of the S.E. trade and the N.W. counter trade slopes downward towards the Eastern seaboard of the Atlantic. It is also understood to slope downwards towards the Equator as in the North Atlantic, but the distribution of observations is not sufficient to confirm this.

In the South of the region occupied by the anti-cyclone there is the region of Westerlies, and observation No. 5 actually occurs in the W'ly wind current, the wind veering to the N.W. at 1,000 feet.

The Westerly half of the chart shows observations 13, 14 and 15 which do not fit into the scheme of trade and counter trade. The trade wind is only found in the Eastern half of the ocean, while in the Western half the winds are more variable and subject to day to day changes according to the pressure distribution. Without day to day synoptic charts it is difficult to relate these observations to the corresponding pressure distribution, particularly as in the Western half of the South Atlantic, the actual pressure distribution on the occasion of each observation may have differed very widely from the mean distribution shown in the chart.

Observations at No. 13, 14 and 15 all gave Northerly winds at the surface, changing in No. 13 through West to S.S.W. with a decrease in velocity up to 4,000 feet and then a steady increase until the maximum height of 8,000 feet was obtained. In No. 14 the change in direction and velocity was slight up to the limit of the observations which terminated at 3,000 feet. In No. 15, however, there is a rapid change in direction in the first thousand feet and a decrease in velocity at 4,000 feet, and it will be noted at this height the direction and velocity of the wind coincide with that at the same height in No. 13. From 4,000 feet upwards the direction remains steady but increases in velocity, attaining a rate of 46 m.p.h. at 7,000 feet.

It would have been particularly interesting to compare this last record with the Synoptic Chart, but as this is not available, it is in any case of interest to note that the very strong S.W. wind above indicates a rapid fall of temperature in the horizontal with low temperatures to N.W.

The observations shown on the chart show a definite march forward of our knowledge of wind circulation over the South Atlantic. They reveal the reversal of the S.E. trade on the Eastern seaboard at a low level, and raise a number of questions of much interest to Meteorologists and Air Navigators. It is difficult to form an idea of what happens at the 8,000 feet level over the whole region. If, for example, we assume the trade wind observed at No. 12 is reversed aloft, what happens in the region between 12 and 13 to give a N.W.'ly current at 12 and



a S.S.W. ly current at 8,000 feet at 13?

There remains a large amount of work to be done in investigating the upper winds over the South Atlantic and other oceans before we can obtain complete knowledge of the general circulation of the atmosphere. The Germans have been very active in this direction with a view to possible development of research work of Trans-Atlantic flying, and six voyages have been carried out in this connection since 1922. The *Meteor* has just recently completed a voyage in the southern part of the South Atlantic, and the large amount of data which have been obtained will be a valuable contribution to our knowledge of the

general circulation. In this expedition the Mirror Theodolite was used, and so greater heights were reached than those referred to above: the mean altitude obtained from the *Meteor* was, it is understood, about 11,000 feet and the maximum about 60,000 feet.

From the practical point of view a knowledge of the general circulation of the atmosphere and the heights at which the various changes of winds occur is of the greatest importance to Air Navigators, and may be a decisive factor in the choice of air routes over the oceans, and we are indeed fortunate in obtaining the co-operation of the Navy in solving this problem.

## WEATHER SIGNALS.

### II.—WIRELESS WEATHER BULLETINS.

#### FRANCE.

##### C.W. Issues "International Collective Reports."

Paris-Eiffel Tower W/T Station, approximate Latitude 48° 51' N., Longitude 2° 18' E., call sign FL, broadcasts weather bulletins, in code, as follows:—

Times of broadcast.	Wavelength.	Observations of:—
0400 G.M.T.	2,650 m. (C.W.)	Land Stations and Ships.
0840 G.M.T.	7,300 m. (C.W.)	do.
0940 G.M.T.	7,300 m. (C.W.)	do.
*1600 G.M.T.	6,000 m. (C.W.)	do.
2100 G.M.T.	7,300 m. (C.W.)	do.

Bulletins commence with the letters "O.N.M."

##### 0400 G.M.T. Bulletin.

Contains observations from land stations in Europe and North Africa taken at 0100 G.M.T., and Ships' observations, in New International Code, and is in four parts, viz:—

Part I. Commencing with the words "Météo Europe" observations from land stations, in the form

$I_n I_n$  BBDDF  $w_1$  TTK'W

$I_n I_n$  = Indicator figures of observation station in the list given below. (If a station is substituted for one in the list, the name of the station is broadcast).

BB = Barometric pressure, corrected, in whole millibars initial 9 or 10 omitted. (To convert to ins., see Table XIII, page 21, MARINE OBSERVER, Volume IV, No. 37.)

DD = Wind direction true (Table III, page 19, MARINE OBSERVER, Volume IV, No. 37).

F = Wind force by Beaufort scale, forces 9 and above sent as 9.

$w_1$  = General state of the weather at time of observation (Table XXI).

TT = Air temperature in whole degrees Centigrade. (To convert to Fahrenheit, see Table XVII, page 58, MARINE OBSERVER, Volume IV, No. 39.)

K' = Barometric tendency. (Table XIV, page 41, MARINE OBSERVER, Volume IV, No. 38.)

W = Past Weather. (Table XI, page 21, MARINE OBSERVER, Volume IV, No. 37.)

Part II. Commencing with the word "Navires," observations from ships, in the form:—

PQ' LLL 111GG BBDDF  $wwv$  Kd.

This Part can be decoded by referring to the "Decode Form" on page 18, MARINE OBSERVER, Volume IV, No. 37, the symbols and their meanings being similar to those given in that part of the "Decode Form" named "International Weather"

Q" = Quarter of the Globe in which the reporting ship is situated (Table XXIII).

Part III. When broadcast gives weather and cloud observations from certain French stations, in code.

Part IV. When broadcast gives weather conditions, *en clair*.

The observations from ships in Part II do not necessarily synchronise with those from the land stations in Part I. Marine observers

\* 1600 G.M.T. bulletin broadcast from ST. PIERRE DES CORPS W/T STATION, approximate latitude 47° 24' N., Longitude 0° 44' E., call sign YG.

are advised to examine the date and time of observations carefully before use.

##### Observation Stations in Part I.

Indicator Figures.	Station.	Approximate Latitude.	Longitude.
01	Paris ...	48° 56' N.	2° 26' E.
02	Madrid ...	40° 24' N.	3° 41' W.
03	Vienna ...	48° 13' N.	16° 22' E.
04	Stockholm ...	59° 21' N.	18° 03' E.
05	Lerwick ...	60° 09' N.	1° 08' W.
06	Lyons ...	45° 45' N.	4° 55' E.
07	San Fernando ...	36° 27' N.	6° 13' W.
08	Munich ...	48° 09' N.	11° 33' E.
09	Haparanda ...	65° 52' N.	24° 09' E.
10	Thorshavn ...	62° 03' N.	6° 45' W.
11	Brest ...	48° 23' N.	4° 31' W.
12	Algiers ...	36° 45' N.	3° 03' E.
13	Warsaw ...	52° 14' N.	21° 01' E.
14	Brönnöy ...	65° 29' N.	12° 13' E.
15	Renfrew ...	55° 52' N.	4° 24' W.
16	Bucharest ...	44° 25' N.	26° 05' E.
17	Tunis ...	36° 46' N.	10° 10' E.
18	Prague ...	50° 05' N.	14° 26' E.
19	Ingöy ...	71° 04' N.	24° 09' E.
20	Seydisfjord ...	65° 10' N.	13° 40' W.
21	Kosice ...	48° 43' N.	21° 14' E.
22	Genoa ...	44° 23' N.	8° 55' E.
23	Lemberg ...	49° 50' N.	24° 00' E.
24	Copenhagen ...	55° 42' N.	12° 37' E.
25	Perpignan ...	42° 43' N.	2° 54' E.
26	Lister ...	58° 06' N.	6° 34' E.
27	Corunna ...	43° 23' N.	8° 25' W.
28	Ancona ...	43° 37' N.	13° 31' E.
29	Helsingfors ...	60° 10' N.	24° 57' E.
30	Mahon ...	39° 54' N.	4° 16' E.
31	Budapest ...	47° 29' N.	19° 03' E.
32	Holyhead ...	53° 18' N.	4° 39' W.
33	Zürich ...	47° 22' N.	8° 34' E.
34	Utrecht (de Bilt) ...	52° 05' N.	5° 11' E.
35	Rome ...	41° 54' N.	12° 27' E.
36	London ...	51° 21' N.	0° 07' W.
37	Hamburg ...	53° 33' N.	9° 58' E.
38	Bordeaux ...	44° 50' N.	0° 42' W.
39	Brussels ...	50° 48' N.	4° 21' E.
40	Valentia (Ireland) ...	51° 57' N.	10° 15' W.
41	Rabat ...	34° 02' N.	6° 46' W.
42	Lisbon ...	38° 41' N.	9° 08' W.
43	Horta ...	38° 32' N.	28° 38' W.
44	Messina ...	38° 12' N.	15° 33' E.
45	Reykjavik ...	64° 09' N.	21° 55' W.
46	Helwan ...	29° 52' N.	31° 20' E.
47	Oran ...	35° 42' N.	0° 41' W.
48	Cassel ...	51° 19' N.	9° 31' E.
49	Malta ...	35° 53' N.	14° 31' E.
50	Constantinople ...	41° 02' N.	28° 58' E.
51	Taranto ...	40° 28' N.	17° 15' E.
52	Sofia ...	42° 42' N.	23° 20' E.
53	Bizerta ...	37° 16' N.	9° 52' E.

Indicator Figures.	Station.	Approximate Position.	
		Latitude.	Longitude.
54	Tripoli...	32° 54' N.	13° 12' E.
55	Agadir...	30° 26' N.	9° 32' W.
56	Athens...	37° 57' N.	23° 43' E.
57	Funchal	32° 37' N.	16° 54' W.
58	Tangier	35° 45' N.	5° 47' W.
59	Belgrade	44° 47' N.	20° 28' E.
60	Pertusato	41° 22' N.	9° 11' E.
61	Florence	43° 47' N.	11° 14' E.
62	Corfu ...	39° 35' N.	19° 55' E.
63	Magdeburg	52° 09' N.	11° 38' E.
64	Barcelona	41° 23' N.	2° 09' E.
65	Moscow	55° 46' N.	37° 39' E.
66	Der-er-Zoor	35° 20' N.	40° 11' E.
67	Limasol	34° 41' N.	33° 04' E.
68	Malin Head	55° 23' N.	7° 24' W.
69	Valladolid	41° 39' N.	4° 43' W.
70	Leningrad	59° 56' N.	30° 16' E.
71	Sebastopol	44° 37' N.	33° 31' E.
72	Khania	35° 30' N.	24° 02' E.
73	Jan Mayen	70° 59' N.	8° 19' W.
74	Cordova	37° 53' N.	4° 49' W.
75	Orenburg	51° 45' N.	55° 06' E.
76	Venice	45° 26' N.	12° 20' E.
77	Damascus	33° 31' N.	36° 14' E.
78	Mygbugten	73° 30' N.	21° 30' W.
79	Muslimié	36° 21' N.	37° 08' E.
80	Vaigatch	70° 24' N.	58° 48' E.
81	Quade Hook (Spitzbergen)	78° 57' N.	11° 42' E.
82	Astrakhan	46° 21' N.	48° 02' E.
83	Omsk ...	54° 59' N.	73° 22' E.
84	Kiev ...	50° 27' N.	30° 30' E.
85	Port Etienne	20° 37' N.	17° 04' W.

NOTE.—The number of stations whose observations are broadcast in this bulletin is restricted, a suitable selection being made from the above list in a manner to ensure the best distribution.

#### 0840 G.M.T. Bulletin.

Preceded by the words "Météo Amérique Atlantique" contains observations from land stations in North America and from ships in the North Atlantic mostly in New International Code, and is in five parts, viz:—

Part I. Commencing with the word "Amérique" observations from North American land stations in the form:—

YYGG I<sub>n</sub>I<sub>n</sub>BBB DF<sub>w</sub>'TT

YY = Day of the month.

GG = G.M. Time of observation.

I<sub>n</sub>I<sub>n</sub> = Indicator figures of observation station, in list given below.

BBB = Barometric pressure corrected in millibars and tenths, initial figure omitted. (To convert to inches *see* Table XIII, page 21, MARINE OBSERVER, Volume IV, No. 37.)

D = Wind direction, true. (Table VIII, page 20, MARINE OBSERVER, Volume IV, No. 37.)

F = Wind force by Beaufort scale.

w' = Weather at time of observation. (Table XXIV.)

TT = Air temperature in whole degrees C. (To convert to Fahrenheit, *see* Table XVII, page 58, MARINE OBSERVER, Volume IV, No. 39.)

The names of the stations with highest and lowest barometer readings may be broadcast in full at the end of this Part, each followed by a five-figure group in the form BBDDF (meanings as given above) with, occasionally, the addition of a five-figure group in the form LL11D, preceded by the word "Cyclone" indicating the latitude (two figures), longitude (two figures) and direction of movement of the disturbance (one figure) on the Compass table 0-8 (0 = stationary, 1 = N.E., 2 = East, 3 = S.E., 4 = South, 5 = S.W., 6 = West, 7 = N.W., 8 = North).

Part II. Commencing with the words "Atlantique oriental," observations from ships. These are broadcast in the same form as Part II of the 0400 G.M.T. bulletin explained above, and can be

similarly decoded.

Part III. Commencing with the words "Atlantique occidental," observations from American ships in the Western North Atlantic in the form:—

I<sub>n</sub>I<sub>n</sub> PQ'LLL 111GG BBDDF TTTw'

I<sub>n</sub>I<sub>n</sub> = Indicator figures of observing ship. The three groups which follow the indicator figures and their meanings are similar to those given in that part of the "Decode Form" named "International Weather" on page 18, MARINE OBSERVER, Volume IV, No. 37. They can be decoded by referring to the "Decode Form."

TTT = Air Temperature to nearest half degree C. (To convert to Fahrenheit, *see* Table XVII, page 58, MARINE OBSERVER, Volume IV, No. 39.)

w' = Present weather. (Table XXIV.)

Part IV. Commencing with the words "Britannique," observations from Ships in the British North Atlantic Wireless Weather Reporting Service. The indicator figures or distinguishing number of each ship (these are published in the "List of Voluntary Observing Ships" each month in the MARINE OBSERVER) are followed by groups of figures which can be decoded in similar manner to the example published on the "Decode Form," page 18, MARINE OBSERVER, Volume IV, No. 37.

Part V. Commencing with the word "Açores" contains observations taken at 0100 G.M.T. from the Azores in the form BBDDF w<sub>1</sub>TTK'R. These symbols will be explained later.

The observations from ships in this bulletin do not necessarily synchronise with those of the land stations. Marine observers are advised to examine the dates and times of observations carefully before use.

Occasionally observations from additional land stations in North America, the Far East, and ships in the Pacific may be added to this bulletin.

Should the bulletin be too long for complete transmission at 0840 G.M.T., it will be continued from Eiffel Tower W/T station at 1125 G.M.T. on a wavelength of 2,650 metres (C.W.).

#### Observation Stations in Part I.

Indicator Figures.	Station.	Approximate Position.	
		Latitude.	Longitude.
01	Belle Isle ...	51° 55' N.	55° 20' W.
02	St. John's, N.F. ...	47° 34' N.	52° 42' W.
03	Sydney, N.S. ...	46° 10' N.	60° 10' W.
04	Father Point ...	48° 31' N.	68° 19' W.
05	Parry Sound ...	45° 20' N.	80° 00' W.
06	White River ...	48° 35' N.	85° 16' W.
07	Winnipeg ...	49° 53' N.	97° 07' W.
08	Le Pas ...	53° 49' N.	101° 15' W.
09	Edmonton ...	53° 33' N.	113° 30' W.
10	Nantucket ...	41° 17' N.	70° 05' W.
11	Washington ...	38° 52' N.	77° 03' W.
12	Hatteras ...	35° 14' N.	75° 32' W.
13	Charleston ...	32° 43' N.	79° 52' W.
14	Bermuda ...	32° 17' N.	64° 46' W.
15	Key West ...	24° 33' N.	81° 48' W.
16	Little Rock ...	34° 45' N.	92° 20' W.
17	Nashville ...	36° 10' N.	86° 47' W.
18	Cleveland ...	41° 30' N.	81° 42' W.
19	Chicago ...	41° 53' N.	87° 37' W.
20	Duluth ...	46° 47' N.	92° 06' W.
21	Huron ...	44° 21' N.	98° 15' W.
22	Salt Lake City ...	40° 45' N.	111° 54' W.
23	Helena ...	46° 34' N.	112° 04' W.
24	Denver ...	39° 48' N.	105° 00' W.
25	Roseburg ...	43° 11' N.	123° 20' W.
26	Tatoosh ...	48° 23' N.	124° 44' W.
27	San Francisco ...	37° 48' N.	122° 26' W.
28	San Diego ...	32° 42' N.	117° 10' W.
29	Fort Worth ...	32° 43' N.	97° 15' W.
30	El Paso ...	31° 50' N.	106° 30' W.
31	Juneau (Alaska) ...	58° 21' N.	134° 20' W.
32	Tanana (Alaska) ...	65° 12' N.	152° 00' W.
33	Dutch Harbour (Alaska) ...	53° 55' N.	166° 30' W.
34	Dawson (Alaska) ...	—	—



## 0940 G.M.T. Bulletin.

Contains observations from land stations in Europe and North Africa taken at 0700 G.M.T., and Ships' Observations, in New International Code, and is in two parts, viz:—

Part I. Commencing with the words "Météo Europe," observations from land stations in the list given in Part I of the 0400 G.M.T. bulletin explained on page 81, in the form:—

$I_n I_n$  BBDDF  $w_1$  TTK'R.

Decoding of the figures broadcast for this Part can be quickly carried out by reference to the explanation of Part I, 0400 G.M.T. bulletin given on page 81. It will be noticed that the symbols and their meanings, with the exception of R, are similar.

R = Rainfall for preceding 24 hours. (Table XXII.)

Part II. Commencing with the word "Navires," observations from ships in the same form as Part II of the 0400 G.M.T. bulletin explained on page 81.

Groups of figures giving the highest and lowest barometer readings may be added to this bulletin in the form Max. name of station BBDDF. Min. name of station BBDDF. For meaning of the symbols BBDDF, see under Part I, 0400 G.M.T. bulletin, page 81.

The observations from ships in Part II do not necessarily synchronise with those from the land stations in Part I. Marine observers are advised to examine the dates and times of observations carefully before use.

## 1600 G.M.T. and 2100 G.M.T. Bulletins.

These bulletins contain observations from land stations in Europe and North Africa, taken at 1300 and 1800 G.M.T. respectively, and Ships' observations.

Both bulletins are in the New International Code, and in the same form as the 0400 G.M.T. bulletin which was explained on page 81; that broadcast at 1600 G.M.T. contains Parts I to IV, and that broadcast at 2100 G.M.T., Parts I and II only.

The observations from ships in Part II of these bulletins do not necessarily synchronise with those from the land stations in Part I. Marine observers are advised to examine the dates and times of observation carefully before use.

## NEW INTERNATIONAL CODE, WEATHER TELEGRAPHY TABLES.

Table XXI.

$w_1$ —General state of the weather (abridged).

Code Figure.	Code Figure.
0—Cloud amount 0–5.	5—Rain.
1—Cloud amount 6–10.	6—Snow or Hail and Snow.
2—Fog or mist.	7—Sleet or Rain and Snow.
3—Passing showers.	8—Hail or Rain and Hail.
4—Drizzle.	9—Thunderstorm.

Table XXII.

R—Rainfall during preceding 24 hours.

Code Figure.	Code Figure.
0 = No rain.	5 = 11–15 mm.
1 = Trace or 0.1 mm.	6 = 16–20 mm.
2 = 0.2–2 mm.	7 = 21–30 mm.
3 = 3–5 mm.	8 = 31–50 mm.
4 = 6–10 mm.	9 = above 50 mm.

SPECIAL WEATHER TELEGRAPHY TABLES,  
NOT NEW INTERNATIONAL CODE.

Table XXIII.

Q"—Quarter of the Globe.

Code Figure.	Latitude.	Longitude.	
1	N.	W.	Barometer in millibars; temperature in ° F.
2	N.	E.	
3	S.	W.	
4	S.	E.	Barometer in millibars or millimetres; temperature in ° C.
5	N.	W.	
6	N.	E.	
7	S.	W.	
8	S.	E.	

Table XXIV.

w'—Present Weather.

Code Figure.		Code Figure.	
0 =	Sky clear.	5 =	Rain.
1 =	" $\frac{1}{4}$ clouded.	6 =	Snow.
2 =	" $\frac{1}{2}$ clouded.	7 =	Mist.
3 =	" $\frac{3}{4}$ clouded.	8 =	Fog.
4 =	" Overcast.	9 =	Thunderstorm.

Table XXV.

C.—State of the Sky and Weather.

Code Figure.	
1 =	Sky clear.
2 =	Partly cloudy (4 to 7 tenths).
3 =	Cloudy or overcast (8 to 10 tenths).
5 =	Rain.
6 =	Snow.
8 =	Fog.

## WIRELESS STORM WARNINGS.

## C.W. Issues.

Eiffel Tower W/T Station broadcasts wireless storm warnings when necessary immediately after the daily weather bulletins at 0220, 0820 and 1920 G.M.T. if the forecasts indicate that the wind force is likely to exceed force 7 on the Beaufort scale. Wavelength 7,300 metres (C.W.).

The signals refer to the following French coastal areas:—

"Manche"	... Belgian frontier to St. Helier (Channel Is.).
"Bretagne"	... St. Helier to (and including) Noirmoutiers (Bay of Biscay).
"Ocean"	... Noirmoutiers to the Spanish frontier.
"Roussillon"	... Spanish Frontier to Faraman.
"Provence"	... From Faraman to the Italian Frontier, including Corsica.
"Méditerranée"	... French coasts in the Mediterranean, only used when one message suffices for the combined areas "Roussillon" and "Provence."

## Form of Message.

The warnings are sent *en clair*. They commence with the name of the day of the week and the duration for which they are valid, followed by the word "Tempête" and the probable direction from which the gale may be expected.

## Example.

"Jeudi 15 heures Manche tempête N.W. Bretagne, Ocean tempête S.W. Méditerranée tempête S.W."

## Explanation.

Storms or gales are predicted (or will continue) from now until 1500 tomorrow in the areas and from the directions mentioned.

## Spark Issues.

The following W/T stations broadcast storm warnings concerning the areas "Manche," "Bretagne" and "Ocean":—

Cherbourg	... Approximate Latitude 49° 37' N., Longitude 1° 36' W., call sign FUC.
Brest	... Approximate Latitude 48° 22' N., Longitude 4° 34' W., call sign FUE.
Lorient (Pen-Mané)	... Approximate Latitude 47° 44' N., 3° 21' W., call sign FUN.
Rochefort	... Approximate Latitude 45° 55' N., 0° 57' W., call sign FUR.

The following W/T stations broadcast storm warnings concerning the areas "Roussillon" and "Provence" (or Méditerranée):—

Porquerolles	... Approximate Latitude 42° 59' N., Longitude 6° 12' E., call sign FUQ and
Ajaccio	... Approximate Latitude 41° 56' N., Longitude 8° 46' E., call sign FUI.

The W/T stations transmit the warning on the 600 metre wavelength as soon as it is received by land line or from Eiffel Tower. The International Safety Signal — — — (TTT) is first sent out, and

is followed a minute later by the storm warning, which is repeated three times at intervals of ten minutes.

When the time of sending falls outside a single operator watch on board ship the message is repeated at the commencement of the succeeding watch.

### III.—WIRELESS TIME SIGNALS.

#### C.W. Issues. New system permanently adopted.

Time signals in accordance with the New International System of W/T Time Signals proposed by the International Time Commission, held at Cambridge in July, 1925, are now broadcast from wireless stations in France, as follows:—

#### Paris-Eiffel Tower W/T Station.

Position, approximate, Latitude 48° 51' N., Longitude 2° 18' E.  
Call Sign FL. Wavelengths 32 m. (C.W.) and 2,650 m. (I.C.W.)

#### International Time-Signals.

W/T Time-Signals are transmitted automatically from the Standard Clock at Paris Observatory, in accordance with the New International System of W/T Time-Signals as follows:—

(1)	From	h.	m.	s.	to	h.	m.	s.	on	32 metres.	(C.W.)
(2)	„	9	26	00	„	9	30	00	„	2,650	„ (I.C.W.)
(3)	„	19	56	00	„	20	00	00	„	32	„ (C.W.)
(4)	„	22	26	00	„	22	30	00	„	2,650	„ (I.C.W.)

The transmission of each series of signals is similar in every respect, the procedure as regards (1) being:—

G.M.T.						Signal.		
h.	m.	s.	h.	m.	s.			
7	55	30				Call (— — — — —) followed by initials of the Bureau International de l'Heure (— — — — —).		
7	56	05	to	7	56	50	— — — — — every 10 sec., the third series being a single dash prolonged for 5 sec.	
	57	00	„	57	50	— — — — —	etc.	
	57	55	„	58	00	55 56 57 58 59 60		
						Time signal.		
7	58	08	„	7	58	10	— —	
	58	18	„	58	20	— —		
	58	28	„	58	30	— —		
	58	38	„	58	40	— —		
	58	48	„	58	50	— —		
	58	55	„	59	00	55 56 57 58 59 60		
						Time signal.		
	59	06	„	59	10	— — — —		
	59	16	„	59	20	— — — —		
	59	26	„	59	30	— — — —		
	59	36	„	59	40	— — — —		
	59	46	„	59	50	— — — —		
7	59	55	„	8	00	00 55 56 57 58 59 60		
						Time signal.		

— = 1 sec.; ■ = 0.2 sec.

#### Bordeaux-La Fayette W/T Station.

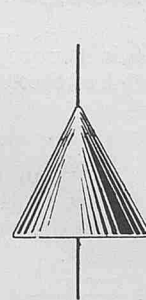
Position, approximate, Latitude 44° 42' N., Longitude 0° 48' W.  
Call sign LY. Wavelength 18,900 m. (C.W.)

#### International Time-Signals.

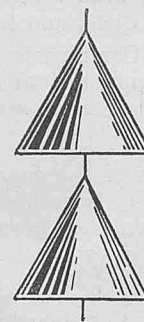
Time-Signals in accordance with the New International System of W/T Time-Signals are broadcast twice daily, viz.: from 7<sup>h</sup> 56<sup>m</sup> 00<sup>s</sup>. to 8<sup>h</sup> 00<sup>m</sup> 00<sup>s</sup>. and from 19<sup>h</sup> 56<sup>m</sup>. 00<sup>s</sup>. to 20<sup>h</sup>. 00<sup>m</sup>. 00<sup>s</sup>. G.M.T. The signals are transmitted automatically by the Standard Clock at Paris Observatory. For procedure, see Eiffel Tower New International System of W/T Time-Signals above.

### IV.—VISUAL GALE WARNINGS.

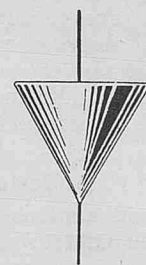
#### Day Signals.



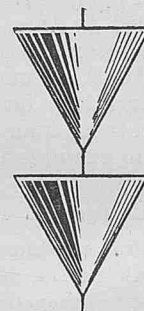
Hoisted when a gale is probable from N.W.



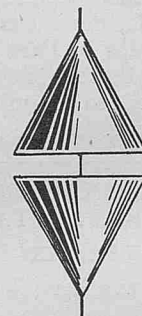
Hoisted when a gale is probable from N.E.



Hoisted when a gale is probable from S.W.



Hoisted when a gale is probable from S.E.



Hoisted when gales of hurricane force are probable.

Any of these signals indicate that there is an atmospheric disturbance in existence, which will probably cause a gale from the quarter indicated by the signal used within a distance of about 50 miles of the place where the signal is hoisted, and the knowledge of which is likely to be of use to seamen. Its meaning is simply "Look out! Bad weather as indicated is probably approaching you."

The signals are hoisted when necessary at the semaphore stations and port offices on the coast of France, and remain hoisted 48 hours from the time of receiving notice from the Ministry of Marine.

#### Special Notices regarding Personnel.

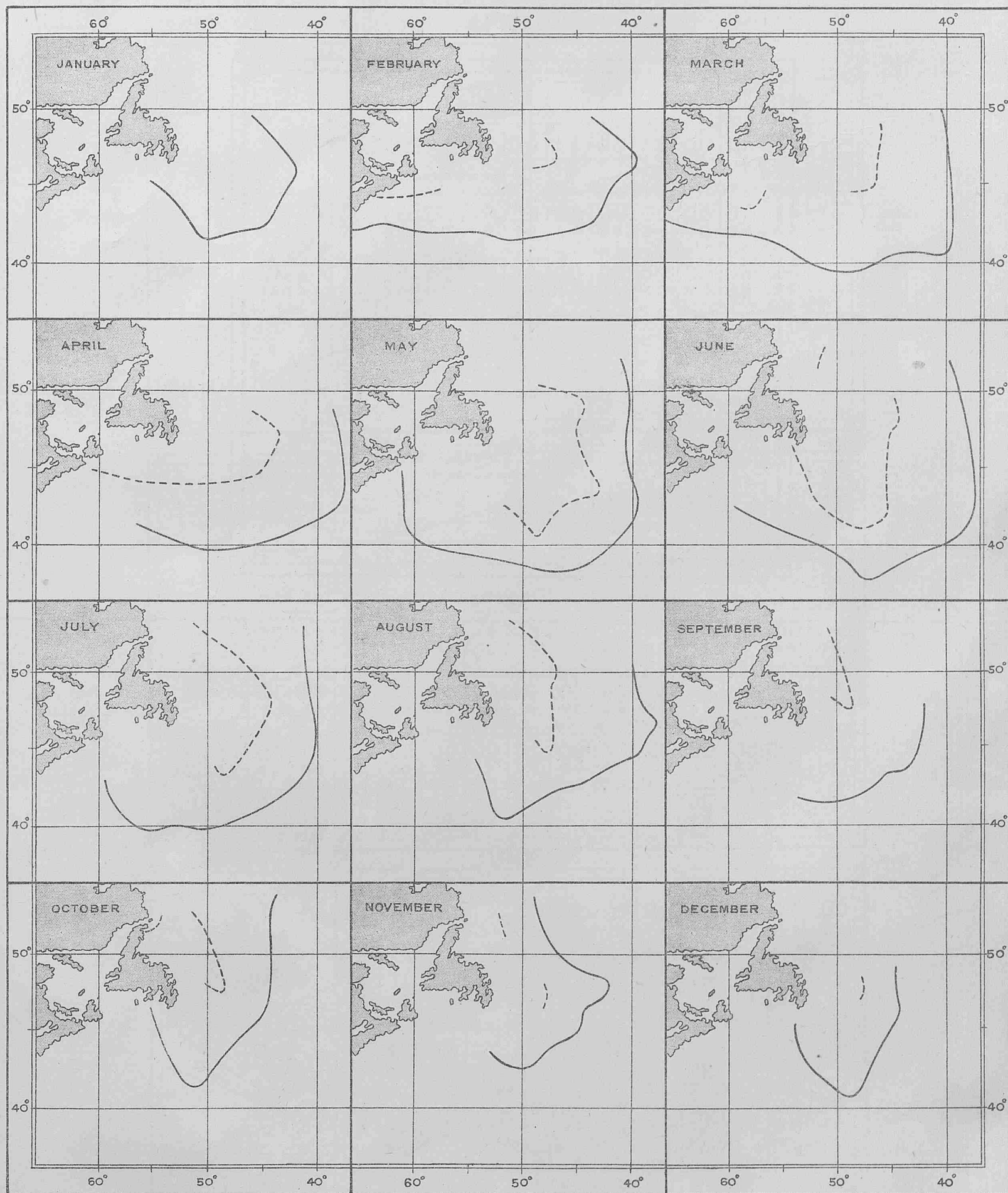
*The Marine Superintendent will be glad to receive information of special distinctions gained and retirements, &c., of Marine Observers.*

#### Rear-Admiral H. P. Douglas, C.M.G.

Captain H. P. DOUGLAS, A.d.C., C.M.G., R.N., Hydrographer of the Navy and representative of the Admiralty on the Meteorological Committee has been appointed a Rear-Admiral in His Majesty's Fleet, to date February 2nd, 1927.



## ICE IN THE WESTERN NORTH ATLANTIC.



Limits of Ice Western North Atlantic.

Limit from 1901 to 1926 shown thus —————

Limit for 1926 shown thus - - - - -

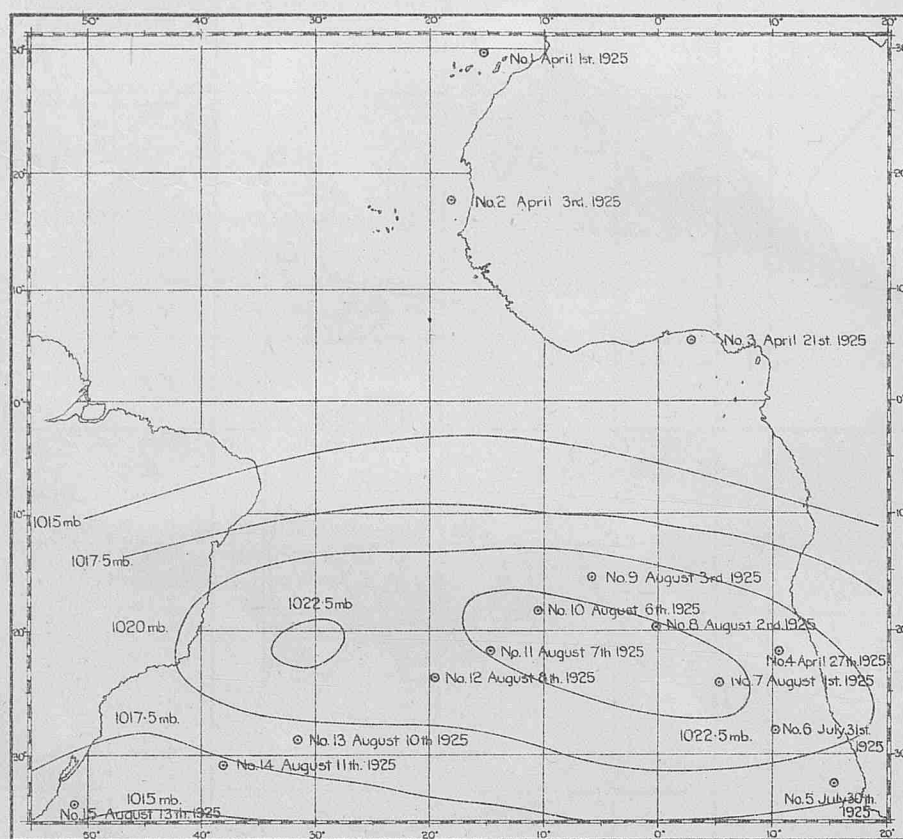


Fig. 1.—"UPPER AIR OBSERVATIONS OVER THE SEA."

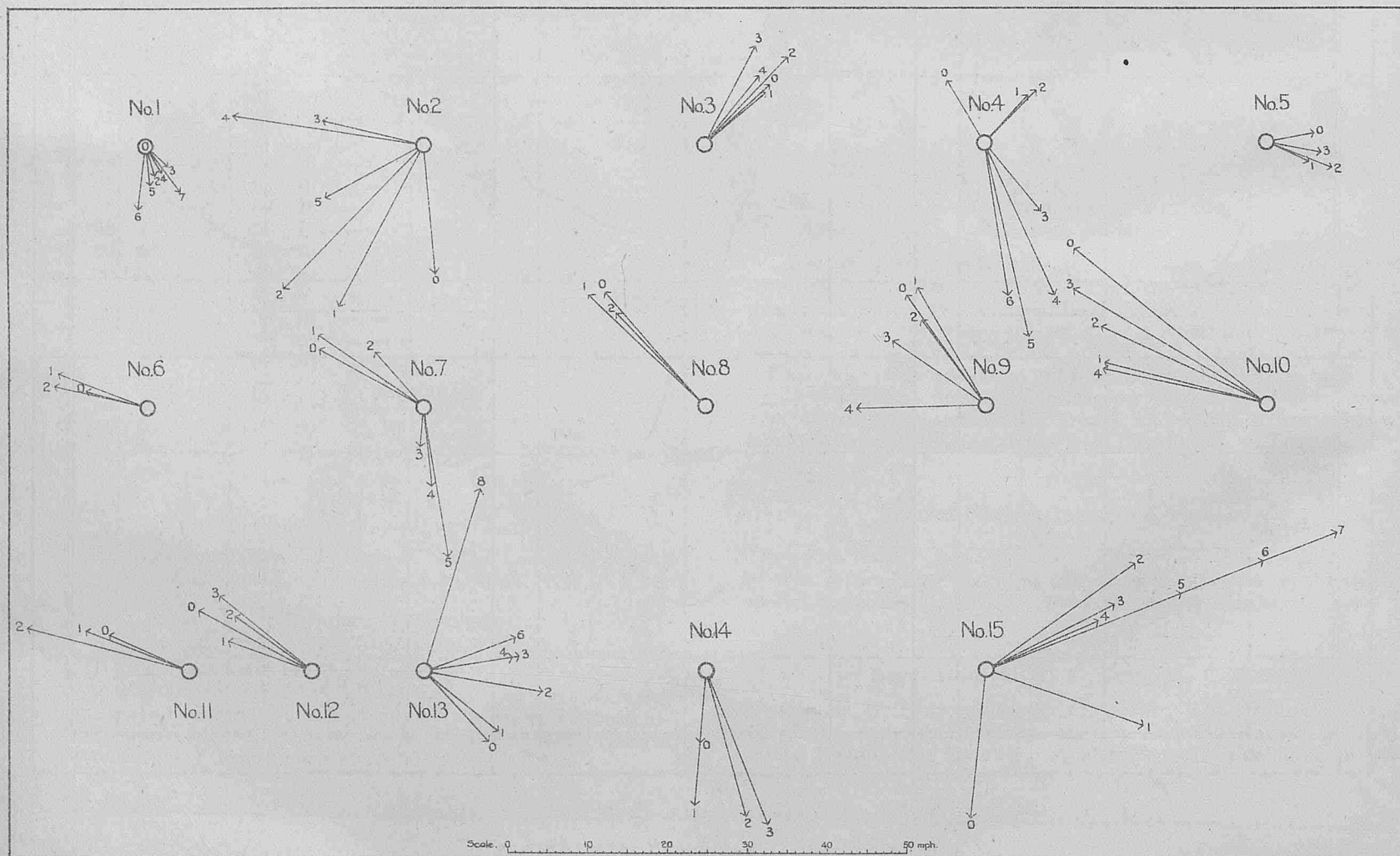
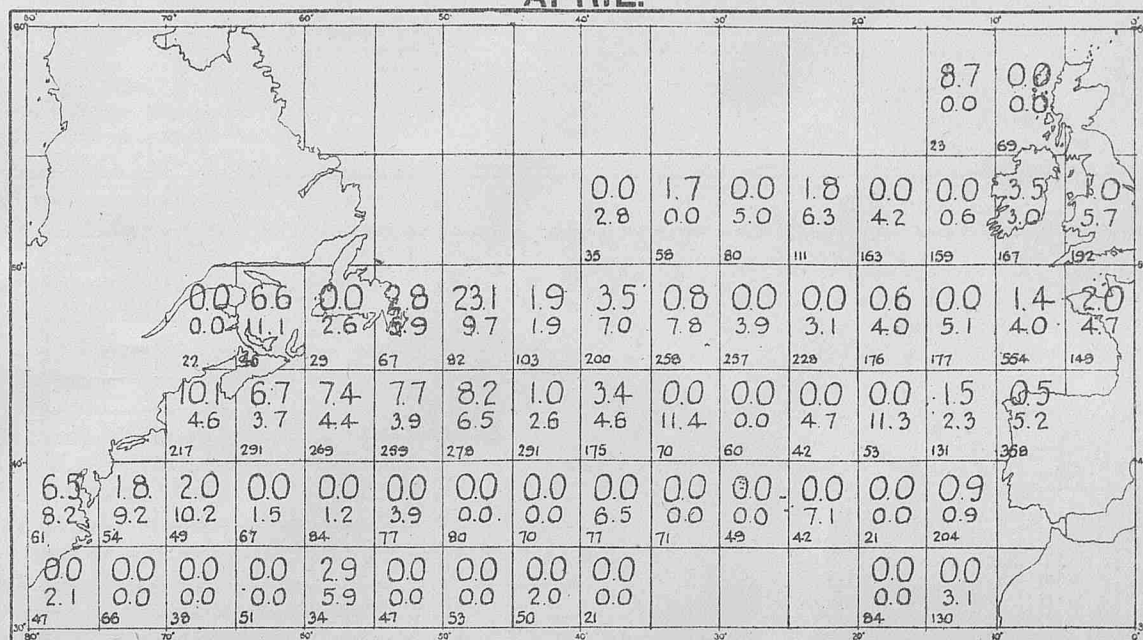


Fig. 2.—"UPPER AIR OBSERVATIONS OVER THE SEA."

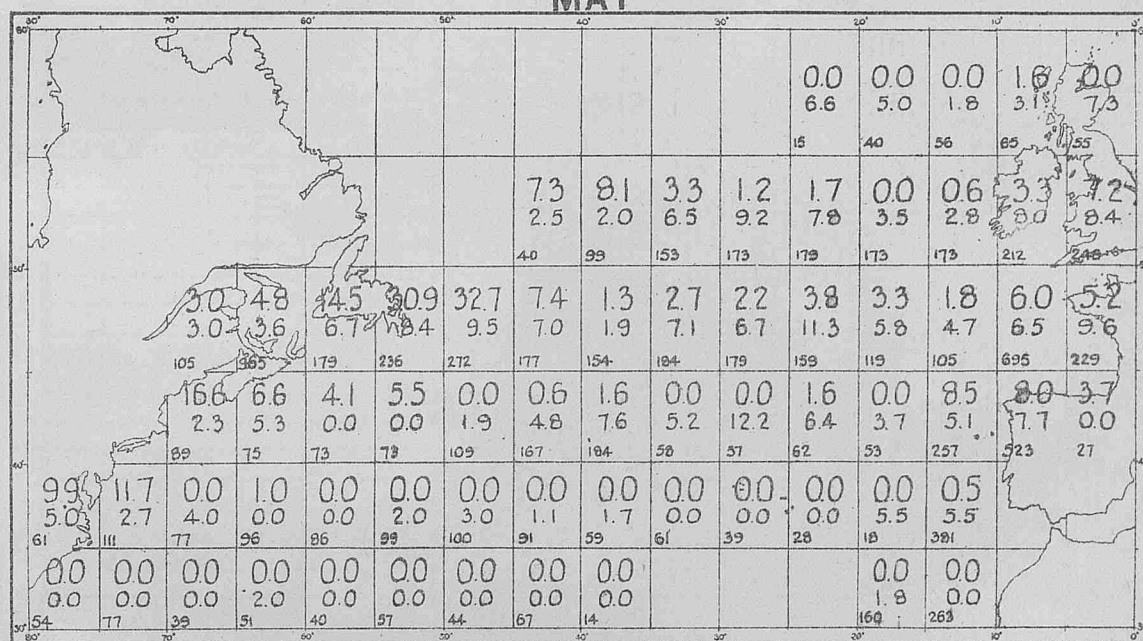


FOG AND MIST OVER THE NORTH ATLANTIC 30°-60° N.  
COMPILED FROM OBSERVATIONS FOR THE YEARS 1921-1925.  
APRIL.

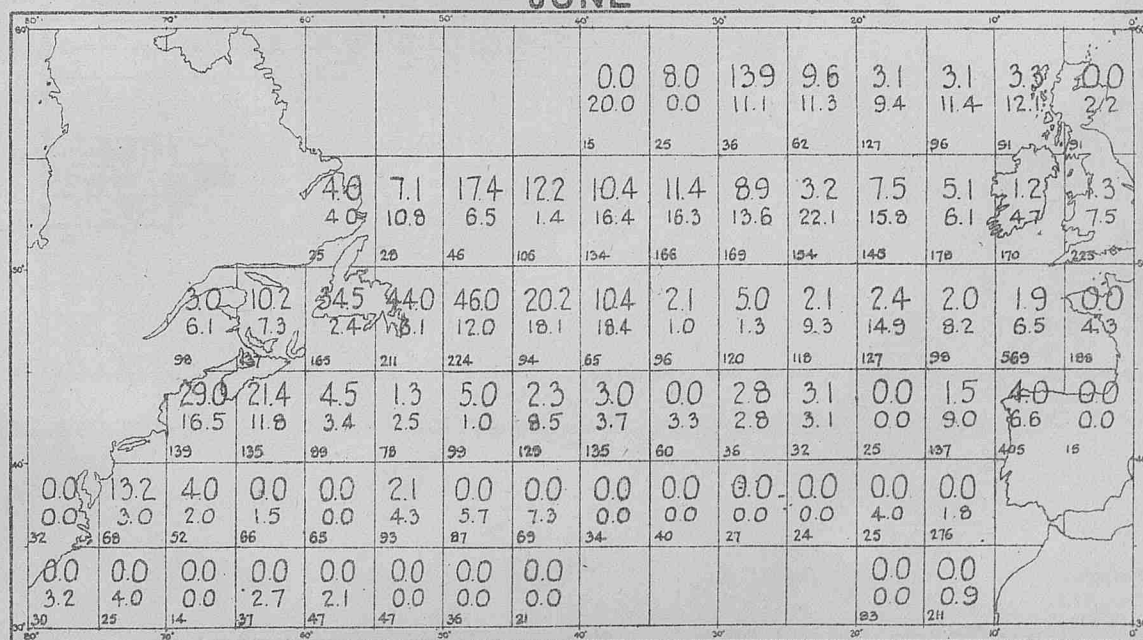
Vol. IV. N° 40.



MAY



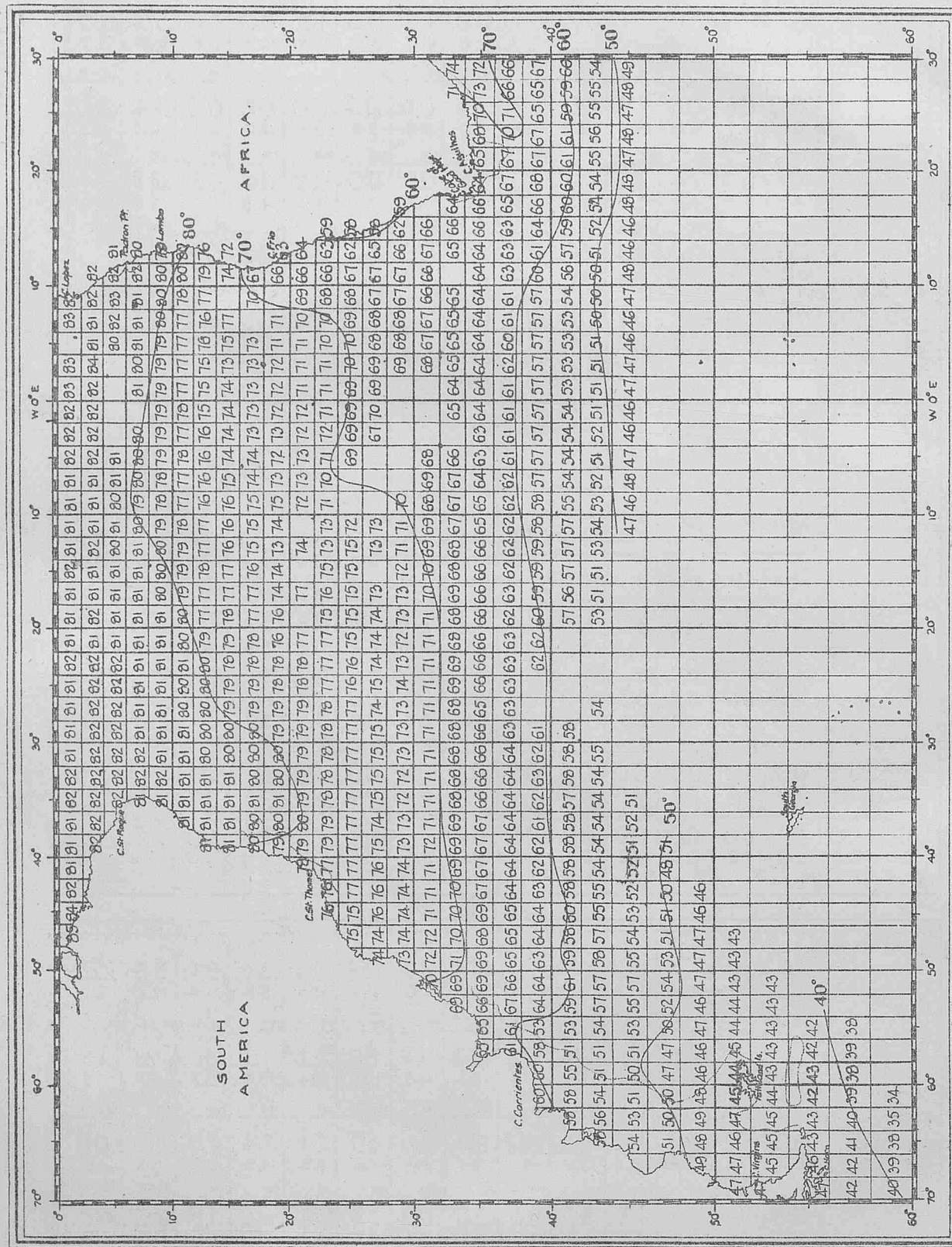
JUNE



The upper (large) numbers in the centre of each 5° square show the percentage frequency of observations of fog. The lower (medium sized) numbers in the centre of each 5° square show the percentage frequency of observations of mist. The small number in the lower left hand corner of each 5° square is the number of observations on which the percentage frequency is based.

# SOUTH ATLANTIC.

## MEAN SEA SURFACE TEMPERATURES FOR MONTH OF APRIL.



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.



## Request to return Additional Remarks and supplementary documents with the Meteorological Log and Form 911.

As the interest of the Corps of Marine Observers increases, so more information is returned to the Marine Division, and there is a tendency to send in supplementary documents to the Meteorological Log and Ship's Meteorological Report Form 911.

The strength of the Marine Division is constant, that is to say, the number of assistants in the Marine Division to handle the data received remains the same whatever the amount.

To maintain or increase the output of published information it is necessary to regulate collection.

Marine Observers will greatly assist, and in so doing, help towards publication by making their Logs and Reports when returned as complete as possible.

Information or considered views in reply to the Marine Superintendent's circulars or notes of enquiry in this Journal may be conveniently written on the pages in the Log and Form 911 for "Additional Remarks."

In this space narratives of experiences in storms, accounts of unusual phenomena and abnormal currents experienced should be entered.

A selection of a few of the best weather charts made during the voyage can be appropriately attached to the fly-leaf of the Log. Sketches and photos should be similarly attached.

By forwarding all information which it is intended to return, along with the Log or Form 911, Marine Observers will make it possible to give better acknowledgment for work well done.

The remarks, weather charts, sketches and photos, now being received are greatly appreciated and it is hoped that these may increase, but if justice is to be done to them, it is necessary that they should be properly placed so that they may receive the greatest possible amount of attention.

### 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.

Before barometer readings are compared with the normal isobars shown on the Meteorological Ocean Charts, transmitted by W/T or plotted on Weather Charts, mercurial barometers should be corrected for height, gravity, temperature and index error, for which tables are given on pp. 84 to 92 4th edition of the Marine Observer's Handbook; see also pp. 10-12, Vol. IV, No. 37, of this Journal. A table for converting inches to millibars is also given below.

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

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

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

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

### BLUE POSTCARD FOR BAROMETER COMPARISON.

Marine Observers will greatly assist by obtaining comparisons with Standard instruments when at suitable ports; also regularly completing and returning the Blue Postcard whether their instruments are M.O. or Ship's.

Form 913.

Barometer Error.

#### TEST CARD FOR BAROMETER ERROR.

To be forwarded with Logs or Reports to

Meteorological Office,  
Air Ministry,  
Kingsway, London

Name of Ship				Ship
Captain				Capt.
In Port of				Port
Mercurial or Aneroid				Date
Maker's Name and No.				Bar. No.
Height above Mean Sea Level .....ft.				..... } Too high
				..... } Too low
Date	Time.	Barometer readings.	Attached Therm.	At
192				Date
				This counterfoil will be returned to Ship.

