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THE MARINE OBSERVER.

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ICE IN THE WESTERN NORTH ATLANTIC.

To the Transatlantic seaman the greatest anxiety for the safe navigation of his ship is undoubtedly caused by the ice that fouls the steamship lanes in the vicinity of the Great Bank of Newfoundland during the spring and early summer of each year, the danger being intensified by the prevalence of fog in these waters at this period of the year.

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

Field Ice.

Field ice is flat ice often extending over considerable areas. Its movement, being controlled more by the action of the wind than by currents, frequently causes it to pile, when its surface becomes irregular. Field ice is formed of sea ice from the Arctic Sea and coasts of Labrador and Newfoundland, its thickness ranging from about 15 feet in the Arctic to about 6 feet on the coasts of Newfoundland. When piling takes place this thickness is greatly exceeded.

During the summer much of the Arctic field ice is set free and drifting south arrives off the N.E. coast of Labrador in November, at the same time that field ice is forming there. By the end of November the waters around the whole Labrador coast have generally frozen over and this ice drifts south, reinforcing the Arctic Field, and arrives off the south-east coast of Newfoundland about the end of January.

Clearing the coast of Newfoundland the field ice spreads east and west over the Great Bank. Extensive fields may be found between the south coast of Newfoundland and the forty-third parallel, and between the forty-fifth meridian and the Nova Scotia coast.

Off the east coast of Newfoundland field ice may be met with late in summer, but further south it very quickly melts, rarely existing south of Newfoundland after the early part of May.

Gulf of St. Lawrence.—Navigation in the Gulf of St. Lawrence is completely suspended, usually from the end of November until the beginning of May. During the cold winter the ice increases rapidly, generally forming in extensive sheets. These are, however, frequently broken across by the wind, leaving "leads" of open water between the separated parts. At other times the wind presses the sheets of ice together, forming an unbroken field extending for many miles.

At the break up of winter conditions towards the end of April the ice commences to move out of the Gulf, causing a block between St. Paul Island and Cape Ray. This block, known as the Bridge,

sometimes continues for three weeks, completely preventing the passage of ships through the Cabot Straits. On leaving the Gulf the movement of the ice is chiefly dependent on the prevailing winds, but if the winds are light or variable the movement is affected by current alone, and it will move in the direction of the Banquereau Bank, where, under the influence of sun and warmer winds, it quickly melts.

FIGURE 1 is a reproduction from a photograph of field ice in the Gulf of St. Lawrence, taken on the 10th May, 1920, by Mr. H. S. KNIGHT, of the R.M.S. *Empress of France*, Captain E. COOK.

Origin of Icebergs.

The bergs which drift across the steamship tracks each year are formed of land ice, and owe their origin to the numerous glaciers on both the east and west coasts of Greenland and adjacent islands.

In those places where more snow falls during the winter than is melted or evaporated during the summer an accumulation of snow must obviously take place. If snow acted like most other solids—sand, for instance—the accumulation during untold ages would be so great that it would form mountains of ice many miles high, with incalculable consequence on the regular rotation of the earth. That this is not the case is due to two properties of water in the solid state: (1) the power of snow to change into ice, and (2) the property of ice to flow like a fluid.

TYNDAL showed that when snow is subject to very great pressure it forms a compact mass of transparent ice, and he showed that this was due to "regelation," a property of ice discovered by FARADAY. The process of regelation can be described as follows: The melting point of ice depends on pressure; the greater the pressure the lower the melting point. If two blocks of ice, very near the freezing point, are pressed together, the few places where they touch take all the pressure, the intensity of which may be very great, at the points of contact. At these points the ice melts because of the lower melting point induced by the pressure. The water runs away from the points of pressure and immediately freezes, because its temperature is now below the normal freezing point. In this way two blocks of ice can be firmly cemented together. For many years it was supposed that this was the way in which snow was compacted into the ice of glaciers. Regelation, however, cannot take place unless the ice is near its freezing point, because very great pressures only lower the freezing point by an insignificant amount. The pressure of ice a mile in depth only lowers the freezing point to 30° F. On the other hand there are

Field Ice, Gulf of St. Lawrence.



Fig. 1. Reproduced from photograph taken by Mr. H. S. Knight, R.M.S. *Empress of France*, 10th May 1920.

extensive glaciers which are formed of blue ice in places—chiefly in the Antarctic—where the temperature of the snow and ice has at no time been much above 0° F.

Recent work on the formation of glaciers has shown that ice crystals, even without appreciable pressure, tend to unite, not by freezing together, but by a kind of distillation in which water molecules leave small crystals and join large crystals. As a few large crystals occupy less space than a large number of small crystals there would be large vacant spaces if crystals were formed from snow in this way, but if the whole is subject to pressure the large crystals become packed together and soon form a mass of solid ice. Even when this has occurred the crystals continue to grow, the large ones absorbing the smaller ones. If a piece of old glacier ice is exposed to the sun the crystals separate and fall apart because the ice melts first along the boundaries of the crystals. Crystals as big as peas are sometimes found, and the size of the crystals is an indication of the age of the ice. In this way the snow becomes transformed in time into ice, but the process is a very slow one, many years being required before the snow-fall of any season is converted into clear ice.

The second property of ice to flow under pressure is shared by many other so-called solids; in fact, if the pressure is only great enough, all solids, even solid rock and the hardest steel, will flow like a very viscous fluid. The whole of the interior of Greenland is covered with an ice sheet formed from snow in the way just described, and this ice sheet is flowing outwards down all slopes towards the sea. Naturally the chief flow is along the valleys, which are filled with great glaciers. When the ice of such a glacier reaches the coast it is pushed out to sea. At first, where the water is shallow, the weight is taken by the bottom; but, as the water becomes deeper, more and more of the weight is taken by the water displaced, until finally the ice becomes wholly water-borne. Great masses of floating ice firmly attached to the shore at one end are met with all along the coast of Greenland—these have received the name of Ice Friths or Ice Tongues.

Calving of Icebergs.

Icebergs are simply masses of ice broken off the end of a glacier when it reaches the sea. There are many ways in which icebergs are "calved." The ice of a glacier is very much cracked—forming the well-known crevasses—and large pieces of ice fall off the ice tongue by a continuation of the process of cracking. The larger icebergs are, however, calved by cracks forming right across the ice

tongue and the end floating away. It must be remembered that the ice of an ice tongue is subject to very great strains caused by the movement of the sea, both in the regular rise and fall of the tide, and the irregular rise and fall due to heavy swell; also wind pressure can exert great strains. The exact method, however, in which the glacier breaks up is of little importance compared with the main facts of the formation of ice from snow, and its transport to the sea by glacier motion.

Colour of Ice.—Snow is white simply because the white light of the sky is reflected from the myriads of facets of the ice crystals which are separated by the included air. As the air becomes driven out and the ice crystals join up, the whole becomes homogeneous and we get clear ice which, in great thicknesses, has a distinct blue colour. The ice seen in icebergs is, however, frequently discoloured by masses of dirt, generally in bands, which fell on the ice while it was part of a glacier, and also by yellow diatoms which attach themselves to the ice from the water. The effect of yellow diatoms and blue ice frequently gives rise to wonderful tints of green seen near the water edge on icebergs.

Proportion of Bergs above Water.—An iceberg if composed of ice only would float with approximately one-ninth of its mass above water, the weight of a cubic foot of sea water being 64 lbs. and that of a cubic foot of ice 57 lbs. The density of ice in icebergs, however, varies largely. In some the snow is not so completely transformed into ice as in others, while some carry appreciable loads of rock and dirt. Thus some bergs may have more and others less than the normal proportion of ice above water. In any case there is always more than eight times as much ice under water as above, and it is this which makes masses of ice which look insignificant as seen from a ship such great dangers to the hull if they are touched.

Height of Berg above Water.—Owing to the difficulty of obtaining the exact distance from the iceberg, measurements obtained from passing ships of the height of bergs above water are generally over-estimated.

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

The highest berg measured by the Atlantic Ice Patrol between 1919 and 1922 was 248 feet above the water, while the longest berg measured 1,690 feet from end to end.

Ice Bearing Currents.—The movements of icebergs are mainly controlled by the set of prevailing currents. The direct effect of wind upon their movements is negligible owing to the immersion of so great a proportion of their mass. The indirect effect of the wind, however, plays an important part by its action on the retardation or acceleration of the currents in which the bergs drift. The currents chiefly concerned in bringing the ice down from the Arctic across the Atlantic steamship tracks are the East Greenland and Labrador currents, while the northern limits of the Gulf Stream during the ice season determine the southern limit of their drift.

The East Greenland Current flows south from the East Greenland sea in the vicinity of Spitzbergen. Converging towards Denmark Strait it passes between Iceland and the mainland, whence it follows the East Greenland coast to Cape Farewell. Its course is then diverted northwards by the pressure of water setting northward from the Atlantic, and rounding Cape Farewell it proceeds up the west coast of Greenland. In about Latitude 68° N. branches of the main stream shoot westward, joining up with the Labrador current flowing down the west side of Baffin Bay.

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

The Gulf Stream, flowing out of the Strait of Florida, follows the United States coast northward to the latitude of Cape Hatteras, when its width rapidly expands and its course gradually inclines to the eastward. On arriving in the vicinity of the Great Bank of Newfoundland its course is east. During the winter it flows to the southward of the Bank, but during summer creeps north, flowing over the southern end of the Bank.

The Cold Wall is the line of demarcation between the cold water of the Labrador current and the warm water of the Gulf Stream.

From the observations obtained by Lieutenant E. H. SMITH, U.S.C.S., Oceanographer to the International Ice Patrol, the movements of the currents which determine the drift of bergs around the tail of the Bank are now fairly established. He says :—"The Labrador

current impinges itself at the tail of the Bank on the northern edge of the Gulf Stream. At times the push is strong enough to split the Labrador current into an east and west branch. In this case the stronger branch determines the berg drift, the relative strength of the branches probably depending to a great extent on the angle of impingement of the Labrador current against the Gulf Stream. The conflict of the two currents together with the position of the Bank produces a frictional arresting of the Gulf Stream on its northern edge, which in turn swings it in sharply to the north and northwest immediately after passing the Tail. The inshore westward swirl of frictional bands of the Gulf Stream sets up an interlacing movement of the two waters. In the vicinity of the Tail the surface temperature of the Labrador current during April is 32° to 34° Fahr., in May its temperature is 36° to 38° Fahr., and in June its temperature rises to 40° to 44° Fahr."

CHART A shows the boundary line of Gulf Stream and Labrador current as observed by the International Ice Patrol Service each year from 1913 to 1922, with the exception of the years 1916, 1917 and 1918, from which it will be seen that the years 1913 and 1919 were abnormal.

Drift of Icebergs.

At the break up of the Arctic winter in the spring of the year, the bergs calved from the glaciers on the east coast of Greenland drift south in the East Greenland current, arriving off Cape Farewell in early summer. Continuing in the current they round Cape Farewell and drift north to about the 68th parallel, where their course is diverted to the westward and they join up with the assemblage of ice drifting down from the north.

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

CHART B shows the general drift of ice in the ice-bearing currents, while Chart C shows a selection of actual drifts of bergs south of the Tail of the Bank as observed by the Ice Patrol vessels during the 1922 season.

Bergs generally frequent the area through which the steamship lanes run from early in March to about the end of July, reaching their maximum frequency in May or early in June. Towards the end of July the Gulf Stream spreads north over the Tail of the Bank, when bergs are rarely to be found south of Latitude 43° N., but north of this latitude they may be observed until late in the year.

Iceberg in Western North Atlantic.

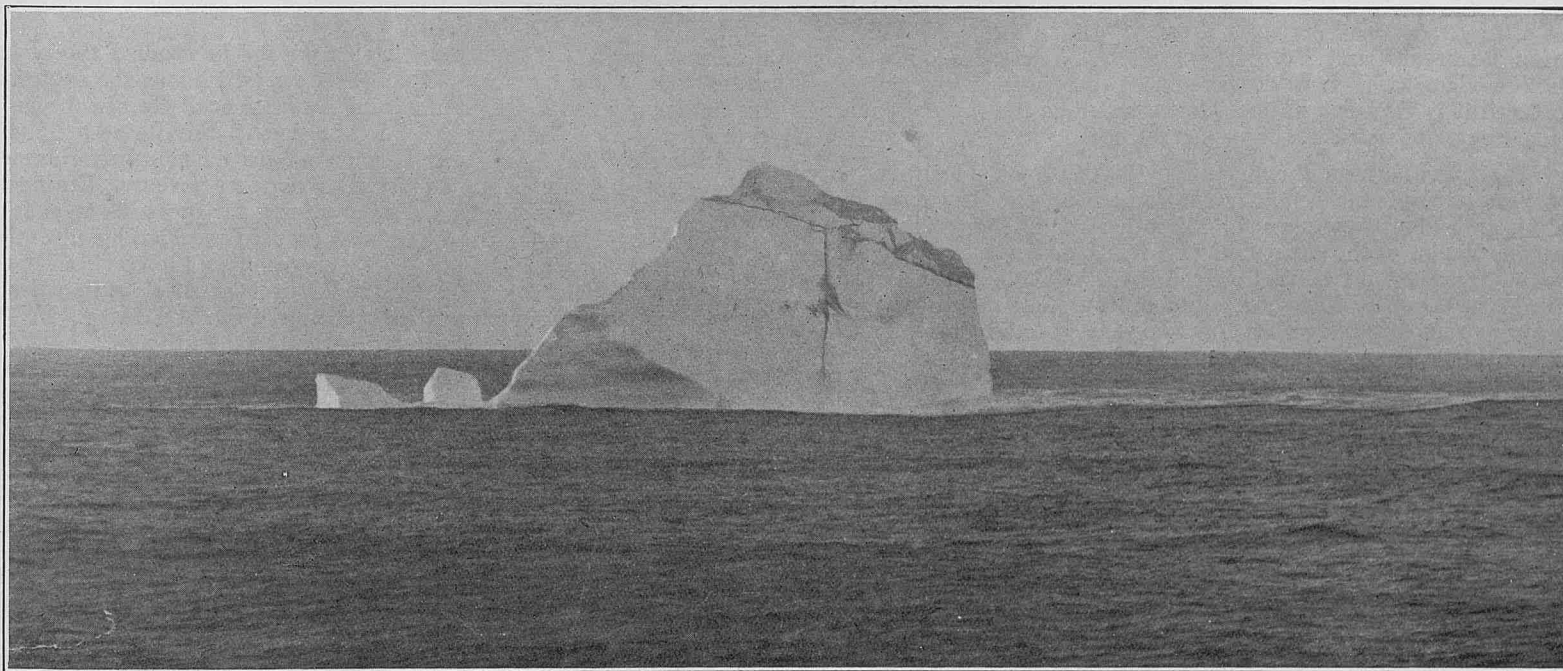


Fig. 2. Reproduced from photograph taken by Mr. H. S. Knight, R.M.S. Empress of France, eastward of Belle Isle Straits, 29th August 1920.

FIGURE 2 is reproduced from a photograph of an iceberg, approximately 260 feet above the water, taken by Mr. H. S. Knight, R.M.S. *Empress of France*, on August 29th, 1920, to the eastward of Belle Isle Straits.

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

CHART D shows the monthly limits within which reports of ice have been received by the Meteorological Office during the year 1923, also the monthly limits reached by ice over the period 1901–23. Occasionally bergs in the last stages of disintegration are reported drifting in the Gulf Stream to the southward or eastward of the above limits, but such reports are exceptional. It must be understood that the limits defined in CHART D are obtained from reports of ice sighted by vessels, the majority of which are following tracks specially laid down to avoid it; it is, therefore, possible that ice may exist outside these limits.

Detection of Ice.—Up to the present there has been no means devised whereby the presence of ice can be detected during fog or in the dark hours, but it is understood that during the coming ice season trials will be carried out by vessels of the Ice Patrol with an instrument by which the proximity of ice may be ascertained under all conditions through the reception of submarine echoes from bergs. Experiments carried out by the Ice Patrol during past years have shown that very little reliance can be attached to echoes from the steam whistle or siren giving a warning of ice, nor does the presence of a berg have any appreciable effect on the temperature of the air or water, but it has been found that when navigating in the vicinity of the Great Bank, if the temperature of the sea remains at or about 60° Fahr., the chances of meeting ice are greatly reduced.

International Ice Patrol.

Arising out of the loss of the R.M.S. *Titanic* through “striking” a berg in April, 1912, a patrol of the ice-infested waters of the Western North Atlantic through which the Transatlantic steamship tracks pass was kept for the remainder of the ice season of that year by ships of the United States Navy. In 1913 the Patrol was kept by the British Auxiliary Barque *Scotia*, and by vessels of the United States Coast Guard Service. At the International Conference for Safety of

Life at Sea, held in London in 1913, it was decided to establish and maintain a regular patrol during the ice season of each year, the United States being asked to organise and manage the service. The Patrol was entrusted to the United States Coast Guard, who, since 1914, have each year detailed two Coast Guard cutters for this duty.

The principal duties of the Patrol are:—

(a) To cruise in the vicinity of the Great Bank of Newfoundland, there to locate and watch the movement of ice, ascertaining its limits for the guidance of navigators.

(b) To obtain oceanographical and meteorological observations whereby research may be made into conditions governing the movement of ice and drift of currents.

The practical utility of the work carried out by the Patrol since its inauguration has proved of the greatest assistance to Transatlantic navigators, having reduced the ice danger to a minimum.

The Ice Patrol cutter remains on station each year until the steamship tracks are free from ice. Her call sign is K.F.O.G. At 1100 and 2300 G.M.T. (civil) information concerning the southern, eastern, and western limits of ice is broadcasted to all ships, on a 600-metres wave length. The message is sent three times in succession with an interval of two minutes between each. At 0130 G.M.T. (civil) similar information is broadcasted on a 2300-metres wave length. Commanders of ships are earnestly invited to co-operate in the work of the Patrol by reporting their position, course and speed and sea surface temperature every four hours when navigating in the area bounded by the 39th and 48th parallel of Latitude and the 44th and 52nd meridians of Longitude. By this means the Patrol are able to keep track of all vessels within the danger zone and are able to warn any vessel standing into danger.

Ice Reports (Form 912).

In former years we have published a yearly summary of the ice conditions for each month of the previous year. With the immediate information now available to ships from the Ice Patrol cutter by wireless such information has little practical value.

The publication of monthly ice limits and the latest reports of ice is useful for the information of ships leaving Europe for Transatlantic ports. Commanders are, therefore, urged to continue to return the Ice Report (Form 912) regularly.

BIOGRAPHICAL NOTES OF SOME LEADERS OF MARINE METEOROLOGY.

III.—MATTHEW FONTAINE MAURY.

WHILE BEAUFORT and PIDDINGTON had each contributed valuable aids to navigation, their work was limited to a more or less individual effort and it is MAURY who must be regarded as the father of marine meteorology, at least as an organised science.

MAURY was born on January 24th, 1806, in Spottsylvania County, just west of Fredricksburg, Va. He came of an old Huguenot family and his early days were spent on his father's farm living the hard life that was the lot of the early settler. After a sparse elementary education he was sent to Harpeth Academy. In 1825 a midshipman's warrant in the U.S. Navy was obtained for him, which he took up contrary to his father's wishes and who refused to advance him a cent towards his upkeep. He thus embarked on a sea career dependent entirely on his own resources.

He made his first cruise on the frigate *Brandywine* visiting British waters and the Mediterranean, and returning to New York in 1826 he was transferred to the sloop-of-war *Vincennes* for a cruise round the world.

In 1831 he was appointed in command of the sloop *Falmouth* to proceed to the Pacific Station. Being his first command and having to navigate his ship on a route unknown to him, he was led to try and find charts or handbooks which would give him some idea of the weather he was likely to experience on the voyage. Although he searched New York for some such guide he was unsuccessful in obtaining one, with the result that during this voyage Maury first conceived the idea of preparing wind and current charts which would supply the

need he himself had felt. During this voyage he studied the phenomenon of the low barometer off Cape Horn, which was the subject of his first paper in the American Journal of Science. He also began to prepare a work on navigation. He returned to the States in 1834 in the *Potomac*. The same year he married his cousin Ann Herndon, although at this time he was in a state of extreme poverty. During the next two years he was engaged in preparing for press his treatise on Navigation. When published this book aroused considerable attention, coming as it did from the pen of one so young in the service. It was favourably noticed by some of the highest nautical authorities in England and was adopted as the text-book of the U.S. Navy. In 1836 he was appointed to the survey of the Southern Harbours.

But the advance of a promising career afloat was prematurely checked by an accident he met with in 1839 which left him permanently lame, and although he made every endeavour to get back to sea again, he was compelled to accept a berth ashore.

While laid aside he aroused public interest in naval matters by a series of articles on naval reform which were published under the title of “Scraps from the Lucky Bag.” In them he advocated the adoption of steam as the motive power for ships and proclaimed a “new era in naval warfare, that of big guns and small ships”; he also advocated the establishment of a Naval School for young midshipmen. Among the articles of navigational interest was one calling attention to the use of Great Circle sailings to reduce the distance between America and England and a paper on the Gulf Stream and its causes. There is no doubt that it was largely the ability and practical knowledge shown



Commander M. F. Maury, United States Navy, LL.D.,
of the National Observatory, Washington, D.C.

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in these articles which led to his being appointed in charge of the Dépôt of Charts and Instruments in 1841. How well he was fitted for this task and with what energy he pursued his work may be judged from the statement which appeared in the "National Intelligencer" a few years later: "The simple dépôt for charts and instruments was transformed into an observatory. Surrounded by such men as FERGUSON, WALKER, HUBBARD, COFFIN, KEITH, YARNELL, LAURENCE, BEECHER and other faithful workers whom he inspired with his own enthusiasm, he made the Naval Observatory national in its importance."

His position at the Chart Dépôt gave him an opportunity of developing his idea of preparing wind and current charts for the use of shipmasters. He obtained the old log books of the U.S. Navy which had been stored away in the Hydrographic Department and after much patient labour he was able to publish Ocean Charts showing the wind and currents experienced by ships, and Sailing Directions embodying the experience of shipmasters.

Owing to the seaman's traditional dislike of untried innovations, these charts and sailing directions were at first somewhat coldly received until Captain JACKSON, commanding *H.W.D.C. Wright*, ventured to trust the new chart and follow the new track suggested by Maury. His experiment was a complete success, the round voyage being made in the time often taken on the out passage. Their utility once demonstrated, there was a general rush to procure Maury's charts and directions, and to effect their improvement captains of both U.S. Navy and merchant ships were invited to co-operate in providing new data, by keeping an abstract log which was issued from the Chart Dépôt.

Those experienced in sail can well appreciate how welcome such charts were, and their practical value is demonstrated by the fact that the passage to Australia, which had previously taken on an average 124 days, was reduced to 97 days on the average, with their aid.

The Government of the U.S.A. were so impressed with the practical commercial advantages of the collection of weather observations at sea and the desirability of extending the work over all oceans, with the co-operation of all maritime nations, that they called an International Conference of the leading sea-going nations to discuss its possibilities. This Conference met at Brussels in 1853, and as a result the British Meteorological Office came into being as a Department of the Board of Trade the next year.

The organisation of the sea meteorological service having been firmly established, Maury endeavoured to organise a system whereby land stations might be co-ordinated and he was connected with the memorial to Congress on this subject from the agricultural interests. In this, however, he was unsuccessful.

The next few years saw the publication of his works on oceanography, one of which at least, "The Physical Geography of the Sea," published in London in 1855, has achieved world-wide fame and has been translated into several European languages. It was described by HUMBOLDT and QUETELET, the two great scientists, as "One of the most charming and instructive books in the English language." A careful study of records of observations of the phenomena of the ocean, it is yet written with a simple directness and reverent acknowledgment of the handiwork of the Divine Creator that makes it well worth reading.

One fact not generally well known, is Maury's connection with the laying of the first cable across the Atlantic in 1858. It was Maury who first suggested the existence of conditions at the bottom of the Atlantic which would enable such a cable to be laid and it was at his instigation that the necessary soundings were carried out, with the result that England and America were linked by the telegraph.

On the outbreak of the Civil War in 1861, Maury resigned his Commission in the U.S. Navy and, true to the State of his birth, Virginia, threw in his lot with the Southern Forces, although immediately the fact of his resignation from the Navy became known, he received offers of appointments both in Russia and France. He was appointed Chief of the Sea Coast, Harbour and River Defences by the Confederacy, a work he carried out most admirably. He invented an electric torpedo for harbour defence and effectively mined the James River.

In 1862 he was sent by the Confederacy to Europe to order torpedo material. Why Maury and not a less senior officer should have been selected for this mission is not known, for he was at this time almost the only man with any practical knowledge of torpedo warfare.

Arrived in England, he actively assisted in the promotion of a petition of peace to the American people, for although Maury from a sense of duty had taken his place in the service of the Southern Confederacy he was bitterly opposed to the War, and his correspondence shows how hard he had laboured to try and avert such a catastrophe. The petition, was, however, unsuccessful.

He was returning to America in 1865 when the news of the defeat of the Southern States reached him and, warned that it would be inadvisable for him to return to his native country, he landed at Cuba, afterwards proceeding to Mexico, where he became Imperial Commissioner of Emigration to the Emperor MAXIMILIAN, with the idea of founding a Virginian Colony there. The scheme was, however, abandoned in 1866 and Maury returned to England. He had become very impoverished by the war, but friends both in America and England rallied round him, and a testimonial amounting to 3,000 guineas was subscribed in recognition of his scientific work of international value.

He opened a school of instruction in torpedo warfare and remained in Europe until 1868. He was presented with the degree of LL.D. by Cambridge University, receiving this honour at the same time as LORD ALFRED TENNYSON.

In 1868 a general amnesty was declared which permitted his return to his native land, and, at the invitation of the Virginian Military Institute at Lexington, he returned to America to take up the appointment of Professor of Meteorology at the Institute, where he remained until his death on the 1st February, 1873.

With his practical knowledge of conditions at sea, coupled with his brilliant powers of organisation and technical research, he succeeded in founding—not only in his own country but internationally—a meteorological service for the benefit of his cloth, which is the foundation of modern work.

Acknowledgment is made to "Life of Matthew Fontaine Maury," by Diana Fontaine Maury Corbin.

(To be continued.)

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

THE MARINE OBSERVERS' 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.

CYCLONE IN SOUTH INDIAN OCEAN.

IN March, 1923, a cyclone swept over the South Indian Ocean. Reports were received from three ships in its neighbourhood. As it is not possible to investigate the storm fully with so few observations, the accounts are recorded below.

S.S. *Port Lincoln*, Captain C. N. JONES, Port Pirie to Port Said, reports :—

"After having the barometer somewhat high for a considerable period, about March 9th, it began to fall—from 29·87 to 29·62 (uncorrected) between 8 p.m., March 8th, and 8 p.m., March 10th—and sky changed from blue and cirrus clouds to overcast with passing rain, which we assumed to be a great change in weather, or that we were in the vicinity of some disturbance, but it came to be the outskirts of a cyclone.

"We were in communication by wireless daily with S.S. *Port Albany*, *Surrey* and *Tennessee*, who by their reports appeared to be making heavy weather of it judging from their positions and day's run which were all we received."

Extracts from Log of S.S. Port Lincoln.

March 8th, noon, Lat. 22° 36' S., Long. 92° 14' E., bar. 29·88, wind S.E. by S. 2.

March 9th, noon, Lat. 19° 33' S., Long. 88° 13' E., bar. 29·75, wind E.S.E. 3.

March 10th, noon, Lat. 16° 27' S., Long. 83° 54' E., bar. 29·65, wind S.E. by S. 3.

S.S. *Port Albany*, Captain C. A. ROBINSON, Observer: Mr. J. S. BEARDSHAW, Fremantle to Suez, reports :—

"March 11th, noon, position, Lat. 19° 11' S., Long. 89° 14' E., course 299°.

"On March 11th the vessel encountered a cyclone commencing with a moderate easterly wind and increasing to gale force in that direction. During the forenoon the barometer commenced falling, indicating 1005·2 (29·68) at noon. By 4 p.m. it had fallen to 1001·7 (29·58), the wind at that time being east, force 6. At 8 p.m. the wind was still east, but had increased to a moderate gale (force 7), with the barometer reading 1001·1 (29·56) with a high sea and rough swell. During the 8-12 watch the wind commenced to veer and by midnight was blowing from E.S.E., force 8-9, with violent squalls, sometimes with rain, barometer standing at 993·5 (29·34), with a high sea and heavy confused swell. From midnight to 4 a.m. the barometer continued to fall rapidly, the lowest reading recorded being 982·5 (29·01) at 4 a.m. During this time the wind increased to hurricane force with violent squalls. The vessel would not steer, heading approximately W. by N. true and logging 11 knots, wind at 4 a.m., S. by E., force 12.

"At 4.30 a.m. the vessel commenced to steer, and was put on N.W. $\frac{1}{2}$ ° N. true. The barometer commenced to rise, and continued to do so throughout the watch with weather steadily improving, and the wind veering and decreasing in force.

"8 a.m., March 12th, barometer 995·6 (29·40), wind S.S.W., force 8-9. Between 4 a.m. and 6 a.m. vessel logged 29 miles, although she appeared to be moving considerably faster through the water. At 8 a.m. the vessel was put on her course, 299°. At 4 p.m. the wind was still S.S.W., having decreased to force 5, barometer 1000·7 (29·55), with rough confused sea and swell. By 8 p.m. the vessel was clear of the storm, and the barometer resumed its usual diurnal range."

Noon position, March 12th: Lat. 17° 10' S., Long. 85° 24' E.

S.S. *Surrey*, Captain C. R. KETTLEWELL, Adelaide to Suez, reports :—

"At 8.0 p.m. on the 11th March, the barometer reading was 1002·4 (29·60).

"Wind E.N.E., force 7-8.

"The sky was overcast and cloudy, lightning was observed to

windward, and occasional heavy rain squalls were experienced, and the general appearance of the weather was ugly and threatening.

"At 10.0 p.m. the barometer stood at 1001·0 (29·56), wind steady at E.N.E., force 8.

"Rain now became continuous with frequent heavy squalls, wind and sea rising.

"At midnight barometer 996·3 (29·42), wind from the same direction, force 9, squalls increasing in frequency and violence—vessel labouring heavily and taking water fore and aft.

"By this time it was evident that vessel was in the direct line of advance of the storm.

"From midnight to 1.30 a.m. experienced a wind of full gale force, accompanied by frequent prolonged squalls with torrential rain.

"Barometer reading at 1.0 a.m., 992·9 (29·32).

"At 1.30 a.m. the wind increased to hurricane force, the vessel being entirely enveloped in sheets of driving rain and spray.

"Barometer at 2.0 a.m., 989·8 (29·23).

"From now on the abnormal conditions continued, the direction of the wind being still steady at E.N.E.

"Barometer at 3.0 a.m., 985·1 (29·09), falling more rapidly until at 4.0 a.m., 978·3 (28·89) was registered.

"The temperature was constant throughout at 76° Fahr.

"The sky when visible was now uniformly overcast, over which the drift scudded furiously.

"At 5.0 a.m. the wind veered to S.E. Barometer 974·6 (29·78). From 5.30 to 6.0 a.m. the wind veered from S.E. through South to S.S.W., barometer falling rapidly until at 6.0 a.m. 969·9 (28·64) was registered and pumping very violently.

"By this time the wind had risen into a blast of irresistible fury, and was estimated at well over 100 miles per hour, the accompanying roar making it necessary for the orders to be given by signs.

"The vessel was enveloped in torrential driving rain and spray, whilst heavy seas were deluging her both fore and aft.

"The visibility at this time did not exceed 20 yards.

"The terrific confused sea seemed to come from all directions—the vessel appearing to be in a veritable maelstrom.

"At this time the centre of the storm is thought to have passed over.

"At 7.0 a.m. the barometer had risen to 974·7 (28·70), and by 8.0 a.m. to 981·9 (29·00), the wind then being S.W. by W., force 11, sea slightly decreasing squalls less frequent and violent.

"From now on the weather slowly moderated, the barometer readings being at 9.0 a.m. 986·1 (29·12); 10.0 a.m., 988·8 (29·20); 11.0 a.m., 991·5 (29·28); and at noon, when vessel was able to resume her course and speed, 993·1 (29·33)."

Surrey's noon positions were: March 11th, Lat. 18° 17' S., Long. 89° 31' E.; March 12th, Lat. 16° 25' S., Long. 86° 41' E.

AURORA AUSTRALIS.

EXTRACT from Meteorological Log of S.S. *Port Pirie*, Captain W. G. HIGGS, Observer, Mr. R. STANNARD, 3rd Officer, London to Australia.

"*Aurora*, March 24th, 1923. 45° 05' S., 75° 52' E. 8.40 p.m. A.T.S. Sky cloudless. Patches of auroral light from zenith to southward. 9.20 p.m. moon set. Diffused auroral light between E. and S.S.W., extending to altitude of 50° from horizon. Det. cu., prop. 1. 9.40 p.m., large ribbon of light at zenith leading 010° to 190°. 10 p.m. Patches very bright, extending to alt. 70°, flickering and darting to and fro. Centre of fan bore 140°, ends 90° and 210°. 10.10 p.m. Rays assume yellowish tinge. At 10.15 p.m. writing could be read at a distance of 10 inches. 10.30 p.m. Aurora rapidly faded away."

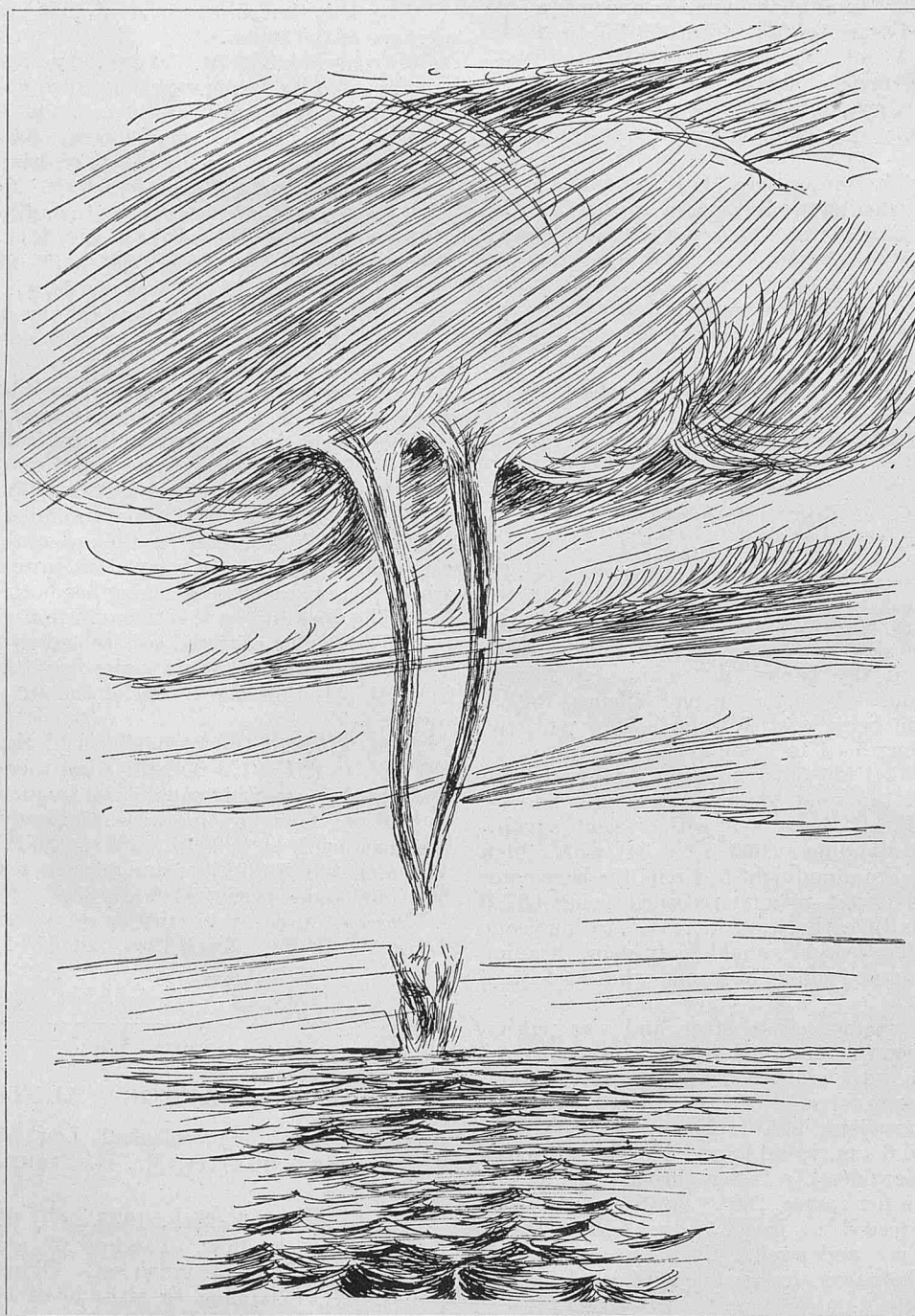
TIDE RIPS.

EXTRACT from Meteorological Log of S.S. *Port Melbourne*, Captain F. J. KEARNEY, Observer, Mr. C. F. POST, 3rd Officer, Liverpool to New Zealand.

"On March 30th, 1923, at 10.20 a.m. A.T.S. Latitude $5^{\circ} 20' N.$, Longitude $81^{\circ} 47' W.$ (approx.), vessel passed through an unusual tide rip as follows. It was plainly visible for about 15 minutes before reaching it and looked very much like a reef and formed an almost

straight line in a N.W. and S.E. direction; the water on the western side had banked up considerably, making a sort of step which would break down in places, and the froth would whirl round like a small whirlpool; also on the western side were dozens of small cases, cheese crates and small kegs floating about, and amongst them a small tree (minus leaves) with yards of cloth attached to it; not one object was to be seen floating on the eastern side."

WATERSPOUT.



Waterspout observed from S.S. *Arracan*, Captain W. Y. HAMILTON, and drawn by Mr. R. MACINNES, Chief Officer.

"Sunday, March 13th, 1921, Lat. $6^{\circ} 24' N.$, Long. $22^{\circ} 50' E.$ Passed a waterspout distant approximately one mile south of ship. Height by sextant angle 9° . Travelling slowly from S.S.E. Clouds Cu-Nb.5. Wind light and variable. Shortly after passing the waterspout a few drops of rain fell. Barometer 1,011, thermometer 82° .

"The waterspout reached down from the cloud in two trunks which joined a little above sea level. A little lower than this it was invisible and was seen again at the point of junction with the sea. When last seen it was in all respects similar to time of first observation and was travelling slowly N.N.W."

WIRELESS AND WEATHER. AN AID TO NAVIGATION.

CHAPTER IV.

TIME.

THE importance of time, position, course and speed in navigation can only be fully appreciated by those whose business is responsibility for navigation.

When an accident has occurred how often has it been found upon examination of the deck log and engine-room register that the times recorded have differed! Such a contingency is now averted in many ships by the use of the magneto clock; if such clocks are not carried this can only be done by co-operation between the navigating and engineering staffs. That is to say, the observation of time of the movement of the engine room telegraph on bridge and in engine-room must be synchronized if their record is to prove reliable evidence.

When it is considered that the object of a weather chart is to give a graphic representation of weather over an area at a particular moment, that the reporting ships are travelling at different speeds and upon different courses and that weather systems are usually also moving and often at great speed, the need for the observations in all reporting ships and at all reporting stations to be synchronized will be apparent.

The meteorological log was arranged so that the times of observation were convenient to the ship; hence those times were fixed for the relief of the watch when in any case the relieved officer of the watch would be taking his observations for the ship's log.

For the purpose of detailed observations and investigation long after the observations are made this system is admirable and has been proved to be the best which can be devised to conform to sea practice.

The immediate advantages to be gained by the navigator of weather observations reported by wireless, however, outweigh some of the objections which there are to observing and recording weather observations at other than the old established routine Ships' Times. That is to say, that so long as lookout and the duties of the officers in connection with the safety and work of their ship are not interfered with, it is possible without inconvenience to observe and record the weather conditions at uniformly fixed times.

Now before the establishment of communication by wireless at sea, fixed times of weather observation for "land line" reports had been established and are now organized in most countries. When these times, which are given upon the chart in Weather Signals in the January number on page 11, happen to correspond with hours of daylight at the position of the ship, or in darkness when the officer of the watch has an assistant, the ship's observations for wireless reports may be taken without inconvenience at the same time as those of the nearest country. There will be breaks midway between coasts which have different fixed observation times, but if the established shore observations are to be used this is inevitable.

Gradient.

In the last chapter in drawing a weather chart we saw that the isobars were close together where the wind was strong and further apart where it was light. That is to say, generally, a steep barometer gradient causes strong winds while a shallow gradient brings light winds; there are exceptions, as in the case of the Mistral of the Gulf of Lyons.

The barometric gradient is referred to the vertical scale of pressure and the horizontal scale of length measured at right angles to the isobars. For example, a ship at A, FIGURE 10, has the wind W. by N., barometer 990 mb.; at the same time, another ship at B, bearing S. 70° E. from A, has barometer 990 mb., wind W. by N.; while a third ship at C, bearing due south of A, and distant 191 miles from her, has barometer 1,000 mb., wind W. by N., and a fourth ship at D, bearing S. 70° E. from C, has the same barometer as C.

The barometer gradient does not depend upon the distance 191 miles between A and C, but upon the distance measured at right angles to the isobars in this case 180 miles. Therefore, in drawing a chart, Aa is the line on which to measure off the spacing of the isobars.

The most convenient lineal unit for finding the barometer gradient is 60 nautical miles.

Thus $180 \text{ miles} \div 60 = 3$;

10 mb. (the difference of pressure between A and C) $\div 3$
 $= 3.3 \text{ mb. gradient.}$

At sea, where the surface friction is less than ashore, 3.3 mb. gradient produces a wind of about force 6.

In this example, for the purpose of clearness the isobars are quite straight on a mercator chart, a condition which will scarcely ever happen in practice.

Gradient and Time.

CHART IV. is made with some observations taken at 0700 G.M.T. (civil) and others at 8 a.m. Ships' Time. It will be noted that the strongest winds are not in the areas represented to have the steepest gradient.

The observations at Stornoway, Holyhead, Scilly, Dungeness, and in *Metagama*, *Celtic*, and *Aquitania*, were made at 0700 G.M.T. Those in H.M.S. *Conway*, School Ship, H.M.S. *Worcester*, Thames Nautical College, and at Pangbourne Nautical College were taken at 0800 G.M.T., and those in *Ionic Star* and *Port Darwin* at 0800 Ships' Time. Now why is it, although the wind is only force 7 at Dungeness and 5 at *Worcester*, where the gradient is very steep, that *Aquitania* and *Celtic*, clear of the land, have winds of force 7 and a shallower gradient?

It will be noted that the barometer is falling at all stations south and east of Holyhead, and it was afterwards found, as we should suppose from these observations, that the depression was moving in a south-easterly direction.

Now Pangbourne, *Worcester*, and Dungeness are roughly on a line of bearing which corresponded to the path of the depression and nearly athwart the trend of the isobars.

At 7 a.m. Dungeness had barometer 997 (29.44), while *Worcester* and Pangbourne did not read their barometers until one hour later, when they showed 989 (29.21) and 985 (29.09), respectively, by which time, with the depression approaching, the glass had fallen an appreciable amount since 7 a.m. Hence the isobars on the chart hereabouts show a false gradient, and give an entirely wrong representation of pressure distribution over S.E. England and the Straits of Dover.

It will also be observed that, though the gradient in the vicinity of *Celtic* and *Aquitania* is fairly consistent with the wind reported by those ships, force 7, the gradient in the vicinity of *Port Darwin* is much more shallow than would be expected with a wind of force 6.

Aquitania's observations were made at 0700 G.M.T. (civil) and *Port Darwin's* were made at 8 a.m. Ships' Time. This ship was bound to the westward and would be keeping Apparent Time for approximately Long. 23° 30' W. — equation of time 16 minutes, that is to say, her time differed by 1 hour 18 minutes from G.M.T., so that her observations were actually made 2 hours and 18 minutes later than those of *Aquitania*.

With increasing pressure in the rear of the trough the glass would read appreciably higher after such an interval.

Thus it will be seen that the gradient cannot be obtained either ashore or afloat unless the observations synchronize.

It is interesting to note that the drawing of a weather chart with these observations was a question set in the examination for the Senior Cadets of the *Conway* and *Worcester*, and though by no means easy was answered in a manner which promises well for the future.

Another example in support of G.M.T.

At midnight on April 20th, 1922, S.S. *Katori Maru* having passed through the ring of winds of hurricane force was in the vortex of a tropical cyclone which was nearly stationary in the Arabian Sea. There were a number of ships in the vicinity and FIGURE 11 gives their positions with that of *Katori Maru* in the centre.

The bearing of the centre from each ship is indicated by the number of points it lay to the right when facing the wind, and the height of the barometer above that in centre, knowledge of which is of great importance.

It will be noted that in some cases the number of points do not agree with the rules (which are derived from averages) laid down in

the Laws of Storms, *i.e.*, 12 points at commencement of storm, 10 points when the barometer has fallen 10 mb. (.3 inch), and 8 points when it has fallen 20 mb. (.6 in.) or more.

The time used in all cases was Ship's Time, so that no doubt there were considerable intervals between the actual moments of observation, some ships being bound west and others east; and had the cyclone also been moving fast the error in the bearings and the gradients would have been considerable, and so W/T weather reports based upon observations made at Ship's Time are misleading for our purpose.

A Very Heavy March Gale developed from a Secondary.

We saw in Chapter III. that a cyclone which caused severe gales on February 26th, 1923, off the S.W. coasts of the British Isles had probably developed from a secondary, but we did not give a series of charts which showed the development. As indicated in Weather Systems of Temperate Northern Latitudes, the conditions of secondary depressions are very variable and so make forecasting difficult. There are, however, secondaries concerning which the prediction of strong winds may be made with confidence and the following example deals with such a secondary; it also serves to illustrate the need for care in drawing isobars and bears out the importance of time, position, course, speed, and barometer tendency. Having mastered the drawing of a simple weather chart and supposing that the ships shown upon CHARTS V., VI., VII. and VIII., had been able to intercept each other's reports and those for the British coasts we will take it for granted that morning and evening charts were made and see how they would have assisted S.S. *Rhodesian Transport*, Captain W. Fowler, from Tenerife to Antwerp.

EVENING, MARCH 6TH, 1922. CHART V.

This chart shows that there is a depression near the 20th Meridian West, far north of *Baltic's* position, and as the barometer has risen at Stornoway and Wick in the last three hours it may have filled in slightly; we must wait until evening reports are received before we can form a definite idea of its movement.

It should be noted that there is a dip in the 996 (29.41) isobar south of the St. George's Channel and that the barometer is falling at Malin Head, Tynemouth, Scilly, and Dungeness; it is falling slowly at Yarmouth and Jersey, falling quickly at Holyhead, but rising at Valentia.

Now this is caused by a secondary over St. George's Channel, the barometer falling in its front and rising in its rear as it moves eastward.

Rhodesian Transport, steaming N. 32° E., 9 knots, across the Bay, will expect her barometer to fall and strong westerly winds during the night. She will, however, note that *Baltic's* wind away to N.W. is from a more southerly direction than the other winds reported to the westward, and seeing that a secondary exists further east will examine *Baltic's* barometer tendency with care. As *Baltic* is steaming S. 83° W., 11 knots and is evidently before the trough, her falling barometer tells little, for this is what would be expected.

MORNING, MARCH 7TH, 1922. CHART VI.

The main depression has moved eastward since last evening. The secondary of last evening has probably moved rapidly east and there is a secondary westward of the Bristol Channel. At a glance the most important feature is the divergence of winds reported by *Scythia*, *Homer*, and *Baltic*.

It will be noted that a secondary is indicated by the sharp curve in the 1004 (29.65) isobar in the vicinity of these ships, that *Baltic's* wind conforms to the circulation of the main depression and that steaming S. 76° W., 13 knots, she has a rising barometer.

Scythia and *Homer* have winds from nearly opposite points of the compass and are only 120 miles apart. Here there is a wind circulation round a Low, for Buys Ballot's Law indicates that the barometer is lower to the north-westward of *Homer*, also that it is lower to the south-eastward of *Scythia* than at the positions of those ships.

Homer to the eastward of this small area of lower barometric pressure has a falling glass when steaming N. 75° E. at 18 knots. *Scythia* to the westward of the small area of lower barometric pressure and steaming the same course and speed as *Homer* also has a falling barometer.

It is not a difficult matter with our knowledge of the Laws of Storms and of the effect of course and speed upon the tendency of the barometer to see what is happening. With a lower barometer between the two ships and the barometers of both the ships in the fore part of this depression as well as the ship in the after part of it falling, when both ships are steaming the same course and speed, the depression must be deepening and moving with the ships. Therefore the secondary is gaining intensity and travelling to the eastward at a speed of about 18 knots.

With observations that did not synchronize such conclusions would not be possible, and an error of one degree in latitude or longitude would also upset our calculations.

Rhodesian Transport will expect her barometer to fall and the wind to back to S.W., increasing with rain as she comes under the influence of the advancing secondary.

EVENING, MARCH 7TH, 1922. CHART VII.

The main depression is now north of Stornoway, the western secondary is indicated by the bend in the 996 (29.41) isobar and is centred east of *Homer's* position, having overhauled and passed that ship.

Homer still has a falling barometer. Now in a ship in rear of a depression but dropping astern of it the barometer rises when the depression is not altering its intensity and, therefore, this observation of *Homer's* barometer tendency with course and speed is of great value, for it is an indication that the depression is travelling at great speed to the eastward and is deepening considerably.

Rhodesian Transport, now in a strong S.W. gale, expects her barometer to fall quickly as the depression approaches with increasing wind, rain and dirty weather, a shift to N.W. and terrific squalls, after which the weather will probably moderate.

MORNING, MARCH 8TH, 1922. CHART VIII.

The complete wind circulation of a cyclone is now shown in this depression which is centred near Bristol. The main depression on the southern part of which this cyclone developed from a secondary is now north of the Orkneys.

During the last 24 hours this secondary depression had rapidly developed and travelled E. by N. 900 miles, causing unusually heavy gales off the coasts of the British Isles.

At Scilly the anemometer before being blown away registered 108 statute miles an hour or 93 knots, which is the second highest recorded in the British Isles.

There were many casualties, including H.M. Destroyer *Laertes* in tow from Portsmouth to Dover, stranded near Newhaven. Four-masted Barque *Garthpool*, in tow of steam tug *Homer*, adrift off Start Point, lost or damaged all sails, braces and lifts, picked up by Dutch S.S. *Themisto* and towed into Weymouth Bay.

S.S. *Orcades* dragged anchors and stranded at Southend. Steam trawler *Marie Therese* sunk with 15 hands. S.S. *Reindeer* and many other vessels suffered damage to deck work and fittings.

(To be continued.)

GREAT BRITAIN AND IRELAND (Supplementary).

For the purpose of decoding and recording the W/T Weather Bulletin for all coasts, the following form may be ruled and used with advantage. The code figures should be entered under the names of the Stations. An example is recorded and decoded on this form overleaf.

Weather Shipping.

| | | | | | | | |
|---|--|---------------------------|-----------------------|-------------------------|-------------------------|-------------------------|--------------------|
| Part I | | | | | | | |
| INFERENCE | | | | | | | |
| PART II | | Odd Groups | | | Even Groups | | |
| Station Reports Code figures | | K Bar Tendency | ww Weather | v Visibility | BB Barometer | DD Wind | F Force |
| 1 Stornoway | | | | | | | |
| 2 Malin Head | | | | | | | |
| 3 Valencia | | | | | | | |
| 4 Holyhead | | | | | | | |
| 5 Scilly | | | | | | | |
| 6 Guernsey | | | | | | | |
| 7 Dungeness | | | | | | | |
| 8 Yarmouth | | | | | | | |
| 9 Tynemouth | | | | | | | |
| 0 Wick | | | | | | | |
| Part III | | FORECAST | | | | Part VI. OUTLOOK | |
| District | | | | | | | |
| Western Area | | | | | | | |
| | | | | | | | |
| Part IV | | | | | | | |
| Southern Area | | | | | | | |
| | | | | | | | |
| Part V | | | | | | | |
| Eastern Area | | | | | | | |
| | | | | | | | |

Weather Shipping.

| | | | | | | | |
|---------------------------------|-----------------------------|--|--------------------------------|-------------------|------------------------|--------------------------------|------------|
| Part I | | A deep depression over the North Channel which is moving E.N.E. will cause strong winds or gales in all districts with much rain at first. Improving weather will spread across the country in its rear. | | | | | |
| INFERENCE | | | | | | | |
| Part II | | Odd Groups | | | Even Groups | | |
| Station Reports Code figures | | K Bar. tendency | ww Weather | v Visibility | BB Barometer | DD Wind | F Force |
| 1 Stornoway 17535 99041 | | Falling quickly | r. mod. but has decreased | poor | 999 mb. 29.50 in. | N.E. | 1 |
| 2 Malin Head 2155- 93283 | | Rising slowly | r. continuous | — | 993 mb. 29.32 in. | N.W. | 3 |
| 3 Valencia 34117 12266 | | Rising very rapidly | c. or o. no apparent change | good | 1,012 mb. 29.89 in. | W.N.W. | 6 |
| 4 Holyhead 46356 97208 | | Falling | p. heavy with rain | moderate | 997 mb. 29.44 in. | S.W. | 8 |
| 5 Scilly 55167 13267 | | Falling slowly | c. or o. after rain or drizzle | good | 1,013 mb. 29.92 in. | W.N.W. | 7 |
| 6 Guernsey 65417 19185 | | Falling slowly | d. slight continuous | good | 1,019 mb. 30.09 in. | S.S.W. | 5 |
| 7 Dungeness 77124 15206 | | Falling quickly | c. or o. cloud increasing | Thin fog or mist. | 1,015 mb. 29.97 in. | S.W. | 6 |
| 8 Yarmouth 87526 14186 | | Falling quickly | r. slight but has increased | moderate | 1,014 mb. 29.94 in. | S.S.W. | 6 |
| 9 Tynemouth 97275 99206 | | Falling quickly | f. or m. apparently overcast | poor | 999 mb. 29.50 in. | S.W. | 6 |
| 0 Wick 0856- 00146 | | Falling very rapidly | r. moderate but has increased | — | 1,000 mb. 29.53 in. | S.S.E. | 6 |
| Part III | | FORECAST | | | | Part VI. OUTLOOK | |
| District | | | | | | | |
| Western Area | Mersey Severn Shannon | } Westerly gale, veering and moderating, visibility becoming good. } Strong northerly winds, moderating, visibility moderate. | | | | Eastern area, northerly gales. | |
| | Clyde Hebrides | | | | | | |
| Part IV | | | | | | | |
| Southern Area | Wight Channel |  |  |  |  |  |  | Strong westerly to north-westerly winds. Visibility poor. Visibility becoming good. |
| | Part V | | | | | | |
| Eastern Area | Dogger Humber Thames | } South westerly gales, visibility poor. } Southerly-winds, strong to gale, backing, visibility poor. Fresh easterly winds, visibility moderate. | | | | | |
| | Tay Forties Shetlands | | | | | | |

WEATHER SIGNALS.

II.—WIRELESS WEATHER BULLETINS.

HOLLAND.

Scheveningen W/T station approximate Latitude 52° 06' N. Longitude 4° 16' E., call sign PCH, transmits a weather message at 1115 G.M.T. daily (Sundays and holidays excepted) on a wave length of 1,800 metres (spark) giving the 0700 G.M.T. observations of the undermentioned stations, always in the following order:—

| | | | |
|------------|---|---------------------|-------------------------------|
| Helder | - | Latitude 52° 57' N. | Longitude 4° 45' E. (approx.) |
| Flushing | - | 51° 26' N. | 3° 34' E. „ |
| Gris Nez | - | 50° 54' N. | 1° 35' E. „ |
| La Hague | - | 49° 43' N. | 1° 57' W. „ |
| Yarmouth | - | 52° 35' N. | 1° 43' E. „ |
| Tynemouth | - | 55° 01' N. | 1° 25' W. „ |
| Skudesnaes | - | 59° 08' N. | 5° 16' E. „ |
| Sylt | - | 64° 54' N. | 8° 21' E. „ |

The name of the station is omitted, but the sets of observations will be easily recognised *by the order in which they are given*. When the data for one or more of the stations is missing, each group of figures is replaced by the letter “X.” The message is preceded by the letters KNMI and is in three parts.

Part I.

Gives the observations of *Helder, Flushing, Gris Nez and La Hague*, two groups of five figures for each station.

First Group - The first 3 figures give the barometer reading corrected in millimetres and tenths, the initial 7 being omitted. (To convert to millibars and inches *see* Table V., p. 28.) The 4th and 5th figures give the wind direction true (Table IV.*, p. 15).

Second Group - 1st figure gives the wind force by Beaufort Scale (*see* p. 12). Forces 9 and above sent as 9. 2nd figure gives the weather (*see* Table XIII., p. 29). 3rd and 4th figures give the temperature in whole degrees Centigrade. (To convert into Fahrenheit *see* Table VII., p. 29.) 5th figure gives the state of the sea (Table XIV.)

Part II.

Gives the observations of *Yarmouth, Tynemouth, Skudesnaes and Sylt* in two groups for each station. The first group containing 5 figures and the second only 4 figures. The figures in these groups have the same meaning as in Part I, the figure representing the state of the sea in the second group being omitted.

Part III.

Consists of a storm signal. For particulars *see* under “Wireless Storm Warnings, Holland” in this number.

Note.—When the weather message is sent on request a charge is debited to the ship concerned.

DENMARK.

Lyngby W/T station, approximate Latitude 55° 46' N., Longitude 12° 29' E., call sign OXE, transmits weather messages on a wave-length of 3,650 metres (C.W.) at the following times:—

0735 G.M.T. (observations at 0700 G.M.T.) of the following stations.

1335 G.M.T. (observations at 1300 G.M.T.) of the following stations.

1835 G.M.T. (observations at 1800 G.M.T.) of the following stations.

| Index No. | Name. | Latitude (approx.) | Longitude (approx.) |
|-----------|--------------|--------------------|---------------------|
| 01 | Copenhagen | 55° 42' N. | 12° 37' E. |
| 02 | Skagen | 57° 44' N. | 10° 38' E. |
| 03 | Hantsholm | 57° 07' N. | 8° 36' E. |
| 04 | Blaavandshuk | 55° 33' N. | 8° 05' E. |
| 05 | Hammeren | 55° 17' N. | 14° 46' E. |

Each message commences with the words “Météo Danois.”

Code used.

0735 Message.—Station index number followed by 5 groups of 5 figures each. In the case of Stations 01 and 02 an extra group may be added.

Explanation of Figures in Groups.

First Group - 1st 3 figures give the barometer reading corrected in millimetres and tenths (initial 7 being omitted). To convert to millibars and inches *see* Table V., p. 28). 4th and 5th figures give the wind direction true. (Table IV., p. 15.)

Second Group - 1st figure gives the wind force by Beaufort Scale (p. 12). Forces 9 and above being sent as 9. 2nd and 3rd figures give the weather at the time of observation. (Table II., pp. 14 and 15.) 4th and 5th figures give the temperature of the air in whole degrees Centigrade. (To convert to Fahrenheit *see* Table VII., p. 29.)

Third Group - 1st figure gives the characteristic of barometer Tendency during the 3 hours preceding the time of observation (Table XV.). 2nd figure gives the amount of barometric tendency during the 3 hours preceding the time of observation in half millimetres. For tendencies 10–19 the *second* figure only is reported and 33 is added to the wind direction number. For tendencies 20–29 the *second* figure only is reported, and 67 is added to the wind direction number. If greater than 29 the tendency is reported as 29. 3rd figure gives weather in the interval since the preceding time of report (Table X., p. 29). 4th figure gives the visibility (Table XVI.). 5th figure gives the relative humidity of the air (Table XVII.).

Fourth Group - 1st figure gives the form of predominating cloud lowest in the scale of cloud forms (Table XVIII.). 2nd figure gives the amount of low cloud. 3rd figure gives the form of predominating cloud highest in the scale of cloud forms when more than one type exists (Table XVIII.). 4th figure gives the total amount of sky covered with cloud. 5th figure gives the height of base of lowest cloud present (Table XIX.).

Fifth Group - 1st and 2nd figures give the rainfall for preceding 13 hours (Table XX.). 3rd figure gives the state of the sea and swell at the coast (Table XXI.). 4th figure gives the visibility seawards from the coast station (Table XVI.). 5th figure gives the time of commencement of rainfall (Table XXII.).

Sixth Group - (Stations 01 and 02 only), gives the form, direction and speed of highest layer of cloud present as determined by nephoscope observations.

1335 message is exactly similar to that of 0735 with the exception that the **Fifth Group** above, relating to “rainfall,” etc., is omitted.

* It should be noted that 00 = calm.

1835 message is in the same form as the 0735 message.

Observations omitted from one message are transmitted at the beginning of the next, the time of the observation being added to the index number of the station.

NORWAY.

Christiania W/T station, approximate Latitude 59° 59' N., Longitude 10° 41' E., call sign LCH, transmits weather bulletins on a wave-length of 8,000 metres (C.W.) at the following times:—

0750 G.M.T. (observations of 0700 G.M.T.) from the following stations.

1350 G.M.T. (" 1300 G.M.T.) " " "
1850 G.M.T. (" 1800 G.M.T.) " " "

| Indicator Figures. | Station. | Position (approx.) | |
|--------------------|-------------------------------|--------------------|------------|
| | | Latitude. | Longitude. |
| 02 | Quade Hook (Spitzbergen) - | 78° 57' N. | 11° 42' E. |
| 05 | Green Harbour (Spitzbergen) - | 78° 02' N. | 14° 14' E. |
| 10 | Ingöy - | 71° 04' N. | 24° 09' E. |
| 12 | Tromsö - | 69° 39' N. | 18° 58' E. |
| 16 | Mygbugten - | 73° 30' N. | 21° 30' W. |
| 20 | Aalesund - | 62° 28' N. | 6° 10' E. |
| 22 | Valdersund - | 63° 52' N. | 9° 45' E. |
| 27 | Kinn - | 61° 33' N. | 4° 48' E. |
| 30 | Oksö - | 58° 04' N. | 8° 04' E. |
| 32 | Lister - | 58° 06' N. | 6° 34' E. |
| 35 | Bjornoya (Bear Island) - | 74° 28' N. | 19° 15' E. |
| 40 | Andenes - | 69° 20' N. | 16° 08' E. |
| 42 | Röst - | 67° 30' N. | 12° 04' E. |
| 47 | Jan Mayen - | 70° 59' N. | 8° 19' W. |
| 50 | Bergen - | 60° 24' N. | 5° 19' E. |
| 52 | Strömskag - | 63° 23' N. | 7° 48' E. |
| 55 | Færder - | 59° 02' N. | 10° 32' E. |
| 57 | Ona - | 62° 52' N. | 6° 33' E. |
| 59 | Runde - | 62° 24' N. | 5° 39' E. |
| 60 | Vardö - | 70° 22' N. | 31° 08' E. |
| 70 | Brönnöy - | 65° 28' N. | 12° 13' E. |
| 80 | Utsire - | 59° 18' N. | 4° 53' E. |
| 82 | Skudesnæs - | 59° 09' N. | 5° 16' E. |
| 90 | Dombaas - | 62° 05' N. | 9° 07' E. |

Messages commence with the words "Météo Norvégien."

The 0750 message consists of 3 parts as follows:—

Part I.

Containing observations of weather from the above stations, the station's indicator figures being transmitted first, then 5 or 6 groups of 5 figures each for each station and can be decoded by following the method* as described for the Lyngby (Denmark) W/T 0735 transmission, p. 43 of this number. In the case of Dombaas, station number 90, the 3rd and 4th figures in the 5th group give the maximum temperature during the eleven hours preceding the time of observation.

Part II.

Preceded by the word "Pilot" contains observations of the upper winds from Bergen (indicator figures 97). Tromsö (98) and Aas (99).

Part III.

Preceded by the word "Ships" contains observations of weather from ships, in 8 groups of 5 figures each for each reporting ship.

The first 3 groups† can be decoded by the same method as explained in "Weather Signals" of the February number, p. 28, under Part II. Remaining groups as follows:—

Fourth Group - 1st and 2nd figures give the weather at the time of observation (*see* Table II., pp. 14 and 15). 3rd figure gives the visibility (*see* Table III., p. 15).

* The barometric pressure is reported in millibars and tenths (the initial 9 or 10 being omitted). To convert to inches *see* Table IV., p. 23.

† The barometric pressure is reported in whole millibars (the initial 9 or 10 being omitted). To convert to inches *see* Table IV., p. 23.

4th figure gives the characteristic of the swell (Table XXIII.).

5th figure gives the direction from which swell comes on scale (0-8) in which 2 = East, 4 = South, &c.; 0 = no swell.

Fifth Group

- Can be decoded by the method explained for the fourth group in the Lyngby (Denmark) W/T 0735 G.M.T. transmission, p. 43 of this number, except that the 5th figure of the group gives the maximum wind force since the time of preceding observation (Table XXIV.).

Sixth Group

- 1st and 2nd figures give the ship's course on scale 01 - 32 (08 = E., 16 = S., &c.). 3rd figure gives the time of commencement of precipitation (Table XXII.).

4th figure gives the time of cessation of precipitation from same Table (XXII.). 0 = no rain or rain still falling.

5th figure gives the past weather (*see* Table X., p. 29).

Seventh Group

- 1st 3 figures give the temperature in degrees and tenths Centigrade (*see* Table VII., p. 29), for conversion to Fahrenheit).

4th figure gives the relative humidity of the air (Table XVII.).

5th figure gives the characteristic of barometric tendency for the last 3 hours (Table XV.).

Eighth Group

- 1st 2 figures give the amount of barometric tendency for the last 3 hours in half millibars. 3rd, 4th and 5th figures give the sea surface temperature in degrees and tenths Centigrade (*see* Table VII., p. 29, for conversion to Fahrenheit).

The 1350 and 1850 messages consist of three parts also and the groups have the same meaning as in the 0750 message, except that the group relating to "rainfall," &c., is omitted from the 1350 transmission of Part I.

NOTE.—(1) Observations from stations 12, 22, 27, 30, 42, 50, 52, 57, 59 and 82 are not transmitted regularly, but only when observations from normal stations are missing.

(2) Observations omitted from one message are transmitted at the beginning of the next, the time of observation being sent after the index number of the station.

Table XIV.

State of the Sea Table (Dutch Reports).

| Code Figure. | Code Figure. |
|------------------|-----------------|
| 0 = calm. | 5 = rough. |
| 1 = very smooth. | 6 = very rough. |
| 2 = smooth. | 7 = high. |
| 3 = slight. | 8 = very high. |
| 4 = moderate. | 9 = phenomenal. |

Table XV.

International Weather Telegraphy, Characteristic of Barometric Tendency, during 3 hours preceding time of Observation Table.

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

Table XVI.

International Weather Telegraphy, Visibility Table.

Code Figure.

| | | |
|---|---|--|
| 0 | = | Objects not visible at 50 metres (55 yards). |
| 1 | = | 200 metres (220 yards). |
| 2 | = | 500 metres (550 yards). |
| 3 | = | 1,000 metres (1,100 yards). |
| 4 | = | 2,000 metres (1½ miles). |
| 5 | = | 4,000 metres (2½ miles). |
| 6 | = | 10,000 metres (6¼ miles). |
| 7 | = | 20,000 metres (12½ miles). |
| 8 | = | 50,000 metres (31¼ miles). |
| 9 | = | Objects visible at 50,000 metres or more. |

Table XX.

International Weather Telegraphy, Amount of Rainfall Table.
(Used for Amounts 0·1–0·6 mm.).

Code Figures.

Meaning.

| | | | | | |
|----|---|---|---|---|---------------------------------------|
| 91 | - | - | - | - | 0·1 mm. |
| 92 | - | - | - | - | 0·2 " |
| 93 | - | - | - | - | 0·3 " |
| 94 | - | - | - | - | 0·4 " |
| 95 | - | - | - | - | 0·5 " |
| 96 | - | - | - | - | 0·6 " |
| 97 | - | - | - | - | Some rain, but not measurable. |
| 98 | - | - | - | - | More than 90 millimetres. |
| 99 | - | - | - | - | Measurement impossible or unreliable. |

Amounts of 0·7 mm. or more are coded as whole millimetres,
e.g., 17·2 mm. coded as 17.

Table XVII.

International Weather Telegraphy, Relative Humidity Table.

Code Figure.

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

Table XXI.

International Weather Telegraphy, State of Sea and Swell
Table (Coast Stations).

Code Figure.

| | | | | | | |
|---|---|---|---|---|-------------------|-----------------------|
| 0 | - | - | - | - | No swell | } Calm or slight sea. |
| 1 | - | - | - | - | Moderate swell | |
| 2 | - | - | - | - | Heavy swell | |
| 3 | - | - | - | - | No swell | } Moderate sea. |
| 4 | - | - | - | - | Moderate swell | |
| 5 | - | - | - | - | Heavy swell | |
| 6 | - | - | - | - | Rather rough sea. | |
| 7 | - | - | - | - | Rough sea. | |
| 8 | - | - | - | - | Very rough sea. | |
| 9 | - | - | - | - | Mountainous sea. | |

Table XVIII.

International Weather Telegraphy, Cloud Form Table.

Code Figure.

| | | | | | | |
|-----------------------------|---|---|---|---|---|----------------|
| 1—Cirrus | - | - | - | - | - | Ci. |
| 2—Cirro-Stratus | - | - | - | - | - | Ci. St. |
| 3—Cirro-Cumulus | - | - | - | - | - | Ci.-Cu. |
| 4—Alto-Cumulus | - | - | - | - | - | A.-Cu. |
| 5—Alto-Stratus | - | - | - | - | - | A.-St. |
| 6—Strato-Cumulus | - | - | - | - | - | St.-Cu. |
| 7—Nimbus | - | - | - | - | - | Nb. |
| 8—Cumulus or Fracto-Cumulus | - | - | - | - | - | Cu. or Fr.-Cu. |
| 9—Cumulo-Nimbus | - | - | - | - | - | Cu.-Nb. |
| 0—Stratus or Fracto-Stratus | - | - | - | - | - | St. or Fr.-St. |

Table XXII.

International Weather Telegraphy, Time of Commencement of
Precipitation.

Code Figure.

| | | | | | |
|---|---|---|---|---|--|
| 0 | - | - | - | - | No rain. |
| 1 | - | - | - | - | 0 to 1 hour before time of observation. |
| 2 | - | - | - | - | 1 to 2 hours before time of observation. |
| 3 | - | - | - | - | 2 to 3 " " " |
| 4 | - | - | - | - | 3 to 4 " " " |
| 5 | - | - | - | - | 4 to 5 " " " |
| 6 | - | - | - | - | 5 to 6 " " " |
| 7 | - | - | - | - | 6 to 8 " " " |
| 8 | - | - | - | - | 8 to 10 " " " |
| 9 | - | - | - | - | Above 10 hours before time of observation. |
| - | - | - | - | - | No observation. |

Table XIX.

International Weather Telegraphy, Height of Base of Lowest
Cloud present Table.

Code Figure.

Metres.

Feet.

| | | | | | | |
|---|---|---|---|---|---------------|---------------|
| 0 | - | - | - | - | 0 to 50 | 0 to 150 |
| 1 | - | - | - | - | 50 " 100 | 150 " 300 |
| 2 | - | - | - | - | 100 " 200 | 300 " 600 |
| 3 | - | - | - | - | 200 " 300 | 600 " 1,000 |
| 4 | - | - | - | - | 300 " 600 | 1,000 " 2,000 |
| 5 | - | - | - | - | 600 " 1,000 | 2,000 " 3,000 |
| 6 | - | - | - | - | 1,000 " 1,500 | 3,000 " 5,000 |
| 7 | - | - | - | - | 1,500 " 2,000 | 5,000 " 6,500 |
| 8 | - | - | - | - | 2,000 " 2,500 | 6,500 " 8,000 |
| 9 | - | - | - | - | No low cloud. | No low cloud. |

Table XXIII.

International Weather Telegraphy, Characteristic of Swell in
the Open Sea Table.

Code Figure.

| | | | | | | |
|---|---|---|---|---|---------------------|-------------------------------|
| 0 | - | - | - | - | No, or slight swell | } and sea smooth to moderate. |
| 1 | - | - | - | - | Moderate swell | |
| 2 | - | - | - | - | Heavy swell | |
| 3 | - | - | - | - | Long low swell | |
| 4 | - | - | - | - | Confused swell | } and sea rough. |
| 5 | - | - | - | - | No, or slight swell | |
| 6 | - | - | - | - | Moderate swell | |
| 7 | - | - | - | - | Heavy swell | |
| 8 | - | - | - | - | Long low swell | |
| 9 | - | - | - | - | Confused swell | |

Table XXIV.

Maximum Wind Force Table, Ship Reports, Norway.

| Code Figure. | Beaufort Number. |
|--------------|------------------|
| 0 | 10 |
| 1 | 11 |
| 2 | 12 |
| 3 | 0 to 3 |
| 4 | 4 |
| 5 | 5 |
| 6 | 6 |
| 7 | 7 |
| 8 | 8 |
| 9 | 9 |

WIRELESS STORM SIGNALS.

HOLLAND.

Scheveningen W/T station, call sign PCH, transmits a storm signal when necessary, both in Dutch and English, immediately after the daily weather bulletin at 1115 G.M.T. and at 2315 G.M.T. Wavelength used is 1,800 metres (spark). If the signal should be sent out on Sundays and holidays (when the station does not transmit a weather bulletin) it will be preceded by the letters KNMI.

The messages are sent three times in succession, the first quickly, the second and third slowly.

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

DENMARK.

Copenhagen W/T station, approximate Latitude 55° 41' N., Longitude 12° 37' E., call sign OXA, transmits storm warnings for the Kattegat and Baltic on request. Wavelength used, 600 metres (spark).

Lyngby W/T station, call sign OXE, transmits a storm signal, when necessary, immediately after the weather bulletins at 0735, 1335 and 1835 G.M.T. on a wavelength of 3,650 metres (C.W.). The message is preceded by the word "Tempête."

NORWAY.

Bergen W/T station, approximate Latitude 60° 24' N., Longitude 5° 22' E., call sign LGN, transmits storm warnings, after the weather bulletins, at 0950 and 2050 G.M.T. on a wavelength of 1,850 metres (C.W.).

The warnings form Part IV. of the Weather Bulletins, and are broadcasted in plain language (Norwegian). They are preceded by the International Safety Signal TTT (■ ■ ■) the word "Stormvarsler," followed by an area indicator word, which signifies that section of the west coast of Norway to which the warning refers.

The warnings are sent when the wind exceeds Beaufort force 7.

The sections are as follows :—

The word Jæren indicates that part of the coast from Lindesnes (58° 00' N., 7° 00' E.) to Stavanger.

" Hordaland indicates that part of the coast from Stavanger (59° 00' N., 5° 40' E.) to Utvær.

" Fjordane indicates that part of the coast from Utvær (61° 02' N., 4° 31' E.) to Statt.

" More indicates that part of the coast from Statt (62° 12' N., 5° 00' E.) to Froya.

" Trondelag indicates that part of the coast from Froya (63° 45' N., 8° 40' E.) to Rörvik.

When the wind force is unlikely to exceed 6 or is likely to decrease without change of direction the words "Stormvarsler Ingen" are transmitted.

III.—VISUAL STORM WARNINGS.

BELGIUM, HOLLAND, GERMANY, DENMARK, NORWAY, SWEDEN.

Day Signals.

The day signals exhibited by the above countries when gales are to be expected from the N.W., N.E., S.E. and S.W. are similar to those used by France. For description see February *Marine Observer*, p. 30.

The following should be noted :—

With the exception of Belgium, the above countries exhibit a *black ball* when a gale is probable, but its direction is uncertain.

Stations in Holland, Germany, Denmark and Norway exhibit one flag when the wind may be expected to veer during the gale and two flags when the wind may be expected to back during the gale. *Black flags* are used by stations in Holland, *red flags* by stations in Germany and Denmark.

Night Signals.

Holland and Germany.

Stations in Holland and Germany exhibit night signals as follows :—

| Signal. | Signification. |
|--|--------------------------|
| Two <i>white</i> lights vertical | Gale probable from S.Wd. |
| Two <i>red</i> lights vertical | Gale probable from N.Wd. |
| A <i>white</i> light over a <i>red</i> light | Gale probable from S.Ed. |
| A <i>red</i> light over a <i>white</i> light | Gale probable from N.Ed. |
| One <i>red</i> light | Caution : gale probable. |

Norway.

Stations in Norway exhibit night signals as follows :—

| Signal. | Signification. |
|--|---|
| Three <i>white</i> lights, triangle point up | Gale from N.W. |
| Three <i>white</i> lights, triangle point down | Gale from S.W. |
| Four <i>white</i> lights, triangle point up (one light above). | Gale from N.E. |
| Four <i>white</i> lights, triangle point down (one light below). | Gale from S.E. |
| One <i>red</i> light | Gale without information as to direction. |

Special Notices regarding Personnel.

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

Commander S. Robinson, C.B.E., R.D., R.N.R.

Marine Observers will join with the Marine Division in congratulating Commander S. ROBINSON, R.D., R.N.R., of R.M.S. *Empress of Australia*, a member of the Corps of Marine Observers, on the honour conferred upon him by His Majesty the King. Captain ROBINSON has been awarded the C.B.E., in recognition of the valuable services rendered by his ship during the great Japanese earthquake disaster in September, 1923.

The *Empress of Australia* was at Yokohama when this terrible catastrophe occurred. Captain ROBINSON, his officers, crew and passengers, played a magnificent part in the work of rescue and were instrumental in saving many hundreds of lives.

ICE IN THE WESTERN NORTH ATLANTIC.

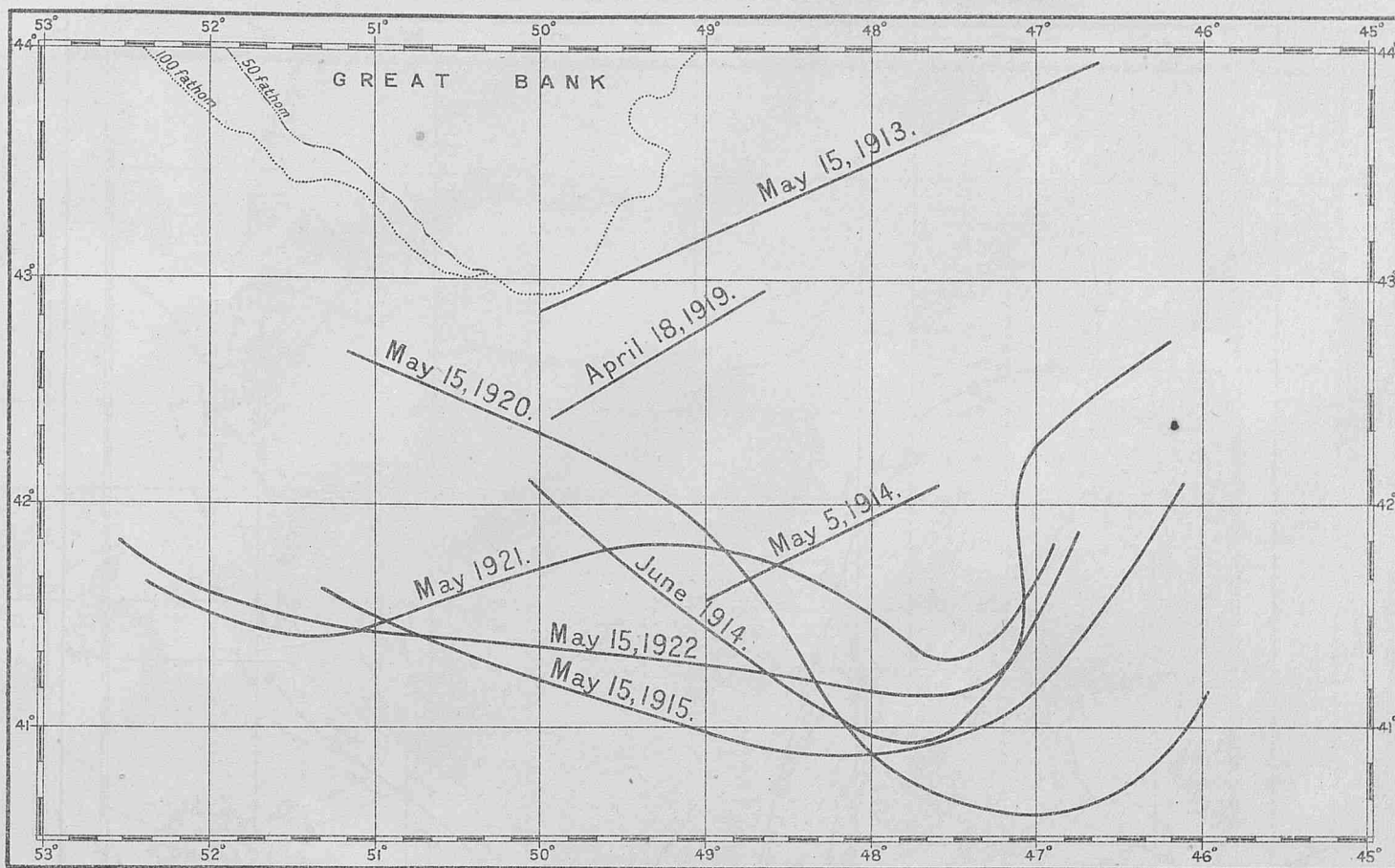


Chart A. Boundary line of Gulf Stream and Labrador Current as defined by Lieut. E.H. Smith, U.S. Coast Guard, Oceanographer, Western North Atlantic Ice Patrol.

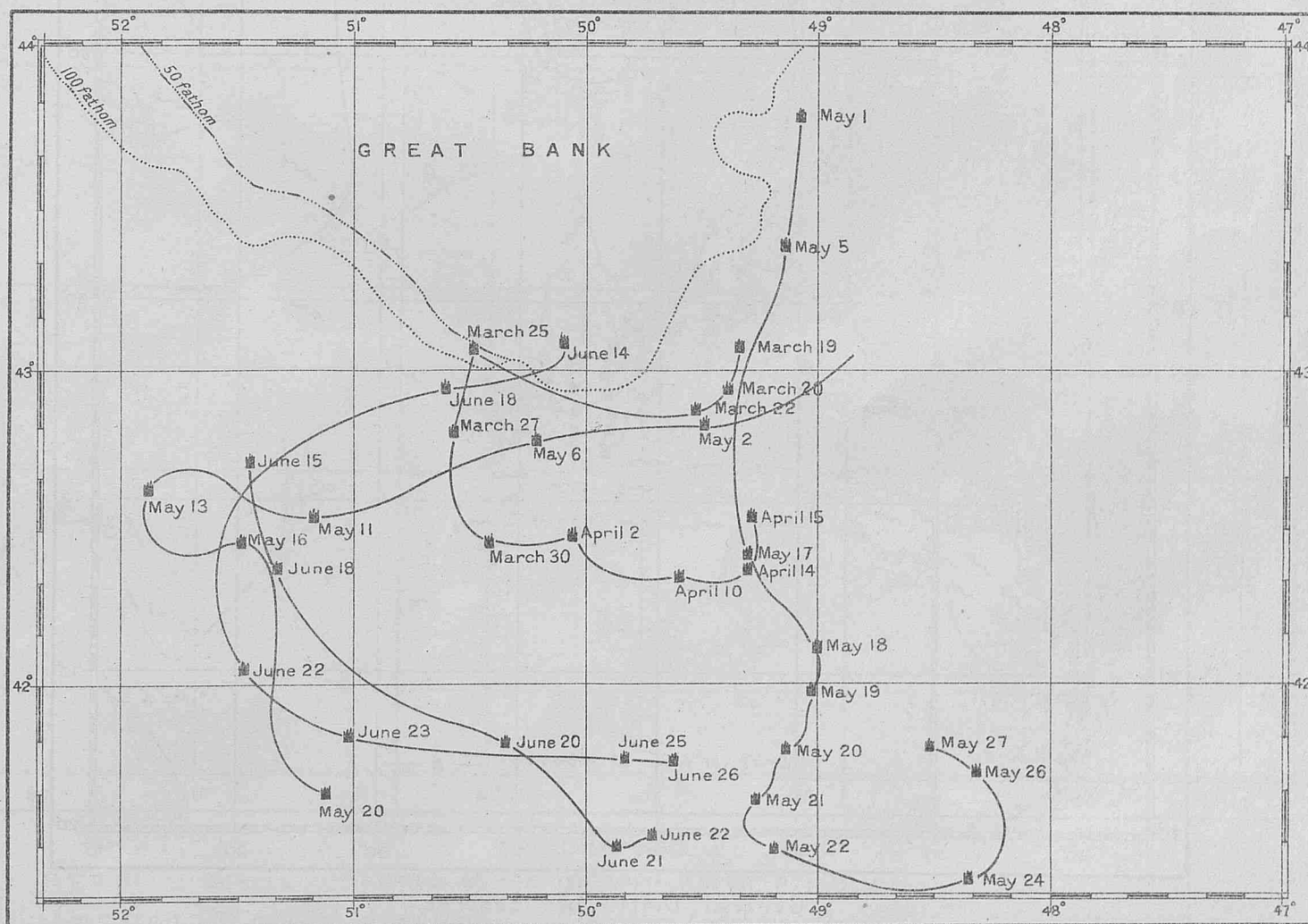
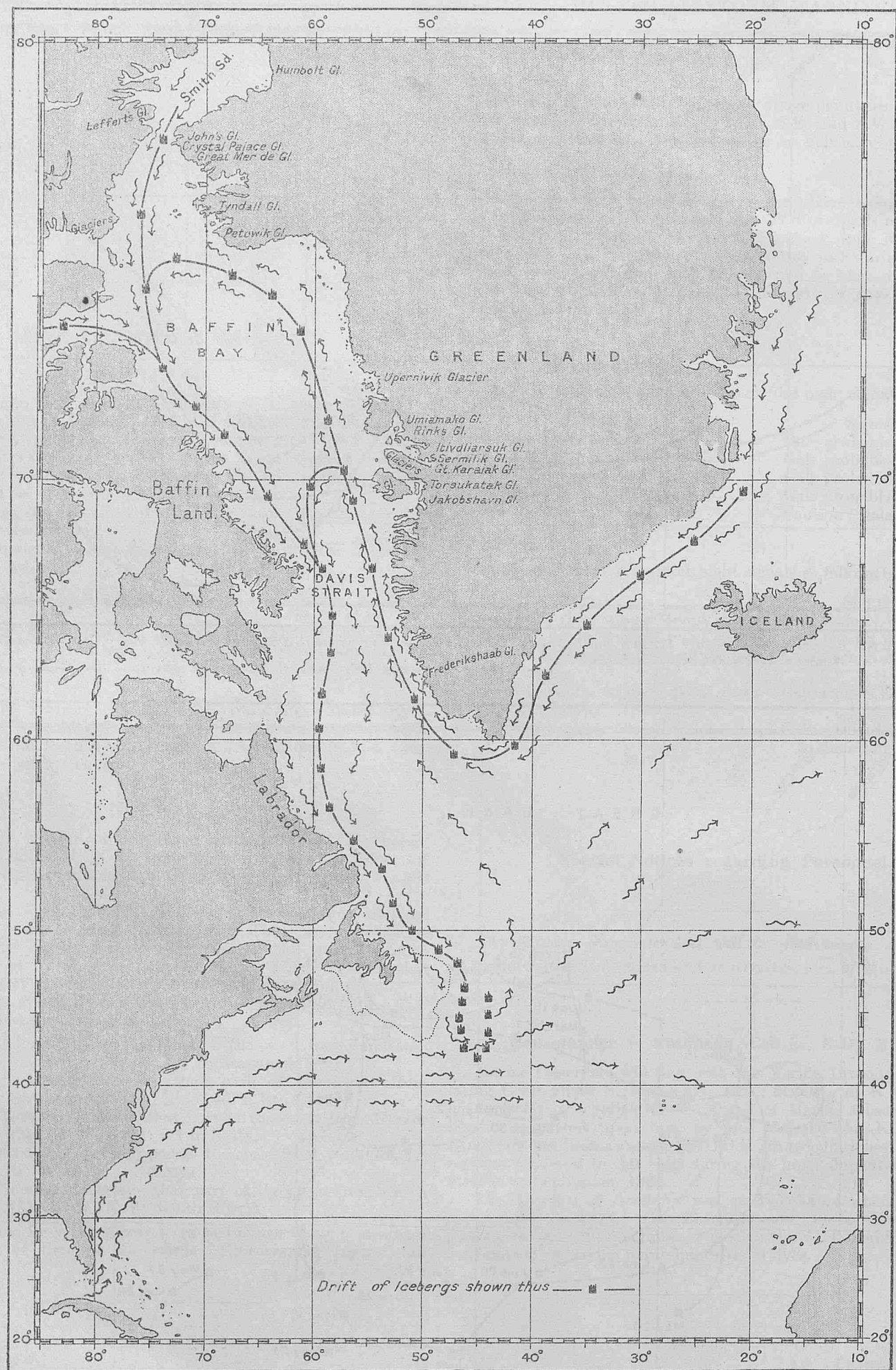


Chart C. Actual drifts of Icebergs observed by the Ice Patrol Cutter during the 1922 season.

ICE IN THE WESTERN NORTH ATLANTIC.



General Drift of Icebergs.

Chart B.

ICE IN THE WESTERN NORTH ATLANTIC.

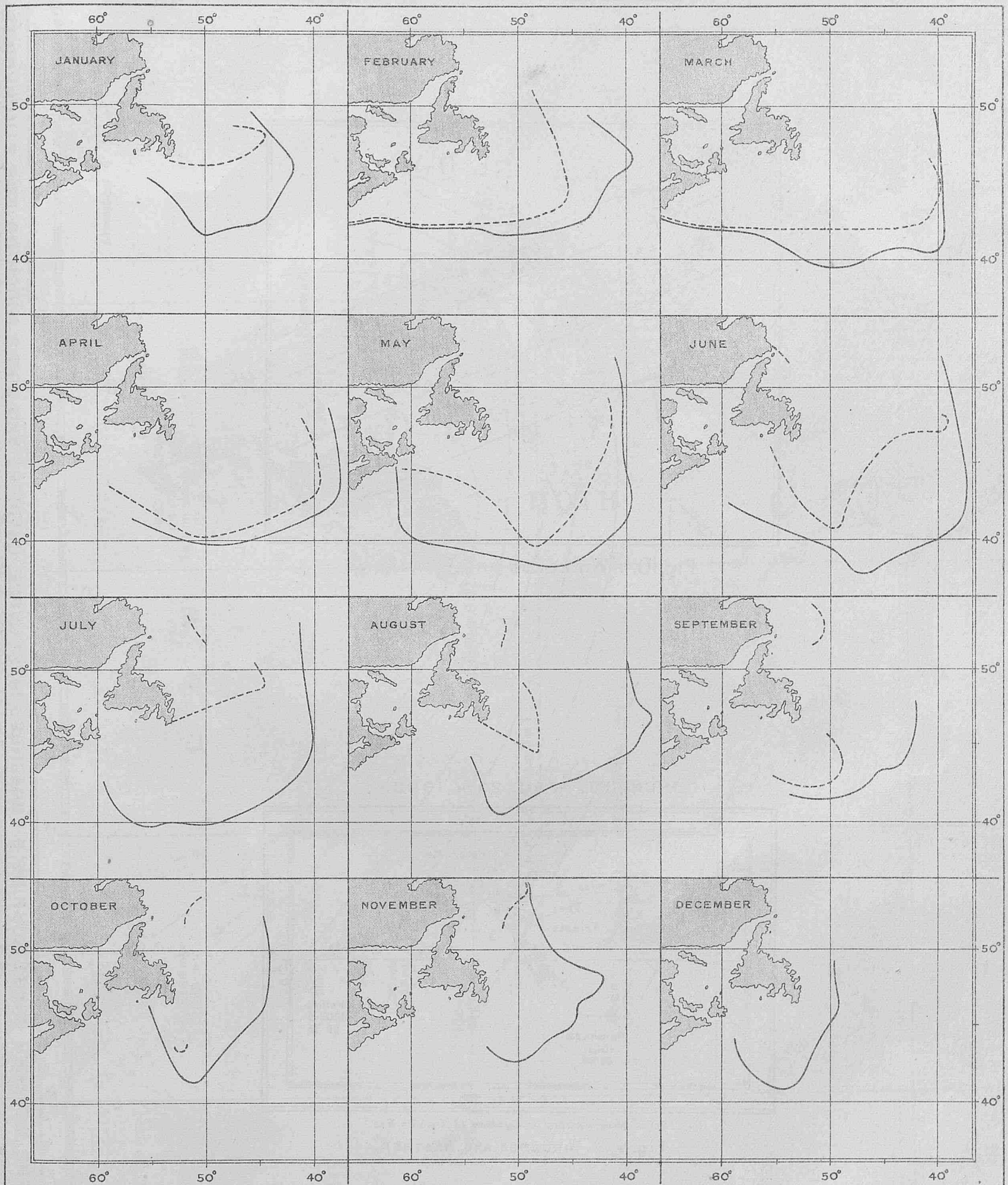


Chart D.

Limits of Ice Western North Atlantic.

Limit from 1901 to 1923 shown thus ———— Limit for December is from 1901 to 1922.
Limit for 1923 shown thus - - - - -

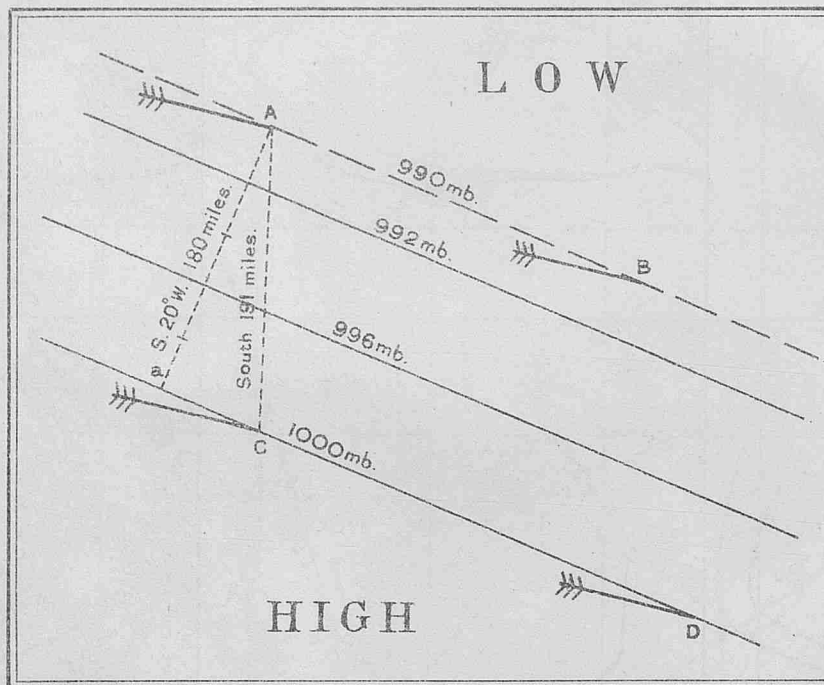
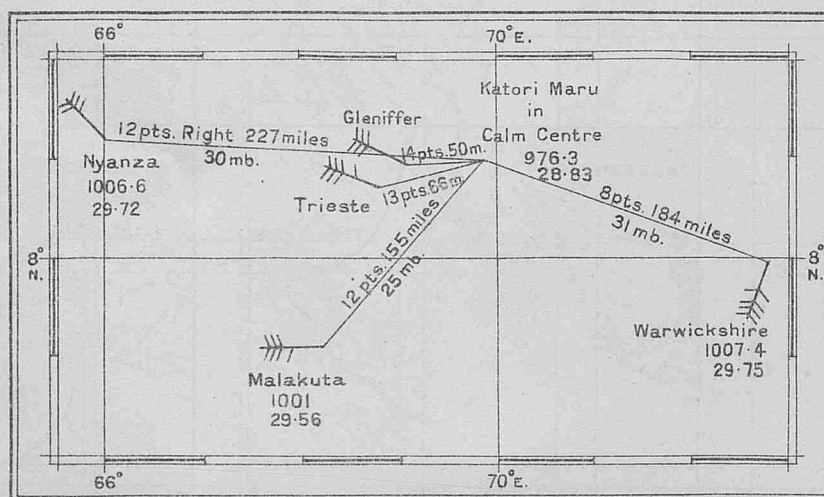


Fig.10.—"WIRELESS AND WEATHER."

MIDNIGHT, APRIL, 20TH. 1922.



Ships' observations in Cyclone in Arabian Sea.

Fig.11, —"WIRELESS AND WEATHER."

MISLEADING WEATHER CHART, MORNING, 6TH. NOVEMBER 1922. FALSE GRADIENT AND TIMES WHICH DO NOT SYNCHRONIZE.

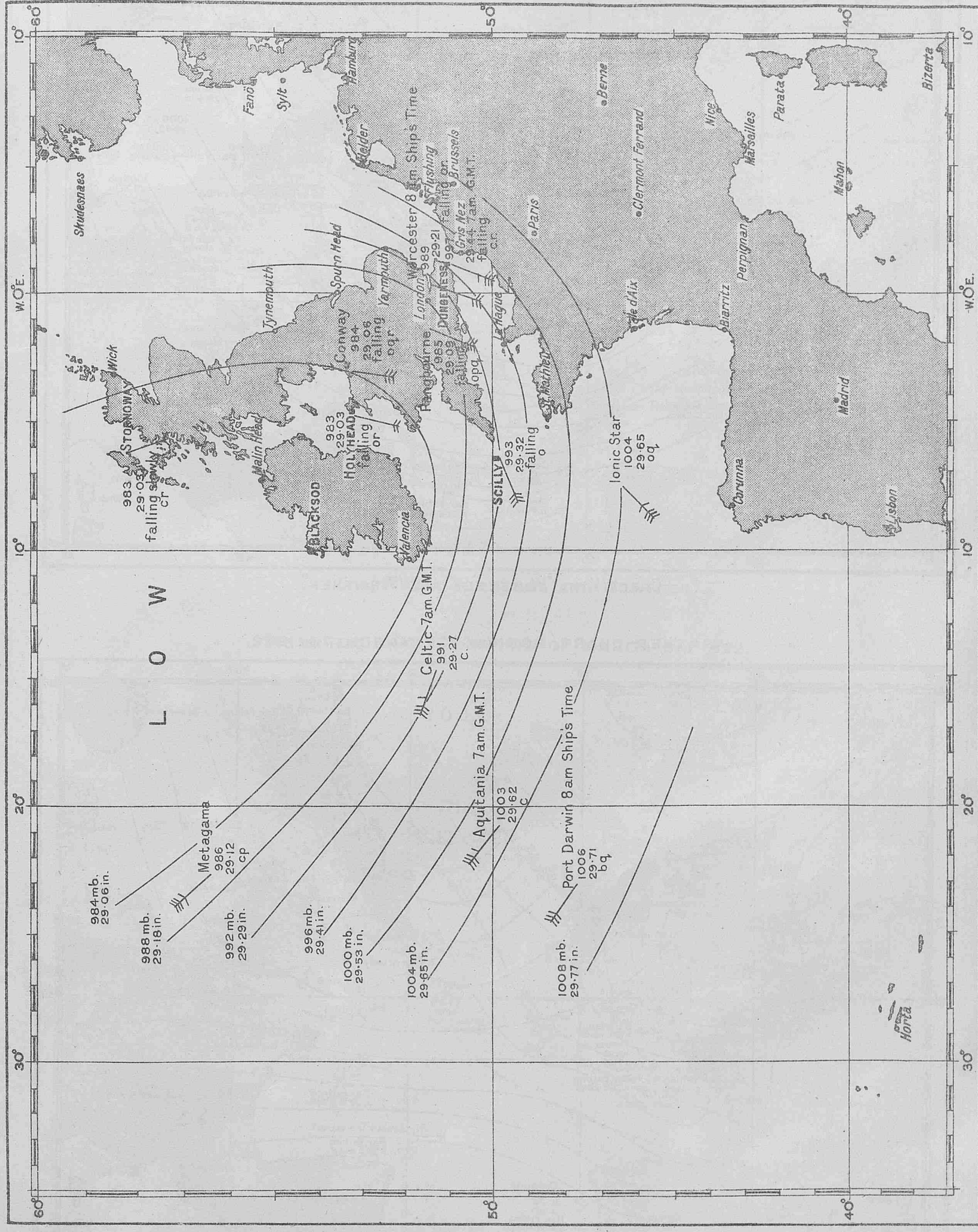


Chart IV,—"WIRELESS AND WEATHER."

WEATHER CHART, EVENING OF MARCH 6TH. 1922.

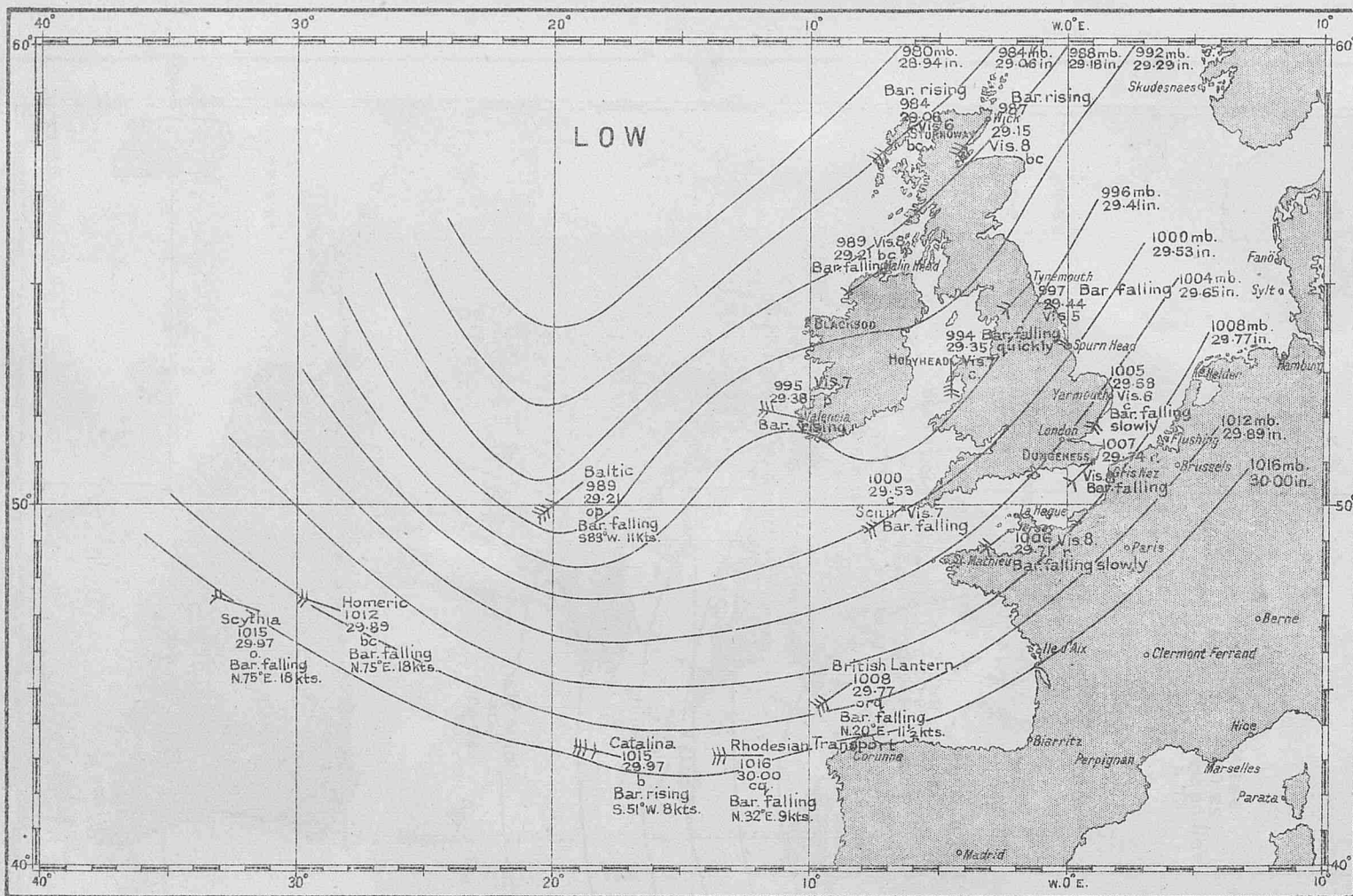


Chart V,—"WIRELESS AND WEATHER."

WEATHER CHART, MORNING OF MARCH 7TH. 1922.

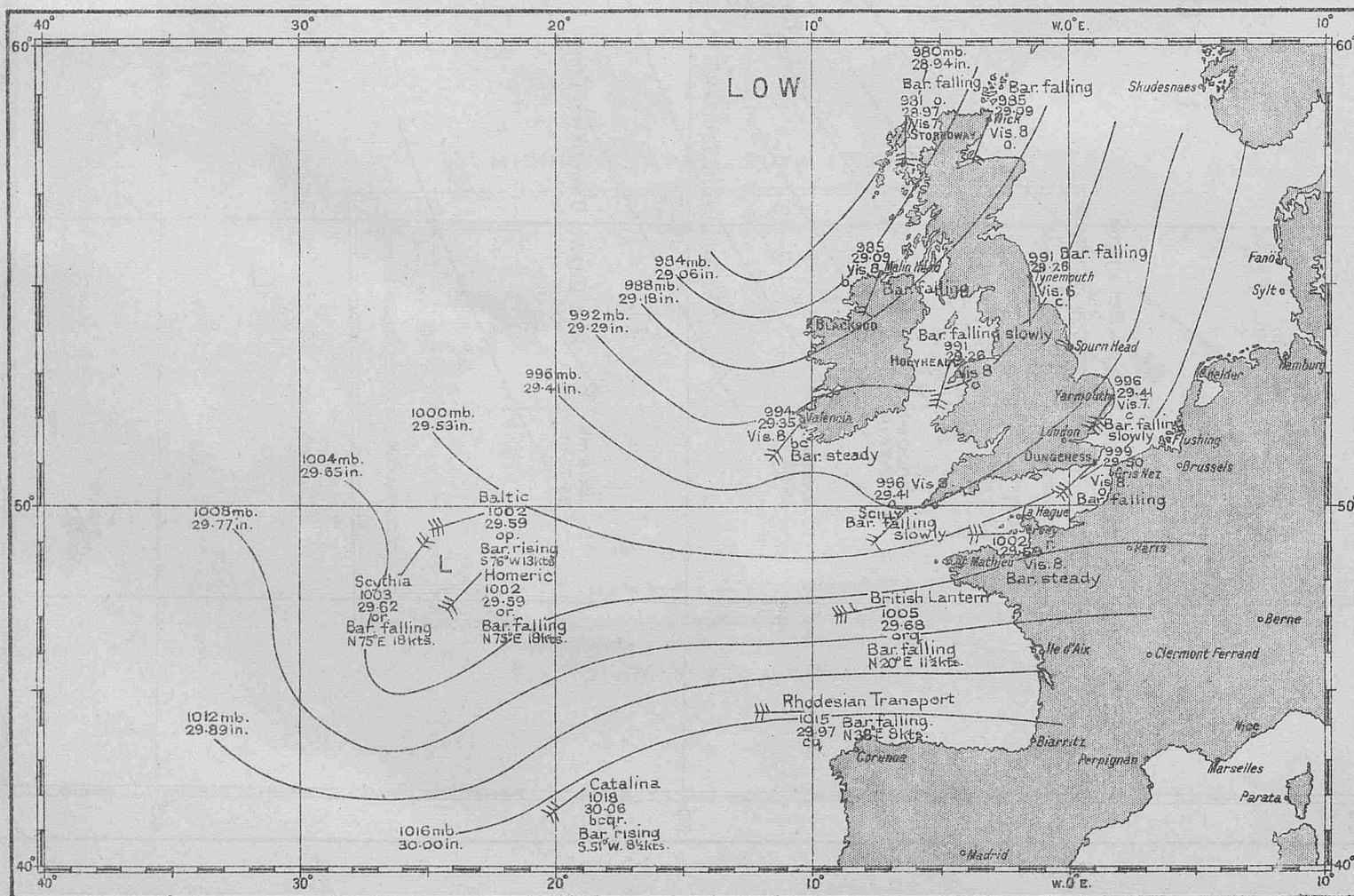


Chart VI,—"WIRELESS AND WEATHER."

WEATHER CHART, EVENING OF MARCH 7TH. 1922.

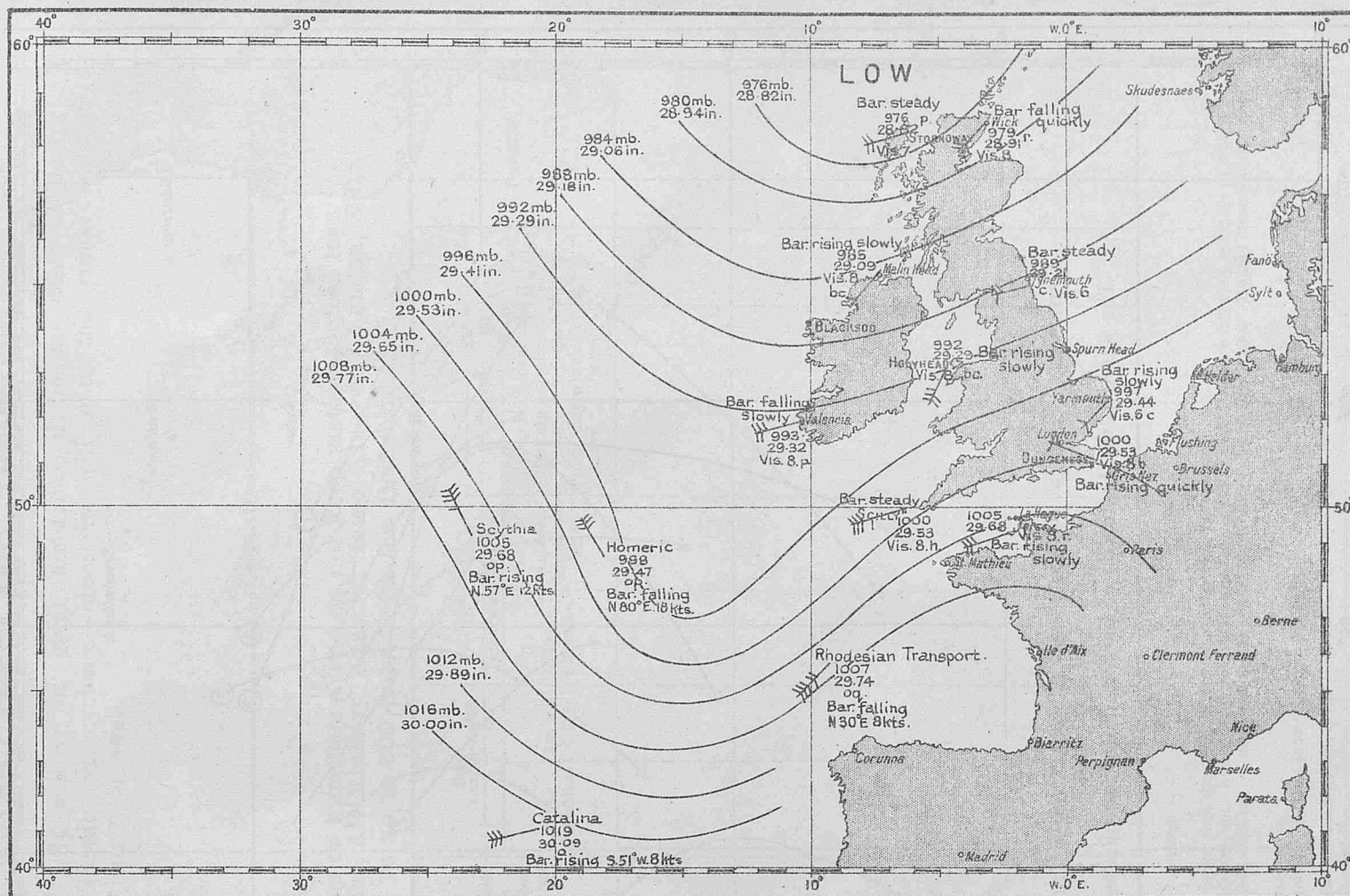


Chart VII,—“WIRELESS AND WEATHER.”

WEATHER CHART, MORNING OF MARCH 8TH. 1922.

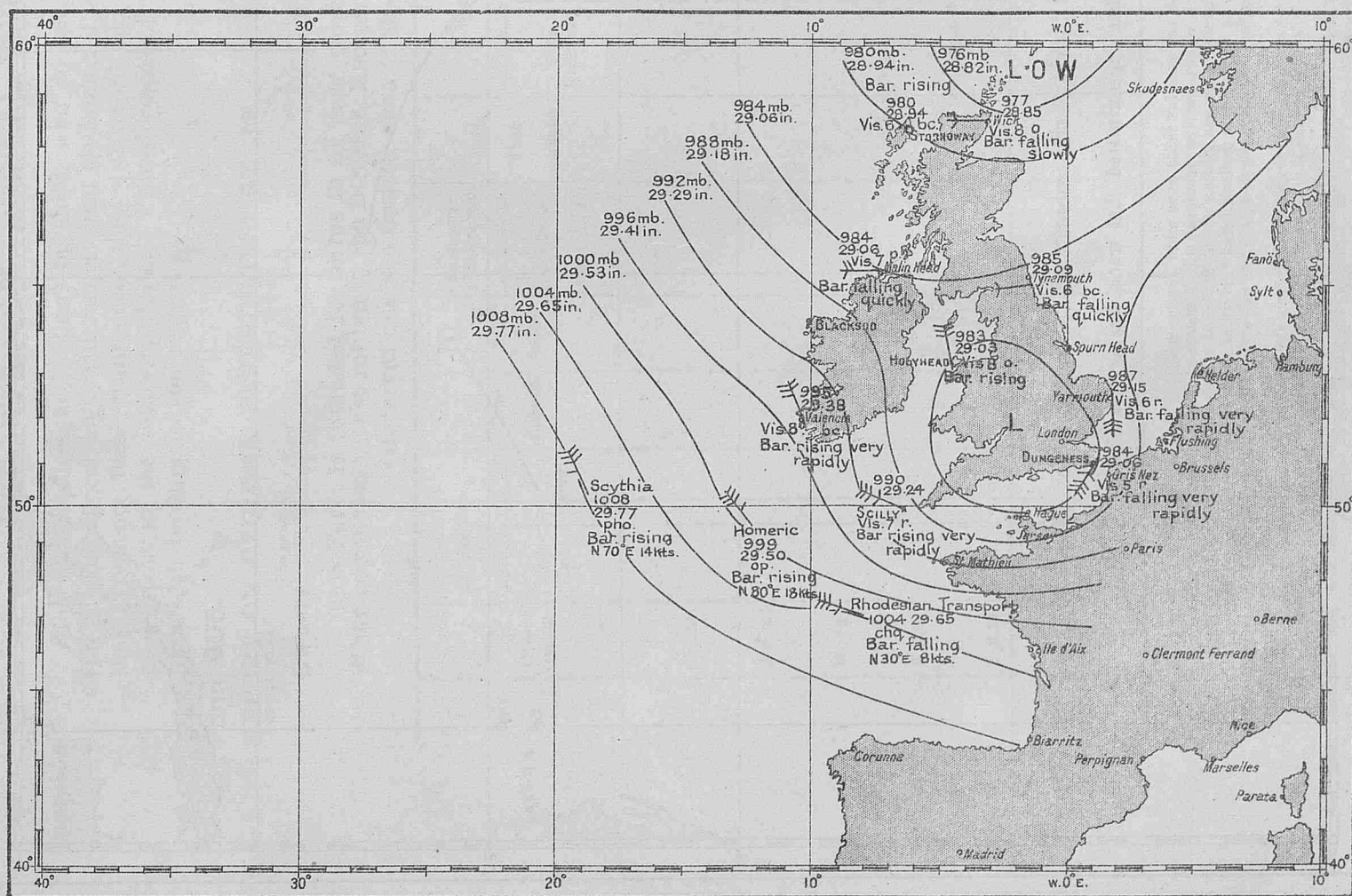
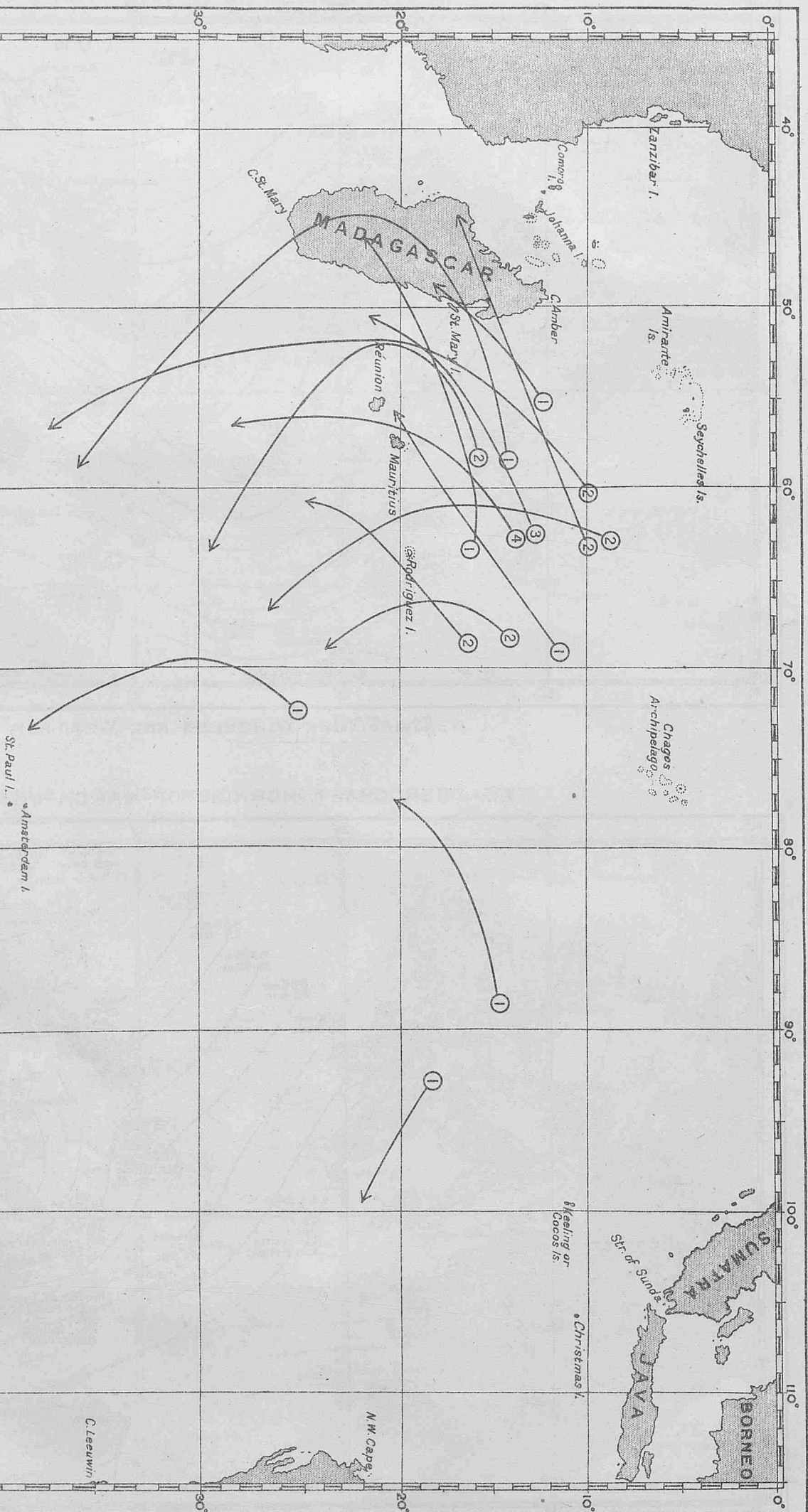


Chart VIII,—“WIRELESS AND WEATHER.”

CYCLONE TRACKS OF THE SOUTH INDIAN OCEAN.



Generalised Tracks of Cyclones in the South Indian Ocean during the month of March from 1886-1917.

The figure at the beginning of track indicates the number of storms that approximated that track during the Month.

NOTICE.

REPORTS ON TROPICAL CYCLONES, HURRICANES AND TYPHOONS.

The Commanders and officers of ships, who do not keep full Meteorological logs, will render great assistance, if, when they experience these disturbances, they will record and send in a report in the following form. Printed copies of these forms can be supplied on request.

It will be of great assistance, if, in all cases in the vicinity of cyclones, observers will note the period and length of swell.

Form 905.

REPORT ON CYCLONE EXPERIENCED BY S.S.

Captain

Owners

from

to

This Form is intended for ships in or near tropical cyclones or hurricanes who do not keep meteorological logs. When completed please return to the Director, Meteorological Office, Air Ministry, Admiralty House, London, W.C.2. (Observations are desired even if the ship may be up to 600 miles from the disturbance.)

| Date. 192... | Position. | | True Course. | Dis- tance. | Barometer Uncorrected. | | Attd. Ther- mometer. | Wind. | | Weather by Beaufort Notation. | Sea. | | Swell. | | Clouds. | | | Remarks. |
|-----------------|---------------------------------|------|-----------------|----------------|---------------------------|-----------------------------|----------------------------|--------------------|-----------------------------------|--|--------------------|-------------------|--------------------|-------------------------------------|---------|--|-------------------------|----------|
| | | | | | | | | | | | | | | | Types. | Upper, and Lower, and direction from which they move. | Amount from move. | |
| | Time of Obser- vation. | Lat. | Long. | | | Height above sea.....ft. | | True Direction. | Force by Beaufort Scale. | | True Direction. | Amount 0 to 9. | True Direction. | Amount Charac- ter- istic. | | | | |
| | 4 a.m. | | | | | | | | | | | | | | | | | |
| | 8 a.m. | | | | | | | | | | | | | | | | | |
| | Noon. | | | | | | | | | | | | | | | | | |
| | 4 p.m. | | | | | | | | | | | | | | | | | |
| | 8 p.m. | | | | | | | | | | | | | | | | | |
| | Midt. | | | | | | | | | | | | | | | | | |

Copies of W/T. weather messages received or sent, from or to other ships or the shore, are specially desired. It is specially desired that it should be stated if the Barometer is Mercorial or Aneroid. The accompanying blue postcard should be completed in accordance with instructions thereon in order that the error of the barometer may be known. If the position by observation at noon is given when obtained, and by D.R. at noon when sights are not obtained, so long as the courses (True) and distances between each set of weather observations are given with time, it will enable the computers to ascertain the position of the ship when each set of observations is recorded, which is very important. Hourly observations are desirable near the storm centre. Please state at each Noon how much ship's time differs from G.M.T.; also state if ship's time is used. If in addition to the observations required by the above form a narrative of the experiences in cyclones is given it will be greatly appreciated. This report will give great assistance in investigating cyclones. Address to which acknowledgment may be sent

ICE CHART.

WESTERN NORTH ATLANTIC.

NUMBERS OF TRANSATLANTIC TRACKS INDICATE

- (12) (13) (14) From 15th February to 10th April, inclusive.
 (15) (16) { Westbound from 1st February to 7th May, inclusive.
 Eastbound from 1st February to 30th April, inclusive.

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.

No later information received from the Cunard S.S. Co., since that appearing on November 1923, North Atlantic Chart.

SYMBOLS USED ON THE CHART.

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

PHENOMENAL DRIFTS OF ICE.

| Date. | Ship or Source of Report. | Position. Lat. Long. | Remarks. |
|----------------|---|-------------------------|---|
| March 24, 1913 | S.S. Floride | 46°21'N. 34°05'W. | Berg 60 ft. high, 200 ft. long. |
| " 20, 1915 | S.S. Wanaby | 38°55'N. 48°32'W. | Piece—supposed portion of a berg 5 ft. high, 60 ft. long. |
| " 21, 1920 | U.S. Hydrographic Bulletin. | 38°02'N. 40°38'W. | Berg 3 ft. high, 30 ft. long. |
| " 21, 1921 | Cape Race W/T report, via S.S. Hollandia. | 37°50'N. 47°23'W. | Berg. |

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

MARINE METEOROLOGY.

Co-operation of Shipowners, Masters and Mates.

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

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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. 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.

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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.

All Masters who wish to assist in developing the rapid interchange of Meteorological information and Weather Forecasting at sea can do so by using the form W/T Weather Report suggested in Weather Signals, given in this Journal, January Number.

The Marine Observer is sent monthly to all ships regularly contributing Logs, Forms and W/T Registers to the Meteorological Office.

Marine Agencies and Port Meteorological Officers.

| | | |
|-------------|----|---|
| LIVERPOOL | .. | (Port Meteorological Office) Commander G. ff. H. Lloyd, R.D., R.N.R., Dock Office. Telephone No.: Bank 8959. |
| CARDIFF | .. | { Captain James Weir, Examiner of Masters and Mates, Mercantile Marine Office. Captain W. H. Hunter, Board of Trade Surveyor's Office. |
| DUNDEE | .. | .. Captain W. K. Stewart, Nautical Instructor, Technical College, Bell Street, Dundee. |
| THE CLYDE | .. | .. Captain M. Corrance, Board of Trade Surveyor's Office, 73, Robertson Street, Glasgow. |
| HULL | .. | .. Captain Geo. B. Sturdy, Ellerman's-Wilson Line, Ltd. |
| 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 P. W. S. Henderson, 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. |

| Date. | Position. | | Description. |
|-----------------------|---|------------|---|
| | Latitude. | Longitude. | |
| NORTH SEA. | | | |
| 1.1.24 | 51°13'N. | 2°01'E. | Wreckage, dangerous to navigation. |
| 13.1.24 | 54°45'N. | 0°37'W. | Drifting wreckage, apparently part of a wooden drifter. |
| 13.1.24 | 55°42'N. | 1°41'W. | Submerged object. |
| 15.1.24 | 55°15'N. | 6°20'E. | Red conical buoy adrift. |
| 15.1.24 | 52°49'N. | 3°00'E. | Red painted light buoy. |
| 21.1.24 | 54°16'N. | 4°18'E. | Submerged object. |
| 25.1.24 | 51°45'N. | 1°54'E. | Submerged wreckage. |
| ENGLISH CHANNEL. | | | |
| 8.1.24 | 49°24'N. | 3°14'W. | Iron hopper barge marked " <i>Morhead E.T.P.O.</i> " anchor down, no one on board, dangerous to navigation. |
| 11.1.24 | 50°10'N. | 3°27'W. | Large derelict iron barge. |
| 20.1.24 | 11 mls. N.E. by E. from Portland. | | Conical buoy and another floating object. |
| 22.1.24 | 12½ mls. S17°W. from Anvil Pt. | | Wreckage, with broken mast showing a little above water. |
| 24.1.24 | 50°20'N. | 2°05'W. | Mast, projecting 3 ft. above water, rigging attached, apparently attached to submerged wreckage. |
| 27.1.24 | 49°25'N. | 5°15'W. | Wreck of sailing vessel, dangerous to navigation. |
| 28.1.24 | 10 mls. 325° from Portland Bill. | | Mast, projecting 3 ft., upright, apparently fast to wreckage. |
| BRISTOL CHANNEL. | | | |
| 9.1.24 | 51°34'N. | 4°25'W. | Wreckage of wooden sailing vessel. |
| 12.1.24 | 51°29'N. | 4°33'W. | Large raft of wood, dangerous to navigation. |
| IRISH CHANNEL. | | | |
| 9.1.24 | About 1 ml. S.S.W. (mag.) from Bar Lt. Vsl. | | Broken mast, projecting 3 or 4 ft., apparently fast to wreckage. |
| 25.1.24 | 54°51'N. | 5°15'W. | Spar, apparently attached to submerged object, projecting above water, dangerous. |
| BALTIC SEA. | | | |
| 3.1.24 | 60°35'N. | 18°25'E. | Lighter, apparently derelict. |
| 17.1.24 | 54°29'N. | 12°04'E. | Wreck of sunken sailing vessel, 2 masts projecting about 5 metres above water. |
| 23.1.24 | 56°45'N. | 10°27'E. | Submerged object in approximately 3½ fms. water. |
| NORTH ATLANTIC OCEAN. | | | |
| 2.1.24 | 48°11'N. | 34°52'W. | Conical shaped buoy with superstructure projecting about 5 ft. out of water. Painted red or was rusty. |
| 5.1.24 | 45°38'N. | 43°33'W. | Derelict schooner, dismasted, decks awash. |
| 5.1.24 | 35°54'N. | 74°53'W. | Spar, projecting about 6 ft. out of water, apparently attached to submerged wreckage. |
| 5.1.24 | 27°20'N. | 74°20'W. | Derelict vessel floating bottom up. |
| 8.1.24 | 32°35'N. | 75°48'W. | Submerged lifeboat. |
| 8.1.24 | 41°27'N. | 27°40'W. | Mast of sunken wreck, protruding about 20 ft. out of water. |
| 8.1.24 | 39°44'N. | 61°37'W. | Schooner <i>G. M. Comeau</i> (? <i>J. W. Comeau</i>) lumber-laden, abandoned and on fire. |
| 9.1.24 | 24°15'N. | 82°07'W. | Heavy upright spar, projecting about 5 ft. out of water. |
| 10.1.24 | 37°05'N. | 75°37'W. | Spar projecting 5 ft. out of water, apparently attached to submerged wreckage. |
| 11.1.24 | 37°50'N. | 70°45'W. | Wreckage, about 15 ft. long and 6 ft. wide, partly submerged. |
| 11.1.24 | 38°32'N. | 55°53'W. | Light and whistle buoy marked " <i>FP. 2</i> ." (Note.—This buoy broke adrift from its station at Frying Pan Shoals about the middle of November, 1923.) |
| 11.1.24 | 39°15'N. | 59°22'W. | Derelict schooner, dismasted, bottom up. Several charred spars attached projecting about 20 ft. above water. (Note this may refer to schooner <i>J. W. Comeau</i> , see report dated 8.1.24 above.) |
| 11.1.24 | 43°50'N. | 17°14'W. | Barque <i>Maguy</i> , abandoned, drifting about east (true) about 1 mile an hour. |
| 14.1.24 | 44°37'N. | 45°08'W. | Schooner <i>Annie M. Parker</i> derelict, dangerous. |
| 23.1.24 | 44°56'N. | 28°04'W. | Large spherical buoy, red, with skeleton superstructure. |
| GULF OF MEXICO. | | | |
| 10.1.24 | 29°03'N. | 92°15'W. | Gas buoy, with white flag on upper part of superstructure. |
| MEDITERRANEAN. | | | |
| 4.1.24 | 6 miles 190° from C. Caxine. | | Wreckage, partly submerged, dangerous. |
| NORTH PACIFIC OCEAN. | | | |
| 9.1.24 | 44°35'N. | 124°27'W. | Raft, about 20 ft. square. |

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LIST OF VOLUNTARY OBSERVING SHIPS.

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

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

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

Only in special cases will individual letters be sent.

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

Ships not contributing logs or reports within a reasonable period will automatically be removed from

the list and the free issue of the "Marine Observer" discontinued; it is, therefore, earnestly requested that changes of service, probable periods of lay up or transfer of Commanders may be notified whenever possible.

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

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

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.

| Name of Vessel. | Captain. | Observing Officers. | Official Meteorological Equipment. | Line. | Last Log, Register, or Report Contributed. | Date Received. |
|----------------------------|---|--|------------------------------------|--------------------------|---|------------------------|
| <i>Aba</i> ... | Hughes, J. | W. J. Dodd | No. | Elder Dempster | Form 911 15.11.23 to 21.12.23... | 29.12.23. |
| <i>Abaris</i> ... | Rippon, A. P. | R. C. Jones | " | L. Walford | " 11.8.23 to 21.8.23 ... | 24.8.23. |
| <i>Abinsi</i> ... | Wright, J. B. | H. Welton | " | Elder Dempster | " 7.3.23 to 14.4.23 ... | 23.4.23. |
| <i>Actor</i> ... | Haylett, E. | F. Medwell | " | Harrison | " 3.5.23 to 31.5.23 ... | 4.6.23. |
| <i>Adda</i> ... | Toft... | G. R. Langmaid | " | Elder Dempster | " ... | " |
| <i>Adriatic</i> ... | Beadnell, F. E., Commr., R.N.R. | A. E. Dyer, J. Collins, G. Howe, R. H. Shaw. | W.T. | White Star | { W.T. Reg. 12.11.23 to 1.12.23... Form 911 12.11.23 to 1.12.23... | 6.12.23. 5.12.23. |
| <i>Agapenor</i> ... | Ramsay, J. | P. S. Atkins | No. | A. Holt | " 17.12.23 to 26.12.23 | 7.1.24. |
| <i>Alban</i> ... | Whayman, W. R. | " | " | Booth | " 20.10.23 to 8.11.23... | 24.11.23. |
| <i>Albania</i> ... | Gibbons, G., R.D., Commr., R.N.R. | H. A. W. Waterhouse | " | Cunard | " 22.10.23 to 20.11.23 | 5.12.23. |
| <i>Aleppo</i> ... | Duncan, W. B. | H. B. Smith | " | Ellerman Wilson | " 28.4.23 to 30.6.23 ... | 5.7.23. |
| <i>Algerian Prince</i> ... | Rowlands, D. | R. C. Proctor | " | Prince | " 25.10.23 to 1.12.23... | 10.12.23. |
| <i>Alipore</i> ... | Gordon, L. M., R.D., Commr., R.N.R. | N. K. Stone | " | P. and O. | " 11.10.23 to 28.11.23 | 27.12.23. |
| <i>Almanzora</i> ... | Mackenzie, G. A. | H. Chamberlain | " | R.M.S.P. | " 11.8.23 to 27.9.23 ... | 6.10.23. |
| <i>Alondra</i> ... | Prendergast, J. J. | H. Martin | " | Yeoward | " 17.11.23 to 6.1.24 ... | 14.1.24. |
| <i>Ampetco</i> ... | Verstichelen, A. | R. Janssen | " | American Petroleum | " 3.12.23 to 15.12.23... | 27.12.23. |
| <i>Anglia</i> ... | Sorge, P. | W. H. Hughes | C.C. | L.M. & S. Rly. | Telegraphic Report 17.1.24 | 17.1.24. |
| <i>Antiochus</i> ... | Sprott, E. J. | J. J. Daniel | No. | A. Holt | Form 911 13.12.23 to 1.1.24 ... | 10.1.24. |
| <i>Appam</i> ... | Yardley, H. A. | B. Holt, W. H. Muirhead, E. Kingan. | M.L. | Elder Dempster | Met. Log. 9.8.23 to 5.1.24 ... | 10.1.24. |
| <i>Aquitania</i> ... | Charles, Sir J. T. W., K.B.E., C.B., R.D., Commodore, R.N.R. | J. L. Croasdaile, P. A. Morgan, A. T. Hamer. | W.T. | Cunard | { W.T. Reg. 27.11.23 to 13.12.23 " 19.12.23 to 10.1.24 | 19.12.23. 14.1.24. |
| <i>Arafura</i> ... | Gordon, A. S. | H. Jeans | No. | Eastern and Australian | Form 911 18.8.23 to 12.11.23... | 24.12.23. |
| <i>Araguaya</i> ... | Gillard, G. S. | H. M. Rennie | " | R.M.S.P. | " 9.9.23 to 28.9.23 ... | 3.10.23. |
| <i>Arana</i> ... | Moir, A. G. | R. Jones | " | " | " ... | " |
| <i>Armada Castle</i> ... | George, J., O.B.E. | L. G. May | " | Union Castle | Form 911 2.11.23 to 24.12.23... | 28.12.23. |
| <i>Arracan</i> ... | Willis, M. | R. MacInnes, H. E. Canner, W. Wilson, A. Olding. | M.L. | P. Henderson | Met. Log. 16.6.23 to 10.9.23 ... | 12.9.23. |
| <i>Arundel</i> ... | Short, H. | Mr. Hill | C.C. | Southern Rly. | Telegraphic Report 17.1.24 | 17.1.24. |
| <i>Arundel Castle</i> ... | Hague, J. W., Capt., R.N.R. | G. Blailhock, C. Williams, C. Keen. | M.L. | Union Castle | Met. Log. 3.8.23 to 2.12.23 ... | 14.12.23. |
| <i>Assyria</i> ... | Erskine, R. | J. Hamilton | No. | Anchor | Form 911 7.11.23 to 4.12.23 ... | 10.12.23. |
| <i>Astronomer</i> ... | Booth, W. M. | W. A. Hall, J. Jackson, W. Moore. | M.L. | Harrison | Met. Log. 25.7.23 to 18.10.23... | 16.11.23. |
| <i>Athenic</i> ... | Crosland, J. E., R.D., Lt.-Commr., R.N.R. | A. C. I. Anson | No. | White Star | Form 911 16.11.23 to 1.12.23... | 24.12.23. |
| <i>Atsuta Maru</i> ... | Segawa, N. | H. Kubota | " | Nippon Yusen Kaisha | " 13.10.23 to 29.10.23 | 7.12.23. |
| <i>Auldmuir</i> ... | Ramsay, J. D. | A. Kelso | " | Glen & Co. | " 27.10.23 to 6.12.23... | 17.12.23. |
| <i>Ausonia</i> ... | Brown, F. G., R. D., Capt., R.N.R. | " | " | Cunard | " ... | " |
| <i>Author</i> ... | Kinlock, R. | A. Goddard | " | Harrison | Form 911 29.8.23 to 7.10.23 ... | 12.10.23. |
| <i>Ballena</i> ... | Pape, E. R. | W. Webster | No. | P.S.N. Co. | " 19.9.23 to 11.10.23... | 15.10.23. |
| <i>Baltic</i> ... | Roberts, J., C.B.E., D.S.O., R.D., Capt., R.N.R. | E. S. Bell, A. E. Weller, G. D. R. Eales. | W.T. | White Star | { W.T. Reg. 26.11.23 to 15.12.23 Form 911 26.10.23 to 18.11.23 | 20.12.23. 22.11.23. |
| <i>Bambra</i> ... | Wyles, W. S. | H. W. Norris, F. Humble, J. E. Turner, P. Bolton. | M.L. | State Service, Australia | Met. Log. 8.6.23 to 14.10.23 ... | 11.12.23. |
| <i>Bampton Castle</i> ... | Swiney, W. A. | F. Norfolk, F. O. Wilbraham, G. W. Smith. | M.L. | Union Castle | Met. Log. 26.2.22 to 12.6.22 ... | 2.12.22. |
| <i>Banffshire</i> ... | Wynne, R. H. | " | No. | Turnbull Martin | Form 911 2.10.23 to 19.10.23... | 19.11.23. |
| <i>Barambah</i> ... | Mayne, W. | T. Swann | " | Commonwealth Govt. | " 4.8.23 to 5.9.23 | 16.10.23. |
| <i>Baron Caudor</i> ... | Baillie, T. | A. Campbell | " | Hogarth & Sons | " 23.10.23 to 2.12.23... | 1.1.24. |
| <i>Beaufort</i> ... | Knowles, C. H., D.S.O., Commr., R.N. | H. L. Wheeler | M.L. | His Majesty's Ship | Met. Log. 31.7.22 to 3.10.22 ... | 10.10.22. |
| <i>Belgenland</i> ... | Bradshaw, J. | " | M.L. | Red Star | " ... | " |
| <i>Benalder</i> ... | Cole, J. H., D.S.O. | A. K. Watson | No. | Ben Line | Form 911 6.9.23 to 6.10.23 ... | 24.10.23. |
| <i>Benedict</i> ... | Aspinall, W. | H. R. Mackay, K. S. Monro | " | Booth | " 17.6.23 to 13.8.23 ... | 27.8.23. |
| <i>Bengloe</i> ... | McCorquodale, A. | M. A. Gilmour | " | Ben Line | " 28.10.23 to 12.11.23 | 20.11.23. |
| <i>Berengaria</i> ... | Irvine, W. R. D., R.D. Capt., R.N.R. | J. A. Myles, G. Overton, E. R. Taylor, R. F. Bovey. | W.T. | Cunard | W T. Reg. 13.12.23 to 27.12.23 | 30.12.23. |

| Name of Vessel. | Captain. | Observing Officers. | Official Meteorological Equipment. | Line. | Last Log, Register, or Report Contributed. | Date Received. |
|---------------------------------------|--|---|------------------------------------|---|--|----------------|
| <i>Bernini</i> ... | Evans, W. ... | J. C. Dawson ... | No. | Lampert & Holt ... | Form 911 7.10.23 to 10.12.23... | 30.12.23. |
| <i>Berrima</i> ... | Hussey Cooper, E. M., R.D., Commr., R.N.R. | J. S. Wheeler ... | " | P. & O. Branch ... | " 21.11.23 to 5.12.23... | 28.12.23. |
| <i>Bolingbroke</i> ... | Landy, E., Sargent, A. H., Aikman, E., | R. Campbell, R. F. Walker, W. P. Hains. | M.L. | Canadian Pacific ... | Met. Log. 22.2.23 to 18.10.23... | 14.11.23. |
| <i>Borda</i> ... | Holland, R. ... | J. F. Wrigley ... | No. | P. & O. Branch ... | Form 911 ... | ... |
| <i>Borneo</i> ... | Morzer Bruyns, M. F. | C. Zimmerman ... | " | Nederland ... | 10.7.23 to 27.7.23 ... | 13.8.23. |
| <i>Bosworth</i> ... | McDonald, J. ... | J. Alexander ... | M.L. | Canadian Pacific ... | Met. Log. 19.5.23 to 8.8.23 ... | 29.8.23. |
| <i>Bothwell</i> ... | Freer, A. ... | K. Hutchings ... | No. | " ... | Form 911 23.5.23 to 7.6.23 ... | 11.6.23. |
| <i>Braemar Castle</i> ... | Whitfield, G. I. ... | C. G. Dann ... | " | Union Castle ... | " 6.9.23 to 23.9.23 ... | 24.10.23. |
| <i>Brandon</i> ... | Freer, A., R.D., Commr., R.N.R. | J. Mackenzie ... | " | Canadian Pacific ... | " 21.10.23 to 20.11.23 | 27.11.23. |
| <i>Brecon</i> ... | Griffiths, J. N. ... | " ... | M.L. | " ... | Met. Log. 9.5.23 to 29.7.23 ... | 27.8.23. |
| <i>Brighton</i> ... | Hill, A. ... | Mr. Munton ... | C.C. | Southern Railway ... | Telegraphic Report 15.1.24 ... | 15.1.24. |
| <i>British Engineer</i> ... | Piper, H. C. ... | A. Campbell ... | No. | British Tankers ... | Form 911 17.11.23 to 8.1.24 ... | 14.1.24. |
| <i>British Lantern</i> ... | Taylor, R. J. ... | C. O. Tucker ... | " | " ... | " 7.9.23 to 15.12.23 ... | 7.1.24. |
| <i>Browning</i> ... | Davies, G. W. ... | W. Simcox ... | " | Lampert & Holt ... | " 13.3.23 to 9.4.23 ... | 14.4.23. |
| <i>Bruyere</i> ... | Heasley, W. S. ... | W. S. Perry ... | " | " ... | " 4.9.23 to 19.11.23 ... | 23.11.23. |
| <i>Bulla</i> ... | Daniel, F. ... | " ... | " | Commonwealth Govt. | " 28.4.23 to 17.5.23 ... | 5.6.23. |
| <i>Calypso</i> ... | Brown, A. M. ... | A. Snowden, E. Ford, J. S. Landers. | M.L. | Ellerman's Wilson ... | Met. Log. 20.10.22 to 11.11.23 | 27.11.23. |
| <i>Cambria C.S.</i> ... | Wightman, H. G. E., D.S.C. | " ... | M.L. | Eastern Tel. Co. ... | " ... | ... |
| <i>Cambria</i> ... | " ... | V. S. Phillips ... | C.C. | L.M. & S. Rly. ... | Telegraphic Report 14.9.23 ... | 14.9.23. |
| <i>Camito</i> ... | Scudamore, J. H. H., D. S. C., R. D., Commr., R.N.R. | D. A. Jack, D. Hay, D. V. Smith, F. Gregg. | M.L. | Elders & Fyffes ... | Met. Log. 19.6.23 to 13.10.23... | 18.10.23. |
| <i>Canada</i> ... | Smith, R. S. ... | F. W. Laws ... | No. | White Star-Dominion Canadian Govt. Mer- chant Marine. | Form 911 3.12.23 to 22.12.23... | 24.12.23. |
| <i>Canadian Scottish</i> ... | Millar, W. H. ... | S. Fieldhouse ... | " | " ... | " 19.8.23 to 1.12.23 ... | 7.1.24. |
| <i>Canadian Skir- misher.</i> ... | Millar, W. H. ... | G. B. Price ... | " | " ... | " 28.5.23 to 5.8.23 ... | 5.9.23. |
| <i>Canadian Winner</i> ... | Wingate, W. ... | J. N. Downes ... | " | " ... | " 4.11.22 to 27.1.23 ... | 19.3.23. |
| <i>Carmania</i> ... | McNeill, S. G. S., R.D., Capt., R.N.R. | P. J. Robinson, J. S. Glendinning, H. R. Lane. | W.T. | Cunard ... | W.T. Reg. 25.10.23 to 18.11.23 | 20.11.23. |
| <i>Caronia</i> ... | Diggle, E. G., R.D., Capt., R.N.R. | J. H. Wood, R. Allen, G. H. Morris. | W.T. | Cunard ... | W.T. Reg. 7.10.23 to 27.10.23... | 30.10.23. |
| <i>Carpentaria</i> ... | Rowe, S. N. ... | " ... | M.L. | British India ... | Form 911 7.10.23 to 27.10.23... | 31.10.23. |
| <i>Cassandra</i> ... | Mitchell, W. E. ... | A. Murray ... | No. | Anchor Donaldson ... | Met. Log. 22.4.23 to 16.10.23... | 27.11.23. |
| <i>Cawdor Castle</i> ... | Purse, C. R. ... | J. A. Lowden, F. P. Wyeth, W. S. J. Aldous, C. B. Hoggan. | M.L. | Union Castle ... | Form 911 28.10.23 to 19.11.23 | 27.11.23. |
| <i>Cedric</i> ... | Metcalf, G. R., Lt.- Commr., R.N.R. | T. F. P. Pratt, W. Pearson, J. W. Peters. | W.T. | White Star ... | W.T. Reg. 10.12.23 to 29.12.23 } | 1.1.24. |
| <i>Celtic</i> ... | Greame, C. H., R.D., Commr., R.N.R. | R. S. Walker, O. V. Lucas, G. T. Kavanagh, H. J. Yates. | W.T. | " ... | Form 911 9.12.23 to 29.12.23 } | 11.12.23. |
| <i>Ceramic</i> ... | Summers, A. H. ... | H. A. Billiard ... | No. | " ... | W.T. Reg. 18.11.23 to 9.12.23... | 7.1.24. |
| <i>Changchow</i> ... | Byers, G. ... | Messrs. Hunter, Adkins and Wherby. | M.L. | China Nav. Co. ... | Form 911 17.12.23 to 5.1.24 ... | 12.12.23. |
| <i>Changsha</i> ... | Gambrell, F. C. ... | A. F. Walker, J. E. Mitchell ... | M.L. | Yuill & Co. ... | " 16.12.23 to 6.1.24 ... | 7.1.24. |
| <i>Chignecto</i> ... | Green, J. ... | E. Cox Walker ... | No. | R.M.S.P. Co. ... | Form 911 5.1.23 to 20.5.23 ... | 12.7.23. |
| <i>China</i> ... | King, A. M., D.S.C. | C. E. Cara, S. Waldron ... | " | P. & O. ... | " 28.9.23 to 9.11.23 ... | 27.12.23. |
| <i>Chindwara</i> ... | Jones ... | J. Walker, W. Wilson, A. McCallum. | M.L. | British India ... | " 16.12.23 to 4.1.24 ... | 7.1.24. |
| <i>Chindwin</i> ... | Esslemont, C. ... | " ... | " | P. Henderson ... | Met. Log. 18.7.23 to 15.9.23 ... | 11.10.23. |
| <i>City of Alexandria</i> ... | Bedford, G. B. ... | T. C. Higgins ... | No. | Ellerman ... | Met. Log. 22.9.23 to 6.12.23 ... | 12.12.23. |
| <i>City of Baroda</i> ... | Haddy, B. H. ... | A. V. Radcliffe, R. J. Witton, A. B. Carson. | M.L. | " ... | " 22.12.21 to 14.4.22... | 10.5.22. |
| <i>City of Batavia</i> ... | Spencer, H. ... | B. Moloney ... | No. | " ... | Form 911 27.8.23 to 18.11.23... | 18.12.23. |
| <i>City of Benares</i> ... | Macdonald, K., O.B.E. | A. A. Fullerton ... | " | " ... | Met. Log. 25.10.22 to 23.7.23... | 6.9.23. |
| <i>City of Brisbane</i> ... | Pine, R. ... | F. B. McLaren, R. H. Spear- man, W. Robinson. | " | " ... | " 5.1.23 to 20.5.23 ... | 12.7.23. |
| <i>City of Canterbury</i> ... | Bremner, D. M. ... | W. H. Matheson ... | " | " ... | Form 911 28.9.23 to 9.11.23 ... | 27.12.23. |
| <i>City of Chester</i> ... | Teague, R. E. ... | F. S. Honeyman, P. C. Wilson, M. G. Fraser. | M.L. | " ... | " 16.12.23 to 4.1.24 ... | 7.1.24. |
| <i>City of Dunkirk</i> ... | Seaborne, F. O. ... | W. Leadbeater ... | No. | " ... | " 18.7.23 to 15.9.23 ... | 11.10.23. |
| <i>City of London</i> ... | Martin, D. ... | C. Inglis ... | " | " ... | Met. Log. 22.9.23 to 6.12.23 ... | 12.12.23. |
| <i>City of Marseilles</i> ... | Henderson, R. C. ... | G. M. Womersley ... | " | " ... | " 21.9.23 to 3.10.23 ... | 8.10.23. |
| <i>City of Newcastle</i> ... | Oliver, R. E., D.S.C. | C. Paton ... | " | " ... | Met. Log. 3.8.23 to 29.10.23 ... | 31.10.23. |
| <i>City of Rangoon</i> ... | Williams, T. L. ... | W. Ibbotson, S. L. Hoare, T. A. Dexter. | M.L. | " ... | Form 911 21.9.23 to 4.10.23 ... | 17.10.23. |
| <i>City of Valencia</i> ... | Williamson, W. A. ... | A. R. Muir ... | No. | " ... | " 28.11.23 to 24.12.23 | 24.12.23. |
| <i>City of Yokohama</i> ... | Jinks, J. W. ... | J. C. McWhirter ... | " | " ... | " 31.10.23 to 19.12.23 | 24.12.23. |
| <i>Clan Buchanan</i> ... | George, L. S. ... | P. G. de Gruchy ... | " | Clan ... | " 26.9.23 to 22.10.23... | 31.10.23. |
| <i>Clan Lindsay</i> ... | Baker, C. W. ... | S. J. Shennan ... | " | " ... | Met. Log. 25.4.23 to 9.8.23 ... | 16.8.23. |
| <i>Clan Macgillivray</i> ... | Young, A. H. ... | A. Campbell ... | " | " ... | Form 911 2.7.23 to 7.8.23 ... | 14.8.23. |
| <i>Clan Macindoe</i> ... | Miller, W. ... | D. A. Stark ... | " | " ... | " 23.10.23 to 12.11.23 | 24.11.23. |
| <i>Clan Macinnes</i> ... | Mee, F. T. ... | A. Lynch, R. Dando ... | " | " ... | " 11.10.23 to 10.1.24... | 14.1.24. |
| <i>Clan Mackay</i> ... | Rayner East, H. ... | J. A. Forster, J. Steven, J. E. Gordon. | M.L. | " ... | " 31.10.23 to 9.12.23... | 14.12.23. |
| <i>Clan Mackellar</i> ... | Cowie, J. G. ... | S. F. Carter ... | No. | " ... | " 27.11.23 to 8.12.23... | 13.12.23. |
| <i>Clan Mackenzie</i> ... | Young, G. ... | W. G. Arthur, J. M. Lorimer | No. | " ... | " 6.9.23 to 29.11.23 ... | 7.12.23. |
| <i>Clan Mackinnon</i> ... | Thomson, W. ... | F. Elwell, W. S. Holden, T. Kay. | M.L. | " ... | Met. Log. 4.12.22 to 25.3.23 ... | 17.4.23. |
| <i>Clan McLaren</i> ... | Scott, G. ... | L. Copland ... | No. | " ... | Met. Log. 30.6.23 to 25.10.23... | 30.10.23. |
| <i>Clan Macnaughton</i> ... | Gray, J. N. ... | C. D. Worthington, F. B. Parke | " | " ... | Form 911 17.11.23 to 13.12.23 | 24.12.23. |
| <i>Clan Macphee</i> ... | Gourlay J. B. ... | P. H. Aydon, J. H. Mellor, J. Macdougall. | M.L. | " ... | Met. Log. 6.4.23 to 4.8.23 ... | 17.8.23. |
| <i>Clan Macvicar</i> ... | Phillips, G. P. ... | J. O. Woodall ... | No. | " ... | Form 911 21.1.23 to 15.2.23 ... | 13.3.23. |
| <i>Clan Malcolm</i> ... | Higgins, C. J. ... | T. G. Young, A. Cameron ... | M.L. | " ... | " 12.6.23 to 7.9.23 ... | 11.9.23. |
| <i>Clan Morrison</i> ... | Porterfield, W. M. ... | D. A. Evans ... | No. | " ... | Met. Log. 26.5.23 to 21.11.23... | 17.1.24. |
| <i>Clan Murdoch</i> ... | Pagan, Q. C. ... | R. E. Owen ... | " | " ... | Form 911 28.11.23 to 30.12.23 | 2.1.24. |
| <i>Clan Ranald</i> ... | Henderson, C. W. ... | S. J. Green ... | " | " ... | Met. Log. 5.8.23 to 10.11.23 | 14.11.23. |
| <i>Clan Ross</i> ... | Christian, W. G. M. ... | P. M. Werrey Easterbrook ... | " | " ... | Form 911 31.10.23 to 9.12.23... | 14.12.23. |
| <i>Clan Sinclair</i> ... | Neill, G. A. ... | J. L. A. Hogg ... | " | " ... | " 27.11.23 to 8.12.23... | 13.12.23. |
| <i>Clan Urquhart</i> ... | Sharpland, C. C. ... | R. M. MacDonald ... | " | " ... | " 6.9.23 to 29.11.23 ... | 7.12.23. |

LIST OF VOLUNTARY OBSERVING SHIPS

iii

| Name of Vessel. | Captain. | Observing Officers. | Official Meteorological Equipment. | Line. | Last Log, Register, or Report Contributed. | Date Received. |
|---------------------------------|---|--|------------------------------------|--|---|----------------|
| <i>Colonia, C.S.</i> ... | Campos, V., O.B.E., Lt.-Commr. R.N.R. | S. A. Garnham, A. S. Muir, W. E. Allen, S. Hall. | M.L. | Telegraph Construction & Maintenance. | Met. Log. 27.10.23 to 22.11.23 | 26.11.23. |
| <i>Colonial</i> ... | Barrow, R. K. ... | A. V. Jones ... | No. | Harrison ... | Form 911 15.9.23 to 29.11.23... | 20.12.23. |
| <i>Colonian</i> ... | Gittins, R. P. ... | J. Crangle ... | " | Leyland ... | " 10.10.23 to 20.10.23 | 25.10.23. |
| <i>Columbia</i> ... | Gemmell, W. ... | T. C. Watson ... | " | Anchor ... | " 8.12.23 to 30.12.23... | 2.1.24. |
| <i>Comino</i> ... | Nuttall, E. L. ... | A. McVicar ... | " | Furness Withy | " 6.9.23 to 16.10.23 ... | 30.10.23. |
| <i>Cooee</i> ... | Festa, M. ... | C. Keen, D. C. Rees ... | " | Commonwealth Govt. | " 29.6.23 to 16.8.23 ... | 8.10.23. |
| <i>Copenhagen</i> ... | Kerr, J. J. ... | W. G. Rees ... | " | Glen & Co. ... | " 27.4.23 to 6.6.23 ... | 23.7.23. |
| <i>Corinthia</i> ... | Hart, F. ... | W. T. Fitzgerald, M. Bennett, F. G. Rogers. | M.L. | White Star | Met. Log. 26.1.23 to 15.5.23 ... | 22.5.23. |
| <i>Cornish City</i> ... | Bowen, T. S. ... | G. S. Dawes ... | No. | Reardon Smith | Form 911 16.11.23 to 21.12.23 | 7.1.24. |
| <i>Cornwall</i> ... | Robertson, H. W. ... | R. Wilkins ... | " | Dowie, J., & Co. ... | " 21.8.23 to 10.9.23 ... | 18.9.23. |
| <i>Cyclops</i> ... | Cosker, W. ... | E. W. Jones ... | " | A. Holt ... | " 21.7.23 to 9.8.23 ... | 23.8.23. |
| <i>Dardanus</i> ... | Shaw, A. T. ... | A. Morton ... | No. | A. Holt ... | Form 911 7.11.23 to 22.11.23 ... | 18.12.23. |
| <i>Darian</i> ... | Masters, W. ... | J. L. McLaren ... | " | Leyland ... | " 8.12.23 to 19.12.23 | 30.12.23. |
| <i>Darro</i> ... | Smith, W. E., D.S.O., R.D., Capt., R.N.R. | E. H. Giller ... | " | R.M.S.P. Co. ... | " 17.11.23 to 13.1.24... | 17.1.24. |
| <i>Daytonian</i> ... | Walker, C. J., D.S.C. | W. T. Godwin ... | " | Leyland ... | " 18.10.23 to 24.11.23 | 5.12.23. |
| <i>Delta</i> ... | Brooks, C., D.S.O. R.D., Commr., R.N.R. | J. O. V. Young ... | " | P. & O. ... | " 6.10.23 to 14.12.23... | 24.12.23. |
| <i>Demerara</i> ... | Hill, T. A. ... | H. J. Holland ... | " | R.M.S.P. Co. ... | " 9.11.23 to 15.12.23... | 17.12.23. |
| <i>Demosthenes</i> ... | Williams, ... | R. Woodgates ... | " | Aberdeen ... | " 21.8.23 to 10.9.23 ... | 18.9.23. |
| <i>Deseado</i> ... | Wakeman, E. C. ... | T. Powell, F. Collinson | " | R.M.S.P. Co. ... | Form 911 28.9.23 to 17.11.23 ... | 23.11.23. |
| <i>Desna</i> ... | Adam, C., R.D., Commr., R.N.R. | H. D. Jackman ... | " | " | " 6.10.23 to 1.12.23 ... | 10.12.23. |
| <i>Deucalion</i> ... | Batt, A. E. ... | W. G. Smith ... | " | A. Holt ... | " 12.11.23 to 29.11.23 | 17.1.24. |
| <i>Devon</i> ... | Gardner, H. W. ... | Mr. Parsons ... | C.C. | New Zealand S.S. Co. | " 23.8.23 to 13.10.23... | 19.10.23. |
| <i>Dieppe</i> ... | Marmery, S. ... | J. Pascoe, J. W. Murphy, W. P. Paterson. | M.L. | Southern Railway | Telegraphic Report. 18.1.24 | 18.1.24. |
| <i>Digby</i> ... | Chambers, F. W., D.S.C. | L. Jones ... | No. | Furness Withy | Met. Log. 29.3.23 to 22.9.23 ... | 3.10.23. |
| <i>Director</i> ... | Watson, R. ... | J. Stanhope ... | " | Harrison ... | Form 911 31.1.23 to 13.3.23 ... | 21.3.23. |
| <i>Discoverer</i> ... | Sawyer, E. I. ... | H. Hardwick ... | " | Asiatic S.N. Co. | " 8.4.23 to 29.5.23 ... | 8.6.23. |
| <i>Dogra</i> ... | Bland, S. ... | C. E. Merchant ... | " | British India | " 6.9.23 to 1.12.23 ... | 27.12.23. |
| <i>Domala, M.V.</i> ... | Whittingham, W. E. | A. Thompson ... | " | White Star | Form 911 25.11.23 to 16.12.23 | 24.12.23. |
| <i>Doric</i> ... | Davies, J. ... | H. Tulloch ... | " | Haldin & Co. ... | " 23.5.23 to 12.6.23 ... | 19.6.23. |
| <i>Dorington Court</i> ... | Barcham, H. C. ... | R. W. Roberts ... | " | Harrison ... | " 2.10.23 to 2.11.23 ... | 8.11.23. |
| <i>Dramatist</i> ... | Gibblings, W. H. ... | R. May ... | " | Union Castle | " 13.7.23 to 15.8.23 ... | 20.8.23. |
| <i>Dromore Castle</i> ... | Harvey, H. B. ... | B. M. Morris, Jenkins | " | Pacific S.N. Co. | " 16.11.23 to 1.12.23... | 24.12.23. |
| <i>Duendes</i> ... | Pape, E. R. ... | C. Lockwood, R. Martin, D. Thornton. | " | Furness Withy | " 7.10.23 to 8.12.23 ... | 17.12.23. |
| <i>Duquesa</i> ... | Jarvis, G. ... | C. McFarlane ... | " | British India | " | " |
| <i>Durenda</i> ... | Wilson, W. ... | J. W. Kavanagh, F. R. Miller, H. H. Litchfield. | M.L. | Eastern and Australian | Met. Log. 14.2.23 to 16.8.23 ... | 8.10.23. |
| <i>Eastern</i> ... | Laing, J. D. ... | — Perkins ... | M.L. | Union Castle | " 13.7.23 to 13.11.23... | 21.11.23. |
| <i>Edinburgh Castle</i> ... | { Culverwell, J. N., Strong, H., R.D., Commr., R.N.R. | G. W. Yonwen ... | No. | Holland Lloyd | Form 911 26.8.23 to 18.11.23... | 11.12.23. |
| <i>Eemland</i> ... | Van Noppen, C. D. | K. Redmore ... | " | Elder Dempster | " 25.11.23 to 10.12.23 | 12.12.23. |
| <i>Egori</i> ... | McDowall, J. ... | W. Myerscough ... | " | British & Argentine S.N. Co. | " 5.3.23 to 26.3.23 ... | 8.5.23. |
| <i>El Cordobes</i> ... | Noton, F. G. ... | J. Kelsey, W. Q. McKeown, H. Millson, R. A. Kenyon, J. L. Hughes. | M.L. | Elder Dempster | Met. Log. 4.1.23 to 2.5.23 ... | 7.6.23. |
| <i>Elmina</i> ... | Ellis, F. ... | E. B. Sergeant ... | No. | Houlder Bros. ... | Form 911 14.10.23 to 11.12.23 | 17.12.23. |
| <i>El Paraguay</i> ... | Evans, T. R. ... | D. L. Evans, C. Houghton, D. Johnstone, C. Mock. | M.L. | A. Holt ... | Met. Log. 12.8.23 to 26.11.23... | 1.12.23. |
| <i>Elpenor</i> ... | Evans, D. L. ... | A. Grant ... | No. | Anchor ... | Form 911 17.11.23 to 7.12.23... | 1.1.24. |
| <i>Elysia</i> ... | Kinnaird, J. ... | F. C. Stratford, R. Jackson, W. T. Kinley, R. J. Hickey. | M.L. | Canadian Pacific | Met. Log. 19.4.23 to 22.9.23 ... | 29.10.23. |
| <i>Empress of Asia</i> ... | Douglas, L. D., R.D., Lt. Commr., R.N.R. | Robinson, S., C.B.E., R.D., Commr., R.N.R. | M.L. | " | " 24.11.22 to 23.5.23... | 26.6.23. |
| <i>Empress of Australia</i> ... | Latta, R. G. ... | S. C. Fox, J. B. Marriott, O. F. Pennington. | W.T. | " | W.T. Reg. 18.10.23 to 2.11.23 } Form 911 | 6.11.23. |
| <i>Empress of Britain</i> ... | Hailey, A. J. ... | " | M.L. | " | Met. Log. 29.6.23 to 6.12.23 ... | 8.1.24. |
| <i>Empress of Canada</i> ... | Robinson, S., C.B.E., R.D., Commr., R.N.R. | R. V. Everett, A. S. Phillips, B. Grant. | M.L. | " | " 13.6.23 to 17.11.23... | 21.11.23. |
| <i>Empress of France</i> ... | Griffiths, E. ... | I. H. Blythe, A. B. Smith, J. D. Vosper, J. B. Napier, C. S. Morris. | M.L. | " | " 22.3.23 to 2.7.23 ... | 30.7.23. |
| <i>Empress of Russia</i> ... | Hosken, A. J. ... | Geary Hill, S. A., D.S.O., Commr., R.N. | M.L. | His Majesty's Ship | " 3.7.22 to 8.6.23 ... | 18.6.23. |
| <i>Endeavour</i> ... | { Nares, J. D., D.S.O., Capt., R.N. | C. S. Humphries ... | No. | R.M.S.P. Co. ... | Form 911 14.10.23 to 29.11.23 | 17.12.23. |
| <i>Essequibo</i> ... | Pearce, A. W. ... | D. L. Hoare ... | M.L. | A. Holt ... | Met. Log. 22.9.23 to 6.11.23 ... | 17.12.23. |
| <i>Eumaerus</i> ... | Read, J. W. ... | H. S. Cox, A. R. Payne, F. Fuller. | M.L. | Aberdeen ... | Met. Log. 25.8.23 to 12.12.23... | 27.12.23. |
| <i>Euripides</i> ... | Collins, P. J., O.B.E. | W. H. Michie ... | No. | A. Holt ... | Form 911 14.7.23 to 31.7.23 ... | 21.8.23. |
| <i>Eurybates</i> ... | Lloyd, R. ... | Scientific Staff ... | M.L. | Scottish Fishery Board | Met. Log. 9.4.23 to 30.11.23 ... | 8.1.24. |
| <i>Explorer</i> ... | Lamont, A. ... | A. B. Thompson ... | No. | Red Star ... | Form 911 3.3.23 to 11.3.23 ... | 19.3.23. |
| <i>Finland</i> ... | Newman, C. ... | C. W. Sabine ... | M.L. | His Majesty's Ship | Met. Log. 25.7.23 to 1.11.23 ... | 10.11.23. |
| <i>Fitzroy</i> ... | Woodhouse, A. F. B., Lt.-Commr., R.N. | H. D. Sicherer ... | No. | Holland Lloyd | Form 911 6.11.23 to 19.12.23... | 24.12.23. |
| <i>Flandria</i> ... | Veldkamp, G. J. ... | A. B. Fouleston ... | M.L. | His Majesty's Ship | Met. Log. 25.7.23 to 1.11.23 ... | 10.11.23. |
| <i>Flinders</i> ... | Henderson, D. A., Lt.-Commr., R.N. | J. A. Vickers ... | No. | Ellerman Wilson | Form 911 18.10.23 to 30.11.23 | 5.12.23. |
| <i>Francisco</i> ... | Wilkins, J., O.B.E. | H. J. Prout ... | M.L. | Royal Fleet Auxiliary | " 20.6.23 to 15.9.23 ... | 27.11.23. |
| <i>Francol</i> ... | Gatley, E. ... | J. W. Allingham, T. Chern- side, G. E. Thomas. | M.L. | India Office Shipping | Met. Log. 2.9.23 to 10.12.23 ... | 18.12.23. |
| <i>Frankenfels</i> ... | Gardiner, J. ... | C. F. Bennett ... | No. | White Star | Form 911 7.8.23 to 6.9.23 ... | 11.9.23. |
| <i>Freienfels</i> ... | Cleugh, J. W. ... | H. C. Rugg ... | " | " | " 7.11.23 to 9.12.23 ... | 14.12.23. |
| <i>Gallic</i> ... | Summers, F. F., R.D., Commr. R.N.R. | D. Wilson ... | " | Furness Withy | " 21.11.23 to 5.12.23... | 11.12.23. |
| <i>Galtymore</i> ... | Ledsome, J. S. ... | " | " | " | " | " |

| Name of Vessel. | Captain. | Observing Officers. | Official Meteorological Equipment. | Line. | Last Log Register, or Report Contributed. | Date Received. |
|-------------------------------------|---|---|------------------------------------|-----------------------------------|---|----------------|
| <i>Garret</i> ... | Visser, C. W. ... | ... | No. | Rotterdam Lloyd ... | Form 911 16.9.23 to 3.10.23 ... | 23.10.23. |
| <i>Garthgarry, Ship</i> ... | Roberts, D. ... | W. Wylie, J. Pearce, H. Bento | M.L. | Marine Nav. Co. ... | Met. Log. 15.7.22 to 27.7.23 ... | 4.10.23. |
| <i>Gascoyne</i> ... | Mills, A. ... | J. F. Donaldson ... | No. | Dalgaty & Co. ... | Form 911 4.10.23 to 14.11.23... | 30.12.23. |
| <i>Gelria</i> ... | Kolkman, J. M. ... | ... | " | Holland Lloyd ... | " 23.11.23 to 2.1.24 ... | 14.1.24. |
| <i>Gladiator</i> ... | Ruffell, — ... | ... | " | Harrison ... | ... | ... |
| <i>Glenamoy, M.V.</i> ... | Angier, J. ... | L. C. Riggs ... | " | Glen Line ... | Form 911 3.10.23 to 5.11.23 ... | 24.12.23. |
| <i>Glenapp, M.V.</i> ... | Griffiths, J. E. ... | F. Poate ... | " | " ... | " 10.10.23 to 3.11.23... | 5.12.23. |
| <i>Glenluce, M.V.</i> ... | Kennett, W. H. ... | A. Hodd ... | " | " ... | " 12.9.23 to 10.12.23... | 14.12.23. |
| <i>Gloucestershire</i> ... | Robin, E. ... | T. E. Field ... | " | Bibby ... | " 1.9.23 to 11.11.23 ... | 14.11.23. |
| <i>Gorala</i> ... | D'Cruz, A. B. ... | A. R. H. Barton ... | " | British India ... | " 2.11.23 to 13.11.23... | 27.12.23. |
| <i>Gorgon</i> ... | Hughes, J. W. ... | J. E. Cooper ... | " | Dalgaty & Co. ... | " 24.9.23 to 5.11.23 ... | 17.12.23. |
| <i>Governor Musgrave</i> ... | Coastad, C. ... | C. B. Odman, E. W. Hughes | " | Commonwealth Light-house Service. | " 20.7.23 to 11.10.23... | 5.12.23. |
| <i>Graciana</i> ... | Yeoman, J. T. ... | P. Hays, M. C. Turner ... | M.L. | Furness Withy ... | Met. Log. 23.3.22 to 29.9.22 ... | 25.10.22. |
| <i>Griqua</i> ... | Clark, J. ... | A. Rearch ... | No. | Ellerman Bucknall ... | Form 911 23.12.22 to 3.2.23 ... | 14.2.23. |
| <i>Haliartus</i> ... | Marsh, L. V. ... | W. H. Upton ... | No. | R. P. Houston ... | " 16.8.23 to 3.10.23 ... | 20.11.23. |
| <i>Harmonides</i> ... | Hughes, W. J. ... | R. P. Davies ... | " | " ... | " 21.10.23 to 15.11.23 ... | 12.12.23. |
| <i>Harmony, Auxy.</i> ... | Jackson, J. C. ... | A. W. Bush ... | " | Moravian Mission ... | " 15.11.23 to 3.12.23... | 19.12.23. |
| <i>Hatarana</i> ... | Cutbush, H. M. ... | J. L. Durkee, F. Wells, E. B. Heath. | M.L. | British India ... | Met. Log. 28.4.23 to 25.7.23 ... | 8.8.23. |
| <i>Hauraki, M.V.</i> ... | Showman, A. C. ... | D. McLeish ... | No. | Union S.S. Co., N.Z. ... | Form 911 30.9.23 to 21.11.23... | 5.12.23. |
| <i>Hazel Branch</i> ... | Barnet, P. K. ... | R. S. Young ... | " | Nautilus ... | " 16.3.23 to 18.6.23 ... | 23.6.23. |
| <i>Henry Holmes, C.S.</i> ... | Bicker-Caarten, A. ... | R. Rudd. ... | " | W. I. & Panama Telegraph Co. | " 30.10.23 to 24.11.23 | 21.12.23. |
| <i>Herald</i> ... | Harvey, J. R., Commr., R.N. | ... | M.L. | His Majesty's Ship ... | ... | ... |
| <i>Herefordshire</i> ... | Stanley, W. ... | P. Hawkins, P. Flood, B. Beesley, M. Simmons, G. Whitworth, P. S. Cooper, H. Moore. | " | Bibby ... | Met. Log. 3.2.23 to 22.7.23 ... | 11.8.23. |
| <i>Herschel</i> ... | Carey, W. J. ... | S. C. Smith ... | No. | Lampert & Holt ... | Form 911 15.9.23 to 22.11.23... | 28.11.23. |
| <i>Hibernia</i> ... | Tanner ... | R. Woodall ... | C.C. | L.M. & S. Rly. ... | Telegraphic Report. 11.1.24 ... | 11.1.24. |
| <i>Highland Enterprise</i> ... | Pond, R. H. ... | ... | No. | Nelson ... | Form 911 23.6.23 to 13.7.23 ... | 27.7.23. |
| <i>" Glen</i> ... | Jones, T. J. ... | F. Abbott ... | " | " ... | Met. Log. 23.12.22 to 22.3.23... | 28.3.23. |
| <i>" Heather</i> ... | Powell, G. A. ... | G. Watson, R. Sinclair Davies, J. C. Morton. | M.L. | " ... | Form 911 29.4.23 to 14.6.23 ... | 3.7.23. |
| <i>" Laddie</i> ... | Alford, C. ... | A. H. Barnes ... | No. | " ... | " ... | ... |
| <i>" Laird</i> ... | Davis, G. O. ... | A. S. Jones, J. S. Collins, J. H. Cables. | M.L. | " ... | Met. Log. 1.9.23 to 14.1.24 ... | 16.1.24. |
| <i>" Piper</i> ... | Collings, D. ... | H. McKinnon, H. Devlin, R. R. Soanes. | " | " ... | " 16.8.23 to 1.1.24 ... | 9.1.24. |
| <i>" Pride</i> ... | Robinson, R. H. ... | W. Watson, S. G. King, F. Abbott. | " | " ... | " 14.6.23 to 7.11.23 ... | 16.11.23. |
| <i>" Rover</i> ... | Ashby Graves, F. ... | H. W. Bennett ... | No. | " ... | Form 911 17.10.23 to 14.12.23 | 17.12.23. |
| <i>" Warrior</i> ... | Brooke, W. ... | G. Ronguie, J. E. Williams, E. Baillie. | M.L. | Commonwealth Govt. | Met. Log. 28.7.23 to 2.11.23 ... | 19.11.23. |
| <i>Hobsons Bay</i> ... | Ogilvie, F. J. ... | G. P. Kitto ... | No. | Lampert & Holt ... | Form 911 25.11.23 to 15.12.23 | 24.12.23. |
| <i>Holbein</i> ... | Symons, P. ... | W. Hill, F. Patchett ... | W.T. | White Star ... | W.T. Reg. 27.9.23 to 13.10.23 } | 16.10.23. |
| <i>Homerie</i> ... | Howarth, F. B., Commr., R.N.R. | W. E. McMullen ... | " | Pacific S.N. Co. ... | Form 911 28.3.23 to 5.9.23 ... | 12.9.23. |
| <i>Huanchaco</i> ... | Jenkins, J. H. ... | C. C. Beal ... | " | Booth ... | " 5.7.23 to 15.7.23 ... | 14.8.23. |
| <i>Hubert</i> ... | Evans, T. G. ... | A. Smith, S. Bryant, J. Carpenter. | M.L. | New Zealand S.S. Co. | Met. Log. 2.2.23 to 22.6.23 ... | 6.7.23. |
| <i>Hurunui</i> ... | Burton Davies, J. ... | ... | ... | ... | ... | ... |
| <i>Ibex</i> ... | Langdon, C. ... | ... | C.C. | G.W. Railway ... | Telegraphic Report. 15.1.24 ... | 15.1.24. |
| <i>Ikala</i> ... | Meetham, J. T. ... | E. Lightfoot ... | No. | Welsford, J. H. ... | Form 911 9.6.23 to 19.6.23 ... | 26.7.23. |
| <i>Ionic Star</i> ... | Wilson, G. ... | J. Sinclair ... | " | Blue Star ... | " 17.1.23 to 19.3.23 ... | 22.3.23. |
| <i>Iroquois</i> ... | Tinson, C. W., O.B.E., Commr., R.N. | R. H. Lucy, C. R. Brent, G. A. R. J. Leslie, E. E. Addis. | M.L. | His Majesty's Ship ... | Met. Log. 1.8.23 to 28.11.23 ... | 10.1.24. |
| <i>Ixion</i> ... | Baetens, F. ... | A. K. Sanderson ... | No. | A. Holt ... | Form 911 28.9.23 to 15.11.23... | 20.11.23. |
| <i>John Pender, C.S.</i> ... | Smythe, T. W., O.B.E. | B. C. Farrow ... | No. | Eastern Tel. Co. ... | " 26.11.23 to 11.12.23 | 17.12.23. |
| <i>Junin</i> ... | Benson, C. W. ... | R. D. Eckford ... | " | Pacific S.N. Co. ... | " 22.11.23 to 30.12.23 | 4.1.24. |
| <i>Kaikoura</i> ... | Downton, M. ... | H. Emmett, C. Pilcher, N. Anderson, J. Hopkins. | M.L. | New Zealand S.S. Co. | Met. Log. 19.6.22 to 23.6.23 ... | 26.6.23. |
| <i>Kaisar-i-Hind</i> ... | Manley, G. ... | R. K. Lowry ... | No. | P. & O. ... | Form 911 9.8.23 to 9.9.23 ... | 1.10.23. |
| <i>Kamo Maru</i> ... | Okano, Y. ... | S. Matsumura ... | " | Nippon Yusen Kaisha | " 29.11.23 to 2.1.24 ... | 8.1.24. |
| <i>Kangaroo</i> ... | Norris, H. C. ... | G. Buckeridge, R. J. Sinclair, F. Humble. | M.L. | State Service Australia | Met. Log. 4.6.23 to 1.11.23 ... | 20.12.23. |
| <i>Karroo</i> ... | Robinson, T. ... | S. J. Nash ... | No. | Ellerman Bucknall ... | Form 911 30.6.23 to 11.7.23 ... | 27.7.23. |
| <i>Kashima Maru</i> ... | Shinomiya, A. ... | J. G. Tsukada ... | " | Nippon Yusen Kaisha | " 13.10.23 to 18.11.23 | 14.1.24. |
| <i>Kashmir</i> ... | Bartlett, E. B., O.B.E. | F. Hopkins, J. Price ... | " | P. & O. ... | " 1.12.23 to 5.1.24 ... | 16.1.24. |
| <i>Kellett</i> ... | Haselfoot, F. E. B., D.S.O., Commr., R.N. | E. H. B. Baker, W. C. Jenks | M.L. | His Majesty's Ship ... | Met. Log. 28.10.23 to 15.11.23 | 5.12.23. |
| <i>Khiva</i> ... | Redhead, C. M., D.S.O., R.D., Capt., R.N.R. | J. D. Strike, J. Maxwell, L. Fraser. | M.L. | P. & O. ... | " 25.5.23 to 17.9.23 ... | 4.10.23. |
| <i>Khyber</i> ... | Pinckney, L. D., O.B.E. | J. B. Livingstone ... | No. | " ... | " 8.11.23 to 23.12.23 | 29.12.23. |
| <i>Kia Ora</i> ... | Thurston, H. P. ... | P. W. Kime ... | " | Shaw Savill & Albion | " 13.10.23 to 2.11.23... | 13.11.23. |
| <i>Kinderdijk</i> ... | Herbschleb, G. C. ... | A. H. Van der Vliet ... | " | Holland America ... | " 10.10.22 to 12.1.23... | 6.2.23. |
| <i>Kitano Maru</i> ... | Kamada, N. ... | G. Chilara ... | " | Nippon Yusen Kaisha | " 14.11.23 to 8.12.23... | 19.12.23. |
| <i>Knight Companion</i> ... | Beale, H. E. ... | E. H. Powell ... | " | A. Holt ... | " 29.9.23 to 11.10.23... | 16.10.23. |
| <i>Kovno</i> ... | Casson, D. H., R.D., Commr., R.N.R. | E. R. Massam, G. H. Duncan, L. Griffiths | M.L. | Ellerman Wilson ... | Met. Log. 5.5.23 to 27.11.23 ... | 3.12.23. |
| <i>Kurmark</i> ... | Cartmer, G. E., O.B.E. | J. R. Laurenson S. E. Clowser, C. H. Porter. | M.L. | Graham & Co. ... | " 27.6.23 to 28.11.23... | 3.12.23. |
| <i>Lady Brenda</i> ... | Young, W. J. ... | B. L. Brind ... | No. | Dawson ... | Form 911 25.9.23 to 4.10.23 ... | 13.10.23. |
| <i>Lady Denison Pender C.S.</i> ... | ... | ... | " | Eastern Tel. Co. ... | ... | ... |
| <i>Laguna</i> ... | Pleignier, H. T. S. ... | F. W. Parker ... | " | Pacific S.N. Co. ... | Form 911 15.10.23 to 4.11.23... | 8.11.23. |
| <i>Lalande</i> ... | Bambra, W. A. ... | N. Webster ... | " | Lampert & Holt ... | " 1.11.23 to 4.12.23 ... | 16.1.24. |
| <i>Lancashire</i> ... | Beckett, F. W. ... | T. L. Owen ... | " | Bibby ... | " 29.9.23 to 6.12.23 ... | 17.12.23. |

V

| Name of Vessel. | Captain. | Observing Officers. | Official Meteorological Equipment. | Line. | Last Log, Register, or Report Contributed. | Date Received. |
|--------------------------------|--|---|------------------------------------|-----------------------------|--|----------------|
| <i>Laomedon</i> ... | Smith, A. ... | A. S. Barclay ... | No. | A. Holt ... | Form 911 19.9.23 to 8.10.23 ... | 30.10.23. |
| <i>La Paz</i> , M.V. ... | Ross, J. ... | R. Collister ... | No. | Pacific S.N. Co. ... | 11.11.23 to 3.12.23 ... | 10.12.23. |
| <i>Laplace</i> ... | Davies, G. W. ... | A. Hughes I. O. Jones ... | No. | Lampport & Holt ... | 5.10.23 to 24.10.23 ... | 2.11.23. |
| <i>Lapland</i> ... | Howell, T. ... | B. T. Harris, H. H. Grace, J. M. Appleby. ... | W.T. | Red Star ... | 5.10.23 to 24.10.23 ... | 27.11.23. |
| <i>Lassell</i> , M.V. ... | Turner, J. E. ... | A. T. Crilly ... | No. | Lampport & Holt ... | 5.8.23 to 24.10.23 ... | 27.11.23. |
| <i>Leicestershire</i> ... | De Legh, P. ... | R. Cuming ... | M.L. | Bibby ... | 2.10.23 to 12.10.23 ... | 18.10.23. |
| <i>Leitrim</i> ... | Robertson, A. ... | H. C. Roberts ... | No. | Dowie, J., & Co. ... | 16.8.23 to 5.9.23 ... | 24.10.23. |
| <i>Levant</i> C.S. ... | West, G. W. ... | ... .. | No. | Eastern Tel. Co. ... | 26.11.23 to 16.12.23 ... | 30.12.23. |
| <i>Lexington</i> ... | Adams, S. E. ... | Coverdale, Meyrick, W. Corlett. ... | M.L. | Furness Withy ... | Met. Log. 14.9.22 to 5.12.23 ... | 17.12.23. |
| <i>Ling Nam</i> ... | Westgarth, W. A. ... | ... .. | No. | Chunghwa Nav. Co. ... | ... .. | ... .. |
| <i>Llanstephan Castle</i> ... | Wilford, T. H. ... | ... .. | No. | Union Castle ... | Form 911 15.10.23 to 14.12.23 ... | 17.12.23. |
| <i>Loch Katrine</i> , M.V. ... | Matthews, G. P. ... | P. Cooper ... | No. | R.M.S.P. Co. ... | 4.2.23 to 3.3.23 ... | 8.3.23. |
| <i>London Commerce</i> ... | ... .. | E. A. Bennett ... | No. | Furness Withy ... | ... .. | ... .. |
| <i>Loreto</i> , M.V. ... | Splatt, W. A. ... | F. Binnion ... | No. | Pacific S.N. Co. ... | Form 911 9.9.23 to 7.1.24 ... | 14.1.24. |
| <i>Losada</i> M.V. ... | Barkley, E. ... | A. H. Turner ... | No. | " " | " 13.10.23 to 31.10.23 ... | 26.11.23. |
| <i>Macedonia</i> ... | Potter, H. W., R.D. Commr. R.N.R. ... | G. Readman ... | No. | P. & O. ... | ... .. | ... .. |
| <i>Macharda</i> ... | Tyers, W. O. ... | W. Moore ... | No. | Brocklebank ... | Form 911 4.8.23 to 27.10.23 ... | 31.10.23. |
| <i>Mahana</i> ... | Kershaw, W. A. R. ... | F. M. Smith ... | No. | Shaw Savill & Albion ... | 9.11.23 to 21.12.23 ... | 11.1.24. |
| <i>Maharaja</i> ... | Hartock, L. ... | ... .. | No. | Asiatic S.N. Co. ... | 23.9.23 to 29.10.23 ... | 17.12.23. |
| <i>Mahopac</i> ... | Puttick, J. ... | F. J. Mumery ... | No. | Atlantic Transport ... | 23.4.23 to 3.8.23 ... | 27.8.23. |
| <i>Mavhar</i> ... | Rowe, J. P. ... | C. Straw, L. Robertson, H. F. Scoins ... | M.L. | Brocklebank ... | Met. Log. 14.4.23 to 18.7.23 ... | 24.8.23. |
| <i>Maimyo</i> ... | Hamilton, G. ... | R. A. L. Williams ... | No. | ... .. | Form 911 27.11.23 to 1.1.24 ... | 10.1.24. |
| <i>Maine</i> ... | Seymour, A. ... | J. W. Prier ... | No. | Atlantic Transport ... | 29.5.23 to 8.6.23 ... | 18.6.23. |
| <i>Majestic</i> ... | Hayes, Sir B. F., K.C.M.G., D.S.O., R.D., Commodore R.N.R. ... | A. F. Butcher ... | W.T. | White Star ... | W.T. Reg. 6.12.23 to 20.12.23 ... | 22.12.23. |
| <i>Makambo</i> ... | Williams, G. E. ... | A. Brown, W. R. Robertson, F. C. Ree, D. Wilson. ... | M.L. | Burns Philp ... | Met. Log. 28.3.23 to 10.9.23 ... | 4.12.23. |
| <i>Makura</i> ... | Brown, T. M. ... | ... .. | ... | ... .. | ... .. | ... .. |
| | Griffiths, G. I. ... | ... .. | ... | ... .. | ... .. | ... .. |
| | Crawford, R. ... | C. A. Stein, R. B. Denniston, T. A. McPherson, R. K. Parry, W. W. Fish, A. Lansley. ... | M.L. | Canadian-Australasian ... | 30.6.23 to 26.10.23 ... | 17.11.23. |
| | Barlow, A. E. ... | ... .. | ... | ... .. | ... .. | ... .. |
| <i>Malancha</i> ... | Whitham, F. ... | J. Robertson ... | No. | Brocklebank ... | Form 911 29.10.23 to 23.11.23 ... | 17.12.23. |
| <i>Malda</i> ... | Gray, T. N. ... | J. Hayward ... | No. | British India ... | 6.12.23 to 12.1.24 ... | 16.1.24. |
| <i>Manchester Corporation.</i> | Everest, J. E. ... | V. R. Jeffrey ... | No. | Manchester Liners ... | 18.10.23 to 28.10.23 ... | 6.11.23. |
| <i>Manchester Mariner</i> | Riley, J. E. ... | ... .. | M.L. | " " | ... .. | ... .. |
| <i>Manchester Merchant.</i> | Barclay, J. ... | D. H. Burton ... | No. | " " | Form 911 19.3.23 to 31.3.23 ... | 8.5.23. |
| <i>Mandasor</i> ... | Kershaw, R. W. ... | W. Baxter ... | No. | Brocklebank ... | " 18.7.23 to 13.10.23 ... | 19.11.23. |
| <i>Manhattan</i> ... | Lazell, F. W. ... | ... .. | No. | Atlantic Transport ... | " 12.3.23 to 7.4.23 ... | 11.4.23. |
| <i>Manipur</i> ... | Scurr, T. W. ... | G. W. Barker ... | No. | Brocklebank ... | " 3.10.23 to 25.12.23 ... | 28.12.23. |
| <i>Manistee</i> ... | Isaacson, J. M. ... | F. McCollm, A. M. Houghton, L. C. Bach. ... | M.L. | Elders & Fyffes ... | Met. Log. 11.7.23 to 4.11.23 ... | 21.12.23. |
| <i>Marburn</i> ... | Clews, A. H. ... | A. M. Watt, W. R. Reid, W. Masson. ... | M.L. | Canadian Pacific ... | " 12.5.23 to 6.10.23 ... | 26.10.23. |
| <i>Marella</i> ... | Mortimer, S. ... | ... .. | M.L. | Burns Philp ... | " 21.2.23 to 11.7.23 ... | 8.9.23. |
| <i>Margha</i> ... | Milne, R. A. ... | J. Strachan, R. W. Cooper, H. Watkins, H. M. Maguire. ... | M.L. | British India ... | " 27.10.23 to 8.1.24 ... | 17.1.24. |
| <i>Marglen</i> ... | Landy, E. ... | E. Laurence ... | No. | Canadian Pacific ... | Form 911 18.5.23 to 25.5.23 ... | 11.6.23. |
| <i>Maryland</i> ... | Pollard, F. W. ... | F. T. Good ... | No. | Atlantic Transport ... | " 3.12.23 to 10.1.24 ... | 17.1.24. |
| <i>Mashobra</i> ... | Gallgie ... | M. W. K. Bishop ... | No. | British India ... | Form 911 30.7.23 to 26.8.23 ... | 26.11.23. |
| <i>Masirah</i> ... | Thowless, E. ... | R. C. Baker ... | No. | Brocklebank ... | " 30.7.23 to 26.8.23 ... | 26.11.23. |
| <i>Massilia</i> ... | Caithness, J. B. ... | G. H. Squires ... | No. | Anchor ... | " 12.5.23 to 4.6.23 ... | 27.6.23. |
| <i>Matakana</i> ... | Bosdet, V. J. ... | H. C. Mont, S. Oswald ... | No. | Shaw, Savill & Albion ... | " 20.6.23 to 31.7.23 ... | 11.8.23. |
| <i>Matheran</i> ... | Smith, W. ... | G. C. Smith, W. J. Miller, G. W. Barker. ... | M.L. | Brocklebank ... | Met. Log. 14.5.23 to 7.8.23 ... | 10.8.23. |
| <i>Mathura</i> ... | Hanna, R. G. ... | H. H. Armstrong ... | No. | ... .. | Form 911 1.12.23 to 11.12.23 ... | 20.12.23. |
| <i>Matiana</i> ... | Langlands, D. H. ... | E. H. Brady ... | No. | British India ... | " 1.12.23 to 11.12.23 ... | 20.12.23. |
| <i>Matina</i> ... | Henderson, J. ... | J. W. Parsons, H. Carden, N. A. Moore. ... | M.L. | Elders & Fyffes ... | Met. Log. 9.9.22 to 24.3.23 ... | 26.4.23. |
| <i>Mauretania</i> ... | Rostron, A. H., C.B.E., R.D., Capt. R.N.R. ... | G. H. Jones, P. O. Davis, W. C. A. Robson. ... | W.T. | Cunard ... | W.T. Reg. 21.10.23 to 4.11.23 ... | 8.11.23. |
| | | | | | Form 911 29.9.23 to 14.10.23 ... | 23.10.23. |
| <i>Megantic</i> ... | Berry, G. ... | H. J. C. Day, R. Conway ... | W.T. | White Star ... | W.T. Reg. 24.10.23 to 15.11.23 ... | 17.11.23. |
| <i>Mekita</i> ... | Landy, E. ... | Mr. Blair, Mr. Jones, Mr. Webster. ... | W.T. | Canadian Pacific ... | " 4.12.23 to 19.12.23 ... | 1.1.24. |
| <i>Mennon</i> ... | Salter, G. H. ... | E. R. Pritchard ... | No. | A. Holt ... | Form 911 12.11.23 to 30.11.23 ... | 24.12.23. |
| <i>Menominee</i> ... | Finch, E. ... | H. E. McCartney ... | No. | Atlantic Transport ... | " 19.8.23 to 17.9.23 ... | 21.9.23. |
| <i>Mesaba</i> ... | Claret, F. H. ... | I. A. Williams ... | No. | " " | " 2.7.23 to 11.7.23 ... | 27.8.23. |
| <i>Metagama</i> ... | Henderson, W. ... | H. A. MacCallum, H. Coughlan ... | W.T. | Canadian Pacific ... | W.T. Reg. 8.11.23 to 29.11.23 ... | 3.12.23. |
| <i>Miami</i> ... | Maxwell Brown, W. E. ... | A. Orchard ... | No. | Elders & Fyffes ... | Form 911 15.10.23 to 17.11.23 ... | 21.11.23. |
| <i>Michigan</i> ... | Tribe, A. E. ... | L. A. Williams ... | No. | Atlantic Transport ... | " 2.12.23 to 5.1.24 ... | 16.1.24. |
| <i>Minderoo</i> ... | Richardson, E. ... | B. J. Bennie, W. J. McPhedron, J. H. Oxtou. ... | M.L. | West Australia Nav. Co. ... | Met. Log. 16.2.23 to 10.7.23 ... | 17.9.23. |
| <i>Minnedosa</i> ... | Sibbons, H. ... | R. Fegan, R. Walker, H. F. Pullen, J. Soames. ... | W.T. | Canadian Pacific ... | W.T. Reg. 10.11.23 to 5.1.24 ... | 7.1.24. |
| | | | | | Form 911 9.11.23 to 5.1.24 ... | 17.1.24. |
| <i>Mirror</i> , C.S. ... | Sherwood, C. A. ... | C. E. F. St. John ... | No. | Eastern Tel. Co. ... | " 7.12.23 to 6.1.24 ... | 23.10.23. |
| <i>Mississippi</i> , M.V. ... | Wylie, J. T. J. ... | A. H. Middleton ... | No. | Atlantic Transport ... | " 6.10.23 to 15.10.23 ... | 6.9.23. |
| <i>Missouri</i> ... | Hutchison, J. G. ... | W. W. Howard ... | No. | " " | " 30.7.23 to 2.9.23 ... | 8.1.24. |
| <i>Moldavia</i> ... | Burleigh, C. W., D.S.O., R.D., Capt. R.N.R. ... | F. T. Ferraby ... | No. | P. & O. ... | " 23.11.23 to 13.12.23 ... | 8.1.24. |
| <i>Mongolian Prince</i> | Chilvers, J. ... | H. A. Shaw ... | No. | Prince ... | Form 911 11.10.23 to 8.12.23 ... | 1.1.24. |
| <i>Monkbarns</i> , Ship | Davies, W. ... | M. B. Glasier ... | No. | J. Stewart & Co. ... | " 10.3.23 to 13.7.23 ... | 18.9.23. |
| <i>Montcalm</i> ... | Rennie, A. ... | F. E. Williams, S. W. Keay ... | W.T. | Canadian Pacific ... | W.T. Reg. 2.12.23 to 19.12.23 ... | 24.12.23. |
| | | | | | Form 911 2.12.23 to 21.12.23 ... | 24.12.23. |
| <i>Montclare</i> ... | Webster, G. S., R.D., Commr. R.N.R. ... | E. J. Jones, M. Cresswell, M. Jack. ... | W.T. | " " | W.T. Reg. 24.11.23 to 13.12.23 ... | 17.12.23. |
| <i>Montrose</i> ... | Parry, H. ... | H. McFadyen, G. Marriott ... | W.T. | " " | " 22.12.23 to 11.1.24 ... | 14.1.24. |
| | | | | | " 8.12.23 to 28.12.23 ... | 1.1.24. |
| <i>Morvada</i> ... | Mills, T. L., O.B.E., R.D., Commr., R.N.R. ... | J. Norris, D. Lonie, F. Dyson ... | M.L. | British India ... | Form 911 8.12.23 to 28.12.23 ... | 1.1.24. |
| | | | | | Met. Log. 15.9.23 to 27.11.23 ... | 29.11.23. |
| <i>Mulbera</i> ... | Steadman, W. R. ... | E. Holland, C. Cox ... | No. | ... .. | Form 911 25.11.23 to 4.12.23 ... | 17.12.23. |
| <i>Musicien</i> ... | Egerton, J. J. ... | O. Stanhope ... | No. | Harrison ... | " 5.4.23 to 17.6.23 ... | 2.8.23. |

| Name of Vessel. | Captain. | Observing Officers. | Official Meteorological Equipment. | Line. | Last Log, Register, or Report Contributed. | Date Received. |
|----------------------------|---|--|------------------------------------|---|--|----------------|
| <i>Nagara</i> ... | Turner, E. A. ... | C. E. Mason ... | No. | R.M.S.P. Co. ... | Form 911 14.9.23 to 15.11.23... | 20.11.23. |
| <i>Napierian</i> ... | Kerruish, W. ... | T. Griffiths ... | " | Leyland ... | " 7.12.23 to 17.12.23... | 4.1.24. |
| <i>Nardana</i> ... | Brown, H. ... | K. C. Le Breton ... | " | British India ... | " 3.3.23 to 5.8.23 ... | 21.8.23. |
| <i>Nariva</i> ... | Macey, W. H. ... | W. H. Grimshaw, F. O. Newton, H. H. Lancaster. | M.L. | R.M.S.P. Co. ... | Met. Log. 3.5.23 to 27.6.23 ... | 29.6.23. |
| <i>Nascopie</i> ... | Smellie, T. F. ... | P. Lloyd, R. J. Summers, R. S. Mott. | M.L. | Hudson's Bay Co. ... | " 15.6.23 to 24.10.23... | 31.10.23. |
| <i>Navasota</i> ... | Willan, F. G. L. ... | P. R. Locks ... | No. | R.M.S.P. Co. ... | Form 911 16.11.23 to 4.1.24 ... | 7.1.24. |
| <i>Navigator</i> ... | Mowat, J. ... | " ... | " | Harrison ... | " 29.4.23 to 26.6.23 ... | 11.7.23. |
| <i>Navab</i> ... | Smith, J. F. ... | " ... | " | Asiatic S.N. Co. ... | " 7.8.23 to 24.9.23 ... | 17.10.23. |
| <i>Nebraska</i> ... | Collins, A. R. D. ... | J. Vivian ... | " | R.M.S.P. Co. ... | " 20.6.23 to 31.8.23 ... | 24.9.23. |
| <i>Nellore</i> ... | Murray, F. S., R.D., Lt. - Commr., R.N.R. | G. Aspinall ... | " | P. & O. ... | " 24.10.23 to 18.12.23 | 27.12.23. |
| <i>Nestor</i> ... | Owen, R. D., O.B.E. | W. J. Eyson ... | " | A. Holt ... | " 12.11.23 to 29.11.23 | 28.12.23. |
| <i>Nevasa</i> ... | Swanson, C. J. ... | E. C. T. West ... | " | British India ... | " 12.10.23 to 21.12.23 | 4.1.24. |
| <i>Newby Hall</i> ... | Kendall, J. W. ... | W. Rogerson, E. J. Myles, A. MacAllister. | M.L. | Ellerman ... | Met. Log. 5.1.23 to 19.6.23 ... | 18.7.23. |
| <i>Niagara</i> ... | Rolls, J. T. ... | R. M. Scott, N. G. Buxton, O. C. Bray. | M.L. | Canadian-Australian... | " 2.6.23 to 28.9.23 ... | 29.10.23. |
| <i>Ningchow</i> ... | Wilson, C. A. ... | R. A. Hannay ... | No. | A. Holt ... | Form 911 16.10.23 to 18.11.23 | 17.12.23. |
| <i>Nizam</i> ... | Park, G. ... | " ... | " | Asiatic S.N. Co. ... | " 21.4.23 to 1.5.23 ... | 29.5.23. |
| <i>Nore</i> ... | Randall H. W., R.D., Capt., R.N.R. | J. C. Ablewhite, R. W. Mackie, J. O. Divers, H. C. Slinn. | M.L. | P. & O. ... | Met. Log. 30.6.23 to 19.9.23 ... | 27.9.23. |
| <i>Norfolk Range</i> ... | Moore, J. E. W. ... | R. F. Handley ... | No. | Furness Withy ... | Form 911 22.11.23 to 31.12.23 | 4.1.24. |
| <i>Norman</i> ... | Morton Betts, W. ... | D. A. Hodgson ... | " | Union Castle ... | " 27.8.23 to 15.9.23 ... | 19.10.23. |
| <i>Norseman</i> , C.S. ... | Barter, H. O. ... | S. M. Hammond E. R. Duffey, L. M. Cooper. | M.L. | Western Tel. Co. ... | Met. Log. 12.2.23 to 21.8.23 ... | 24.9.23. |
| <i>Northumberland</i> ... | Haines, F. P. ... | " ... | No. | Federal ... | Form 911 16.6.23 to 28.7.23 ... | 31.7.23. |
| <i>Nortonian</i> ... | McCormick, J. ... | T. Miller ... | " | Leyland ... | " 3.12.23 to 5.1.24 ... | 9.1.24. |
| <i>Nubian</i> ... | Watmough, T. M. ... | G. H. Jolly ... | " | " ... | " 30.6.23 to 13.9.23 ... | 18.9.23. |
| <i>Nyanza</i> ... | Carpendale, F. W. J. ... | F. Aheir, C. H. Hand, F. Ardern. | M.L. | P. & O. ... | Met. Log. 17.9.23 to 7.1.24 ... | 12.1.24. |
| <i>Odland I.</i> ... | Williamsen ... | H. Svendgaard ... | No. | Hannevig Bros. ... | Form 911 19.12.23 to 2.1.24 ... | 4.1.24. |
| <i>Ohio</i> ... | Lainson, W. H. ... | W. Paine, C. K. Brown, G. C. Clairmonte. | M.L. | R.M.S.P. Co. ... | Met. Log. 18.5.23 to 2.12.23 ... | 13.12.23. |
| <i>Olympia</i> ... | Duncan, A. R. ... | H. Gorman, J. F. Adam, D. Haig. | M.L. | Anchor ... | " 22.3.22 to 26.8.23 ... | 1.10.23. |
| <i>Olympic</i> ... | Marshall, W., D.S.O., R.D., Capt. R.N.R. Howarth, F. B., Commr., R.N.R. | S. B. Morfee, J. C. M. Boyce | W.T. | White Star ... | W.T. Reg. 1.11.23 to 15.11.23... | 19.11.23. |
| <i>Omar</i> ... | Simmer, G. L., R.D., Commr., R.N.R. | W. M. McRitchie, C. V. Dodgson, L. E. Fordham, H. S. Schofield, T. J. Jones. | M.L. | Orient ... | Met. Log. 22.9.23 to 6.1.24 ... | 16.1.24. |
| <i>Onitsha</i> ... | Williams, T. E. ... | D. Rollo ... | No. | Elder Dempster ... | Form 911 1.9.23 to 21.9.23 ... | 20.11.23. |
| <i>Oranien</i> ... | Watmough, T. M. ... | R. J. S. Pope ... | " | Leyland ... | " 12.2.23 to 26.4.23 ... | 30.4.23. |
| <i>Orari</i> ... | Robinson, F. W. ... | C. H. Denton, C. F. Hicks, E. Mills. | M.L. | New Zealand S.S. Co. ... | Met. Log. 3.2.23 to 19.7.23 ... | 25.7.23. |
| <i>Orator</i> ... | Flynn, D. ... | J. C. Sinclair ... | No. | Harrison ... | Form 911 2.7.23 to 22.7.23 ... | 22.8.23. |
| <i>Orbita</i> ... | Parker, W. H., C.B.E., R.D., Capt., R.N.R. | D. R. Lee, H. H. Lancaster... | W.T. | R.M.S.P. Co. ... | W.T. Reg. 23.11.23 to 13.12.23 | 17.12.23. |
| <i>Orcoma</i> ... | Pearson, A. T. D. ... | R. E. Ward, J. J. Buckley ... | M.L. | Pacific S.N. Co. ... | Form 911 22.11.23 to 12.12.23 | 17.12.23. |
| <i>Orduña</i> ... | Warner, G. E. ... | J. W. Carr, J. Vivian, J. Smith, A. A. Martin. | W.T. | R.M.S.P. Co. ... | Met. Log. 24.8.23 to 9.11.23 ... | 10.11.23. |
| <i>Oriana</i> ... | Christian, G. H. ... | G. Pattison, Mason, G. F. Nicholson, Cruikshank. | M.L. | Pacific S.N. Co. ... | W.T. Reg. 4.11.23 to 24.11.23... | 29.11.23. |
| <i>Orlita</i> ... | Dominy, R. H., C.B.E., Commr., R.N.R. | F. W. Hockey, H. S. Roberts, —, Gale. | M.L. | " ... | Form 911 3.11.23 to 26.11.23... | 30.11.23. |
| <i>Ormonde</i> ... | Douglas, H. P., C.M.G., Capt., R.N. | " ... | M.L. | His Majesty's Ship ... | Met. Log. 26.1.23 to 14.8.23 ... | 18.8.23. |
| <i>Ormonde</i> ... | Staunton, H. G., C.B.E., R.D., Commr., R.N.R. | G. A. Moir, F. J. L. Butler, E. G. Smithard. | M.L. | Orient ... | Met. Log. 1.1.23 to 23.4.23 ... | 30.4.23. |
| <i>Ormuz</i> ... | James, L. V., D.S.C. | J. S. Metcalf, A. J. Croft-Cohen, I. E. G. Goldsworthy, L. A. Keeble. | M.L. | " ... | Met. Log. 19.8.23 to 5.12.23 ... | 17.12.23. |
| <i>Oroya</i> ... | Chittenden, A. ... | S. Lewis ... | No. | Pacific S.N. Co. ... | Form 911 25.10.23 to 12.1.24... | 16.1.24. |
| <i>Orsova</i> ... | Matheson, C. G., D.S.O., R.D., Commr., R.N.R. | C. Fox, J. C. K. Dowding, T. J. Jones, J. C. Jackson. | M.L. | Orient ... | Met. Log. 29.4.23 to 12.8.23 ... | 22.8.23. |
| <i>Ortega</i> ... | Chittenden, A. ... | J. G. Aitken ... | No. | Pacific S.N. Co. ... | Form 911 18.7.23 to 22.9.23 ... | 29.9.23. |
| <i>Orvieto</i> ... | Owens, A. L., R.D., Lt.-Commr., R.N.R. | G. H. Wylie, A. J. Baxter, G. E. Martin, A. O. H. O'Brien, M. C. Lester. | M.L. | Orient ... | Met. Log. 24.6.23 to 7.10.23 ... | 24.10.23. |
| <i>Osterley</i> ... | Coad, A. J., R.D., Commr., R.N.R. | F. G. Goodman, T. B. Grainger-Grieve, E. Hatch. | M.L. | " ... | " 22.7.23 to 6.11.23 ... | 27.11.23. |
| <i>Othello</i> ... | Pearson, Z. C. ... | A. J. Walker ... | No. | Ellerman Wilson ... | Form 911 29.11.23 to 14.12.23 | 24.12.23. |
| <i>Otira</i> ... | Elford, H. E. ... | V. R. Bowling ... | " | Shaw, Savill & Albion | " 24.11.23 to 13.12.23 | 1.1.24. |
| <i>Oxfordshire</i> ... | Adamson, B. W. ... | W. L. Whiteside, C. J. Blyten-Beesley, H. J. Jarrett. | M.L. | Bibby ... | Met. Log. 15.9.23 to 22.11.23... | 28.11.23. |
| <i>Pakeha</i> ... | Hartman W. H. ... | W. L. P. Cox ... | No. | Shaw, Savill & Albion | Form 911 1.9.23 to 8.10.23 ... | 17.12.23. |
| <i>Paparoa</i> ... | Ashworth, F. ... | A. E. Lettington ... | " | New Zealand S.S. Co. ... | " ... | " |
| <i>Paris</i> ... | Cook, C. L. ... | Mr. Biles... .. | C.C. | Southern Rly. ... | Telegraphic Report. 22.9.23 ... | 22.9.23. |
| <i>Patia</i> ... | Downes, F. J. ... | S. A. Sapsworth ... | No. | Elders & Fyffes ... | Form 911 2.1.23 to 4.2.23 ... | 9.2.23. |
| <i>Patrol</i> , C.S. ... | Bredenberg, F. ... | Davison, Gardiner, Albrecht, Morrell. | M.L. | Eastern Extension (A. & C.) Telegraph Co. ... | Met. Log. 3.3.23 to 26.6.23 ... | 3.8.23. |
| <i>Persic</i> ... | Davies, E. ... | N. E. Banks ... | No. | White Star ... | Form 911 22.9.23 to 30.10.23... | 1.1.24. |
| <i>Peshawur</i> ... | Hester, C. ... | " ... | M.L. | P. & O. ... | " ... | " |
| <i>Philadelphian</i> ... | Baker, J. A. ... | G. W. B. Lloyd ... | No. | Leyland ... | Form 911 21.10.23 to 23.12.23 | 24.12.23. |
| <i>Polyphemus</i> ... | Hatfield, J. ... | F. Silva ... | " | A. Holt ... | " ... | " |
| <i>Poona</i> ... | Cherry, W. G. W. ... | F. J. Ablewhite ... | " | P. & O. ... | Form 911 30.11.23 to 31.12.23 | 10.1.24. |
| <i>Port Albany</i> ... | Robinson, C. A. ... | G. L. Hazlewood, A. W. Jenkyns, J. S. Beardshaw, W. B. Craig. | M.L. | Commonwealth & Dominion. | Met. Log. 18.5.23 to 23.9.23 ... | 2.10.23. |
| <i>„ August</i> ... | Hearn, G. W. ... | G. T. Harris, R. C. Carter, C. F. Coate. | M.L. | " " " | " 14.4.23 to 19.9.23 ... | 25.9.23. |
| <i>„ Caroline</i> ... | Renaut, F. A. ... | E. G. Fullick P. H. Pedrick, T. Palmer. | M.L. | " " " | " 18.7.23 to 19.11.23... | 24.11.23. |

LIST OF VOLUNTARY OBSERVING SHIPS

vii

| Name of Vessel. | Captain. | Observing Officers. | Official Meteorological Equipment. | Line. | Last Log, Register, or Report Contributed. | Date Received. |
|--------------------------------|--|---|------------------------------------|---------------------------------------|--|----------------|
| <i>Port Curtis</i> ... | Van den Bergh, C. | A. G. Rhind ... | No. | Commonwealth & Dominion. | ... .. | ... |
| " <i>Darwin</i> ... | Farmer F. ... | E. T. N. Lawrey ... | No. | " " " | Form 911 3.8.23 to 23.9.23 ... | 9.10.23. |
| " <i>Hacking</i> ... | Stickland, A. E. ... | Rowland Hill ... | " | " " " | 13.10.23 to 4.12.23... | 14.1.24. |
| " <i>Hunter</i> ... | Cottell, S. C. ... | C. P. Thrower, W. R. Johnston, L. Copeland, A. G. Newbury. | M.L. | " " " | Met. Log. 4.5.23 to 22.9.23 ... | 27.9.23. |
| " <i>Lyttelton</i> ... | Ferris, J. | W. L. Lynd, E. Leavett, G. Fergusson, G. H. Harvey. | M.L. | " " " | 24.2.23 to 16.8.23 ... | 18.8.23. |
| " <i>Melbourne</i> ... | Kearney, F. J. ... | D. G. H. Bradley, C. F. Post, T. L. Kidwell. | M.L. | " " " | " 15.3.23 to 18.7.23 ... | 25.7.23. |
| " <i>Nicholson</i> ... | Hoad, A. C. ... | J. G. Lewis, W. G. Jones, J. Buchan, F. Dow. | M.L. | " " " | " 30.12.22 to 24.6.23... | 28.6.23. |
| " <i>Pirie</i> ... | Higgs, W. G. ... | H. C. Jeffery, E. E. Roswell, R. S. Stannard, E. N. Rogerson. | M.L. | " " " | " 25.8.23 to 26.12.23... | 30.12.23. |
| " <i>Stephens</i> ... | Sawbridge, I. K. ... | E. J. Syvret, H. G. B. Pinkney, L. Bayley. | M.L. | " " " | " 28.1.23 to 13.6.23 ... | 10.7.23. |
| " <i>Sydney</i> ... | Lea, W. H. ... | H. E. Higgs, A. W. Sams, A. R. Martin, J. Fishwick. | M.L. | " " " | " 15.6.23 to 16.10.23... | 20.10.23. |
| " <i>Victor</i> ... | Jack, J. ... | J. Hunter, R. S. Keating, R. T. R. Tomsett. | M.L. | " " " | " 6.4.23 to 3.9.23 ... | 14.9.23. |
| <i>President Jackson</i> ... | Griffith, J. ... | E. Walker ... | No. | Pacific S.S. Co. ... | Form 911 22.10.23 to 21.11.23 | 14.1.24. |
| <i>Protea, H.M.S.A.S.</i> ... | Dalglish ... | H. McMaster ... | " | South African Naval Service. | " 14.5.23 to 29.6.23 ... | 31.7.23. |
| <i>Protesilaus</i> ... | Wilkinson, H. ... | T. Miners, R. C. Neville, A. Woolfenden, F. Smith. | M.L. | A. Holt ... | Met. Log. 27.9.23 to 14.12.23... | 8.1.24. |
| <i>Pyrrhus</i> ... | Clark, G. T. ... | F. Berry ... | No. | " ... | Form 911 28.4.23 to 7.5.23 ... | 10.5.23 |
| <i>Rajah</i> ... | Park, G. ... | ... .. | No. | Asiatic S.N. Co. ... | Form 911 17.6.23 to 10.7.23 ... | 15.8.23. |
| <i>Regina</i> ... | Morehouse, W. A. ... | A. Hulme ... | " | White Star-Dominion ... | " 10.11.23 to 2.12.23... | 6.12.23. |
| <i>Reindeer</i> ... | Mulhall, W. ... | ... .. | C.C. | G.W. Railway ... | Telegraphic Report 8.12.23 ... | 8.12.23. |
| <i>Rhodesian Transport</i> ... | Fowler, W. H. ... | B. A. Insley ... | No. | Houlder Bros. ... | Form 911 25.4.23 to 27.7.23 ... | 10.8.23. |
| <i>Rialto</i> ... | Mordue, J. A. ... | ... .. | " | Ellerman Bucknall ... | " 1.11.23 to 2.1.24 ... | 18.1.24. |
| <i>Rimutaka</i> ... | Hemming, F. A. ... | P. McCallum, H. Horwood, W. Kyles. | M.L. | New Zealand S.S. Co. ... | Met. Log. 7.4.23 to 19.8.23 ... | 24.8.23. |
| <i>Romney</i> ... | Leicester, F. S. ... | E. S. Phillips ... | No. | Lampport & Holt ... | Form 911 2.8.23 to 14.10.23 ... | 30.10.23. |
| <i>Royal Transport</i> ... | Dove, J. ... | F. W. Pawson ... | " | Houlder Bros. ... | " 3.7.23 to 13.10.23 ... | 17.10.23. |
| <i>Ruapehu</i> ... | McKellar, A. W., R.D., Capt., R.N.R. | ... .. | M.L. | New Zealand S.S. Co. ... | ... .. | ... |
| <i>Sachem</i> ... | Furieux, S. ... | C. Waldron, A. Tomkins ... | No. | Furness Withy ... | Form 911 28.7.23 to 1.9.23 ... | 6.9.23. |
| <i>Samaria</i> ... | Horsburgh, G. ... | E. Esson ... | " | Cunard ... | " 24.9.23 to 10.10.23... | 16.10.23. |
| <i>Sandown Castle</i> ... | Jackson, C. R. ... | W. F. Malden ... | " | Union Castle ... | " 13.10.23 to 2.11.23... | 16.11.23. |
| <i>Saorise, Yacht</i> ... | O'Brien, C. ... | H. S. Hodges ... | " | C. O'Brien ... | " 1.9.23 to 6.10.23 ... | 7.11.23. |
| <i>Sardinia</i> ... | Cadiz, F. G. ... | C. E. Arundel ... | " | P. & O. ... | " 13.6.23 to 3.7.23 ... | 19.7.23. |
| <i>Saturnia</i> ... | Black, J. ... | T. Ure ... | W.T. | Anchor Donaldson ... | W.T. Reg. 24.11.23 to 16.12.23 | 27.12.23. |
| <i>Saxoleine</i> ... | Biddick, E. ... | C. S. Rodgers ... | No. | Hunting & Son ... | Form 911 23.11.23 to 17.12.23 | 27.12.23. |
| <i>Saxon</i> ... | Stanley, W. F. ... | R. S. W. Harris ... | " | Union Castle ... | " 28.11.23 to 2.1.24 ... | 14.1.24. |
| <i>Saxonia</i> ... | Storey, F. E., R.D., Capt., R.N.R. | E. S. Simmonds ... | " | Cunard ... | " 16.11.23 to 7.1.24 ... | 8.1.24. |
| <i>Scholar</i> ... | O'Connor, T. ... | H. Hall ... | " | Harrison ... | " 27.9.23 to 23.10.23... | 2.11.23. |
| <i>Scientist</i> ... | Hansen, W. A. ... | D. G. Russell ... | " | " ... | " 26.8.23 to 4.12.23 ... | 13.12.23. |
| <i>Scindia</i> ... | Matthews, W. ... | H. D. Campsie ... | " | Anchor ... | " 19.10.23 to 1.1.24 ... | 7.1.24. |
| <i>Scotia</i> ... | Telfer ... | O. W. L. Jones ... | C.C. | L.M. & S. Rly. ... | " 7.7.23 to 19.9.23 ... | 25.9.23. |
| <i>Scottish Bard</i> ... | McDonnell, S. ... | W. H. Campbell ... | No. | Tankers, Ltd. ... | Telegraphic Report 24.12.23 | 24.12.23. |
| <i>Scottish Borderer</i> ... | Jeffrey, D. G., D.S.O. | G. F. Widger ... | " | Form 911 25.8.23 to 14.9.23 ... | " 8.11.23 to 26.11.23... | 1.10.23. |
| <i>Scythia</i> ... | Prothero, W. ... | T. Parry, D. S. Kite, M. Boston. | W.T. | Cunard ... | W.T. Reg. 16.12.23 to 5.1.24 ... | 8.1.24. |
| <i>Sheaf Mount</i> ... | Groves, C. V. ... | J. L. Forster ... | No. | Souter, W. A. ... | Form 911 6.11.23 to 25.11.23... | 3.12.23. |
| <i>Sheaf Spear</i> ... | Whitfield, G. A., O.B.E. | A. E. Harvey, W. H. Grise-wood. | M.L. | " ... | Met. Log. 28.3.23 to 17.4.23 ... | 3.7.23. |
| <i>Sicilia</i> ... | Miller, E. C. ... | H. Sanders ... | No. | P. & O. ... | " 18.3.23 to 20.8.23 ... | 8.10.23. |
| <i>Socrates</i> ... | James, F. R. ... | E. R. Hartley ... | " | Lampport & Holt ... | Form 911 20.10.23 to 27.11.23 | 1.1.24. |
| <i>Somerses</i> ... | Barnett, H. ... | C. H. Landfield ... | " | New Zealand S.S. Co. ... | " 8.8.23 to 28.8.23 ... | 8.11.23. |
| <i>Somme</i> ... | Miles, F. R., Commr., R.N.R. | B. K. Berry, C. C. Prosser, D. P. Larham. | M.L. | R.M.S.P. Co. ... | " 17.11.23 to 1.1.24 ... | 4.1.24. |
| <i>Songster</i> ... | Smith, D. P. ... | J. R. McIntyre, D. Richards, W. H. Hunt. | M.L. | Harrison ... | Met. Log. 24.4.23 to 28.11.23... | 17.12.23. |
| <i>Spectator</i> ... | Owen, W. F. ... | L. Seddon ... | No. | " ... | " 16.7.22 to 23.10.22... | 2.11.22. |
| <i>Spero</i> ... | French, H. E. ... | ... .. | M.L. | Ellerman Wilson ... | Form 911 25.10.23 to 14.11.23 | 5.12.23. |
| <i>Stephan, C.S.</i> ... | Carlton, G. F., O.B.E., Commr., R.N.R. | L. J. Hegarty, J. Matthews, F. B. Bolingbroke. | M.L. | Telegraph Construction & Maintenance. | Met. Log. 5.5.23 to 3.10.23 ... | 10.10.23. |
| <i>Surrey</i> ... | Kettlewell, C. R. ... | G. W. Allard, S. E. Hobbin, D. McIntyre. | M.L. | Federal ... | " 27.5.23 to 3.11.23 ... | 7.11.23. |
| <i>Sussex</i> ... | Upton, E. C. S. ... | W. A. Ewington ... | No. | Eastern and Australian ... | Form 911 27.7.23 to 7.9.23 ... | 21.11.23. |
| <i>St. Albans</i> ... | ... .. | ... .. | " | Rankin Gilmour ... | Form 911 13.9.23 to 26.9.23 ... | 7.11.23. |
| <i>St. Patrick</i> ... | Bearpark, E. W. ... | W. P. Baker ... | " | " ... | " ... | " |
| <i>Tainui</i> ... | Kelly, R. A. ... | T. T. Oliver ... | No. | Shaw, Savill & Albion ... | Form 911 5.12.22 to 14.1.23 ... | 12.2.23. |
| <i>Tairoa</i> ... | Summers, W. G. ... | J. Steele ... | " | Yull & Co. ... | " 16.10.22 to 27.2.23... | 7.3.23. |
| <i>Taiyuan</i> ... | Hamilton, H. E. ... | R. D. Thomas, W. Bailley, D. D. Tyer. | M.L. | " ... | Met. Log. 30.4.23 to 5.10.23 ... | 20.11.23. |
| <i>Tallybius</i> ... | Agnew, J. ... | F. Parker ... | No. | A. Holt ... | Form 911 26.11.22 to 10.1.23... | 20.2.23. |
| <i>Tambora</i> ... | Meerburg, J. M. ... | H. Van Manen ... | " | Rotterdam Lloyd ... | " 16.8.23 to 7.10.23 ... | 19.10.23. |
| <i>Teiresias</i> ... | Reynard, J. G. ... | W. F. