

TABLE OF PRINCIPAL CONTENTS.

	PAGE	
Temperature and Salinity, with Figures 1-5	49	Lithographic Illustrations, after page 64 :—
Currents on the track from the Latitude of Cape Blanco to the Brazils	55	Chart of Tracks of Typhoons in the Far East, 1893-1918, for month of April
The Marine Observer's Log, with illustrations	56	Charts of Currents on Route, Latitude of Cape Blanco to the Brazils, May, June and July (with explanation) and Figures 3 and 4 (insets).
Notes upon Average conditions in the Indian Ocean, North of Latitude 35° S. IV. April	59	Chartlet A., showing Conditions of Current and Wind in Equatorial Atlantic in May 1921 (with explanation).
Weather Charts, Eastern North Atlantic	60	Weather Charts XIII and XIV, Mornings of April 26th and 27th, 1924.
Weather Signals :—		Weather Charts XV and XVI, Mornings of April 28th and 29th, 1924.
France. II. Wireless Weather and Storm Signals		
III. Wireless Time Signals; IV. Visual Storm Signals	61	

TEMPERATURE AND SALINITY.

BY LIEUTENANT J. R. LUMBY, R.N. (RETIRED), MINISTRY OF AGRICULTURE AND FISHERIES.

In a previous article in this Journal the writer mentioned the fact that a study of the varying distributions of the salinity and temperature of the waters of the sea affords information about the movements of these waters. From the point of view of fishery investigations such information is all-important, because numbers of the organisms, both plants and animals, living in the sea are passively transported by the currents. Moreover, in the lives of many of the food fishes, the fisheries for which have so great an economic value in this country, there is a period when they are unable to swim against the current, upon whose vagaries their future existence depends—the period in which they are present as eggs floating in the sea or as newly hatched larvæ.

It is clear, of course, that any water movement, however slow, has influence on the lives of these fish, and assumes therefore an importance in fishery investigations which it does not possess from the standpoint of the navigator. Nevertheless, it may be of general interest to outline the way in which temperature and salinity observations are used in the study of currents.

Temperature is the state upon which depends the readiness of a substance to impart heat to or receive heat from another substance. But it does not follow from this that equal amounts of two substances having the same temperature contain equal amounts of heat, nor that they change their temperature by a similar amount when equal quantities of heat are added to, or taken away from either of them. For example, more heat is necessary to raise the temperature of a given quantity of fresh water than would be required to raise the temperature of an equal quantity of sea water by the same amount. In the same way the temperature of the land is raised and lowered more rapidly than that of the sea, a fact of considerable significance as regards the distribution of temperature both of the land and of the sea.

The origin of the heat in the sea is solar radiation. Within the tropics, therefore, where the sun's rays fall most nearly perpendicularly on the surface of the sea, we find the high temperatures; going away from the equator towards the poles temperature falls as latitude increases. FIGURE 1 shows that the highest mean annual temperature

for the surface waters of the North Atlantic occurs rather north of the equator, and is approximately 27°C , whereas in the Arctic the mean temperature falls below -1°C .

Temperatures below the freezing point of fresh water are possible in the sea because sea water freezes at about -1.9°C .

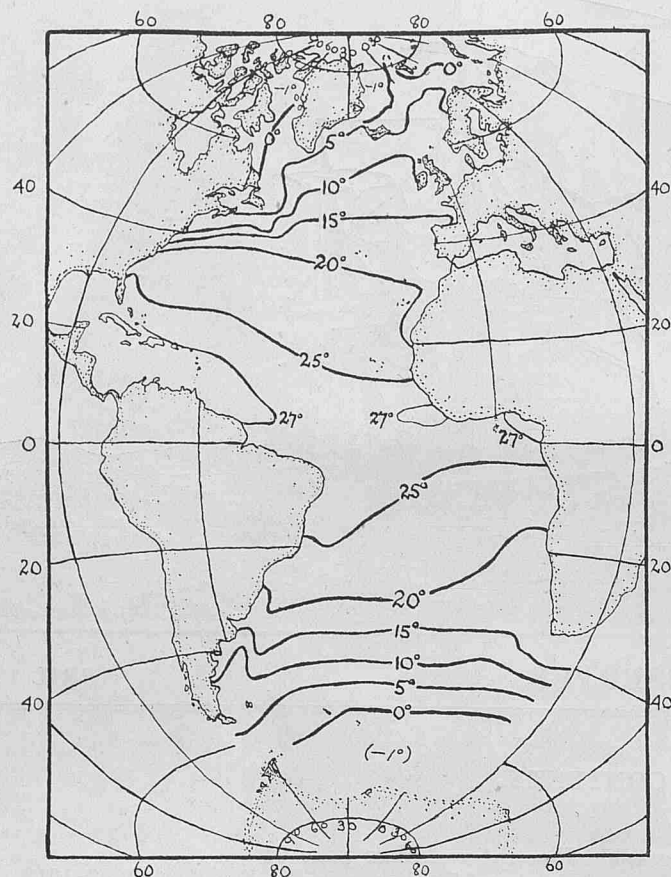


Fig. 1.—The Mean Annual Temperature ($^{\circ}\text{C}$.) of the Surface Waters of the Atlantic Ocean (after Schott).

The average change of temperature in a north and south direction for the surface of the Atlantic Ocean is shown in the following table.

Table I.—Mean Temperature ($^{\circ}\text{C}$.) of the Surface Waters of the Atlantic Ocean in 10° Zones of Latitude (after Krümmel).

Lat.	0° – 10°	10° – 20°	20° – 30°	30° – 40°	40° – 50°	50° – 60°	60° – 70°	70° – 80°
N.	26.8	25.6	23.9	20.3	12.9	8.9	4.3	—
S.	25.7	23.2	21.2	17.1	9.5	1.9	-1.3	-1.7

The reason why the temperature in the higher latitudes of the North Atlantic is higher than in corresponding latitudes of the South Atlantic may be sought mainly in the difference between the circulations of the waters of these two Oceans. There is nothing in the South Atlantic comparable with the North Atlantic Drift and there is in the Southern Ocean an almost unimpeded drift in an easterly direction round the earth.

Looking more closely at the surface temperature distribution of the North Atlantic, we see that, as we go north from the equator, the rate of change of temperature differs very much according to the line of longitude along which we may choose to travel. Put in another way, we see that the *isotherms* are not parallel to the lines of latitude. For instance, the isotherm of 25°C . has its western extremity in 30°N . Lat. and its eastern in 10°N . Lat. This does not accord fully with what we might expect, if we supposed the temperature of the surface water in any place to be directly determined by the amount of heat there absorbed from the sun's rays. The bending of the isotherms away from the lines of

latitude may be explained by the fact that the waters in the centre of the North Atlantic circulate in a clockwise direction, warm water moving to the north on the western side of the Ocean, while relatively cold water moves south along its eastern boundary.

Again, in 50° – 60°N . Lat. we find the isotherms on the eastern side curving markedly towards the north. The north-easterly course taken by the warm waters to which is due the curving of the isotherms towards the north can be traced both as the North Atlantic Drift and as the European Stream north and west of the British Isles, along the coasts of Norway, and well into the Arctic regions beyond Spitzbergen.

On the eastern coasts of Greenland, Iceland, and North America the convexity of the isotherms towards the south is clearly attributable to the East Greenland, East Icelandic, and Labrador Streams, all of which bring south, cold water from the polar regions. In the border land between the warm north-going Gulf Stream and the cold south-coming Labrador Stream, the isotherms crowd each other more closely than elsewhere.

A further point of interest is the course taken by the isotherms off the African coast in the vicinity of the Canary Islands. Since the waters there move off-shore towards the west, other waters must flow in to take their place. This compensation is effected partly by the movement of water from the north but also by the upwelling of relatively cold water from the depths.

At any one place solar radiation is not felt always to the same extent. If we observed the temperature of the surface water regularly throughout the year at a particular spot in the North Atlantic, we should find that, as the sun's declination grew more N'y, so the temperature would rise, and *vice versa*. But we should also find that the dates of highest and lowest temperatures lagged behind the dates of most N'y and most S'y declination of the sun.

The difference between the highest and lowest temperatures occurring in the course of a year is known as the annual range. This type of temperature range varies from place to place mainly because the ocean currents have varying limits throughout the year and because the temperature of the land changes more quickly than that of the sea.

FIGURE 2 shows us the distribution of range by means of lines joining positions which have similar mean annual temperature ranges. In some of the details which appear in this chart, there may be slight inaccuracy. For example, it is possible that south of Greenland and Iceland, range should be lower than is shown. This, however, is of little importance in the present instance, since a small scale chart may never be used to exhibit more than the broad outlines of the conditions represented. Our figure may be regarded therefore as accurate enough for this purpose.

The chart shows us that low ranges are found in the open ocean, where the disturbing influence of the land is felt least. As the coast is approached and the water becomes shallower, range increases for the reason already given, namely, that the temperature of the land changes more rapidly than that of the sea. The widest ranges are found in the regions where cold currents approach the warm ones—as, for example, where the Gulf Stream moves close to the Labrador Stream—because the strength and position of these streams are constantly changing.

Range is small both in polar and equatorial regions, but for very different reasons. Near the equator, range is small because the annual variation of solar radiation and of air temperature is small. At the poles, although seasonal differences are very marked, temperature range in the sea is small because the temperature, being already low, has not far to fall before the water freezes. In summer most of the heat gained is employed in melting the ice formed in winter.

Besides the annual range of temperature, a diurnal variation occurs, due to the alternation of day and night. Diurnal range is of an altogether smaller order than the annual range, which is the largest temperature variation with which we have to deal. In the tropics, the daily range in calm, cloudless weather is about $1\frac{1}{2}^{\circ}\text{C}$., but with a moderate to fresh wind and a clouded sky it is only about $\frac{1}{2}^{\circ}\text{C}$. This difference is due to the fact that absorption and radiation of heat take place under a clear sky to a greater extent than under a clouded sky. The action of the wind is to increase evaporation and to mix the surface water layer with the layers below. By day, water beneath the surface tends to be

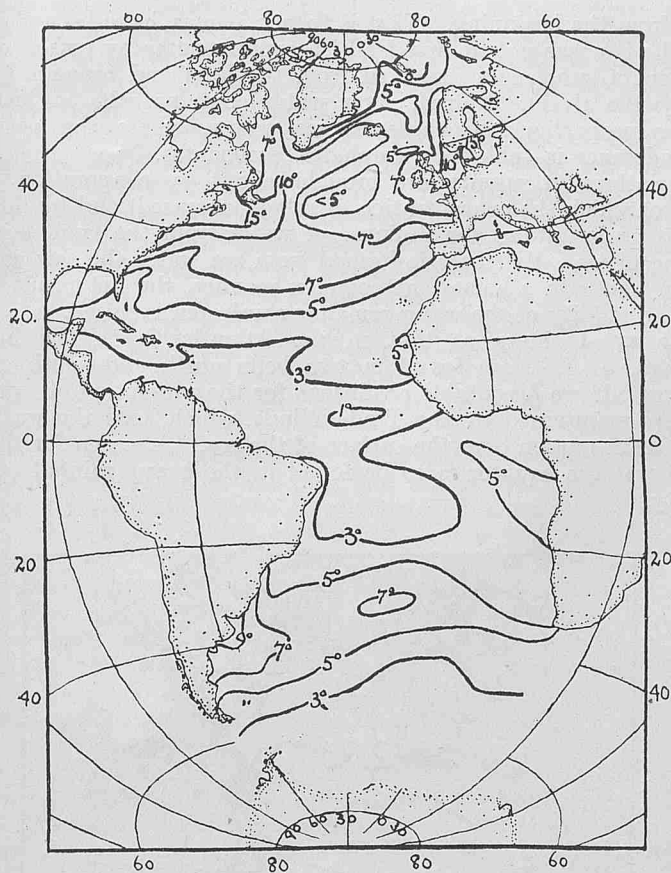


Fig. 2.—The Mean Annual Range of Temperature (°C.) of the Surface Waters of the Atlantic Ocean (after Schott).

cooler and by night warmer than the actual surface layer in which absorption and radiation for the most part occur.

Speaking generally, the minimum in the daily course of temperature occurs between 4 and 8 a.m., and the maximum is reached between noon and 4 p.m.

In addition to the daily and yearly fluctuations in temperature there are evidences of small, but nevertheless important variations which have longer periods than a year. The best known case is that of the two yearly variation, temperature tending to be above normal in even years and below normal in odd years. This phenomenon is perhaps better known in connection with air temperature than with that of the sea. If, as appears to be the case, the intensity of solar radiation is connected with the outburst of sunspots, we may expect to find an eleven-year period in the temperature of the sea, with a maximum when the sunspot number is at a minimum, and *vice versa*.

The rays from the sun are not all of the same nature. Heat rays which belong to the red end of the spectrum are rapidly absorbed on striking the surface of the sea, and in consequence the greatest changes of temperature take place at or near the surface. Conduction plays only an unimportant part in distributing heat beneath the surface. The principal distribution of heat is effected by the vertical circulation which goes on almost everywhere in the sea, and which arises from the stirring effect of the wind on the upper layers and from differences in density. If a layer of water is cooled below the temperature of the water on which it rests—provided that the salinity is the same—it will sink until its temperature is equal to that of the surrounding water. Cold water is heavier, bulk for bulk, than warm water; but it is also true that water containing a quantity of salt (the salt content being termed salinity) is heavier than water containing less salt. Thus a layer of highly saline water resting upon water of lower salinity may sink before its temperature falls below that of the underlying layers, and so convey heat to the water constituting these lower layers. An interesting example of the manner in which heat is conveyed and is in fact stored beneath the surface has been observed in the shallow oyster basins found on the Norwegian coast. In summer the surface layer of water, which is comparatively fresh and therefore light is heated during the day; as also, but to a less extent, is the uppermost layer of the bottom water which is salt and heavy. During the night the surface water cools. Since, however, it still

remains lighter than the water immediately below it, the lower layer never reaches the surface and so loses very little of its heat. After this process has been going on for some time, the temperature a fathom or so from the surface sometimes reaches remarkable values, as high as 35° C., while the highest temperature at the surface may be no more than 20° C.

The attempt to study conditions in the sea has been compared with an attempt which might be made to study the land by an observer floating in a balloon high above the clouds. In such a case the land could only rarely be seen and no direct observations could be made. Such a comparison is not without justification. So, while it is comparatively easy to gather information about the conditions at the surface of the sea, it is much less easy to know what goes on below the surface especially in the deepest parts of the ocean. Our knowledge of the vertical distribution of temperature in the sea is therefore less than that of the horizontal distribution. An idea of the way in which temperature decreases as depth increases may be gathered from the following observations of temperature which were made at a position in the middle of the Atlantic a little north of the equator.

Depth (fathoms)	-	-	0	55	109	219	437	547
Temp. (°C.)	-	-	26.9	18.6	10.7	7.7	5.1	4.8

On comparing the figures here with those in Table I. it becomes evident that the temperature of the water at 500 fathoms in the tropics is roughly the same as that of the surface water a little north of 50° N. Lat.

Clearly the vertical temperature gradient in the North Atlantic has not everywhere the same steepness, for in the Arctic regions even the surface water is colder than the water in the tropics at 500 fathoms.

In the following series of observations from a position S.W. from Cape Farewell (in Greenland) we find at 100 fathoms a cold layer of water intermediate between two warmer layers. The cold layer is derived from the East Greenland Current, while the surface and bottom layers are composed of "Atlantic" water (as opposed to "Polar" water) which being relatively salt, has in one instance, sunk below the cold water from the north.

Depth (fathoms)	-	0	27	55	82	109	164	273	547	1,094
Temp. (°C.)	-	5.4	4.8	3.3	0.8	1.0	3.3	3.4	3.1	1.9

It is moreover to be noticed that the temperature of the water at the very bottom (1,100 fathoms) is also low. From FIGURE 3, which represents the temperature of the water on the floor of the Atlantic we see that there is, particularly in the deepest parts, little difference in temperature between one place and another.

The temperature in the deeps on both sides of the Atlantic Ridge in the North Atlantic, and on the east of the ridge (north of Walfisch Ridge) in the South Atlantic is about 2½° C. The bottom water of the North Atlantic is largely composed of surface water which has at some time moved northward from the tropics till it has been cooled sufficiently to sink. Polar water is prevented from creeping out of the Arctic Ocean along the bottom of the North Atlantic by the submarine ridges which exist between these oceans. The bottom water of the Norwegian Sea has, on the other hand, a temperature of -1° C., because it originates from somewhere in the vicinity of Jan Mayen Island, where the surface temperature is low.

In the South Atlantic the low temperatures show that water has moved from the Antarctic regions into the bottoms of the Argentine and Brazilian Basins, and also into the Cape Basin, where further movement to the north on the east side of the Atlantic Ridge has been checked by Walfisch Ridge.

Since heat is conveyed only very slowly down to the great depths of the sea, variations of temperature there will be, if they exist, very small and slow, so much so that it would require the most delicate thermometer to detect them. As we make series of temperature observations from the surface downwards, we find therefore that seasonal variations of temperature diminish until they can no longer be observed, and we find moreover that they lag further and further behind those at the surface until the seasons are reversed. That is to say, the highest temperatures occur in winter and the lowest in summer. Such conditions prevail in the Barents Sea and to a certain extent in the deeper waters of the North Sea.

Reference to the sinking of the surface water in high latitudes and of the rising of the bottom water in low ones has already been made. When we examine either the vertical temperature gradients in the North Atlantic or the temperature distribution at, let us say,

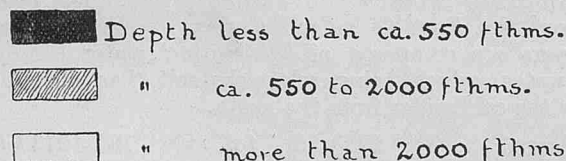
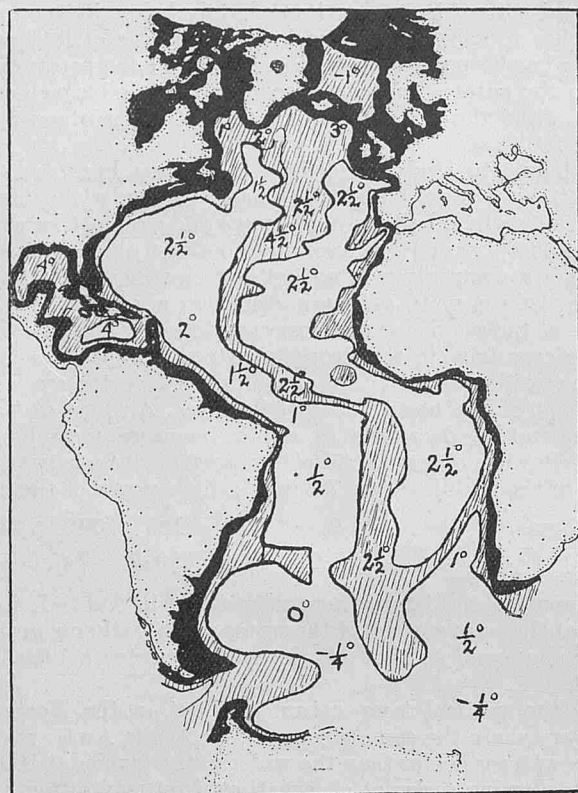


Fig. 3.—The Temperature ($^{\circ}\text{C}.$) of the Bottom Water of the Atlantic Ocean (after Schott).

500 fathoms, we find, as we might expect, that near the equator the temperature falls more rapidly than further to the north, but we also find that while the temperature of the water at 500 fathoms in the tropics is about $5^{\circ}\text{C}.$, in 40°N. Lat. , it approaches $10^{\circ}\text{C}.$

We have, therefore, in addition to a circulation of the North Atlantic waters in a horizontal plane at the surface, a circulation in a vertical plane, water moving north on the surface, sinking (probably somewhere south of Greenland), and returning to the south as a subsurface current.

So far we have dealt only with temperature, but we may see also that the water movements which are suggested by the distribution of temperature in the sea are confirmed by the distribution of salinity. Rather less than half of all the known elements have been detected in solution in sea water, but, considering the quantity of water in which they are dissolved, only a few are present in appreciably large amounts.

Moreover, most of the dissolved substances are to be found everywhere in the sea in much the same proportions. So that for practical purposes we assume that a determination of the quantity of one substance present in a given quantity of sea water can be used to give a value for the total dissolved substances, by making an allowance for the substances not determined. A value so obtained is what we mean by *salinity*.

The substances present in the largest amounts are sodium and chlorine. The chlorides* can be determined in a very exact manner, and in this way we arrive at the salinity. Salinity is usually given as the weight of salts contained in 1,000 parts (by weight) of sea water. That is to say, a salinity of 35 per mille (usually written 35‰) indicates that there are 35 lbs. of salt in 1,000 lbs. of sea water.

The origin of the salts in the sea we do not know. One hypothesis suggests that the substances now found in solution were probably

there from the beginning. That is to say, it may have been the case that the sea was not at first fresh, becoming saltier by reason of the addition of substances dissolved from the land and brought to the sea by the rivers. Indeed, river water contains salts in just the reverse proportions to those in sea water, where the order of preponderance is—chlorides, sulphates, carbonates.

Variations in salinity are brought about by evaporation (as a result of which the concentration of salt is increased) and by dilution due to precipitation, the draining of water from the land, and the melting of ice. When ice is formed from sea water the salt concentration varies in a somewhat complex manner, the net result being that the salinity of the water remaining unfrozen is raised.

FIGURE 4 shows us that in the Atlantic Ocean the highest salinities, 37‰ , are found in two belts north and south of the equator. There favourable conditions for the promotion of evaporation are maintained by the Trade Winds, which keep the warm air in constant motion over the surface of the sea. A reason for the low salinity at the equator is to be found in the heavy rainfall of that locality.

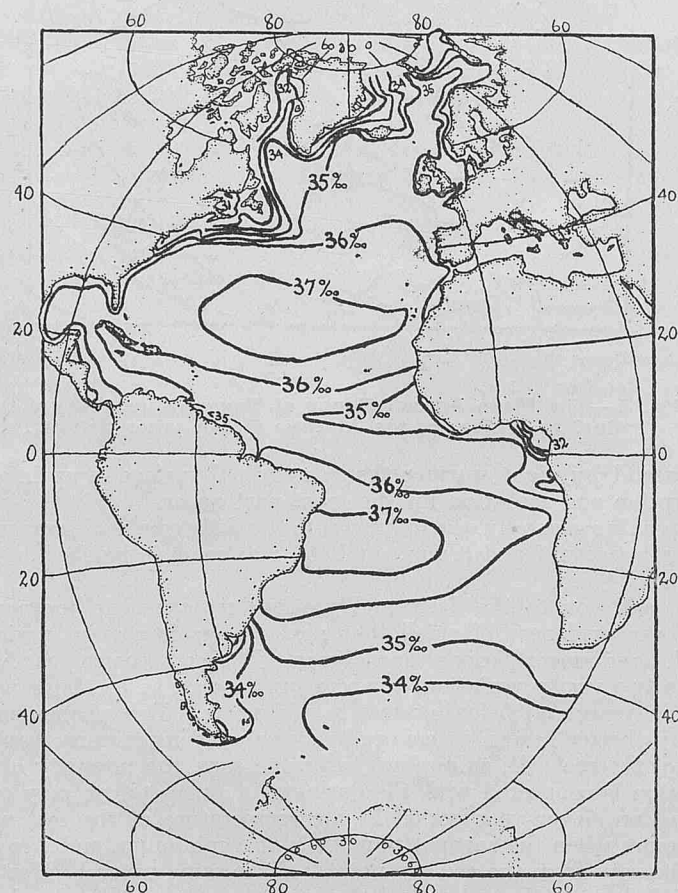


Fig. 4.—The Mean Salinity (‰) of the Surface Waters of the North Atlantic (after Schott).

Table II.—Mean Salinity (‰) of the Surface Waters of the Atlantic Ocean in 10° Zones of Latitude (after Krümmel).

Lat.	0° – 10°	10° – 20°	20° – 30°	30° – 40°	40° – 50°	50° – 60°	60° – 70°
N.	35.3	36.2	37.0	36.3	35.1	34.9	33.5
S.	35.6	36.7	36.3	35.3	34.2	33.4	33.?

The table above shows us that the North Atlantic is rather saltier than the South, especially in high latitudes. Here we see again the effect of the North Atlantic Drift in carrying salt and, as we have already noticed, warm water far to the North.

Salinity decreases as we leave the tropics, and travels towards the poles, mainly because evaporation becomes less with decreasing temperature, and because to a certain extent precipitation increases.

* To be more exact, the halides are determined.

In polar regions low salinities result from the melting of ice, and in the case of the Arctic Ocean, from the many rivers bringing fresh water off the surrounding continents. Furthermore, as the coast is approached, lower salinities are found—especially off the mouths of the larger rivers—for obvious reasons.

Returning to FIGURE 4, we may trace the course of the water at the equator in the direction of the tongue of water of relatively low salinity which stretches westward from the African coast. As the Equatorial Streams come more and more within the influence of the Trade Winds, the salinity of the water is increased. Further we may see the directions taken by the North Atlantic Drift and European Stream, carrying "Atlantic" water north of the Arctic circle, and we find the crowding of the *isohalines* (lines joining position of equal salinity) off Newfoundland in the regions where the Labrador Current borders the Gulf Stream, and where the East Greenland and East Icelandic Polar Streams meet the North Atlantic Drift and the European Stream.

Mention has been made of the fact that the bottom water of the Oceans originates in high latitudes, and we may therefore expect the salinity of these waters to be approximately the same as that of the surface water in the locality whence they are derived as a mixture of "Atlantic" and "Polar" waters. The salinity of the bottom water in the North Atlantic has in fact a value a little above 34.9‰ , and it can be seen from FIGURE 4 that the surface salinity S.W. of Cape Farewell has a similar value.

Off the African coast in the Canary Islands region the bending of the isohalines sharply to the south (*cf.* the isohaline of 36.0‰) is probably to be accounted for by the upwelling of bottom water, which is thought to take place in this locality.

Of the periodic variations in salinity which occur our knowledge is at present limited. Something is known of their extent in the North Sea, where the work has been most intensive, and the result has been to show us that as we move out of the North Sea variations grow less. Towards the western entrance to the English Channel and towards a line drawn between Scotland and Norway they approach the low value of one tenth per mille. It seems to follow, therefore, that while variations of salinity in the ocean generally may be small, they will rise as the isohalines become more crowded. That is to say, salinity range will be wide where salt and fresh currents border one another, changing their relative positions from time to time.

For the seas in the vicinity of the British Islands, there is evidence of an annual fluctuation in salinity, though it is but small when compared with the annual fluctuation in temperature. In winter and early spring warm salt water from the southward enters the North Sea by way of the Færoe-Shetland and the English Channels. At the same time it flows more strongly into the Norwegian Sea and extends its limits further to the north and west.

Though the broad effects of this movement on the climate of western Europe are undoubtedly well known, the course and intensity of this influx of warm Atlantic water is not, however, the same in all years, and its variations from year to year form the basis of present investigations. In considering the additional warmth which becomes available to us from this source it must not be forgotten that heat is given up during winter not from one surface layer alone but from the whole body of water down to considerable depths, because as the surface layer cools and sinks its place is taken by water from below which in turn radiates part of its heat, the process being constantly repeated.

Table III.—The Temperature ($^{\circ}\text{C.}$) of the Air over the Færoes in Winter when the wind blows from the Direction of (a) the North Atlantic Drift (b) the Polar Stream (after Knudsen).

Month.	Wind from	
	N. Atlantic Drift.	Polar Stream.
November	7.4°C.	1.8°C.
December	6.2	0.0
January	5.3	-0.4
February	5.8	-0.6
March	5.6	-1.1
April	7.2	2.5

The extent of the influence of ocean currents on climate may be gathered from the table above, the figures in which show that the air temperature over the Færoe Islands in winter is ca. 6°C. higher when the air comes from the direction of the North Atlantic Drift than when it has previously passed over the Polar currents.

Moreover, it has been shown that the variations of winter air temperature in Scandinavia, the growth of the pine tree, the season of flowering of certain plants, etc., have a close connection with variations in the European Stream and, therefore, with the whole circulation of the North Atlantic waters.

As regards vertical gradient, salinity in the tropics decreases as depth increases, and as we go further north the rapidity of this decrease becomes less, until the whole of the water from top to bottom has roughly the same salinity. As we go still further north, into the region of the polar streams, the gradient tends to be reversed, salinity increasing with depth. Here the relatively warm salt waters from the south sink below the fresher and lighter (though colder) waters of the Arctic currents.

In conclusion the following chart showing the *residual* (*i.e.* non-tidal) movement of the water in the North Sea and adjacent seas may be of interest.

Although our figure, which is based upon the results of salinity and temperature observations, drift bottle experiments, current meter observations, etc., appears fairly complete, it must not be taken as final. There remain many gaps and uncertainties which necessitate the continuation of similar observations in the years to come.

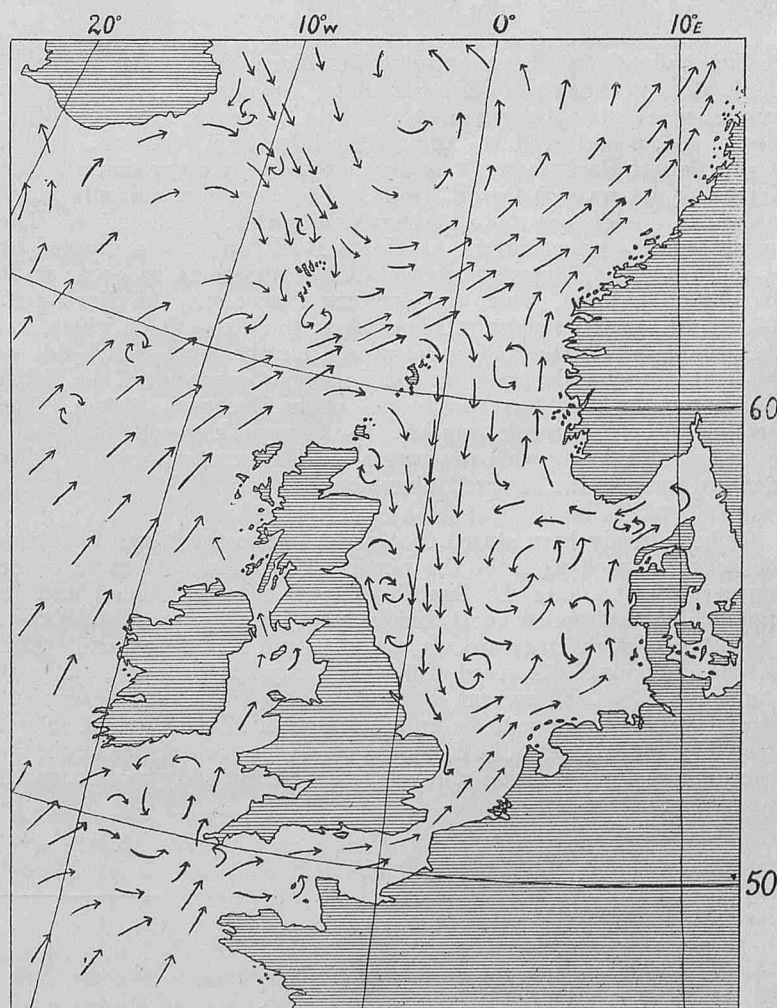


Fig. 5.—The Circulation of the Upper Layers of the Waters bordering the British Islands.

In the first place it can be seen that, west of the British Islands, our chart gives a northerly direction to the water movement because there is reason to believe that the water in the Rockall Channel is derived from the south rather than the west. It appears to be distinct from the water outside the line of banks of which Rockall

forms part; this latter water, being proper to the North Atlantic Drift is derived from the western side of the Atlantic. The speed of the current in the Rockall Channel has been estimated at about six miles a day, but there is as yet considerable difficulty in giving a reliable value for the average speed of these currents. Such values as are given here must therefore be accepted with due reserve. There is, however, evidence that the Irminger Current south and west of Iceland flows at a speed of about six miles a day, so that this value for the rate of the water movement north-west and west of the British Islands may be reasonably accurate. Over the line of banks running N.E'ly. towards the Færoe Islands, considerable eddies appear to occur. For instance, over the George Bligh Bank a set of 37 miles in a direction 220° (true) has been recorded as occurring in the course of a day during a S.W'ly. gale.

As the Færoe-Shetland Channel is approached, the speed of the current probably increases, and in the Channel itself the water moves between 10 and 16 miles a day in a N.E'ly. direction. Neither the speed nor the direction of this current are constant. It is interesting to note that over the Færoe-Iceland ridge, on the other hand, there is little or no movement of "Atlantic" water to the eastward.

The speed of the East Icelandic current in these regions is a little uncertain, but it may be put perhaps at about 3-4 miles a day.

As the water moves east from the Færoe-Shetland Channel its speed appears to fall, and along the Norwegian coast it may move at the rate of about four miles a day.

The bulk of the water entering the North Sea passes north of Shetland, and moves southwards along the English coast at an *average* speed of 2-3 miles a day. With a strong following wind, speeds of 5, 6 and even 12 miles a day have been recorded. South of the Dogger Bank water from the north meets water entering the North Sea by way of Dover Straits. The combined currents move eastwards, finally turning to the north along the Danish coasts. The *average* speed of the current at Horns Reef has been estimated at $9\frac{1}{2}$ miles a day. The set into the Skagerrak seems to occur most strongly in autumn, when the outward flow along the Norwegian coast is also at its height. This outflow, the strength of which has been estimated at about 30 miles a day, for the most part bends to the right and moves north along the Norwegian coast out of the North Sea, merging in the Norwegian branch of the European Stream. The remainder of the water flowing from the Skagerrak spreads westwards to an extent varying with the season and apparently forms an eddy of mixed water in the Fisher Bank region.

It has already been stated that water enters the North Sea from the south as well as from the north. The main current into the Southern Bight enters the English Channel close to Ushant and on approaching the English coast divides, part bending towards the east. The other part returns towards the west and rounding Land's End leaves the Channel. A speed of 6 miles a day has been recorded past Land's End, but the current does not appear to be of a permanent nature. There appears to be an eddy motion in the Channel Island area which may, it seems, be either anticlockwise or clockwise, probably according as the extension and retraction of the eddy motion south

of Ireland alters the direction taken by the water entering the Channel.

The swirl south of Ireland seems to reach further to the south in the summer months than in winter, in consequence of which the current passing Ushant appears to take a more N'ly. direction in summer than in winter.

There is little doubt as to authenticity of the swirling motion south of Ireland which has been established by an investigation of the salinity distribution in this locality.

The water in the Irish Sea generally moves from south to north at an approximate average speed of 2 miles a day. The water in the English Channel and Southern Bight usually moves eastwards and north-eastwards at about the same rate. Here, however, there is evidence of the occurrence of much higher speeds, up to 11 miles a day within the Channel. Moreover, objects have drifted from the mouth of the Channel to the coast of Denmark at the rate of at least 6 miles a day.

In the Channel Pilot (Part I) the speed of the N.E'ly. current past Ushant is stated to reach on occasions 30 miles a day, but such rapid movements as these do not appear to be common.

Especially in shallow waters the currents depend to a large extent upon the strength and direction of the wind. For example, the set through Dover Straits may be, in periods when the wind blows from between north and east, entirely reversed and may be directed down Channel at 2 miles a day. Under the influence of E'ly. winds (either N.E'ly. or S.E'ly.) the whole of the northern circulation of the North Sea may be reversed, and a current may flow from Denmark towards England and north along the English and Scottish coasts. Again a N.W'ly. wind forces the current normally flowing southwards along the western side of the North Sea, well down into the Southern Bight, on to the shores of Belgium and Holland.

Thus, so far as the area on our chart south of 60° N. Lat. is concerned, the circulation depicted may be considered as one which occurs under average wind conditions; that is, when the wind is blowing from the west.

The ways in which it can differ from its apparently usual condition, are so numerous as to make it impossible to enter into further details at the present time. Furthermore, the extent and manner of the influence of the winds on the currents may vary with the season. For this reason the circulation depicted in FIGURE 5 is perhaps, more often to be found in winter than in summer, winter being the season when the W'ly. winds are more effective. Finally, it must be called to mind that the direction of a current is not necessarily the same as that of the wind producing it. In the open ocean it appears that there is, for certain areas at least, a well defined relation between the direction of the wind and that of the induced current, but in the neighbourhood of land circumstances are different, since the configuration of the coast must, and does to a large extent determine the direction of the bordering currents.

NOTE.—For conversion of Centigrade degrees to degrees of Fahrenheit, see Table XVII, under "Weather Signals," page 45, March, 1925, Number, and in the "Marine Observers' Handbook," pages 87 and 88.

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

CURRENTS ON THE TRACK FROM THE LATITUDE OF CAPE BLANCO TO THE BRAZILS.

PREPARED IN THE MARINE DIVISION BY C. S. DURST, B.A., SENIOR PROFESSIONAL ASSISTANT.

THE charts published in the January 1925 and the present Number of "The Marine Observer" are constructed on precisely similar lines to those published last year for the Cape Blanco-Table Bay track. Resultant arrows are given showing the currents experienced for every two degrees of Latitude on the track and also current roses for every five degrees of Latitude or, in some cases, less. The roses are displaced slightly so as not to clash with the resultant arrows, but both forms of representation are made from precisely the same information, namely, the observations contributed to the Marine Division during the years 1910 to 1914 and 1920 to 1923.

The track to the Brazils cuts across the westerly flowing Equatorial Current and at some seasons of the year the easterly flowing Counter-Equatorial Current. It is not unnatural therefore that these prominent features should be the first to attract attention in the discussion of the flow of water on this track. In the present article it is proposed to deal with these streams and in a later Number to discuss other features of the currents on this route.

The main outlines of the Equatorial and Counter-Equatorial Currents are well known. The Trade Winds of the Northern and Southern hemispheres drag with them a flow of water, the North East and South East Trade Drifts, which tend to set in a more westerly direction than the wind owing to the force engendered by the rotation of the earth. If winds of the same force and direction are blowing over the open ocean in different latitudes, a stronger current will be set up at the lower latitude. In this way it follows that a ship passing through the Trade Wind regions towards the Equator should experience a gradually increasing westerly current. It is probable that this westerly *Drift* is further reinforced by a *Stream* current set up by a definite though slight inclination of the ocean surface downwards towards the Equator, which slope, in its turn, is due to the tendency of the North-East and South-East Trades to draw water away from the equatorial regions.

The Trade drifts have between them a strip of easterly flowing water, the Counter-Equatorial Current, which in the Atlantic Ocean varies in width and extent from season to season, being widest in August and September. Between the months of December and March it cannot be distinguished as an easterly flowing stream westward of Longitude 25° W.

The Equatorial Current.

The fluctuation from month to month of the velocity of the Equatorial Current on the track to the Brazils in the near neighbourhood of the Equator is shown in FIGURE 1, inset on the chart published in the January, 1925, Number. It is to be noticed that there are two minima of velocity occurring in May and October, and two maxima in July and December. The same features were found on the Cape route in these Latitudes (see FIGURE 4, inset to the Current Chart in Vol. I, No. 7, of this JOURNAL.)

It would seem then that this double maximum in the solstices is a feature of the Equatorial Current, and it appears that that effect is confined to a strip between about Latitude 4° N. and 4° S., the northern limit of which strip is the boundary of the Counter-Equatorial Current.

Easterly Sets on the Equator.

On 24th May, 1921, Captain J. B. HALL, of S.S. *Tudor Star*, reported he had found a set of S. 81° E. 31½ miles per day on the Equator when bound for the River Plate. Other confirmatory reports were also received and the conditions prevailing were subjected to a close examination. The consistency of easterly sets in that year is shown by CHARTLET A, which gives the currents experienced by all ships reporting to the Marine Division on that route in May 1921. It was then found that during that period the position of the Doldrums had been about 250 miles south of the normal position. Furthermore, it was noticed from an examination of the data collated under Captain TOYNBEE during the years 1855 to 1871 that easterly sets had occurred in April and May, 1862, and that in that period also the Doldrums had been south of their normal position. It was then surmised that the position of the Doldrums had a definite connection with the presence of the easterly set, and in an article which appeared

on the back of the APRIL, 1922, METEOROLOGICAL CHART OF THE NORTH ATLANTIC it was stated "On the strength of these instances, if a ship outward bound (in April and May) finds the N.E. Trade persists to within a few degrees of the Equator she may anticipate finding an easterly set on the Equator, while conversely if a homeward bound ship finds the S.E. Trade fails before crossing the Line, an easterly set is probably to be met with near the Equator."

That surmise has now been submitted to a statistical examination which would seem to prove conclusively that there is a close relationship between the two.

For each log-keeping ship which passed over this route during the months of April and May the Latitudes at which the N.E. and S.E. Trades ceased were determined. The mean of these two Latitudes was considered to be the centre of the Doldrums. Thus the amount by which the Doldrums were north or south of their normal position was obtained. Similarly the amount was determined by which the current experienced by that ship near the Equator differed from normal. FIGURE 3 shows the increase or decrease of east or west setting current with variations of the mid position of the Doldrums. It will be seen that if the Doldrums are 3° north of normal the current is as much as 10 miles per day more westerly than would be expected from a chart of normals of current, while if the Doldrums are 3° to southward of normal the current is as much as 10 miles per day more easterly than would be expected.

This relationship may be directly due to the wind in the near neighbourhood of the Equator. As will be seen from FIGURE 2 (inset on the chart published in the January, 1925, Number) in April and May the normal position of the Doldrums is but slightly north of the Equator so that a movement to the southward of their position will imply a decrease of the South-East Trade on the Equator. But it does not seem that this can be the whole cause of the easterly sets when it is considered how strong those easterly currents were in 1921 and again in 1923, a year in which a similar shift of the Doldrums was found to have taken place.

The current then between Latitude 4° N. and 4° S. in the Atlantic seems to be formed of two parts: (I) the direct wind effect (which is shown by this relationship between the velocity of the current and the position of the Doldrums), and (II) an effect the cause of which is at present unknown which gives rise to a current fluctuating throughout the year and having maxima of westerly velocity in the solstices.

The Counter-Equatorial Current.

It is a feature of both the Pacific and the Atlantic Oceans that at certain seasons of the year an easterly Counter-Current is formed in the open ocean between the Trade Drifts.

A theory put forward for the formation of this Counter-Current is that the water displaced to the westward by the Trade Drifts must be replaced by other water, and that a certain percentage of this replacement is made by means of an easterly stream at the surface.

It does not seem that this theory is very satisfactory. It does not take sufficient account of the sub-surface currents which would contribute a far larger quota than any surface current could contribute.

Both the Atlantic and the Pacific Oceans are governed by similar atmospheric circulations, namely, the North East and South East Trades and on the face of it, it must be that the Counter-Equatorial Current is a result, direct or indirect, of such conditions. In both oceans the position of the meeting point of the Trade Winds is usually north of the Equator throughout the year and has a very definite seasonal oscillation, being most northerly in August and September, most southerly in February, March and April. In both Oceans the Counter-Equatorial Current has a seasonal variation of position and strength which is most markedly present in those months in which the meeting of the Trades is thrust furthest to the northward.

In the months of northern Autumn the South East Trade Wind crosses the Equator and as it penetrates into the Northern Hemisphere it veers until above Latitude 4° N. it becomes a southerly and south-westerly wind. The effect of such a wind is to produce a surface current running in a north-easterly and easterly direction.

From the data of the years 1910-1914 and 1920-1923 a computation was made of the effect of wind on current between

Latitudes 4° and 10° N. on the track to the Brazils during the months of June to October, the months of Easterly set. The result is given below.

Wind Force.	Angle of set to the right of wind direction.	Velocity of resultant current in miles per day.	Theoretical Velocity in miles per day.
3	79°	3.7	4.6
4	72°	7.1	7.0
5	65°	12.3	9.8

It will be seen that the mean values of the velocity of the current when different forces of wind were prevailing are not very different from values given by theory, though the angle between wind direction and current is greater than the 45° based on theory.

Since during these months the winds of this district blow much the

most frequently from south and south-west it is evident from the figures above that a considerable part of the actual easterly current found north of Latitude 4° N. is due to wind.

FIGURE 4 shows the mean east and west components of current between Latitude 4° and 10° N. Month by month throughout the year at each observation of current a note of the wind blowing was entered and a calculation made of the east or west component of current that would be expected if the current was directly proportional to the wind (as it is in extra tropical latitudes when an average is taken) and set at an angle of 45° to the wind direction. The mean component of current to be expected from the wind was thus obtained and is shown on FIGURE 4 by the broken line.

From a comparison of these two curves it would seem that the greater part of the fluctuation in velocity of the current from month to month is accounted for by the change in direction of the wind but that all through the year there is an easterly stream current (averaging 4½ miles per day). This easterly stream current has the effect of reducing the westerly wind drift in the months November to June but from July to October it reinforces the easterly wind drift and creates what is known as the Counter-Equatorial Current.

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.

DEMARKATION FOR WEATHER CHANGES IN THE NORTH SEA.

THE following remarks are by Captain H. E. FRENCH, M.B.E., of S.S. *Kovno*.

"Regarding lines of demarkation for weather changes, I can give you my personal experience for upwards of 30 years (of which 19 years in command) in the North Sea trade between Hull and the Baltic and Scandinavia. Between a line drawn from the Skaw to Færder and thence westward to the Humber there are three positions where we invariably find a change in the weather when conditions point to a change.

"1st. From Færder to the Naze any variation in weather conditions takes place about Arendal. Say we have thick weather or snow leaving the Christiania Fjord, the pilots will generally say as soon as we get the length of Arendal this will change and we invariably get either a shift of wind or weather at this point.

"2nd. There is generally a change about 30 to 40 miles to the W.S.W. of the Naze and Hantsholm. If there is likely to be a change this is invariably where it takes place.

"3rd. Our course from either the Naze or Hantsholm takes us over the Dogger Bank. Any likely change about to take place will generally occur after the ship has passed from the shoal to the deep water to the westward.

"These three places are where we generally get a change and it has become practically second nature to us to look for any likely change at either of these points should weather conditions point to a change.

"I have had but little experience in the coastal trades except during the war and then I found the change of weather generally occurred either off St. Abbs Head or Flambro' Head."

CLOUD PHOTOGRAPH.



THE photograph above was taken by Mr. H. G. B. PINKNEY, 2nd Officer of S.S. *Port Hacking*, Captain A. E. STICKLAND, when bound from London to Melbourne, in Lat. 32° N., Long. 13½° W. during the afternoon of April 23rd, 1924.

The weather at the time was :—Wind N.W., Barometer, 30.14. Thermometer, 71°.

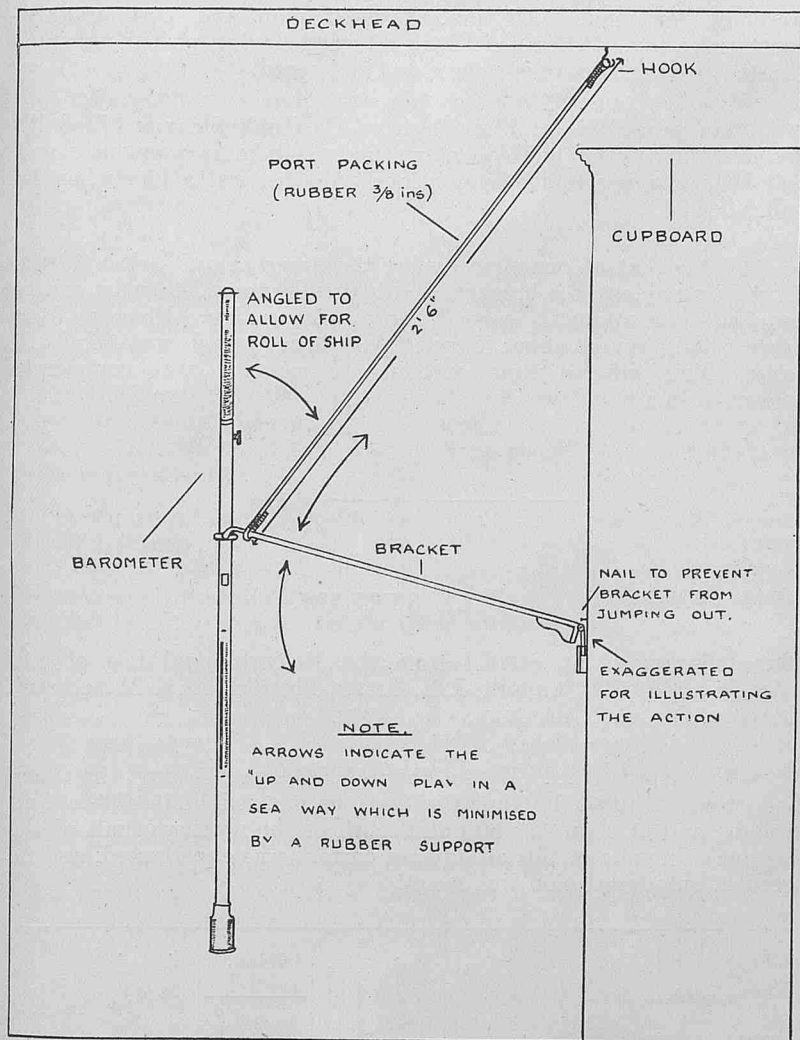
The Cu-Nb. photographed was moving from N.W. with the wind.

Marine Observers are invited to try it and to report the result of their observations. It is thought that it may be necessary to ease up the flexible suspension at vibration speeds in some ships.

“Sudden shocks and vibration are entirely done away with by means of this simple method.”

April 25th 1924.

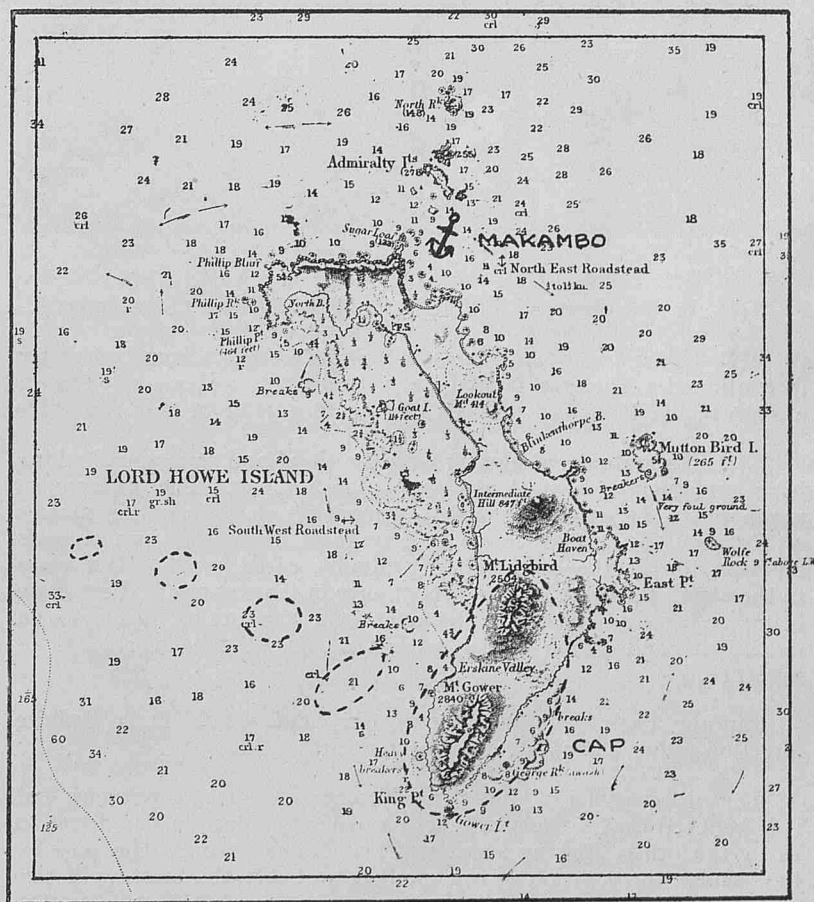
“At Lord Howe Is. Sky cloudless with the exception of a ‘cap’ on Mts. Gower and Lidgbird, wind west; somewhere about the position marked on enclosed chart, I noticed a tiny cloud like a small puff of smoke which gradually increased as it travelled towards the mountains until it was a small Cumulus and attached itself to the ‘cap’ on them; by the time it had joined on to the ‘cap’ another cloudlet had already formed and was on its way, this continued for the few hours we remained at the island, and though the ‘cap’ was thus continually added to, nothing left on the lee side, it seemed as though the cloud was actually born at a spot about five miles to wind’ard of the island.”



“ The accompanying sketch is an illustration of an experiment which has been carried out on board during the last voyage to Australia, to eliminate as much as possible the pumping of the barometer. A piece of port packing rubber $\frac{3}{8}$ inch square and 2 ft. 6 in. long was used, one end being secured to the bracket arm near the barometer and the other end secured to a hook in the deck-head of the Chart-room, sufficient tension being used to raise the bracket and barometer high enough to allow for an up and down movement of about six inches.

“ In the opinion of all Officers on board, it has proved a great success, and from very careful observations taken under the very worst conditions (*i.e.* with the ship light and in bad weather), with and without the rubber, I found that the pumping was reduced by considerably more than half, also there is a much slower movement of the mercury, which gives one more time to take careful high and low readings, to arrive at an average reading.

“ After some time the rubber stretches, and has to be shortened, and I suggest that a brass spring of a similar tension would prove more satisfactory.



This is an interesting example of condensation created by wind blowing over high land—in much the same way that the “table-cloth” is formed over Table Mountain, *see* Vol. II., No. 13.

To the N.W. of Mt. Gower and Mt. Lidgbird there may have formed a patch of comparatively stagnant air over which the damp N.W. wind was riding. As the wind was gradually pushed higher and higher the temperature was decreased and cloud formed. On the S.E. side the air descended once more and the cloud was reabsorbed in the air.

EARTHQUAKE SHOCKS.

THE following is an extract from the Meteorological Log of S.S. *Empress of Australia*, Captain A. J. HAILEY, bound Victoria, B.C. to Japan. Observer, Mr. R. A. LEICESTER, 3rd Officer.

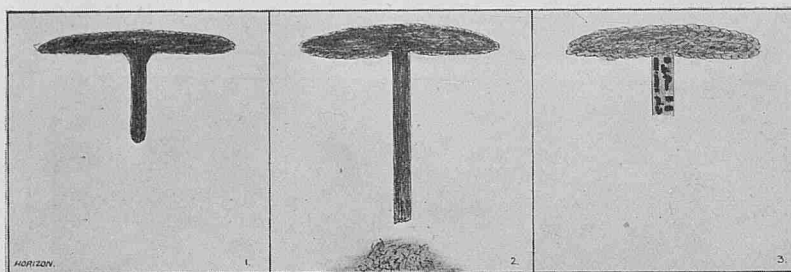
"16th September, 1924. 3.15 p.m. Latitude 51° 50' N., Longitude 167° W. Experienced severe shakes (2) on board. Nothing on board to cause same; thought to be earthquake shocks, being same as felt in Yokohama, September 1st, 1923."

WATERSPOUT.

THE following is an extract from the Meteorological Log of S.S. *Risaldar*, Captain G. PARK, Java to Calcutta.

"April 23rd, 1924 at 5 p.m. Position, between Sabang and Gt. Nicobar I. Weather :—clear blue sky with Nb. 4; giving distant showers. Wind W. 1. Sea calm. Swell S. slight.

"Observed waterspout distant 4 miles, 3 points on starboard bow or N. 30° W. and travelling E. 3.



"(1) As first observed and considered this the usual waterspout.

"(2) Thick, heavy and dense to marvel at the amount of water it contained. The sea immediately under the waterspout was in a state of liveliness and may be likened to vapour or thin smoke.

"(3) The waterspout closing with the cloud and revolving, looking from underneath, against the hands of a clock. The waterspout appeared to be semi-transparent containing dark irregular masses or shapes. By selecting one or any mass I counted two seconds for this to revolve and which gradually eased until, when close to the cloud, the same mass revolved once in ten seconds. I estimate being 2.5 miles off the waterspout and the action clearly seen by myself and Chief Officer with the aid of the long glass or telescope."

Captain Park asks whether waterspouts rotate in a definite direction either clockwise or counter-clockwise.

The observations of direction of rotation are not numerous, but it is believed that waterspouts are as likely to rotate in one direction as in the other, just as small whirlwinds ashore do. The impulse that causes the rotation of the spout is probably the meeting of two currents of air which are as likely to give rise to eddies in one direction as in the other.

RESCUE OF MAN OVERBOARD FROM ANOTHER SHIP.

EXTRACT from the Meteorological Log of S.S. *Dorset*, Captain C. R. KETTLEWELL.

"April 23rd, 1924. 2.30 a.m. A.T.S. Lat. 7° 04' N. Long. 80° 10' W. Slight sea and southerly swell. Wind N.N.W. 2-3.

"2.30 a.m. Heard cries from man in water on starboard side. Engines stopped, helm a'port, life-buoy thrown and accident boats called away. Helm and engines to Commander's orders while searching for man. 3.00 a.m. Located man and port accident boat sent away. 3.15 a.m. Boat returned having picked up man. Hoisted boat and resumed course and full speed.

"Man proved to be Fireman from Oil Tank Steamer, *Fred W. Weller* (Amer.) who had fallen overboard 23 hours previously and had been clinging to life-buoy which was thrown to him when he had fallen in.

"States that at one time during the day was quite close to the shore being able to see breakers and had endeavoured to swim ashore but had been gradually carried out by strong tide. Distance from nearest land round about Cape Mala when rescued was about 26 miles. Man suffered from exposure to sun but was completely recovered in a few days."

GULF STREAM.

THE following is an extract from the Meteorological Log of S.S. *Manchester Mariner*, Captain J. E. RILEY, Philadelphia to Manchester, Observer, Mr. C. E. STOCKER.

"29th April, 1924. Up to Noon (A.T.S.) on this day, the vessel had steamed about 140 miles within the charted limit of the Gulf Stream, and at noon was 80 miles south of the northern limit of the Stream. In spite of this an adverse current was experienced, and no weed of any description was seen."

Date 1924.	Time.	Lat.	Long.	True Course.	Dist.	Wind.		Air Temp.	Sea Temp.	Re- marks.
						Dir.	Force.			
Apr. 28	Noon	40° 03' N.	68° 43' W.	N. 74° E.	39	N.	4	46	44	8 p.m. Entered limit of Gulf Stream.
	4 p.m.	—	—	E.	40	N.	4	48	42	
	8 p.m.	—	—	E.	36	E.N.E.	3	40	41	
Apr. 29	Midt.	—	—	E.	37	E.N.E.	3	40	46	
	4 a.m.	—	—	E.	38	E.	3	42	55	
	8 a.m.	—	—	E.	38	E.	3	49	60	
	Noon	40° 06' N.	63° 58' W.	E.	40	E.	4	47	57	
		Cur- rent in last 24 hours		N. 72° W. 9½ miles.						

NOTES UPON AVERAGE CONDITIONS IN THE INDIAN OCEAN NORTH OF LATITUDE 35° S.

IV.—April.

WITH the movement of the sun northward the land and sea in the Northern Hemisphere are rapidly gaining heat, while the land and sea in corresponding latitudes of the Southern Hemisphere are losing it.

Over the north Indian Ocean and adjacent land, pressure systems are undergoing changes which make the month of April one of transitional conditions.

The areas of lowest barometer 1008 mb. (29.77 in.) are now situated, one over north-east India and the western portion of the Bay of Bengal, and the other over N.E. Africa and the southern Red sea. There is very little variation in pressure, which is very irregular over the whole of the North Indian Ocean. Winds are generally light with a large percentage of calms.

In the Arabian Sea, north of Latitude 20° N. the winds come from between N.W. and S.W. From Latitude 20° N. to the Equator, over the eastern half of the sea, the general direction of the wind is from the N.W., while between the same parallels over the western half of the sea N.E'ly. winds predominate.

In the Bay of Bengal, north of Latitude 15° N. moderate S.W'ly. winds are general, but strong N.W. winds are not infrequent on the eastern side. South of Latitude 15° N. to the Equator the winds are extremely variable.

In the south Indian Ocean pressure increases with Latitude from about Latitude 5° S. to the centre of the permanent anti-cyclone 1026 mb. (30.30 in.) which is gradually moving west and is now situated in Latitude 33° S. Longitude 90° E. The difference in normal pressure over this area for the month is 16 mb. (.47 in.).