In British Home Ports please take three readings at 7 a.m., or 6 p.m. G.M.T. If in a colonial or foreign port, read at 8 a.m. Local Standard Time.

### CONVERSION TABLE.

To Convert Inches into Millibars.

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



# 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.
- (D) From 15th February to 10th April, inclusive.
- (E) From 11th April to 15th May, or until the Cape Race route clear of ice.

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, of this Number.

### SYMBOLS USED ON THE CHART.

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

Reports of Ice sighted between February 1st and February 28th, 1927, which have been received by the Meteorological Office, are shown by the Symbols plotted in the position reported, the figures indicating the day of the month.

## PHENOMENAL DRIFTS OF ICE.

Date.	Ship or Source of Report.	Position. Lat. Long.	Remarks.
April 27, 1829	—	35°54'N. 39°00'W.	2 pieces 18 in. in diameter.
" 6, 1909	S.S. Trafalgar ...	35°54'N. 31°47'W.	Apparently river ice about the size of a lifeboat.
" 11, 1914	S.S. Erodiade ...	32°55'N. 62°11'W.	4 ft. high 50 ft. wide, and 100 ft. long.
" 24, 1916	S.S. Communipaw...	49°05'N. 36°48'W.	Large berg.
" 4, 1921	Cape Race W/T report, via S.S. Hollandia.	43°35'N. 35°57'W.	
" 16, 1926	Trawler Orizaba ...	61°03'N. 10°30'W.	Floating ice, about 40ft. long, and 3 ft. high.



**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. N° 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.	
NORTH SEA.			
10.2.27	55°56'N.	1°54'W.	Top of a spar.
12.2.27	51°01'N.	1°12'E.	Floating wreckage and quantity of lifebelts.
12.2.27	52°10'N.	3°—E.	Red painted can buoy marked in white, "M. 1.," no top mark.
16.2.27	4 m. East (True)		Piece of wreckage looking like ship's cabin, iron and wood, 5 feet above water.
19.2.27	51°09'N.	1°37'E.	Floating derelict, dangerous to navigation.
ENGLISH CHANNEL.			
12.2.27	243° dist. 6½ m. from Dungeness.		Wreckage, appearing to be part of wooden deck-house.
12.2.27	1 m. N.N.E. Varne Red Buoy.		White painted, apparently undamaged lifeboat, bottom up.
12.2.27	15 m. off Start Point brg. about N. (T.).		Floating mine or drifting buoy.
12.2.27	6 m. S.E. of Folkestone.		Drifting square pontoon.
13.2.27	4 m. S. of Folkestone.		Norwegian SS. <i>Raa</i> , drifting after collision, not yet sunk, very dangerous to navigation.
NORTH ATLANTIC.			
1.2.27	42°15'N.	69°30'W.	Two spars apparently attached to submerged wreckage.
5.2.27	29°03'N.	74°22'W.	Large red nun buoy, numbered "2."
6.2.27	42°51'N.	47°52'W.	Large log, 40 feet by 2 feet in diameter, covered with marine growth.
7.2.27	47°37'N.	7°55'W.	Red spherical light buoy, mast with black and white check, red cage at top surmounted by light not working, marked "G. 3" in white, in track of shipping bound up or down passing thirty miles off Finisterre.
8.2.27	27°33'N.	74°30'W.	Derelict, bottom up, about 80 feet long, showing 4 feet out of water.
9.2.27	39°56'N.	73°53'W.	Floating wreckage with a spar on end just awash.
13.2.27	41°02'N.	60°13'W.	Derelict schooner <i>Annabel Cameron</i> awash, foremast standing, dangerous to navigation.
17.2.27	49°06'N.	7°30'W.	Large can buoy painted black.
GULF OF MEXICO.			
1.2.27	29°07'N.	94°09'W.	Tree trunk, about 40 feet long, 3 feet in diameter.
2.2.27	29°08'N.	94°18'W.	Log about 25 feet long, 2 feet in diameter, covered with marine growth.
4.2.27	28°06'N.	94°02'W.	Derelict, about 100 feet long, showing 6 feet out of water, bottom up.
6.2.27	26°23'N.	87°03'W.	Large tree trunk.
6.2.27	24°33'N.	84°27'W.	Large log, 40 feet long, 3 feet in diameter.
NORTH PACIFIC.			
4.2.27	51°20'N.	172°05'W.	Heavy spar apparently attached to submerged wreckage.

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Shields.

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



# LIST OF VOLUNTARY OBSERVING SHIPS

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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 11.2.27.	Date Received.
<i>Aba</i> ...	Yardley, H. A., D.S.C.	J. Doyle, L. B. Silvester, S. J. Bristowe.	M.L.	Elder Dempster	Met. Log. 28.4.25 to 25.9.26	14.10.26.
<i>Abinsi</i> ...	Millson, H. E.	E. W. Bascombe	No. A.	" Holt	Form 911 6.10.26 to 1.12.26	8.12.26.
<i>Achilles</i> ...	Wilson, C. A.	A. Frew, J. McKay, J. D. Greeves.	M.L.	Harrison	Met. Log. 29.8.26 to 4.12.26	10.1.27.
<i>Actor</i> ...	Haylett, E.					
<i>Adda</i> ...	Toft, J. T.	R. G. Roberts, O. V. Lucas	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.		W.T.	White Star	W.T. Reg. 15.11.26 to 4.12.26	8.12.26.
<i>Aeneas</i> ...	Wallace, W. K.	J. M. Anderson	No. A.	A. Holt	Form 911 18.10.26 to 6.11.26	9.11.26.
<i>Agapenor</i> ...	Ramsay, J.		" A.	"	18.11.26 to 5.12.26	1.2.27.
<i>Aidan</i> ...	Pym, J.	J. Whayman	" A.	Booth	20.11.26 to 8.12.26	10.1.27.
<i>Alban</i> ...	Whayman, W.		" A.	"	29.12.26 to 10.1.27	1.2.27.
<i>Albania</i> ...	Gronow, S.	L. Harper	" A.	"	11.12.26 to 23.12.26	3.2.27.
<i>Alipore</i> ...	Harrison, R., D.S.O., R.D., Captain, R.N.R.	D. A. C. Butler	" M.	Cunard	29.8.25 to 22.9.25	24.9.26.
<i>Almanzora</i> ...	Wakeman, E. C.	A. H. Phillipson	" A.	P. and O.	12.9.26 to 24.11.26	13.12.26.
<i>Alondra</i> ...	Prendergast, J. J.	H. Peters	" A.	R.M.S.P.	19.11.26 to 2.1.27	5.1.27.
<i>Ampetco</i> ...	Vandenkerckhove, A.	A. Vandenbulck	" A.	Yeoward	1.1.27 to 24.1.27	25.1.27.
<i>Andes</i> ...	Parker, W. H., C.B.E., R.D., R.N.R.		No.	American Petroleum	11.10.26 to 30.10.26	13.11.26.
<i>Antiochus</i> ...	Dunlop, S. K.	E. T. Bayes	" A.	R.M.S.P. Co.		
<i>Aorangi</i> ...	Crawford, R.	G. H. Kime, H. A. Titchfield, Showman, A. C.	M.L.	A. Holt	4.9.26 to 19.10.26	27.10.26.
<i>30 Aquitania</i> ...	Charles, Sir J. T. W., K.B.E., C.B., R.D., Commodore, R.N.R.	E. Anderson, C. Holdaway, J. L. Croasdaile, J. Locke, D. MacLean.	W.T.	Canadian-Australasian	Met. Log. 25.8.26 to 9.12.26	10.1.27.
<i>62 Arabic</i> ...	Harvey, H.	W. F. Jackman, J. M. Appleby, W. Jenkins.	"	Cunard	W.T. Reg. 6.1.27 to 20.1.27	24.1.27.
<i>Arafura</i> ...	Gordon, A. S.	J. T. Heddle, G. C. Smith, O. B. Godfrey, R. Lloyd Harry.	M.L.	White Star	" 17.12.26 to 9.1.27	14.1.27.
<i>Archimedes</i> ...	Downs, E. B.	J. M. Edgar	No. A.	Eastern and Australian	Met. Log. 30.6.26 to 26.10.26	29.12.26.
<i>Argyllshire</i> ...	Wallace, J.	J. McCrone	No. M.	Lampart & Holt	Form 911 22.3.26 to 9.6.26	16.7.26.
<i>Ariguani</i> ...	Scudamore, 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.	Federal	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.	"	Elders & Fyffes	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.	"	Union Castle	Met. Log. 4.1.26 to 11.4.26	26.4.26.
<i>Arundel</i> ...	Short, H.	Mr. Hill	C.C.	P. Henderson	" 4.1.26 to 11.4.26	26.4.26.
<i>Arundel Castle</i> ...	George, J., O.B.E.	C. S. Keen	No. A.	Southern Rly.	Telegraphic Report 11.2.27	11.2.27.
<i>Astronomer</i> ...	Richards, J.	A. Brown, J. Glen, — Thompson.	M.L.	Union Castle	Form 911 12.11.26 to 2.1.27	4.1.27.
<i>Athenic</i> ...	Davies, E.	W. Hill	No. A.	Harrison	Met. Log. 15.8.26 to 25.12.26	1.1.27.
<i>Atreus</i> ...	Salter, G. H.	J. C. Podmore	" A.	White Star	Form 911 13.11.26 to 27.11.26	20.12.26.
<i>Atsuta Maru</i> ...	Shibutani, S.	K. Murazumi	" A.	A. Holt	" 1.10.26 to 5.12.26	13.12.26.
<i>Auditor</i> ...	Owen, W. T.	T. E. Steel	" M.	Nippon Yusen Kaisha	" 11.12.26 to 12.1.27	19.1.27.
<i>Ausonia</i> ...	Stafford, W., D.S.C., R.D., Lt.-Commr., R.N.R.	E. R. B. Freeman	" A.	Harrison	" 28.11.26 to 2.1.27	5.1.27.
<i>Avon</i> ...	Hannam, F. S.	E. S. Dunch	" M.	Cunard	" 19.11.26 to 13.12.26	14.12.26.
<i>Balfour</i> ...	McQueen, O. S.	N. P. Phillips	No. A.	R.M.S.P.	" 10.11.26 to 20.1.27	8.2.27.
<i>Balranald</i> ...	Townshend, W. P., Commr., R.N.R.	F. Ward, E. Cowell, J. Davis, E. Alexander.	M.L.	Canadian Pacific	" 13.12.26 to 22.12.26	29.12.26.
<i>51 Baltic</i> ...	White, E. R., Commr., R.N.R.	H. C. Gray, D. K. Crawford, J. Law.	W.T.	P. & O. Branch	Met. Log. 2.7.26 to 7.11.26	20.11.26.



Name of Vessel.	Captain.	Observing Officers.	Official Meteorological Equipment.	Line.	Last Log, Register, or Report Contributed. Received up to 11.2.27.	Date Received.
<i>Bambra</i> ...	Turner, J. E. ...	H. W. Norris, J. Eggleston, C. Melson.	M.L.	State Service, Australia	Met. Log. 4.5.26 to 11.11.26 ...	29.12.26.
<i>Bampton Castle</i> ...	Hutchings, A. H. ...	J. W. S. Brooks ...	No. A.	Union Castle ...	Form 911 24.7.26 to 26.12.26...	10.1.27.
<i>Banbury Castle</i> ...	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.
<i>Banffshire</i> ...	Wynne, R. H. ...	W. F. Lockhead ...	" A.	Turnbull Martin ...	" 14.10.26 to 26.11.26	2.12.26.
<i>Baron Murray</i> ...	Edgar, J. E. ...	W. P. G. Arthur, H. Thompson	" A.	Hogarth & Sons ...	" 8.5.26 to 10.6.26 ...	21.9.26.
<i>Barpetta</i> ...	Strachan, J. ...	W. P. Page ...	" M.	British India ...	" 19.12.26 to 30.12.26	24.1.27.
<i>Barrabool</i> ...	...	F. N. Wyatt ...	No.	P. & O. Branch ...	" ...	...
<i>Baychimo</i> ...	Cornwall, S. A. ...	E. J. Hankin ...	" A.	Hudson's Bay Co. ...	" 17.10.26 to 1.12.26	8.12.26.
<i>Baymaud</i> ...	Foellmer, G. ...	...	" M.	...	" ...	...
<i>59 Belgeland</i> ...	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.
<i>Benalder</i> ...	Cole, J. H., D.S.C....	...	No. A.	Ben Line ...	" 21.12.26 to 1.1.27 ...	13.1.27.
<i>Bendigo</i> ...	Nicholl, R. N. C. ...	H. J. Cholerton ...	" M.	P. & O. Branch ...	" 4.9.26 to 8.10.26 ...	21.9.26.
<i>81 Berengaria</i> ...	Rostron, 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.
<i>Berrima</i> ...	Short, C. E. ...	T. Ferguson ...	No. M.	P. & O. Branch ...	Form 911 4.8.26 to 5.12.26 ...	7.12.26.
<i>Berwyn</i> ...	McCombie, G. ...	D. Dunn ...	" A.	Canadian Pacific ...	" 3.1.27 to 15.1.27 ...	24.1.27.
<i>Bintang</i> ...	Morzer Briuys, M. F.	M. C. Altins ...	" M.	Nederland ...	" 11.12.26 to 30.12.26	10.1.27.
<i>Bogota</i> ...	Good, W. J. ...	W. Billington ...	" A.	R.M.S.P. Co. ...	" 21.5.26 to 19.9.26 ...	21.9.26.
<i>Bolingbroke</i> ...	Dott, J. F. ...	C. A. Mott ...	M.L.	Canadian Pacific ...	Met. Log. 23.1.26 to 31.8.26 ...	8.9.26.
<i>Borda</i> ...	McQueen, D. Murray, M. F.	...	No. M.	P. & O. Branch ...	Form 911 1.1.27 to 23.1.27 ...	1.2.27.
<i>Bothwell</i> ...	Holland, R. ...	...	" A.	Canadian Pacific ...	" 19.11.26 to 26.12.26	13.1.27.
<i>Brandon</i> ...	Rothwell, A. J. ...	T. Beck ...	" A.	" ...	" 25.7.26 to 25.8.26 ...	27.8.26.
<i>Brecon</i> ...	Sargent, A. H., R.D., Lt.-Commr., R.N.R.	...	" A.	" ...	" ...	...
<i>Brenda</i> ...	Prentice, W. ...	...	" A.	" ...	" 22.12.26 to 22.1.27	25.1.27.
<i>Brighton</i> ...	Lamont, A. ...	J. McMillan ...	" A.	Scottish Fishery Board	" 5.1.27 to 30.1.27 ...	2.2.27.
<i>British Advocate</i> ...	Hill, A. ...	Mr. Munton ...	C.C.	Southern Railway ...	Telegraphic Report 10.2.27 ...	10.2.27.
<i>British Engineer</i> ...	Taylor, R. J. ...	M. Kennedy ...	No. M.	British Tankers ...	Form 911 12.10.26 to 13.11.26	23.12.26.
<i>British Soldier</i> ...	Joures, T. W. ...	E. L. W. Evans ...	" M.	" ...	" 26.1.26 to 9.3.26 ...	12.4.26.
<i>Bronte</i> ...	Putt, R. O. ...	H. J. Crangle ...	" A.	" ...	" 17.11.26 to 10.12.26	3.1.27.
<i>Browning</i> ...	Crappier, J. S. ...	W. Jones, C. E. Legg ...	" A.	Lampert & Holt ...	" 26.11.26 to 15.12.26	28.1.27.
<i>Bruxere</i> ...	Connorton, W. A. ...	A. B. Murray ...	" A.	" ...	" 29.3.26 to 1.7.26 ...	5.7.26.
<i>Burma</i> ...	Denson, W. ...	R. Mowbray ...	" A.	" ...	" 20.1.26 to 12.2.26 ...	22.3.26.
<i>Cambria C.S.</i> ...	Reid, R. B. ...	J. Henderson ...	" A.	Henderson ...	" 24.7.26 to 10.10.26...	29.10.26.
<i>Cambria</i> ...	Sherwood, C. A., D.S.C.	A. J. English, B. C. Farrow, C. F. St. John.	M.L.	Eastern Tel. Co. ...	Met. Log. 20.6.26 to 24.8.26 ...	29.9.26.
<i>Cameronia</i> ...	Telfer, J. E., O.B.E.	V. S. Phillips ...	C.C.	L.M. & S. Rly. ...	Telegraphic Report 22.1.27	22.1.27.
<i>Camito</i> ...	Smart, R. W. ...	...	No. A.	Anchor ...	Form 911 21.11.26 to 12.12.26	18.12.26.
<i>Canadian Importer</i> ...	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.
<i>Canadian Inventor</i> ...	McCulloch ...	C. R. Randle ...	No. A.	Canadian Govt. Mercantile Marine.	Form 911 18.11.26 to 4.1.27 ...	10.1.27.
<i>Canadian Miller</i> ...	Boulton, F. W. ...	D. Grey ...	" A.	" ...	" 25.8.26 to 4.9.26 ...	22.9.26.
<i>Canadian Scottish</i> ...	McConechy, W. T. ...	C. E. Moore, H. Ruegg ...	" A.	" ...	" 14.3.26 to 23.6.26 ...	15.7.26.
<i>Canadian Skirmisher</i> ...	Wallace, C. ...	J. T. White ...	" A.	" ...	" 1.10.26 to 8.11.26 ...	23.12.26.
<i>Canadian Winner</i> ...	Millar, W. H. ...	...	" A.	" ...	" 19.11.26 to 5.1.27 ...	11.1.27.
<i>35 Carmania</i> ...	Bisset, C. R. ...	R. Girling, J. Cochrane ...	" M.	" ...	" 16.11.26 to 21.12.26	9.2.27.
<i>Carnarvon Castle</i> ...	Brown, F. G., R.D., Capt., R.N.R.	L. R. Simpson, W. M. Stewart, P. L. Williams.	W.T.	Cunard ...	W.T. Reg. 29.11.26 to 15.12.26	18.12.26.
<i>34 Caronia</i> ...	Hague, J. W., Commr., R.N.R.	S. Colbourne, H. A. Causton, G. Gorrings, H. Iddes.	M.L.	Union Castle ...	Form 911 25.7.26 to 13.8.26 ...	20.8.26.
<i>Casanare</i> ...	Hossack, W. H., R.D., Capt., R.N.R.	R. F. Bovey, T. Ashcroft, D. Butler, S. V. Williams.	W.T.	Cunard ...	Met. Log. 18.7.26 to 12.12.26...	21.12.26.
<i>Cavina</i> ...	...	...	No.	Elders & Fyffes ...	W.T. Reg. 1.11.26 to 20.11.26...	24.11.26.
<i>52 Cedric</i> ...	Riseley, A. D. ...	...	" A.	" ...	Form 911 1.11.26 to 20.11.26...	24.11.26.
<i>53 Celtic</i> ...	Hickson, V. W., Lt.-Commr., R.N.R.	E. A. A. Crowley, J. Farrell.	W.T.	White Star ...	W.T. Reg. 22.11.26 to 13.12.26	16.12.26.
<i>Centauro</i> ...	Berry, G. ...	F. Pratt, A. Thompson, J. Peters.	"	" ...	Form 911 21.11.26 to 13.12.26	15.12.26.
<i>Ceramic</i> ...	Rose, A. F. ...	L. Johnstone ...	No. M.	A. Holt & Co. ...	W.T. Reg. 17.1.27 to 6.2.27 ...	10.2.27.
<i>Changle</i> ...	Roberts, J., C.B.E., D.S.O., R.D., Capt., R.N.R.	D. W. Chamberlain ...	" A.	White Star ...	Form 911 16.1.27 to 6.2.27 ...	10.2.27.
<i>China</i> ...	Gambrill, F. C. ...	J. Thomas, D. D. Tyer, J. A. Allan, - Johnson.	M.L.	Yuill & Co... ..	" 28.10.26 to 15.12.26	17.1.27.
<i>Chindwara</i> ...	Furlong, G. H. S., R.D., Capt., R.N.R.	M. K. Stone ...	No. M.	P. & O. ...	Met. Log. 18.8.26 to 10.12.26...	27.1.27.
<i>Chindwin</i> ...	Brooks, E. G. ...	J. J. Smith ...	" M.	British India	Form 911 8.10.26 to 27.10.26...	15.11.26.
<i>City of Baroda</i> ...	Esslemont, C. ...	J. P. Stewart ...	" A.	Henderson ...	" 20.11.26 to 28.11.26	29.12.26.
<i>City of Benares</i> ...	Houghton, W. ...	A. Beaton, J. Cook, W. H. Dalton.	M.L.	Ellerman ...	" 2.10.26 to 21.12.26...	14.1.27.
<i>City of Brisbane</i> ...	Anderson, W. W. ...	C. G. Inglis ...	No. A.	" ...	Met. Log. 19.9.26 to 31.5.26 ...	4.6.26.
<i>City of Canterbury</i> ...	Seabome, F. O., D.S.C.	R. W. May ...	" A.	" ...	Form 911 14.12.26 to 9.1.27 ...	24.1.27.
<i>City of Chester</i> ...	Brenner, D. M. ...	...	" A.	" ...	" 29.10.26 to 11.12.26	20.12.26.
<i>City of Edinburgh</i> ...	Letton, F. W. ...	H. Asher, W. Speakman, H. A. Hazell.	M.L.	" ...	" 21.10.26 to 12.11.26	17.11.26.
<i>City of Hong Kong</i> ...	Wyper, J. ...	N. G. Fraser ...	No. M.	" ...	Met. Log. 11.4.26 to 18.8.26 ...	20.9.26.
<i>City of London</i> ...	Walton, H., O.B.E., R.D., Commr., R.N.R.	...	" A.	" ...	Form 911 13.9.26 to 12.10.26...	2.11.26.
<i>City of Marseilles</i> ...	Parker, F. W., R.D., Commr., R.N.R.	K. M. Nicholson ...	" A.	" ...	" 7.11.26 to 9.12.26 ...	3.1.27.
<i>City of Rangoon</i> ...	Brown, G. ...	W. A. MacAdams, G. F. L. Coates.	" A.	" ...	" 24.10.26 to 15.1.27...	20.1.27.
<i>City of Yokohama</i> ...	Jones, P. ...	A. Gibb ...	M.L.	" ...	" 25.2.26 to 18.3.26 ...	22.3.26.
<i>Clan Alpine</i> ...	McDonald, W. D. ...	W. N. M. Faichney ...	No. A.	" ...	Met. Log. 4.9.26 to 4.12.26 ...	15.12.26.
<i>Clan Lamont</i> ...	Lennox, W. J. ...	G. Short ...	" A.	" ...	Form 911 16.11.26 to 1.1.27 ...	21.1.27.
<i>Clan Lindsay</i> ...	Urquhart, P., D.S.C.	P. de Gruchy ...	" A.	Clan ...	" 19.11.26 to 14.12.26	24.1.27.
<i>Clan Macbeth</i> ...	Worthington, J. H.	J. Hall ...	" A.	" ...	" 10.12.26 to 5.1.27 ...	13.1.27.
<i>Clan Macfadyen</i> ...	Young, A. H., R.D., Lieut.-Commr., R.N.R.	W. Hurst ...	" A.	" ...	" 19.12.26 to 2.1.27 ...	17.1.27.
<i>Clan Macgillivray</i> ...	Stenson, F. J., R.D., Capt., R.N.R.	H. M. Wavell ...	" A.	" ...	" 15.11.26 to 22.12.26	3.1.27.
	West W. F. ...	J. H. Johnson ...	" A.	" ...	" 23.11.26 to 28.12.26	11.1.27.
			" A.	" ...	" 23.10.26 to 20.11.26	14.12.26.

## LIST OF VOLUNTARY OBSERVING SHIPS

iii

Name of Vessel.	Captain.	Observing Officers.	Official Meteorological Equipment.	Line.	Last Log, Register, or Report Contributed. Received up to 11.2.27.	Date Received.
<i>Clan Macindoe</i> ...	Low, A. ...	J. G. Baillie ...	No. A.	Clan ...	Form 911 1.10.26 to 3.12.26 ...	7.12.26.
<i>Clan Mackellar</i> ...	Scotland, A. ...	D. McAllister ...	" A.	" ...	" 14.11.26 to 31.12.26 ...	5.1.27.
<i>Clan Mackinnon</i> ...	McComish, 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 Ranald</i> ...	Laird, C. ...	T. O. Marr ...	" A.	" ...	" 12.12.26 to 5.1.27 ...	13.1.27.
<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.	" ...	" 30.11.26 to 23.1.27 ...	7.2.27.
<i>Clan Urquhart</i> ...	Gibb, A. F. W. ...	T. G. Mitchell ...	" A.	" ...	" 31.10.26 to 1.12.26 ...	7.12.26.
<i>Colonia, C.S.</i> ...	Carlton, G. F. ...	W. E. Allen, R. E. Coad, O. B. E., Commr., F. B. Bolingbroke.	M.L.	Telegraph Construction & Maintenance.	Met. Log. 13.6.26 to 24.9.26 ...	30.9.26.
<i>Colonian</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. Burd, 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> ...	Gibbings, W. ...	D. G. Russell ...	" A.	Harrison ...	" 11.10.26 to 26.11.26 ...	2.12.26.
<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 & Fyffes ...	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.	" ...	" 24.10.26 to 12.11.26 ...	21.12.26.
<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. ...	" 30.10.26 to 23.11.26 ...	15.12.26.
<i>Demerara</i> ...	Willan, F. C. L. ...	J. J. C. Blake ...	" M.	" ...	" 17.10.26 to 11.12.26 ...	14.12.26.
<i>Demosthenes</i> ...	Orriss, F. A. ...	C. C. Dingle, L. D. Jennings	" M.	Aberdeen ...	" 29.11.26 to 18.12.26 ...	24.1.27.
<i>Deseado</i> ...	Hannam, F. S. ...	A. F. Walker ...	" M.	R.M.S.P. Co. ...	" 4.9.26 to 31.10.26 ...	5.11.26.
<i>Desna</i> ...	Green, J. ...	R. Wilson ...	" M.	" ...	" 3.12.26 to 19.1.27 ...	31.1.27.
<i>Deucalion</i> ...	Findlay, J. ...	Mr. Parsons ...	" C.C.	A. Holt ...	" 5.12.26 to 11.1.27 ...	7.2.27.
<i>Dieppe</i> ...	Marmery, S. ...	" ...	"	Southern Railway ...	Telegraphic Report 14.1.27 ...	14.1.27.
<i>Dimboola</i> ...	Roy, C. M. ...	" ...	No. A.	Melbourne S.S. Co. ...	Form 911 27.11.26 to 21.12.26 ...	24.1.27.
<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. ...	R. W. Smith ...	No. M.	British India ...	Form 911 9.9.26 to 11.10.26 ...	30.10.26.
<i>Domitia, C.S.</i> ...	Campos, V., O.B.E., Lt.-Commr., R.N.R.	" ...	M.L.	Telegraph Construction and Maintenance.	" ...	"
<i>61 Doric</i> ...	Bolton, S., D.S.C., R.D., R.N.R.	G. Kavanagh, J. A. Heenan, J. Clarke.	W.T.	White Star ...	Form 911 1.10.26 to 24.10.26 ...	27.10.26.
<i>Doric Star</i> ...	Thomas, R. T. ...	L. McDermott ...	No. A.	Blue Star ...	W.T. Reg. 12.12.26 to 29.1.27...	7.2.27.
<i>Dorington Court</i> ...	Clarke, E. S. ...	E. W. Blomberg ...	" 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.	D. H. McDougall ...	" A.	Union Castle ...	" 20.8.26 to 27.9.26 ...	4.10.26.
<i>Dryden</i> ...	Major, T. W. ...	" ...	" M.	Lampart & Holt ...	" 9.11.26 to 30.11.26...	31.1.27.
<i>Duendes</i> ...	Pape, E. R. ...	W. Billington ...	" M.	P.S.N. Co. ...	" 20.10.26 to 13.11.26 ...	6.12.26.
<i>Dunaff Head</i> ...	Burt, H. L., R.D., Commr., R.N.R.	F. S. Napier ...	" A.	Ulster S.S. Co. ...	" 4.12.26 to 13.1.27 ...	25.1.27.
<i>Dundrum Castle</i> ...	Weller, H. E. ...	W. S. Byles ...	" A.	Union Castle ...	" 17.10.26 to 16.11.26 ...	21.12.26.
<i>Dunrobin</i> ...	Ramsay, J. D. ...	" ...	" A.	Glen & Co. ...	" 13.11.26 to 20.12.26 ...	10.1.27.
<i>Duquesa</i> ...	Ellis, F., D.S.C. ...	E. W. Denman ...	" M.	Furness Withy ...	" 24.10.26 to 15.12.26 ...	21.12.26.
<i>Edinburgh Castle</i> ...	Wilford, T. H. ...	" ...	No.	Union Castle ...	Met. Log. 8.1.26 to 24.1.26 ...	29.5.26.
<i>Egyptian Prince</i> ...	Ord, T. ...	W. R. Holt ...	No. A.	Prince ...	Form 911 10.8.26 to 18.10.26 ...	22.10.26.
<i>Elmina</i> ...	Williams, T. E. ...	J. A. McGough, G. Shorter, E. Moger.	M.L.	Elder Dempster ...	Met. Log. 2.6.26 to 5.10.26 ...	11.10.26.
<i>El Paraguay</i> ...	Smith, F. C. ...	J. Allerton ...	No. M.	Houlder Bros. ...	Form 911 16.10.26 to 16.12.26 ...	21.12.26.
<i>Elpenor</i> ...	Gordon, A. L. ...	M. Robertson, C. Kavanagh	M.L.	A. Holt ...	Met. Log. 11.10.26 to 7.2.27 ...	10.2.27.
<i>Elysia</i> ...	Duncan, A. R. ...	A. Laidlaw, C. Jenkins, J. A. C. A. Leitch	"	" ...	" 15.10.26 to 26.12.26 ...	10.1.27.
<i>Empress of Asia</i> ...	Holland, A. T. ...	R. H. Foley, L. Johnston, L. C. Hogg, T. M. W. Golby.	"	Anchor ...	" 27.5.26 to 6.9.26 ...	8.10.26.
<i>Empress of Canada</i> ...	Lovegrove, A. V. R., D.S.O., R.D., Capt., R.N.R.	W. T. Miller ...	"	Canadian Pacific ...	" 10.6.26 to 20.9.26 ...	20.10.26.
<i>Empress of France</i> ...	Robinson, S., C.B.E., R.D., Commr., R.N.R.	H. C. Halliday ...	"	" ...	" 1.5.26 to 3.11.26 ...	8.11.26.
<i>Empress of Russia</i> ...	Griffiths, E. ...	E. Roberts, W. Ewens, O. F. Pennington, W. Pickersgill.	"	" ...	" 7.3.26 to 14.6.26 ...	6.9.26.
<i>Empress of Scotland</i> ...	Hosken, A. J. ...	J. H. Reid ...	"	" ...	" 15.5.26 to 13.10.26...	28.10.26.
<i>Endeavour</i> ...	Latta, R. G. ...	M. McLellan, W. Bacon, F. G. Hutchings.	"	" ...	" 3.3.26 to 30.6.26 ...	17.7.26.
<i>Essequibo</i> ...	Stuart, R.N., V.C., D.S.O.	R. M. Southern, G. S. Norrington, E. V. B. Baker, E. H. B. Baker, J. Torlesse.	No. M.	His Majesty's Ship ...	Form 911 5.11.26 to 20.12.26...	3.1.27.
<i>Eumaeus</i> ...	Commr. S. A. Geary-Hill, D.S.O., R.N.	" ...	" A.	" ...	" 27.11.26 to 29.12.26 ...	5.1.27.
<i>Euripides</i> ...	Kite, E. ...	J. L. Forster, J. H. Birtles ...	M.L.	A. Holt ...	Met. Log. 18.7.26 to 22.11.26...	29.11.26.



Name of Vessel.	Captain.	Observing Officers.	Official Meteorological Equipment.	Line.	Last Log, Register, or Report Contributed. Received up to 11.2.27.	Date Received.
<i>Euryades</i> ...	Stewart, J. R. ...	... Stout, F. Sheekey ...	No. A. ...	A. Holt ...	Form 911 13.12.26 to 1.1.27 ...	7.2.26.
<i>Explorer</i> ...	Allan, J. ...	... Stout, F. Sheekey ...	" A. ...	Scottish Fishery Board	" 12.1.27 to 27.1.27 ...	7.2.27.
<i>Ferndale</i> ...	Daniel, F. ...	D. Jones, E. F. Pemble ...	No. M. ...	Commonwealth Govt.	Form 911 16.12.26 to 24.12.26 ...	3.1.27.
<i>Flandria</i> ...	Maars, L. ...	T. Doornbosch ...	No. M. ...	Holland Lloyd ...	Form 911 3.12.26 to 27.1.27 ...	31.1.27.
<i>Francisco</i> ...	Scales, H. ...	J. C. Nettleship ...	No. A. ...	Ellerman Wilson ...	Form 911 27.11.26 to 31.12.26 ...	20.1.27.
<i>Freya</i> ...	Angus W. ...	T. R. Ness ...	" A. ...	Scottish Fishery Board	" 9.1.27 to 29.1.27 ...	7.2.27.
<i>Gaika</i> ...	Whitfield, G. J. ...	... ..	" A. ...	Union Castle	" 30.11.26 to 21.12.26 ...	29.12.26.
<i>Galtymore</i> ...	Southerland, — ...	... ..	No. M. ...	Furness Withy ...	... ..	...
<i>Garret</i> ...	Visser, C. W. ...	C. J. Vandenboom ...	" M. ...	Rotterdam Lloyd ...	Form 911 1.11.26 to 16.11.26 ...	29.12.26.
<i>Garth Castle</i> ...	Jackson, C. R. ...	W. S. J. Aldous ...	No. A. ...	Union Castle	" 17.12.26 to 10.1.27 ...	1.2.27.
<i>Gascoyne</i> ...	Rutt, W. N. ...	R. Simpson ...	" A. ...	Dalgely & Co. ...	Form 911 19.1.26 to 24.2.26 ...	30.3.26.
<i>Gelria</i> ...	Veldkamp, G. J. ...	... ..	No. M. ...	Holland Lloyd	" 19.11.26 to 6.1.27 ...	10.1.27.
<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 ...	" 24.12.26 to 5.1.27 ...	14.1.27.
<i>Glenagarry</i> ...	Angier, J. ...	... ..	No. ...	" ...	" ...	...
<i>Glenluce</i> ...	Kennett, W. H. ...	... ..	" A. ...	" ...	" ...	...
<i>Glenishane</i> ...	Beer, E. ...	R. A. Dale ...	No. A. ...	" ...	" 27.9.26 to 9.1.27 ...	13.1.27.
<i>Glowcestershire</i> ...	Robin, E. ...	H. J. Janett ...	" A. ...	Bibby ...	" 28.8.26 to 5.11.26 ...	9.11.26.
<i>Gorgon</i> ...	Hughes, J. W. ...	A. E. Bowlt ...	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 23.9.26 to 16.10.26 ...	19.1.27.
<i>Harmonides</i> ...	Hughes, W. F. ...	S. S. Davidson ...	" A. ...	" ...	" 5.9.26 to 27.9.26 ...	18.10.26.
<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. ...	F. Wells, C. Parkes, W. T. Barnes.	M.L. ...	British India	" 12.6.25 to 27.2.26 ...	29.3.26.
<i>Hatimura</i> ...	Beedle, T. S. ...	... ..	No. M. ...	British India	... ..	...
<i>Hauraki, M.V.</i> ...	Lane, S. R., R.D., Capt. R.N.R.	... ..	No. M. ...	British India	... ..	...
<i>Henry Holmes, C.S.</i> ...	Frew, J. D. ...	... ..	M.L. ...	Union S.S. Co. N.Z. ...	" 22.6.26 to 11.7.26 ...	20.9.26.
<i>Herald</i> ...	Bicker Caarten, A. ...	M. A. Green ...	No. M. ...	W. I. & Panama Tele- graph Co.	" 12.11.26 to 21.12.26 ...	5.1.27.
<i>Herefordshire</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>Hermine</i> ...	Mann, R. P. ...	H. R. Mackay ...	No. A. ...	Bibby ...	Form 911 21.8.26 to 29.1.27 ...	7.2.27.
<i>Herschel</i> ...	Roberts, T. V. ...	G. P. McCraith ...	" A. ...	Shaw, Savill & Albion	" 25.9.26 to 11.10.26 ...	22.11.26.
<i>Hertford</i> ...	Watson, W. W. ...	J. F. Maurey ...	" A. ...	Lampart & Holt	" 18.11.26 to 30.11.26 ...	17.12.26.
<i>Hibernia</i> ...	Urquhart, D. ...	A. Robertson ...	" A. ...	Federal ...	" 18.8.26 to 7.9.26 ...	4.10.26.
<i>Highland Enterprise</i> ...	Tanner, E. B., O.B.E.	R. Woodall ...	C.C. ...	L.M. & S. Rly. ...	Telegraphic Report, 5.2.27 ...	5.2.27.
<i>" Glen</i> ...	Pond, K. H. ...	J. H. Tilton ...	No. A. ...	Nelson ...	Form 911 12.12.25 to 11.2.26 ...	10.3.26.
<i>" Heather</i> ...	Jones, T. J. ...	W. Jealous ...	" A. ...	" ...	" 29.3.26 to 26.5.26 ...	31.5.26.
<i>" Laddie</i> ...	Powell, G. A. ...	J. H. Fitton, J. Hardy ...	" A. ...	" ...	" 13.12.25 to 24.6.26 ...	14.7.26.
<i>" Piper</i> ...	Alford, C. ...	E. F. Smart ...	" A. ...	" ...	" 23.11.26 to 14.1.27 ...	24.1.27.
<i>" Pride</i> ...	Collings, D. ...	J. S. Collins, S. E. Jackson W. T. Breen.	M.L. ...	" ...	Met. Log. 25.4.26 to 16.9.26 ...	23.9.26.
<i>" Prince</i> ...	Robinson, R. H. ...	W. Williams ...	No. A. ...	" ...	Form 911 30.7.26 to 2.10.26 ...	7.10.26.
<i>" Roner</i> ...	Brown, J. B. ...	S. A. Wheaton ...	" A. ...	Prince ...	" 14.1.27 to 28.1.27 ...	10.1.27.
<i>" Warrior</i> ...	Ashby Graves, F. ...	C. G. Legg ...	" A. ...	Nelson ...	" 10.11.26 to 1.1.27 ...	14.1.27.
<i>Hildebrand</i> ...	Robinson, R. H. ...	J. O. Simons ...	" M. ...	" ...	" 25.3.26 to 19.5.26 ...	26.5.26.
<i>Hobsons Bay</i> ...	Maddrell, J. ...	A. Allan ...	" A. ...	Booth ...	" 24.11.26 to 7.1.27 ...	26.1.27.
<i>Holbein</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>54 Homeric</i> ...	Gough, W. A. ...	H. L. Rudd ...	No. A. ...	Lampart & Holt	Form 911 31.10.26 to 8.12.26 ...	3.1.27.
<i>Hororata</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>Hubert</i> ...	Holland, E. ...	E. R. Kemp, F. Malcounonne ...	No. A. ...	New Zealand S.S. Co.	Form 911 1.9.26 to 3.1.27 ...	5.1.27.
<i>Huntingdon</i> ...	Pym, J. H. ...	S. G. Edwards ...	" A. ...	Booth ...	" 21.9.26 to 29.11.26 ...	14.12.26.
<i>Hurunui</i> ...	Ashworth, W. ...	R. Cox ...	" A. ...	Federal ...	" 14.9.26 to 6.10.26 ...	11.10.26.
<i>Ingoma</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>Iris, C.S.</i> ...	Barrow, R. K. ...	D. G. Russell ...	No. M. ...	Harrison ...	Form 911 17.12.26 to 28.1.27 ...	2.2.27.
<i>Iroquois</i> ...	Hughes, H. R. ...	W. Oliver, D. Bruce, D. Mac- Donald, T. Vickers.	M.L. ...	Pacific Cable Board	Met. Log. 23.1.26 to 25.4.26 ...	5.10.26.
<i>Ixion</i> ...	Jackson, A. L., Commr. R.N.	H. L. Jenkins ...	" ...	His Majesty's Ship	" 26.4.26 to 23.8.26 ...	29.9.26.
<i>Javanese Prince</i> ...	Williams, R. J. ...	W. Angus ...	No. A. ...	A. Holt ...	Form 911 29.7.26 to 18.10.26 ...	1.11.26.
<i>Jervis Bay</i> ...	Naylor, E. ...	W. Venn ...	" A. ...	Prince ...	" 21.12.26 to 6.1.27 ...	24.1.27.
<i>John Pender, C.S.</i> ...	Chaplin, W. R. ...	R. W. Laycock ...	" M. ...	Commonwealth Govt.	" 20.10.26 to 2.12.26 ...	24.1.27.
<i>Justin</i> ...	Smythe, T. W. ...	H. W. Milne ...	" A. ...	Eastern Tel. Co. ...	" 8.9.26 to 25.9.26 ...	25.10.26.
<i>Kaisar-i-Hind</i> ...	Lee, O. J. P. ...	R. C. Holmes ...	" A. ...	Booth ...	" 15.1.27 to 26.1.27 ...	7.2.27.
<i>Kamo Maru</i> ...	Manley, G. ...	A. H. Cole ...	" M. ...	P. & O. ...	" 12.12.26 to 1.2.27 ...	4.2.27.
<i>Kangaroo</i> ...	Shiratori, S. ...	M. Tamura ...	" A. ...	Nippon Yusen Kaisha	" 12.11.26 to 15.12.26 ...	3.1.27.
<i>Karapara</i> ...	Norris, H. C. ...	V. J. Denton, H. W. Norris, E. Hutchinson, H. Griffiths.	M.L. ...	State Service Australia	Met. Log. 25.7.26 to 13.11.26 ...	21.12.26.
<i>Kashmir</i> ...	Sinclair, R. J. ...	J. W. Knight ...	No. M. ...	British India	Form 911 24.11.26 to 7.1.27 ...	24.1.27.
<i>Kathlamba</i> ...	Miller, A. C. ...	J. H. Anderson ...	" M. ...	P. & O. ...	" 7.11.26 to 13.12.26 ...	14.1.27.
<i>Kenilworth Castle</i> ...	Stringer, R. H., O.B.E., R.D., Commr.	... ..	" A. ...	Ellerman Bucknall ...	Met. Log. 21.8.26 to 27.9.26 ...	11.10.26.
<i>Kent</i> ...	Mordue, J. A. ...	... ..	M.L. ...	Union Castle	" 17.1.26 to 11.7.26 ...	15.7.26.
<i>Khiva</i> ...	Chave, Sir B., K.B.E. Attwood, J. Owen, S.	H. L. Iddes, T. M. Gordon ...	No. A. ...	New Zealand S.S. Co.	Form 911 28.7.26 to 31.8.26 ...	8.9.26.
<i>Khyber</i> ...	Downton, M. M. ...	F. M. Knight ...	M.L. ...	P. & O. ...	Met. Log. 17.10.26 to 31.1.27 ...	3.2.27.
<i>Kia Ora</i> ...	Cooper, C. P. ...	G. W. Wood ...	" ...	P. & O. ...	Form 911 27.8.26 to 8.12.26 ...	13.12.26.
<i>Knight Companion</i> ...	Hester, C. W., R.D., Commr. R.N.E.	C. B. Roche, E. J. Parry, H. D. Case, G. S. B. Collard.	" ...	Shaw Savill & Albion	Met. Log. 21.6.26 to 15.12.26 ...	30.12.26.
<i>Koeno</i> ...	McIntosh, A. ...	E. A. Hickling, J. Laurenson ...	No. M. ...	A. Holt ...	Form 911 26.9.26 to 9.11.26 ...	13.11.26.
<i>Kwetyang</i> ...	Reed, G. C. ...	J. J. Daniel ...	M.L. ...	Ellerman Wilson	Met. Log. 12.6.26 to 26.11.26 ...	27.11.26.
<i>37 Laconia</i> ...	Dossor, W. A. ...	H. Redfern, A. Snowdon, A. Hebblewhite.	" ...	China Nav. Co. ...	" 25.3.26 to 4.8.26 ...	27.9.26.
<i>Lady Denison Pen- der, C.S.</i> ...	Byers, G. ...	W. McDonald, T. Hackett ...	W.T. ...	Cunard ...	W.T. Reg. 17.1.27 to 22.1.27 ...	10.2.27.
<i>Laguna</i> ...	Britten, E. T. ...	T. Parry, J. Ashcroft, J. W. Caunce.	No. A. ...	Eastern Tel. Co. ...	Form 911 16.1.27 to 23.1.27 ...	9.2.27.
<i>Lahore</i> ...	West, G. W. ...	F. Lawrence ...	" A. ...	Pacific S.N. Co. ...	" 9.5.26 to 7.7.26 ...	7.8.26.
<i>Lalande</i> ...	Pattison, G. H. ...	... ..	" A. ...	P. & O. ...	Met. Log. 7.11.26 to 24.11.26 ...	14.12.26.
<i>Lancashire</i> ...	Kirkwood, J. H. ...	W. G. Stevenson ...	" M. ...	Lampart & Holt	Form 911 27.11.26 to 31.12.26 ...	5.1.27.
	Dawson, E. N. ...	A. E. Warburton ...	" A. ...	Bibby ...	" 25.9.26 to 23.10.26 ...	16.11.26.
	Hamill, H. ...	W. H. Muirhead ...	" A. ...		" 25.9.26 to 2.12.26 ...	9.12.26.

## 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 11.2.27.	Date Received
36 <i>Lancastria</i> ...	Malin, R. G., Lt.-Commr., R.N.R.	R. P. Campbell, L. R. Sharp, F. G. Russell	W.T.	Cunard ...	W.T. Reg. 7.11.26 to 27.11.26... Form 911 7.11.26 to 28.11.26...	1.12.26. 1.12.26.
<i>Lantaro</i> , M.V. ...	Barkley, E.	...	No.	Pacific S.N. Co. ...	...	...
<i>Laomedon</i> ...	Beswick, W., D.S.C., Lt.-Commr., R.N.R.	A. Yarwood ...	No. A	A. Holt ...	... 16.11.26 to 1.12.26...	29.12.26.
<i>La Paz</i> , M.V. ...	Benson, C. W.	...	" M.	Pacific S.N. Co. ...	... 2.12.26 to 18.12.26...	7.1.27.
<i>Laplace</i> ...	Shaw, W.	A. L. Murray, R. D. Cottam	" A.	Lampport & Holt ...	... 7.8.26 to 13.10.26 ... Met. Log. 1.1.26 to 8.5.26 ...	18.10.26. 17.5.26.
55 <i>Lapland</i> ...	Thomas, A. J.	E. Cornellie, J. C. Flett	W.T.	Red Star ...	W.T. Reg. 3.1.27 to 23.1.27 ... Form 911 2.1.27 to 23.1.27 ...	31.1.27. 31.1.27.
<i>Lassell</i> , M.V. ...	Hickman, V. T.	F. J. Durrant ...	No. A.	Lampport & Holt ...	Met. Log. 20.2.26 to 9.3.26 ...	29.3.26.
<i>Leicestershire</i> ...	English, G. L.	J. Cullen, W. A. Kent, D. Y. Sharrock, J. D. Archer.	M.L.	Bibby ...	Met. Log. 30.10.26 to 10.1.27...	13.1.27.
<i>Leighton</i> , M.V. ...	Lindesay, J. M.	J. T. A. Thomson ...	No. A.	Lampport & Holt ...	Form 911 17.8.26 to 20.11.26...	13.12.26.
<i>Leitrim</i> ...	Robertson, A.	H. G. Letts ...	" A.	Dowie, J., & Co. ...	... 10.7.26 to 7.9.26 ...	10.9.26.
<i>Loch Katrine</i> ...	Buret, T. J. C.	...	" M.	R.M.S.P. Co. ...	... 17.10.26 to 4.1.27 ...	2.2.27.
<i>London Commerce</i> ...	Young, H. J., D.S.C.	...	" A.	Furness Withy ...	... 4.12.26 to 4.1.27 ...	10.1.27.
<i>London Importer</i> ...	Williamson, J. M.	J. S. Williams, W. Stanley ...	M.L.	Ulster S.S. Co. ...	Met. Log. 3.10.26 to 24.12.26...	24.1.27.
<i>Lord Antrim</i> ...	Jarvis, F. E.	L. G. Kirwan ...	No. A.	Pacific S.N. Co. ...	Form 911 2.1.27 to 21.1.27 ...	7.2.27.
<i>Loriga</i> , M.V. ...	Makin, F. W.	E. C. Hicks ...	" A.	...	... 20.8.26 to 6.12.26 ...	10.12.26.
<i>Losada</i> , M.V. ...	Ross, J.	E. Baxter ...	" M.	...	... 4.12.26 to 29.12.26 ...	31.12.26.
<i>Macedonia</i> ...	Potter, H. W., R.D., Commr., R.N.R.	E. R. Bodley ...	" M.	P. & O. ...	... 15.11.26 to 6.1.27 ...	14.1.27.
<i>Macharda</i> ...	Tyers, W. O.	D. M. Fulton ...	" M.	Brocklebank ...	Met. Log. 8.1.27 to 18.1.27 ...	28.1.27.
<i>Mahana</i> ...	Kershaw, W. A. R.	F. M. Smith, H. C. Smith, J. C. K. Rogers.	" A.	Shaw, Savill & Albion	... 15.4.26 to 10.8.26 ...	30.8.26.
<i>Maharaja</i> ...	Hinton, J. C.	H. A. Hartley ...	" M.	Asiatic S.N. Co. ...	Form 911 23.10.26 to 18.11.26	20.12.26.
<i>Mahia</i> ...	Williams, G.	R. Naef ...	No.	Shaw, Savill & Albion	Met. Log. 20.3.26 to 23.6.26 ...	15.7.26.
<i>Maihar</i> ...	Rowe, J. P.	C. Shaw, H. T. Scoins, G. Henshaw.	M.L.	Brocklebank ...	...	...
<i>Maimyo</i> ...	Seurr, T. W.	H. M. Drummond...	No. A.	Burns Philp ...	Form 911 9.7.26 to 1.12.26 ...	6.12.26.
<i>Maiwara</i> ...	Brown, T. M.	...	M.L.	White Star ...	W.T. Reg. 20.1.27 to 3.2.27 ...	7.2.27.
58 <i>Majestic</i> ...	Metcalfe, G. R.	W. T. Fitzgerald, J. Paine ...	W.T.	Burns Philp ...	Met. Log. 26.6.26 to 6.10.26 ...	29.12.26.
<i>Makambo</i> ...	McLean, J.	F. C. Vogelmann, T. R. Lang, W. O. L. Wilding.	M.L.	...	...	...
<i>Makura</i> ...	Brown, T. M.	...	"	Canadian-Australasian	... 9.9.26 to 20.1.27 ...	7.2.27.
<i>Malabar</i> ...	Davey, A. H.	O. C. Bray, W. J. Weber, L. P. Bourke.	"	Burns, Philp & Co. ...	Form 911 8.9.26 to 22.9.26 ...	25.9.26.
<i>Malakuta</i> ...	Mawson, J.	...	"	Brocklebank ...	... 29.7.26 to 12.8.26 ...	28.9.26.
<i>Malancha</i> ...	Adamson, F. L.	J. H. Round ...	No. M.	British India ...	... 6.12.26 to 7.1.27 ...	31.1.27.
<i>Malda</i> ...	Sharpe, G.	R. Humble ...	" M.	P. & O. ...	... 6.8.26 to 11.9.26 ...	1.11.26.
<i>Maloja</i> ...	Gray, T. N.	W. S. Donald ...	" M.	Shaw, Savill & Albion	... 29.11.26 to 31.12.26 ...	13.1.27.
<i>Mamari</i> ...	Warner, S. C.	...	" M.	Manchester Liners ...	... 13.1.27 to 25.1.27 ...	28.1.27.
<i>Manchester Brigade</i> ...	Falconer, H.	P. Campbell ...	" A.	...	...	...
<i>Manchester Corporation</i> ...	Stott, C. H.	E. Hale ...	" A.	...	...	...
<i>Manchester Hero</i> ...	Everest, J. E.	W. L. Lavers ...	" A.	...	Met. Log. 3.10.25 to 20.7.26 ...	27.7.26.
<i>Manchester Merchant</i> ...	Riley, J. E.	J. H. Emmitt, H. Anderton, B. M. Brown.	M.L.	...	Form 911 26.6.26 to 11.8.26 ...	20.8.26.
<i>Manchester Regiment</i> ...	Struss, F. D.	E. W. Jeffries ...	No. A.	...	...	...
<i>Manchester Shipper</i> ...	Foale, J. R.	R. H. Walker ...	" A.	...	... 15.11.26 to 7.1.27 ...	13.1.27.
<i>Manipur</i> ...	Dormer, A. E.	H. Swindells ...	M.L.	...	Met. Log. 24.7.26 to 16.11.26...	29.11.26.
<i>Mantua</i> ...	Cochran, G. N.	R. Penston, K. Leadbetter ...	No. M.	Brocklebank ...	Form 911 5.9.26 to 2.10.26 ...	14.10.26.
<i>Marburn</i> ...	Randell, G. G.	D. B. Leader ...	" M.	P. & O. ...	... 5.11.26 to 15.12.26...	18.12.26.
<i>Marella</i> ...	Stewart, A.	R. H. W. Jackson ...	" M.	Canadian Pacific	... 24.4.26 to 7.5.26 ...	20.5.26.
<i>Marengo</i> ...	Mortimer, S.	J. A. Street ...	M.L.	Burns Philp ...	Met. Log. 2.4.25 to 25.8.25 ...	1.12.25.
<i>Margha</i> ...	Williams, J. C., R.D., Commr., R.N.R.	F. Barnard, H. Bryon, J. Ford	"	Ellerman Wilson ...	... 11.9.26 to 21.12.26...	30.12.26.
<i>Marsina</i> ...	Milne, R. A., R.D., Commr., R.N.R.	P. Wright, H. E. Evans, R. M. Wyatt, E. H. Rabey.	"	British India ...	... 24.10.26 to 21.1.27...	26.1.27.
<i>Mastira</i> ...	Rothery, S.	H. C. Tarrington ...	No. A.	Burns, Philp & Co. ...	Form 911 15.9.26 to 6.10.26 ...	15.11.26.
<i>Matakana</i> ...	Mallett, R.	A. E. Evans ...	" M.	Brocklebank ...	... 12.9.26 to 13.10.26...	16.11.26.
<i>Mataram</i> ...	Thurston, H. P.	J. Hart, J. Dickson, G. E. Lindsay.	M.L.	Shaw, Savill & Albion	Met. Log. 15.8.26 to 23.9.26 ...	29.11.26.
<i>Mataroa</i> ...	Voy, W.	V. V. Edmonds ...	No. A.	Burns Philp & Co. ...	Form 911 17.11.26 to 11.12.26	7.2.27.
<i>Matheran</i> ...	Kershaw, W. A. R.	H. H. Armstrong, H. Willington, J. Richardson.	M.L.	Shaw, Savill & Albion	Met. Log. 5.9.26 to 31.12.26 ...	5.1.27.
<i>Mathura</i> ...	Hanna, R. G.	...	"	Brocklebank ...	...	...
<i>Matiana</i> ...	Bacon, A. E.	H. H. Armstrong ...	No. M.	British India ...	Form 911 1.2.26 to 3.3.26 ...	8.3.26.
<i>Maunganui</i> ...	Green, F. V.	J. M. Brown ...	" M.	Union S.S. Co. of N.Z.	... 30.12.26 to 23.1.27...	28.1.27.
32 <i>Mauretania</i> ...	Davey, A. H.	C. G. Eustace ...	" M.	Cunard ...	W.T. Reg. 4.6.26 to 9.7.26 ...	23.8.26.
<i>Media</i> ...	Diggle, E. G., R.D., Capt., R.N.R.	E. R. Taylor, J. A. Quarrie, G. Duguid.	W.T.	...	W.T. Reg. 10.10.26 to 24.10.26 ...	15.11.26.
<i>Medic</i> ...	Mallett, R.	S. C. Cramb ...	No. A.	T. & J. Brocklebank...	... 31.10.26 to 15.11.26 ...	17.11.26.
<i>Megantic</i> ...	Jones, W. H.	W. Nicoll ...	" A.	White Star ...	Form 911 2.5.26 to 28.6.26 ...	7.7.26.
22 <i>Melita</i> ...	Trant, E. L., R.D., Commr., R.N.R.	H. A. Billiald, R. Conway, J. C. Boyce.	" A.	...	W.T. Reg. 28.11.26 to 17.12.26 ...	11.1.27.
<i>Memnon</i> ...	Notley, A. H.	J. Shearer, N. J. P. Roberts	W.T.	Canadian Pacific ...	... 6.12.26 to 26.12.26...	29.12.26.
21 <i>Metagama</i> ...	Melling, C. F.	L. S. Evans ...	No. A.	A. Holt ...	Form 911 16.1.27 to 3.2.26 ...	7.2.27.
<i>Middlesex</i> ...	Freer, A., Commr., R.N.R.	R. Walker, A. Mansey	W.T.	Canadian Pacific ...	W.T. Reg. 5.11.26 to 19.12.26...	6.1.27.
<i>Minderoo</i> ...	Macrae, A. B.	...	No. M.	Federal ...	... 25.12.26 to 14.1.27...	18.1.27.
<i>Minna</i> ...	Richardson, E.	B. J. Bennie, W. J. McPhedraun, J. H. Oxtan.	" A.	West Australia Nav. Co.	Met. Log. 2.5.26 to 4.10.26 ...	1.12.26.
23 <i>Minnedosa</i> ...	Mackenzie, G. G.	J. H. Hennessey ...	" A.	Scottish Fishery Board	Form 911 5.1.27 to 21.1.27 ...	25.1.27.
<i>Minnosota</i> ...	Griffiths, J. N.	J. P. Dobson, F. W. Roberts	W.T.	Canadian Pacific ...	W.T. Reg. 4.12.26 to 22.12.26...	30.12.26.
<i>Minnetonka</i> ...	Gates, T. F., C.B.E.	H. E. McCartney ...	No. M.	H.M. Transport ...	Form 911 2.1.27 to 9.1.27 ...	25.1.27.
<i>Minnewaska</i> ...	Claret, F. H. C.B.E., Commr., R.N.R.	A. R. Stevens ...	" M.	Atlantic Transport ...	... 16.1.27 to 5.2.27 ...	8.2.27.
<i>Mirror</i> , C.S. ...	Gibson, L.	A. G. Watts ...	" M.	Eastern Tel. Co. ...	... 8.10.26 to 14.10.26 ...	4.11.26.
<i>Mississippi</i> ...	Wylie, J. T. J.	A. T. Perrin ...	" A.	Atlantic Transport ...	... 29.10.26 to 29.11.26 ...	8.12.26.
<i>Moldavia</i> ...	Burleigh, C. W., D.S.O., R.D., Capt., R.N.R.	R. H. Maskell ...	" M.	P. & O. ...	... 5.12.26 to 23.12.26...	19.1.27.
<i>Mongolian Prince</i> ...	Edwards, W.	F. Mugford ...	" A.	Prince ...	W.T. Reg. 16.10.26 to 29.10.26	11.11.26.
24 <i>Montcalm</i> ...	Hamilton, G.	H. McFadyen ...	W.T.	Canadian Pacific ...	... 1.1.27 to 21.1.27 ...	24.1.27.
25 <i>Montclare</i> ...	Webster, G. S., R.D., Lt.-Commr., R.N.R.	R. Fegan, H. S. Knight, E. Shergold.	"	...	Form 911 14.11.26 to 2.12.26...	20.12.26.



Name of Vessel.	Captain.	Observing Officers.	Official Meteorological Equipment.	Line.	Last Log, Register, or Report Contributed. Received up to 11.2.27.	Date Received.
<i>Montferland</i> ...	Van Noppen, C. D.	W. Slooten	No. M.	Holland Lloyd	Form 911 5.8.26 to 6.11.26 ...	17.11.26.
27 <i>Montnairn</i> ...	Turnbull, J., A.d.C., C.B.E., R.D., Capt. R.N.R.	F. B. Williams, F. Chodzko, F. Hindle.	W.T.	Canadian Pacific	W.T. Reg. 12.12.26 to 30.12.26	4.1.27.
26 <i>Montrose</i> ...	Landy, E.	A. Watt, R. Woods, A. W. Patrick.	"	"	" 2.10.26 to 21.10.26	27.10.26.
20 <i>Montroyal</i> ...	Griffiths, E., Lieut.- Commr. R.N.R.	H. Tudor ...	"	"	Form 911 21.11.26 to 12.12.26	15.12.26.
<i>Moresby</i> ...	Edgell, J. A., O.B.E., Capt., R.N.	W. H. Martin ...	M.L.	His Majesty's Australian Ship.	Met. Log. 17.7.26 to 22.7.26 ...	26.7.26.
<i>Morvada</i> ...	Mills, T. L., O.B.E., R.D., Commr., R.N.R.	A. J. Norris ...	No. M.	British India	Form 911 31.8.26 to 14.12.26	24.1.27.
<i>Mulbera</i> ...	Steadman, W. R.	E. H. Spriggs ...	" M.	"	" 7.11.26 to 27.1.27 ...	1.2.27.
<i>Nagara</i> ...	Foster, E.	E. Hewitt ...	" M.	R.M.S.P. Co.	" 1.1.27 to 6.1.27 ...	31.1.27.
<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>Nellore</i> ...	Hignett, A. H., R.D., Lt. - Commr., R.N.R.	S. H. Baldwin ...	" M.	"	" 3.10.26 to 19.12.26...	29.12.26.
<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. Sainty, 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> ...	Christie, W.	J. W. Pring ...	No. A.	A. Holt	Form 911 13.10.26 to 30.12.26	10.1.27.
<i>Norfolk</i> ...	Mead, G. F.	T. Mather ...	" A.	Federal	" 13.1.27 to 24.1.27 ...	7.2.27.
<i>Norna</i> ...	Wright, J. W.	E. Pearce ...	" A.	Scottish Fishery Board	" 3.1.27 to 31.1.27 ...	7.2.27.
<i>Norseman, C.S.</i> ...	Barter, H. O., R.N., Commr., R.N.R.	E. Pearce ...	" M.	Western Tel. Co.	" 19.11.26 to 15.12.26	4.1.27.
<i>Northwestern Miller</i> ...	Nuttall, E. L.	W. P. Paterson ...	" A.	Furness Withy	" 20.11.26 to 23.12.26	29.12.26.
<i>Nova Scotia</i> ...	Furneaux, S.	T. E. C. Earl ...	" A.	British India	" 8.9.26 to 4.10.26 ...	18.10.26.
<i>Nowshera</i> ...	Rowe, S. N.	...	" M.	Leyland	Form 911 28.12.26 to 10.1.27...	14.1.27.
<i>Nubian</i> ...	Watmough, T. M.	...	" A.	...	...	...
<i>Oaklands Grange</i> ...	St. Clair, C., D.S.C.	E. J. Longheed ...	" A.	Houlder Bros.	26.11.26 to 21.12.26	21.1.27.
42 <i>Ohio</i> ...	Clarke, E., R.D., Commr., R.N.R.	E. A. E. Littlewood, D. P. Larnham, G. N. Elliott.	W.T.	R.M.S.P. Co.	W.T. Reg. 17.10.26 to 7.11.26	12.11.26.
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.	"	White Star	Form 911 18.9.26 to 7.11.26 ...	12.11.26.
<i>Orama</i> ...	Shelford, W. S., Lieut. - Commr., R.N.R.	T. Fox Russell, C. K. Blake, H. Tanner.	M.L.	Orient	W.T. Reg. 16.12.26 to 3.1.27 ...	6.1.27.
<i>Oranian</i> ...	Hoskins, W.	W. Lawton ...	No. A.	Leyland	Form 911 16.12.26 to 4.1.27 ...	6.1.27.
<i>Orbita</i> ...	Warner, G. E., R.D., R.N.R.	C. V. Fletcher, H. H. Tre- weeks, A. Chamberlin.	No.	R.M.S.P. Co.	Met. Log. 25.7.26 to 26.10.26...	2.11.26.
43 <i>Orca</i> ...	Le Brecht, H. A.	R. Griffiths, R. Gill, T. Naylor.	W.T.	Pacific S.N. Co.	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.	H. G. Whittle, S. Robbins, J. E. P. Matthews, D. P. Larham.	M.L.	R.M.S.P. Co.	W.T. Reg. 12.9.26 to 3.10.26 ...	7.10.26.
<i>Orduna</i> ...	Smith, W. E., D.S.O., R.D., Capt., R.N.R.	...	No.	R.M.S.P. Co.	Form 911 11.9.26 to 3.10.26 ...	7.10.26.
<i>Orestes</i> ...	Hanney, T. W.	C. C. N. Gibson, D. W. Hutch- inson, G. R. Bubb, J. L. Jones.	No. A.	A. Holt	Met. Log. 19.8.26 to 5.11.26 ...	11.11.26.
<i>Orita</i> ...	Splatt, W. A.	...	M.L.	Pacific S.N. Co.	W.T. Reg. 5.9.26 to 26.9.26 ...	4.10.26.
<i>Ormonde</i> ...	Wyatt, A. G. N., Lieut. Commr., R.N.	A. M. Hughes ...	"	His Majesty's Ship	Form 911 4.9.26 to 27.9.26 ...	4.10.26.
<i>Ormonde</i> ...	James, L.V., D.S.C.	...	No. M.	Orient	Met. Log. 1.11.26 to 11.11.26...	17.11.26.
<i>Ormuz</i> ...	O'Sullivan, F. R.	F. J. L. Butler, W. Wickham, A. A. Addison, H. A. Whittle.	M.L.	Orient	Met. Log. 22.6.26 to 29.11.26...	20.12.26.
<i>Oronsay</i> ...	Owens, A. L., R.D., Lt.-Commr., R.N.R.	J. C. K. Dowding, E. Hatch, R. Galpin, R. S. Hawker.	"	"	" 7.9.26 to 17.11.26 ...	1.12.26.
<i>Oroya</i> ...	Duncan, E. E.	G. Lewis ...	No. M.	Pacific S.N. Co.	Met. Log. 8.8.26 to 11.11.26 ...	17.11.26.
<i>Orsova</i> ...	Cameron, E. P., R.D., Commr., R.N.R.	L. J. Vesty W. Elliott, J. F. Castle-Bartley.	M.L.	Orient	" 11.9.26 to 19.1.27 ...	24.1.27.
<i>Ortega</i> ...	Barkley, E.	G. M. Rice ...	No. M.	Pacific S.N. Co.	Form 911 28.10.26 to 4.1.27 ...	10.1.27.
<i>Orieto</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	Met. Log. 22.8.26 to 24.11.26...	4.12.26.
<i>Osterley</i> ...	Hayes, I. J.	S. Burnnand ...	No. A.	"	Form 911 29.9.26 to 15.11.26...	24.11.26.
<i>Otahi</i> ...	McNish, R.	C. R. Brown ...	" A.	New Zealand S.S. Co.	Met. Log. 5.9.26 to 9.12.26 ...	14.12.26.
<i>Otira</i> ...	Wood, C.	D. N. MacGregor ...	" M.	Shaw, Savill & Albion	Form 911 1.11.26 to 3.2.27 ...	8.2.27.
<i>Otranto</i> ...	Staunton, H. G., C.B.E., R.D.	S. Myers ...	" M.	Orient	" 24.12.26 to 7.2.27 ...	10.2.27.
<i>Oxfordshire</i> ...	Crumplin, W. E.	D. T. Nicholas ...	" A.	Bibby Bros.	" 15.12.26 to 29.1.27...	2.2.27.
<i>Pacific Shipper, M.V.</i> ...	Newman, G. W. A.	G. Davis ...	" A.	Furness Withy	" 22.11.26 to 22.12.26	31.12.26.
<i>Pacuare</i> ...	Harvey, A. E.	M. C. Cruickshank ...	" A.	Elders & Fyffes	" 11.9.26 to 19.11.26...	22.11.26.
<i>Pakeha</i> ...	W. P. Clifton Mogg	E. T. Baker, R. E. Nicholson, A. J. Tillot.	M.L.	Shaw, Savill & Albion	Met. Log. 26.10.26 to 25.11.26	30.11.26.
<i>Pareora</i> ...	Evans, J. O.	N. Turner ...	No. A.	Hain S.S. Co.	" 3.8.26 to 16.8.26 ...	8.9.26.
<i>Paris</i> ...	Cook, C. L.	Mr. Biles ...	C.C.	Southern Rly.	Met. Log. 27.5.26 to 12.10.26...	18.10.26.
<i>Patia</i> ...	Maxwell Brown, W. E.	J. Kinsley ...	No. A.	Elders & Fyffes	Form 911 25.10.26 to 7.11.26	9.11.26.
<i>Patrician</i> ...	Pugh, R. H.	H. W. Stanley ...	" M.	Harrison	Telegraphic Report. 15.10.26 ...	15.10.26.
<i>Patrol, C.S.</i> ...	Welsh, T. K.	J. S. Browne ...	No.	Eastern Extension (A. & C.) Telegraph Co.	Form 911 19.9.26 to 24.10.26...	4.11.26.
<i>Persic</i> ...	Bulman, J. B.	R. Conway ...	No. A.	White Star	Met. Log. 11.6.26 to 28.9.26 ...	23.11.26.
<i>Peshawur</i> ...	Hester, C. W., R.D., Commr., R.N.R.	D. G. Baillie, J. K. Crone, R. D. Whyte-Mackay.	M.L.	P. & O.	Met. Log. 18.10.26 to 15.11.26	9.2.27.
<i>Piako</i> ...	Kettlewell, C. R.	...	"	New Zealand S.S. Co.	Form 911 27.9.26 to 4.11.25 ...	17.3.26.
<i>Polycarp</i> ...	Evans, T. G.	...	No. A.	Booth	Met. Log. 16.1.26 to 2.7.26 ...	9.7.26.

## vii

Name of Vessel.	Captain.	Observing Officers.	Official Meteorological Equipment.	Line.	Last Log, Register, or Report Contributed. Received up to 11.2.27.		Date Received.
Port Adelaide ...	Hayter, S. W. ...	R. W. Linklater, E. N. Rogers, L. Porter.	M.L.	Commonwealth & Dominion	Met. Log.	14.8.26 to 18.12.26...	29.12.26.
" Albany ...	Robinson, C. A. ...	E. A. Leavett, W. Eastoe, J. Thom.	"	" " "	"	1.5.26 to 9.11.26 ...	17.11.26.
" Auckland ...	Durham, R. S. ...	G. L. Hazlewood, C. F. Post, J. H. Sloan, H. E. Braine.	"	" " "	"	18.9.26 to 22.1.27 ...	7.2.27.
" Bowen ...	Gilling, W. ...	W. R. Johnston ...	No. A.	" " "	Form 911	21.7.26 to 27.8.26 ...	20.9.26.
" Caroline ...	Williams, R. ...	"	M.L.	" " "	Met. Log.	31.5.26 to 2.12.26 ...	8.1.27.
" Darwin ...	Sawbridge, I. R. ...	E. T. N. Lawrey ...	"	" " "	Form 911	23.10.26 to 4.12.26...	13.12.26.
" Dumedin ...	Lea, W. H. ...	E. G. Jones, R. Needham, H. M. Post, E. Wheeler.	"	" " "	Met. Log.	17.7.26 to 29.10.26...	4.11.26.
" Hacking ...	Hoad, A. C. ...	F. W. Elgar, G. Lovegrove, E. Luker.	"	" " "	"	30.10.26 to 11.12.26	15.12.26.
" Hobart ...	Craven, R. ...	C. Hersee, L. Copeland, G. G. Langford, C. L. Webb.	"	" " "	"	12.9.26 to 5.1.27 ...	13.1.27.
" Hunter ...	Cottell, S. C. ...	A. Cooper, R. Forrest, J. T. Weldin.	"	" " "	"	1.6.26 to 2.11.26 ...	23.11.26.
" Melbourne ...	Kearney, F. J. ...	D. G. H. Bradley, J. A. Fairbairn, A. G. Starkey.	M.L.	" " "	"	4.5.26 to 5.9.26 ...	8.9.26.
" Napier ...	Jones, C. N. ...	"	No. A.	" " "	Form 911	2.10.26 to 20.11.26...	9.12.26.
" Nicholson ...	Jack, J. ...	J. L. Lewis, G. I. H. Dean, P. A. Munday, C. Jolly.	M.L.	" " "	Met. Log.	10.9.26 to 3.1.27 ...	19.1.27.
" Pirie ...	Kippons, T. ...	H. C. Jeffery, W. G. Jones, N. M. Muzzill, S. Hearn.	"	" " "	"	6.4.26 to 6.9.26 ...	13.9.26.
" Sydney ...	Higgs, W. G. ...	G. L. H. Dean, K. D. Morgan, H. G. Boys Smith.	"	" " "	"	26.6.26 to 29.7.26 ...	5.8.26.
" Victor ...	Swan, L. H. ...	L. M. R. Bayly, W. J. Watson, A. Brown.	"	" " "	"	16.7.26 to 20.11.26...	1.12.26.
" Wellington ...	Farmer, F. ...	P. H. Pedrick ...	No. A.	" " "	Form 911	14.10.26 to 2.2.27 ...	11.2.27.
President Jackson	Griffith, J. ...	"	" A.	Pacific Mail S.S. Co....	"	4.10.26 to 30.11.26...	10.1.27.
President Jefferson	Nichols, F. R. ...	B. Christensen ...	" A.	Admiral Oriental Line	"	30.12.26 to 18.1.27...	7.2.27.
President Wilson	Nelson, H. ...	A. M. Quinlan ...	" A.	Dollar ...	"	5.9.26 to 2.11.26 ...	22.11.26.
Protea, H.M.S.A.S.	Woodhouse, A. F. B., Lt.-Commr., R.N.	R. J. Whitley ...	No. M.	South African Naval Service.	"	1.8.26 to 14.9.26 ...	12.10.26.
Pyrrhus ...	Read, J. W. ...	W. J. Ryan ...	" A.	A. Holt ...	"	1.12.26 to 7.1.27 ...	10.1.27.
Ranpura ...	King, A. M., D.S.C.	G. Randall ...	" M.	P. & O. ...	"	1.1.27 to 19.1.27 ...	24.1.27.
60 Regina ...	Smith, R. G. ...	R. H. Shaw, C. Cochrane, H. J. Yates.	" W.T.	White Star-Dominion	W. T' Reg.	14.11.26 to 4.12.26	8.12.26.
Reindeer ...	Langdon, C. ...	"	C.C.	G.W. Railway ...	Form 911	14.11.26 to 4.12.26	8.12.26.
Remuera ...	Cameron, J. J. ...	P. McCullum, P. Shakespeare	No. A.	New Zealand S.S. Co.	Telegraphic Report	10.2.27	10.2.27.
Reventazon ...	Jack, D. A. ...	L. C. Bach, H. C. Drummond	No.	Elders & Fyffes ...	Form 911	13.3.26 to 19.4.26 ...	27.7.26.
Rhodesian Transport.	Fowler W. H. ...	"	No. A.	Houlder Bros. ...	"	23.11.26 to 26.12.26	30.12.26.
Rimutaka ...	Hemming, F. A. ...	H. A. Fryer, D. E. Hughes, G. O. Saul, H. Vernon	M.L.	New Zealand S.S. Co.	Met. Log.	17.7.26 to 10.12.26	15.12.26.
Risaldar ...	Park, G. ...	T. E. Hart, C. B. Miller, W. H. J. Llewellyn.	"	Asiatic S.N. Co. ...	"	10.4.26 to 16.9.26 ...	19.10.26.
Rotorua ...	Hunter, J. B. ...	E. Lawrence, R. G. Rees, H. Cockerill.	M.L.	N.Z.S. Co. ...	"	3.7.26 to 15.10.26 ...	26.10.26.
Royal Fusilier ...	Dawson, J. ...	J. Fraser ...	No. A.	London & Edinburgh S.S. Co.	Form 911	6.1.27 to 27.1.27 ...	2.2.27.
Royal Transport...	Dove, J. ...	R. W. Wass ...	" A.	Houlder Bros. ...	"	24.1.26 to 24.7.26 ...	6.8.26.
Ruapehu ...	McKellar, A. W., R.D., Capt., R.N.R.	H. M. Selmer, W. J. Glassborow, H. C. Russell.	M.L.	New Zealand S.S. Co.	Met. Log.	26.8.26 to 26.12.26...	30.12.26.
Sachem ...	"	"	No.	Furness Withy ...	"	"	"
St. Albans ...	Smith, G. L. ...	J. W. Kavanagh, W. McIntyre	M.L.	Eastern and Australian	Met. Log.	9.4.26 to 5.9.26 ...	26.11.26.
St. Helier ...	Diamond, S. L. ...	C. Shalford.	"	"	"	"	"
St. Julien ...	Mulhall, W. ...	C. Bell ...	C.C.	G.W. Railway ...	Telegraphic Report	4.11.26 ...	4.11.26.
St. Andrew ...	Langdon, C. H. ...	C. Joy ...	"	"	"	29.9.26 ...	29.9.26.
Salaga ...	Bearpark, E. W. ...	"	No. A.	Rankin Gilmour ...	Form 911	25.11.26 to 6.12.26	23.12.26.
38 Samaria ...	Sola, P., D.S.O.	C. V. Evans ...	" A.	Elder Dempster ...	"	18.9.26 to 4.12.26 ...	14.12.26.
"	McNeil, S. G. S., R.D., Capt., R.N.R.	C. S. Williams, M. Boston, A. B. Fasting.	W.T.	Cunard ...	"	20.12.26 to 8.1.27 ...	13.1.27.
Saxoleine ...	Rodgers, C. S. ...	B. Johnsen ...	No. A.	Hunting & Son ...	W.T. Reg.	20.12.26 to 8.1.27 ...	11.1.27.
Saxon ...	Owen, S. H. ...	E. G. Broodbank ...	" A.	Union Castle ...	Form 911	18.2.26 to 9.3.26 ...	29.3.26.
Scindia ...	Matthews, W. ...	R. S. Paton ...	" A.	Anchor ...	"	27.8.26 to 18.10.26...	29.10.26.
Scholar ...	Egerton, J. J. ...	W. A. Pemberton ...	" M.	Harrison ...	"	18.8.26 to 17.11.26	1.12.26.
Scotia ...	Prichard, S.D., M.B.E.	O. W. L. Jones ...	C.C.	L.M. & S. Rly. ...	"	19.12.26 to 2.2.27 ...	9.2.27.
Scottish Bard ...	McDonnell, S. ...	J. W. Lilley ...	No. A.	Tankers Ltd. ...	Telegraphic Report	10.2.27 ...	10.2.27.
33 Seythia ...	Prothero, W. ...	G. Overton, J. C. Munro, P. G. Britten.	W.T.	Cunard ...	Form 911	22.11.26 to 3.12.26	3.1.27.
Sheaf Lance ...	Earl, C. ...	"	No.	W. A. Souter ...	W.T. Reg.	22.11.26 to 12.12.26	15.12.26.
Sheaf Mount ...	Groves, C. V. ...	C. A. Goold ...	No. A.	"	Form 911	21.11.26 to 12.12.26	15.12.26.
"	Whitfield, G. A., O.B.E.	"	M.L.	"	Met. Log.	10.6.26 to 8.7.26 ...	22.7.26.
Sheaf Spear ...	Grisewood, W. H., Dring, S. J.	"	"	"	"	25.6.26 to 3.10.26 ...	18.10.26.
Shropshire, M.V.	Adamson, B. W. ...	W. L. Whiteside, R. Cumming, W. H. Brittain, J. E. Goldsworthy.	"	Bibby ...	Met. Log.	6.11.26 to 15.1.27 ...	18.1.27.
Socrates ...	Taylor, F. C. ...	W. E. Jordan ...	No. A.	Lamport & Holt ...	Form 911	25.11.26 to 14.12.26	3.1.27.
Soekaboemi ...	Z. W. Flach ...	J. Watson ...	" M.	Rotterdam Lloyd ...	"	11.9.26 to 5.1.27 ...	2.2.27.
Somme... ..	Miles, F. R., Commr. R.D., R.N.R.	D. Fraser, J. G. F. Betson ...	" A.	R.M.S.P. Co. ...	Form 911	1.5.26 to 23.7.26 ...	13.8.26.
Spero ...	Montgomery, H. ...	T. E. Fea, D. Millward ...	M.L.	Ellerman Wilson ...	Met. Log.	17.6.26 to 18.12.26...	24.12.26.
Stockwell ...	Thowless, E. ...	W. Gibson ...	No. A.	Brocklebank ...	Form 911	26.9.26 to 1.1.27 ...	21.1.27.
Stuart Prince ...	Kemp, E. J. ...	W. Venn ...	" A.	Prince ...	"	18.2.26 to 6.3.26 ...	26.4.26.
Suwa Maru ...	Okuno, Y. ...	"	" A.	Nippon Yusen Kaisha	"	23.8.26 to 20.9.26 ...	11.10.26.
Sylvafield... ..	Biddick, E....	"	" A.	Hunting & Son ...	"	23.10.26 to 31.12.26	11.1.27.
Tainui ...	Elford, H. C. ...	P. S. Horwood ...	" A.	Shaw, Savill & Albion	"	15.12.26 to 20.1.27...	24.1.27.
Tairoa... ..	Summers, W. G. ...	S. A. Bannister ...	" A.	"	"	30.3.26 to 12.5.26 ...	17.5.26.
Tahiti ...	Aldwell, B. M. ...	D. A. Menlove ...	" A.	Union S.S. Co. of N.Z.	"	4.11.26 to 22.12.26...	17.1.27.
Taipang ...	Frame, A. M. ...	T. G. Stratford, W. Bailley, L. A. Baile	M.L.	Yuill & Co. ...	Met. Log.	22.5.26 to 9.9.26 ...	18.1.27.
Tamaroa ...	Hartman, W. H. ...	T. A. Smith ...	No. M.	Shaw, Savill & Albion	"	"	"
Tanda ...	Pilcher, E. ...	J. W. Kavanagh, B. Dun, C. Stratford, H. E. Nuzum.	"	E. & A. S.S. Co. ...	"	27.8.26 to 3.12.26 ...	7.1.27.



Name of Vessel.	Captain.	Observing Officers.	Official Meteorological Equipment.	Line.	Last Log, Register, or Report Contributed. Received up to 11.2.27.	Date Received.
<i>Tambora</i> ...	Huisman, N. ...	H. Van Manen ...	No. M.	Rotterdam Lloyd ...	Form 911 29.8.26 to 14.10.26...	30.10.26.
<i>Teiresias</i> ...	Wilkinson, W. H. ...	W. Stanger ...	" A.	A. Holt & Co. ...	" 21.11.26 to 25.12.26	9.2.27.
<i>Tekoa</i> ...	Barnett, H. ...	P. H. Chalwin ...	" M.	New Zealand S.S. Co. ...	" 10.11.26 to 2.12.26...	7.1.27.
<i>Telamon</i> ...	Duggan, C. ...	G. Bevan ...	" A.	A. Holt ...	" 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. ...	" ...	" A.	A. Holt ...	" 12.1.27 to 29.1.27 ...	7.2.27.
<i>Titan</i> ...	Wilkinson, T. G. ...	D. MacLavith, D. T. Williams, G. W. Best, C. G. Bailey.	M.L.	" ...	Met. Log. 20.10.25 to 11.3.26	18.3.26.
<i>Tongariro</i> ...	White Parsons, V.C. ...	J. J. Youngs, E. Quick ...	No. M.	New Zealand S.S. Co. ...	Form 911 8.11.26 to 28.11.26...	24.1.27.
<i>Transylvania</i> ...	Bone, D. W. ...	P. Middleton ...	" A.	Anchor ...	" 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. ...	Met. Log. 2.9.25 to 8.2.26 ...	2.3.26.
<i>Turakina</i> ...	Hamilton, E. S. ...	A. N. Marshall, G. S. Shepherd	No. M.	New Zealand S.S. Co. ...	Form 911 27.9.26 to 5.1.27 ...	28.1.27.
<i>Tuscania</i> ...	Smart, R. W. ...	" ...	" A.	Anchor ...	" 25.12.26 to 16.1.27...	20.1.27.
<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. ...	J. Gilbertson ...	No. M.	Huddart Parker, Ltd. ...	Form 911 22.10.26 to 16.11.26	7.1.27.
<i>Ulysses</i> ...	McHutchon, W. ...	E. C. Radford ...	" A.	A. Holt ...	" 18.12.26 to 30.1.27...	3.2.27.
<i>Unvolosi</i> ...	Barnes, E. W. ...	R. L. B. Ryde ...	" A.	Bullard King ...	" 18.12.26 to 7.1.27 ...	7.2.27.
<i>Valacia</i> ...	Inch, F. ...	G. Meggitt ...	" M.	Cunard ...	" 28.9.26 to 7.11.26 ...	22.11.26.
<i>Vardulia</i> ...	Fear, E. T. C. ...	L. D. W. Rand ...	" A.	" ...	" 18.10.26 to 23.12.26	24.1.27.
<i>Verbania</i> ...	Pooley, T. S. M. ...	A. F. Watts ...	" A.	" ...	" 28.5.26 to 3.8.26 ...	13.12.26.
<i>Vigilant</i> ...	Simpson, E. S. S. ...	J. Hunter ...	" A.	Scottish Fishery Board	" 1.1.27 to 31.1.27 ...	7.2.27.
<i>Waioapu</i> ...	Norton, A. ...	S. A. Smith ...	" M.	Canadian-Australasian	" 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.	Union S.S. Co. of N.Z.	Met. Log. 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 13.12.26 to 5.1.27 ...	7.2.27.
<i>War Nizam</i> ...	Moncrieff, T. ...	J. Row ...	" A.	British Tankers ...	" 22.12.26 to 8.1.27 ...	7.2.27.
<i>Welshman</i> ...	Rollerson, W. ...	J. Mendus ...	" M.	White Star-Dominion	" 22.10.26 to 14.11.26	26.11.26.
<i>William Scoresby</i> , R.S.S.	Mercer, G. M., D.S.C., Lt.-Commr., R.N.R.	" ...	"	Falkland Islands Government.	" ... ..	"
<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>Wonganella</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>Walling Island</i> ...	" ...	" ...	"	" ...	Lighthouse Register 17.1.26 to 20.7.26	10.11.26.
<i>Cape Pembroke</i> (Falkland Is.).	" ...	" ...	"	" ...	Lighthouse Register 1.1.26 to 30.6.26	18.8.26.

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 31.1.27.	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>Manzanares</i> ...	Edwards, H. ...	W. E. A. Duff... ..	Elders & Fyffes ...	" " ...	3.1.27.
<i>Reventazon</i> ...	Jack, D. A. ...	L. C. Bach ...	" ...	" " ...	3.1.27.

April, M.O., 1927.