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A HINT TO MARINE OBSERVERS IN DIFFICULT TIMES.

THERE has not been in living memory such a universal depression of trade as that through which we have been passing. Some of those who should know best tell us that the "barometer of shipping"—than which there is no better prognostication of trade—shows signs of rising. Meanwhile many ships are laid up, thousands of officers and men of the Merchant Navy are thrown out of employment and many who go to sea are working under unusual difficulties.

We are confident that better times are coming. Meanwhile as regards this voluntary service of Marine Meteorology the great thing is to develop its practical utility as an aid to navigation and so make it a greater factor in the economical working of British Empire Trade. Therefore every reasonable effort should be made to maintain the regular service of Wireless Weather reports by "Selected Ships" in all parts of the world, and to make the best possible use of the information.

Notwithstanding the fact that the British Observing Fleet now numbers no more than 400* ships, only 80* of these keeping the Meteorological Log and 306 being "Selected Ships," and that the work of Marine Observers is at a very high state of efficiency, there is still some wasted energy in making written returns. Quality rather than quantity should be the axiom for recording and returning observations in writing.

* While in the press it has been decided to reduce the number of Meteorological Log keeping ships to 50 and Form Ships to a number sufficient to maintain the British complement of Selected Ships.

In some "Selected Ships" where there is only one officer in a watch, it is evident that in the endeavour of their observing officers to make full written returns on Form 911 and to make their coded reports complete in the Register Form 138, the work has suffered through attempting too much, probably with a mistaken idea that unless these forms were completely filled they would not stand such a good chance of obtaining the Excellent Classification.

Excellent is awarded by comparison and is therefore gained in competition, but quality is the deciding factor, and no ship is penalized for *having* carried out her instructions.

The attention of Marine Observers is specially invited to the second paragraph of the introductory notes at the head of Form 911, in which it is desired, that the number of routine sets of observations recorded daily (from two to four) should be made according to the number of officers in a watch and it should be noted, that it is not intended, that these synchronized observations made at fixed Greenwich Times should be made and recorded at night, unless there are two officers in the Watch. Attention is also invited to the schedule for observation and communication by which two appropriate observation times are indicated for all "Selected Ships" in each zone. These times are starred on the chart of the world indicating the zones given with the instructions to "Selected Ships" in the January Marine Observer. "A Selected Ships" having two officers in each watch and carrying three W.T. operators will render

great assistance by working all four times, when in regions where the Meteorological Services ashore are indicated as desiring four reports daily. These instructions were so framed in order that no "Selected Ship" should be expected to do work which could not be conveniently done with her complement of officers, and to guard against the possibility of neglect of lookout at night time. By carrying them out, not only will effective and sufficient service be rendered, but needless inconveniences may be spared, with better results. The Meteorological Log is now being kept in not more than 80* observing ships in trades covering parts of the oceans where these sorts of observations are required for completing the original purpose for which the work was established in 1855 of making a meteorological survey of the oceans. As these observations are recorded according to the ships time (time of place) and are made at the relief of the watch they should not be reduced, and for that reason if at any time an observing ship equipped for keeping the Meteorological Log finds this undertaking to be more than she can conveniently continue, the Commander is asked to notify the appropriate Port Meteorological Officer or Agent with a view to relief. The Meteorological Log has been and remains the backbone of British Marine Meteorology and at the present time we are engaged in preparing to make a fresh effort to do full justice to the work which has been done at sea in keeping this log. It is more than ever necessary that the work of Meteorological Logkeeping ships should be of high standard and that it should be confined to a limited number of ships in trades covering parts of the oceans not adequately charted, or for which, there is not sufficient suitable data. The charting of currents is steadily proceeding and it is necessary that all observing ships should regularly record, set and drift of current when it can be obtained with reliance, whether they keep Form 911 or the Meteorological Log.

The reporting of current experienced by "Selected Ships" to all ships is desirable and this is a most useful practice which has not been so well maintained since the weather was reported in code.

"B Selected Ships" reports being addressed to C.Q. may usefully abbreviate the coded part of their reports to the first four or universal groups of code figures, and give the set and drift of current when it has been obtained and is considered reliable. Thus:—

C.Q. Weather 50307 61713 06302
19873 Current W.S.W. threequarter knot from 28N 65W to 30N 61W. *Christales*.

* This number is being reduced to 50.

"A Selected Ships" may often, with advantage to all concerned, adopt this procedure in regions where there is not a station detailed to receive their reports addressed to a Meteorological Centre. Now all "A Selected Ships" are provided with Meteorological Office screens and thermometers when their own instruments are not considered sufficiently accurate and many of them are lent barographs; in these ships it is highly desirable that all the elements specified in Form 911 should be recorded. All "Selected Ships" have reliable barometers, either of their own or lent by the Meteorological Office, no observing ship being detailed as "Selected Ship" until the fact that she has on board a good mercurial barometer has been duly reported.

Some "B Selected Ships" have not thermometers which are entirely satisfactory and some of these ships appear to be under the impression that it is necessary for them to record all the elements for which columns are given in Form 911.

It would be far better in such cases, in "B Selected Ships" which may not have a large complement and in all observing ships which may be working under conditions which are not conducive to so many observations being accurately made and recorded, if on Form 911, columns 15, 16 and 19 to 24 were left blank, and that more attention was given to the other observations.

Temperatures which are not measured with reliable thermometers and which are not observed and recorded with care are better omitted. The information of the state of visibility and the clouds accurately recorded by the Beaufort Notation is better than information of all elements which cannot be recorded with accuracy due to the observing officer having too much to do to do it well. If all observing ships return the routine written observations they are asked for and remark fully and well upon special and unusual experiences and phenomena we shall have all the data we require and the quality of that data will be improved.

By suitable written return and giving all possible attention to the application of Marine Meteorology to the navigation of their ships Marine Observers will best help in difficult times to make Marine Meteorology a greater factor in the commercial structure of the British Empire.

MARINE SUPERINTENDENT.

London.

11th January, 1932.

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.

AMSTERDAM ISLAND.

South Indian Ocean.

THE following is an extract from the Meteorological Record of S.S. *Berwickshire*, Captain E. H. EVENS, East London to Hobart, Tasmania. Observer, Mr. J. D. WOODALL, 2nd Officer.

"April 1st, 1931, at 0540, observed Amsterdam Island bearing 130° 30 miles and altered course to pass close. At 0852 Hoskel Point 180° 1 mile and at 0915 Novara Point 270° 2 miles when course was reset for Mewstone Island, Tasmania. Current was found to be setting to the northward at 2 knots, while coasting steam whistle was sounded but there was no sign of human life. Huts near Hoskel Point appeared to be in a very bad state of repair. Hundreds of very fine cattle were seen grazing between Goodenough and Novara Points, and showed no signs of alarm when whistle was sounded. Large patches of kelp were seen off the east side of the island and was also fallen in with during the following hours of daylight."

MAGNETIC DISTURBANCE.

Red Sea.

THE following is an extract from the Meteorological Record of S. S. *Glentworth*, Captain D. M. ATCHISEN, Sabang to Suez. Observer, Mr. A. BONE, 2nd Officer.

"On April 7th, 1931, at 10.00 a.m. A.T.S., a magnetic disturbance was experienced off Shadwan Island, Red Sea. Latitude 27° 27' N., Longitude 34° 02' E. During a period of about 15 minutes the compass was rendered useless being deflected about 30° each side of vessel's course (N. 30° W. Mag.)."

PHOSPHORESCENCE.

Bay of Bengal.

THE following is an extract from the Meteorological Record of S.S. *Matheran*, Captain J. J. MULCAHY, Colombo to Calcutta. Observer, Mr. W. COWIE, 3rd Officer.

"April 15th, 1931, at 1640 G.M.T., noticed what appeared to be a row of lights on the horizon, somewhat like the loom of a large town. At 1650 G.M.T. the ship entered a belt of phosphorescent water stretching East and West. At 1659 G.M.T. the water again became normal, so the belt must have been 2 miles broad. Co. 045°. Speed 13 kts. Wind S.S.W. 3. Cloudless."

Position of ship:—Latitude 15° 32' N., Longitude 85° 33' E. (approx.).

DUST.

West Coast of North America.

THE following is an extract from the Meteorological Log of S.S. *Wairuna*, Captain A. R. STEWART, Ocean Falls to San Francisco. Observer, Mr. A. H. DUNNINGS, 3rd Officer.

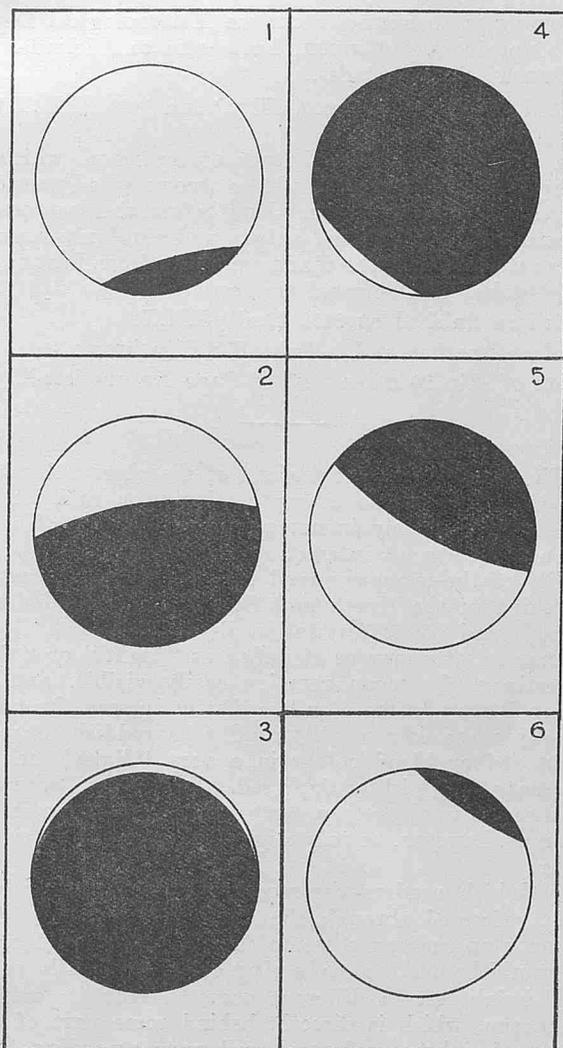
"April 22nd, 1931, during watch 8 p.m. to midnight, handrails covered with whitish substance which mixed with several dew, forming a paste. At San Francisco we learned that several ships had reported similar experiences. Reported in the newspapers as volcanic ash, with the remark that 'no volcanic eruption was within reasonable distance'."

Position of ship:—Latitude 40° 04' N., Longitude 124° 22' W.

TOTAL ECLIPSE OF THE MOON.

Atlantic Ocean.

THE following is an extract from the Meteorological Record of S.S. *Manora*, Commander H. T. HUDSON, R.D., R.N.R., Calcutta to London. Observer, Mr. W. BRAUN, 2nd Officer.



"April 2nd, 1931, a very good total eclipse of the moon was observed, owing to there being a cloudless sky. The following times were found to coincide with those given in the Nautical Almanac.

Commencement of eclipse 1823 G.M.T.

Moon completely covered 1922 G.M.T.

Moon commenced to uncover 2053 G.M.T.

End of eclipse 2152 G.M.T.

Figure 1 shows commencement of eclipse in bottom right-hand corner.

Figure 2 shows the moon a little more than half-covered. Already the shadowed part was assuming a reddish colour.

Figure 3 shows the moon nearly totally covered. The upper limb remained very bright for a long time, and the rest of the covered

moon was a faint red in colour, not unlike a setting sun, only not as bright.

Figure 4 shows the moon beginning to uncover in bottom left-hand corner.

Figure 5. Crescent of moon at 2112 G.M.T.

Figure 6. Top right-hand corner covered. The remainder of moon was bright.

Position of ship:—Latitude 36° 39' N., Longitude 2° 25' W."

The following is an extract from the Meteorological Log of S.S. *Australia*, Captain W. SCOTT, Liverpool to Adelaide, via Cape of Good Hope. Observer, Mr. E. H. LIDSTONE, 2nd Officer.

"April 2nd, 1931. Moon until 2050 G.M.T. was obscured by clouds. When these clouds dispersed the moon was about 4/5ths covered, the dark portion was visible, being of a brownish-red colour.

"At 8.17 p.m. ship's time, 2112 G.M.T., the moon was half uncovered and at 8.30 p.m. was again obscured by clouds and was not visible until 8.55 p.m. when the eclipse was over. Moon's bearing when first seen S. 65° E. True.

"Position, Latitude 32° 01' N., Longitude 13° 29' W."

The following is an extract from the Meteorological Log of S.S. *Windsor Castle*, Captain J. H. KERBEY, Southampton to Cape Town. Observer, Mr. J. L. GOATLEY, 4th Officer.

"April 2nd, 1931, at 2045 G.M.T. observed eclipse of the moon. The time of the commencement of the eclipse was not noted, but at 2050 G.M.T. the total phase of eclipse ended and at 2153 G.M.T. the eclipse finished.

"During the phase of total eclipse the moon showed faintly a red-orange colour.

"Position of ship—Latitude 17° 30' N., Longitude 17° 30' W."

The following is an extract from the Meteorological Record of S.S. *Aba*, Captain S. H. LAWSON, Liverpool to West Coast of Africa. Observer, Mr. G. L. DONALD, 3rd Officer.

"On April 2nd, 1931, observed total eclipse of the moon, commencing at 1922 G.M.T. and total eclipse ending at 2053 G.M.T. Although the partial eclipse began nearly an hour before, it was not until within a few minutes of the total phase that any unusual phenomenon was observed. At about 1915 G.M.T. it became very dark, and where we had had hazy weather, with only moderate visibility, we now had a beautiful clear-cut horizon.

"The total eclipse, as stated, began at 1922 G.M.T. At 2053 G.M.T., the bottom edge of the moon re-appeared, brilliant red in colour, changing slowly to flame colour, eventually at 2152 G.M.T. the eclipse ended, and the haze again returned.

"Position of ship—Latitude 10° N., Longitude 16° W."

The following is an extract from the Meteorological Record of S.S. *Appam*, Captain J. M. DRAPER, Liverpool to West Coast of Africa. Observer, Mr. W. M. M. HUTCHINGS, 2nd Officer.

"April 2nd, 1931. Observed total eclipse of moon. Entered shadow at 1823 G.M.T. and was entirely enveloped at 1922. Moon commenced to emerge from shadow at 2052, being completely free at 2151. Four minutes after the moon had become totally enveloped by the shadow a rich reddish arc of light appeared around its upper limb, and later about four minutes before emerging from the shadow a bright bluish arc of light appeared around its lower limb. The sky throughout the whole period of the eclipse was cloudless, but formations of A-Cu and Ci-Cu appeared after.

"Position of ship—Latitude 5° 21' N., Longitude 4° 34' E."

The following is an extract from the Meteorological Record of S.S. *Clan Macalister*, Captain F. J. STENSON, R.D., R.N.R., Liverpool to Durban. Observer, Mr. T. M. LEES DAVIES, 4th Officer.

"On April 2nd, 1931, at 6.28 p.m. A.T.S. (G.M.T. 1855), the moon was observed rising out of low bank of Cumulus bearing 72°, approximate altitude 8°, partly eclipsed in lower right-hand quadrant.

Obscuration was rapid, and at 6.52 p.m. A.T.S. (G.M.T. 1916) only a thin crescent was visibly clear in upper left-hand quadrant. From then obscuration was slower, and at 7.20 p.m. A.T.S. (G.M.T. 1944) eclipse was complete. Obscuration was of a deep red colour and transparent, the markings on the moon being visible throughout the eclipse. About 8.00 p.m. A.T.S. (G.M.T. 2024) eclipse began to lift at lower right-hand quadrant. At 9.24 p.m. A.T.S. (G.M.T. 2151) eclipse had finished. Weather at the time was fine and clear.

"Position of ship by observation—Latitude $70^{\circ} 10' S.$, Longitude $4^{\circ} 08' W.$ "

Mediterranean Sea.

THE following is an extract from the Meteorological Record of S.S. *Atreus*, Captain J. H. WILLCOX, Straits Settlements to Liverpool via Suez. Observer Mr. E. A. H. GEPP, 3rd Officer.

"On April 2nd, 1931, at 8.10 p.m. A.T.S. (1823 G.M.T.) obtained excellent view of total eclipse of the moon, which was at its full at the above time. The eclipse was observed to start as a faint shadow appearing at the base of the moon. This arc of the earth's shadow spread comparatively rapidly, until, at 8.40 p.m. (A.T.S.), the moon was approximately half covered. The rate of progression then seemed to slow down—at 9.00 p.m. only a strip of the moon was unobscured, and at 9.13 p.m. the total phase commenced.

"The moon at this time was visible as a dull orange or old gold colour, with the edges brighter generally than the centre, but the markings were distinctly visible as dark patches on its surface. At 10.30 p.m. A.T.S. the glow on the edges began to concentrate towards one side, and at 10.40 p.m. A.T.S. the total phase finished.

"As before, the rate of progression of the phenomenon appeared to slow down when the moon was half-exposed again at 11.10 p.m. The eclipse finished at 11.39 p.m. A.T.S. (2152 G.M.T.).

"At the beginning of the eclipse moon was bearing approximately S.E. by E., altitude 35° , and at the finish approximately South, altitude 51° .

"Position of ship at commencement:—Latitude $32^{\circ} 50' N.$, Longitude $28^{\circ} 22' E.$ and at the finish of the eclipse Latitude $33^{\circ} 05' N.$, Longitude $27^{\circ} 40' E.$ "

The following is an extract from the Meteorological Record of S.S. *Malancha*, Captain F. WHITHAM, Port Said to London.

"2nd April, 1931, total eclipse of the moon observed. Contact 7.40 p.m. A.T.S., 1841 G.M.T., Moon in umbra until about 9.50 A.T.S. when it commenced to part contact. During the period of total eclipse the moon was of a reddish brown colour and at first with a comparatively brighter portion near the upper limb. This brighter section worked its way clockwise round the moon and when in about its original position the moon commenced to part contact. The arc of the moon to first appear seemed to be part of a larger sphere than the rest of the moon in the umbra. This was probably an optical illusion caused by the contrast in lightness.

"Position of ship:—Latitude $36^{\circ} N.$, Longitude $14^{\circ} E.$ approx."

The following is an extract from the Meteorological Record of S.S. *Nagpur*, Captain A. J. ELLIOTT, at Port Said. Observer, Mr. J. WOTHERSPOON.

"Lunar eclipse of 2nd April, 1931, observed at Port Said. The most noticeable feature of same was the colouring of the moon's disc when completely in the umbra, emerald green in upper left-hand segment and dark rose coloured in bottom right-hand segment. As the eclipse progressed a darker shadow was seen on the umbra side of the moon (lower half). No distinct markings were observed."

Indian Ocean.

THE following is an extract from the Meteorological Record of S.S. *Matheran*, Captain J. J. MULCAHY, Suez to Colombo. Observers, Messrs. S. S. SLADE and W. COWIE.

"April 2nd, 1931, at 10.35 p.m. A.T.S., 1922 G.M.T. observed a total eclipse of the moon. The moon was completely covered for 1 hr. 30 minutes and assumed a reddish-yellow tinge, somewhat

resembling an orange. 2054 G.M.T. commenced to clear and at 2203 G.M.T. it was back to normal.

"Ship's position, in the Gulf of Aden, Latitude $12^{\circ} 09' N.$, Longitude $50^{\circ} 11' E.$ "

The following is an extract from the Meteorological Log of S.S. *Nestor*, Captain F. ADCOCK, Fremantle to Durban. Observer, Mr. W. T. HARRIS.

"April 2nd, 1931, at 1800 G.M.T. Weather calm, sky became overcast with Cu-Nb. and darkness set in, very light rain shower. Occasional clearing when eclipse was plainly visible. Moon bright at N.E. limb and fading into a dark red at the opposite limb. Present weather light easterly airs, fine and clear.

"2000 G.M.T. Sky became completely overcast. Heavy rain shower.

"2120 G.M.T. Sky clearing from westward. Easterly half of moon observed through Cu. clouds, wind light N.N.W.

"Position of ship:—Latitude $30^{\circ} 12' S.$, Longitude $101^{\circ} 10' E.$ "

South Australian Waters.

The following is an extract from the Meteorological Log of M.V. *Karamea*, Captain R. MCINTOSH, Fremantle to Adelaide. Observer Mr. H. MURRAY CLARK, Cadet.

"April 3rd, 1931, at 2.23 a.m. (A.T.S.) 2nd 1823 (G.M.T.) observed total eclipse of the moon.

"At the commencement the altitude of the moon, which was full and very bright, was about 45° and her 'mountains' were exceptionally clear through a long glass. Just before the last crescent was covered the moon appeared to 'bulge' and similarly when the first crescent was uncovered. The shadow passing from East to West left a dull red 'wake' as it crossed the moon.

"The Eclipse finished at 2152 (2nd) G.M.T.

"Fine clear weather and a light S.S.E.'ly breeze.

"Position of ship 20 miles west of Cape Naturaliste."

NOTE.—The most important feature of the observation of a total eclipse of the moon is the colour of the moon and its degree of visibility when completely immersed in the shadow. The accounts published above form an interesting comparison of the colour and the visibility of the moon observed in widely different parts of the world by ships in the North and South Atlantic, Mediterranean, Indian Ocean and Great Australian Bight.

Total lunar eclipses may be classified as "light" or "dark." In "light" eclipses the moon remains easily visible, and the dark markings on it may be more or less distinctly seen throughout. In such an eclipse the colour will usually be reddish, orange-red or even bright red or blood colour in a very "light" eclipse, or it may be coppery, brownish or dark red. In a really "dark" eclipse the moon disappears altogether, but such a phenomenon is very rare. The moon may, however, be only slightly visible, of a grey or bluish-grey colour.

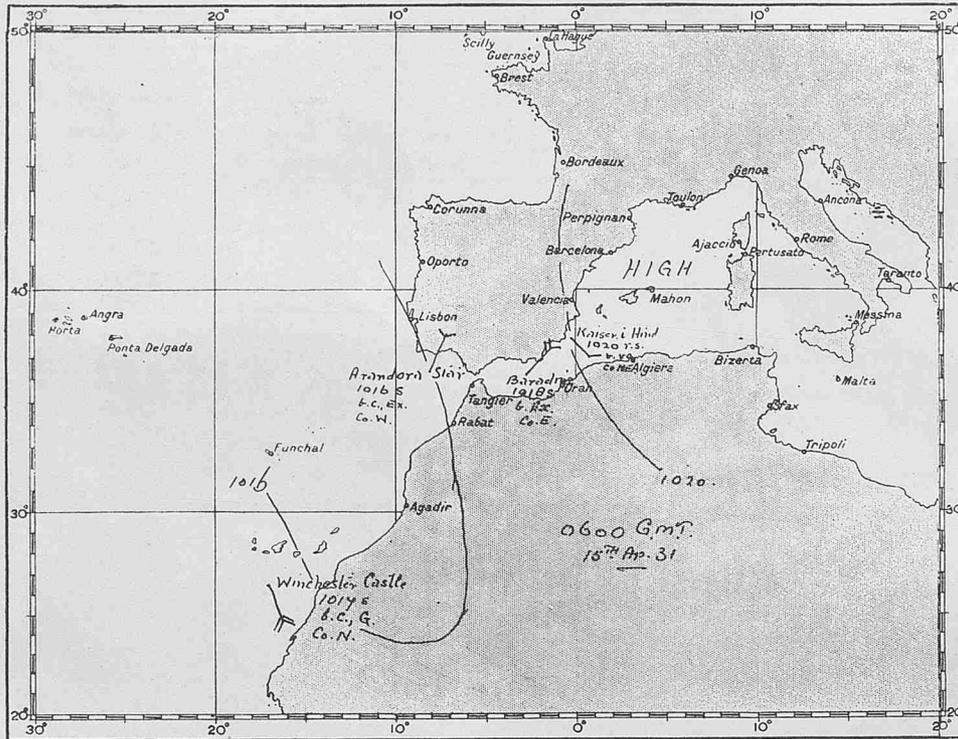
The light which renders the moon visible when totally eclipsed is sunlight refracted through the earth's atmosphere. As viewed from the moon on such an occasion the comparatively large body of the earth would be outlined by a ring of light, usually reddish and of unequal brightness in different parts, having its origin in the light of the sun, which is directly behind some part of the earth. The amount of light so refracted will vary according to the condition of the particular section of the earth's atmosphere on the earth's limb at the time, as viewed from the moon. Humidity, cloudiness, dust of volcanic or other origin, and the presence or absence of high land masses would all affect the result. The ring of light would also be unequal because usually the sun would not be centrally behind the earth. Furthermore the earth continues to rotate during the duration of the eclipse and brings fresh sections of the atmosphere into view of the moon so that the degree of light and colour may change in the same eclipse.

The eclipse of April 2nd, 1931, is shown to have been a comparatively "light" one. The most unusual and interesting observation is that of S.S. *Nagpur*, at Port Said, emerald-green being entirely outside the normal range of colours associated with lunar eclipses.

WEATHER CHARTS MADE AT SEA (continued).

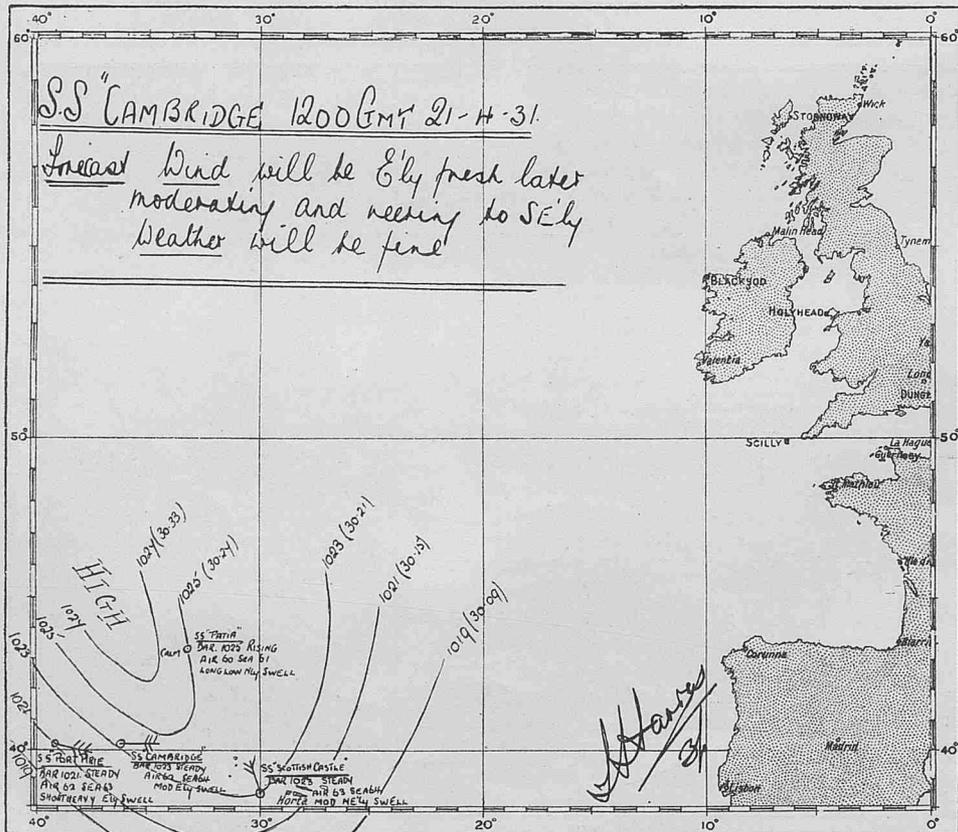
Vicinity of Gibraltar Straits.

This chart is one of a series made on board S.S. *Baradine*, Captain H. ELLIOT SMITH, by Mr. C. B. ROCHE, Chief officer.



Vicinity of Azores.

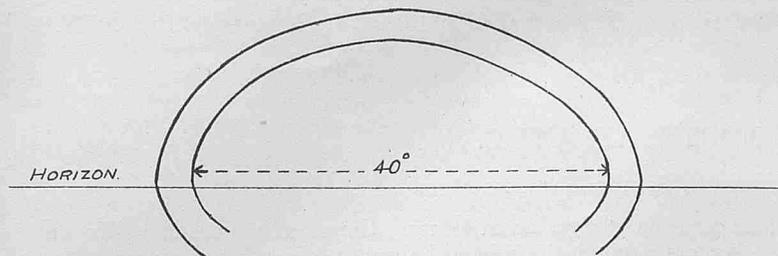
This chart is one of a series made on board S.S. *Cambridge*, Captain R. WILLIAMS, by Mr. T. S. FARRAR, 3rd officer.



LUNAR RAINBOWS.

Caribbean Sea.

THE following is an extract from the Meteorological Log of S.S. *Pakeha*, Captain H. C. ELFORD, Newcastle to Colon. Observer, Mr. A. J. TILLOTT.



"On April 10th, 1931, at 3.20 a.m. A.T.S. observed during a light rain shower against a background of heavy Cu-Nb, a well-defined lunar rainbow of a uniform silvery white. No colours were distinguishable.

The bow bore N.W. and appeared quite close to the ship. The moon, in its last quarter, bore S.E. and was shining brightly. The bow remained until 3.37 a.m. when the moon was obscured by cloud, and the rainbow disappeared.

The angular altitude of the vortex was measured at 22°, and its largest diameter 40°. The shape was approximately oval, as in diagram.

Barometer 1017 mb. Temperature, dry 74°, wet 72°, sea 77°. Wind N.E., force 3. Clouds Cu. 3/10. Cu-Nb 3/10.

Position of ship, Latitude 21° 30' N., Longitude 64° 20' W., on passage between Mona Island and Colon."

South Pacific Ocean.

THE following is an extract from the Meteorological Log of R.M.S. *Rotorua*, Captain C. B. LAMB, Balboa to Suva. Observer, Mr. L. W. FULCHER, 3rd Officer.

"At 8.30 p.m. A.T.S. April 21st (G.M.T. 0715 April 22nd) an extraordinarily clear lunar rainbow was seen against a background of very dark Cu-Nb. clouds from which rain was falling. The highest part of the bow, which bore S. 62° E. had an altitude of 33°. The colouring was very distinct, red, orange, green and violet showing up very well. The broadest and most distinct band of colour was green, which was at least one-third of the total width of the bow. The moon, which was about eight days old, was bearing N. 62° W., and was obscured from the ship by a small cumulus cloud. This bow remained visible for about three minutes but another and fainter one was seen about forty minutes later. In the second case the colouring was whitish but with a faint red tinge on the outside edge. This bow was visible for rather less than a minute. The position of the ship at the first observation was Latitude 31° 19' S. Longitude 153° 13' W. by D.R. Course 077°, speed 13½ knots. The barometer was 1003.2 mb., temperature wet 57°.9, dry 61°.6, and wind W.S.W., force 4."

WATERSPOUTS.

North Atlantic.

THE following is an extract from the Meteorological Record of M.V. *Lockmonar*, Captain A. PURVIS, Cristobal to United Kingdom.

"17th April, 1931, 12.20 p.m. A.T.S. observed three waterspouts to northward, distance about 10 miles. The spouts formed from nimbus of line-squall appearance, the lower edge of which was 50' above the horizon, estimated 900 feet. The spouts took about four minutes to form and remained visible for 12 minutes, when they appeared to break in the middle. Detailed observation was impracticable owing to distance. The three spouts remained vertical.

The nimbus from which the spouts issued formed between 10.30 and 11.00 a.m. and remained in evidence until 2 p.m. The lower

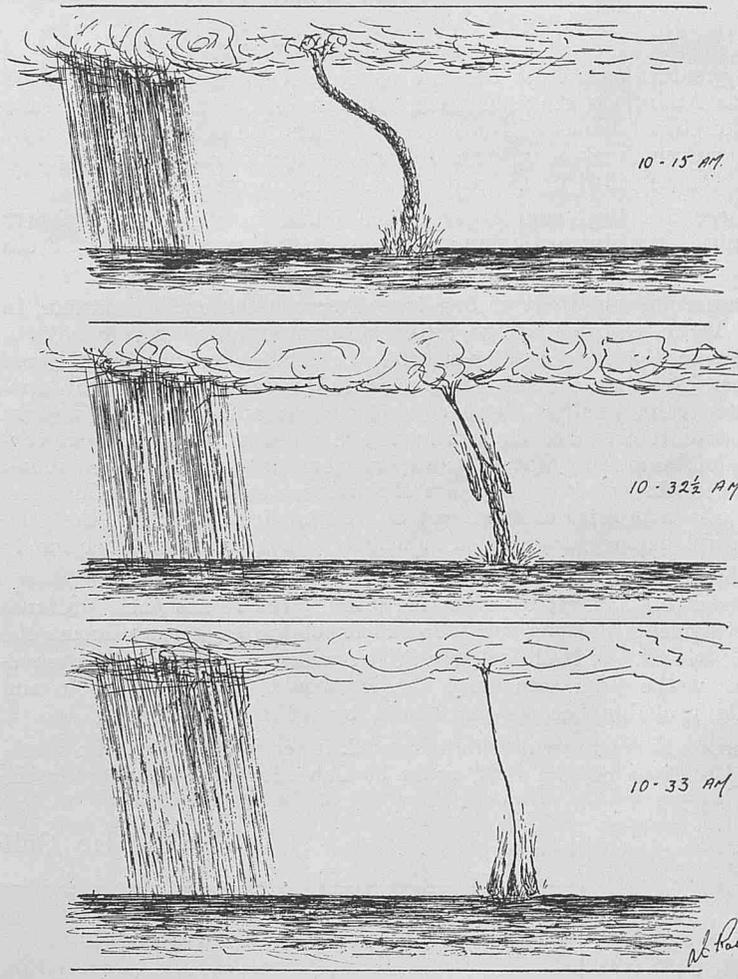
edge became ragged after the appearance of the spouts following which it moved eastward with passing showers, clearing by 3 p.m.

Barometer 30.60 in. Temperature 69°. Wind E.S.E., force 2.

Position of ship, Latitude 30° 49' N. Longitude 55° 00' W."

Malacca Strait.

THE following is an extract from the Meteorological Log of M.V. *Glenamoy*, Captain W. J. INGS, Singapore to Penang. Observer, Mr. A. C. RADLEY, 2nd Officer.



"April 5th, 1931, at 10.10 a.m. A.T.S., observed a waterspout forming to the E.S.E. distant about five miles.

"At 10.15 a.m. the waterspout was well formed below heavy nimbus clouds, and a rain squall was following in the rear.

"The waterspout was apparently travelling in a southerly direction at a moderate speed.

"At 10.32 a.m. a large portion of the upper part of the waterspout was seen to fall back down the sides, then the waterspout quickly diminished in size and by 10.34 a.m. had completely disappeared.

"Wind N. by E. force 4, Clouds Ci; Ci-St; Cu; Cu-Nb and Nb. Barometer 1013.8 mb.

"Temperature Dry Bulb 83°. Wet Bulb 79.5°.

"Position of ship, Latitude 3° 05' N., Longitude 100° 45' E. Course 338°, speed 11 knots."

METEOR.

South Pacific.

THE following is an extract from the Meteorological Log of S.S. *Westmoreland*, Captain H. E. REILLY, Balboa to Auckland. Observer, Mr. J. F. CLEMENT, 3rd Officer.

"On April 23rd, 1931, at 6.14 A.T.S., shortly after sunset and when the only stars visible were Sirius and Canopus, and those only

just appearing, a brilliant meteor was observed which travelled over a slight arc for about half the angular distance between Canopus and Southern Cross.

"It was afterwards considered to have appeared approximately 15° from Canopus and disappeared 15° to 20° from the Southern Cross, lasting for a period of about one to one and a half seconds and trailing a moderately long tail for a further second.

"The meteor's appearance closely resembled a blue pyrotechnic light, with rapidly changing colours in its wake, which phenomenon being so sudden, it is impossible to record.

"Its brilliancy was amazing, and must have been many times greater than that of Sirius, and had it been dark instead of almost broad daylight it must have lit up the sky with almost the brightness of the moon.

"Position of ship, Latitude 10° 44' S., Longitude 118° 26' W."

ICE IN THE WESTERN NORTH ATLANTIC.

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

THE greatest menace to the safe navigation of ships in the Western North Atlantic is the almost constant presence of ice in the vicinity of the Grand Banks of Newfoundland. The ice acted upon by wind and current makes it very difficult to locate and the danger is greatly intensified by the prevalence of fog in these waters.

There are two main types of ice found in the Western North Atlantic constituting a danger to navigation, namely, pack or sea ice and berg or glacier ice.

Formation and Drift of Sea Ice.—Towards the end of autumn, in the Arctic sea and on the coasts of Labrador and Newfoundland, owing to the fall in temperature, the surface cooling of the sea causes numberless small ice plates called frazil crystals to form. During calm weather these crystals collect and form a thin scum on the surface which at first has little stiffness owing to heat conduction from the water below, preventing the brine remaining between the crystals which are themselves fresh from freezing. As the season progresses the sheet of ice and brine thickens, the temperature being reduced to a sufficient extent to allow the brine to freeze, when the whole becomes a rigid sheet of ice.

The diverse character of the ice forming the Arctic pack, prevents the fragments freezing together and forming a solid mass during the polar winter. It is this characteristic which permits the free movement of the pack, otherwise the ice would not be navigable and would probably become permanent by addition of snow.

During the summer much of the pack is set free and drifting southward, arrives off the N.E. coast of Labrador in November at the

same time as sludge ice is forming there. By the end of November the waters around the whole Labrador coast have generally frozen over, and the whole pack drifts south, arriving off the east coast of Newfoundland about the end of January.

When clear of the Newfoundland coast the ice spreads east and west forming fields and floes which may be met with north of the 43rd parallel, between the 45th meridian and the east coast of Nova Scotia. Off the Newfoundland coast, ice fields may be met with late in summer, but further south it quickly melts, rarely existing south of Newfoundland after the early part of May.

The thickness of pack ice ranges from about 15 feet in the Arctic to about 6 feet on the coast of Newfoundland, but these thicknesses may be greatly exceeded owing to the interposal of capes in the way of moving ice-fields, and to the unequal movement between the floes exerting pressure on the ice, causing it to hummock.

Navigation within the Gulf of St. Lawrence is completely suspended, usually from the beginning of December to the end of April. During the winter months the ice increases rapidly forming extensive sheets. These are, however, frequently broken across by the wind, leaving leads of open water between the separated parts. At other times the wind presses the sheets of ice together forming a close pack extending for many miles.

At the break-up of winter conditions, towards the end of April, the ice commences to move out of the Gulf sometimes causing a block between St. Paul Island and Cape Ray. This block, known as "the Ridge," sometimes continues for three weeks completely closing the

Field Ice, Gulf of St. Lawrence.



Cabot Straits to navigation. On leaving the Gulf, the movement of the ice is chiefly dependent on the prevailing winds, but if the winds are light or variable the movement is affected by current alone, and it will move in the direction of the Banquereau Bank, where it quickly melts under the influence of the sun and warm winds.

Formation of Land Ice and Calving of Icebergs.—Research on the formation of glaciers by the scientific staff of SCOTT'S last Antarctic expedition, shows that ice is formed entirely by the growth and modification of snow crystals. The larger crystals grow at the expense of the smaller and tend to unite by a kind of distillation in which water molecules leave small crystals and join large crystals. The growth of the large and diminution of the small crystals permits them to pack more closely under pressure. When closely packed the crystals still remain distinct, being separated by air spaces at their boundaries. Snow in this condition is known as *nêvé*. The subsequent change from *nêvé* to ice takes place in exactly the same manner as the change from snow to *nêvé*. In the course of time the crystals grow so as to include the air cavities, which in the form of *nêvé* marked the boundaries between them.

The rate of change from snow to ice depends upon the temperature and pressure. The rate being quicker at high than at low temperatures, and when subject to great pressure the crystals come in closer contact, allowing direct movement of the water molecules between them.

In the interior of Greenland, owing to the low temperature, one layer of snow cannot melt before the next falls, there is, therefore, a huge accumulation of snow which, in the course of time is changed into ice in the manner described, thus forming a massive ice sheet known as the "Greenland ice cap." From this cap the ice, subject to enormous pressure, flows outward in all directions but mainly where its motion is least obstructed. The chief flow is therefore down the sloping valleys towards the sea.

When the ice of a glacier reaches the coast it continues to move seawards, its weight being taken by the ocean bed until the water deepens sufficiently to make the ice buoyant, when it becomes waterborne. Such an extension of glacier ice from the shore, seaward, is termed an "Ice Tongue."

The bergs which menace the shipping lanes of the North Atlantic are huge masses of ice which are broken off from the ice tongues of the Greenland glaciers, chiefly through the undermining action of the surface sea water and the formation and development of cracks and crevices in the ice tongue, due to the strain exerted by the action of tides, heavy swell and wind pressure.

It is estimated that between ten and fifteen thousand icebergs are calved from the Greenland glaciers yearly.

Colour of Ice.—The white light of the sky, reflected from numberless facets of the snow crystals when separated by the included air gives snow its white appearance. In the case of ice formed directly from a snow drift falling upon ice, the direction or growth of the crystals is upwards from the ice upon which the snow falls, so that the air is able to escape from between the crystals as they join up, thereby forming clear air-free ice which at great thicknesses appears blue.

Most glacier ice, however, contains air which is included in the crystals themselves in the form of small spherical bubbles, and this gives to the ice a whiteish opaque appearance. Many crevices in the glaciers become filled with sand and debris blown down from the surrounding land, thus forming silt bands in the ice which greatly discolour it.

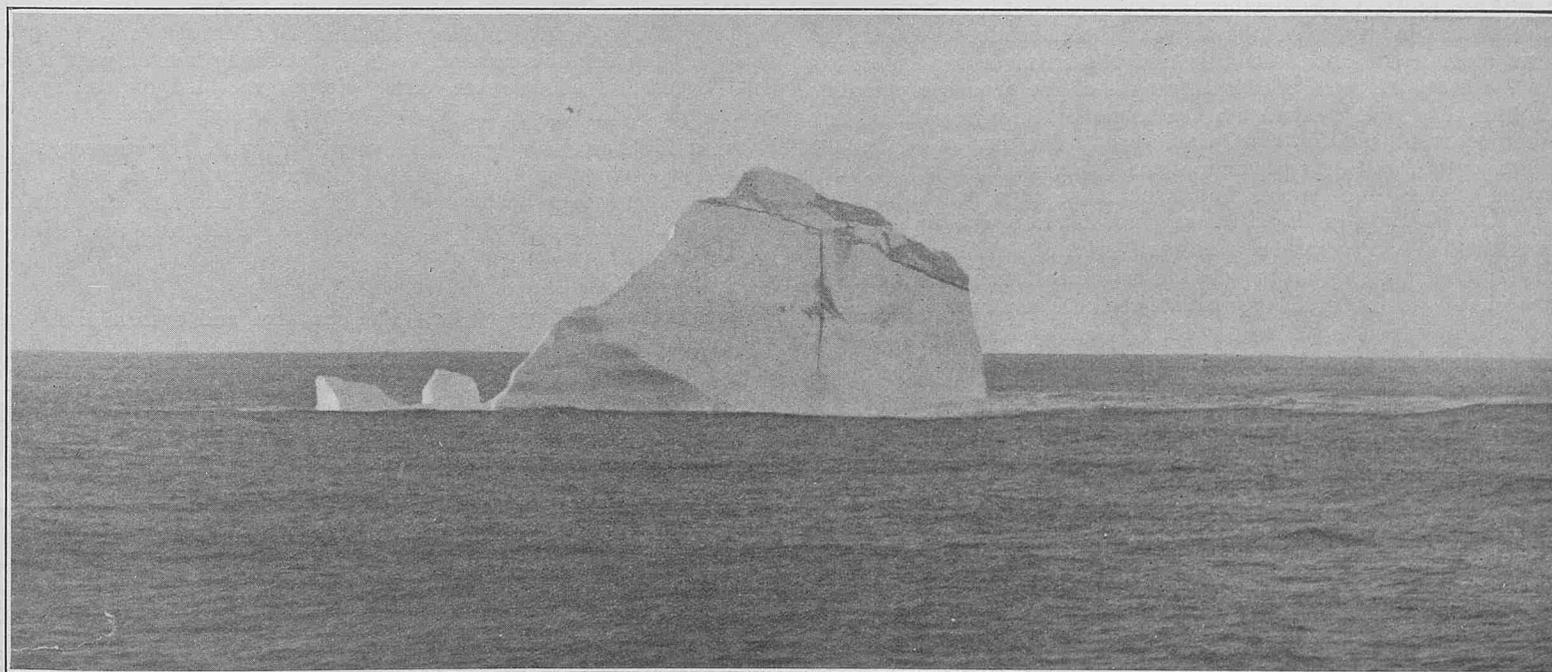
Density and Size of Bergs.—The density of ice in icebergs is variable. In some the snow is not so completely transferred into ice as in others, while some carry appreciable loads of rock material. An iceberg, if composed of pure ice only, would float with approximately one-ninth of its mass above water, the weight of a cubic foot of sea water being 64 lbs., and that of a cubic foot of ice 57 lbs. Recent research into the density of Greenland Bergs by Professor H. T. BARNES, D.Sc., F.R.S., records that from one-sixth to one-tenth of the volume of an iceberg consists of air, causing it to displace less water than ordinary ice. It was found that many bergs float with as much as one-third of their mass out of water.

Professor E. VON DRYGALSKI measured 87 bergs shortly after calving from the Greenland glaciers and found the highest to be 449 feet above the surface. He found that their height decreases rapidly with the length of time that elapses after their formation a difference of 13 feet being noticed in one instance after an interval of one week and in another a decrease of 76 feet in about eight weeks.

The highest berg measured by the International Ice Patrol was 262 feet above water while the longest berg measured 1,696 feet from end to end. During the 1928 season ships steaming on the Belle Isle tracks reported many bergs of such dimensions as have hitherto been thought to exist only in Southern waters. One berg reported was of tabular form approximately 100 feet in height and six and a half miles in length.

The apparent size of bergs when observed at sea at a distance of two or more miles may be very deceptive, there rarely being any object of known size near them with which they can be compared. It is especially difficult to estimate the size of bergs which are sighted floating in the mixed waters of the Gulf Stream and Labrador currents, where abnormal refraction frequently causes them to loom large. Under such circumstances the Ice Patrol Cutter has sighted bergs, not over 30 feet in height, at a distance of 30 miles from a

Iceberg in Western North Atlantic.



height of eye of 20 feet, and on one occasion the white painted cutter was reported to herself as a berg by a steamer passing 10 miles distant.

Drift of Icebergs.—The movements of icebergs are mainly controlled by the set of prevailing currents. The direct effect of wind upon their drift is negligible owing to the immersion of so great a proportion of their mass. The effect of the wind, however, indirectly plays an important part by its action on the retardation or acceleration of the currents which govern the movement of the bergs.

There are three currents, two cold water and one warm water, chiefly concerned in causing the ice menace to Atlantic shipping. The East Greenland and Labrador currents bring the ice south from their place of calving, while the Gulf Stream determines the southern limit of their drift, and is responsible for the disintegration and melting of the bergs.

The East Greenland current flows south from the East Greenland Sea in the vicinity of Spitzbergen. Converging towards Denmark Strait, it passes between Iceland and the mainland, whence it follows the East Greenland coast to Cape Farewell. Its course is then diverted northward by the pressure of water setting northward from the Atlantic, and, rounding Cape Farewell, it proceeds up the west coast of Greenland. In about Latitude 63° North, a branch of the main stream shoots westward across Davis Strait and joins the Labrador current flowing down the west side of the Strait.

The Labrador Current.—Ice bearing currents of polar origin setting out of Smith and Lancaster Sounds unite and set south on the western side of Baffin Bay and Davis Strait. Entering the Atlantic, it continues south along the coasts of Labrador and Newfoundland. It expands over the northern part of the Great Bank and divides into two branches. One branch setting S.W., flows through the deep water channel south-eastward of Cape Race, while the other flows south along the eastern edge of the Great Bank until it meets the northern edge of the Gulf Stream, forming what is known as the "cold wall."

The Gulf Stream, flowing out of the Straits of Florida, follows the United States coast northward, to the Latitude of Cape Hatteras, when its width rapidly expands and its course gradually inclines to the eastward. On arriving in the vicinity of the Great Bank of Newfoundland its course is east. During the winter, it flows to the southward of the Bank, but during the summer, creeps north flowing over the Tail of the Bank. The "cold wall" is the line of demarcation between the cold water of the Labrador current and the warm water of the Gulf Stream.

From observations obtained by the Ice Patrol Cutters, the movement of the currents which determine the drift of bergs around the Tail of the Bank are now fairly established. Lieutenant-Commander E. H. SMITH, U.S.C.S., Oceanographer to the International Ice Patrol, states:—"The Labrador current impinges itself at the Tail of the Bank on the northern edge of the Gulf Stream. At times the push is strong enough to split the Labrador current into an east and west branch. In this case the stronger branch determines the berg drift, the relative strength of the branches probably depending to a great extent on the angle of impingement of the Labrador current, against the Gulf Stream. The conflict of the two currents together with the position of the Bank, produces a frictional arresting of the Gulf Stream on its northern edge, which in turn swings it in sharply to the north and north-west immediately after passing the Tail. The inshore westward swirl of frictional bands of the Gulf Stream sets up an interlacing movement of the two waters." In the vicinity of the Tail the surface temperature of the Labrador current during April is 32° to 34° Fahr., in May its temperature is 36° to 38° Fahr., and in June, its temperature rises to 40° to 44° Fahr.

At the break-up of the Arctic winter in the Spring of the year, the bergs calved from the glaciers on the east coast of Greenland drift south in the East Greenland current, arriving off Cape Farewell in early summer. Continuing in the current, they round Cape Farewell and drift north to about the 63rd parallel, where they are caught in the westerly branch of the current and drift into the centre of the Davis Strait. In the centre of the Strait the water is comparatively warm and the majority of these bergs disintegrate, very few of them reaching the Labrador current on the western side of the Strait. The majority of the bergs which reach the Great Bank are calved

from the ice tongues of the glaciers on the west coast of Greenland, north of the 68th parallel. The bergs are carried up the west coast of Greenland to the head of Baffin Bay where they are caught in the southerly drift setting out of Smith Sound down the western side of Baffin Bay.

The Labrador current in the higher latitudes is to a large extent caused by the action of north and north-easterly winds. Such winds are predominant in spring when the current attains its maximum velocity. It is also at this time that the break-up of the ice occurs, so that large quantities drift down from Baffin Bay through Davis Strait and along the coast of Labrador and Newfoundland, to the Tail of the Bank, where they finally disintegrate under the influence of the Gulf Stream.

In the vicinity of the Great Bank the average hourly drift of icebergs increase as the season advances owing to the strengthening of the Labrador current. Observations carried out by the Patrol show that in March the average drift of bergs is from 0.0 to 0.3 knots, while in April the Patrol observed a berg drifting along the east side of the Great Bank at the rate of 1.5 knots. The average drift of bergs, however, around the Tail of the Bank in the mixed waters is 0.4 to 0.7 knots and when in the water of the northern edge of the Gulf Stream is 0.8 to 1.4 knots.

The following tables compiled from the records of the United States Hydrographic Office and those of the International Ice Patrol, for the years 1900-1926, show the average number of bergs that drift south of the 28th parallel during each month of the year.

NORMAL NUMBER OF ICEBERGS SOUTH OF THE 48TH PARALLEL.

(Menace to the Cape Race Tracks).

Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
3	10	36	83	130	68	25	13	9	4	3	2

NORMAL NUMBER OF ICEBERGS SOUTH OF THE 43RD PARALLEL.

(Menace to the United States to Europe Tracks).

Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
0	1	4	9	18	13	3	2	1	0	0	0

The International Ice Patrol has found that an average sized berg, drifting in the mixed waters south of the Tail of the Bank, takes from 12 to 14 days to disintegrate during April, May or June. In July, August and September the time is shortened to from 10 to 12 days. The life of a similar sized berg actually located within the Gulf Stream is about seven days. Bergs grounded on the south-west slope of the Great Bank may last for a month or six weeks.

CHART A shows the general drift of ice in the ice bearing currents, and the position of the glaciers in Greenland from which the majority of the bergs which reach the Great Bank of Newfoundland are calved. CHART B shows the actual drift of bergs in the vicinity of the Great Bank as compiled by the International Ice Patrol in the years 1914-1930.

North Atlantic Limits of Ice.—The southern and eastern limits of ice in the Western North Atlantic vary considerably from month to month and from year to year.

CHART C shows the monthly limits within which reports of ice have been received by the Meteorological Office during the year 1931 also the monthly limits reached by ice over the period 1901-1931. It must be understood that the limits defined on this Chart are obtained from reports of ice sighted by vessels, the majority of which are following tracks specially laid down to avoid ice; it is therefore possible that ice may exist outside these limits. The following list gives the particulars of all reported ice which have made phenomenal drifts. It is not possible to indicate, even approximately the drift followed by the ice. The position of this ice, when reported, is shown on CHART D.

Phenomenal positions of ice.

No.	Date.	Source of Report.	Position of ice.		Remarks.
			Latitude N.	Longitude W.	
1	14.1.1836	H.M.S. <i>Cove</i> ...	60° 55'	5° 50'	Two bergs.
2	9.1.1913	S.S. <i>Oriflamme</i> ...	48° 37'	34° 42'	Berg 40 ft. high, 400 ft. long.
3	27.1.1916	S.S. <i>Rio Verde</i> ...	33° 34'	70° 32'	Hummock 2 ft. high, 30 ft. in circumference.
4	3.2.1922	S.S. <i>Weehawken</i> ...	41° 42'	58° 59'	Ice (sustained bow damage).
5	24.3.1913	S.S. <i>Floride</i> ...	46° 21'	34° 05'	Berg 60 ft. high, 200 ft. long.
6	20.3.1915	S.S. <i>Wanaby</i> ...	36° 55'	48° 32'	Piece; supposed portion of a berg, 5 ft. high, 60 ft. long.
7	21.3.1920	U.S. Hyd., Bulletin	38° 02'	40° 38'	3 ft. high, 30 ft. long.
8	21.3.1921	S.S. <i>Hollandia</i> ...	37° 50'	47° 23'	Berg.
9	6.4.1909	S.S. <i>Trafalgar</i> ...	35° 54'	31° 47'	Two pieces 18 ins. in diameter.
10	11.4.1914	S.S. <i>Erodiade</i> ...	32° 55'	62° 11'	Apparently river ice about the size of a lifeboat.
11	24.4.1916	S.S. <i>Communipaw</i>	49° 05'	36° 48'	4 ft. high, 50 ft. wide, and 100 ft. long.
12	4.4.1921	S.S. <i>Hollandia</i> ...	43° 35'	35° 57'	Large berg.
13	16.4.1926	Trawler <i>Orizaba</i> ...	61° 03'	10° 30'	Floating ice about 40 ft. long, and 3 ft. high.
14	7.4.1930	S.S. <i>La Crescenta</i>	42° 24'	34° 22'	Small berg about 20 ft. in diameter.
15	20.5.1907	S.S. <i>Lord Landsdowne</i> .	31° 00'	38° 00'	Two small pieces 6 ft. by 6 ft. and 12 ft. by 4 ft. out of water.
16	6.5.1908	S.S. <i>Oceano</i> ...	150-200 miles North of Bermuda.		Pieces.
17	27.5.1909	S.S. <i>Reventazon</i>	32° 28'	44° 10'	60 ft. long, 10 ft. high.
18	15.5.1911	S.S. <i>Camillo</i> ...	10 miles East of Nantucket Shoal Lt.-V.		Small berg.
19	11.5.1914	S.S. <i>Indradeo</i> ...	42° 18'	62° 43'	Large slabs of field ice and growlers 100-150 ft. long, 5 ft. out of water.
20	17.5.1915	S.S. <i>Pola</i> ...	38° 16'	61° 50'	Some field ice.
21	15.5.1920	U.S. Hyd., Bulletin	45° 11'	36° 42'	Berg.
22	27.5.1930	S.S. <i>Valperga</i> ...	40° 37'	37° 50'	Iceberg about 16 ft. high with growlers.
23	25.6.1886	Brig. <i>Blanch</i> ...	48° 40'	15° 22'	Large berg.
24	5.6.1907	S.S. <i>Kingswell</i> ...	32° 37'	64° 25'	Several bergs.
25	-6.1907	Bque. <i>Silverstream</i>	80 miles West of Fastnet.		Berg.
26	11.6.1912	S.S. <i>Valetta</i> ...	37° 30'	74° 24'	Three pieces of ice.
27	7.6.1913	S.S. <i>Holtby</i> ...	39° 35'	64° 50'	Berg 10 ft. high.
28	27.6.1915	S.S. <i>Stella</i> ...	36° 28'	57° 45'	Small piece.
29	30.6.1921	U.S. Navy Dept....	33° 20'	49° 16'	Berg 10 ft. high.
30	16.6.1924	S.S. <i>West Irmo</i> ...	38° 03'	63° 20'	Growler.
31	25.6.1926	S.S. <i>Baxtergate</i> ...	30° 20'	62° 32'	Large piece about 30 ft. long and 15 ft. wide, showing about 3 ft. above water.
32	-7.1890	S.S. <i>Slavonia</i> ...	48° 53'	24° 11'	Last remnants of berg.
33	-7.1902	Two reports by fishermen.	56° 30'	6° 30'	40-50 ft. long, 15 ft. wide, 2 ft. 6 ins. out of water,
34	31.7.1909	S.S. <i>Shimosa</i> ...	36° 59'	30° 01'	25 ft. long, 3 to 8 ft. wide.
35	10.7.1913	S.S. <i>Lothian</i> ...	37° 27'	36° 48'	Piece, 6 ft. high, 50 ft. in circumference.
36	18.7.1916	U.S. Hyd., Bulletin	32° 09'	54° 26'	Piece of berg, 3 or 4 ft. out of water.
37	23.7.1916	S.S. <i>San Giorgio</i> ...	42° 09'	63° 24'	Berg 60 ft. long.
38	23.7.1918	U.S. Hyd., Bulletin	44° 25'	35° 01'	Large berg.
39	18.7.1921	" "	44° 30'	39° 26'	Small berg about 15 ft. square.
40	21.7.1921	" "	39° 09'	40° 39'	Berg.
41	31.7.1921	" "	37° 37'	27° 29'	Berg.
42	10.7.1926	S.S. <i>Chelatros</i> ...	42° 42'	36° 45'	Two pieces of ice.
43	12.8.1903	S.S. <i>Saxon Prince</i>	37° 52'	71° 30'	Piece, 3 ft. high, 40 ft. long.
44	7.8.1908	S.S. <i>Caronia</i> ...	50° 31'	18° 55'	Two pieces, 10 ft. square, and 15 ft. square.
45	2.8.1909	S.S. <i>Shimosa</i> ...	37° 16'	42° 06'	Piece, 18 ft. by 5 ft., 2 ft. out of water.
46	14.8.1912	S.S. <i>Ulstermore</i> ...	43° 55'	39° 16'	Piece.
47	27.8.1912	S.S. <i>Lux</i> ...	42° 30'	15° 26'	50 ft. square, 4 ft. out of water.
48	10.8.1915	S.S. <i>St. Louis</i> ...	41° 02'	48° 00'	Berg.
49	16.8.1915	S.S. <i>St. Leonards</i>	41° 09'	56° 43'	Berg.

No.	Date.	Source of Report.	Position of ice.		Remarks.
			Latitude N.	Longitude W.	
50	21.8.1915	S.S. <i>Strathgarry</i> ...	40° 46'	68° 20'	Growler.
51	-8.1915	" "	39° 00'	46° 20'	Piece, 20 ft. long, 4 ft. high.
52	29.8.1920	U.S. Hyd., Bulletin	40° 30'	47° 52'	Berg.
53	2.9.1883	Bque., <i>Olivette</i> ...	35° 40'	30° 00'	Lump of ice.
54	-9.1895	S.S. <i>Gulf of Taranto</i>	36° 35'	71° 36'	Two bergs 30 ft. high, 300-400 ft. long, and much field ice over two miles area.
55	19.9.1906	S.S. <i>Lord Landsdowne</i> .	54° 20'	22° 00'	Small berg 20 ft. by 6 ft.
56	10.9.1908	S.S. <i>Deutschland</i>	45° 28'	27° 18'	Two small bergs and one large.
57	6.9.1920	U.S. Hyd., Bulletin	47° 10'	38° 04'	Bergs.
58	2.9.1922	S.S. <i>Hallgjerd</i> ...	50° 00'	40° 05'	Berg.
59	15.9.1922	S.S. <i>Empress of Britain</i> .	52° 52'	40° 12'	Large berg.
60	3.9.1923	S.S. <i>Djambi</i> ...	40° 10'	31° 36'	Piece of ice about 30 ft. long, 1½ ft. out of water.
61	15.10.1883	S.S. <i>Elenora</i> ...	37° 00'	18° 00'	Piece ice.
62	8.10.1912	S.S. <i>Putney Bridge</i>	35° 15'	44° 50'	Small berg 35 ft. long, 6 ft. high.
63	27.10.1916	S.S. <i>Montreal</i> ...	51° 17'	41° 17'	Small berg.
64	2.10.1918	U.S. Hyd., Bulletin	50° 10'	40° 50'	Large berg.
65	19.10.1920	" "	45° 22'	40° 09'	Berg.
66	19.10.1920	" "	45° 24'	40° 07'	Berg.
67	17.10.1921	S.S. <i>Mount Vernon</i>	48° 23'	42° 19'	Berg about 70 ft. high, 400 ft. long.
68	6.10.1922	S.S. <i>Christian Krogh</i>	50° 43'	40° 42'	Berg 60 ft. high.
69	7.10.1923	S.S. <i>Eastern Dawn</i>	40° 46'	65° 54'	Large growler about 100 ft. square.
70	23.10.1927	Trawler, <i>Grecian Empire</i> .	30 miles E.S.E. of the Outer Skerries, Shetland Islands.		Piece of ice 100 ft. long, 6 ft. above water.
71	7.11.1922	Cape Race, W/T Station.	47° 38'	40° 04'	Berg and growlers.
72	-12.1903	S.S. <i>Lord Antrim</i>	42° 00'	55° 00'	Ice.
73	22.12.1915	S.S. <i>Carolyn</i> ...	42° 53'	57° 39'	Large berg.
74	16.12.1920	S.S. <i>Oriana</i> ...	43° 53'	44° 39'	Berg.
75	16.12.1927	S.S. <i>Ascania</i> ...	47° 52'	40° 50'	Four large bergs. (approximate).

Detection of Ice.—The practical utility of the work carried out by the Ice Patrol Cutters has greatly reduced the danger of ice to vessels trading between European and United States Ports, but the frequent long periods of fog and low visibility make it impossible for the Patrol to include the latest position of all bergs in their Radio reports, therefore the danger of collision with ice within the area where bergs are liable to exist remains a very real one. Experiments carried out by the Ice Patrol during recent years show that seamen can depend upon no fore-warning of ice beyond the limit of their visibility; the greatest safeguards are therefore the keeping of a sharp lookout and navigating at such a speed as will enable the ship to stop or sheer before striking a berg just visible ahead.

Up to the present there has been no instrument devised whereby the presence of ice can be detected in the dark hours or during fog. No reliance whatever can be attached to echoes from the steam whistle or syren giving a warning of ice, nor does the presence of a berg have any appreciable effect on the temperature of the air or water, but it has been found that when navigating in the vicinity of the Great Bank, if the temperature of the sea remains at or about 60° Fahr. the chances of meeting ice are greatly reduced.

The approximate temperature of the warm water abutting the cold wall is as follows:—

Throughout the winter and up to April, 54°, April 54°-56°, May 58°-60°, and from June throughout the summer to November, 61°-63°, when it falls to a minimum in February. On ordinary clear days the average berg can be picked up by the masthead look-out when 18 miles distant and will be seen from the bridge when between 12 to 15 miles away. On a cloudy day with good visibility deduct about 2 miles from the foregoing:—

In clear weather with hazy horizon the tops of bergs have been observed 11 miles. During light fog or drizzling rain, bergs are

visible at from 2 to 3 miles. In light low fogs bergs are generally picked up by the look-out aloft before they can be observed from the bridge.

In dense fog a berg cannot be seen more than 200 yards ahead of ship, when, if the sun is shining, it appears as a luminous white mass. With no sun it first appears close aboard as a dark mass. In dense fog the bow look-out will probably first detect the ice, as the first visible sign is the wash and breaking of the sea on the base of the berg.

On a clear dark night a berg will not be seen with the naked eye further than one-quarter of a mile, but should the bearing be known it may be picked up with glasses when 1 mile distant.

The distance that a berg may be seen on a clear moonlight night depends upon (a) the altitude and age of the moon, and (b) the relative position of moon, berg and ship.

A berg placed between a ship and the moon when low is the most difficult to observe.

With a full moon at not less than 35° in altitude covered by a thin film of Cirro-Stratus clouds, a berg is visible to the naked eye at a distance of 5 miles, irrespective of the relative position of moon, berg and ship.

Observations carried out in the vessels of the Ice Patrol Service show the following average frequency of fog and low visibility experienced in the vicinity of the Great Bank:—

MONTH	PERCENTAGE OF	
	PERCENTAGE OF FOG.	FOG AND LOW VISIBILITY.
April	29	50
May	27	39
June	44	53

International Ice Patrol.—Arising out of the loss of the R.M.S. *Titanic* through striking a berg in 1912, an International Conference for Safety of Life at Sea was held in London in 1913. At this Conference it was decided to establish and maintain a regular patrol during the ice season of each year, the United States being asked to organise and manage the Service. Since 1914 the patrol has been entrusted to the United States Coast Guard, who each year detail two Coast Guard Cutters to cruise in the vicinity of the Great Bank of Newfoundland, there to locate and watch the movement of ice and ascertain its limits for the guidance of navigators.

The Patrol also carries out oceanographical and meteorological research into the conditions governing the movement of ice and drift of currents.

Commanders of ships are earnestly asked to co-operate in the work of the Patrol by reporting their position, course, and speed, and sea surface temperature every four hours when navigating in the area bounded by the 39th and 48th parallel of Latitude, and the 44th and 52nd meridians of Longitude. By this means the Patrol are able to keep track of all vessels within the danger zone, and are able to warn any vessel standing into danger.

Gulf of St. Lawrence Ice Patrol.—From the opening of navigation in the spring until the route is clear of ice an Ice Patrol is maintained by the Canadian Government in the Gulf of St. Lawrence between Cape Ray and Heath Point.

A regular message embodying ice conditions from Cape Race to Quebec and recommendations as to route to be followed is compiled by the Ice Patrol every four hours commencing at 0500 G.M.T. and kept for immediate transmission by W/T to ships upon request. Similar information is also broadcast four times daily.

Commanders of incoming ships are requested to facilitate the work of the Patrol by supplying information regarding ice in their vicinity.

Descriptions of particulars of ice warning messages broadcast by the Ice Patrol Vessels are published on the back of the Ice Chart in *THE MARINE OBSERVER* as soon as available each year.

North Atlantic Tracks.

The suggestion that all ships engaged in the Trans-North Atlantic Trade should follow separate routes when east bound to those used when west bound, was first made by Commander F. M. MAURY, U.S.N., in 1855, but it was not until 1875 that his suggestion was adopted. The Cunard Steamship Company then laid down specified

routes which all their ships were ordered to follow. On the recommendation of the United States Hydrographic Office these routes were amended in 1891 and seven years later the Trans-North Atlantic Track Conference was formed.

The Conference consists of the principal International Shipping Companies engaged in the Trans-North Atlantic trade, and they, working in conjunction with the United States Coast Guard, who operates the International Ice Patrol Service, revise the tracks from time to time as ice conditions necessitate during the different seasons of the year.

The Tracks are shown on Admiralty Route Charts 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*.

The Tracks were revised in March, 1931, full particulars of which are as follows:—

North Atlantic Lane Routes. United States.

Track "A" (Extra Southern).

Westbound.

Will only be brought into operation when necessity arises.

Steer from Fastnet or Bishop Rock on Great Circle course, but nothing South, **to cross the meridian of 47° 00' West in Latitude 40° 30' North**, thence by either rhumb line or Great Circle to Boston Light Vessel or to a position South of Nantucket Light Vessel.

Eastbound.

Will only be brought into operation when necessity arises.

From the position of 70° 00' West and 40° 10' North, or from Boston, steer by rhumb line **to cross the meridian of 47° 00' West in Latitude 39° 30' North**, and from this last position nothing North of the Great Circle to Fastnet or Bishop Rock.

Track "B" (Southern).

Westbound.

From April 11th to June 30th (both days inclusive).

Except when Ice conditions necessitate the use of "A" Track.

Steer from Fastnet or Bishop Rock on Great Circle course, but nothing South, **to cross the meridian of 47° 00' West in Latitude 41° 30' North**, thence by either rhumb line or Great Circle to Boston Light Vessel, or to a position South of Nantucket Light Vessel.

Eastbound.

From April 11th to June 30th (both days inclusive).

Except when Ice conditions necessitate the use of "A" Track.

From the position of 70° 00' West and 40° 10' North, or from Boston, steer by rhumb line **to cross the meridian of 47° 00' West in Latitude 40° 30' North**, and from this last position nothing North of the Great Circle to Fastnet or Bishop Rock.

Track "C" (Northern).

Westbound.

From July 1st to April 10th (both days inclusive).

Except when Ice conditions necessitate the use of "B" Track.

Steer from Fastnet or Bishop Rock on Great Circle course, but nothing South, **to cross the meridian of 50° 00' West in Latitude 43° 00' North**, thence by either rhumb line or Great Circle to Boston Light Vessel, or to a position South of Nantucket Light Vessel.

Eastbound.

From July 1st to April 10th (both days inclusive).

Except when Ice conditions necessitate the use of "B" Track.

From the position of 70° 00' West in 40° 10' North, or from Boston, steer by rhumb line, **to cross the meridian of 50° 00' West in Latitude**

42° 00' North, 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 and Canadian Track "D". When proceeding on Canadian Tracks "E" or "F" via Halifax, ships pass North of Sable Island both Westbound and Eastbound.

(NOTE.—General Instructions Canadian Tracks for vessels bound to or from the North of Ireland.)

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' West 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 any 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.

Canada.

Track "D."

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

Westbound.

Steer from Fastnet, Inishtrahull, or Bishop Rock on Great Circle course, to cross the meridian of 50° West in Latitude 43° North, 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 60 miles South of Sable Island to cross the meridian of 50° West in Latitude 42° North, thence on the Great Circle course to Fastnet, Inishtrahull, or Bishop Rock.

Track "E."

From 11th April to 15th May, or until the Cape Race Route Clear of Ice, and December 1st to February 14th.

Westbound.

Steer from Fastnet, Inishtrahull, or Bishop Rock on the Great Circle course, to the meridian of 50° West in 45° 55' North, 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° West in Latitude 45° 25' North, thence on the Great Circle course to the Fastnet, Inishtrahull or Bishop Rock.

Track "F."

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

Westbound.

Steer from Fastnet, Inishtrahull, or 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 Halifax or the Gulf of St. Lawrence.

Eastbound.

Steer from Halifax or the Gulf of St. Lawrence to a position 25 miles South of Cape Race thence on a course 10 miles South of the Great Circle track until approaching Fastnet, Inishtrahull, or 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 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 Bishop Rock.

General Instructions.

Vessels bound to or from U.S. Ports from or to the North of Ireland have the option of following either the U.S. or 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' North in 70° 00' West to position 60 miles South of Sable Island.

On Track "D" Westbound proceeding by rhumb line from position 43° 00' North in 50° 00' West to position South of Nantucket and Eastbound from position 40° 10' North in 70° 00' West to position 42° 00' North in 50° 00' West.

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. Should vessels on Track "C" bound to or from United States be deviated to Track "B" on account of ice, Canadian vessels will remain on Track "D" for the period prescribed but will have the above option of deviating as necessary in the vicinity of ice areas.

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

Summary of Ice Conditions during 1931.

THE following monthly summary of ice conditions in the Western North Atlantic during 1931 is compiled from Ice reports returned by those ships of the Voluntary Observing Fleet traversing the Trans-North Atlantic routes, and engaged in the Arctic Fisheries also from the Bulletins issued by the U.S.C.G. Cutter, carrying out International Ice Patrol service, and from other sources. The ice season of 1931 was remarkable for the general absence of ice on the steamship routes south of the 48th parallel, probably due to abnormal weather conditions prevailing in high latitudes during the previous winter and spring. The Ice Patrol Cutter finding no ice likely to menace the southern tracks, proceeded north along the Labrador coast to investigate existing conditions in the Davis Strait and obtain observations of the general movement of the water.

January and February.—No ice of any description was reported during these months.

March.—Towards the end of the month the steamship tracks within the Gulf of St. Lawrence, via Cabot Strait to Montreal were reported free of ice.

In the Western North Atlantic the Ice Patrol Cutter "General Greene," searching on and in the vicinity of the Grand Banks, sighted no ice other than two large bergs held in field ice off the N.E. coast of Newfoundland, between Horse Island and Cape St. John. No reports of ice were received during the month from ships traversing the Atlantic Lane Routes.

April.—The Danish Meteorological Institute reported on April 8th "Free of ice 100 miles off Cape Farewell. Only bands of ice south of Cape Farewell. Icebergs met with in Longitude 39° W."

The Canadian Signal service reported on April 11th "Montreal to Anticosta no ice in sight. Magdalene to St. Pauls occasional field ice, Northumberland Strait and Gut of Canso west end considerable ice. Other points in Gulf no ice in sight."

The first ocean steamer to navigate the St. Lawrence this season arrived at Montreal on the 15th.

In the Western North Atlantic, the Ice Patrol Cutter sighted field ice with many bergs and growlers extending off shore from Cape Bonavista eastward for 60 miles. A few bergs and growlers were reported during the month in the vicinity of Cape Race, the southernmost berg being sighted in Lat. $46^{\circ} 25' N.$, Long. $52^{\circ} 11' W.$ on the 8th.

May.—The Danish Meteorological Institute reported on May 10th "Free of ice 40 miles off Cape Farewell." Within the Gulf of St. Lawrence, bergs were reported in Belle Isle Strait on the 12th.

In the vicinity of the Grand Banks a few bergs were reported during the month west of the 50th meridian between the parallels of 45° and 49° North. The southernmost berg was sighted on the 12th in Lat. $45^{\circ} 32' N.$, Long. $52^{\circ} 20' W.$ Small bergs were also reported on the 18th and 23rd in Lat. $48^{\circ} 12' N.$, Long. $47^{\circ} 07' W.$ and Lat. $47^{\circ} 45' N.$, Long. $46^{\circ} 30' W.$, respectively.

June.—The Danish Meteorological Institute reported on June 15th "Ice edge 20 miles off Frederikshaab. Northern edge of ice extends to Fiskernaasset, outer edge open, compact further in, navigation unimpeded by storis." No ice was reported within the Gulf of St. Lawrence other than in Belle Isle Strait, where numerous bergs were reported throughout the month.

East of Belle Isle bergs were reported both North and South of the tracks to the 54th meridian.

A few bergs were reported during the first half of the month in the vicinity of Cape Race, the southernmost berg being reported on the 9th in Lat. $45^{\circ} 51' N.$, Long. $54^{\circ} 06' W.$

July.—The Danish Meteorological Institute reported on July 3rd "Off Nunarsuit open water to 8 miles off shore. Northern edge of ice extends to Arsuk, the edge consists of open ice with bergs inside. Twenty bergs reported between Cape Farewell and Nunarsuit."

On July 22nd "Ice edge 40 miles off Cape Farewell consisting of compact ice with bergs inside."

Within Belle Isle Strait numerous bergs and growlers were reported throughout the month, east of Belle Isle numerous bergs were reported both north and south of the tracks to the 49th meridian.

No ice having been reported to the southward of the 50th parallel the Ice Patrol Cutter "General Greene" steamed north to observe ice conditions and procure ocean current data along the Labrador coast and in the Davis Straits. On July 8th she reported 38 bergs of all sizes and numerous growlers from Lat. $50^{\circ} 42' N.$, Long. $55^{\circ} 0' W.$ to Lat. $53^{\circ} 15' N.$ Long. $55^{\circ} 32' W.$ Seventeen of the above bergs were within twenty miles of the southern point of Belle Isle and west of Long. $55^{\circ} 20' W.$

August.—No ice was reported during the month other than a few bergs in Belle Isle Straits and on the tracks eastward of Belle Isle to Long. $54^{\circ} 30' W.$

September.—No ice was reported throughout the month within the Belle Isle Straight or on, or in the vicinity of any of the North Atlantic shipping tracks.

Numerous bergs and growlers were reported in the Davis Straits between Latitudes $59^{\circ} 27' N.$ and $63^{\circ} 15' N.$, and Longitudes $43^{\circ} 52'$ and $51^{\circ} 40' W.$

October.—No ice was reported throughout the month in the vicinity of any of the North Atlantic shipping tracts other than one large berg reported on October 11th in Latitude $52^{\circ} 23' N.$, Long. $44^{\circ} 04' W.$

In the Davis Straits many bergs and growlers were reported on the 14th and 6th between Latitudes $59^{\circ} 10'$ and $60^{\circ} 21' N.$, and Longitudes $43^{\circ} 20' W.$ and $48^{\circ} 30' W.$

November.—A medium sized berg was reported within the Straits of Belle Isle on November 6th, this being the only ice reported during the month in the vicinity of any of the North Atlantic Shipping tracks.

Throughout the month numerous bergs and growlers were reported in the Davis Strait between Latitudes $58^{\circ} 51'$ and $60^{\circ} 27' N.$, and Longitudes $38^{\circ} 15'$ and $48^{\circ} 00' W.$

December.—On December 12th the Canadian Signal Service reported, "Montreal to Sorel no ice in sight, Eastward to Crane Island light open ice everywhere. Strohtraverse to Father Point light open ice inshore. Other points no ice in sight."

The River St. Lawrence was reported closed to Navigation on December 15th.

Condition and Movement of Ice in Davis Strait.

The following summary is taken from the pamphlet "The state of the ice in Davis Strait" 1820-1930 by Captain C. I. H. Speers-schneider, published by the Danish Meteorological Institute.

The date when the ice drifts past Cape Farewell depends solely upon the wind. An abnormal drift of the ice out into Davis Strait or far south off Cape Farewell is not in itself proof of an extraordinary amount of ice which always appears in considerable masses over great areas, but rather points to the direction and force of a prevailing wind. Easterly gales around Cape Farewell in the spring will carry vast masses of ice round the Cape to the southwest coast of Greenland. Northerly winds drive the ice far south of Cape Farewell whence easterly winds will scatter the ice far out into the Davis Strait. Continuous southwesterly and southerly wind drives the ice along the coast further northward than usual. North-easterly wind may blow the ice so far out into the Strait as to make it difficult to distinguish between Storis and west ice. The Storis and west ice may be seen as far south as $62^{\circ} N.$

When in some years the extension of the ice has been uncommonly great, it does not necessarily follow that the amount of ice formed in those years was abnormal, but rather points to special conditions of wind. "A severe ice year," therefore, ought to be called "A year with pronounced or abnormal conditions of wind."

In the course of the summer the ice usually reaches Fiskenaes more rarely Godthaab, and very rarely Sukkertoppen. The greatest number of icebergs is seen between Cape Farewell and Frederikshaab, further northward the number decreases.

As the polar ice during the winter is drifting from Angmagssalik to Cape Farewell at a rate of nine miles per day, the vanguard of the Storis will pass Cape Farewell about two months after it passed Angmagssalik. The mean date of passing Cape Farewell for the year 1899-1929 is January 17th.

With much ice along the east coast of Greenland the ice drift begins earlier at Cape Farewell than otherwise, frequently causing abnormal flows into the Davis Strait during the following summer. On rare occasions the Storis may be met with some 200 miles east of Cape Farewell, and bergs were once reported in Long. $31^{\circ} 10' W.$ and Long. $32^{\circ} W.$ From a survey of the ice conditions during the last forty odd years it may be said:—The ice normally passes Cape Farewell during the latter half of January and fills Julianehaab Bay in February. It reaches Arsuk in March, Fiskenaes in April, and if drifting further North approaches Godthaab in May. Normally the greatest amount of ice is found during May and June. It decreases during July, and in August only reaches to Nunarsuit or disappears completely from the West Coast.

SOUTHERN ICE REPORTS.

During the Year 1931.—April.

Year.	Day.	Position of Ice.		Description.	Remarks	Name of Ship reporting.
		Latitude.	Longitude.			
1931	1	$56^{\circ} 13' S.$	$32^{\circ} 57' W.$	Several bergs	.. .. .	R.R.S. <i>Discovery II.</i>
	1	$56^{\circ} 33' S.$	$32^{\circ} 07' W.$	A few bergs	.. .. .	do.
	16	$52^{\circ} 20' S.$	$31^{\circ} 06' W.$	1 berg	.. .. .	do.
	1	$57^{\circ} 07' S.$	$30^{\circ} 27' W.$	A few bergs	.. .. .	do.
	3	From $55^{\circ} 38' S.$	$30^{\circ} 08' W.$	A few bergs	.. .. .	do.
		to $55^{\circ} 09' S.$	$30^{\circ} 08' W.$			
	1	$57^{\circ} 24' S.$	$29^{\circ} 55' W.$	Several bergs	.. .. .	do.
17	$51^{\circ} 09' S.$	$29^{\circ} 55' W.$	2 large bergs	.. .. .	do.	

WEATHER SIGNALS.

I.—SHIPS' WIRELESS WEATHER SIGNALS.

Urgent Meteorological reports should be made at any time. Any ship at any time encountering a tropical revolving storm should report to all ships and the appropriate station, continuing to report at intervals of three hours so long as the ship remains under the influence of the storm.

Ships experiencing gales in which the wind reaches Force 10 or above in the Beaufort Scale should inform all ships within range.

Ships encountering Ice or other navigational dangers should report immediately to all ships and the appropriate station; see instructions for Danger to Navigation Signals for all ships, pages 28 and 29, Vol. IX, No. 97.

For full particulars of "Selected Ships" Routine Meteorological Reports with Schedule for Communication, see pages 13 to 16, Vol. IX, No. 97.

See List of W/T Stations detailed to receive reports from **A Selected Ships** with particulars up to date below, also on Chart V.

In parts of the world where such stations and particulars are not given, British **A Selected Ships** should make their reports to **CQ**

on 2100 metres (143 kc/s) as stated on page 15, Vol. IX, No. 97 (January, 1932, MARINE OBSERVER).

B Selected Ships broadcast their report to C.Q. on 600 m. spark, and these may be intercepted by the stations ringed in on Chart V. In making these reports to C.Q. "B Selected Ships" should make special endeavour to ensure that the report is received at these shore stations. With a view to assisting Meteorological Services who have provided information and to ensuring that routine reports from all "Selected Ships" within range of certain coast stations may be received by those services a list of stations specially detailed to receive reports from "B Selected Ships" is also given on pages 85 and 86. The procedure given on pages 13 to 16, Vol. IX, No. 97, should be adhered to as far as possible.

According to agreement reached by the International Meteorological Conference, 1929, all arrangements for the co-operation of shipping in Voluntary Marine Meteorological work are to be made through the Meteorological Services of the different countries in which the ships are registered, in accordance with the agreed upon International plan for all parts of the World, following the International Convention for Safety of Life at Sea, 1929.

WIRELESS STATIONS DETAILED TO RECEIVE ROUTINE CODED WEATHER REPORTS FROM "A SELECTED SHIPS."

Request for Information.

THE ATTENTION OF METEOROLOGICAL SERVICES IS INVITED TO THE INVITATION GIVEN ON PAGE 13 OF VOL. IX, No. 97, JANUARY MARINE OBSERVER.

Ocean.	Station.	Position.	Call Sign.	Frequency and Wave Length.		Area and limits covered by Station.	Telegraphic address of Meteorological Centre.	Information required—Limit of Groups.	Notes.				
				For Station to call up "Selected Ships."	For "Selected Ships" to report to Station.								
North Atlantic and North Sea.	Portishead.	Lat. 51° 28' 41" N. Long. 2° 47' 30" W.	GKU.	149 kc/s. (2013 metres).	143 kc/s. (2100 metres).	North Sea and Eastern North Atlantic East of Longitude 40° W. and North of Latitude 38° N. but not within 300 miles of station. (see Chart V.)	Weather London.	Weather only, up to seven groups, preferably No. 3 Supplementary Groups.	Control system. "Selected Ships" chosen to report in given order notified by station daily at 2230, 0330, and 1030 G.M.T. Roll call thus—Weather begins—Call signs of chosen "Selected Ships"—Weather ends.				
	Chatham Mass., Sayville N.Y. or West Palm Beach.	Lat. 41° 42' N. Long. 70° 00' W. Lat. 40° 45' N. Long. 73° 06' W. Lat. 26° 42' N. Long. 80° 02' W.	WCC. WSL. WMR.	142.9 kc/s. (2098 metres).		North Atlantic West of Longitude 40° W.	Observer Washington.	Weather only. First four groups of observations taken at 0000 and 1200 G.M.T. only required.	No control. All British "A Selected Ships" within area to address their 0000 and 1200 G.M.T. observations to Observer Washington and their 1800 G.M.T. observations to CQ in accordance with schedule.				
	Horta, Azores.	Lat. 38° 32' N. Long. 28° 38' W.	CTH.							125 kc/s. (2400 metres).	North Atlantic South of Latitude 38° N. and East of Longitude 40° W.	Radio Horta.	Weather only, up to seven groups, preferably No. 3 Supplementary Groups.	No control—all British "A Selected Ships" within area should report in accordance with Schedule.

WIRELESS STATIONS DETAILED TO RECEIVE ROUTINE CODED WEATHER REPORTS FROM
 "A SELECTED SHIPS."

(Continued.)

Ocean.	Station.	Position.	Call Sign.	Frequency and Wave Length.		Area and limits covered by Station.	Telegraphic address of Meteorological Centre.	Information required—Limit of Groups.	Notes.
				For Station to call up "Selected Ships."	For "Selected Ships" to report to Station.				
Mediterranean and Red Sea.									
South Atlantic.									
Indian Ocean.	Colombo.	Lat. 6° 55' 14" N. Long. 79° 52' 46" E.	VPB	130 kc/s. (2300 metres).	143 kc/s. (2100 metres).	Indian Ocean including Arabian Sea and Bay of Bengal within a range of about 1500 miles.	Obs.	Weather only. No. 6 Supplementary groups preferred.	No control—all British "A Selected Ships" within area should report in accordance with Schedule.
	Perth.	Lat. 32° 01' 51" S. Long. 115° 49' 31" E.	VIP	—	125 kc/s. (2400 metres).	Indian Ocean and Southern Ocean between Long. 105° and 135° E.; but not within 100 miles of station.	Weather.	Weather only. No. 6 Supplementary groups.	No control—all British "A Selected Ships" within area should report in accordance with Schedule. Reports not required for observation times not starred on Chart I, p. 15, Vol. IX. No. 97 (January).
North Pacific and China Sea.	Cape d'Aguilar, Hong Kong.	Lat. 22° 12' 39" N. Long. 114° 15' 11" E.	VPS.		125 kc/s. (2400 metres).	China Sea and North Pacific to about 1,500 miles from station.	Royal Observatory.	Weather only, preferably No. 6 Supplementary Groups.	No control—all British "A Selected Ships" within area should report in accordance with Schedule.
South Pacific.	Sydney.	Lat. 33° 46' 00" S. Long. 151° 03' 09" E.	VIS	—	125 kc/s. (2400 metres).	S. Pacific, Coral and Tasman Seas and Southern Ocean between Long. 135° and 160° E.; but not within 100 miles of station.	Weather.	Weather only. No. 6 Supplementary groups.	No control—all British "A Selected Ships" within area should report in accordance with Schedule. Reports not required for observation times not starred on Chart I, p. 15, Vol. IX. No. 97 (January).

WIRELESS STATIONS DETAILED TO INTERCEPT ROUTINE CODED WEATHER REPORTS FROM
"B SELECTED SHIPS."

Ocean.	Station.	Position.	Call Sign.	Telegraphic address of Meteorological Centre desiring information.	Information desired.	Notes.
North Atlantic.	Horta, Azores.	Lat. 38° 32' N. Long. 28° 38' W.	CTH.	Radio Horta	Weather only, up to 7 groups, preferably No. 3 Supplementary Groups.	
South Atlantic.	Salinas	Lat. 0° 35' 00" S. Long. 47° 18' 45" W.	PPL.	Metereo Rio.	Weather only, including supplementary groups.	
	S. Luiz	Lat. 2° 31' 48" S. Long. 44° 16' 51" W.	PXM.			
	Fortaleza	Lat. 3° 46' 21" S. Long. 38° 32' 26" W.	PPC.			
	Natal	Lat. 5° 46' 41" S. Long. 35° 18' 24" W.	PXN.			
	F. Noronha	Lat. 3° 50' 24" S. Long. 32° 24' 48" W.	PXF.			
	Olinda	Lat. 8° 00' 35" S. Long. 34° 51' 00" W.	PP0.			
	Amaralina	Lat. 13° 00' 12" S. Long. 38° 30' 45" W.	PPA.			
	Abrolhos	Lat. 17° 57' 30" S. Long. 38° 41' 05" W.	PXH.			
	Victoria	Lat. 20° 10' 00" S. Long. 40° 17' 46" W.	PPT.			
	Rio	Lat. 22° 53' 42" S. Long. 43° 13' 24" W.	PPR.			
	Santos	Lat. 23° 56' 27" S. Long. 46° 19' 28" W.	PPS.			
	Florianopolis. Juncçao	Lat. 27° 36' 00" S. Long. 48° 30' 18" W. Lat. 32° 04' 00" S. Long. 52° 07' 00" W.	PPF. PPJ.			
Indian Ocean.	Calcutta.	Lat. 22° 33' 31" N. Long. 88° 20' 16" E.	VWC.				Weather.	Weather only up to 6 groups, No. 6 Supplementary Groups preferred.
	Rangoon.	Lat. 16° 45' 57" N. Long. 96° 11' 51" E.	VTR.			
	Madras.	Lat. 12° 59' 17" N. Long. 80° 10' 56" E.	VWM.			
	Bombay.	Lat. 19° 04' 55" N. Long. 72° 49' 54" E.	VWB.			
	Karachi.	Lat. 24° 51' 05" N. Long. 67° 02' 32" E.	VWK.			
	Matara.	Lat. 6° 01' 07" N. Long. 80° 35' 39" E.	GZP.			
	Mauritius.	Lat. 20° 23' S. Long. 57° 35' E.	VRS.	Observatory Mauritius.	Weather 4 universal groups and first of No. 6 Supplementary Groups.	
	Geraldton.	Lat. 28° 47' 15" S. Long. 114° 36' 24" E.	VIN	Weather.	Weather only, including No. 6 Supplementary Groups.	
	Perth.	Lat. 32° 01' 51" S. Long. 115° 49' 31" E.	VIP			
	Esperance.	Lat. 33° 52' 40" S. Long. 121° 53' 34" E.	VIE			

WIRELESS STATIONS DETAILED TO INTERCEPT ROUTINE CODED WEATHER REPORTS FROM
" B SELECTED SHIPS."

(Continued.)

Ocean.	Station.	Position.	Call Sign.	Telegraphic address of Meteorological Centre desiring information.	Information desired.	Notes.
North Pacific and China Sea.	Cape d'Aguilar, Hong Kong.	Lat. 22° 12' 39" N. Long. 114° 15' 11" E.	VPS.	Royal Observatory.	Weather only, preferably No. 6 Supplementary Groups.	
South Pacific.	Auckland.	Lat. 36° 50' 36" S. Long. 174° 46' 08" E.	ZLD.	Weather Wellington.	Weather only, up to 7 groups.	
	Wellington.	Lat. 41° 16' 26" S. Long. 174° 45' 55" E.	ZLW.			
	Awarua.	Lat. 46° 30' 27" S. Long. 168° 22' 21" E.	ZLB.			
	Chatham Island.	Lat. 43° 57' 02" S. Long. 176° 31' 04" W.	ZLC.			
	Rarotonga.	Lat. 21° 11' 54" S. Long. 159° 48' 51" W.	ZKR.			
	Apia.	Lat. 13° 15' 17" S. Long. 170° 49' 42" W.	ZMA.			
	Thursday I.	Lat. 10° 35' 14" S. Long. 142° 12' 43" E.	VII	Weather	Weather only, including No. 6 Supplementary Groups.	
	Townsville	Lat. 19° 16' 09" S. Long. 146° 49' 47" E.	VIT			
	Brisbane	Lat. 27° 25' 34" S. Long. 153° 07' 19" E.	VIB			
	Sydney	Lat. 33° 46' 00" S. Long. 151° 03' 09" E.	VIS			
	Melbourne	Lat. 37° 46' 56" S. Long. 144° 52' 09" E.	VIM			
	Adelaide	Lat. 34° 51' 14" S. Long. 138° 31' 55" E.	VIA			

II.—WIRELESS WEATHER SIGNALS.

WIRELESS STORM WARNINGS.

HOLLAND.

North Sea.

I.C.W. Issues.

Scheveningen W/T station, Latitude $52^{\circ} 06'$ N., Longitude $4^{\circ} 16'$ E. (approx.), call sign **PCH**, transmits storm warnings on receipt and following the end of the next compulsory silent period, both in Dutch and English, and also at 1230 and 2030 G.M.T. Wavelength used is 600 metres (I.C.W.).

The warnings are transmitted, first at the rate of 15 words per minute, and then repeated twice, quickly.

NOTE.—If the storm warning is sent on request a charge will be debited to the ship concerned.

FRANCE.

Spark Issues.

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

Cherbourg - Rouges Terres ... Approximate Latitude $49^{\circ} 37'$ N., Longitude $1^{\circ} 36'$ W., call sign **FUC**.

Brest-Mengam ... Approximate Latitude $48^{\circ} 21'$ N., Longitude $4^{\circ} 35'$ W., call sign **FUE**.

Lorient-Pen-Mané ... Approximate Latitude $47^{\circ} 44'$ N., Longitude $3^{\circ} 21'$ W., call sign **FUN**.

Rochefort-Soubise ... Approximate Latitude $45^{\circ} 56'$ N., Longitude $0^{\circ} 59'$ W., call sign **FES**.

The following W/T stations broadcast storm warnings concerning the areas "Roussillon," "Provence," "Rhône," and "Corse":—

Porquerolles ... Approximate Latitude $42^{\circ} 59'$ N., Longitude $6^{\circ} 12'$ E., call sign **FUQ**.

Ajaccio-Aspretto ... Approximate Latitude $41^{\circ} 56'$ N., Longitude $8^{\circ} 46'$ E., call sign **FUI**.

The W/T stations transmit the warning on the 600 metre wave length as soon as it is received. The International Safety Signal — — — (TTT) is first sent out, followed by D.E. and station call sign. This transmission commences towards the end of one of the international three-minute silent periods and the nature of the warning is sent immediately after the end of the silent period. The message is repeated after several 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.

C.W. Issues.

Eiffel Tower W/T Station, call sign **FLE**, broadcasts wireless storm warnings on a wavelength of 7,200 m. C.W.

The warnings are broadcast if the forecasts indicate that the wind force is likely to exceed force 7 on the Beaufort scale.

The signals refer to the following French coastal areas:—

Manche, Bretagne, Océan, Gascogne, Roussillon, Rhône, Province, Corse.

The limits of the areas mentioned above are as follows:—

"Manche"	...	Belgian frontier to and including Carteret.
"Bretagne"	...	From and including Cherbourg to estuary of Loire.
"Océan"	...	From and including Lorient to the Gironde.
"Gascogne"	...	From and including Île de Ré to Spanish frontier.
"Roussillon"	...	From Spanish frontier to and including Cette.
"Rhône"	...	From and including Cette to Camarat.
"Provence"	...	From and including Camarat to Italian frontier.
"Corse"	...	All the coasts of Corsica.

Form of Message.

The warnings are sent *en clair* in French, and are valid for 24 hours from the time indicated in the message.

They commence with the name of the day of the week, the time from which the validity of the warning is reckoned, the name of area threatened followed by the word "Tempête" and the probable direction from which the gale may be expected.

Example.

"Jeudi 15 heures Manche tempête, Nord-Ouest (N.W.)."

Explanation.

From Tuesday until 1500 to-morrow a gale (Force 7 or over Beaufort) and from a direction between North and West will threaten all parts of the coast between the Belgian frontier and Carteret.

WIRELESS ICE WARNINGS.

DENMARK.

Danish Waters.

I.C.W. Issues.

The following W/T stations broadcast a summary of ice conditions in Danish waters, *en clair* (English). Wavelength 600 metres, I.C.W.

Blaavand W/T station, approximate Latitude $55^{\circ} 33'$ N., Longitude $8^{\circ} 05'$ E., call sign **OXB**, at 0100 and 1300 G.M.T.

Copenhagen W/T station, approximate Latitude $55^{\circ} 41'$ N., Longitude $12^{\circ} 37'$ E., call sign **OXA** at 1100 and 2300 G.M.T.

HOLLAND.

I.C.W. Issues.

Scheveningen W/T station, call sign **PCH**, broadcasts, when necessary, data concerning ice conditions in certain Dutch harbours and approaches, daily as follows:—

at 1230 and 2030 G.M.T. after the Storm Warning (if issued).

Wavelength 600 metres (I.C.W.).

The ice report is broadcast in a local code and will contain the ice conditions for the following harbours:—

Delfzijl (Ems).	Helder (Zuider Zee).
Harlingen (Zuider Zee).	Rotterdam (Waterway).
Amsterdam (North Sea Canal).	Dordrecht (North).
Zaandam (Voorzaan).	Dordrecht (Mallegat).

The report commences with the words "Ijsbericht, Ice report."

The broadcast of the ice reports will begin when navigation is closed to small steamers and seagoing motor vessels at any of the harbours mentioned in the list, and will cease when navigation is re-opened.

Ice reports are transmitted twice: first at the rate of 15 words per minute, and then quickly.

III.—WIRELESS TIME SIGNALS.

FRANCE.

C.W. Issues.

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, Latitude 48° 51' 30" N., Longitude 2° 17' 43" E.

Call Sign **FLE.** Wavelengths 32.5 m. (C.W.) and 2,650 m. (I.C.W.).

New International Time-Signals.

W/T Time-Signals are transmitted automatically from the Standard Clock at Paris Observatory, Latitude 48° 50' 11" N., Longitude 2° 20' 14" E., in accordance with the New International System of W/T Time-Signals as follows:—

- | | | | |
|-----|--------------|------------|------------------------|
| | h. m. s. | h. m. s. | |
| (1) | From 7 56 00 | to 8 00 00 | on 32.5 metres. (C.W.) |
| (2) | „ 9 26 00 | „ 9 30 00 | „ 2,650 „ (I.C.W.) |
| (3) | „ 19 56 00 | „ 20 00 00 | „ 32.5 „ (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 (— — — — —) and two groups of three one-second (— — —).
7 56 05 to 7 56 50		— — — every 10 sec., except that the third series from 25 sec. to 30 sec. consists of a single dash prolonged for 5 sec.
57 00 „	57 50	— — — — — etc.
57 55 „	58 00	{ 55 56 57 58 59 60 ■ ■ ■ ■ ■ Time signal.
58 08 „	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-Croix d'Hins W/T Station.

Position, Latitude 44° 42' 22" N., Longitude 0° 48' 30" W.

Call Sign **FYL.** Wavelength 19,150 m. (C.W.).

New International Time-Signals.

Time-Signals in accordance with the New International System of W/T Time-signals are broadcast twice daily, at 8^h. 00^m. 00^s. G.M.T. and 20^h. 00^m. 00^s. 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.

GREAT BRITAIN.

IMPORTANT AMENDMENT.

WIRELESS GALE WARNINGS.

I.C.W. and spark issues.

Vol. IX, No. 98, p. 48.

Delete from "These warnings are broadcast in plain language, etc.", to "when Iceland is appropriate it will be repeated thus—*Iceland Iceland*".

Substitute the following:—

1. On and after 1st April, 1932, gale warnings will be broadcast on a wave of 500 kc/s (600 m.), from the following W/T stations only:—

Station.	Call Sig.	Lat. (approx.)	Long. (approx.)	Station.	Call Sig.	Lat. (approx.)	Long. (approx.)
Wick	GKR	58° 26' N.	3° 06' W.	Fishguard.	GRL	52° 01' N.	4° 59' W.
Humber	GKZ	53° 20' N.	0° 17' E.	Valentia.	GCK	51° 56' N.	10° 21' W.
Niton	GNI	50° 35' N.	1° 17' W.	Malin Head.	GMH	55° 22' N.	7° 20' W.

2. The warnings will be broadcast from the station or stations appropriate to the area within which the gale is expected immediately upon receipt at the station, and also, when this time is outside the periods of single operator watch, at 18 minutes past the first hour, within the next such period. The date and time of origin will be given in each warning.

3. Warnings will be preceded by the W/T safety signal (TTT) repeated at short intervals ten times on full power. The warning is broadcast one minute later.

4. Example—"Gale Warning Thursday 1230 G.M.T. Easterly Gale south of line Spurn head to Galway and in Dogger district."

5. Gale Warnings will only be broadcast when winds of gale force (force 8 of the Beaufort Scale) or above are expected; when a "whole gale" (force 10 or above) is expected this will be stated.

6. The above scheme is experimental and commanders of observing ships are requested to note in the space for additional remarks in the Meteorological Log or Register if these gale warnings have been effective aids to navigation, giving the circumstances, or to report any difficulties in this service with suggested remedies.

Special Notices Regarding Personnel.

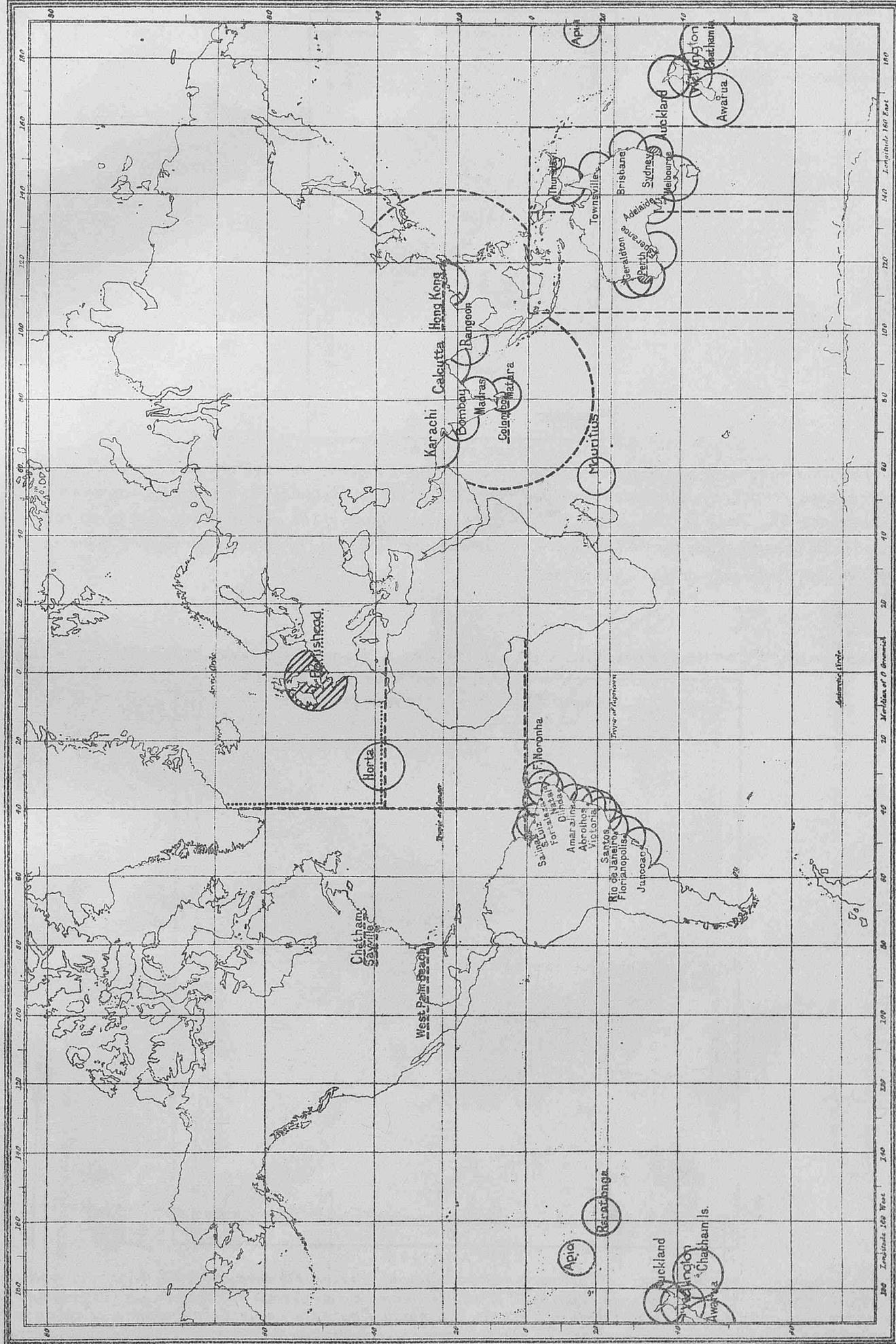
The Marine Superintendent will be glad to receive information of special distinctions gained and retirements, &c., of Marine Observers.

OBITUARY.

The death of Captain G. W. SHARP, commander of the S.S. *Mahronda*, and a member of our Corps of Voluntary Marine Observers, which took place on February 7th on board his ship at Middlesborough, is noted with regret.

Chart V. — SHIPS' WIRELESS WEATHER SIGNALS.

Stations for Reception of Routine Wireless Weather Reports from "Selected Ships."



The dotted line indicates the area in which British 'A' Selected Ships report under control to Portishead.

A pecked line indicates the reporting area, round stations in other countries to which British 'A' Selected Ships should report. The names of such stations being underlined with a pecked line.

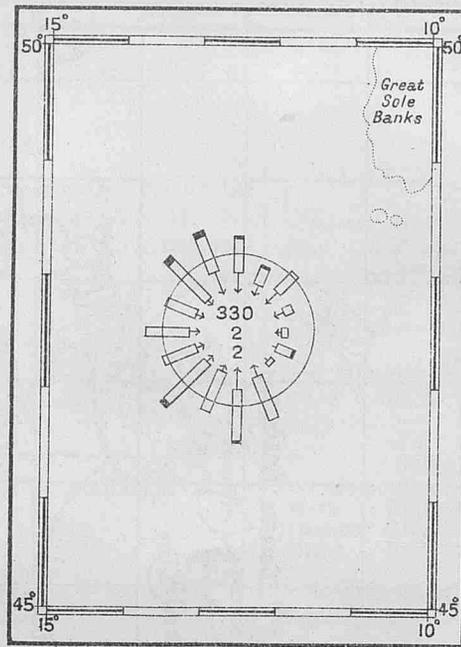
The small shaded areas round stations detailed to receive reports from 'A' Selected Ships indicate where these ships should not report on account of congestion.

The full circles indicate the areas round islands and coast stations which are detailed to intercept 'B' Selected Ships' reports made to GQ on 600 metres.



APRIL

WIND FOR THE OCEAN REGION ADJACENT TO THE S.W. APPROACHES TO GREAT BRITAIN.



EXPLANATION.

The wind rose is drawn from observations within the 5° square. Arrows fly with the wind, length represents frequency, thickness strength.

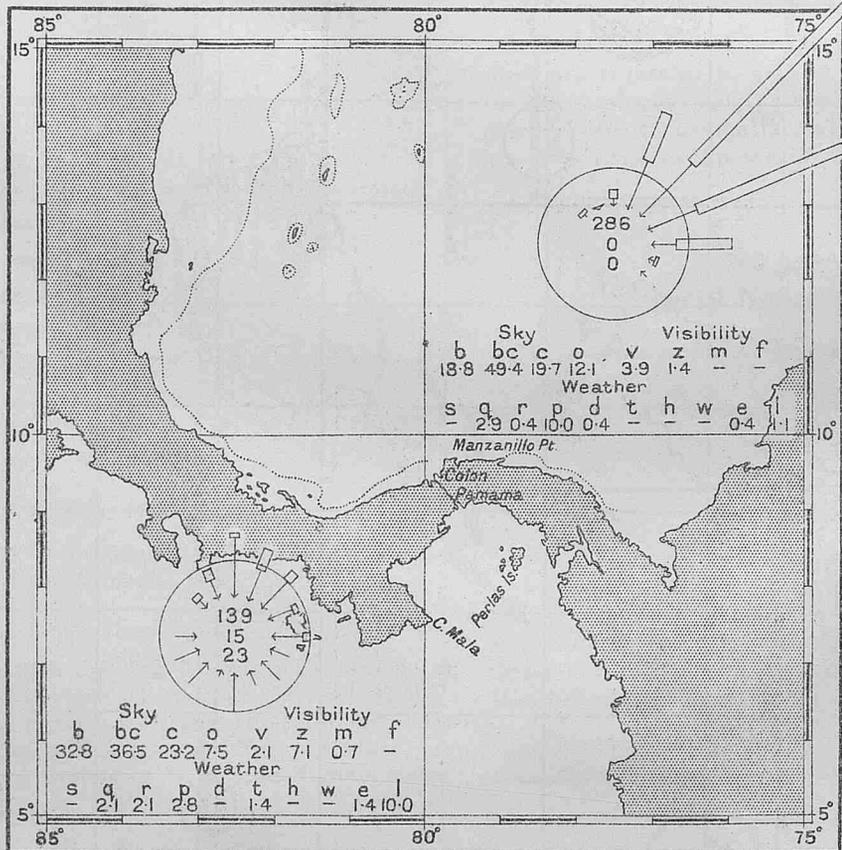
GALE	MODERATE	LIGHT
8-12	4-7	1-3

 Distance from head of arrow to circle represents 5%, Scale:-

10%	20%
-----	-----

 The upper figure in the centre of the rose gives total number of observations; the middle figure, the percentage frequency of calms; the lower figure the percentage frequency of variable winds.

WIND, FOG, MIST AND WEATHER FOR THE OCEAN REGIONS TO THE N.E. AND S.W. OF THE PANAMA CANAL.



EXPLANATION.

The wind roses are drawn from Sea observations within the 5° squares. Arrows fly with the wind, length represents frequency, thickness strength.

GALES	MODERATE	LIGHT
8-12	4-7	1-3

 Distance from head of arrow to circle represents 5%. Scale:-

10%	20%
-----	-----

 The upper figure in the centre of the rose gives total number of observations, The middle figure the percentage frequency of calms, and the lower figure the percentage frequency of variable winds. The percentage frequency of types of weather are shown in the lower half of each 5 square by the figures beneath each of the letters of the Beaufort weather notation. For example in the 5 square Latitude 5° to 10°N, Longitude 80° to 85°W, c was logged 25 times in every 100 observations while v was logged 15 times.

Compiled from observations of British Ships received since the adoption of the Hollerith system of extraction covering the years 1921-1930.

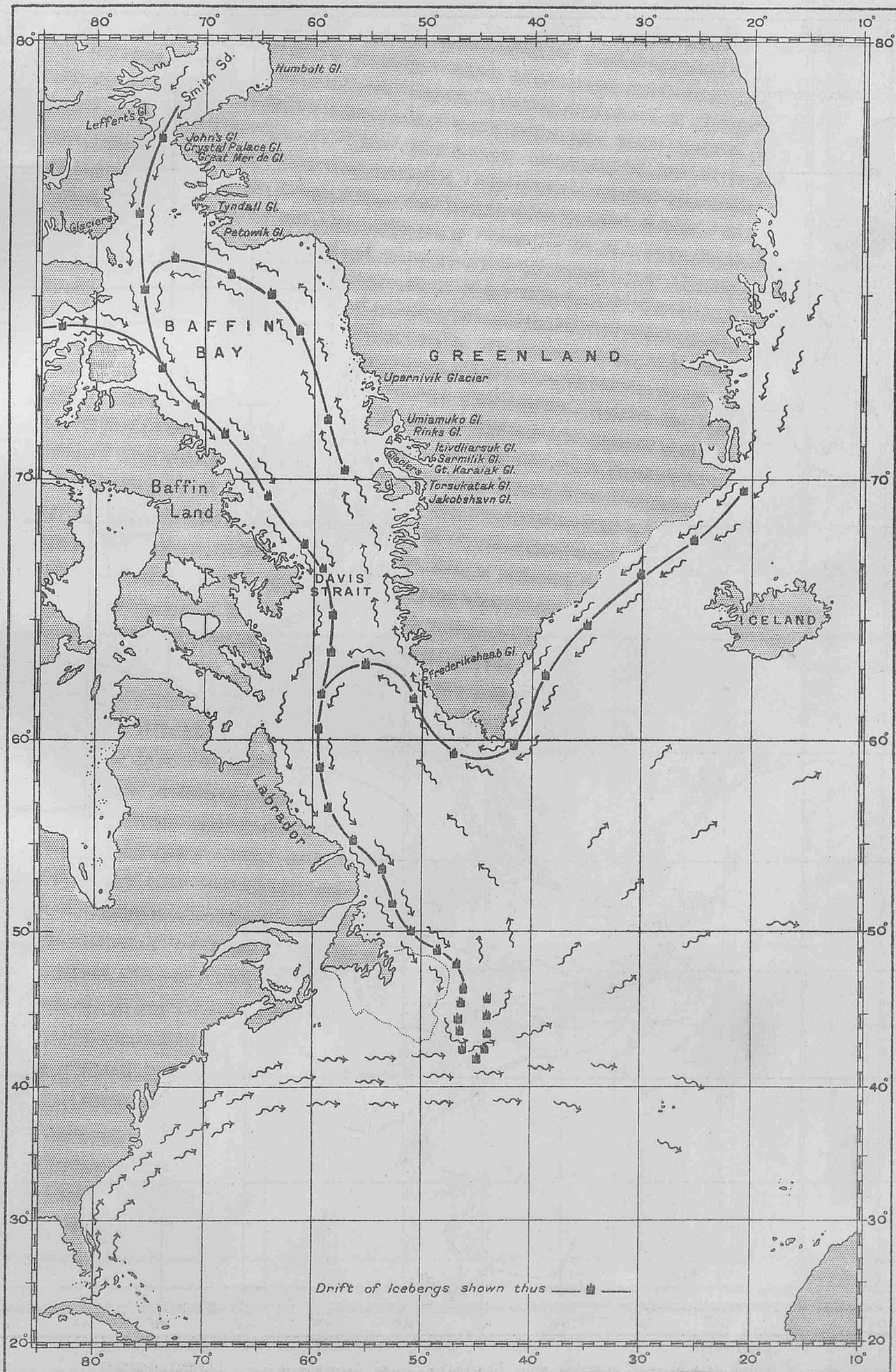


Chart A.—GENERAL DRIFT OF ICEBERGS.

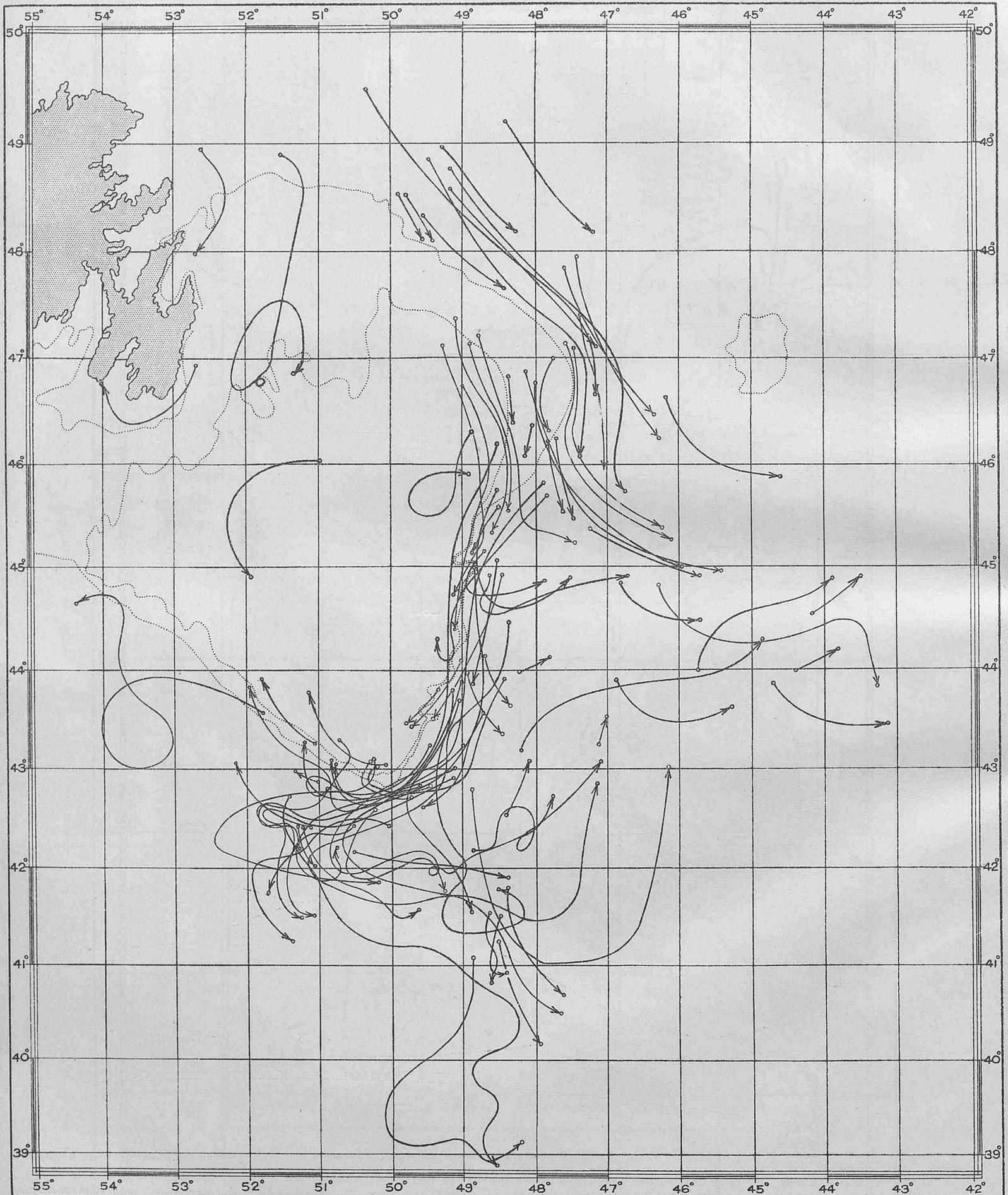


Chart B.—COMPILED DRIFTS OF ICEBERGS, 1900-1930.

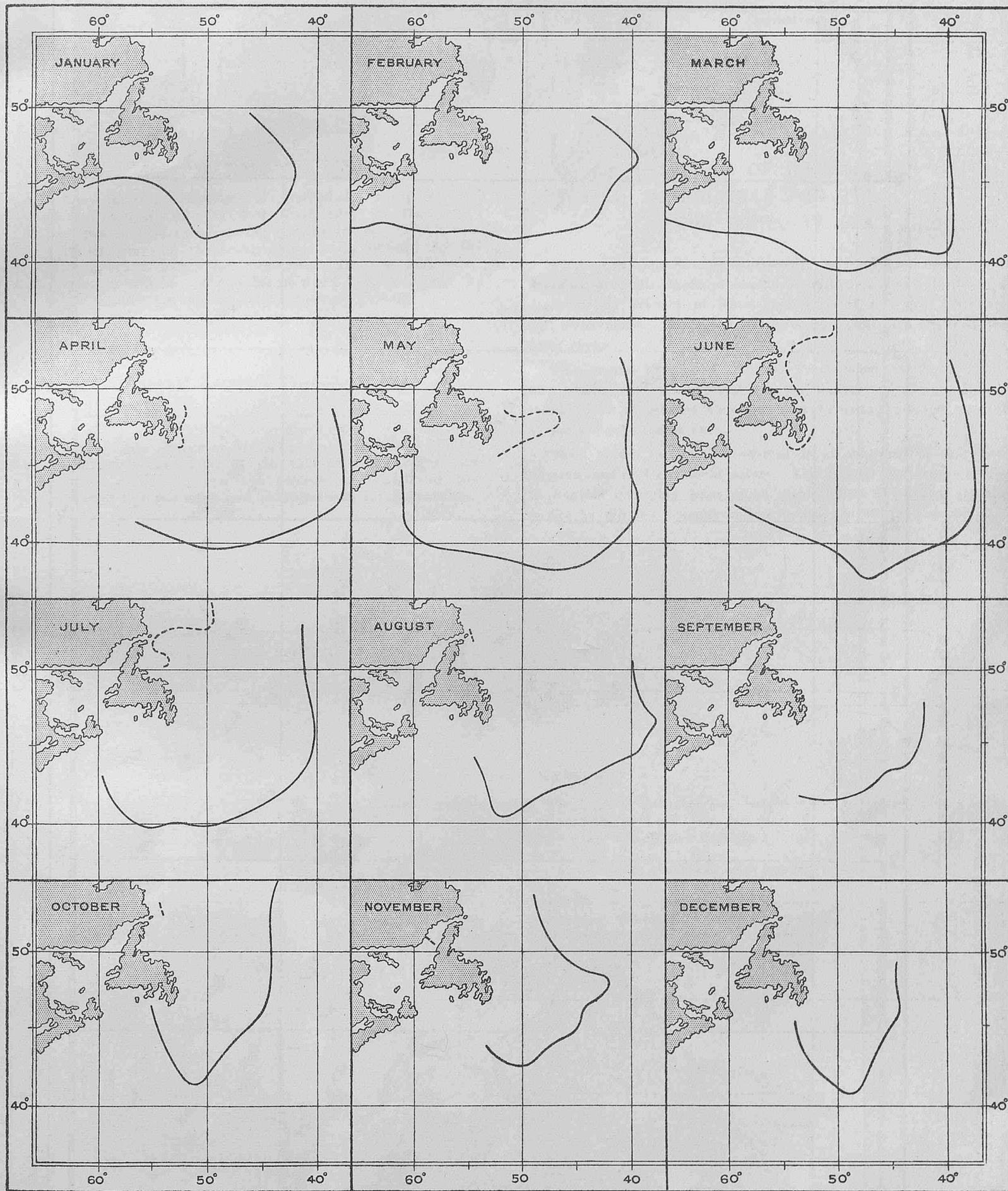


Chart C.—LIMITS OF ICE, WESTERN NORTH ATLANTIC.

Limit from 1901 to 1931 shown thus —————

Limit for 1931 shown thus - - - - -

PHENOMENAL POSITIONS OF ICE.

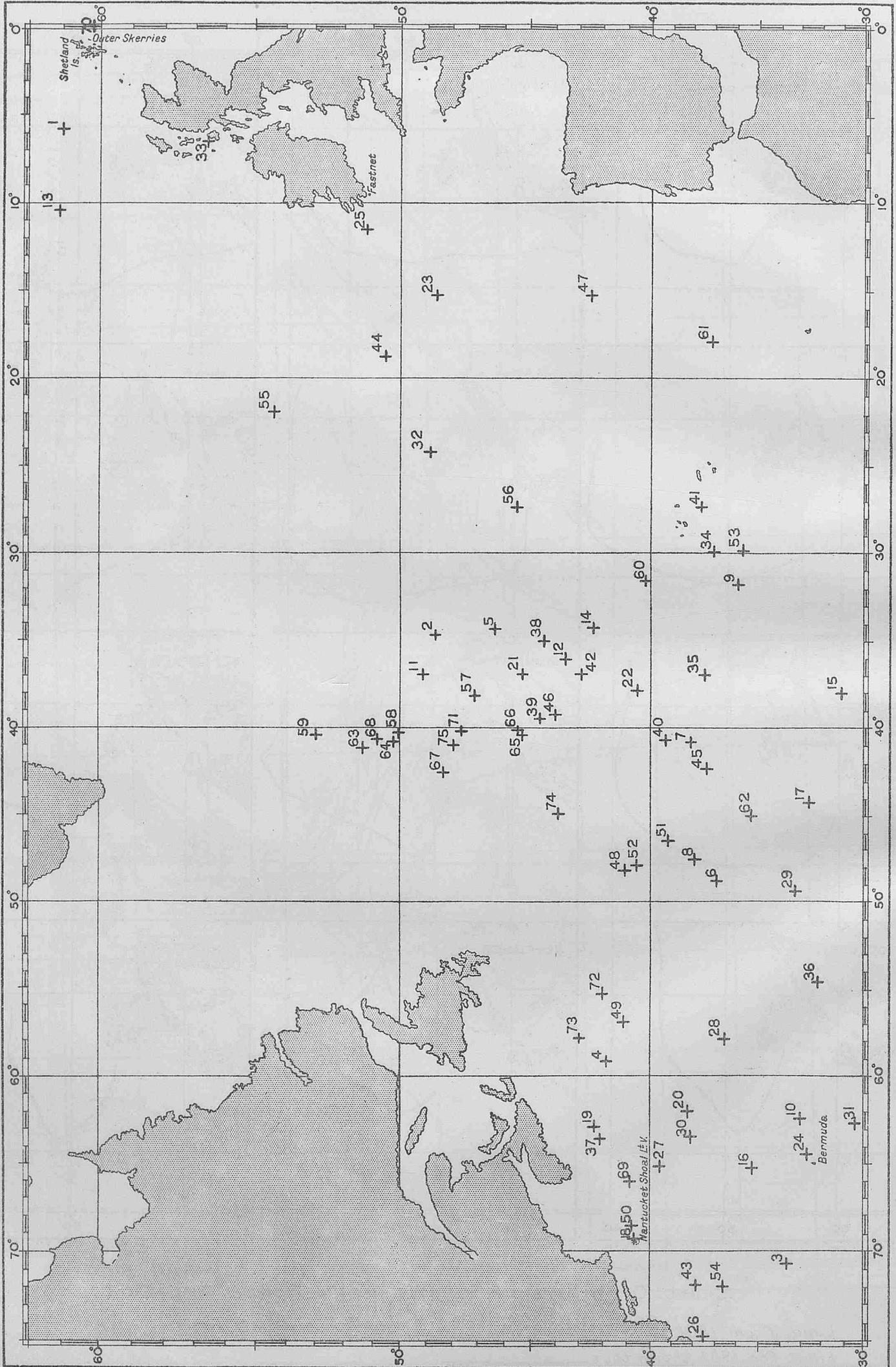


Chart D.

NOTICES.

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 Meteorological 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.

DESPATCH OF INFORMATION

REQUIRED IMMEDIATELY FOR THE CONDUCT OF THE WORK AT SEA.

Shipowners, Marine Superintendents and all concerned in the despatch of mails to Ships abroad are asked to kindly facilitate the despatch and delivery of postal matter received at their offices from the Meteorological Office and Air Ministry Publication Depot to their Ships abroad.

This matter addressed to the Commanders of Ships contains information which is required for the Conduct of Marine Meteorological Work at Sea and is most effective if received by the Commanders at the earliest possible date.

Much of the information referred to is published in the Marine Observer and is of a seasonal nature. This journal also contains advice to Regular Observing Ships which enables them to perform voluntary service by Wireless Communication for the benefit of all shipping.

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.

"Selected Ships" on the Trade Routes of the Southern Ocean are requested to add to their routine Wireless Weather reports information of floating ice seen or reported within the last 24 hours so that this information may be disseminated to the utmost advantage of all concerned.

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 11th April to 30th June, inclusive.
- (C) From 1st July to 10th April, 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 80 and 81 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.

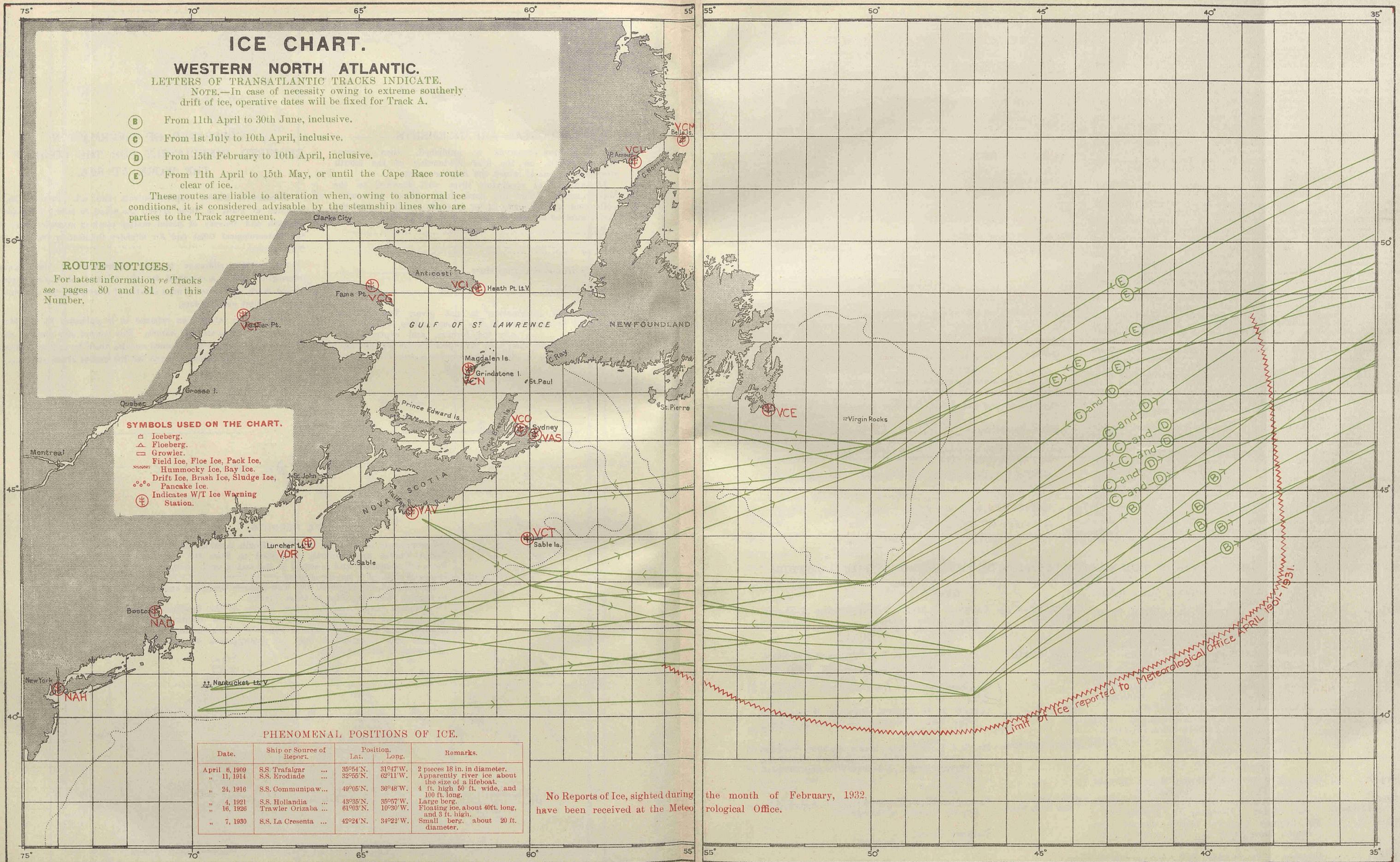
PHENOMENAL POSITIONS OF ICE.

Date.	Ship or Source of Report.	Position.		Remarks.
		Lat.	Long.	
April 6, 1900	S.S. Trafalgar ...	35°54' N.	31°47' W.	2 pieces 18 in. in diameter.
" 11, 1914	S.S. Erodiade ...	32°55' N.	62°11' W.	Apparently river ice about the size of a lifeboat.
" 24, 1916	S.S. Communipaw ...	49°05' N.	38°48' W.	4 ft. high 50 ft. wide, and 100 ft. long.
" 4, 1921	S.S. Hollandia ...	43°35' N.	35°57' W.	Large berg.
" 16, 1926	Trawler Orizaba ...	61°03' N.	10°30' W.	Floating ice, about 40ft. long, and 3 ft. high.
" 7, 1930	S.S. La Cresenta ...	42°24' N.	34°22' W.	Small berg, about 20 ft. diameter.

No Reports of Ice, sighted during the month of February, 1932.

the month of February, 1932. No Reports of Ice, sighted during the month of February, 1932. have been received at the Meteorological Office.

Limit of Ice reported to Meteorological Office APRIL 1901-1931.



CO-OPERATION OF SHIPOWNERS, MASTERS AND MATES.

Captains and officers who wish to co-operate regularly with the Meteorological Office should apply to the appropriate Port Meteorological Officers or Agents, a list of these gentlemen with addresses is given below. A general description of Marine Meteorological Work, including the particulars desired from intending Marine Observers, is given in Chapter I of THE MARINE OBSERVER'S HANDBOOK, 5TH EDITION, which may be obtained from H.M. Stationery Office direct, or through any booksellers, price 2s. 6d.

The names of vessels regularly observing for the Meteorological Office, London, together with their Commanders and Observing Officers, are given monthly in THE MARINE OBSERVER, which may be obtained from H.M. Stationery Office, price 2s. 6d., 2s. 8d. post free.

The Captains and Officers of regular observing ships constitute the Corps of Voluntary Marine Observers. For certain branches of this work tested instruments are lent to the Captains of British ships registered at ports in Great Britain. A certain number of Regular Observing ships are detailed as "Selected Ships" for the purpose of the World Wide Scheme of Routine Ships' Wireless Weather Telegraphy Reporting. These "Selected Ships" are indicated monthly in the "Fleet List" in THE MARINE OBSERVER by a number.

To decode "Selected Ships" reports the pamphlet M.O. 329, price 3d. may be obtained from H.M. Stationery Office.

Only ships registered at Ports in Great Britain will, in future, be included in the Meteorological Office, London, "Fleet List."

Marine Observers are asked to send in their Meteorological Log through the appropriate Port Meteorological Officer or Agent (accompanied by Form 138 in the case of "Selected Ships") at intervals of not more than six months. The Meteorological Record Form 911 (accompanied by Form 138 in the case of "Selected Ships") should be posted direct to the Meteorological Office, London, at the end of each voyage.

When sending in the Meteorological Log or Record, Regular Observing ships will render great assistance if they will notify the Port Meteorological Officer or Agent of their requirements.

The Port Meteorological Officers and Agents inspect official instruments at regular intervals, replacing those which are defective.

Where ships' instruments are found by comparison to be reliable they may be used for the work of "Selected Ships." A reliable mercurial barometer is essential as part of the equipment of a "Selected Ship."

A copy of THE MARINE OBSERVER is sent monthly to the Captain of every observing ship for the information and guidance of the officers doing this work. He is also supplied with THE MARINE OBSERVER'S HANDBOOK and such charts and atlases as are considered necessary as Meteorological equipment for The Work of a Regular Observing ship in a particular trade.

WIRELESS AND WEATHER AN AID TO NAVIGATION, published by H.M. Stationery Office, which affords information and guidance for the practical application of Marine Meteorology to Navigation, may be purchased through any bookseller, price 5s.

Returns made by Regular Observing ships are acknowledged monthly in THE MARINE OBSERVER, and a list of those Commanders and Officers who have performed specially fine work is published yearly in THE MARINE OBSERVER and Excellent Awards are made to them.

The work done by Regular Observing Ships in making written returns, and by "Selected Ships" in broadcasting routine information by W/T, together with "Weather Shipping" Bulletins broadcast from the shore, conforming with the recommendations of the International Convention of Safety of Life at Sea, 1929, provide the necessary information for the use of all shipping. Thus by shipowners encouraging the specialist work in those of their ships whose names appear in THE MARINE OBSERVER, this Voluntary Work under the supervision of the Meteorological Office provides a service to all shipping at minimum cost to the National funds.

Shipowners are asked to facilitate the forwarding of postal matter from the Air Ministry addressed to the Captains of their ships.

LATE PRESS.

DERELICTS AND FLOATING WRECKAGE.

Date.	Position.		Description.
	Latitude.	Longitude.	
NORTH SEA.			
19.2.32	Haisboro Lightship. S.S.E. 4 miles		Large spar 20 feet long: dangerous to navigation.
ENGLISH CHANNEL.			
14.2.32	50°12'N.	3°15'W	Red painted buoy, apparently looking like a mine.
22.2.32	11 m. E. of Owers Light Vessel.		Red conical buoy.
IRISH SEA.			
3.2.32	4 miles off South Stack bearing 194°.		Submerged wreckage. Heavy log covered with barnacles, dangerous to navigation.
4.2.32	Skerries bearing 169° distant 2½ miles.		
MEDITERRANEAN.			
13.2.32	36°35'N.	20°31'E.	Small spherical buoy or mine.
NORTH ATLANTIC.			
1.2.32	35°45'N.	74°07'W.	Gas buoy surmounted by a cage and square flag showing a flashing white light at irregular intervals.
5.2.32	49°52'N.	14°03'W.	Large conical buoy.
5.2.32	29°02'N.	79°43'W.	Derelict launch.
7.2.32	39°15'N.	9°41'W.	Iron barge 90 feet long painted light grey hull, marked on hatch cover <i>SGOC Bilbao</i> .
8.2.32	40°30'N.	71°38'W.	Wooden pile about 30 feet long, 2 feet in diameter, painted white and black with vertical stripes and marked with letter <i>A</i> .
20.2.32	51°19'N.	16°11'W.	Large spherical black buoy with staff.
GULF OF MEXICO.			
6.2.32	25°07'N.	84°11'W.	Large tree trunk about 20 feet long and 3 feet in diameter.
NORTH PACIFIC.			
8.2.32	22°10'N.	157°50'W.	Derelict motor launch awash.

NAUTICAL OFFICERS AND AGENTS OF THE MARINE DIVISION OF THE METEOROLOGICAL OFFICE,
AIR MINISTRY.

LONDON Captain L. A. BROOKE SMITH, R.D., R.N.R.,
Marine Superintendent.
Commander J. HENNESSY, R.D., R.N.R., Senior
Nautical Assistant.
Room 319, Adastral House, Kingsway, W.C.2.
(Telephone No.: Holborn 3434 Extension 421).
Nearest station Temple, District Railway.

THAMES Lieut. Commander C. H. WILLIAMS, R.N.R., Port
Meteorological Officer, P.L.A. Building, King
George V Dock (south side), London, E.16.
(Telephone No.: Albert Docks 2659. Telegraphic
Address: Barometric Aldock, London).

MERSEY Commander M. CRESSWELL, R.N.R., Port
Meteorological Officer, Dock Office, Liverpool.
(Telephone No.: Bank 8959. Telegraphic
Address: Meteorite, Liverpool).

Agents.

BELFAST Captain J. MCINTYRE, Harbour Master, Harbour
Office. (Telephone No.: Belfast 4090).

BRISTOL
CHANNEL Captain T. JOHNSTON, Technical College, Cathays
Park, Cardiff. (Telephone No.: Cardiff 6813).

CLYDE Mr. ROBERT CLEARY, Master Mariner, The
Clutha Stevedoring Co., Ltd., Princes Dock,
Glasgow. (Telephone No.: 513 Ibrox).

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

Agents (contd.).

FREMANTLE ... Captain J. J. AIREY, Deputy Director of Naviga-
W. Australia. tion, Customs House.
(Telephone No.: B 1391).

HONG KONG, Lieut. Commander G. B. R. RUDYERD-HELPMAN,
China. R.N., Superintendent, Admiralty Chart and
Chronometer Depot, H.M. Dockyard.
(Telephone No.: 108 Dockyard).

HUMBER Captain A. M. BROWN, Ellerman Wilson Line
Office, Hull. (Telephone No.: Central 2180).

SOUTHAMPTON Mr. R. I. T. MCEWAN, Master Mariner, Gilchrist
Navigation School, 5, Union Bank Chambers,
1, Bernard Street. (Telephone No.: Southampton
4277).

SYDNEY, Commander G. D. WILLIAMS, D.S.O., R.D., R.N.R.,
New South Wales. Deputy Director of Navigation.
Customs House.
(Telephone No.: B6421).

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

LIST OF VOLUNTARY OBSERVING SHIPS

FLEET LIST.

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 records received, are given with the date and description of last log, register or record 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 records 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.

Explanation of Abbreviations.

Unless otherwise stated, vessels on the following list are s.s.—M.V. indicates Motor Vessel; S.T. = Steam Trawler.

M.L. = Equipped with tested Instruments lent by the Meteorological Office for keeping Meteorological Logs.

W.T. = Equipped wholly or partly with tested Instruments lent by the Meteorological Office for reporting in code by W/T in the International Selected Ship system.

No. = No Meteorological Office instrumental equipment on board.

M = Ship's barometer *mercurial*.

A = Ship's barometer *aneroid*.

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

To indicate the nature of the wireless apparatus of Selected Ships—

†† preceding ship's name indicates fitted for long range continuous wave transmission and reception.

*† = Short range transmission and long range continuous wave reception.

** = Short range transmission and reception.

The numbers preceding the names of ships are for identification purposes, when observations are re-transmitted in synoptic messages by wireless or cable, and are not intended for use at sea.

Selected Ships.

Those ships in this list which have a number and symbols indicating W/T apparatus before their names are "Selected Ships" invited to make by W/T, reports of observations taken at arranged G.M. Times to "All Ships."

Name of Vessel	Captain.	Observing Officers.	Meteoro-logical Equipment.	Line.	Last Log, Register, or Record Contributed. Received up to 12.2.32.	Date Received.
122 †† <i>Accra</i> , M.V.	Shooter, J. C.	R. B. Ellis, E. Arber	W.T.-M.	Elder Dempster	Forms 911 & 138 16.12.31 to 24.1.32	29.1.32
155 *† <i>Achilles</i>	Cosker, W.	C. Broad, J. Simpson	M.L.	A. Holt	Form 915 5.9.31 to 19.1.32	23.1.32
055 *† <i>Actor</i>	Whyte, D. L.	G. Penston, E. Pearce, P. Harrow.	No. M.	Harrison	Forms 911 & 138 26.2.31 to 1.5.31	21.5.31
123 †† <i>Adda</i> , M.V.	Lawson, J. H.	J. Boyd, F. C. Langton	W.T.-M.	Elder Dempster	" " 31.12.31 to 5.2.32	11.2.32
050 †† <i>Adriatic</i>	Freeman, C. P., R.D., Commr., R.N.R.	G. Steele, G. Walters, A. Cherry,	W.T.	White Star	" " 4.1.32 to 23.1.32	27.1.32
090 *† <i>Aeneas</i>	Wallace, W. K.	T. Robb, H. D. Rudd, P. Dunsire.	"	A. Holt	Form 911 13.5.31 to 19.6.31	20.6.31
166 *† <i>Agamemnon</i>	Beswick, W., D.S.C., Commr., R.N.R.	W. K. Hole, W. G. Harrison, O. Thomas.	"	"	Forms 911 & 138 1.1.32 to 15.1.32	8.2.32
127 *† <i>Albion Star</i>	Hall, J. B.	T. Gilchrist	No. M.	Blue Star	Form 911 8.7.31 to 29.10.31	25.11.31
080 †† <i>Alcantara</i> , M.V.	Clarke, E., R.D., Commr., R.N.R.	W. W. Dovell	W.T.	R.M.S.P.	Forms 911 & 138 20.11.31 to 5.1.32	18.1.32
178 *† <i>Alipore</i>	Lyndon, E. P., R.D., Lt.-Commr., R.N.R.	J. P. McArthur	No. M.	P. & O.	Form 911 24.12.31 to 3.1.32	1.2.32
175 †† <i>Almanzora</i>	Hannam, F. S.	G. W. Martin, F. J. Bett, J. G. Scott.	W.T.	R.M.S.P.	" 30.10.31 to 15.12.31	16.12.31
012 †† <i>Almeda Star</i>	Turner Russell, W.	H. Metcalf, E. Russell, C. L. Williams.	No. M.	Blue Star	Forms 911 & 138 16.11.31 to 30.12.31	5.1.32
<i>Alondra</i>	Scott, L. S.	E. W. Thomas, P. Hamilton.	" A.	Yeoward	Form 911 10.1.32 to 31.1.32	3.2.32
<i>Alynbank</i>	Robertson, J.	A. Hunter	" A.	A. Weir & Co.	" 25.11.31 to 11.1.32	1.2.32
103 †† <i>Andaluucia Star</i>	Vernon, R.	W. Gunning, P. Clarke, A. Holland.	" M.	Blue Star	Forms 911 & 138 2.11.31 to 15.12.31	23.12.31
<i>Antiloehus</i>	Dougall, W. T.	C. F. Lock	" A.	A. Holt	Form 911 2.11.31 to 7.12.31	4.1.32
209 †† <i>Aorangi</i> , M.V.	Spring-Brown, J. F.	E. Anderson, D. H. Richards, J. S. Madden.	M.L.	Canadian-Australasian	" 915 23.7.31 to 5.11.31	7.1.32
120 †† <i>Apapa</i> , M.V.	Beith, A.	V. Feeney, V. H. Thomas	W.T.-M.	Elder Dempster	Forms 911 & 138 19.11.31 to 28.12.31	31.12.31
029 †† <i>Appam</i>	Draper, J. M.	W. M. M. Hutchings, C. V. Evans, H. O. Forster.	W.T.	"	" 2.12.31 to 13.1.32	15.1.32
017 †† <i>Aquitania</i>	Irving, R. B., O.B.E., R.D., A.D.C., Capt., R.N.R.	B. Toynce, G. F. Jeffries, D. M. Maclean.	"	Cunard	" 18.12.31 to 1.1.32	4.1.32
<i>Araby</i>	Lee, J., D.S.C.	H. Haigh	No. A.	MacIver	Form 911 28.9.31 to 10.12.31	14.12.31
115 †† <i>Arandora Star</i>	Moulton, E. W.	H. F. Partridge, F. Graham	" M.	Blue Star	Forms 911 & 138 19.12.31 to 7.1.32	8.1.32
<i>Architect</i>	Mowat, I.	G. Dewar	" M.	Harrison	" 2.8.31 to 29.10.31	16.11.31
293 *† <i>Ariguani</i>	Scudamore, J. H. H., D.S.C., R.D., Commr., R.N.R.	B. E. Druce, A. F. Moss, J. S. Bell.	W.T.	Elders & Fyffes	Form 915 7.9.31 to 28.1.32	9.2.32
144 †† <i>Arlanza</i>	Huff, G. F.	S. A. Gammon, H. V. Todd, W. J. Wraake.	"	R.M.S.P.	Forms 911 & 138 19.12.31 to 1.2.32	3.2.32
091 †† <i>Armadae Castle</i>	Harvey, H. B.	W. Pace, A. H. Parry	"	Union Castle	" 14.11.31 to 2.1.32	5.1.32
296 *† <i>Arracan</i>	Thomson, S.	G. Davidson, H. H. Brown, J. P. Anderson.	M.L.	P. Henderson	Form 915 5.9.31 to 15.11.31	14.12.31
<i>Arundel</i>	Shaw, B.	E. Hill	C.C.	Southern Rly.	Telegraphic Report 5.2.32	5.2.32
095 †† <i>Arundel Castle</i>	Stuart, C. E., R.D., Capt., R.N.R.	G. L. Clarke, H. Baty	W.T.	Union Castle	Forms 911 & 138 22.11.31 to 10.1.32	22.1.32

THE MARINE OBSERVER

Name of Vessel.	Captain.	Observing Officers.	Meteoro-logical Equipment.	Line.	Last Log. Register, or Record Contributed. Received up to 12.2.32.	Date Received.
280 *† <i>Astronomer</i> ...	Richards, J. ...	W. P. Baker, R. Williams, E. B. Stephens.	No. M.	Harrison ...	Forms 911 & 138 5.7.31 to 7.10.31	13.10.31
065 †† <i>Asturias</i> M.V. ...	LeBrecht, H. A. ...	H. G. Whittle, S. J. Hill, T. W. Stevens.	W.T.	R.M.S.P. Co. ...	" " 10.10.31 to 23.11.31	25.11.31
281 *† <i>Atrous</i> ...	Wilcox, J. H. ...	E. A. H. Gepp ...	No. A	A. Holt ...	Form 911 7.6.31 to 21.9.31 ...	5.10.31
212 *† <i>Auditor</i> ...	Owen, W. T. ...	L. Richardson ...	" M.	Harrison ...	Forms 911 & 138 2.8.30 to 29.9.31 ...	14.10.31
212 *† <i>Australia</i> ...	Scutt, W. ...	H. Falkiner, E. H. Lidstone, L. Smith.	" M.	British India ...	Form 915 5.9.31 to 19.1.32 ...	3.2.32
124 †† <i>Avila Star</i> ...	Thomas, R. J. ...	W. J. Stratta, C. Barratt, R. C. Freaker.	" M.	Blue Star ...	Forms 911 & 138 7.12.31 to 20.1.32	25.1.32
068 †† <i>Balmoral Castle</i> ...	Barron, A. ...	J. C. Brown, A. G. C. Price, G. F. Oakley	W.T.	Union Castle ...	Forms 911 & 138 19.12.31 to 7.2.32	9.2.32
179 *† <i>Balranald</i> ...	Short, C. E. ...	J. A. Stewart, P. Mallett, C. S. Pine.	No. M.	P. & O. Branch ...	" " 10.12.31 to 1.1.32	13.1.32
051 †† <i>Baltic</i> ...	Hume, R. ...	...	W.T.	White Star ...	" " 18.1.32 to 7.2.32	9.2.32
248 *† <i>Banffshire</i> ...	Page, W. J. ...	A. Banks, F. Westacott ...	No. M.	Turnbull Martin ...	" " 8.8.31 to 28.10.31 ...	12.1.31
180 *† <i>Baradine</i> ...	Elliot Smith, H. ...	C. F. Halliday, J. Mann, G. L. Farnfield.	" M.	P. & O. Branch ...	Form 915 1.8.31 to 4.11.31 ...	9.11.31
037 *† <i>Baronesa</i> ...	Compton, R. W. ...	H. N. Sherwell, F. W. Kent, J. G. Freeman.	" M.	Houlder ...	Forms 911 & 138 16.11.31 to 15.1.32	20.1.32
213 *† <i>Barpeta</i> ...	Partridge, H. ...	J. H. Pool, A. J. Baillie, D. Clundison.	" M.	British India ...	" " 2.12.31 to 1.1.32	25.1.32
181 *† <i>Barrabool</i> ...	Sheepwash, J. S. ...	F. N. Mosey, G. Hussey, J. Jones.	" M.	P. & O. Branch ...	" " 12.9.31 to 18.12.31	29.12.31
070 †† <i>Bayano</i> ...	Legge, A. W. ...	G. Milne ...	W.T.	Elders & Fyffes ...	Form 911 1.12.31 to 4.1.32 ...	11.1.32
059 †† <i>Beaverburn</i> ...	Landy, E. ...	...	M.L.	Canadian Pacific ...	" " " " " " " " " " " "	" " " " " " " " " " " "
059 †† <i>Belgenland</i> ...	Morehouse, W. A. ...	F. Good, J. Mackie, J. R. Loe.	W.T.	Red Star ...	Forms 911 & 138 3.11.31 to 21.11.31	24.11.31
183 †† <i>Bendigo</i> ...	Wyatt, F. N. ...	H. Morgan, R. S. Frost, G. C. Forrest.	No. M.	P. & O. Branch ...	" " 8.11.31 to 7.12.31	4.1.32
237 †† <i>Bengora Head</i> ...	Milligan, J. ...	C. J. Res ...	" A.	Ulster S.S. Co. ...	Form 911 22.11.31 to 27.11.31 ...	1.12.31
237 †† <i>Berengaria</i> ...	Britten, E. T., R.D., Commr., R.N.R.	J. A. Crossdale, D. M. Maclean, E. A. Drivers.	W.T.	Cunard ...	Forms 911 & 138 8.1.32 to 21.1.32	22.1.32
145 *† <i>Berwickshire</i> ...	Evens, E. H. ...	E. Coulthart, J. O. Woodall, R. Frankish.	"	Turnbull Martin ...	" " 22.10.31 to 22.1.32	28.1.32
057 †† <i>Britannic</i> M.V. ...	Summers, F. F. R.D., Commr., R.N.R.	G. N. Jones, H. P. Grindrood, A. J. Fisher.	W.T.	White Star ...	" " 14.12.31 to 20.12.31	4.1.32
269 *† <i>British Admiral</i> ...	Putt, R. O. ...	H. J. Were, W. Barnsfield ...	No. M.	British Tankers ...	" " 2.1.32 to 28.1.32	8.2.32
283 *† <i>British Dominion</i> ...	Taylor, R. J. ...	J. E. Jones, F. Hall, C. Leach.	" M.	" " ...	" " 10.11.31 to 2.2.32	11.2.32
266 *† <i>British Lantern</i> ...	Penton, P. M. ...	T. Snowling, L. Hambling, D. Malcolm.	" M.	" " ...	" " 31.12.31 to 13.1.32	29.1.32
249 *† <i>Buteshire</i> ...	Gibb, A. W. P. ...	P. McMillan, S. W. Brown, F. C. Doyle.	M.L.	Turnbull Martin ...	Form 915 22.10.30 to 3.3.31 ...	29.12.31
031 †† <i>Caledonia</i> ...	Collie, A. ...	R. Blake, J. Green, R. Macfee	W.T.	Anchor ...	Forms 911 & 138 13.12.31 to 22.12.31	4.1.32
139 †† <i>California</i> ...	Smart, R. W. ...	D. Morrison, A. C. Johnston, J. F. Adams.	"	" " ...	" " 22.6.31 to 6.12.31	10.12.31
180 *† <i>Cambria</i> ...	Copland, C. P. ...	O. W. Ll. Jones ...	C.C.	L.M. & S. Rly. ...	Telegraphic Report 26.12.31 ...	26.12.31
295 *† <i>Camito</i> ...	Williams, R. ...	T. Farrar ...	M.L.	Federal ...	Form 911 17.7.31 to 10.11.31 ...	23.11.31
282 †† <i>Cape of Good Hope</i> ...	Forrester, W. T., O.B.E.	C.P. Hopper, H. J. Perrett, W. Ireland.	"	Elders & Fyffes ...	Form 915 24.6.31 to 18.10.31 ...	23.10.31
092 †† <i>Carinathia</i> ...	Jacobson, T. A. ...	W. R. Carling ...	No. A.	Lyle S.S. Co. ...	Form 911 3.11.31 to 26.11.31 ...	31.12.31
273 *† <i>Carnarvonshire</i> ...	Townley, J. C., R.D., Capt., R.N.R.	J. Chapman, A. B. Fasting, G. S. Hutchinson.	W.T.	Cunard ...	Forms 911 & 138 12.10.31 to 17.10.31	3.11.31
184 †† <i>Cathay</i> ...	Morton Betts, W. ...	G. F. Pettitt, E. Clancy ...	"	Union Castle ...	" " 25.10.31 to 13.12.31	15.12.31
157 *† <i>Cavina</i> ...	Gulston, H. S. ...	S. W. Spencer ...	No. M.	Glen ...	" " 4.10.31 to 3.11.31	9.11.31
056 †† <i>Ceramic</i> ...	Daziell, Riven, J. ...	A. J. McHattie ...	" M.	P. & O. ...	" " 28.11.31 to 28.1.32	1.2.32
184 †† <i>Cerinthus</i> M.V. ...	Forrester, W. T. ...	B. R. Coe ...	" A.	Elders & Fyffes ...	Form 911 15.1.31 to 17.1.32 ...	20.1.32
157 *† <i>Changinola</i> ...	Ward Hughes, J. ...	B. L. Brind, D. R. Bannerman, F. Widdows.	M.L.	A. Holt & Co. ...	Form 915 28.1.31 to 16.11.31 ...	28.12.31
061 †† <i>Chindwin</i> ...	Lloyd, W. ...	A. Waters ...	W.T.	White Star ...	Forms 911 & 138 16.11.31 to 12.12.31	18.12.31
061 †† <i>Chinese Prince</i> ...	Ramsay, N. ...	E. Allen, C. L. Seaman, G. B. Williams.	M.L.	Hadley Shipping ...	Form 915 19.10.31 to 5.2.32 ...	9.2.32
061 †† <i>Chitripo</i> ...	Bostock, R. J. ...	O. H. Pulman ...	No. A.	Elders & Fyffes ...	Form 911 12.10.31 to 23.10.31 ...	27.10.31
192 †† <i>Chitral</i> ...	Paterson, G. ...	J. A. Wilson ...	" A.	Henderson ...	" " 29.8.31 to 11.11.31 ...	1.12.31
265 *† <i>City of Baroda</i> ...	Uncles, H. ...	...	M.L.	Furness Withy ...	" " " " " " " " " " " "	" " " " " " " " " " " "
061 †† <i>City of Cambridge</i> ...	Carden, H. ...	S. Waddington, C. E. Gardiner.	No. A.	Elders & Fyffes ...	" " 1.12.31 to 2.1.32 ...	8.1.32
061 †† <i>City of Exeter</i> ...	Siggers, O. ...	T. D. Forbes, P. Maloney, E. J. Berryman.	" M.	P. & O. ...	Forms 911 & 138 10.12.31 to 31.1.32	1.2.32
274 *† <i>City of Harvard</i> ...	Bremner, D. M. ...	H. G. Williams, E. Bonfield, R. W. Leese.	W.T.	Ellerman ...	Form 915 22.11.31 to 29.1.32 ...	8.2.32
089 *† <i>City of Hereford</i> ...	Ewing, W. ...	H. H. Asher ...	No. A.	" " ...	Form 911 5.12.31 to 12.1.32 ...	25.1.32
026 †† <i>City of London</i> ...	Mordue, J. A. ...	...	" A.	" " ...	" " 1.12.31 to 3.1.32 ...	5.1.32
026 †† <i>City of Nagpur</i> ...	Nichol, L. ...	H. Burns, J. Fyfe, W. V. Mighton.	W.T.	" " ...	Forms 911 & 138 30.10.31 to 1.1.32	9.1.32
300 †† <i>City of Paris</i> ...	MacMillan, J. ...	F. Deighton, E. Brook-Williams, S. W. Dutton.	"	" " ...	Form 915 15.8.31 to 5.12.31 ...	16.12.31
271 *† <i>City of Roubaix</i> ...	Ricketts, R. J. ...	F. Tibbets, J. H. T. Vizer ...	No. M.	" " ...	Forms 911 & 138 15.11.31 to 2.12.31	12.12.31
272 *† <i>City of Singapore</i> ...	Brown, J. G. ...	A. J. Barnett, E. Gillies, C. MacPherson.	W.T.	" " ...	" " 2.12.31 to 20.12.31	22.12.31
035 *† <i>City of Sydney</i> ...	McNiel, N. ...	J. W. Wotherspoon, J. Campbell, W. Kerr.	"	" " ...	" " 27.9.31 to 18.10.31	21.12.31
027 *† <i>Clan Alpine</i> ...	McMillan, J. ...	J. Cook, E. A. Davidson, W. Charlton.	"	" " ...	" " 11.10.31 to 1.11.31	4.1.32
027 *† <i>Clan Keith</i> ...	Radcliffe, A. V., R.D., Lt.-Commr., R.N.R.	L. C. Davies, J. L. Robertson, A. N. G. Jones	No. M.	" " ...	Form 138 15.10.31 to 31.12.31 ...	4.1.32
027 *† <i>Clan Macalister</i> ...	Kendall, J. W. ...	F. Wrigley, C. C. Collard ...	" M.	" " ...	Forms 911 & 138 12.8.31 to 22.11.31	19.12.31
027 *† <i>Clan Macalister</i> ...	Mason, E. ...	C. H. S. Wills, C. S. Humphries, H. G. Griffith.	" M.	" " ...	" " 10.12.31 to 4.2.32	8.2.32
027 *† <i>Clan Macalister</i> ...	Young, A. H., R.D., Commr., R.N.R.	A. G. M. Watkins ...	" A.	Clan ...	Form 911 19.12.31 to 8.1.32 ...	29.1.32
027 *† <i>Clan Macalister</i> ...	Waterhouse, J. ...	W. N. Todman, A. H. Black, D. W. Gibbons.	W.T.	" " ...	Forms 911 & 138 5.12.31 to 22.12.31	1.2.32
027 *† <i>Clan Macalister</i> ...	Stenson, F. J., A.D.C., R.D., Capt., R.N.R.	J. L. Jones ...	" A.	" " ...	" " 17.10.31 to 6.1.32 ...	11.1.32

LIST OF VOLUNTARY OBSERVING SHIPS

Name of Vessel.	Captain.	Observing Officers.	Meteoro-logical Equipment.	Line.	Last Log, Register, or Record Contributed. Received up to 12.2.32.	Date Received.
<i>Clan Macbeth</i> ...	Giles, H. J., R.D. R.N.R.	I. Cape Scott, L. W. Gibbons.	No. A.	Clan	Form 911 29.11.31 to 22.12.31 ...	30.12.31
<i>Clan Macfarlane</i> ...	Redford, L. F., Lt.- Commr. R.N.R.	W. H. Simpson	" A.	"	21.7.31 to 17.10.31 ...	19.10.31
<i>Clan Macindoe</i> ...	Scott-Smith, H. E. G. O.B.E., R.D., Lt.- Commr. R.N.R.	J. C. Dunphy	" A.	"	" 14.11.31 to 7.12.31 ...	11.1.32
33 *† <i>Clan Mackellar</i> ...	Lyall, A. B.	A. V. Howard, G. S. Bullock, L. B. Sparkes.	W.T.	"	Form 915 25.5.31 to 26.10.31 ...	9.11.31
001 *† <i>Clan Macphee</i> ...	Gibb, A. W. P.	E. H. Stone, G. Drake S. M. W. Easterbrook.	"	"	" 911 19.12.31 to 15.1.32 ...	2.2.32
004 *† <i>Clan MacNair</i> ...	Holman, W. G.	F. H. Petheridge, A. Wood- row, J. P. Vooght.	"	"	Forms 911 & 138 18.7.31 to 20.10.31	21.10.31
002 *† <i>Clan Macwhirter</i> ...	O'Bryne, C. E.	M. J. Lewis, H. Whitehead, C. Rodger.	"	"	Form 915 11.6.31 to 30.10.31 ...	7.11.31
003 *† <i>Clan Malcolm</i> ...	George, L. S.	A. Lynch, H. Hind, R. W. Cook.	"	"	" 27.8.31 to 6.1.32 ...	14.1.32
<i>Clan Morrison</i> ...	Porterfield, W. M., Lt.- Commr. R.N.R.	H. W. Peletier, W. Leck, A. G. Beynon.	No. A.	"	Form 911 25.1.32 to 3.2.32 ...	12.2.32
<i>Clan Ramald</i> ...	Hawley, F. J.	H. C. Carter	" A.	"	" 30.12.31 to 9.1.32 ...	19.1.32
<i>Clan Sinclair</i> ...	Cater, H.	D. Mc Allister	" A.	"	" 17.11.31 to 5.12.31 ...	21.12.31
<i>Colonial</i> ...	Baird, W.	W. Moore, A. P. Brown, A. Smart.	" M.	Harrison	" 16.10.31 to 16.11.31 ...	20.11.31
298 *† <i>Comedian</i> ...	Cadogan, A.	F. M. Eales, W. G. Ellis ...	" M.	"	" 22.10.31 to 17.12.31 ...	22.12.31
185 *† <i>Comort</i> ...	Cartwright, C. W., D.S.C.	R. E. Tucker	" M.	P. & O.	" 21.11.31 to 14.12.31 ...	18.1.32
198 *† <i>Contractor</i> ...	Owen, W. J.	W. G. Neill, I. Siddon, B. Myles	" M.	Harrison	Forms 911 & 138 28.11.31 to 12.12.31	1.1.32
049 *† <i>Coptic</i> , M.V.	Williams, G.	J. G. James, P. Saville, W. Burt.	W.T.	Shaw, Savill & Albion	" 26.11.31 to 27.12.31	1.1.32
100 *† <i>Cornwall</i> ...	Reilly, H. E.	H. Hopkins, C. Saul, ... R. S. Miller.	M.L.	Federal	Form 915 16.8.31 to 12.12.31 ...	27.1.32
006 *† <i>Coronado</i> ...	Thorburn, R. A.	J. Bell, H. Holmes, T. G. Roberts.	W.T.	Elders & Fyffes ...	Forms 911 & 138 6.1.32 to 5.2.32 ...	8.2.32
214 *† <i>Counsellor</i> ...	Jackson, J.	G. C. Heaton, J. Davidson, J. L. Curle.	No. M.	Harrison	" 26.9.31 to 12.11.31	27.11.31
301 *† <i>Culebra</i> ...	Goble, C. J.	H. D. Hooper, T. Davies, H. A. Wright.	M.L.	R.M.S.P. Co.	Form 915 11.5.31 to 29.9.31 ...	14.10.31
036 *† <i>Cumberland</i> ...	Maltby, T. L.	W. H. Corlett, J. L. Williams, J. Glen.	No. M.	Federal Harrison	Forms 911 & 138 30.7.31 to 1.11.31	9.11.31
302 *† <i>Dakar</i> ...	Brown, W.	A. A. Johnson	No. A.	Leyland	Form 911 15.1.32 to 26.1.32 ...	12.2.32
<i>Darvo</i> ...	Green, J.	A. J. Barff	W.T.-M.	R.M.S.P. Co.	Forms 911 & 138 29.10.31 to 13.12.31	22.12.31
<i>Davitsian</i> ...	Thomas, R.	W. Edington, L. T. Peterson	No. A.	Leyland	Form 911 15.1.30 to 1.1.32 ...	15.1.32
303 *† <i>Demerara</i> ...	Matthews, G. P.	A. W. Hanchett, J. H. Stoker, S. Pollock.	W.T.-M. M.L.	R.M.S.P. Co. Booth	Forms 911 & 138 27.9.31 to 19.11.31 Form 915 14.11.31 to 21.1.32 ...	24.11.31 26.1.32
304 *† <i>Deseado</i> ...	Buret, J. F. C.	T. Jeyes	W.T.-M.	R.M.S.P. Co.	Forms 911 & 138 8.11.31 to 31.12.31	4.1.32
117 *† <i>Desna</i> ...	Schlanbusch, O. V. ...	H. Lang, W. Lowe, L. T. Peterson.	"	"	" 7.12.31 to 28.1.32	2.2.32
252 *† <i>Devon</i> ...	Clarke, P. B.	G. Chaplin, J. D. Marks, M. Willinott.	No. M.	Federal	" 17.12.31 to 24.1.32	2.2.32
<i>Dieppe</i> ...	Lidbetter, W.	E. A. Biles	C.C.	Southern Railway ...	Telegraphic Report 11.2.32 ...	11.2.32
284 *† <i>Director</i> ...	Worthington, B.	M. G. O'Brien, A. E. Rogers, H. W. Jones.	No. M.	Harrison	Forms 911 & 138 15.9.31 to 30.11.31	15.12.31
138 *† <i>Discovery II</i> , R.R.S	Carey, W. M., Commr., R.N.	R. A. B. Ardley, A. L. Nelson, L. C. Hill.	M.L.	Falkland Is. Govt. ...	Form 915 31.3.31 to 31.5.31 ...	30.9.31
<i>Dorellan</i> ...	Hugan, C.	A. F. Wood	No. A.	Leyland	Form 911 23.11.31 to 26.1.32 ...	5.2.32
136 *† <i>Dorie Star</i> ...	Mills, D. H.	L. Vernon, H. Butt, J. McLean	No. M.	Blue Star	" 2.11.31 to 25.1.32 ...	11.2.32
275 *† <i>Dramatist</i> ...	Meek, A. J.	G. H. Howard, I. W. Page, R. Bryde.	" M.	Harrison	Forms 911 & 138 29.11.31 to 22.12.31	1.1.32
142 *† <i>Duchess of Atholl</i> ...	McQueen, D. S.	G. Mowatt, C. D. Watt, E. Glennie.	W.T.-M.	Canadian Pacific	" 7.1.32 to 11.1.32 ...	29.1.32
152 *† <i>Duchess of Bedford</i> ...	Sibbons, H.	J. Roche, A. Antrobus, F. Stell.	"	" " " " ...	" 29.11.31 to 18.12.31	24.12.31
151 *† <i>Duchess of Richmond</i> ...	Freer, A., Capt. R.N.R.	W. A. Stanley	"	" " " " ...	" 6.12.31 to 22.12.31	31.12.31
143 *† <i>Duchess of York</i> ...	Stuart, R. N., V.C. D.S.O., Commr., R.N.R.	D. Parsons, J. B. Saunders ...	"	" " " " ...	" 25.12.31 to 15.1.32	21.1.32
098 *† <i>Dunbar Castle</i> , M.V	Vincent, E. S., R.D. Commr., R.N.R.	J. Daziel	W.T.	Union Castle	" 11.12.31 to 30.12.31	19.1.32
<i>Dunrobin</i> ...	Ramsay, J. D.	W. R. Holt, J. Y. Butt ...	No. A.	Glen & Co.	Form 911 12.11.31 to 2.1.32 ...	14.1.32
052 *† <i>Dunster Grange</i> ...	Wilson, G. F.	J. Allerton, E. G. Raynor, D. Murray.	" M.	Houlder	Forms 911 & 138 11.10.31 to 15.12.31	18.12.31
102 *† <i>Duquesa</i> ...	Frost, C. R.	R. Rushton, C. W. Denman, F. D. Jones.	" M.	Furness Withy	" 30.11.31 to 28.1.32	2.2.32
15 *† <i>Durenda</i> , M.V.	Blencowe, J.	C. E. Pugh	" M.	British India	" 30.8.31 to 27.10.31	24.11.31
077 *† <i>Edinburgh Castle</i> ...	Gilbert, E. F.	L. H. Farrow	W.T.	Union Castle	Forms 911 & 138 30.10.31 to 19.12.31	30.12.31
107 *† <i>El Argentino</i> , M.V.	Ellis, F., D.S.C.	W. Findlay, J. Burch, C. G. Adlard.	No. M.	Houlder	" 18.8.31 to 20.10.31	9.11.31
009 *† <i>Elmworth</i> , M.V. ...	Dick, J.	J. M. Whyte	" M.	R. S. Dalgleish	Form 911 3.9.31 to 23.9.31 ...	9.10.31
158 *† <i>Elpenor</i> ...	Wilson, R. J.	J. Macfarlane, F. Vose, F. Scott.	W.T.	A. Holt	Form 915 23.8.31 to 3.1.32 ...	11.1.32
108 *† <i>Elstree Grange</i> ...	Williams, W. E.	P. A. Hawkesworth, E. W. Ekins.	No. M.	Houlder	Forms 911 & 138 9.9.31 to 2.12.31	9.1.32
109 *† <i>El Paraguayo</i> ...	Owen, R.	G. Fletcher, R. L. Aldridge ...	" M.	"	" 13.12.31 to 5.2.32	12.2.32
110 *† <i>El Uruguayo</i> ...	McNamara, T.	F. E. Hailstone	" M.	"	" 2.11.31 to 5.1.32	13.1.32
088 *† <i>Empire Star</i> ...	Owen, G., R.D., Lt.- Commr., R.N.R.	R. Thorne, R. McKraith, P. H. Hunt.	M.L.	Blue Star	Form 915 31.8.31 to 3.1.32 ...	30.1.32
006 *† <i>Empress of Australia</i> ...	Griffiths, E.	A. Tippet, A. H. Pigott, R. Newsom.	W.T.	Canadian Pacific	Forms 911 & 138 23.12.31 to 10.1.32	8.2.32
034 *† <i>Empress of Britain</i> ...	Latta, R. G.	J. R. Bubb	"	" " " " ...	" 4.12.31 to 21.12.31	6.1.32
154 *† <i>Empress of Canada</i> ...	Hailey, A. J., Lt.- Commr., R.N.R., Douglas, L. D., Lieut.-Commr., R.N.R.	G. O. Baugh, R. H. Foley, H. Kennedy, G. W. R. Graves.	M.L.	" " " " ...	Form 915 19.7.31 to 16.12.31 ...	18.1.32
153 *† <i>Empress of Japan</i> ...	Robinson, S., C.B.E., R.N.R.	R. Goss, R. Wolfenden, A. Le Maistre	"	" " " " ...	" 7.8.30 to 13.1.31 ...	16.2.31

Name of Vessel.	Captain.	Observing Officers.	Meteoro-logical Equipment.	Line.	Last Log, Register, or Record Contributed. Received up to 12.2.32.	Date Received.
011 †† <i>Euripides</i> ...	Vaughan, P. R., D.S.C., R.D., Commr. R.N.R.	R. H. Shaw, D. Don, J. H. Campbell.	W.T.—M.	White Star ...	Forms 911 & 138 23.12.31 to 23.1.32	1.2.32
<i>Explorer</i> ...	Allan, J.	A. Stout ...	No. A.	Scottish Fishery Brd.	Form 911 2.11.31 to 24.11.31	2.12.31
067 †† <i>Ferndale</i> ...	Beighton, J. N.	L. J. Hopkins, H. C. Howie, D. W. Campbell.	„ M.	Aberdeen Common-wealth.	Forms 911 & 138 3.9.31 to 8.10.31	26.11.31
074 †† <i>Fordsdale</i> ...	Avern, J., Commr. R.N.R.	E. Hickling, F. Davies, M. Harrier.	„ M.	Shaw, Savill and Albion.	„ „ 26.9.31 to 27.12.31	21.1.32
030 †† <i>Franconia</i> ...	Gibbons, G., R.D., Capt., R.N.R.	J. Ashcroft, C. Taylor, R. Pollitt.	W.T.	Cunard ...	Form 911 28.12.31 to 1.1.32	15.1.32
159 †† <i>Fresno City</i> ...	Davies, D.	F. W. P. Davies ...	M.L.	Sir W. Reardon Smith and Sons Ltd.	... ..	...
125 †† <i>Glenamoy, M.V.</i> ...	Ings, W. J.	F. Laycock, L. Eccles, A. C. Radley.	W.T.	Glen Line ...	Form 915 22.6.31 to 27.10.31	2.11.31
126 †† <i>Glengarry, M.V.</i> ...	Angier, J.	G. Morgan, I. G. Neill, S. W. Bell.	No. M.	„ ...	Forms 911 & 138 19.6.31 to 4.10.31	9.10.31
085 †† <i>Governor</i> ...	Windsor, G. R.	A. Watson, J. Stanhope ...	„ M	Harrison ...	„ „ 3.11.31 to 31.1.32	4.2.32
111 †† <i>Hardwicke Grange</i> ...	Fowler, W. H.	W. L. Baker, A. W. Seybold, W. E. Ellis.	„ M.	Houlder ...	Forms 911 & 138 2.8.31 to 7.10.31	13.10.31
<i>Harmonides</i> ...	Elwell, F. R.	L. Pogson ...	„ A.	R. P. Houston ...	Form 911 24.11.31 to 24.12.31	29.12.31
262 ** <i>Hauraki, M.V.</i> ...	Norton, A. T. ...	D. W. Blacklaws, D. McLeish, H. A. Brockett.	M.L.	Union S.S. Co., N.Z. ...	Form 915 8.12.30 to 16.7.31	28.9.31
206 †† <i>Herminius</i> ...	Thurston, H. P.	F. W. Gilroy ...	„	Shaw, Savill & Albion	Form 911 9.7.31 to 1.11.31	9.11.31
253 †† <i>Hertford</i> ...	Burton Davies, J.	P. Shakespeare, P. Block, P. M. Devitt.	„	Federal ...	Form 915 14.2.31 to 24.6.31	6.7.31
<i>Hibernia</i> ...	Williams, E. R.	C. A. Marsh ...	C.C.	L.M. & S. Railway ...	Telegraphic Report 12.2.32	12.2.32
182 †† <i>Highland Brigade</i> ...	Lloyd, H.	W. Stephen, N. Hersee, C. Morgan	No. M.	Nelson ...	Forms 911 & 138 9.8.31 to 27.9.31	7.10.31
116 †† <i>Highland Chieftain, M.V.</i> ...	Robinson, R. H.	W. J. Presland, L. Irving, J. E. Pink.	W.T.—M	„ ...	„ „ 29.11.31 to 19.1.32	25.1.32
099 †† <i>Highland Monarch, M.V.</i> ...	Ashby Graves, F.	R. Polden ...	No. M.	„ ...	„ „ 16.11.31 to 4.1.32	11.1.32
250 †† <i>Highland Princess, M.V.</i> ...	Collings, D.	C. Leech ...	„ M.	„ ...	Form 911 14.12.31 to 26.12.31	8.2.32
<i>Hilary</i> ...	Jones, W. C. H., R.D., Commr. R.N.R.	W. H. Cross, G. Wayman, R. Rashley.	M.L.	Booth ...	Form 915 16.10.31 to 1.2.32	6.2.32
079 †† <i>Hildebrand</i> ...	Buck, R. H., R.D., Capt., R.N.R.	C. W. Smethurst ...	W.T.	„ ...	Forms 911 & 138 19.11.31 to 27.12.31	26.1.32
075 †† <i>Hobson's Bay</i> ...	Roberts, T. V., R.D., Lt.-Commr., R.N.R.	F. L. Gross, C. Smith, C. Carroll.	No. M.	Aberdeen Common-wealth.	Form 915 9.7.31 to 11.10.31	19.10.31
<i>Hubert</i> ...	Briscoe, W.	R. Parry, G. G. Westhorp, L. A. Sterling.	M.L.	Booth ...	„ 17.5.31 to 25.7.31	28.7.31
261 †† <i>Huntingdon</i> ...	Field, H. G. B.	P. S. Calcutt, H. F. Wilkinson, M. T. D. Walter.	W.T.	Federal ...	Forms 911 & 138 26.4.31 to 15.8.31	27.8.31
200 †† <i>Huntsman</i> ...	Russell, H.	J. Richardson, D. H. Goddard	No. M.	Harrison ...	Form 911 15.8.31 to 2.11.31	13.11.31
289 †† <i>Inanda</i> ...	Gibbins, W. H.	D. C. Brown, R. L. Williams, T. W. Kent.	„ M.	Harrison ...	Forms 911 & 138 6.12.31 to 14.1.32	25.1.32
<i>Ingoma</i> ...	Richardson, R.	D. D. Kerr ...	„ M.	„ ...	Form 911 8.11.31 to 18.12.31	22.12.31
160 †† <i>Ixion</i> ...	Stewart, J. A.	C. S. Pope, G. Collier, F. G. Brown.	M.L.	A. Holt ...	Form 915 11.4.30 to 9.9.31	16.11.31
<i>Jamaica Merchant</i>	Rach, L. G., R.D., Lt.-Commr., R.N.R.	C. P. Winard, B. W. Smith, A. E. Rich.	„	Jamaica Direct Fruit	Form 915 10.6.31 to 21.8.31	3.9.31
072 ** <i>Jamaica Planter</i> ...	P. D. Allen ...	G. R. Wortley ...	W.T.	„ ...	Forms 911 & 138 9.11.31 to 10.12.31	23.12.31
<i>Javanese Prince, M.V.</i> ...	Smith, J.	C. E. Edney ...	No. A.	Prince ...	Form 911 24.10.31 to 7.11.31	20.11.31
187 †† <i>Jeyapore</i> ...	Harris, W. L.	A. G. Edwards ...	„ M.	P. & O. ...	Forms 911 & 138 17.10.31 to 14.11.31	26.11.31
188 †† <i>Kaisar-i-Hind</i> ...	Headlam, P. C. R.D., Commr. R.N.R.	T. T. Ferguson, H. Flint, L. Irons.	„ M.	P. & O. ...	Forms 911 & 138 26.10.31 to 16.12.31	2.1.32
041 †† <i>Karama, M.V.</i> ...	Kenworthy, V.	N. S. Milne, C. Sendall, P. Campbell.	M.L.	Shaw, Savill & Albion	Form 915 17.7.31 to 1.11.31	4.11.31
217 †† <i>Karayara</i> ...	White, R. W.	J. B. Walker, A. W. Clarke, L. J. Jones.	No. M.	British India ...	Forms 911 & 138 21.11.31 to 11.1.32	8.2.32
236 †† <i>Karmala</i> ...	McBryde, A.	A. Storr, L. Porter, F. W. J. Pearce.	„ M.	P. & O. ...	„ „ 28.6.31 to 2.10.31	8.10.31
191 †† <i>Kashmir</i> ...	Axford, R. G.	L. A. Hill, G. Randall, D. S. Charter.	„ M.	„ ...	„ „ 22.8.31 to 28.11.31	3.12.31
114 †† <i>Kenya</i> ...	Miller, A. C.	R. Lord, H. Evans, G. Spedding.	„ M.	British India ...	„ „ 5.11.31 to 18.12.31	4.1.32
218 †† <i>Khandalla</i> ...	Eadie, J. D.	D. W. Dix, A. J. Woodcock	„ M.	„ ...	„ „ 22.10.31 to 3.12.31	29.12.31
186 †† <i>Kidderpore</i> ...	Wright, C. S., R.D., Commr., R.N.R.	J. Collard ...	„ M.	P. & O. ...	„ „ 13.10.31 to 19.12.31	18.1.32
169 ** <i>Kwangchow</i> ...	Stringer, C. B. L.	B. C. Finch, F. H. Smith	M.L.	China Nav. Co. ...	Form 915 10.5.31 to 17.10.31	13.1.32
147 †† <i>Laconia</i> ...	Hawkes, W. R. D., Capt. R.N.R.	J. D. Archer ...	W.T.	Cunard ...	Forms 911 & 138 30.11.31 to 19.12.31	29.12.31
<i>Laguna, M.V.</i> ...	Dunn, R. E. O.B.E. ...	W. Billington ...	No. A.	Pacific S.N. Co. ...	Form 911 16.5.31 to 2.6.31	5.6.31
193 †† <i>Lahore</i> ...	Hollow, J. H.	J. G. K. Gregory, F. Hull, S. R. Eva.	„ M.	P & O ...	Forms 911 & 138 8.11.31 to 5.2.32	11.2.32
167 †† <i>Lancastria</i> ...	Bond, H. A. I. R.D., Commr., R.N.R.	... ..	W.T.	Cunard ...	... ..	...
082 †† <i>La Paz, M.V.</i> ...	Morgan, D. R.	G. Pattison ...	No. M.	Pacific S.N. Co. ...	Form 911 14.11.31 to 21.11.31	11.2.32
134 †† <i>Lapland</i> ...	Harvey, H.	L. Williams, H. Patterson, R. M. Farmer.	W.T.	Red Star ...	Forms 911 & 138 19.10.31 to 24.10.31	10.11.31

LIST OF VOLUNTARY OBSERVING SHIPS

Name of Vessel.	Captain.	Observing Officers.	Meteoro-logical Equipment.	Line.	Last Log. Register, or Record Contributed. Received up to 12.2.32.	Date Received.
076 *† <i>Largs Bay</i> ...	Jermyn, W. M. ...	F. B. Marsden, B. S. Mackenzie.	No. M.	Aberdeen Common-wealth.	Forms 911 & 138 17.5.31 to 28.6.31	28.9.31
112 *† <i>La Rosarina Lassell</i> ...	Webb, C. ...	W. S. Hamblin...	" M.	Houlder ...	" " 4.10.31 to 10.12.31	17.12.31
064 †† <i>Laurentic</i> ...	Lindsay, J. M. ...	" " " " " "	" A.	Lampport & Holt ...	Form 911 24.8.31 to 13.11.31	16.12.31
	Jackson, W. H. P. ...	F. M. Murphy, T. Holmes, A. Thompson.	W.T.	White Star ...	Forms 911 & 138 14.8.31 to 5.12.31	7.12.31
083 *† <i>Lautaro, M.V.</i> ...	Kite, E. ...	J. Lloyd Jones, J. Williams...	No. M.	Pacific S.N. Co. ...	" " 24.10.31 to 12.11.31	3.12.31
254 *† <i>Limerick</i> ...	Molyneux, P. L. ...	J. Trotter, N. A. Thomas ...	" M.	Federal... ..	" " 1.9.31 to 15.10.31	21.10.31
093 *† <i>Llandaff Castle</i> ...	Linklater, H. ...	J. M. Goode ...	W.T.	Union Castle ...	" " 4.12.31 to 7.2.32	11.2.32
097 †† <i>Llangibby Castle, M.V.</i> ...	Nicholl, D. ...	H. S. Warren ...	"	" " " " " "	" " 10.10.31 to 13.12.31	18.12.31
094 *† <i>Llandoverly Castle</i> ...	Morgan, A. O., R.D., Commr., R.N.R.	R. C. J. Hatt ...	"	" " " " " "	" " 21.11.31 to 21.1.32	20.1.32
216 *† <i>Llanstephan Castle</i> ...	Bickford, C. N. ...	J. B. Duncan, G. H. Pickering, S. Smith.	"	" " " " " "	Forms 911 & 138 28.6.31 to 28.8.31	3.9.31
084 *† <i>Lobos, M.V.</i> ...	Good, W. T. ...	R. H. Sissons, J. Kerr, E. Potter.	No. M.	Pacific S.N. Co. ...	" " 3.10.31 to 4.1.32	9.1.32
137 *† <i>Logician</i> ...	Herschel, R. J. ...	T. Winstanley, E. L. Stockley	" M.	Harrison ...	" " 22.6.31 to 13.10.31	23.10.31
008 *† <i>Losada</i> ...	Ridyard, A. ...	L. W. Hutchinson ...	" M.	Pacific S.N. Co. ...	" " 25.11.31 to 20.12.31	1.2.32
013 *† <i>Macharda</i> ...	Hanna, R. G. ...	C. Lindsay Miller, C. Parry, G. A. Jackson.	No. M.	Brocklebank ...	Forms 911 & 138 10.11.31 to 7.12.31	4.1.32
232 *† <i>Madura</i> ...	Wright, J. A. ...	A. Usher, W. Bain, G. S. Haywood.	" M.	British India... ..	" " 22.11.31 to 3.12.31	29.12.31
078 *† <i>Magician</i> ...	Bury, E. R. ...	W. E. Shotton, J. Johnson ...	" M.	Harrison ...	" " 30.10.31 to 5.1.32	21.1.32
141 *† <i>Mahia</i> ...	Andrews, C. M. ...	G. Sangwin, M. P. Congdon, J. Jackson.	W.T.	Shaw, Savill & Albion	" " 22.7.31 to 19.11.31	23.11.31
140 *† <i>Mahratta</i> ...	Columbine, T. T. ...	T. C. Eddy, H. F. Scoins, J. Wilson.	No. M.	Brocklebank ...	" " 22.11.31 to 20.12.31	11.1.32
014 *† <i>Mahronda</i> ...	Sharpe, G. ...	W. Le Brocq, M. Melville, H. Wellington.	" M.	" " " " " "	" " 20.11.31 to 21.1.32	26.1.32
015 *† <i>Mahsud</i> ...	Kershaw, R. W. ...	S. Richardson, J. R. Paisley	" M.	" " " " " "	" " 2.10.31 to 22.1.32	1.2.32
016 *† <i>Maidan</i> ...	Ison, W. A. ...	F. Moore, F. L. Attwood, L. E. Jeans.	" M.	" " " " " "	" " 26.2.31 to 8.5.31	12.5.31
042 *† <i>Maimoa</i> ...	Johnson, J. W. ...	A. Winton, D. O. V. Pickers-gill, W. A. Rogers.	M.L.	Shaw, Savill & Albion	Form 915 19.6.31 to 23.10.31	3.11.31
054 †† <i>Majestic</i> ...	Trant, E. L., R.D., Commr., R.N.R.	R. B. O'Brien, H. N. McFill, L. Thompson.	W.T.	White Star ...	Form 911 & 138 21.1.32 to 5.2.32	8.2.32
018 *† <i>Makalla</i> ...	Maughan, J. W. ...	A. C. Hocking ...	No. M.	Brocklebank ...	Form 911 26.10.31 to 26.11.31	21.12.31
225 ** <i>Makura</i> ...	MacDonald, D. ...	A. P. Cousin, S. H. Crawford, H. McRae.	M.L.	Canadian- Australasian	Form 915 16.4.31 to 1.8.31	1.10.31
019 *† <i>Malakuta</i> ...	Adamson, F. L. ...	H. Simpson ...	No. M.	Brocklebank ...	Forms 911 & 138 11.5.31 to 2.12.31	29.1.32
020 *† <i>Malancha</i> ...	Cochran, G. N. ...	L. F. Dodson ...	" M.	" " " " " "	" " 25.11.31 to 22.12.31	29.12.31
219 *† <i>Malda</i> ...	Denne, G. H. A. ...	D. Macfadyen, F. M. Ben-castle K. K. Boyd.	" M.	British India ...	" " 18.10.31 to 12.1.32	15.1.32
195 †† <i>Malwa</i> ...	Browning, J. B., R.D., Commr. R.N.R.	R. E. Baldwin - Wiseman, C. H. Hanl. G. R. Peters.	" M.	P. & O. ...	" " 17.10.31 to 21.1.32	25.1.32
196 †† <i>Malwa</i> ...	Britten, P. O. ...	P. G. Lawrence... ..	" M.	" " " " " "	" " 1.11.31 to 20.11.31	2.1.32
053 *† <i>Manaar</i> ...	Thowless, E. ...	A. L. Harrop, J. Robinson, R. G. Widdon.	" M.	Brocklebank ...	" " 20.7.31 to 9.10.31	21.10.31
<i>Manchester Brigade</i>	Stott, C. H. ...	E. E. Bonnaud, J. Eccles, W. E. Hardman.	M.L.	Manchester Liners ...	Form 915 14.3.31 to 1.8.31	10.8.31
<i>Manchester Com-merce.</i>	Linton, P. ...	" " " " " "	"	" " " " " "	" " " " " "	"
<i>Manchester Hero</i> ...	Mitchell, G. M. ...	R. O. Jones, J. N. Emmitt, M. Barnes	"	" " " " " "	Form 915 27.6.31 to 4.10.31	21.10.31
028 †† <i>Mandala</i> ...	Stockwell, H. ...	E. Ashby, A. Pyatt, G. Singer.	No. M.	British India... ..	Forms 911 & 138 18.11.31 to 25.1.32	8.2.32
146 *† <i>Mandasor</i> ...	Richardson, T. ...	H. Fosbrooke, F. C. Madden, J. B. Leigh.	" M.	Brocklebank ...	" " 1.11.31 to 24.11.31	30.11.31
220 *† <i>Manela</i> ...	Maples, S. H. ...	W. F. Solly, T. M. Robertson, D. M. Gill.	" M.	British India ...	" " 30.12.31 to 14.1.32	8.2.32
022 *† <i>Manipur</i> ...	Fuleber, H. D. ...	J. L. Rodger ...	" M.	Brocklebank ...	" " 27.11.31 to 28.12.31	2.1.32
221 *† <i>Manora</i> ...	Hudson, H. T., R.D., Commr., R.N.R.	A. F. Baber, W. Brawn, J. W. Elcoat.	" M.	British India... ..	" " 25.10.31 to 29.11.31	4.12.31
177 *† <i>Mantola</i> ...	James, D. F. ...	S. Henderson, G. B. Potts, H. I. Fisher.	" M.	" " " " " "	" " 23.11.31 to 16.12.31	22.12.31
197 †† <i>Mantua</i> ...	Hignett, R.D., Commr. R.N.R.	J. D. Homidge, J. A. Wild, E. J. Sparling.	W.T.-M.	P. & O. ...	" " 22.8.31 to 9.11.31	2.12.31
299 ** <i>Marella</i> ...	Donaldson, A. ...	A. W. Blair, D. Pemberton, A. G. W. Thomas.	M.L.	Burns Philp ...	Form 915 3.6.31 to 23.10.31	7.1.32
<i>Marengo</i> ...	Sibree, J. S. ...	F. Brown, C. Newton, J. E. Dobson.	"	Ellerman Wilson ...	" " 26.3.31 to 29.10.31	6.11.31
222 †† <i>Margha</i> ...	Kitson, G. A. ...	L. F. Waitkins, J. Smail. ...	W.T.	British India... ..	Forms 911 & 138 7.1.32 to 19.1.32	9.2.32
104 *† <i>Marquesa</i> ...	Smiles, R. S. ...	J. Wetherall ...	No. M.	Furness Houlder ...	" " 8.9.31 to 19.11.31	24.11.31
021 *† <i>Masula</i> ...	Fitt, W. H. ...	J. L. Richardson, W. G. Jones.	" M.	British India ...	" " 31.12.31 to 22.1.32	27.1.32
251 *† <i>Matakana</i> ...	Gordon, H. R. ...	H. Thompson ...	M.L.	Shaw, Savill & Albion	Form 911 20.6.31 to 29.9.31	2.10.31
044 †† <i>Mataroa</i> ...	Gaskell, J. H., R.D., Lt. Commr., R.N.R.	F. Eadon, F. C. Charnley, T. H. Davies.	"	" " " " " "	Form 915 22.5.31 to 30.8.31	1.10.31
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024 *† <i>Matra</i> ...	Cornish, N. P. ...	" " " " " "	" M.	Brocklebank ...	" " 1.8.31 to 3.12.31	9.12.31
032 †† <i>Mauretania</i> ...	Peel, R. V., R.D., Capt., R.N.R.	R. H. C. Crawford, L. R. Sharpe, G. Duguid.	W.T.	Cunard... ..	" " 12.11.31 to 13.1.32	16.1.32
101 †† <i>Melita</i> ...	Lewis, J. P. ...	C. E. Duggan, H. W. Saunders, A. M. Watt.	"	Canadian Pacific ...	" " 3.1.32 to 22.1.32	25.1.32
278 *† <i>Middlesex</i> ...	Almond, J. G. ...	J. R. Ricketts, E. G. Henry, L. G. Gould.	M.L.	Federal ...	Forms 911 & 138 16.10.31 to 31.12.31	7.1.32
<i>Minderoo</i> ...	Johnson, L. ...	A. J. Perry ...	"	Western Australian S.N. Co.	Form 911 18.10.31 to 23.11.31	4.1.32
224 *† <i>Modasa</i> ...	Gilchrist, J. W. ...	E. Hale. ...	No. M.	British India... ..	Forms 911 & 138 23.10.31 to 11.1.32	18.1.32
194 †† <i>Moldavia</i> ...	Allin, C. H. C. ...	T. E. Heath, J. K. Krone, E. J. Kerridge.	W.T.-M.	P. & O. ...	" " 26.12.31 to 8.1.32	2.2.32
199 †† <i>Mongolia</i> ...	Rhodes, H. R. ...	H. Tee, H. C. Slinn, H. M. Webb.	No. M.	" " " " " "	" " 28.11.31 to 19.12.31	1.2.32
260 †† <i>Monowai</i> ...	Toten, A. T. ...	L. B. Elhert, T. W. Gibson, L. J. Drew.	M.L.	Union S.S. of N.Z. ...	Form 915 22.1.31 to 9.5.31	4.8.31

LIST OF VOLUNTARY OBSERVING SHIPS

Name of Vessel.	Captain.	Observing Officers.	Meteorological Equipment.	Line.	Last Log, Register, or Record Contributed. Received up to 12.2.32.	Date Received.
130 *† Port Carotine ...	Hearn, G. W. ...	V. G. Battle, E. W. R. Young, R. E. Garner.	M.L.	Commonwealth and Dominion.	Form 915 17.6.31 to 8.10.31 ...	19.10.31
131 *† Port Darwin ...	Hudson, J. J. ...	K. D. Morgan, W. R. Johnson, L. C. Asser.	W.T.	" " "	" 5.5.31 to 27.8.31 ...	11.9.31
132 ** Port Denison ...	Hall, G. S. ...	A. G. Newbury, R. A. Holloway, H. Duckling.	M.L.	" " "	" 23.4.31 to 26.8.31 ...	3.9.31
133 *† Port Dunedin, M.V.	Mason, W. S., D.S.C.	H. M. Post, C. A. Hodson, R. Betters.	"	" " "	" 5.10.31 to 29.1.32 ...	2.2.32
010 *† Port Fremantle, M.V.	Gilling, W. ...	A. Naismith ...	"	" " "	Form 911 12.8.31 to 17.9.31 ...	21.9.31
176 *† Port Gisborne, M.V.	Higgs, W. G. ...	R. B. Linklater, L. J. Skailles, L. E. Ring.	"	" " "	Form 915 19.7.31 to 24.10.31 ...	30.10.31
135 *† Port Hunter ...	Durham, R. S., D.S.C.	G. T. C. Harris, C. R. Townshend, P. A. Mundy.	"	" " "	" 6.9.31 to 27.12.31 ...	31.12.31
Port Wellington ...	Jones, C. N. ...	W. B. Hopkins ...	No. A.	" " "	Form 911 26.8.31 to 4.1.32 ...	11.1.32
106 *† Princesa ...	Friend, A. B. ...	F. Poulson, E. Lougheed, O. Sheard.	" M.	Houlder ...	Forms 911 & 138 14.12.31 to 30.12.31	2.1.32
163 *† Protesilaus ...	Rundle, G. G. ...	W. C. McGugan ...	M.L.	A. Holt ...	Form 915 28.5.31 to 14.9.31 ...	23.10.31
205 †† Rajputana ...	Holland, R. ...	G. Aspinall, H. M. Askin, C. F. Wright.	" M.	P. & O. ...	Forms 911 & 138 11.10.31 to 6.1.32	15.1.32
063 *† Rancher ...	McCullum, J. ...	G. Harvey ...	" M.	Harrison ...	" " 26.10.31 to 14.1.32	19.1.32
228 †† Ranchi ...	Brooks, C. D.S.O., R.D. Cmmr., R.N.R.	T. A. Sergeant ...	" M.	P. & O ...	" " 22.11.31 to 13.1.32	18.1.32
236 †† Rangitane M.V. ...	McKellar, A. W. ...	A. Brown, R. C. Aldridge, C. J. P. Guille.	W.T.-M.	New Zealand S.S. Co.	Form 915 3.7.31 to 15.10.31 ...	22.10.31
257 †† Rangitata M.V. ...	Hunter, J. L. B. ...	J. Oxnard, D. Chadwick, S. Leggett.	"	" " "	Forms 911 & 138 24.10.31 to 3.2.32	11.2.32
240 †† Rangitiki M.V. ...	Barnett, H. ...	H. Hill, L. F. Malcouronne, J. V. Halliday.	"	" " "	" " 30.8.31 to 9.12.31	14.12.31
207 †† Ranpura ...	Furlong, G. H. S., R.D. Capt. R.N.R.	F. Ferguson, R. A. Perry, H. Toon.	No. M.	P. & O. ...	" " 10.10.31 to 1.12.31	9.12.31
071 †† Rawalpindi ...	Stringer, O.B.E., R.D., Cmmr., R.N.R.	H. G. M. Perry, D. E. C. Otter, W. R. Stockglen.	W.T.-M.	" " "	" " 1.11.31 to 3.2.32	8.2.32
247 *† Recorder ...	Egerton, J. J. ...	A. S. Milne, H. C. Blyth, W. Weatherall.	No. M.	Harrison ...	" " 30.10.31 to 8.12.31	11.12.31
306 *† Reina del Pacifico, M.V.	Roberts, E. ...	W. A. Hearle, R. Bridson, J. K. Campbell.	" M.	Pacific S.N. Co. ...	" " 15.11.31 to 4.1.32	11.1.32
239 *† Remuera ...	Wilde, H. J. ...	A. J. Angell, J. R. Vincent, H. Vernon.	M.L.	New Zealand S.S. Co.	Form 915 31.7.31 to 5.11.31 ...	11.11.31
Rhexenor ...	Stout, G. L. ...	J. S. Parry ...	No. A.	A. Holt... ..	Form 911 14.9.31 to 6.12.31 ...	18.1.32
Rhodesian Transport.	Bowen, A. C. ...	H. S. Butler ...	" A.	Houlder Bros. ...	" 5.4.31 to 5.7.31 ...	30.7.31
189 *† Rother ...	Woodhead, T. H. ...	H. Robinson, H. L. Marshall	W.T.	Goole Steam Shipping	Form 911 & 138 26.12.31 to 17.1.32	19.1.32
241 *† Rotorua ...	Lamb, C. B. ...	L. W. Fulcher, K. L. Jones, J. G. Gould.	M.L.	New Zealand S.S. Co.	Form 915 3.4.31 to 22.7.31 ...	29.7.31
062 *† Royal Star... ..	Walsh, W. ...	A. F. Day, J. Higgin, J. W. McHugh.	"	Blue Star ...	" 6.9.31 to 30.11.31 ...	7.12.31
246 *† Ruahine ...	Kinnell, G. ...	A. Hocken, R. Warren, L. Mercer.	W.T.	New Zealand S.S. Co.	Forms 911 & 138 26.9.31 to 31.12.31	11.1.32
St. Helier ...	Pitman, R. ...	A. C. Ricketts ...	C.C.	G.W. Railway ...	Telegraphic Report 5.12.31 ...	5.12.31
St. Julien ...	Richardson, L. ...	A. E. Ricketts, H. D. Freeman.	"	" " "	" " 11.2.32 ...	11.2.32
St. Minver, S.T. ...	Hatton, A. ...	C. Shaw, W. Robertson, G. Henshaw.	No. A.	Bunch Steam Fishing Co.	Form 911 12.12.31 to 11.1.32 ...	21.1.32
St. Patrick ...	" " " " " "	F. E. Martin ...	C.C.	G. W. Railway ...	Telegraphic Report 15.9.31 ...	15.9.31
038 †† Samaria ...	Malin, R. G., Lt.-Cmmr., R.N.R.	A. MacKellar, F. G. Watts, J. A. Myles.	W.T.	Cunard ...	Forms 911 & 138 26.10.31 to 14.11.31	17.11.31
291 *† Scholar ...	Peterkin, A. G. ...	A. Robertson, R. J. Mackinnon	No. M.	Harrison ...	" " 15.10.31 to 22.12.31	29.12.31
Scotia ...	O'Neill, J. ...	W. H. Hughes ...	C.C.	L.M. & S. Railway ...	Telegraphic Report 6.2.32 ...	6.2.32
033 †† Scythia ...	Oram, B. B., R.D., Cmmr., R.N.R.	F. P. Collins, A. Bridgewater, H. L. Pryse.	W.T.	Cunard ...	Forms 911 & 138 14.12.31 to 16.1.32	20.1.32
211 *† Shropshire, M.V. ...	English, G. L. ...	A. D. Quayle, R. Cumming, D. Hetherington	"	Bibby ...	" " 1.11.31 to 7.1.32	14.1.32
Silksworth ...	Blacklock, G. ...	W. S. Allen ...	No. A.	R. S. Dalgleish ...	Form 911 1.11.31 to 24.11.31 ...	1.1.32
230 *† Somerset ...	Pilcher, C. R. ...	C. Edgecombe, H. M. Knight, H. V. G. Hastings.	M.L.	Federal ...	" 16.8.31 to 14.11.31 ...	19.11.31
277 *† Spero ...	Montgomery, H. ...	H. W. Vickers, A. Kirk ...	"	Ellerman Wilson ...	Form 915 28.3.31 to 3.10.31 ...	7.10.31
Stephen ...	Barlow, E. P. ...	C. G. Powell, G. H. Daniels	"	Booth ...	" 26.6.31 to 30.10.31 ...	27.11.31
270 †† Strathaird ...	Townsend, W. P. ...	R. H. Hand ...	W.T.-M.	P. & O. ...	" " " " " "	" " " " " "
259 *† Surrey ...	Lettington, A. E. ...	R. Rees, D. J. Murray, H. H. Mackillican.	M.L.	Federal... ..	Form 915 17.5.31 to 16.9.31 ...	26.9.31
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229 *† Tactician ...	Trinick, F., O.B.E. ...	E. P. Simmons ...	" M.	Harrison ...	" 19.7.31 to 7.10.31 ...	10.10.31
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234 *† Talma ...	Harley, G. J. ...	M. H. Vincent, R. Potter, R. H. Weatherseed.	W.T.-M.	British India ...	Forms 911 & 138 17.5.31 to 21.9.31	12.10.31
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