Between the Equator and Latitude 5° S., extending to Latitude 10° S. west of the 60th meridian, is a belt of variables and calms, the percentage of calms being highest off the coast of Sumatra. Moving north with the sun in declination the S.E. Trades varying in strength between force 3 and 5 blow steadily between the 8th and 28th parallels from the Australian coast to the east coast of Madagascar.

In the Mozambique channel the southern monsoon becomes established during this month, the general direction of the wind coming from south to S.E. South of the Trade Wind belt the winds are variable in direction and may attain gale force from any quarter of the compass.

Cyclonic Storms.—During the second half of the month occasional storms may be experienced in any part of the Arabian Sea except the S.W. Only three storms are recorded in this month during the years 1890–1923. Originating in the S.E. or centre of the sea they travel in a N. W'ly. direction towards the Persian Gulf and at times recurve to the north and north-east.

Bay of Bengal.—Cyclonic storms are very infrequent over the Bay. Only seven storms or 2 per cent. of the total number of storms recorded during the years 1877–1912 occurred in this month. They form in the south of the Bay or in the Andaman Sea and may travel in any northerly direction.

South Indian Ocean.—Cyclonic storms are not so frequent in April as in the first three months of the year. Sixty-eight storms, giving a percentage frequency of 13 per cent. are recorded in this month during the years 1848–1917.

The majority of storms originate west of the 70th meridian and

travel in a S.E'ly. direction, recurving in about Latitude 23° S. to the S.W. Occasionally these storms cross Madagascar and enter the Mozambique Channel.

See chart giving tracks in Vol. I., No. 4, of this JOURNAL.

Air Temperature.—The normal temperature of the air over the Arabian Sea shows a considerable increase over that of March, more especially in the extreme north, where it averages 81° F., increasing to 84° F. in the south. In the Bay of Bengal the rise is not so large, temperature being 83° F. in the north, ranging to 84° F. in the south.

Between Latitudes 5° N. and 5° S. average temperature registers 83° F., whence it gradually decreases to the southward, being about 65° F. in Latitude 35° S.

Sea Surface Temperature.—Over the Arabian Sea the normal sea surface temperature increases from 78° F. in the north to 85° F. in the south. In the Bay of Bengal the normal temperature at the head of the Bay is 83° F., increasing to 85° F. in the south, but reaches 87° F. close in to the shore on the eastern side. Between Latitudes 5° N. and 5° S. the normal temperature is between 84° F. and 85° F., whence it decreases with increased Latitude to about 65° F. in 35° south.

Currents.—In the Arabian Sea, the surface current flowing down the Bombay coast, branches off the Gulf of Cambay. One branch, continuing down the coast, rounds the Island of Ceylon and turns north, flowing up the east coast of the Peninsula. The other branch, flowing west of the 70th meridian in a S.S.W. direction, gradually turns to the westward. Flowing in this direction between the Equator and Latitude 5° N., it turns N.E. on striking the east African coast, and flowing up that coast again separates between Cape Guardafui and Socotra. One branch turns west into the Gulf of Aden, while the other, flowing up the Arabian coast, gradually turns to the eastward, when it again joins the stream running down the Bombay coast.

In the centre of the Arabian Sea the currents are variable.

In the Bay of Bengal the current flowing up the west coast of the Peninsula turns to the eastward in the northern part of the Bay and returns to the southward, flowing parallel to the land on the western side. In the centre of the Bay the currents are variable.

South Indian Ocean.—Between Latitude 30° and 35° S. the current, setting in a general N. E'ly. direction, gradually turns to the westward when east of the 90th meridian and joining with the S.E. Trade Drift, flows in this direction between the 10th and 30th parallels and the 110th and 60th meridians. On reaching the 60th meridian the current divides, one stream flowing in a S. W'ly. direction south of Madagascar and continuing around the Cape. The other stream flowing north of Madagascar branches in a S.W. and N.W. direction off Cape Delgado. The S.W. branch flowing down the African coast joins up with that setting around the Cape and forms the Agullas current. The other branch, flowing up the Zanzibar coast, gradually sweeps to the eastward and flows in this direction between Latitude 6° S. and the Equator, extending to Latitude 5° N. when east of the 80th meridian.

Between the 110th meridian and the west coast of Australia the currents are variable.

WEATHER CHARTS EASTERN NORTH ATLANTIC.

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

IN the February Number, under "Weather Signals," particulars of weather messages broadcast for shipping from British stations were published, while in this Number will be found reports broadcast from Eiffel Tower, Paris.

The following example is intended to show the value of the above reports to a ship leaving the Mediterranean for a British port.

The Eiffel Tower reports contain observations at land stations over western Europe and northern Africa, together with observations reported by ships in the Eastern Atlantic. They are therefore of great benefit to shipping leaving the Straits, who, while steaming along the Spanish and Portuguese coast, wish to construct weather charts, but are unable to intercept the British "Weather Shipping" Bulletin.

For construction of weather charts see "Wireless and Weather, an Aid to Navigation," Chapter III., Volume I., Number 2, of this JOURNAL.

S.S. *City of London* (Captain D. MARTIN) on passage from Port Said to London, when passing through the Straits of Gibraltar desires to know the weather conditions likely to be experienced during the remainder of her voyage.

CHART XIII., FOR THE MORNING OF APRIL 26TH, 1924, is made from data obtained in the Eiffel Tower report, her own observations, and such ships as she is able to receive from, direct.

The chart shows that a large depression centred west of the British Isles extends and influences the weather over the whole of western Europe. Secondary depressions are indicated over the Bay of Biscay and in the Mediterranean off the N.E. coast of Spain. South-west of the Straits pressure is high. The barometer tendencies at the European shore stations are slight and irregular, but point to the movement of the secondaries in a North-easterly direction. The barometer over the British Isles is falling slowly, indicating slight movement of the main depression to the east. Over Spain, northern Africa, and at Funchal pressure is rising slowly, indicating a movement of the anti-cyclone in a N.E. direction.

City of London will expect as she proceeds and rounds St. Vincent a decrease in the force of her wind, with fine clear weather.

CHART XIV., FOR THE MORNING OF APRIL 27TH, 1924.—*City of London*, situated just north of Cape Roca, is now in a position to intercept weather messages from ships in the eastern North Atlantic, which, added to those contained in the Eiffel Tower report, allows her to make a chart in fuller detail than that of the previous morning.

From this chart she sees that the large depression has remained practically stationary during the past 24 hours, while an intense secondary centred south of Ireland is causing a whole gale to blow at the entrance to the English Channel. A wedge of high pressure now extends in a north-east direction from the Canaries over Spain and southern France, while relatively low pressure exists over the central Mediterranean.

The barometer tendencies at British stations and of ships to the northward and westward give some indication of the passage of secondaries from west to east, which will cause strong winds from between S.W. and N.W., at times reaching gale force, and unsettled weather conditions over the ocean north of Finisterre. South of Finisterre pressure continues to increase. *City of London*, steaming N. 24° W. 12 knots, will, as she makes northing, experience a shift of wind to the S.W., increasing in force, when the glass will commence to fall and weather become unsettled.

On the morning of the 28th, *City of London*, now north of Finisterre, is able to intercept the British "Weather Shipping" Bulletin and, together with reports received from other ships, constructs CHART XV.

This chart shows the main depression to have maintained its position west of the British Isles during the past twenty-four hours, while secondaries are again indicated at the mouth of and to the west of the Channel. High pressure continues to the south of Finisterre.

The barometer tendencies at the stations north of Holyhead indicate no movement of the main depression, while the tendencies at the stations south of Holyhead and of ships to the northward and westward are affected by the movement of secondaries to the eastward.

City of London, steaming N. 20° E. 14 knots, while crossing the Bay will expect a falling barometer with pressure fluctuating as secondaries pass. The wind will vary between N.W. and S.W. from strong to a gale in force, with heavy squalls, accompanied by rain and variable visibility.

On the morning of the 29th, *City of London*, north of Ushant and within the 100-fathom line, is now within an area to which the official forecast contained in the "Weather Shipping" Bulletin applies. The construction of CHART XVI. for this morning, although not essential, is of great assistance in interpreting the official forecasts, which should be read, with reference to Chartlet, showing Stations, Forecast Areas and Districts, and to what is said in Mr. DINES' article on "Meteorological Office Forecasts," appearing in the February, 1925, Number of this JOURNAL.

On the 29th that part of the Official Forecast contained in the "Weather Shipping" Bulletin of immediate interest to *City of London* while proceeding up Channel, was as follows:—

Inference.—Pressure remains low in the Atlantic and further disturbances are likely to cross our area maintaining generally unsettled weather. In the south winds will be mainly from S.W. to west blowing strongly at times.

Forecast Southern Area.—Wind west to S.W. strong or high, visibility poor at times.

Eastern Area (Thames).—Wind N.W. backing S.W. moderate, visibility deteriorating.

Outlook.—Unsettled, with strong winds on southern coasts.

WEATHER SIGNALS.

II.—WIRELESS WEATHER BULLETINS.

FRANCE.

“International Collective Reports.” Spark Issue. Land Stations’ Observations only.

Paris—Eiffel Tower W/T station, approximate Latitude 48° 51' N. Longitude 2° 18' E., call sign FL, broadcasts a weather bulletin in code, at 1005 G.M.T. on a wave length of 2,600 metres (spark).

This bulletin contains the 0700 G.M.T. observations from the undermentioned stations.

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

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

Code used :—New International. The bulletin is preceded by the words “Météo Europe.”

Expressed by symbols :— $I_n I_n$ BBDDF w_1 TTK' R.

$I_n I_n$ = Indicator Figures of observation station. (If a station is substituted for one in the above list the name of the station is transmitted.)

BB = Barometer (corrected) in whole millimetres (initial 7 omitted). To convert to mbs. and ins., see Table XV, p. 45, March, 1925, MARINE OBSERVER.

DD = Wind direction true. (Table III, p. 13, January 1925 MARINE OBSERVER.)

F = Wind force by Beaufort Scale. Forces 9 and above sent as 9.

w_1 = Cloud amount and general state of the weather (Table XXVI).

TT = Air temperature in whole degrees Centigrade. (To convert to Faht., see Table XVII, p. 45, March 1925 MARINE OBSERVER.)

K' = Barometer tendency. (Table XXVII.)

R = Rainfall for the preceding 24 hours. (Table XXVIII.)

NOTE.—The number of stations whose observations are broadcast in this bulletin is restricted, a suitable selection being made in a manner to ensure the best distribution. Immediately following the observations information relating to pressure maxima and minima is usually sent in the form Max. (or Min.) name of station BBDDF, etc. (same meanings as in bulletin).

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

Eiffel Tower W/T station also broadcasts weather bulletins in code at 0400, 1600 and 2100 G.M.T., on a wave length of 7,300 metres, C.W. These bulletins are in two parts, viz. :—

0400 G.M.T. Bulletin.

Part I preceded by the words “Météo Europe” gives the 0100 G.M.T. observations for the same stations, in the same code as the 1005 G.M.T. bulletin.

Part II preceded by the word “Navires” gives 0100 G.M.T. observations from ships in the N. Atlantic.

Code used :—New International. Expressed by symbols :—PQLLL 111GG BBDDF wvvKd; with the exception of the barometer which is given in whole millimetres (initial 7 omitted, *see* conversion Table XV, p. 45, March 1925 MARINE OBSERVER), these symbols and their meanings are exactly similar to those given on the "Decode Form," p. 14, January 1925 MARINE OBSERVER, and decoding of the figures sent can be quickly carried out by reference to the "Decode Form."

1600 } G.M.T. Bulletins 2100 }

Same form as 0400 G.M.T. bulletin. The observations are those of 1300 and 1800 G.M.T. respectively.

NOTE.—Particular attention should be paid to the *times* of the observations in the "Navires" section of these bulletins.

A weather bulletin is broadcast in code by Eiffel Tower W/T station at 0940 G.M.T. on a wave length of 7,300 metres (C.W.), containing observations from American land stations, ships in the North Atlantic, and the Azores, arranged in **five parts** and preceded by the words "Météo Amérique Atlantique." Code used :—New International.

Part I.—Commencing with the word "Amérique," contains observations from the undermentioned stations in the form YYGG, I_n I_n, BBDF, I_n I_n, BBDF, &c. where,

YY = Day of the month.

GG = Time of observations G.M.T.

I_n I_n = Indicator letters of station.

BB = Barometer reading, corrected, to nearest whole millimetre. (*See* conversion Table XV, p. 45, March 1925, MARINE OBSERVER.

D = Wind direction, true (Table VIII, p. 16, January 1925, MARINE OBSERVER.

F = Wind force by Beaufort scale.

Stations in Part I.

Indicator Letters.	Station.	Approximate Position.	
		Latitude.	Longitude.
BI	Belle Isle ...	51° 55' N.	55° 20' W.
J	St. John's, N.F.*...	47° 34' N.	52° 42' W.
S	Sydney, N.S. ...	46° 10' N.	60° 10' W.
FP	Father Point ...	48° 31' N.	68° 19' W.
PN	Parry Sound ...	45° 20' N.	80° 00' W.
WR	White River ...	48° 35' N.	85° 16' W.
WI	Winnipeg ...	49° 53' N.	97° 07' W.
LP	Le Pas ...	53° 49' N.	101° 15' W.
ED	Edmonton ...	53° 33' N.	113° 30' W.
T	Nantucket ...	41° 17' N.	70° 05' W.
WA	Washington ...	38° 52' N.	77° 03' W.
H	Hatteras ...	35° 14' N.	75° 32' W.
C	Charleston ...	32° 43' N.	79° 52' W.
B	Bermuda ...	32° 17' N.	64° 46' W.
K	Key West ...	24° 33' N.	81° 48' W.
LR	Little Rock ...	34° 45' N.	92° 20' W.
NV	Nashville ...	36° 10' N.	86° 47' W.
V	Cleveland ...	41° 30' N.	81° 42' W.
CH	Chicago ...	41° 53' N.	87° 37' W.
DU	Duluth ...	46° 47' N.	92° 06' W.
HN	Huron ...	44° 21' N.	98° 15' W.
SLC	Salt Lake City ...	40° 45' N.	111° 54' W.
HL	Helena ...	46° 34' N.	112° 04' W.
DV	Denver ...	39° 48' N.	105° 00' W.
RO	Roseburg ...	43° 11' N.	123° 20' W.
TAT	Tatoosh ...	48° 23' N.	124° 44' W.
SF	San Francisco ...	37° 48' N.	122° 26' W.
DI	San Diego ...	32° 42' N.	117° 10' W.
FW	Fort Worth ...	32° 43' N.	97° 15' W.
EP	El Paso ...	31° 50' N.	106° 30' W.
JU	Juneau (Alaska) ...	58° 21' N.	134° 20' W.
DH	Dutch Harbour (Alaska)	53° 55' N.	166° 30' W.
TN	Tanana (Alaska) ...	65° 12' N.	152° 00' W.

* See Note (1)

A five figure group (LL11D) may be added to this Part, preceded by the word "cyclone," giving the latitude, longitude and direction of movement (0 = stationary, 1 = N.E., 2 = East, &c.) of the disturbance.

Part II.—Commences with the words "Atlantique Oriental" and gives ships' observations in the same form as Part II of the 0400 G.M.T. issue, *see* p. 61, of this Number.

Part III.—Commences with the words "Atlantique Occidental" and gives observations from ships in the Western N. Atlantic, in the form I_n I_n PQLLL 111GG BBDDF TTTW, where :—

I_n I_n = Indicator letters or numbers of ship. The three following groups can be decoded in the same manner as for Part II, 0400 G.M.T. issue, *see* p. 61 of this Number.

TTT = Air temperature to nearest half degree Centigrade.

W = Present weather (Table XXIX).

Part IV. Commences with the words "Britannique" and gives observations from British ships. The name of each ship is sent and the groups following it can be decoded in similar manner to the example given on the "Decode Form," p. 14, January 1925, MARINE OBSERVER.

Part V. Commences with the word Açores and gives 0700 G.M.T. observations from the Azores in the form :—

Name of station, BBDDF wTTK'R. These groups can be decoded in a similar manner to that explained in the "Météo Europe" bulletin at 1005 G.M.T., p. 61, of this Number.

NOTE—(1) Observations from Belle Isle and St. John's may contain two groups of which the first refers to 1300 G.M.T. of previous day and the second to 0100 G.M.T. of day of issue. If only one group is sent it refers to 1300 G.M.T. of previous day.

(2) In Part II. "Atlantique Oriental" portion of 0940 G.M.T. bulletin indicator figures or letters of the ship whose observations are being sent, may also be included.

(3) Should the "Météo Amérique Atlantique" bulletin be too long for complete transmission at 0940 G.M.T., it will be resumed at 1125 G.M.T. on a wave length of 2,650 metres C.W.

(4) When observations for any Part of the bulletins are missing the word "Néant" or "Nil" will be sent.

Nantes-Basse Lande-W/T station approximate Latitude 47° 11' N., Longitude 1° 42' W., call sign UA broadcasts at 1230 G.M.T. the general meteorological situation in the N. Atlantic, together with a forecast, *en clair*. The wave length used is 2,800 metres (spark).

NEW INTERNATIONAL CODE, WEATHER TELEGRAPHY TABLES.

Table XXVI.

w₁—Cloud amount and general state of weather (abridged).

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

Table XXVII.

K'—Barometer Tendency (millimetres and millibars).

Code Figure.	Code Figure.
0 Barometer steady. (The barometer has not fallen or risen more than $\frac{1}{2}$ mm. in 3 hours.)	
1 Do. rising slowly. The barometer has risen $\frac{1}{2}$ to $1\frac{1}{2}$ mm. (0.7-2.0 mb.) in last 3 hours.	
2 Do. rising. Do. do. $1\frac{1}{2}$ to $3\frac{1}{2}$ mm. (2.0-4.7 mb.)	do.
3 Do. rising quickly. Do. do. $3\frac{1}{2}$ to 6 mm. (4.7-8.0 mb.)	do.
4 Do. rising very rapidly. Do. do. over 6 mm. (8.0 mb.)	do.
5 Do. falling slowly. Do. has fallen $\frac{1}{2}$ to $1\frac{1}{2}$ mm. (0.7-2.0 mb.)	do.
6 Do. falling. Do. do. $1\frac{1}{2}$ to $3\frac{1}{2}$ mm. (2.0-4.7 mb.)	do.
7 Do. falling quickly. Do. do. $3\frac{1}{2}$ to 6 mm. (4.7-8.0 mb.)	do.
8 Do. falling very rapidly. Do. do. over 6 mm. (8.0 mb.)	do.

Table XXVIII.

R—Rainfall during preceding 24 hours.

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

SPECIAL WEATHER TELEGRAPHY TABLE,
NOT NEW INTERNATIONAL CODE.

Table XXIX.—Present Weather.

Code Figure.	Explanation.	Code Figure.	Explanation.
0 = Sky clear	= b.	5 = Rain	= r.
1 = „ $\frac{1}{4}$ clouded	= b	6 = Snow	= s
2 = „ $\frac{1}{2}$ clouded	= bc	7 = Mist	= m
3 = „ $\frac{3}{4}$ clouded	= c	8 = Fog	= f
4 = „ Overcast	= o	9 = Thunderstorm	= tl

WIRELESS STORM WARNINGS.

FRANCE.

Eiffel Tower W/T station broadcasts wireless storm signals when the forecasts indicate that the wind force is likely to exceed force 7 on the Beaufort scale, immediately after the weather messages transmitted at 0220, 0820, 1420 and 1920 G.M.T. on a wave length of 2,600 metres spark.

The signals refer to the following French coastal areas :—

“Manche”	—The Channel.
“Bretagne”	—Entrance to English Channel, South Coast of Brittany and the Northern part of the Bay of Biscay.
“Ocean”	—From the Loire to the Spanish Frontier, including the central and Southern part of the Bay of Biscay.
“Roussillon”	—Spanish Frontier to Faraman.
“Provence”	—From Faraman to the Italian Frontier, including Corsica.
“Méditerranée”	—French coasts in the Mediterranean, only used when one message suffices for the combined areas “Roussillon” and “Provence.”

Form of Message.

The signal is sent *en clair*. It commences with the name of the day of the week and the duration for which the warning is valid, followed by the word “Tempête” and the probable direction from which the gale may be expected.

Example of Message.

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

Explanation.

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

The following stations transmit storm signals concerning the areas “Manche,” “Bretagne” and “Ocean” :—

Cherbourg	approximate Latitude 49° 37' N., Longitude 1° 36' W., call sign FUC
Brest	approximate Latitude 48° 22' N., Longitude 4° 34' W. call sign FUE
whilst	
Porquerolles	approximate Latitude 42° 59' N., Longitude 6° 12' E., call sign FUQ and
Ajaccio	approximate Latitude 41° 55' N., Longitude 8° 46' E., call sign FUI

transmit storm signals concerning the areas “Roussillon” and “Provence” (or Méditerranée).

These four stations transmit the signal on the 600 metre wave length as soon as it is received by land line or from Eiffel Tower. The International Safety Signal — — — (TTT) is first sent out, and is followed a minute later by the storm signal which is repeated three times at intervals of ten minutes.

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

III.—WIRELESS TIME SIGNALS.

FRANCE.

Station.	Call Sign.	Wave length (metres).	G.M.T. of Time Signals.	System.
EIFFEL TOWER. Lat. 48° 51' 30" N. ... Long. 2° 17' 43" E. ...	FL	2,600 (Spark)	0927–0930 1044–1049 2244–2249	New International (Automatic) <i>see</i> FIGURE 1. Preparative signals from 0923–0927 G.M.T. Old system (semi-automatic) <i>see</i> FIGURE 2. Preparative signals from 1038–1040 and 2238–2240 G.M.T.
NOTE.—(1) The New International Time Signals are automatically operated from Paris Observatory (Lat. 48° 50' 11" N., Long. 2° 20' 14" E.). (2) The Old system Time Signals are partially Automatic <i>i.e.</i> , the preparative signals are sent by hand and the time signals are automatically operated from Paris Observatory.				
LYON-DOUA. Lat. 45° 41' 00" N. ... Long. 4° 47' 00" E. ...	YN	15,500 (C.W.)	0859–0904	Old system (semi-automatic) <i>see</i> FIGURE 2. Preparative signals from 0858–0859 G.M.T. <i>See</i> Note (2) above.

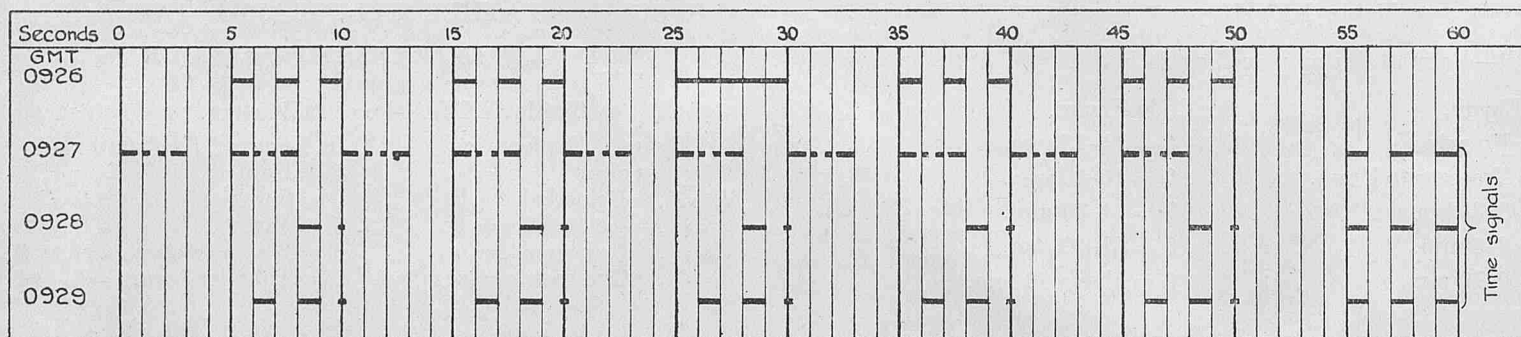


Fig. 1.—New International System ("Onogo" system, automatic).

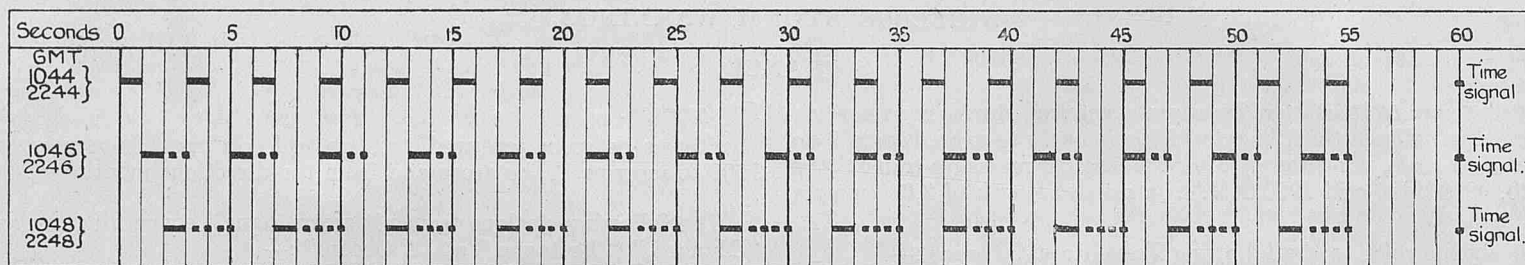
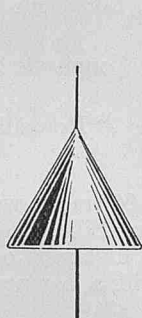


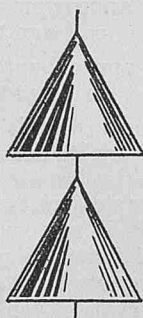
Fig. 2.—Old System (Semi-automatic).

IV. VISUAL STORM WARNINGS.

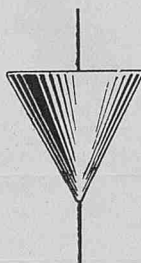
FRANCE.



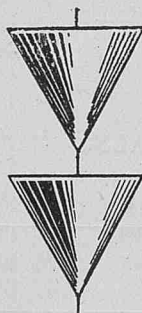
Hoisted when a gale is probable from N.W.



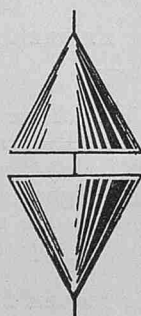
Hoisted when a gale is probable from N.E.



Hoisted when a gale is probable from S.W.



Hoisted when a gale is probable from S.E.



Hoisted when gales of hurricane force are probable.

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

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

Special Notices regarding Personnel.

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

Obituary.

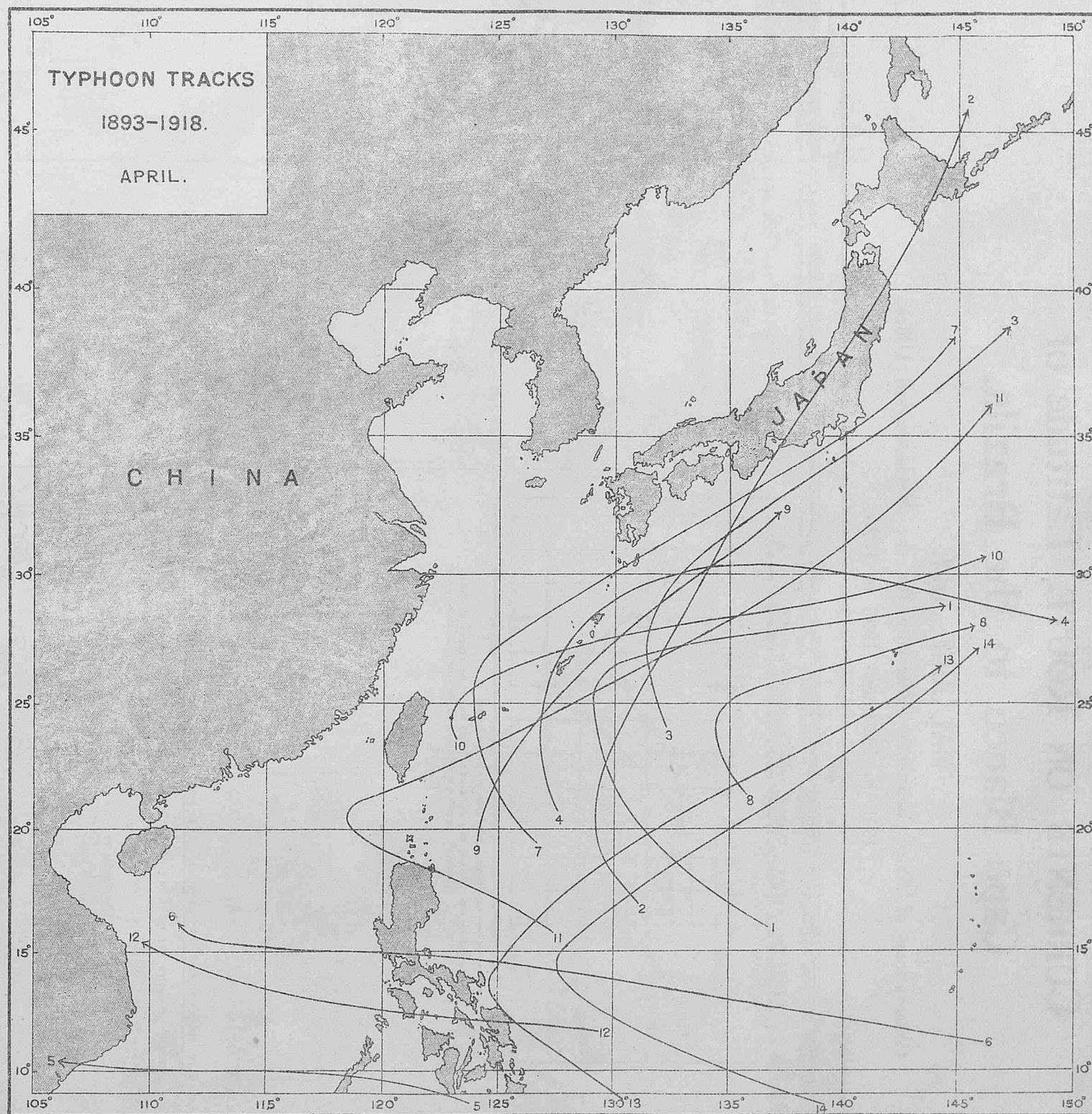
The death of Commander Sir THOMAS FISHER, R.N., General Manager of the Canadian Pacific Steamships, Limited, on February 22nd, in London is noted with regret.

On becoming General Manager of the Canadian Pacific Steamships, Limited, Sir THOMAS FISHER very soon let it be known that he saw a great value in the practice of marine meteorology, and gave the officers of his Line great encouragement. He was a strong supporter of this Journal, an advocate especially of the Atlantic wireless weather reporting service. His loss will be keenly felt.

The death of Captain E. G. HUGHES, of S.S. *Crawford Castle*, on December 30th, 1924, is noted with regret.

Captain HUGHES became a regular member of the Corps of Voluntary Marine Observers soon after post-war reorganisation and has twice figured in the list of annual awards for "Excellent" logs. He was an exceptionally keen observer, and was a frequent visitor to the Marine Division between voyages, where his advice and desire to get at the root of things was always much appreciated.

TYPHOONS IN THE FAR EAST DURING 26 YEARS.



APRIL. — Single chart: 14 tracks; a little more than one case in two years.

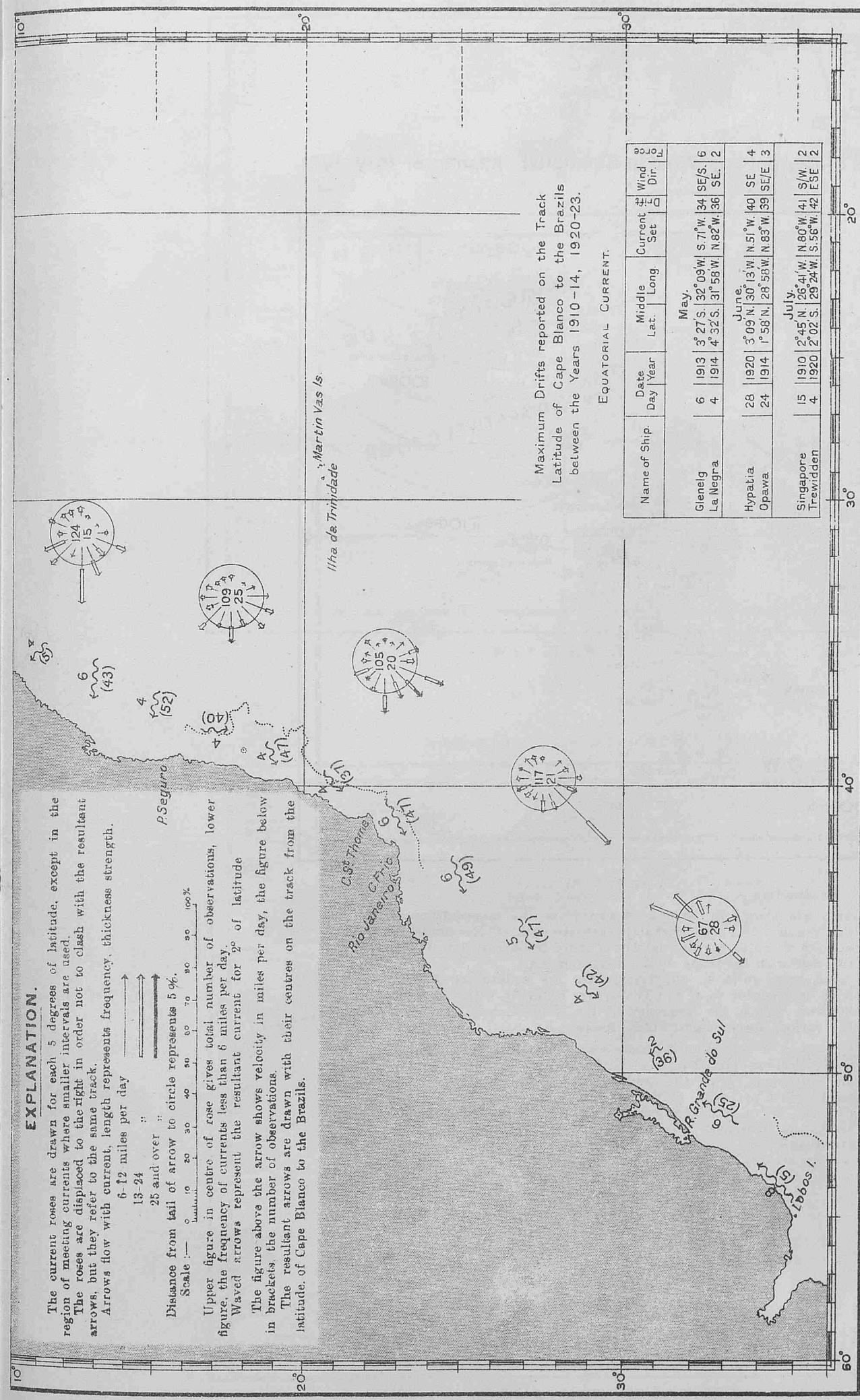
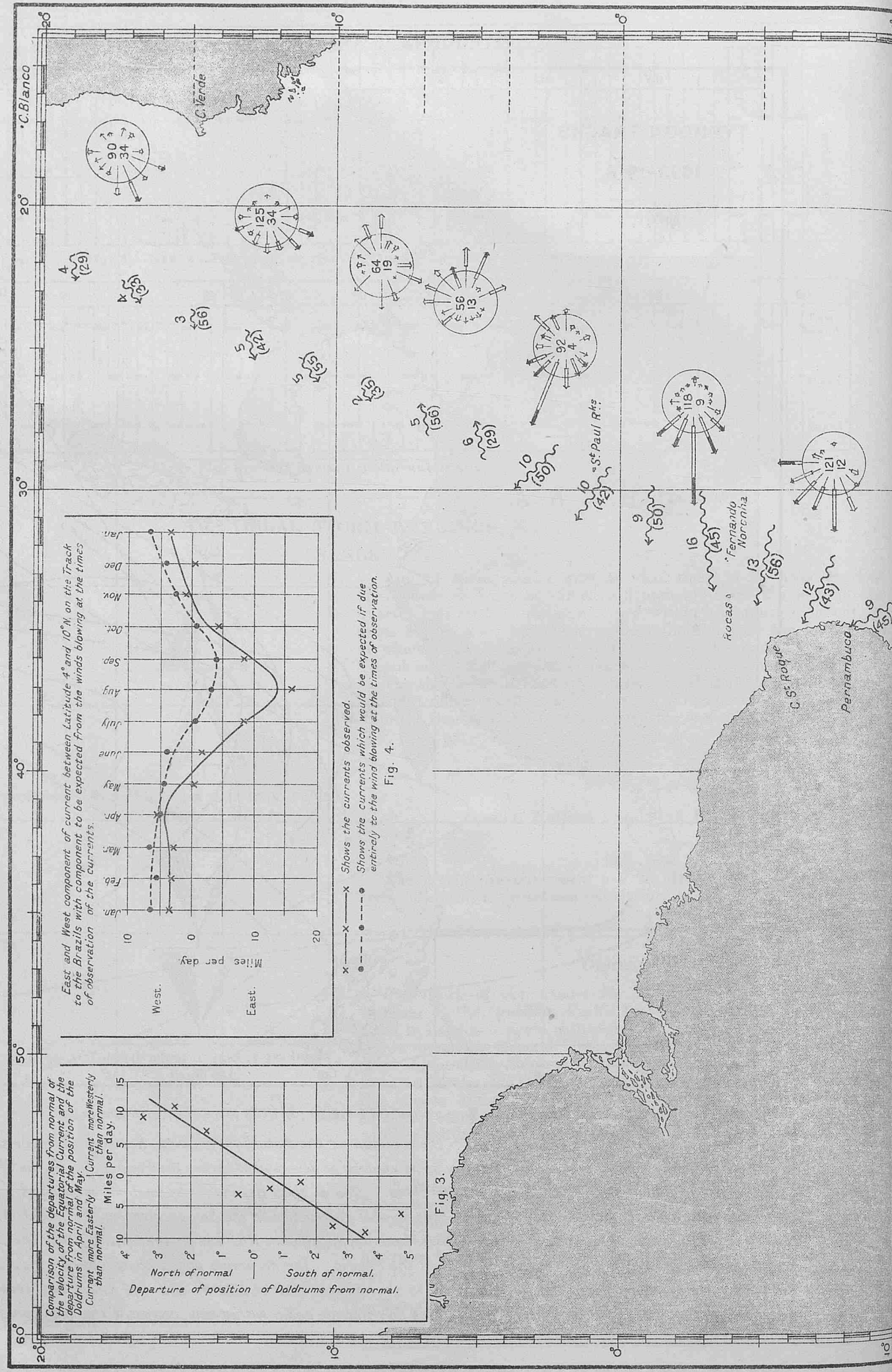
Remarks. — We are passing through the minimum of the disturbing activity; however the focus shown in the low latitudes gives signs of increasing energy and begins to throw some centres of depressions across the Philippines, on the China Sea, where they persevere to the close neighbourhood of the coasts of Indo-China. One of them deserves a special notice: it was a narrow and violent typhoon which swept over Cape St. James and caused considerable destruction in the Saigon river on the 1st. of May 1904.

Very rare are the oceanic depressions that reach Japan, this month; but on the contrary they show a tendency to converge more to the south towards the Bonin Is., to continue on the Pacific. The recurving points continue their movement of the preceding month westwards, in some instances they have approached the eastern coast of Luzon, and one track has recurved between the Bashi and Ballintang channels not far from the Pratas. This corresponds again with a new retreat of the high pressures on the continent.

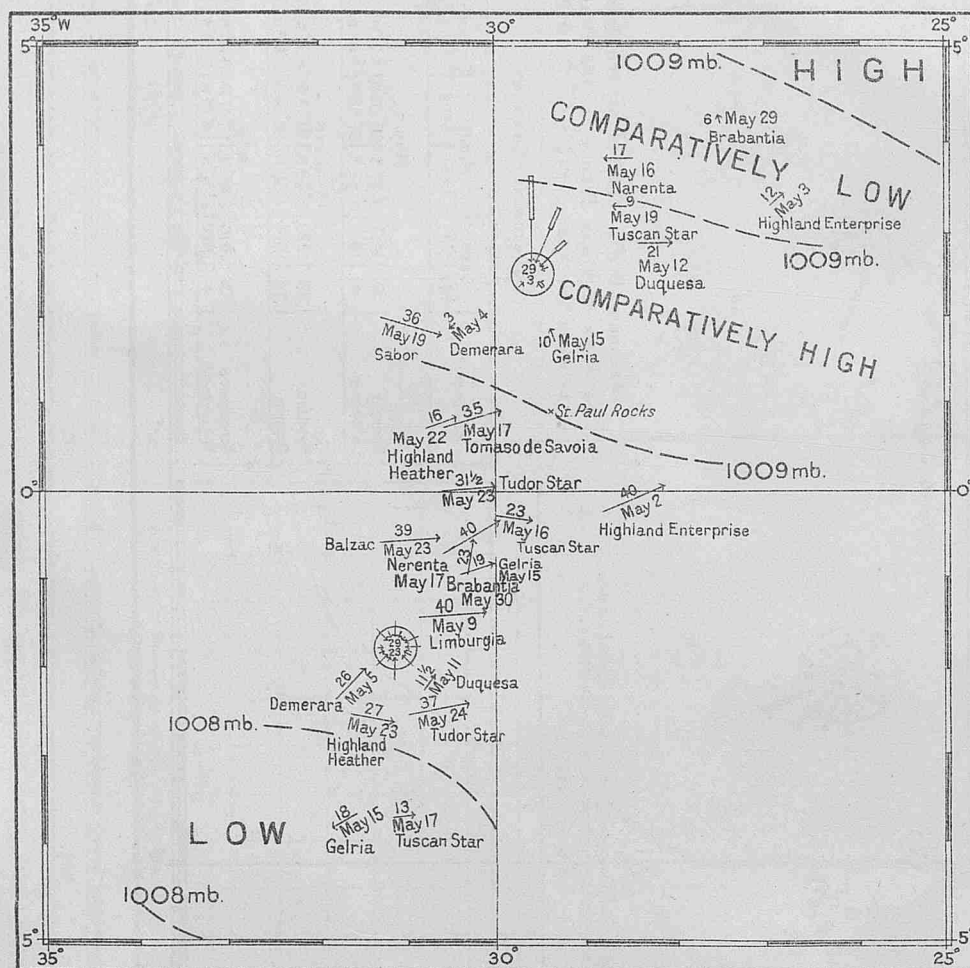
CURRENTS ON ROUTE, Latitude of Cape Blanco to the Brazils.

MAY, JUNE, JULY:

Observations of Ships Regularly Observing for the Meteorological Office.
1910 to 1914 and 1920 to 1923.



Conditions of Current and Wind in Equatorial Atlantic in May, 1921.



Chartlet A.

Explanation:—

Currents are shown by arrows, drawn from the mid-position of the ship's run, and proportional to the strength of the current. The velocity in miles per day is shown above the arrow, the date below, together with the name of the observing ship.

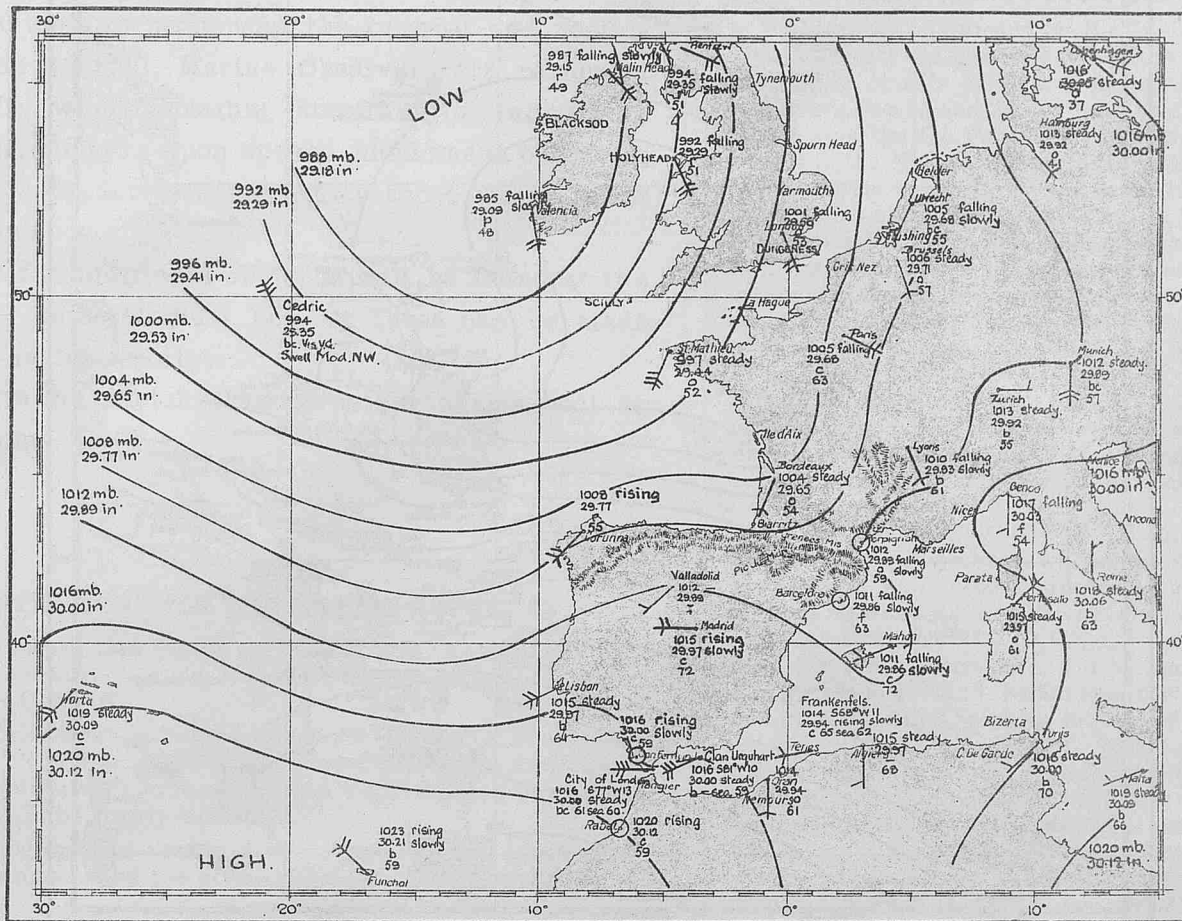
The wind roses refer to the track from the equator to 5° N., and from the equator to 5° S. The arrows which fly with the wind show by their length the frequency of the winds and by their thickness the various forces, light winds, forces 1-3, ———; moderate winds

4-7, =====; and gales 8-12, =====. (LIGHT MODERATE GALE)

The circle supplies a scale for estimating the frequency of winds in any direction. From the heads of the arrows to the circumference represents 5 per cent. of the whole number of observed winds (100 per cent. = $\frac{1}{2}$ in.). The upper figures in the centre of the wind rose are the total number of observations, the percentage of calms being given underneath.

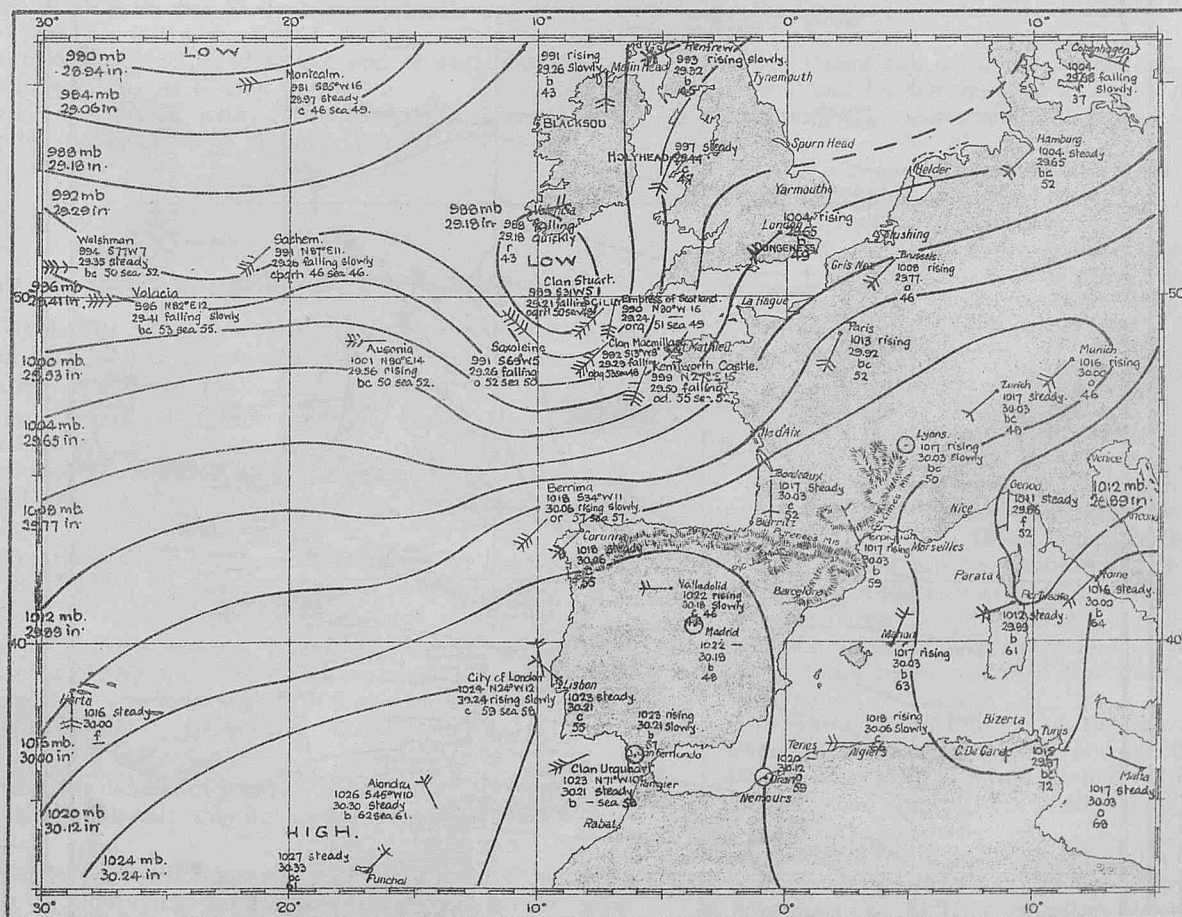
The isobars are not reliable for absolute pressure, but give a conception of the relative distribution along the track.

MORNING OF 26TH. APRIL, 1924.



WEATHER CHART, XIII.

MORNING OF 27TH. APRIL, 1924.



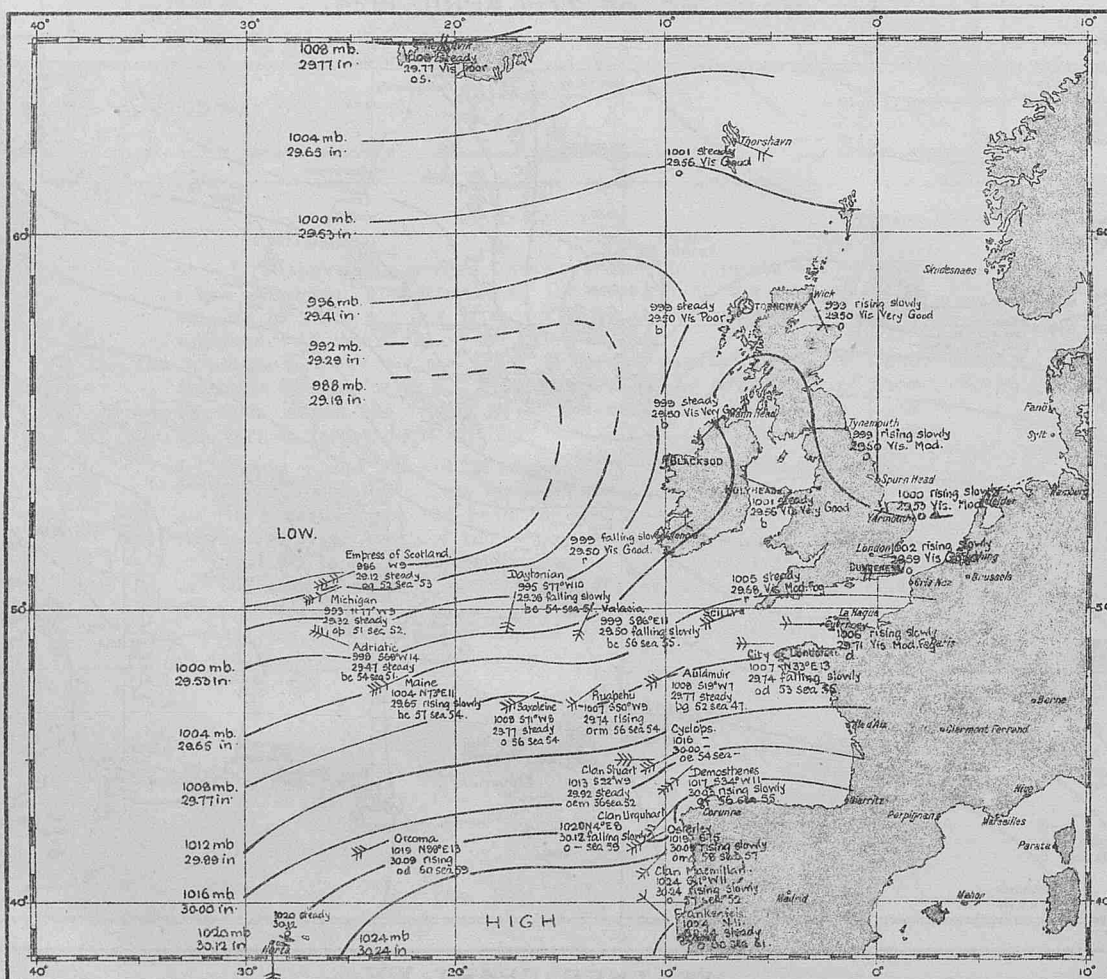
WEATHER CHART, XIV.

This is a detailed weather map of Europe and the North Atlantic, showing isobars, isotherms, and various weather stations with their readings. The map includes a coordinate grid from 40°N to 10°N and 40°W to 10°W.

Key Features:

- Isobars:** Lines of equal barometric pressure are drawn across the map, with values ranging from 984 mb to 1024 mb.
- Weather Systems:** A low-pressure system is centered over the North Atlantic, and a high-pressure system is located over the Azores.
- Weather Stations:** Numerous stations are marked with their names and weather conditions. Examples include:
 - London:** 1001 mb, 29.56 in, 51°N 0°W, 29.56 rising slowly, 0 52 sea 51.
 - Paris:** 1001 mb, 29.56 in, 48°N 2°E, 29.56 rising slowly, 0 52 sea 51.
 - Madrid:** 1001 mb, 29.56 in, 40°N 4°W, 29.56 rising slowly, 0 52 sea 51.
 - Barcelona:** 1001 mb, 29.56 in, 41°N 2°E, 29.56 rising slowly, 0 52 sea 51.
 - Valencia:** 1001 mb, 29.56 in, 39°N 0°E, 29.56 rising slowly, 0 52 sea 51.
 - Malaga:** 1001 mb, 29.56 in, 36°N 4°W, 29.56 rising slowly, 0 52 sea 51.
 - Seville:** 1001 mb, 29.56 in, 37°N 6°W, 29.56 rising slowly, 0 52 sea 51.
 - Granada:** 1001 mb, 29.56 in, 38°N 3°W, 29.56 rising slowly, 0 52 sea 51.
 - Alcala:** 1001 mb, 29.56 in, 40°N 3°W, 29.56 rising slowly, 0 52 sea 51.
 - Madrid:** 1001 mb, 29.56 in, 40°N 4°W, 29.56 rising slowly, 0 52 sea 51.
 - Barcelona:** 1001 mb, 29.56 in, 41°N 2°E, 29.56 rising slowly, 0 52 sea 51.
 - Valencia:** 1001 mb, 29.56 in, 39°N 0°E, 29.56 rising slowly, 0 52 sea 51.
 - Malaga:** 1001 mb, 29.56 in, 36°N 4°W, 29.56 rising slowly, 0 52 sea 51.
 - Seville:** 1001 mb, 29.56 in, 37°N 6°W, 29.56 rising slowly, 0 52 sea 51.
 - Granada:** 1001 mb, 29.56 in, 38°N 3°W, 29.56 rising slowly, 0 52 sea 51.
 - Alcala:** 1001 mb, 29.56 in, 40°N 3°W, 29.56 rising slowly, 0 52 sea 51.
 - Madrid:** 1001 mb, 29.56 in, 40°N 4°W, 29.56 rising slowly, 0 52 sea 51.
 - Barcelona:** 1001 mb, 29.56 in, 41°N 2°E, 29.56 rising slowly, 0 52 sea 51.
 - Valencia:** 1001 mb, 29.56 in, 39°N 0°E, 29.56 rising slowly, 0 52 sea 51.
 - Malaga:** 1001 mb, 29.56 in, 36°N 4°W, 29.56 rising slowly, 0 52 sea 51.
 - Seville:** 1001 mb, 29.56 in, 37°N 6°W, 29.56 rising slowly, 0 52 sea 51.
 - Granada:** 1001 mb, 29.56 in, 38°N 3°W, 29.56 rising slowly, 0 52 sea 51.
 - Alcala:** 1001 mb, 29.56 in, 40°N 3°W, 29.56 rising slowly, 0 52 sea 51.
 - Madrid:** 1001 mb, 29.56 in, 40°N 4°W, 29.56 rising slowly, 0 52 sea 51.
 - Barcelona:** 1001 mb, 29.56 in, 41°N 2°E, 29.56 rising slowly, 0 52 sea 51.
 - Valencia:** 1001 mb, 29.56 in, 39°N 0°E, 29.56 rising slowly, 0 52 sea 51.
 - Malaga:** 1001 mb, 29.56 in, 36°N 4°W, 29.56 rising slowly, 0 52 sea 51.
 - Seville:** 1001 mb, 29.56 in, 37°N 6°W, 29.56 rising slowly, 0 52 sea 51.
 - Granada:** 1001 mb, 29.56 in, 38°N 3°W, 29.56 rising slowly, 0 52 sea 51.
 - Alcala:** 1001 mb, 29.56 in, 40°N 3°W, 29.56 rising slowly, 0 52 sea 51.
 - Madrid:** 1001 mb, 29.56 in, 40°N 4°W, 29.56 rising slowly, 0 52 sea 51.
 - Barcelona:** 1001 mb, 29.56 in, 41°N 2°E, 29.56 rising slowly, 0 52 sea 51.
 - Valencia:** 1001 mb, 29.56 in, 39°N 0°E, 29.56 rising slowly, 0 52 sea 51.
 - Malaga:** 1001 mb, 29.56 in, 36°N 4°W, 29.56 rising slowly, 0 52 sea 51.
 - Seville:** 1001 mb, 29.56 in, 37°N 6°W, 29.56 rising slowly, 0 52 sea 51.
 - Granada:** 1001 mb, 29.56 in, 38°N 3°W, 29.56 rising slowly, 0 52 sea 51.
 - Alcala:** 1001 mb, 29.56 in, 40°N 3°W, 29.56 rising slowly, 0 52 sea 51.
 - Madrid:** 1001 mb, 29.56 in, 40°N 4°W, 29.56 rising slowly, 0 52 sea 51.
 - Barcelona:** 1001 mb, 29.56 in, 41°N 2°E, 29.56 rising slowly, 0 52 sea 51.
 - Valencia:** 1001 mb, 29.56 in, 39°N 0°E, 29.56 rising slowly, 0 52 sea 51.
 - Malaga:** 1001 mb, 29.56 in, 36°N 4°W, 29.56 rising slowly, 0 52 sea 51.
 - Seville:** 1001 mb, 29.56 in, 37°N 6°W, 29.56 rising slowly, 0 52 sea 51.
 - Granada:** 1001 mb, 29.56 in, 38°N 3°W, 29.56 rising slowly, 0 52 sea 51.
 - Alcala:** 1001 mb, 29.56 in, 40°N 3°W, 29.56 rising slowly, 0 52 sea 51.
 - Madrid:** 1001 mb, 29.56 in, 40°N 4°W, 29.56 rising slowly, 0 52 sea 51.
 - Barcelona:** 1001 mb, 29.56 in, 41°N 2°E, 29.56 rising slowly, 0 52 sea 51.
 - Valencia:** 1001 mb, 29.56 in, 39°N 0°E, 29.56 rising slowly, 0 52 sea 51.
 - Malaga:** 1001 mb, 29.56 in, 36°N 4°W, 29.56 rising slowly, 0 52 sea 51.
 - Seville:** 1001 mb, 29.56 in, 37°N 6°W, 29.56 rising slowly, 0 52 sea 51.
 - Granada:** 1001 mb, 29.56 in, 38°N 3°W, 29.56 rising slowly, 0 52 sea 51.
 - Alcala:** 1001 mb, 29.56 in, 40°N 3°W, 29.56 rising slowly, 0 52 sea 51.
 - Madrid:** 1001 mb, 29.56 in, 40°N 4°W, 29.56 rising slowly, 0 52 sea 51.
 - Barcelona:** 1001 mb, 29.56 in, 41°N 2°E, 29.56 rising slowly, 0 52 sea 51.
 - Valencia:** 1001 mb, 29.56 in, 39°N 0°E, 29.56 rising slowly, 0 52 sea 51.
 - Malaga:** 1001 mb, 29.56 in, 36°N 4°W, 29.56 rising slowly, 0 52 sea 51.
 - Seville:** 1001 mb, 29.56 in, 37°N 6°W, 29.56 rising slowly, 0 52 sea 51.
 - Granada:** 1001 mb, 29.56 in, 38°N 3°W, 29.56 rising slowly, 0 52 sea 51.
 - Alcala:** 1001 mb, 29.56 in, 40°N 3°W, 29.56 rising slowly, 0 52 sea 51.
 - Madrid:** 1001 mb, 29.56 in, 40°N 4°W, 29.56 rising slowly, 0 52 sea 51.
 - Barcelona:** 1001 mb, 29.56 in, 41°N 2°E, 29.56 rising slowly, 0 52 sea 51.
 - Valencia:** 1001 mb, 29.56 in, 39°N 0°E, 29.56 rising slowly, 0 52 sea 51.
 - Malaga:** 1001 mb, 29.56 in, 36°N 4°W, 29.56 rising slowly, 0 52 sea 51.
 - Seville:** 1001 mb, 29.56 in, 37°N 6°W, 29.56 rising slowly, 0 52 sea 51.
 - Granada:** 1001 mb, 29.56 in, 38°N 3°W, 29.56 rising slowly, 0 52 sea 51.
 - Alcala:** 1001 mb, 29.56 in, 40°N 3°W, 29.56 rising slowly, 0 52 sea 51.
 - Madrid:** 1001 mb, 29.56 in, 40°N 4°W, 29.56 rising slowly, 0 52 sea 51.
 - Barcelona:** 1001 mb, 29.56 in, 41°N 2°E, 29.56 rising slowly, 0 52 sea 51.
 - Valencia:** 1001 mb, 29.56 in, 39°N 0°E, 29.56 rising slowly, 0 52 sea 51.
 - Malaga:** 1001 mb, 29.56 in

MORNING OF 29TH. APRIL, 1924.



WEATHER CHART, XVI.

NOTICES.

IMPORTANT.

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

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

Photographs, sketches and weather charts will be most welcome.

ILLUSTRATIONS FOR THE MARINE OBSERVER.

When making sketches, charts or plans, Marine Observers will give us great assistance if they will give consideration to reproduction in "The Marine Observer."

The size of any chart or drawing should not, if possible, exceed that of a page of "The Marine Observer," and if charts and drawings of all kinds are made with Indian Ink upon white drawing paper their reproduction will be greatly facilitated.

When photographs are sent in it would give us great assistance if they are accompanied by the plate or film, which will be returned if desired.

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.

GULF OF ST. LAWRENCE. ICE PATROL SERVICE.

From the opening of navigation in the spring, until the route is clear of ice, an ice patrol is maintained in the Gulf of St. Lawrence between Cape Ray and Heath pt.

A regular message embodying ice conditions, from Cape Race to Quebec, and recommendations as to the route to be followed is compiled by the ice patrol every four hours, commencing at 0500 G.M.T. (civil), and kept for immediate transmission by W/T to ships, upon request.

Similar information is also broadcast twice daily by the ice patrol at 0100 and 1300 G.M.T. (civil), on a wave length of 600 metres spark.

The coast W/T Stations at Cape Race (VCE) North Sydney (VCO) and Grindstone isl. (VCN) will receive this message and repeat it to ships upon request. Cape Race station will also include the message in the ice report broadcast twice daily at 0215 and 1415 G.M.T. (civil).

Ships requiring the latest information concerning the Gulf of St. Lawrence route should call the ice patrol vessel on 600 metres (spark).

The work of the patrol will be greatly facilitated if incoming ships will co-operate in supplying information regarding ice in their vicinity. Continuous watch is maintained. Call Sig.—VCQ.

INTERNATIONAL ICE PATROL SERVICE.

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

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

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

Having located the ice, the patrol vessel will send daily radiograms and broadcasts as stated below. Each broadcast will be preceded by the general call "QST" on 600 metres wave length. The wave length will then be shifted to that designated in (a) and (b) below. All time in radiograms will be in Greenwich civil time. The broadcasts will be as follows:—

(a) At 1100 and 2300 (G.C.T.), 6 a.m. and 6 p.m., 75th meridian time, ice information will be sent broadcast by radio on 706 metres (425 kc.). These broadcasts will be sent three times, with an interval of 2 minutes between each.

(b) At 1200 and 0000 (G.C.T.), 7 a.m. and 7 p.m., 75th meridian time, ice information will be sent broadcast by radio on 1,621 metres (185 kc.), continuous wave. These broadcasts will be sent three times, with an interval of 2 minutes between each.

(c) At 0100 (G.C.T.), 8 p.m., 75th meridian time, a radiogram will be sent to the Hydrographic Office, Washington, D.C., through land radio stations, defining the ice danger zone, its southern limits, or other definite ice news, while other messages will be sent during the night if any later information is obtained by the patrol vessel. The telegraphic address of the Hydrographic Office is "Hydrographic, Washington, D.C."

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

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

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

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

The radio messages from the patrol vessels will be given publicity by the Hydrographic Office as follows:

(a) By radio broadcast from:—

Station,	G.C.T.	75th meridian standard time.	Wave length (metres).
Arlington	{ 1530 ...	10.30 a.m. ...	2,655, A.C. tube.
	{ 0255 ...	9.55 p.m. ...	2,655, A.C. tube.
Annapolis	{ 2200 ...	5.00 p.m. ...	17,130, C. W.
Boston	{ 1600 ...	11.00 a.m. }	1,363, T.D. tube.
	{ 2200 ...	5.00 p.m. }	
New York	{ 1530 ...	10.30 a.m. }	1,538, T.D. tube.
	{ 2200 ...	5.00 p.m. }	
Norfolk	{ 1545 ...	10.45 a.m. }	1,363, tube.
	{ 2100 ...	4.00 p.m. }	

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

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

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

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

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

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

ICE CHART.

WESTERN NORTH ATLANTIC.

LETTERS OF TRANSATLANTIC TRACKS INDICATE

- (A) { Westbound. From 1st April to 30th June, inclusive.
Eastbound. From 25th March to 7th July, 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.

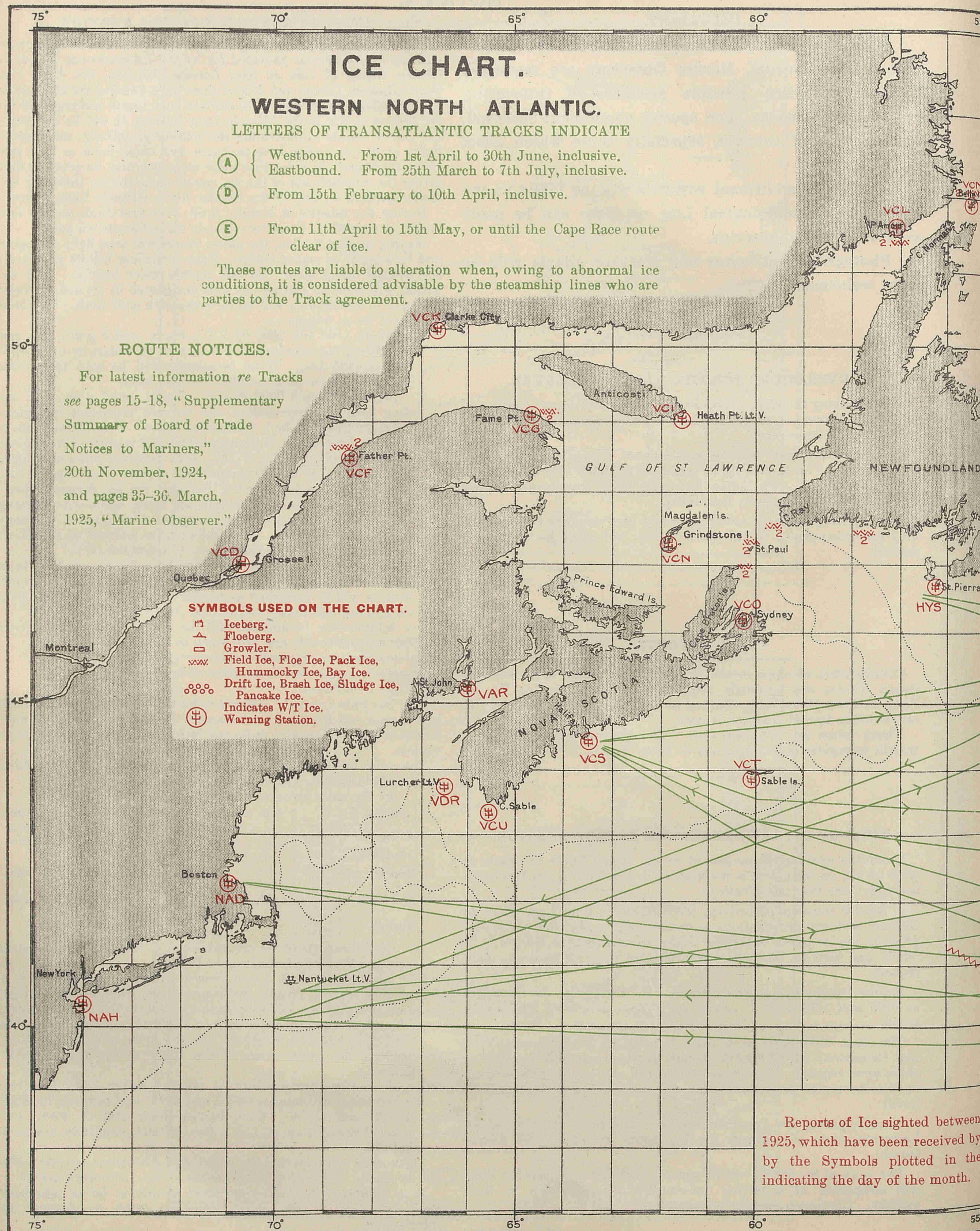
These routes are liable to alteration when, owing to abnormal ice conditions, it is considered advisable by the steamship lines who are parties to the Track agreement.

ROUTE NOTICES.

For latest information re Tracks see pages 15-18, "Supplementary Summary of Board of Trade Notices to Mariners," 20th November, 1924, and pages 35-36, March, 1925, "Marine Observer."

SYMBOLS USED ON THE CHART.

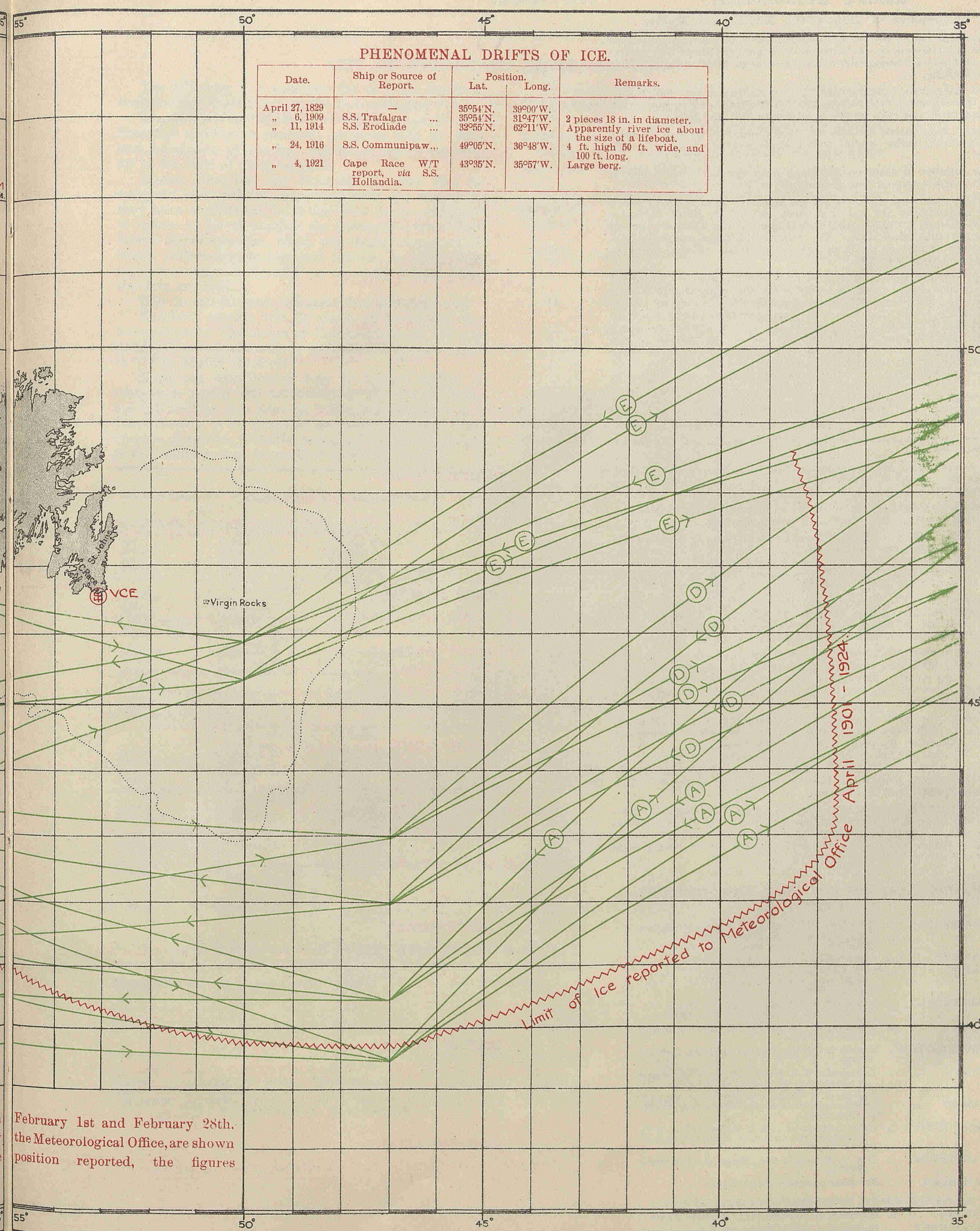
- Iceberg.
- Floeberg.
- Growler.
- Field Ice, Floe Ice, Pack Ice, Hummocky Ice, Bay Ice.
- Drift Ice, Brash Ice, Sludge Ice, Pancake Ice.
- Indicates W/T Ice.
- Warning Station.



Reports of Ice sighted between February 1st and February 28th, 1925, which have been received by the Meteorological Office, are shown by the Symbols plotted in the position reported, the figures indicating the day of the month.

PHENOMENAL DRIFTS OF ICE.

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



February 1st and February 28th, the Meteorological Office, are shown in position reported, the figures

Co-operation of Shipowners, Masters and Mates.

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

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

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

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

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

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

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

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

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

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

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

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

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

Masters who wish to assist in developing the rapid interchange of Meteorological information and Weather Forecasting at sea can do so by using the standard form, not in code, of W/T Weather Report suggested in "Weather Signals," given in this Journal, January, 1925 Number (*see* pages 11 and 12). For this purpose a mercurial barometer of which the index error has been ascertained is essential.

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

Marine Agencies and Port Meteorological Officers.

LIVERPOOL	..	(Port Meteorological Office), Lieut.-Commander M. Cresswell, R.N.R., Dock Office. Telephone No.: Bank 8959.
CARDIFF	..	Captain T. Johnston, Technical College.
LEITH	..	Captains G. Black and C. G. Bonner, V.C., D.S.C., Leith Salvage and Towage Co., Ltd., 2, Commercial Street.
THE CLYDE	..	Captain M. C. Corrance, Board of Trade Surveyor's Office, 73, Robertson Street, Glasgow.
HULL	..	Captain Geo. B. Sturdy, c/o Mr. W. Hakes, Commercial Road.
SOUTHAMPTON	..	Captain D. Forbes, Nautical Academy, 1, Albion Place.
TYNE	..	Commander E. S. Macleod, R.D., R.N.R., Board of Trade Surveyor's Office, North Shields.
DUBLIN	..	{ Captain M. H. Clarke, Chief Surveyor, Ministry of Industry and Commerce, Marine Department, 27, Eden Quay.
HONG KONG	..	Lieut.-Commander C. R. H. Harvey, O.B.E., R.N., Superintendent, Admiralty Chart and Chronometer Depot.
VANCOUVER	..	T. S. H. Shearman, Esq., Room 40, Post Office Building.
AUSTRALIA	..	The Commonwealth Meteorologist.

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

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

LATE PRESS.

DERELICTS AND FLOATING WRECKAGE.

Date.	Position.		Description.
	Latitude.	Longitude.	
NORTH SEA.			
4.2.25	52°41'N.	4°14'E.	Derelict.
6.2.25	51°54'N.	2°50'E.	Large iron mooring buoy.
12.2.25	51°48'N.	3°12'E.	Spherical buoy, light extinguished.
12.2.25	$\frac{1}{2}$ mile E.S.E. of West Hinder Lt. Vsl.		Three buoys, of which two white and black spindle-shaped and one a red conical buoy, reported adrift.
16.2.25	52°53'N.	3°41'E.	Extinguished light buoy, drifting.
20.2.25	52°28'N.	2°44'E.	Round black buoy, about a foot above water.
ENGLISH CHANNEL.			
1.2.25	48°43'N.	4°55'W.	Submerged obstruction.
21.2.25	50°24'N.	0°45'W.	Drifting piece of wood, end on, 3 ft. above water, apparently mast attached to submerged wreckage.
NORTH ATLANTIC.			
4.2.25	36°50'N.	72°43'W.	Large spar, floating upright, projecting 5 to 10 ft. out of water.
4.2.25	30°56'N.	74°57'W.	Red nun buoy.
5.2.25	47°25'N.	32°36'W.	Spar, about 30 ft. long, marine growth attached.
6.2.25	39°31'N.	74°09'W.	Wreckage, apparently vessel bottom up.
7.2.25	35°—'N.	75°05'W.	Log, about 18 in. in diameter, floating on end, apparently fast to submerged wreckage.
8.2.25	40°51'N.	71°43'W.	Spar, about 80 ft. long.
9.2.25	41°41'N.	62°43'W.	Bell buoy.
12.2.25	15°16'N.	55°24'W.	Spars adrift, in upright position 5 ft. above water.
18.2.25	48°48'N.	21°00'W.	Big black buoy.
20.2.25	34°18'N.	63°50'W.	Trawler, <i>Canada</i> , abandoned, dangerous to navigation.
22.2.25	49°37'N.	8°—'W.	Red spherical buoy.
MEDITERRANEAN.			
5.2.25	33°53'N.	24°22'E.	Derelict dhow, floating high in water, mast and rigging floating alongside.
10.2.25	33°11'N.	24°—'E.	Derelict Greek schooner, dangerous to navigation.
GULF OF MEXICO.			
6.2.25	24°22'N.	81°27'W.	Wreckage, apparently part of a deck, with house about 30 ft. square.
SOUTHERN OCEAN.			
2.2.25	40°—'S.	85°—'E.	Derelict hopper barge, dangerous to navigation.

LIST OF VOLUNTARY OBSERVING SHIPS.

i

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

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

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

Only in special cases will individual letters be sent.

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

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

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

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

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

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

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

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

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

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

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

Name of Vessel.	Captain.	Observing Officers.	Official Meteorological Equipment.	Line.	Last Log, Register, or Report Contributed. Received up to 13.2.25.	Date Received.
<i>Aba</i> ...	Hughes, J. ...	G. Pugh Williams ...	No.	Elder Dempster ...	Form 911 11.12.24 to 15.1.25...	21.1.25.
<i>Abinsi</i> ...	Wright, J. B. ...	W. Borrows ...	"	Elder Dempster ...	" 24.12.24 to 30.1.25...	5.2.25.
<i>Actor</i> ...	Haylett, E. ...	W. Rennie ...	"	Harrison ...	" 22.8.24 to 6.9.24 ...	7.10.24.
<i>Adda</i> ...	Toft, J. T. ...	J. E. Wood, E. H. Gatward ...	"	Elder Dempster ...	" 12.6.24 to 18.7.24 ...	21.7.24.
50 <i>Adriatic</i> ...	Beadnell, F. E., Commr., R.N.R.	J. Collins, R. Hawkins, A. C. I. Anson, L. G. A. Farmer.	W.T.	White Star ...	W.T. Reg. 10.11.24 to 29.11.24... Form 911 28.12.24 to 16.1.25...	4.12.24. 22.1.25.
<i>Agapenor</i> ...	Ramsay, J. ...	J. P. Makepeace ...	No.	A. Holt ...	" 31.8.24 to 10.9.24 ...	23.9.24.
<i>Alban</i> ...	Torrible, R. H. ...	G. E. Freeman ...	"	Booth ...	" 9.12.24 to 5.1.25 ...	19.1.25.
<i>Albania</i> ...	Gronow, S. ...	E. W. Connell ...	"	Cunard ...	" 3.11.24 to 11.11.24...	28.11.24.
<i>Algerian Prince</i> ...	Rowlands, D. ...	G. Potts ...	"	Prince ...	" 30.9.24 to 12.10.24...	16.10.24.
<i>Alipore</i> ...	Gordon, L. M., R.D., Commr., R.N.R.	H. D. Case ...	"	P. and O. ...	" 24.4.24 to 15.6.24 ...	14.7.24.
<i>Almanzora</i> ...	Mackenzie G. A. ...	A. P. Portsmouth ...	"	R.M.S.P. ...	" 28.11.24 to 11.1.25...	16.1.25.
<i>Alondra</i> ...	J. J. Prendergast ...	J. Pennington ...	"	Yeoward ...	" 3.1.25 to 25.1.25 ...	2.2.25.
<i>Ampetco</i> ...	Verstichelen, A. ...	E. Suret ...	"	American Petroleum... L.M. & S. Rly.	" 31.10.24 to 30.11.24 ...	9.12.24.
<i>Anglia</i> ...	Sorge, P. ...	W. H. Hughes ...	C.C.	Form 911 19.10.24 to 15.11.24	Telegraphic Report 11.4.24 ...	11.4.24.
<i>Antiochus</i> ...	Ireland, T. ...	A. C. D. Howes ...	No.	A. Holt ...	Form 911 19.10.24 to 15.11.24	25.11.24.
<i>Aorangi</i> ...	Crawford, R. ...	R. B. Denniston ...	M.L.	Canadian-Australasian Elder Dempster ...	Met. Log. 9.7.24 to 21.12.24 ...	29.12.24.
30 <i>Appam</i> ...	Yardley, H. A. ...	B. Holt, J. Doyle, P. Marriott	M.L.	Cunard ...	W.T. Reg. 4.12.24 to 18.12.24 ... 25.12.24 to 8.1.25 ...	22.12.24. 12.1.25.
<i>Arafura</i> ...	Gordon, A. S. ...	R. Lloyd Harry ...	No.	Eastern and Australian Union Castle ...	Form 911 17.8.24 to 18.10.24...	15.12.24.
<i>Armada Castle</i> ...	Millard, L. A. ...	M. M. Tomkins ...	"	P. Henderson ...	" 2.1.25 to 18.1.25 ...	10.2.25.
<i>Aracan</i> ...	Willis, M. ...	H. Poole, D. Frame, J. Aitken	M.L.	Southern Rly. ...	Met. Log. 17.5.24 to 7.9.24 ...	1.10.24.
<i>Arundel</i> ...	Short, H. ...	Mr. Hill ...	C.C.	Union Castle ...	Telegraphic Report 1.2.25 ...	1.2.25.
<i>Arundel Castle</i> ...	Hague, J. W., Commr., R.N.R.	G. Blaiklock, C. Williams, F. Granger.	M.L.	Anchor ...	Met. Log. 12.9.24 to 4.1.25 ...	12.1.25.
<i>Assyria</i> ...	Erskine, R. ...	J. Hamilton ...	No.	Harrison ...	Form 911 9.11.24 to 3.12.24 ...	12.12.24.
<i>Astronomer</i> ...	Booth, W. M. ...	E. S. Machon, A. M. Jeffries, J. Jackson.	M.L.	White Star ...	Met. Log. 12.7.24 to 15.10.24...	30.10.24.
<i>Athenic</i> ...	Jones, J. L. ...	C. Cochrane ...	No.	Nippon Yusen Kaisha	Form 911 2.11.24 to 24.12.24...	12.1.25.
<i>Atsuta Maru</i> ...	Furuhashi, M. ...	S. Mizoguchi ...	"	Harrison ...	" 29.10.24 to 30.11.24 ...	5.12.24.
<i>Auditor</i> ...	Owen, W. F. ...	T. E. Steel ...	"	Glen & Co. ...	" 27.11.24 to 16.12.24 ...	19.1.25.
<i>Auldmeir</i> ...	Ramsay, J. D. ...	J. A. S. Adams ...	"	Cunard ...	" 11.10.24 to 27.10.24 ...	11.11.24.
<i>Ausonia</i> ...	Gibbons, G., R.D., Commr., R.N.R.	A. T. Hamer ...	"		" 27.9.24 to 18.10.24...	30.10.24.
51 <i>Baltic</i> ...	Hickson, V. W. ...	E. A. A. Crowley, J. Law, F. Patchett.	W.T.	White Star ...	W.T. Reg. 24.11.24 to 13.12.24 ... 27.10.24 to 14.11.24 ... Form 911 26.10.24 to 16.11.24 ... 23.11.24 to 14.12.24 ...	17.12.24. 18.11.24. 19.11.24. 17.12.24.
<i>Bambra</i> ...	Wyles, W. S. ...	G. Buckeridge, H. W. Norris, J. Eggleston, W. Walters.	M.L.	State Service, Australia	Met. Log. 28.6.24 to 11.11.24...	10.2.25.
<i>Bampton Castle</i> ...	Swiney, W. A. ...	L. C. Chapman, H. A. Deller, C. B. Hoggan.	"	Union Castle ...	" 25.1.24 to 7.10.24 ...	20.10.24.
<i>Banbury Castle</i> ...	Wynne, R. H. ...	C. C. Page ...	No.	Turnbull Martin ...	Form 911 27.10.24 to 4.12.24...	16.1.25.
<i>Banffshire</i> ...	Daniel, F. ...	J. M. Bowie ...	"	Commonwealth Govt.	" 6.11.24 to 25.11.24...	15.12.24.
<i>Barambah</i> ...	Baillie, T. ...	A. Campbell ...	"	Hogarth & Sons ...	" 15.8.24 to 28.8.24 ...	16.10.24.
<i>Baron Caudor</i> ...	Beedle, T. S. ...	W. G. E. Rawlinsom ...	"	British India ...	" 13.11.24 to 14.12.24 ...	5.1.25.
<i>Barpeta</i> ...	Rice, W. V., D.S.O., D.S.C., Commr., R.N.	H. M. S. Forbes ...	M.L.	His Majesty's Ship ...	Met. Log. 28.7.24 to 3.11.24 ...	28.11.24.
59 <i>Belgenland</i> ...	Bradshaw, J. ...	C. J. Murray, J. M. Appleby, H. H. Grace.	W.T.	Red Star ...	W.T. Reg. 21.7.24 to 11.9.24 ... 26.9.24 to 16.10.24... Form 911 26.9.24 to 15.10.24...	4.11.24. 20.10.24. 20.10.24.
<i>Benalder</i> ...	Cole, J. H. D.S.C....	W. M. Webster ...	No.	Ben Line ...	" 22.11.24 to 14.12.24 ...	19.1.25.
<i>Bengloe</i> ...	McCorquodale, A. ...	G. M. Duff ...	"	Ben Line ...	" 25.11.24 to 13.12.24 ...	20.12.24.
1 <i>Berengaria</i> ...	Irvine, W. R. D., R.D. Capt., R.N.R.	G. H. Jones, R. F. Bovey, W. C. A. Robson.	W.T.	Cunard ...	W.T. Reg. 16.11.24 to 1.12.24...	5.12.24.

Name of Vessel.	Captain.	Observing Officers.	Official Meteorological Equipment.	Line.	Last Log, Register, or Report Contributed. Received up to 13.2.25.	Date Received.
<i>Bernini</i> ...	Evans, W. ...	H. L. Rudd ...	No.	Lamport & Holt ...	Form 911 28.8.24 to 21.9.24 ...	1.12.24.
<i>Berrima</i> ...	Townshend, W. P. ...	H. C. Slinn ...	"	P. & O. Branch ...	" 28.10.24 to 11.11.24 ...	15.12.24.
<i>Bogota</i> ...	Dunn, R. E. ...	W. E. Mc. Mullen ...	"	R.M.S.P. Co. ...	" 3.10.24 to 22.12.24 ...	8.1.25.
<i>Bolingbroke</i> ...	Stewart, A. ...	C. E. Duggan ...	M.L.	Canadian Pacific ...	Met. Log. 25.8.24 to 23.9.24 ...	2.10.24.
<i>Borda</i> ...	Holland, R. ...	" ...	"	P. & O. Branch ...	Form 911 4.9.24 to 15.1.25 ...	6.2.25.
<i>Bothwell</i> ...	Dott, J. F. ...	S. W. Keay ...	No.	Canadian Pacific ...	" 3.11.24 to 4.12.24 ...	8.12.24.
<i>Brandon</i> ...	Mc. Combie, G. F. G. ...	W. J. P. Roberts, G. B. Marriott ...	"	" ...	" 22.12.24 to 24.1.25 ...	30.1.25.
<i>Brecon</i> ...	McDonald, J. ...	P. H. Moore, J. Mackenzie, H. C. Waters. ...	M.L.	" ...	Met. Log. 15.5.24 to 30.10.24 ...	6.1.25.
<i>Brenda</i> ...	Murdoch, R. G. ...	A. M. Adams ...	No.	Scottish Fishery Board ...	Form 911 11.11.24 to 30.11.24 ...	3.12.24.
<i>Brighton</i> ...	Hill, A. ...	Mr. Munton ...	C.C.	Southern Railway ...	Telegraphic Report 13.2.25 ...	13.2.25.
<i>British Engineer</i> ...	Piper, H. G. ...	E. L. Miller ...	No.	British Tankers ...	Form 911 17.9.24 to 20.11.24 ...	27.11.24.
<i>British Lantern</i> ...	Taylor, R. J. ...	R. B. Page ...	"	" ...	" 9.7.24 to 13.8.24 ...	18.8.24.
<i>Browning</i> ...	Connorton, C. A. ...	W. E. Johnston ...	"	Lamport & Holt ...	" 21.9.24 to 17.10.24 ...	29.10.24.
<i>Bruyere</i> ...	Pugh, E. ...	C. E. Legg ...	"	" ...	" 14.10.24 to 23.12.24 ...	16.1.25.
<i>Cambria C.S.</i> ...	Wightman, H. G. E., D.S.C. ...	E. N. L. Staples ...	M.L.	Eastern Tel. Co. ...	Met. Log. 8.7.24 to 5.10.24 ...	27.1.25.
<i>Cambria</i> ...	" ...	V. S. Phillips ...	C.C.	L.M. & S. Rly. ...	Telegraphic Report 12.2.25 ...	12.2.25.
<i>Camito</i> ...	Scudamore, J. H. H., D. S. C., R. D., Commr., R.N.R. ...	D. A. Jack, R. M. Cossantine, S. Borrie, S. Ray. ...	M.L.	Elders & Fyffes ...	Met. Log. 8.7.24 to 13.12.24 ...	19.12.24.
<i>Canada</i> ...	Jones, T. ...	F. W. Laws ...	No.	White Star-Dominion ...	Form 911 29.11.24 to 20.12.24 ...	30.12.24.
<i>Canadian Inventor</i> ...	Roberts, R. P. ...	S. M. Holinden ...	"	Canadian Govt. Merchant Marine. ...	" 16.12.23 to 6.2.24 ...	24.3.24.
<i>Canadian Scottish</i> ...	Forson, A. ...	S. Fieldhouse ...	"	" ...	" 8.1.25 to 24.1.25 ...	9.2.25.
<i>Canadian Seigneur</i> ...	Dixon, C. C. ...	" ...	"	" ...	" ...	" ...
<i>Canadian Skirmisher</i> ...	Millar, W. H. ...	C. W. Crofts ...	"	" ...	Form 911 26.11.24 to 5.1.25 ...	2.2.25.
<i>Canadian Winner</i> ...	Hocking, N. P. ...	R. D. Ranns ...	"	" ...	" 13.9.24 to 15.10.24 ...	13.11.24.
<i>Carlow Castle</i> ...	Whitfield, G. J. ...	L. H. Stevens ...	"	Union Castle ...	" 21.8.24 to 3.1.25 ...	6.1.25.
<i>35 Carmania</i> ...	McNeil, S. G. S., R.D., Capt., R.N.R. ...	D. S. Kite, W. M. Stewart, T. A. O. Ellis. ...	W.T.	Cunard ...	W.T. Reg. 1.12.24 to 20.12.24 ...	23.12.24.
<i>34 Caronia</i> ...	Diggle, E. G., R.D., Capt., R.N.R. ...	D. W. Sorrell, J. A. Quarrie, E. R. Taylor. ...	W.T.	Cunard ...	Form 911 29.11.24 to 21.12.24 ...	23.12.24.
<i>Cassandra</i> ...	Mitchell, W. E. ...	G. M. Sime ...	No.	Anchor Donaldson ...	W.T. Reg. 22.12.24 to 17.1.25 ...	22.1.25.
<i>52 Cedric</i> ...	Hickson, V. W. ...	A. E. Weller, G. T. Kavanagh, W. Pearson. ...	W.T.	White Star ...	Form 911 8.10.24 to 16.12.24 ...	18.12.24.
<i>53 Celtic</i> ...	Berry, G. ...	R. S. Walker, G. T. Kavanagh, D. W. Chamberlain. ...	W.T.	" ...	W.T. Reg. 18.1.25 to 8.2.25 ...	10.2.25.
<i>Centaur</i> ...	Rose, A. F. ...	L. Johnstone ...	No.	A. Holt & Co. ...	Form 911 30.11.24 to 21.12.24 ...	23.12.24.
<i>Ceramic</i> ...	Summers, F. F. ...	E. E. Burt ...	"	White Star ...	Form 911 12.11.24 to 16.12.24 ...	29.12.24.
<i>Changsha</i> ...	Gambrill, F. C. ...	A. M. Frame, F. G. Stratford, H. Lishman, L. H. Bailie. ...	M.L.	Yuill & Co. ...	Met. Log. 17.11.23 to 22.4.24 ...	2.8.24.
<i>Chignecto</i> ...	Green, J. ...	A. F. Walker ...	No.	R.M.S.P. Co. ...	Form 911 19.1.24 to 26.2.24 ...	7.4.24.
<i>China</i> ...	King, A., D.S.C. ...	E. Cox Walker ...	"	P. & O. ...	" 9.4.24 to 20.5.24 ...	26.5.24.
<i>Chindwara</i> ...	Brisley, P. L. ...	A. G. Earl ...	"	British India ...	" 2.10.24 to 12.11.24 ...	1.12.24.
<i>Chindwin</i> ...	Esslemont, C. ...	J. Summers, W. Wilson, C. Owen, J. G. Walker. ...	M.L.	P. Henderson ...	Met. Log. 6.9.24 to 20.11.24 ...	10.12.24.
<i>Chinhua</i> ...	Byers, G. ...	Messrs. Stringer, Taylor, W. E. Chapman, L. V. Rowe. ...	"	China Nav. Co. ...	" 10.7.24 to 15.11.24 ...	3.2.25.
<i>City of Alexandria</i> ...	Bedford, G. B. ...	T. C. Higgins ...	No.	Ellerman ...	" ...	" ...
<i>City of Baroda</i> ...	Houghton, W. ...	A. D. Henderson ...	M.L.	" ...	Met. Log. 29.10.23 to 29.9.24 ...	6.11.24.
<i>City of Batavia</i> ...	Sproule, A. ...	" ...	"	" ...	" ...	" ...
<i>City of Benares</i> ...	Nancollas, H. E. ...	S. J. Nash ...	No.	" ...	Form 911 4.7.24 to 31.7.24 ...	18.8.24.
<i>City of Benares</i> ...	McArthur, J. ...	A. A. Fullerton ...	"	" ...	" 6.12.24 to 17.12.24 ...	26.1.25.
<i>City of Brisbane</i> ...	Seaborne, F. O. ...	W. E. Fletcher ...	"	" ...	" 29.12.24 to 23.1.25 ...	2.2.25.
<i>City of Canterbury</i> ...	Macdonald, K., O.B.E. ...	A. M. Hamilton ...	"	" ...	" 3.9.24 to 9.11.24 ...	14.11.24.
<i>City of Chester</i> ...	Teague, R. E. ...	F. C. Wilson ...	M.L.	" ...	Met. Log. 29.4.24 to 27.10.24 ...	18.11.24.
<i>City of Edinburgh</i> ...	Spencer, H. ...	E. V. Henday ...	No.	" ...	Form 911 31.8.24 to 30.9.24 ...	16.10.24.
<i>City of London</i> ...	Martin, D. ...	J. L. Mumford ...	"	" ...	" 19.12.24 to 29.12.24 ...	8.1.25.
<i>City of Marseilles</i> ...	Brown, G. ...	W. J. Nixon ...	"	" ...	" 5.12.24 to 28.12.24 ...	6.1.25.
<i>City of Rangoon</i> ...	Williams, T. L. ...	W. Ibbotson, S. L. Hoare, T. A. Dexter. ...	M.L.	" ...	Met. Log. 25.4.23 to 9.8.23 ...	16.8.23.
<i>City of Valencia</i> ...	Williamson, W. A., R.D., Lieut.-Commr. R.N.R. ...	C. C. Duncan ...	No.	" ...	Form 911 12.7.24 to 26.9.24 ...	16.10.24.
<i>City of Yokohama</i> ...	Jinks, J. W. ...	R. Moloney ...	"	" ...	" 22.11.24 to 8.12.24 ...	22.12.24.
<i>Clan Cumming</i> ...	" ...	S. M. Werrey Easterbrook ...	"	Clan ...	" ...	" ...
<i>Clan Lindsay</i> ...	Worthington, C. D. ...	G. K. Johnson ...	"	" ...	Form 911 8.10.24 to 13.11.24 ...	19.11.24.
<i>Clan Macbeth</i> ...	Young, A. H., R.D., Lieut.-Commr., R.N.R. ...	T. Lund ...	"	" ...	" 16.12.24 to 30.12.24 ...	27.1.25.
<i>Clan Macgillivray</i> ...	West, W. F. ...	P. G. de Gruchy ...	"	" ...	" 28.11.24 to 17.12.24 ...	12.1.25.
<i>Clan Macindoe</i> ...	Miller, W. ...	F. G. Darnborough ...	"	" ...	" 24.9.24 to 27.11.24 ...	3.12.24.
<i>Clan Mackellar</i> ...	Jones, M. H. ...	E. N. Stewart ...	"	" ...	" 28.9.24 to 14.11.24 ...	3.12.24.
<i>Clan Mackenzie</i> ...	Young, G. ...	W. G. Arthur, F. B. Fairweather. ...	"	" ...	" 7.11.24 to 21.11.24 ...	12.12.24.
<i>Clan Mackinnon</i> ...	Mackie, R. W. ...	W. S. Holden, T. V. Wilson, C. Jones. ...	M.L.	" ...	Met. Log. 6.9.24 to 15.12.24 ...	22.1.25.
<i>Clan Macnaughton</i> ...	Gray, J. N. ...	A. G. Storkey, F. Burnes ...	No.	" ...	Form 911 19.1.24 to 24.2.24 ...	26.2.24.
<i>Clan Macphee</i> ...	Gourlay, J. B. ...	P. H. Aydon, W. D. E. Campbell, F. Buckley, — Carter. ...	M.L.	" ...	Met. Log. 26.1.24 to 12.6.24 ...	8.8.24.
<i>Clan Macgarttag</i> ...	Gray, J. N. ...	T. Walls ...	No.	" ...	Form 911 7.12.24 to 2.1.25 ...	27.1.25.
<i>Clan Macvicar</i> ...	Phillips, G. P. ...	L. S. Murrin ...	"	" ...	" 22.11.24 to 11.12.24 ...	31.12.24.
<i>Clan Malcolm</i> ...	Higgins, C. J. ...	T. G. Young, R. F. Buckley ...	M.L.	" ...	Met. Log. 4.5.24 to 7.9.24 ...	22.9.24.
<i>Clan Morrison</i> ...	Porterfield, W. M. ...	D. A. Evans ...	No.	" ...	Form 911 11.10.24 to 19.11.24 ...	9.12.24.
<i>Clan Murdoch</i> ...	Pagan, J. C. ...	C. W. Thomas ...	"	" ...	" 6.11.24 to 23.11.24 ...	25.11.24.
<i>Clan Ranald</i> ...	Openshaw, L. G. ...	W. H. D. Stephen ...	"	" ...	" 8.11.24 to 21.11.24 ...	29.12.24.
<i>Clan Ross</i> ...	Jones, R. C. ...	G. Short ...	"	" ...	" 25.10.24 to 2.12.24 ...	9.12.24.
<i>Clan Sinclair</i> ...	Neill, G. A. ...	F. B. Parker ...	"	" ...	" 21.12.24 to 31.1.25 ...	5.2.25.
<i>Clan Stuart</i> ...	Stenson, F. J., R.D., Commr. R.N.R. ...	R. Silk ...	"	" ...	" 20.11.24 to 26.11.24 ...	16.1.25.
<i>Clan Uruguay</i> ...	Gibb, A. F. W. ...	R. H. Law ...	"	" ...	" 7.11.24 to 28.11.24 ...	29.12.24.
<i>Colonia, C.S.</i> ...	Campos, V., O.B.E., Lt.-Commr., R.N.R. ...	S. A. Garnham, A. S. Muir, J. M. Matthews, W. Sangwine. ...	M.L.	Telegraph Construction & Maintenance. ...	Met. Log. 4.10.24 to 21.1.25 ...	30.1.25.
<i>Colonial</i> ...	Barrow, R. K. ...	A. V. Jones ...	No.	Harrison ...	Form 911 23.8.24 to 28.11.24 ...	3.12.24.
<i>Colonian</i> ...	Gittins, R. P. ...	J. Crangle ...	"	Leyland ...	" 9.11.24 to 8.12.24 ...	11.12.24.
<i>Columbia</i> ...	Gemmell, W. ...	S. G. Taylor ...	"	Anchor ...	" 30.11.24 to 21.12.24 ...	29.12.24.

LIST OF VOLUNTARY OBSERVING SHIPS

iii

Name of Vessel.	Captain.	Observing Officers.	Official Meteorological Equipment.	Line.	Last Log, Register, or Report Contributed. Received up to 13.2.25.	Date Received.
<i>Comino</i> ...	Nuttall, E. L. ...	A. McVicar ...	No.	Furness Withy ...	Form 911 9.9.24 to 14.10.24 ...	22.10.24.
<i>Cohee</i> ...	Festa, M. ...	C. Keen ...	"	Commonwealth Govt. ...	" 9.8.24 to 29.8.24 ...	7.10.24.
<i>Corinthic</i> ...	Hart, F. ...	" ...	M.L.	White Star ...	Met. Log. 13.6.24 to 3.10.24 ...	7.10.24.
<i>Cornish City</i> ...	Bowen, T. S. ...	G. S. Dawes ...	No.	Reardon Smith ...	Form 911 8.1.24 to 16.2.24 ...	7.4.24.
<i>Cornwall</i> ...	Robertson, H. W. ...	W. W. Glover ...	"	Dowie, J., & Co. ...	" 12.9.24 to 18.10.24 ...	18.11.24.
<i>Crawford Castle</i> ...	Hughes, E. G. ...	J. C. Brown ...	"	Union Castle ...	" 6.9.24 to 26.9.24 ...	4.11.24.
<i>Culebra</i> ...	Mackay, A. S. ...	A. H. Dabree, S. J. Hill, R. Hocken. ...	M.L.	R.M.S.P. Co. ...	Met. Log. 17.8.24 to 14.10.24 ...	7.11.24.
<i>Cuthbert</i> ...	Reynolds, W. H. B. ...	A. B. Fasting ...	No.	Booth ...	Form 911 2.10.24 to 10.12.24 ...	30.12.24.
<i>Cyclops</i> ...	Cosker, W. ...	R. W. Ellis ...	"	A. Holt ...	" 22.10.24 to 30.11.24 ...	29.12.24.
<i>Dardanus</i> ...	Shaw, A. T. ...	" ...	No.	A. Holt ...	" 11.1.25 to 21.1.25 ...	29.1.25.
<i>Darian</i> ...	Masters, W. ...	A. S. Holland ...	"	Leyland ...	" 18.1.25 to 29.1.25 ...	5.2.25.
<i>Darro</i> ...	Smith, W. E., D.S.O. ...	W. H. Fowler ...	"	R.M.S.P. Co. ...	" 29.11.24 to 24.1.25 ...	28.1.25.
<i>Daytonian</i> ...	Walker, C. J., D.S.O. ...	W. T. Godwin ...	"	Leyland ...	" 15.10.24 to 23.11.24 ...	6.12.24.
<i>Delta</i> ...	Brooks, C., D.S.O. ...	J. O. V. Young ...	"	P. & O. ...	" 28.6.24 to 8.8.24 ...	13.8.24.
<i>Demerara</i> ...	R. D., Commr., R.N.R. ...	Hill, T. A. ...	"	R.M.S.P. Co. ...	" 7.12.24 to 29.12.24 ...	6.1.25.
<i>Demosthenes</i> ...	Cormick, R. E. ...	E. Hewitt ...	"	Aberdeen ...	" 19.10.24 to 6.1.25 ...	16.1.25.
<i>Deseado</i> ...	Williams, W. J. ...	R. A. Alcock ...	"	R.M.S.P. Co. ...	" 21.11.24 to 10.1.25 ...	16.1.25.
<i>Desna</i> ...	Wakeman, E. C. ...	S. G. Dawson ...	"	"	" 20.10.24 to 13.12.24 ...	17.12.24.
<i>Deucalion</i> ...	Adam, C., R.D., Commr., R.N.R. ...	A. Hamby ...	"	"	" 24.12.24 to 16.1.25 ...	19.1.25.
<i>Devon</i> ...	Findlay, J. ...	P. W. Savery, O. Thomas ...	"	A. Holt ...	" 20.12.23 to 11.5.24 ...	4.6.24.
<i>Dieppe</i> ...	Gardner, H. W. ...	A. Bell ...	C.C.	New Zealand S.S. Co. ...	Telegraphic Report. 12.2.25 ...	12.2.25.
<i>Digby</i> ...	Marmery, S. ...	Mr. Parsons ...	M.L.	Southern Railway ...	Met. Log. 17.4.24 to 9.11.24 ...	26.11.24.
<i>Dimboola</i> ...	Westgarth, W. A., D.S.C. ...	J. Pascoe, J. W. Murphy, W. P. Paterson. ...	"	Furness Withy ...	"	"
<i>Discoverer</i> ...	Chambers, F. W., D.S.C. ...	" ...	No.	Melbourne S.S. Co. ...	Form 911 21.11.24 to 16.12.24 ...	19.1.25.
<i>Dogra</i> ...	Roy, C. M. ...	G. A. Molyneux ...	"	Harrison ...	" 18.6.24 to 14.10.24 ...	23.10.24.
<i>Domala, M.V.</i> ...	Ling, J. T. ...	W. E. Shotton ...	"	Asiatic S.N. Co. ...	" 27.12.24 to 12.1.25 ...	2.2.25.
<i>61 Doric</i> ...	Hartock, L. ...	E. C. Akers ...	"	British India ...	" 12.1.24 to 6.2.24 ...	18.3.24.
<i>Doric Star</i> ...	Whittingham, W. E., O.B.E., R.D., Commr. R.N.R. ...	C. E. Merchant ...	"	"	"	"
<i>Dorington Court</i> ...	Davies, J. ...	A. Thompson ...	W.T.	White Star ...	" 9.11.24 to 30.11.24 ...	3.12.24.
<i>Dorset</i> ...	Thomas, R. T. ...	A. S. Menzies ...	No.	Blue Star ...	" 29.9.24 to 27.10.24 ...	5.12.24.
<i>Dromore Castle</i> ...	Isaacs, W. A. ...	E. V. Quickenden ...	"	Haldin & Co. ...	" 17.8.24 to 8.9.24 ...	18.9.24.
<i>Dryden</i> ...	Kettlewell, C. R. ...	H. S. White, H. Neagle, J. S. Bloomfield, L. Cann. ...	M.L.	New Zealand S.S. Co. ...	Met. Log. 3.4.24 to 6.10.24 ...	10.10.24.
<i>Dundrum Castle</i> ...	Linklater, H. ...	S. S. Smith ...	No.	Union Castle ...	Form 911 16.12.24 to 9.1.25 ...	30.1.25.
<i>Dundes</i> ...	Knight, R. A. ...	G. D. Oldfield ...	"	Lampart & Holt ...	" 28.9.24 to 7.12.24 ...	6.1.25.
<i>Duffield</i> ...	Kershaw, H. J. ...	R. May ...	"	Union Castle ...	" 29.11.24 to 30.12.24 ...	16.1.25.
<i>Duquesa</i> ...	Pape, E. R. ...	D. P. Morgan ...	"	Pacific S.N. Co. ...	" 22.11.24 to 24.12.24 ...	29.12.24.
<i>Durenda</i> ...	King, A. ...	T. S. Robertson ...	"	Hunting & Sons ...	" 10.11.24 to 9.12.24 ...	16.12.24.
<i>Eastern</i> ...	Pearson, J. M. ...	C. P. Lane ...	"	Furness Withy ...	Form 911 25.10.24 to 31.12.24 ...	5.1.25.
<i>Ebani</i> ...	Wilson, W. ...	W. H. Creese ...	"	British India ...	" 6.10.24 to 12.11.24 ...	15.12.24.
<i>Edinburgh Castle</i> ...	Smith, G. L. ...	H. Jeans, C. Holdaway ...	M.L.	Eastern and Australian ...	Met. Log. 4.5.24 to 24.11.24 ...	3.2.25.
<i>Eemland</i> ...	Faill, — ...	W. McKeown ...	No.	Elder Dempster ...	"	"
<i>El Cordobes</i> ...	Strong, H., R.D., Commr., R.N.R. ...	" ...	M.L.	Union Castle ...	Met. Log. 11.4.24 to 12.10.24 ...	27.10.24.
<i>Elmina</i> ...	Van Noppen, C. D. ...	J. G. Sander ...	No.	Holland Lloyd ...	Form 911 26.8.24 to 25.11.24 ...	15.12.24.
<i>El Paraguay</i> ...	Noton, F. G. ...	N. H. Oldham ...	"	British & Argentine S.N. Co. ...	" 29.11.24 to 29.12.24 ...	16.1.25.
<i>Elpenor</i> ...	Millson, H. E. ...	W. McKeown, J. H. Hall, C. H. Turner. ...	M.L.	Elder Dempster ...	Met. Log. 1.3.24 to 30.8.24 ...	8.9.24.
<i>Elysia</i> ...	Ellis, F., D.S.C. ...	W. E. Williams ...	No.	Houlder Bros. ...	Form 911 8.11.24 to 8.1.25 ...	16.1.25.
<i>Empress of Asia</i> ...	Holden, W. R. F. ...	P. E. Wright, C. Mock ...	M.L.	A. Holt ...	Met. Log. 26.5.24 to 12.9.24 ...	17.9.24.
<i>Empress of Australia</i> ...	Kinnaird, J. ...	A. Grant ...	No.	Anchor ...	Form 911 16.2.24 to 8.3.24 ...	1.4.24.
<i>Empress of Canada</i> ...	Douglas, L. D., R.D., Lt. - Commr., R.N.R. ...	" ...	M.L.	Canadian Pacific ...	Met. Log. 5.6.24 to 14.9.24 ...	14.10.24.
<i>Empress of France</i> ...	Hailey, A. J. ...	C. Critchley, R. A. Leicester, A. B. Smith ...	M.L.	"	" 24.4.24 to 28.10.24 ...	24.11.24.
<i>Empress of Russia</i> ...	Robinson, S., C.B.E., R.D., Commr., R.N.R. ...	W. S. Halliday, L. C. Barry ..	M.L.	"	Met. Log. 19.6.24 to 13.11.24 ...	29.12.24.
<i>Empress of Scotland</i> ...	Griffiths, E. ...	O. Pennington, E. Roberts, A. W. Patrick. ...	M.L.	"	" 7.6.24 to 11.11.24 ...	18.11.24.
<i>Endeavour</i> ...	Hosken, A. J. ...	— Reid ...	M.L.	"	" 28.8.24 to 8.12.24 ...	26.1.25.
<i>Essequibo</i> ...	Gillies, J., C.B.E. ...	B. Grant, S. C. Fox, D. Loram, L. W. Akerman, W. J. Phillips. ...	M.L.	"	Met. Log. 26.4.24 to 29.10.24 ...	11.12.24.
<i>Eumaeus</i> ...	Nares, J. D., D.S.O., Capt., R.N. ...	H. Exton Turner ...	M.L.	His Majesty's Ship ...	Met. Log. 23.10.23 to 19.2.24 ...	14.6.24.
<i>Euripides</i> ...	Duncan, E. E. ...	L. W. Hanson ...	No.	R.M.S.P. Co. ...	Form 911 6.11.24 to 23.12.24 ...	5.1.25.
<i>Eurybates</i> ...	Power, J. ...	E. R. Pritchard ...	"	A. Holt ...	" 23.9.24 to 16.10.24 ...	30.10.24.
<i>Explorer</i> ...	Collins, P. J., O.B.E. ...	H. S. Cox, G. R. Fisher, F. Fuller. ...	M.L.	Aberdeen ...	Met. Log. 10.10.24 to 2.2.25 ...	9.2.25.
<i>Fitzroy</i> ...	Lloyd, R. ...	J. J. Goldsmith ...	No.	A. Holt ...	Form 911 20.12.24 to 31.12.24 ...	12.2.25.
<i>Flandria</i> ...	Lamont, A. ...	Scientific Staff ...	M.L.	Scottish Fishery Board ...	Met. Log. 20.6.24 to 27.9.24 ...	24.10.24.
<i>Flinders</i> ...	Silk, H. V., Lt.-Commr., R.N. ...	C. W. Sabine ...	M.L.	His Majesty's Ship ...	" 24.7.24 to 31.10.24 ...	11.11.24.
<i>Francisco</i> ...	Veldkamp, G. J. ...	T. Doornbosch ...	No.	Holland Lloyd ...	Form 911 13.12.24 to 30.1.25 ...	2.2.25.
<i>Frankenfels</i> ...	Henderson, D. A., Lt.-Commr., R.N. ...	K. F. Boxall ...	M.L.	His Majesty's Ship ...	Met. Log. 26.7.24 to 30.10.24 ...	18.11.24.
<i>Freienfels</i> ...	Wilkins, J., O.B.E. ...	F. D. Shaw ...	No.	Ellerman Wilson ...	Form 911 21.11.24 to 26.12.24 ...	31.12.24.
<i>Freyja</i> ...	Cartmer, G. E., O.B.E. ...	L. M. Burfitt, J. H. A. Mackie, J. Garmory. ...	M.L.	India Office Shipping ...	Met. Log. 12.6.24 to 17.9.24 ...	14.10.24.
<i>Gallie</i> ...	Cleugh, J. W. ...	C. H. Porter, V. R. Watkins, H. Wilson. ...	"	"	" 7.9.24 to 7.12.24 ...	17.12.24.
<i>Galtymore</i> ...	Hughes, W. ...	J. H. Hennessey ...	No.	Scottish Fishery Board ...	Form 911 1.1.25 to 28.1.25 ...	2.2.25.
<i>Garret</i> ...	Summers, F. F., R.D., Commr. R.N.R. ...	W. G. O. Jones ...	"	White Star ...	Met. Log. 3.8.24 to 9.12.24 ...	12.12.24.
<i>Gascogne</i> ...	Ledsome, J. S. ...	N. Goubrough ...	"	Furness Withy ...	Form 911 12.1.25 to 20.1.25 ...	23.1.25.
	Visser, C. W. ...	F. Weeda ...	"	Rotterdam Lloyd ...	" 19.11.24 to 6.1.25 ...	12.1.25.
	Mills, A. ...	P. G. Collins ...	"	Dalgaty & Co. ...	" 9.6.24 to 9.8.24 ...	22.9.24.

Name of Vessel.	Captain.	Observing Officers.	Official Meteorological Equipment.	Line.	Last Log Register, or Report Contributed. Received up to 13.2.25.	Date Received.
<i>Gelria</i> ...	Kolkman, J. M. ...	J. N. F. Cordijs ...	No.	Holland Lloyd ...	Form 911 21.11.24 to 12.1.25...	16.1.25.
<i>Gladiator</i> ...	Ruffell, ...	D. H. Bryant, W. E. Shotton ...	"	Harrison ...	" 7.1.24 to 8.3.24 ...	12.3.24.
<i>Glenamoy</i> , M.V. ...	Angier, J. ...	L. C. Riggs ...	"	Glen Line ...	" 15.4.24 to 11.5.24 ...	18.8.24.
<i>Glenapp</i> , M.V. ...	Griffith, J. E. ...	F. Poate ...	"	" ...	" 17.12.24 to 28.12.24 ...	8.1.25.
<i>Glenluce</i> , M.V. ...	Barkley, E. ...	J. D. Richards ...	"	" ...	" 20.10.24 to 14.11.24 ...	18.11.24.
<i>Glenishane</i> ...	Roberts, W. E. ...	V. Rowe, R. A. Dale ...	"	" ...	" 22.12.24 to 7.1.25 ...	16.1.25.
<i>Gloucestershire</i> ...	Robin, E. ...	T. E. Field ...	"	Bibby ...	" 27.9.24 to 4.12.24 ...	8.12.24.
<i>Gorgon</i> ...	Hughes, J. W. ...	W. E. Crompton ...	"	A. Holt & Co. ...	" 31.10.24 to 23.12.24 ...	22.1.25.
<i>Gourko</i> ...	Montgomery, H. ...	G. H. Kirk, N. J. Donovan ...	M.L.	Ellerman Wilson ...	Met. Log. 22.5.24 to 2.11.24 ...	11.11.24.
<i>Haliartus</i> ...	Marsh, L. V. ...	W. H. Upton ...	No.	R. P. Houston ...	Form 911 2.12.24 to 2.1.25 ...	6.2.25.
<i>Harmonides</i> ...	Hughes, W. J. ...	D. L. Roberts ...	"	" ...	" 23.11.24 to 23.12.24 ...	16.1.25.
<i>Harmony</i> , Auxy. ...	Jackson, J. C. ...	A. W. Bush ...	"	Moravian Mission ...	" 4.12.24 to 20.12.24 ...	6.1.25.
<i>Hatarana</i> ...	Mardon, T. T. ...	J. L. Durkee, F. Wells, E. B. Heath, E. C. McGuinness. ...	M.L.	British India ...	" 12.9.23 to 26.3.24 ...	22.4.24.
<i>Hauraki</i> , M.V. ...	Frew, J. D. ...	E. A. Buckingham ...	No.	Union S.S. Co., N.Z. ...	" 10.11.24 to 1.12.24 ...	12.1.25.
<i>Henry Holmes</i> , C.S. ...	Bicker Caarten, A. ...	E. S. C. Hale ...	"	W. I. & Panama Telegraph Co. ...	" 10.11.24 to 18.12.24 ...	21.1.25.
<i>Herald</i> ...	Harvey, J. R., O.B.E., Commr., R.N. ...	W. C. Jenks ...	M.L.	His Majesty's Ship ...	Met. Log. 6.6.24 to 3.10.24 ...	29.12.24.
<i>Herefordshire</i> ...	Stanley, W. ...	P. Flood, G. Whitworth, P. S. Cooper, S. M. Burton, G. Holdsworth. ...	"	Bibby ...	" 1.3.24 to 19.8.24 ...	8.9.24.
<i>Herschel</i> ...	Carey, W. J. ...	A. N. Blundell ...	No.	Lampert & Holt ...	Form 911 15.11.24 to 9.1.25 ...	16.1.25.
<i>Hibernia</i> ...	Tanner ...	R. Woodall ...	C.C.	L.M. & S. Rly. ...	Telegraphic Report. 7.2.25 ...	7.2.25.
<i>Highland Enterprise</i> ...	Pond, R. H. ...	D. R. S. Webster ...	No.	Nelson ...	Form 911 29.3.24 to 12.6.24 ...	8.7.24.
" <i>Glen</i> ...	Jones, T. J. ...	C. M. Best ...	"	" ...	" 14.12.24 to 2.1.25 ...	16.1.25.
" <i>Heather</i> ...	Powell, G. A. ...	G. L. Goodman ...	M.L.	" ...	" ...	" ...
" <i>Laddie</i> ...	Alford, C. ...	A. S. Jones, J. S. Collins, G. E. Leech. ...	No.	" ...	Form 911 16.9.24 to 8.11.24 ...	22.12.24.
" <i>Piper</i> ...	Collings, D. ...	H. McKinnon, F. Falconer, R. R. Soanes. ...	M.L.	" ...	Met. Log. 21.7.24 to 8.12.24 ...	17.12.24.
" <i>Pride</i> ...	Robinson, R. H. ...	F. W. Harvey, H. Thomas, F. Abbott. ...	"	" ...	" 15.4.24 to 31.8.24 ...	17.9.24.
" <i>Rover</i> ...	Ashby Graves, F. ...	W. T. Breen ...	"	" ...	" 24.10.24 to 21.12.24 ...	29.12.24.
" <i>Warrior</i> ...	Brooke, W. ...	F. M. Lyons ...	No.	Booth ...	Form 911 20.5.24 to 23.7.24 ...	12.9.24.
<i>Hildebrand</i> ...	Maddrell, J. ...	J. E. Williams, O. J. Edwards, M. P. Pearce. ...	M.L.	Commonwealth Govt. ...	" 17.9.24 to 31.10.24 ...	3.11.24.
<i>Hobsons Bay</i> ...	Kydd, O. J. ...	G. P. Kitto ...	"	" ...	Met. Log. 29.7.24 to 2.11.24 ...	13.11.24.
<i>Holbein</i> ...	Gough, W. A. ...	H. Clark, H. Yates, A. Griffiths. ...	No.	Lampert & Holt ...	Form 911 18.9.24 to 17.11.24 ...	19.11.24.
<i>54 Homeric</i> ...	Metcalfe, G. R., Lt.-Commr., R.N.R. ...	J. E. Martin, W. G. Iddes ...	W.T.	White Star ...	W.T. Reg. 13.11.24 to 28.11.24 ...	2.12.24.
<i>Honorius</i> ...	Samuels, C. ...	A. G. Litherland ...	No.	R. P. Houston ...	Form 911 5.1.25 to 2.2.25 ...	9.2.25.
<i>Hororata</i> ...	Haines, F. P. ...	S. G. Edwards ...	"	New Zealand S.S. Co. ...	" ...	" ...
<i>Huanchaco</i> ...	Redyard, A. ...	P. McCallum, C. D. Watt, L. A. Beale. ...	"	Pacific S.N. Co. ...	" 15.7.24 to 5.8.24 ...	15.8.24.
<i>Hubert</i> ...	Jones, W. C. H. ...	" ...	"	Booth ...	" 6.11.24 to 18.11.24 ...	6.12.24.
<i>Hurumui</i> ...	Burton Davies, J. ...	" ...	M.L.	New Zealand S.S. Co. ...	Met. Log. 29.3.24 to 24.10.24 ...	29.10.24.
<i>Iber</i> ...	Langdon, C. ...	E. Lightfoot ...	C.C.	G.W. Railway ...	Telegraphic Report. 7.2.25 ...	7.2.25.
<i>Ikala</i> ...	Meetham, J. T. ...	T. B. Littlechild ...	No.	J. H. Welsford & Co. ...	Form 911 8.11.24 to 24.11.24 ...	15.12.24.
<i>Intaba</i> ...	Gibbins, W. A. ...	J. Richardson ...	"	Harrison ...	" 29.11.24 to 14.1.25 ...	21.1.25.
<i>Intombi</i> ...	Sawyer, E. I. ...	J. Sinclair ...	"	" ...	" 3.8.24 to 19.10.24 ...	22.10.24.
<i>Ionic Star</i> ...	Wilson, G. ...	G. A. R. J. Leslie, R. H. Lucy, G. A. Gould. ...	"	Blue Star ...	" 29.1.24 to 26.3.24 ...	29.3.24.
<i>Iroquois</i> ...	Tinson, C. W., O.B.E., Commr., R.N. ...	A. R. Cook ...	M.L.	His Majesty's Ship ...	Met. Log. 15.7.24 to 7.11.24 ...	3.2.25.
<i>Ixion</i> ...	Carnon, C. G. ...	B. C. Farrow ...	No.	A. Holt ...	Form 911 12.11.24 to 2.12.24 ...	16.1.25.
<i>John Pender</i> , C.S. ...	Smythe, T. W., O.B.E. ...	R. D. Eckford ...	"	Eastern Tel. Co. ...	" 5.12.24 to 13.12.24 ...	18.12.24.
<i>Junin</i> ...	Benson, C. W. ...	H. E. Reilly, F. T. Bisley, G. T. Webb, F. Vesington. ...	"	Pacific S.N. Co. ...	" 19.6.24 to 7.10.24 ...	14.10.24.
<i>Kaikoura</i> ...	Downton, M. ...	T. F. Wrigley ...	M.L.	New Zealand S.S. Co. ...	Met. Log. 15.7.24 to 19.12.24 ...	29.12.24.
<i>Kaisar-i-Hind</i> ...	Manley, G. ...	F. Takaku ...	No.	P. & O. ...	Form 911 6.12.24 to 23.12.24 ...	1.1.25.
<i>Kamo Maru</i> ...	Okano, Y. ...	C. M. C. Clayton, R. J. Sinclair ...	"	Nippon Yusen Kaisha ...	" 1.10.24 to 2.11.24 ...	7.11.24.
<i>Kangaroo</i> ...	Norris, H. C. ...	F. Humble. ...	M.L.	State Service Australia ...	Met. Log. 26.2.24 to 14.8.24 ...	17.10.24.
<i>Karoo</i> ...	Robinson, T. ...	H. J. Perrett ...	No.	Ellerman Bucknall ...	Form 911 2.6.24 to 16.6.24 ...	25.6.24.
<i>Kashima Maru</i> ...	Shinomiya, T. ...	M. Takada ...	"	Nippon Yusen Kaisha ...	" 2.1.24 to 9.2.24 ...	14.3.24.
<i>Kashmir</i> ...	Stringer, R. H., O.B.E., R.D., Commr., R.N.R. ...	F. Hopkins ...	"	P. & O. ...	" 24.8.24 to 8.9.24 ...	18.11.24.
<i>Kellett</i> ...	Haselfoot, F. E. B., D.S.O., Commr., R.N. ...	E. H. B. Baker, R. A. Stephens ...	M.L.	His Majesty's Ship ...	Met. Log. 30.7.24 to 15.10.24 ...	20.10.24.
<i>Kenilworth Castle</i> ...	Millard, L. A. ...	A. E. Denn, W. M. Tomkins ...	M.L.	Union Castle ...	" 16.5.24 to 25.1.25 ...	6.2.25.
<i>Khiva</i> ...	George J., O.B.E. ...	L. Fraser, K. H. Cummins, G. K. Fox. ...	"	P. & O. ...	" 24.10.24 to 31.1.25 ...	5.2.25.
<i>Khyber</i> ...	Randall, H. W. R.D., Capt., R.N.R. ...	N. B. S. Hewett ...	No.	" ...	Form 911 6.4.24 to 11.5.24 ...	14.5.24.
<i>Kia Ora</i> ...	Pinckney, L. D., O.B.E. ...	J. C. Kelly Rogers ...	"	Shaw Savill & Albion ...	" 25.12.24 to 31.1.25 ...	5.2.25.
<i>Kildonan Castle</i> ...	McIntosh, A. ...	R. S. W. Harris ...	"	Union Castle ...	" 17.10.24 to 7.12.24 ...	10.12.24.
<i>Kinderdijk</i> ...	Wilford, T. H. ...	A. Stenger ...	"	Holland America ...	" 27.3.24 to 3.5.24 ...	8.5.24.
<i>Kitano Maru</i> ...	Jochems, A. B. ...	R. Nakane ...	"	Nippon Yusen Kaisha ...	" 8.6.24 to 5.10.24 ...	14.10.24.
<i>Knight Companion</i> ...	Gotoh, M. ...	A. M. Hunter ...	"	A. Holt ...	" 19.12.24 to 6.1.25 ...	2.2.25.
<i>Kovno</i> ...	Beale, H. E. ...	E. R. Massam, L. Griffiths, J. Sanders, T. Fea. ...	M.L.	Ellerman Wilson ...	Met. Log. 16.12.23 to 22.7.24 ...	2.9.24.
<i>Kyogle</i> ...	Casson, D. H., R.D., Commr., R.N.R. ...	C. B. Odman, E. W. Hughes ...	No.	Commonwealth Light-house Service. ...	Form 911 13.11.24 to 13.12.24 ...	19.1.25.
<i>Lady Denison Pender</i> , C.S. ...	Coalstad, C. ...	F. Lawrence ...	"	Eastern Tel. Co. ...	" 13.10.24 to 18.11.24 ...	5.1.25.
<i>Laguna</i> ...	West, G. W. ...	F. W. Parker ...	"	Pacific S.N. Co. ...	" 22.3.24 to 14.4.24 ...	28.4.24.
<i>Lalande</i> ...	Mander, F. ...	T. J. A. Thomson ...	"	Lampert & Holt ...	" 20.11.24 to 13.12.24 ...	30.12.24.
<i>Lancashire</i> ...	Bambra, W. A. ...	W. M. S. Higginson ...	"	Bibby ...	" 26.10.24 to 1.1.25 ...	12.1.25.
<i>Laomedon</i> ...	Beckett, F. W. ...	A. J. Barclay ...	"	A. Holt ...	" 19.11.24 to 23.12.24 ...	5.1.25.
<i>La Paz</i> , M.V. ...	Smith, A. H. ...	A. Lyall ...	"	Pacific S.N. Co. ...	" 12.11.24 to 28.11.24 ...	17.12.24.
<i>Laplace</i> ...	Ross, J. ...	W. Boyde, R. B. Langley ...	"	Lampert & Holt ...	" 24.8.24 to 11.11.24 ...	17.11.24.
<i>55 Lapland</i> ...	Davies, G. W. ...	W. N. Jenkins ...	W.T.	Red Star ...	W.T. Reg. 2.1.25 to 20.1.25 ...	30.1.25.
<i>Lassell</i> , M.V. ...	Howell, T. ...	H. G. Cuthill ...	No.	Lampert & Holt ...	Form 911 1.1.25 to 25.1.25 ...	30.1.25.
<i>Leicestershire</i> ...	Hickman, V. T. ...	W. Whiteside, P. H. Potter, D. Sharrock, W. H. Muirhead. ...	M.L.	Bibby ...	Met. Log. 3.11.24 to 28.11.24 ...	19.12.24.
<i>Leitrim</i> ...	English, G. L. ...	H. C. Roberts ...	No.	Dowie, J., & Co. ...	Form 911 16.8.24 to 25.9.24 ...	30.9.24.
<i>Ling Nam</i> ...	Robertson, A. ...	" ...	"	Chunghwa Nav. Co. ...	" 27.10.23 to 12.1.24 ...	22.4.24.

LIST OF VOLUNTARY OBSERVING SHIPS

v

Name of Vessel.	Captain.	Observing Officers.	Official Meteorological Equipment.	Line.	Last Log, Register, or Report Contributed. Received up to 13.2.25.	Date Received.
<i>Llanstephan Castle</i>	Owen, S. H. ...	J. B. M. Reynolds... ..	No.	Union Castle ...	Form 911 20.9.24 to 25.11.24...	29.11.24.
<i>Loch Katrine</i> ...	Matthews, G. P. ...	C. Noakes	"	R.M.S.P. Co. ...	" 25.4.24 to 1.8.24 ...	13.8.24.
<i>London Commerce</i>	Young, H. J., D.S.C.	P. G. Leverett	"	Furness Withy ...	" 20.12.24 to 20.1.25...	29.1.25.
<i>Loreto M.V.</i> ...	Barkley, E. ...	F. Binnion	"	Pacific S.N. Co. ...	" 18.5.24 to 7.6.24 ...	12.6.24.
<i>Losada M.V.</i> ...	Meldrum, G. W. ...	A. H. Turner	"	" " ...	" 4.10.24 to 24.10.24...	27.10.24.
<i>Macedonia</i> ...	Potter, H. W., R.D., Commr., R.N.R.	J. B. Buggi	No.	P. & O. ...	" 6.7.24 to 14.7.24 ...	28.7.24.
<i>Macharda</i> ...	Cochran, G. ...	W. Moore	"	Brocklebank ...	" 6.9.24 to 24.11.24 ...	5.12.24.
<i>Mahana</i> ...	Kershaw, W. A. R. ...	F. Gilroy	"	Shaw Savill & Albion	" 21.12.24 to 2.2.25 ...	9.2.25.
<i>Maharaja</i> ...	Peet, T. M. ...	B. C. P. Boermel	"	Asiatic S.N. Co. ...	" 29.10.24 to 30.11.24 ...	29.12.24.
<i>Maihar</i> ...	Rowe J. P. ...	C. Shaw L. Robertson, R. G. Widdon.	M.L.	Brocklebank ...	Met. Log. 26.1.24 to 26.5.24 ...	23.6.24.
<i>Maimyo</i> ...	Richardson, T. ...	P. Yates	No.	" " ...	Form 911 12.12.24 to 15.1.25...	19.1.25.
<i>Maine</i> ...	Seymour, H. ...	S. C. Skinner	"	Atlantic Transport ...	" 24.10.24 to 26.11.24 ...	1.12.24.
<i>58 Majestic</i> ...	Hayes, Sir B. F., K.C.M.G. D.S.O., R.D., Commadore, R.N.R.	A. F. Butcher, W. W. Pearson	W.T.	White Star ...	W.T. Reg. 10.12.24 to 22.12.24	29.12.24.
<i>Makambo</i> ...	Brown, T. M. ...	F. C. Ree, H. Mann, D. G. Irvine, D. Wilson, J. Abbot, K. Thompson.	M.L.	Burns Philp ...	Form 911 9.12.24 to 22.12.24...	29.12.24.
<i>Makura</i> ...	Barlow, A. E. ...	G. O. Knaggs, J. D. Lundie, W. A. Todd, J. Joyes.	M.L.	Canadian-Australasian	Met. Log. 13.2.24 to 28.8.24 ...	2.12.24.
<i>Malancha</i> ...	Showman, A. C. ...	"	"	"	" 3.7.24 to 17.10.24 ...	5.1.25.
<i>Malda</i> ...	Mawson, J. ...	"	"	"	"	"
<i>Manchester</i> ...	Whitham, F. ...	A. Hill	No.	Brocklebank ...	Form 911 14.11.24 to 29.1.25...	2.2.25.
<i>Manchester</i> ...	Gray, T. N. ...	W. Hunt	"	British India ...	" 23.11.24 to 26.12.24 ...	19.1.25.
<i>Manchester</i> ...	Everest J. E. ...	L. H. Moorhouse	"	Manchester Liners ...	" 29.11.24 to 1.1.25 ...	5.1.25.
<i>Manchester</i> ...	Riley, J. E. ...	C. E. Stocker, J. F. Fisher, Dormer, A. E.	M.L.	" " ...	Met. Log. 23.3.24 to 25.11.24...	5.12.24.
<i>Manchester</i> ...	Barclay J. ...	A. H. Boyd	No.	" " ...	Form 911 2.11.24 to 17.12.24...	22.12.24.
<i>Mandasor</i> ...	Kershaw, R. W. ...	W. Baxter	"	Brocklebank ...	" 16.12.24 to 28.12.24 ...	2.2.25.
<i>Manhattan</i> ...	Hutchison J. G. ...	R. Day	"	Atlantic Transport ...	" 10.11.24 to 18.12.24 ...	22.12.24.
<i>Manipur</i> ...	Scurr, T. W. ...	G. W. Barker	"	Brocklebank ...	" 12.10.24 to 1.1.25 ...	3.1.25.
<i>Manistee</i> ...	Isaacson, J. M. ...	S. Browne, J. Blower, F. R. Inch.	M.L.	Elders & Fyffes ...	Met. Log. 26.7.24 to 7.12.24 ...	16.12.24.
<i>29 Marburn</i> ...	Stewart, A. ...	J. B. Hewson, T. Fisher ...	W.T.	Canadian Pacific ...	W.T. Reg. 18.1.25 to 7.2.25 ...	10.2.25.
<i>Marella</i> ...	Mortimer S. ...	T. W. Burdis, D. Pemberton, K. L. Thompson, W. McBride, A. M. Hill.	M.L.	Burns Philp ...	Form 911 18.1.25 to 7.2.25 ...	10.2.25.
<i>Marengo</i> ...	Bean, A. ...	W. G. Pearce, G. B. Bray, E. Wood.	"	Ellerman Wilson ...	" 24.11.23 to 17.4.24...	2.12.24.
<i>Margha</i> ...	Milne, A. R., R.D., Commr., R.N.R.	J. Strachan, P. Wright, H. E. Evans.	"	British India ...	" 22.5.24 to 28.8.24 ...	3.9.24.
<i>Marglen</i> ...	Griffiths, J. N. ...	T. H. Wilson, C. Mowatt ...	No.	Canadian Pacific ...	" 25.10.24 to 4.1.25 ...	21.1.25.
<i>27 Marloch</i> ...	Hamilton, G. ...	J. McLellan, C. Crawley, C. Draper.	W.T.	" " ...	Form 911 23.1.25 to 7.2.25 ...	13.2.25.
<i>Maryland</i> ...	Pollard, F. W., D.S.O., R.D., Commr., R.N.R.	A. S. Mather	No.	Atlantic Transport ...	W.T. Reg. 9.11.24 to 28.11.24...	4.12.24.
<i>Masirah</i> ...	Thowless, E. ...	R. C. Baker	"	Brocklebank ...	Form 911 9.11.24 to 28.11.24...	5.12.24.
<i>Massilia</i> ...	Henderson, J. L. ...	E. Richardson	"	Anchor ...	" 15.9.24 to 22.10.24...	30.10.24.
<i>Matakana</i> ...	Bosdet, V. J. ...	A. Chrystal, D. N. Mac- Gregor.	"	Shaw, Savill & Albion	Form 911 4.4.24 to 25.4.24 ...	26.5.24.
<i>Mataram</i> ...	Kenworthy, V. ...	B. H. Doughty	"	Burns Philp & Co. ...	" 12.9.24 to 20.9.24 ...	22.9.24.
<i>Matheran</i> ...	Williams, D. J. ...	J. A. Embley, J. Robertson, D. Hunter.	M.L.	Brocklebank ...	" 5.7.24 to 25.11.24 ...	10.12.24.
<i>Mathura</i> ...	Hanna, R. G. ...	H. H. Armstrong	No.	" " ...	Met. Log. 19.11.24 to 22.12.24	3.2.25.
<i>Matiana</i> ...	Langlands, D. H. ...	W. G. Bussey	"	British India ...	Met. Log. 2.7.24 to 13.10.24 ...	7.11.24.
<i>Matina</i> ...	Henderson, J. ...	" " " " " " " "	M.L.	Elders & Fyffes ...	Form 911 16.12.24 to 1.1.25 ...	26.1.25.
<i>32 Mauretania</i> ...	Rostron, A. H., C.B.E., R.D., A.-d.-C., Capt., R.N.R.	J. A. Myles, A. N. Sargent, R. Allen.	W.T.	Cunard ...	Met. Log. 6.11.24 to 24.1.25 ...	5.2.25.
<i>Media</i> ...	Maughan ...	" " " " " " " "	No.	T. & J. Brocklebank ...	Met. Log. 3.9.23 to 28.5.24 ...	31.5.24.
<i>56 Megantic</i> ...	Berry, G. ...	H. J. C. Day, R. Conway ...	W.T.	White Star ...	W.T. Reg. 2.11.24 to 7.11.24...	12.11.24.
<i>22 Melita</i> ...	Clews, A. H. ...	H. A. MacCullum, W. E. Bacon, A. Benshaw.	W.T.	Canadian Pacific ...	" 18.10.24 to 6.11.24 ...	11.11.24.
<i>Memnon</i> ...	Salter, G. H. ...	E. D. Potts	No.	A. Holt ...	Form 911 3.10.24 to 19.10.24...	21.10.24.
<i>Menominee</i> ...	Pollard, W. ...	A. Smith	"	Atlantic Transport ...	" 17.1.25 to 26.1.25 ...	9.2.25.
<i>Mercian</i> ...	Gardner, J. ...	R. Hughes	"	Leyland ...	" 10.11.24 to 18.12.24 ...	22.12.24.
<i>21 Metagama</i> ...	Henderson, W. ...	B. Leslie, A. M. Watt, E. V. Glennie.	W.T.	Canadian Pacific ...	W.T. Reg. 29.11.24 to 18.12.24	22.12.24.
<i>Miami</i> ...	Maxwell Brown, W. E.	G. McKee	No.	Elders & Fyffes ...	Form 911 16.12.24 to 20.1.25...	26.1.25.
<i>Michigan</i> ...	Tribe, A. E. ...	L. A. Williams	"	Atlantic Transport ...	" 11.6.24 to 20.6.24 ...	25.6.24.
<i>Minderoo</i> ...	Richardson, E. ...	B. J. Bennie, W. J. McPhedron, J. H. Oxtan.	M.L.	West Australia Nav. Co.	Met. Log. 30.12.23 to 12.6.24...	27.8.24.
<i>Minna</i> ...	Mackenzie, G. G. ...	D. Rattray	No.	Scottish Fishery Board	Form 911 18.12.24 to 9.2.25 ...	13.2.25.
<i>23 Minnedosa</i> ...	Notley, A. ...	— Carter, — Soame, — Mac- kenzie.	W.T.	Canadian Pacific ...	W.T. Reg. 5.1.25 to 22.1.25 ...	26.1.25.
<i>Minnetonka</i> ...	Gates, T. F. ...	H. E. McCartney	No.	Atlantic Transport ...	Form 911 6.9.24 to 24.9.24 ...	26.9.24.
<i>Minnewaska</i> ...	Claret, F. ...	W. S. Mackie	"	" " ...	" 18.1.25 to 7.2.25 ...	10.2.25.
<i>Mirror, C.S.</i> ...	Sherwood, C. A. ...	C. E. F. St. John	"	Eastern Tel. Co. ...	" 5.1.25 to 24.1.25 ...	27.1.25.
<i>Mississippi, M.V.</i>	Wylie, J. T. J. ...	H. K. Cockerill	"	Atlantic Transport ...	" 29.8.24 to 6.10.24 ...	20.10.24.
<i>Moena</i> ...	Morzer Bruyns, M. F.	G. H. Vander Roest	"	Nederland ...	" 7.1.25 to 19.1.25 ...	22.1.25.
<i>Mokavia</i> ...	Griffin, R. H., O.B.E., R.D., Capt., R.N.R.	D. Buckley	"	P. & O. ...	" 18.12.24 to 6.2.25 ...	10.2.25.
<i>Mongolian Prince</i>	Durrant, G. D. ...	P. F. Owens	"	Prince ...	" 2.8.24 to 8.11.24 ...	12.11.25.
<i>Monkbarns, Ship</i>	Davies, W. ...	R. Baise, J. Williams ...	"	J. Stewart & Co. ...	" 22.12.24 to 8.1.25 ...	13.2.25.
<i>24 Montcalm</i> ...	Sibbons, H. ...	H. McFadyen	W.T.	Canadian Pacific ...	" 10.10.24 to 26.11.24 ...	5.2.25.
<i>25 Montclare</i> ...	Webster, G. S., R.D., Commr., R.N.R.	R. Fegan, W. Phillips, H. S. Knight.	"	" " ...	W.T. Reg. 19.1.25 to 5.2.25 ...	9.2.25.
<i>28 Montlaurier</i> ...	Clews, A. H. ...	F. E. Williams	"	" " ...	" 21.12.24 to 9.1.25 ...	15.1.25.
<i>26 Montrose</i> ...	Landy, E. ...	T. Beck, A. Mansey, C. Clarke.	"	" " ...	Form 911 21.12.24 to 9.1.25 ...	16.1.25.
<i>20 Montroyal</i> ...	Latta, R. G. ...	F. E. Williams	"	" " ...	W.T. Reg. 29.12.24 to 14.1.25	21.1.25.
<i>Morvada</i> ...	Mills, T. L., O.B.E., R.D., Commr., R.N.R.	J. Norris, C. L. Hazeldine ...	M.L.	British India ...	" 10.1.25 to 30.1.25 ...	3.2.25.
					Form 911 10.1.25 to 31.1.25 ...	5.2.25.
					" 11.7.24 to 31.7.24 ...	5.8.24.
					W.T. Reg. 4.10.24 to 21.10.24...	23.10.24.
					Met. Log. 5.1.24 to 24.7.24 ...	11.9.24.

Name of Vessel.	Captain.	Observing Officers.	Official Meteorological Equipment.	Line.	Last Log, Register, or Report Contributed. Received up to 13.2.25.	Date Received.
<i>Mulbera</i> ...	Steadman, W. R. ...	E. Holland ...	No.	British India ...	Form 911 28.11.24 to 10.12.24	22.12.24.
<i>Nagara</i> ...	Shillitoe, B., R.D., Commr., R.N.R.	C. K. Brown ...	"	R.M.S.P. Co. ...	" 18.7.24 to 16.9.24 ...	22.9.24.
<i>Napierian</i> ...	Kerruish, W. ...	T. Griffiths ...	"	Leyland ...	" 14.2.24 to 26.2.24 ...	14.3.24.
<i>Nardana</i> ...	Moth, F. L. ...	S. C. T. Smith ...	"	British India ...	" 17.11.24 to 28.12.24	11.2.25.
<i>Nariva</i> ...	Buret T. J. C. ...	H. M. S. Laidlaw, C. Waterhouse, E. N. Giller, D. Parsons.	M.L.	R.M.S.P. Co. ...	Met. Log. 4.10.24 to 4.12.24 ...	10.12.24.
<i>Nascopie</i> ...	Smellie, T. F. ...	A. S. Watts, T. D. Roseburgh	M.L.	Hudson's Bay Co. ...	" 16.6.24 to 17.10.24...	23.10.24.
<i>Navasota</i> ...	Willan, F. G. L., R.D., Commr., R.N.R.	W. A. Delap ...	No.	R.M.S.P. Co. ...	Form 911 23.6.24 to 20.8.24 ...	28.8.24.
<i>Nawab</i> ...	Smith J. F. ...	... ..	"	Asiatic S.N. Co. ...	" 20.7.24 to 27.9.24 ...	22.12.24.
<i>Nebraska</i> ...	Collins, A. R. D., O.B.E., R.D., Lt.-Commr., R.N.R.	A. F. Walker ...	"	R.M.S.P. Co. ...	" 15.3.24 to 21.4.24 ...	5.5.24.
<i>Nellore</i> ...	Murray, F. S., R.D., Lt. - Commr., R.N.R.	G. E. Owen ...	"	P. & O. ...	" 5.12.24 to 5.2.25 ...	13.2.25.
<i>Nestor</i> ...	Owen, R. D., O.B.E.	O. V. Jones ...	M.L.	A. Holt ...	" 10.7.24 to 22.8.24 ...	1.9.24.
<i>Nevasa</i> ...	Swanson, C. J. ...	D. Lorrie ...	No.	British India ...	" 13.10.24 to 30.12.24	6.1.25.
<i>Newby Hall</i> ...	Kendall, J. W. ...	A. Martin ...	M.L.	Ellerman ...	Met. Log. 12.9.24 to 10.1.25 ...	27.1.25.
<i>Niagara</i> ...	Rolls J. T. ...	R. B. Denniston, T. A. Macpherson, J. V. Bray, J. Dawson.	M.L.	Canadian-Australian...	" 19.7.24 to 13.11.24...	8.12.24.
<i>Ningchow</i> ...	Wilson, C. A. ...	R. A. Hannay ...	No.	A. Holt ...	Form 911 14.10.24 to 8.1.25 ...	16.1.25.
<i>Nore</i> ...	Parker, J. W. ...	R. W. Mackie, C. B. Roche, R. H. Turner, G. Haughey.	M.L.	P. & O. ...	Met. Log. 6.11.24 to 24.1.25 ...	29.1.25.
<i>Norman</i> ...	Morton Betts W. ...	D. A. Hodgson ...	No.	Union Castle ...	Form 911 1.12.24 to 20.12.24...	19.1.25.
<i>Norna</i> ...	Wright, J. ...	T. Mather ...	"	Scottish Fishery Board	" 13.1.25 to 31.1.25 ...	4.2.25.
<i>Norseman, C.S.</i> ...	Barter, H. O., R.D., Commr., R.N.R.	... ..	M.L.	Western Tel. Co. ...	Met. Log. 11.9.23 to 28.3.24 ...	7.7.24.
<i>Nortonian</i> ...	McCormick, J. ...	T. Griffiths ...	No.	Leyland ...	Form 911 2.8.24 to 30.9.24 ...	4.10.24.
<i>Nubian</i> ...	Watmough, T. M. ...	H. R. Gaskill ...	"	" ...	" 21.12.24 to 2.1.25 ...	6.1.25.
<i>Nyanza</i> ...	Carpendale, F. W. J.	G. D. Brown, C. H. Hand, S. Ferguson.	M.L.	P. & O. ...	Met. Log. 20.10.24 to 4.1.25 ...	9.1.25.
<i>Oaklands Grange</i> ...	Routledge, R. ...	E. A. Insley ...	No.	Houlder Bros. ...	Form 911 27.5.24 to 19.9.24 ...	26.9.24.
<i>42 Ohio</i> ...	Nicholson, M. S., R.D., Capt., R.N.R.	R. W. Morford ...	W.T.	R.M.S.P. Co. ...	" 12.12.24 to 9.1.25 ...	12.1.25.
<i>Olympia</i> ...	Caldwell, R. ...	D. R. Urquhart, G. Lynas, C. Mortimer.	M.L.	Anchor ...	" 13.8.24 to 26.10.24...	29.10.24.
<i>57 Olympic</i> ...	Metcalfe, G. R. ...	J. C. M. Boyce, G. W. Couch, C. J. Warltire.	W.T.	White Star ...	W.T. Reg. 11.1.25 to 29.1.25 ...	2.2.25.
<i>Orama</i> ...	Staunton, H. G., C.B.E., R.D., Commr., R.N.R.	... ..	M.L.	Orient ...	Form 911 10.1.25 to 29.1.25 ...	2.2.25.
<i>Oranian</i> ...	Hoskins, W. ...	D. Hewett ...	"	Leyland ...	Form 911 4.9.24 to 17.11.24 ...	24.11.24.
<i>Orari</i> ...	Robinson, F. W. ...	R. Newman, T. Breen, F. Longhead, C. Wilkinson, H. Farrant.	M.L.	New Zealand S.S. Co.	Met. Log. 9.8.24 to 20.1.25 ...	27.1.25.
<i>40 Orbita</i> ...	Parker, W. H., C.B.E., R.D., Capt. R.N.R.	R. V. Rutley, C. Frankom ...	W.T.	R.M.S.P. Co. ...	Form 911 11.1.25 to 4.2.25 ...	10.2.25.
<i>Orcoma</i> ...	Dominy, R. H., C.B.E., Commr. R.N.R.	G. B. Wardale, L. Jones, W. Billington.	M.L.	Pacific S.N. Co. ...	Met. Log. 20.11.24 to 4.2.25 ...	9.2.25.
<i>41 Orduna</i> ...	Warner, G. E., R.D., Commr., R.N.R.	R. W. Sumpton, J. Vivian, H. D. Hooper, G. F. Russell.	W.T.	R.M.S.P. Co. ...	W.T. Reg. 11.1.25 to 6.2.25 ...	10.2.25.
<i>Oriana</i> ...	{ Daniel, T. ... }	... ..	M.L.	Pacific S.N. Co. ...	Form 911 10.1.25 to 6.2.25 ...	9.2.25.
<i>Orita</i> ...	{ Kite, E. ... }	... ..	"	" ...	Met. Log. 15.2.24 to 24.10.24 ...	8.11.24.
<i>Ormonde</i> ...	Splatt, W. A. ...	J. G. Harvey, T. R. Scott, D. W. Hutchinson, C. P. D. Dean.	M.L.	" ...	Met. Log. 19.9.24 to 6.12.24 ...	19.12.24.
<i>Ormonde</i> ...	Knowles, C. H., D.S.O., Commr., R.N.	A. M. Hughes ...	M.L.	His Majesty's Ship ...	Met. Log. 8.11.24 to 6.12.24 ...	31.12.24.
<i>Ormonde</i> ...	Coad, A. J., Commr., R.N.R.	N. Savage, T. B. Grieve, N. A. Whinfield, W. A. Wickham.	M.L.	Orient ...	Met. Log. 14.9.24 to 16.12.24...	31.12.24.
<i>Ormuz</i> ...	James L. V., D.S.C.	C. Fox, J. C. K. Dowding, H. MacLean, L. A. Keeble, F. S. Shurrock.	M.L.	" ...	Met. Log. 19.10.24 to 22.1.25...	28.1.25.
<i>Oroya</i> ...	Pearce, A. ...	S. Lewis ...	No.	Pacific S.N. Co. ...	Form 911 29.10.24 to 5.1.25 ...	12.1.25.
<i>Orsova</i> ...	Matheson, C. G., D.S.O., R.D., Commr., R.N.R.	M. J. Sarson, A. J. Croft Cohen, C. V. Dodgson, P. P. Murphy, L. E. Fordham.	M.L.	Orient ...	Met. Log. 12.10.24 to 13.1.25...	19.1.25.
<i>Ortega</i> ...	Christian, C. H. ...	D. W. Hutchison ...	No.	Pacific S.N. Co. ...	Form 911 12.6.24 to 5.7.24 ...	26.8.24.
<i>Orvieto</i> ...	Sinner, G. L., R.D., Commr., R.N.R.	C. G. Thorne, A. J. Baxter, G. E. Martin, A. O. H. O'Brien, M. C. Lester.	M.L.	Orient ...	Met. Log. 20.7.24 to 21.10.24...	23.10.24.
<i>Osterley</i> ...	Cameron, E. P. ...	F. G. Goodman, E. Hatch, J. C. Jackson, H. Tanner.	M.L.	" ...	" 17.8.24 to 19.11.24...	28.11.24.
<i>Othello</i> ...	Pearson, Z. C. ...	J. W. Botheroyd ...	No.	Ellerman Wilson ...	Form 911 31.12.24 to 19.1.25	9.2.25.
<i>Oliva</i> ...	Elford, H. E. ...	J. H. Fuller ...	"	Shaw, Savill & Albion	" 19.12.24 to 8.1.25 ...	3.2.25.
<i>Ovid</i> ...	Groom, A. C. B. ...	... ..	"	Shakespeare Shipping Co.	" 1.12.24 to 27.12.24...	21.1.25.
<i>Oxfordshire</i> ...	Crumplin, W. E. ...	F. C. Brooks ...	"	Bibby Bros. ...	" 20.11.24 to 19.12.24	22.12.24.
<i>Pacific Shipper, M.V.</i>	Newman, G. W. A.	J. W. Woodward ...	"	Furness Withy ...	" 8.9.24 to 24.9.24 ...	22.10.24.
<i>Pakeha</i> ...	W. P. Clifton Mogg	M. F. Armitage ...	M.L.	Shaw, Savill & Albion	Form 911 1.7.24 to 10.8.24 ...	15.8.24.
<i>Paparoa</i> ...	Ashworth, F. ...	C. J. Brewer ...	No.	New Zealand S.S. Co.	" 21.10.24 to 14.11.24	30.12.24.
<i>Pareora</i> ...	Evans, J. O. ...	R. F. Hillings ...	"	Hain S.S. Co. ...	" 18.9.24 to 27.10.24...	8.12.24.
<i>Paris</i> ...	Cook, C. L. ...	Mr. Biles ...	C.C.	Southern Rly. ...	Telegraphic Report. 19.2.24 ...	19.2.24.
<i>Patia</i> ...	Bostock, R. J. ...	W. McIlwaine ...	No.	Elders & Fyffes	Form 911 30.11.24 to 4.1.25 ...	12.1.25.
<i>Patrol, C.S.</i> ...	Welsh, T. K. ...	H. A. Davison, B. L. Vinden, A. T. Morrell.	M.L.	Eastern Extension (A. & C.) Telegraph Co.	Met. Log. 11.2.24 to 13.7.24 ...	25.8.24.
<i>Persic</i> ...	Davies, E. ...	H. Williams ...	No.	White Star ...	Form 911 19.10.24 to 1.12.24...	3.12.24.
<i>Peshawar</i> ...	Hester, C. W., R.D., Commr., R.N.R.	D. G. Baillie, E. J. R. North, J. R. Alleyne.	M.L.	P. & O. ...	Met. Log. 24.7.24 to 4.12.24 ...	10.12.24.
<i>Philadelphum</i> ...	Baker, J. A. ...	W. Lawton ...	No.	Leyland ...	Form 911 2.10.24 to 20.11.24...	26.11.24.
<i>Polyphemus</i> ...	Hatfield, J. ...	R. E. Wilkes ...	"	A. Holt ...	" 11.11.24 to 30.11.24	5.1.25.
<i>Poona</i> ...	Cherry, W. G. W. ...	F. R. W. Page ...	"	P. & O. ...	" 21.7.24 to 31.8.24 ...	15.9.24.

LIST OF VOLUNTARY OBSERVING SHIPS

vii

Name of Vessel.	Captain.	Observing Officers.	Official Meteorological Equipment.	Line.	Last Log, Register, or Report Contributed. Received to 13.2.25.	Date Received.
<i>Port Adelaide</i> ...	Hayter, S. W. ...	... ..	M.L.	Commonwealth & Dominion.	... ..	...
" <i>Albany</i> ...	Robinson, C. A. ...	A. Jenkyns, W. B. Craig, A. G. Newbury, W. Eastoe.	M.L.	" " "	Met. Log. 4.5.24 to 3.10.24 ...	30.10.24.
" <i>Augusta</i> ...	Sawbridge, I. R. ...	G. T. C. Harris, R. C. Carter, C. F. Coate.	M.L.	" " "	" 6.4.24 to 15.10.24...	7.11.24.
" <i>Caroline</i> ...	Renaut, F. A. ...	H. Smith, T. Copeland, E. Fenton, C. Chamberlin.	M.L.	" " "	" 16.8.24 to 17.12.24...	22.12.24.
" <i>Curtis</i> ...	Van den Bergh, C. ...	W. H. Miles ...	No.	" " "	Form 911 10.11.24 to 21.11.24	6.12.24.
" <i>Darwin</i> ...	Brown, A. H. ...	E. T. N. Lawrey, E. W. R. Young.	"	" " "	" 24.12.24 to 12.1.25...	10.2.25.
" <i>Denison</i> ...	Ferris, J. ...	... ..	"	" " "	... ..	...
" <i>Hacking</i> ...	Williams, R. ...	Rowland Hill ...	"	" " "	" 3.11.24 to 17.12.24...	26.1.25.
" <i>Hunter</i> ...	Cottell, S. C. ...	A. Cooper, C. F. Post, J. H. Bower.	M.L.	" " "	Met. Log. 12.4.24 to 23.9.24 ...	30.9.24.
" <i>Melbourne</i> ...	Kearney, F. J. ...	D. G. H. Bradley, J. A. Fairbairn, C. Newton.	M.L.	" " "	" 13.3.24 to 25.7.24 ...	6.8.24.
" <i>Nicholson</i> ...	Hoad, A. C. ...	E. A. Leavett, C. R. Townshend, G. G. Langford.	M.L.	" " "	" 12.3.24 to 14.8.24 ...	9.9.24.
" <i>Pirie</i> ...	Higgs, W. G. ...	H. C. Jeffery, W. G. Jones, J. T. Nicholson, E. G. L. Jones.	M.L.	" " "	" 9.8.24 to 13.12.24...	19.12.24.
" <i>Sydney</i> ...	Lea, W. H. ...	A. W. Sams, C. Groves, A. M. Stanton, G. Freeman-Pannett.	M.L.	" " "	" 13.6.24 to 15.11.24...	18.11.24.
" <i>Victor</i> ...	Swan, L. H. ...	E. G. Fullick, R. T. R. Tomsett, W. Pickup.	M.L.	" " "	" 12.4.24 to 22.8.24 ...	28.8.24.
<i>President Jackson</i> ...	Griffith, J. ...	E. Walker ...	No.	Pacific S.S. Co. ...	Form 911 19.8.24 to 15.11.24...	8.1.25.
<i>Protea, H.M.S.A.S.</i> ...	Woodhouse, A. F. B., Lt.-Commr., R.N.	H. McMaster ...	"	South African Naval Service.	" 8.9.24 to 28.9.24 ...	21.10.24.
<i>Pyrrhus</i> ...	Elford, W. J. ...	W. Owen ...	No.	A. Holt ...	Form 911 8.9.24 to 25.9.24 ...	26.9.24.
60 <i>Regina</i> ...	Smith, R. G. ...	A. Hulme, H. Gray, W. Wilkinson, N. E. Banks, Dayman.	W.T.	White Star-Dominion	Met. Log. 26.10.24 to 12.1.25...	27.1.25.
<i>Reindeer</i> ...	Mulhall, W. ...	... ..	C.C.	G.W. Railway ...	Telegraphic Report. 12.2.25 ...	12.2.25.
<i>Rhodesian Transport.</i> ...	Fowler, W. H. ...	A. E. Warburton ...	No.	Houlder Bros. ...	Form 911 5.7.24 to 28.9.24 ...	2.10.24.
<i>Rialto</i> ...	Mordue, J. A. ...	... ..	"	Ellerman Bucknall ...	" 23.10.24 to 25.11.24	17.12.24.
<i>Rimutaka</i> ...	Hemming, F. A. ...	H. Horwood, R. S. Cox, O. M. Watts.	M.I.	New Zealand S.S. Co.	Met. Log. 9.3.24 to 26.8.24 ...	4.9.24.
<i>Risaldar</i> ...	Park, G. ...	H. Gibson, N. W. Heard, T. E. Ward.	"	Asiatic S.N. Co. ...	" 8.3.24 to 13.10.24...	18.11.24.
<i>Romney</i> ...	Leicester, F. S. ...	W. H. Underhill ...	No.	Lampert & Holt ...	Form 911 13.8.24 to 9.11.24 ...	14.11.24.
<i>Royal Fusilier</i> ...	Dawson, J. ...	J. Fraser ...	"	London & Edinburgh S.S. Co.	" 7.1.25 to 26.1.25 ...	5.2.25.
<i>Royal Transport...</i> ...	Dove, J. ...	R. Martin ...	"	Houlder Bros. ...	" 2.11.24 to 2.12.24 ...	5.12.24.
<i>Ruapehu</i> ...	McKellar, A. W., R.D., Capt., R.N.R.	P. J. Connolly, G. E. Hargreaves, F. Cooke.	M.L.	New Zealand S.S. Co.	Met. Log. 26.4.24 to 17.9.24 ...	24.9.24.
<i>Sachem</i> ...	Westgarth, W. A. ...	C. Waldron, E. Sainty ...	M.L.	Furness Withy ...	Form 911 2.11.24 to 14.12.24...	15.12.24.
<i>St. Albans</i> ...	Pilcher, E. ...	W. McIntyre ...	"	Eastern and Australian Scientific Expeditionary Research Assocn.	" 10.9.24 to 18.11.24...	19.1.25.
<i>St. George</i> ...	Blair, D., O.B.E., R.D., Commr., R.N.R.	... ..	"	... ..	... ..	...
<i>St. Patrick</i> ...	Bearpark, E. W. ...	J. Hill ...	No.	Rankin Gilmour ...	Form 911 3.11.24 to 23.11.24...	16.1.25.
<i>Salaga</i> ...	Sola, P., D.S.O. ...	F. A. Elston ...	"	Elder Dempster ...	" 6.1.25 to 18.1.25 ...	20.1.25.
<i>Samaria</i> ...	Horsburgh, G., O.B.E.	R. P. Cambell ...	"	Cunard ...	" 26.10.24 to 16.11.24	20.11.24.
<i>Sandown Castle</i> ...	Jackson, C. R. ...	E. H. de Heaume ...	"	Union Castle ...	" 20.11.24 to 19.12.24	16.1.25.
10 <i>Saturnia</i> ...	Black, J. ...	T. Ure ...	W.T.	Anchor Donaldson ...	W.T. Reg. 26.10.24 to 14.11.24	18.11.24.
<i>Saxoleine</i> ...	Biddick, E. ...	T. Redford ...	No.	Hunting & Son ...	Form 911 25.10.24 to 15.11.24	19.11.24.
<i>Saxon</i> ...	Stanley, W. F., R.D., Commr., R.N.R.	R. S. W. Harris ...	"	Union Castle ...	" 14.12.24 to 1.1.25 ...	21.1.25.
<i>Saxonia</i> ...	Jones, R. D. ...	H. A. D. Waterhouse ...	"	Cunard ...	" 7.9.24 to 7.10.24 ...	16.10.24.
<i>Scholar</i> ...	McCullum, J. ...	A. L. Cresswell ...	"	Harrison ...	" 30.9.24 to 16.12.24...	22.12.24.
<i>Scientist</i> ...	Hansen, W. A. ...	D. G. Russell ...	"	... ..	" 21.5.24 to 9.8.24 ...	12.8.24.
<i>Scindia</i> ...	Smart, R. W. ...	H. D. Campsie ...	"	Anchor ...	" 4.10.24 to 17.12.24...	29.12.24.
<i>Scotia</i> ...	Telfer ...	O. W. L. Jones ...	C.C.	L.M. & S. Rly. ...	Telegraphic Report 31.1.25 ...	31.1.25.
<i>Scottish Bard</i> ...	McDonnell, S. ...	S. W. Watts ...	No.	Tankers Ltd. ...	Form 911 31.12.24 to 19.1.25...	26.1.25.
<i>Scottish Borderer</i> ...	Thompson, F. ...	G. F. Widger ...	"	... ..	" 12.6.24 to 13.7.24 ...	21.7.24.
<i>Scottish Strath</i> ...	French, A. L. ...	W. Black ...	"	... ..	" 9.11.24 to 14.12.24...	3.1.25.
33 <i>Scythia</i> ...	Prothero, W. ...	T. Parry, G. Overton, W. B. Tannet.	W.T.	Cunard ...	W.T. Reg. 12.1.25 to 18.1.25 ...	10.2.25.
<i>Sheafdart</i> ...	... ..	T. B. Griffiths ...	No.	Kaitani Mining Administration.	Form 911 2.11.24 to 23.11.24...	25.11.24.
<i>Sheaf Mount</i> ...	Groves, C. V. ...	C. A. Goold ...	"	Souter, W. A. ...	" 17.8.24 to 26.8.24 ...	1.9.24.
<i>Sheaf Spear</i> ...	Whitfield, G. A., O.B.E.	A. E. Harvey, W. H. Grisewood.	M.L.	"	Met. Log. 17.7.24 to 13.11.24...	1.1.25.
<i>Sicilia</i> ...	Davis, H. C., D.S.C., R.D., Commr., R.N.R.	R. Rowe ...	No.	P. & O. ...	Form 911 8.7.24 to 24.7.24 ...	19.9.24.
<i>Socrates</i> ...	James, F. R. ...	E. R. Hartley ...	"	Lampert & Holt ...	" 3.12.24 to 5.1.25 ...	22.1.25.
<i>Soekaboemi</i> ...	Ter Maisch, K. J. ...	W. N. de Wijn ...	"	Rotterdam Lloyd ...	" 25.11.24 to 28.12.24	31.12.24.
<i>Somersetshire</i> ...	Adamson, B. W. ...	P. Hawkins, J. Cullen, M. Simmons.	M.L.	Bibby ...	Met. Log. 28.6.24 to 28.9.24 ...	3.10.24.
<i>Somme</i> ...	Spriddell, F. G. ...	K. W. Simpton, H. Chamberlain, V. Hill, C. C. Prosser.	M.L.	R.M.S.P. Co. ...	Met. Log. 16.2.24 to 29.9.24 ...	18.11.24.
<i>Songster</i> ...	Miles, F. R., Commr., R.N.R.	... ..	"	... ..	... ..	...
<i>Spectator</i> ...	Thompson, W. ...	W. F. O'Neill ...	M.I.	Harrison ...	" 13.10.23 to 5.11.23...	19.2.24.
<i>Spero</i> ...	Richardson, R. ...	D. Fraser, G. Orton ...	No.	... ..	Form 911 28.9.24 to 23.12.24...	1.1.25.
<i>Spero</i> ...	French, H. E. ...	E. A. Gould, G. Mussared, R. Higginbottom, J. Ruth-erford.	M.L.	Ellerman Wilson ...	Met. Log. 23.2.24 to 9.8.24 ...	19.8.24.
<i>Stephan, C.S.</i> ...	Carlton, G. F., O.B.E., Commr., R.N.R.	S. G. Elcoate, F. B. Bolingbroke, W. E. Allen, T. J. Horan.	M.L.	Telegraph Construction & Maintenance.	" 25.7.24 to 13.10.24...	17.10.24.
<i>Stuart Prince</i> ...	... ..	G. B. Taylor ...	No.	Prince ...	... ..	...
<i>Surrey</i> ...	Field, H. E. B. ...	G. W. Allard, S. E. Hoblyn, R. R. Bennett.	M.L.	Federal ...	" 12.1.24 to 6.6.24 ...	11.6.24.
<i>Sussex</i> ...	Upton, E. C. S. ...	W. A. Ewington ...	No.	... ..	Form 911 28.10.24 to 13.11.24	15.12.24.
<i>Tainui</i> ...	Hartman, W. H. ...	P. S. Horwood ...	"	Shaw, Savill & Albion	" 13.12.24 to 23.1.25...	28.1.25.
<i>Tairoa</i> ...	Summers, W. G. ...	S. A. Bannister ...	"	" " "	" 26.5.24 to 4.7.24 ...	23.8.24.

Name of Vessel.	Captain.	Observing Officers.	Official Meteorological Equipment.	Line.	Last Log, Register, or Report Contributed. Received up to 13.2.25.	Date Received.
<i>Taiyuan</i> ...	Hamilton, H. E. ...	T. M. Young, W. Bailey, ...	M.L.	Yuill & Co. ...	Met. Log. 11.7.24 to 15.12.24...	10.2.25.
<i>Talhybius</i> ...	Thomas, R. D. ...	A. M. Frame. ...	No.	A. Holt ...	Form 911 22.11.24 to 5.12.24...	29.12.24.
<i>Tambora</i> ...	Duggan, C. ...	J. H. Brown ...	"	Rotterdam Lloyd ...	" 23.10.24 to 10.12.24	22.12.24.
<i>Teiresias</i> ...	Ruhaak, H. G. ...	H. Van Manen ...	"	A. Holt ...	" 8.1.25 to 28.1.25 ...	2.2.25.
<i>Teucer</i> ...	Holden, W. R. F. ...	R. S. Young ...	"	" ...	" 27.11.24 to 12.12.24	5.1.25.
<i>Themistocles</i> ...	Hodgson, R. N. ...	G. Lancaster ...	"	Aberdeen ...	" 22.10.24 to 6.12.24...	15.12.24.
<i>Theseus</i> ...	Jernyn, W. M. ...	W. F. Sargent ...	"	A. Holt ...	" 26.1.25 to 3.2.25 ...	12.2.25.
<i>Titan</i> ...	Batt, A. E. ...	J. T. Fettes ...	M.L.	" ...	Met. Log. 6.6.24 to 12.10.24 ...	11.12.24.
<i>Tolmie, S.F.Bqtne.</i>	Wilkinson, T. G. ...	G. Gow, L. Horton, S. C. Tinmouth.	No.	B. C. Mills, Tug and Barge Co.	Form 911 18.6.24 to 24.9.24 ...	27.10.24.
<i>Tottori Maru</i> ...	Stewart, J. C. ...	E. F. Collins R. E. Smith ...	"	Nippon Yusen Kaisha	" 7.9.24 to 13.10.24 ...	20.10.24.
<i>Transmitter, C.S.</i>	Matsukura, B. ...	S. Ibori ...	"	Eastern Tel. Co. ...	" 7.12.23 to 2.2.24 ...	18.2.24.
<i>Traveller</i> ...	Jones, I. L. T., M.B.E.	S. P. Sheldon ...	"	Harrison ...	" 19.6.24 to 18.7.24 ...	22.7.24.
<i>Trematon</i> ...	Worthington, B. ...	A. Robertson ...	M.L.	" ...	Met. Log. 31.3.23 to 24.9.24 ...	14.10.24.
<i>Tuscania</i> ...	Hicks, F. H. ...	J. Christopher, D. Thomas, F. J. Webb, S. Smith, C. Mayberry.	No.	Anchor ...	Form 911 26.10.24 to 16.11.24	20.11.24.
<i>Tyndareus</i> ...	Bone, D. W. ...	J. W. Cherry ...	"	A. Holt ...	" 17.5.24 to 22.8.24 ...	10.9.24.
<i>Ulimaroa</i> ...	Adcock, F. ...	D. L. Hoare ...	"	Huddart Parker, Ltd.	" 17.10.24 to 23.11.24	19.1.25.
<i>Ulysses</i> ...	Wyllie, W. J. ...	J. Gilbertson ...	"	A. Holt ...	" 20.12.24 to 8.1.25 ...	3.2.25.
<i>Umtali</i> ...	McHutcheon, W. ...	T. R. Phillips ...	"	Bullard King ...	" 15.11.24 to 5.12.24...	28.1.25.
<i>Valacia</i> ...	Barnes, E. W. ...	W. H. Foster ...	"	Cunard ...	" 5.6.24 to 12.6.24	17.6.24.
<i>Valdura</i> ...	Doyle, M. ...	J. W. Caunce ...	M.L.	Gow Harrison ...	Met. Log. 19.6.24 to 20.11.24...	8.12.24.
<i>Vardulia</i> ...	Mitchell, A. ...	H. J. Maughan, J. Anderson, A. M. S. Well.	No.	Cunard ...	Form 911 23.12.24 to 4.1.25 ...	6.1.25.
<i>Vasconia</i> ...	Murchie, P. A., R.D., Commr., R.N.	J. E. Deans ...	"	" ...	" 7.12.24 to 19.12.24	22.12.24.
<i>Vellavia</i> ...	Inch F. ...	E. Gleave ...	"	" ...	" 30.3.24 to 11.4.24 ...	22.4.24.
<i>Ventura de Larrinaga.</i>	Fear, E. T. C. ...	H. H. Kidwell ...	"	Larrinaga ...	" 2.10.24 to 4.11.24 ...	25.11.24.
<i>Verbania</i> ...	Keay, W. S. ...	H. J. Kay ...	"	Cunard ...	" 7.1.25 to 9.2.25 ...	12.2.25.
<i>Verentia</i> ...	Hatcher, W. H. ...	J. G. Wiseman ...	"	" ...	" 20.12.24 to 24.1.25...	5.2.25.
<i>Vigilant</i> ...	Edkin, E. ...	A. F. Watts ...	No.	Scottish Fishery Board	Form 911 20.12.24 to 17.1.25...	28.1.25.
<i>Waiotapu</i> ...	Simpson, E. S. S. ...	J. Hunter ...	No.	Canadian-Australasian Union Castle	Form 911 2.10.24 to 22.10.24...	9.12.24.
<i>Walmer Castle</i> ...	Davey, A. ...	B. S. Cave ...	"	" ...	" 31.10.24 to 22.12.24	23.12.24.
<i>Wangaratta</i> ...	Stanley, W. P., R.D., Commr., R.N.R.	C. Aylen ...	M.L.	British India ...	Met. Log. 30.6.24 to 26.11.24...	1.12.24.
<i>Warfelda</i> ...	Scutt W. ...	T. W. Wordingham, W. C. Cripps, K. M. Morrison.	No.	" ...	Form 911 18.11.24 to 12.1.25...	16.1.25.
<i>War Nizam</i> ...	Steel, R. ...	E. V. Wilkinson ...	"	British Tankers ...	" 23.11.24 to 28.12.24	3.1.25.
<i>Welshman</i> ...	Putt, R. O. ...	E. R. Clark ...	"	White Star-Dominion	" 3.12.24 to 30.12.24...	6.1.25.
<i>Winifredian</i> ...	Rollerson, W. ...	W. A. Fletcher ...	"	Leyland ...	" 14.12.24 to 19.1.25...	2.2.25.
<i>Woodarra</i> ...	Harrocks W. ...	W. E. Boyle ...	M.L.	British India ...	Met. Log. 3.4.24 to 22.6.24 ...	2.8.24.
<i>Yorkshire</i> ...	Reilly, J. V. ...	L. D. Graham, A. V. Fisher, L. C. Comber, J. Wallace.	No.	Bibby ...	Form 911 8.11.24 to 15.1.25 ...	19.1.25.
<i>Zeeland</i> ...	Millson, G. C. ...	E. Jones ...	No.	Red Star ...	Form 911 20.12.24 to 8.1.25 ...	12.1.25.
<i>Conway H.M.S.</i>	Thomas, A. J. ...	W. F. Jackman ...	Cadets' M.L.	" ...	Cadets' Met. Log. 21.9.24 to 13.12.24	19.12.24.
<i>Pangbourne Nautical College.</i>	Broadbent, H. W., R.D. Capt., R.N.R.	The Senior Cadets...	"	" ...	Cadets' Met. Log. 21.9.24 to 13.12.24	19.12.24.
<i>Worcester, H.M.S.</i>	Tracy, A. F. G., Commr., R.N.	"	"	" ...	Cadets' Met. Log. 26.9.24 to 17.12.24	19.12.24.
<i>Abaco</i> ...	Sayer M. B., O.B.E., R.D., Capt., R.N.R.	"	Lighthouse Register.	" ...	Lighthouse Register 2.1.24 to 6.7.24	13.8.24.
<i>Cay Lobos</i> ...	"	"	"	" ...	Lighthouse Register 1.1.24 to 30.6.24	13.8.24.
<i>Double Headed Shot</i> ...	"	"	"	" ...	Lighthouse Register 1.6.24 to 30.6.24	5.9.24.
<i>Inagua</i> ...	"	"	"	" ...	Lighthouse Register 8.1.24 to 9.7.24	13.8.24.
<i>Sombrero</i> ...	"	"	"	" ...	Lighthouse Register 1.7.24 to 31.12.24	10.2.25.
<i>Watling Island</i> ...	"	"	"	" ...	Lighthouse Register 1.1.24 to 30.6.24	13.8.24.
<i>Cape Pembroke (Falkland Is.).</i>	"	"	"	" ...	Lighthouse Register 1.1.24 to 30.6.24	23.9.24.

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

Name of Vessel.	Captain.	Observing Officer.	Line.	Last Case of Water Samples, Reports, etc., Received up to 31.1.25.	Date Received.
<i>Alban</i> ...	Whayman, W. R. ...	R. Griffiths ...	Booth ...	Water Samples ...	23.4.24.
<i>Denis</i> ...	Harris, F. C. P. ...	" ...	" ...	" ...	"
<i>Hildebrand</i> ...	Maddrell, J. ...	R. S. Hulme Goodier ...	" ...	" ...	13.1.25.
<i>Patia</i> ...	Bostock, R. J. ...	W. McIlwaine ...	Elder & Fyffes ...	" ...	21.1.25.
<i>Portuguero</i> ...	Martin ...	H. H. Dunning ...	" ...	" ...	31.1.25.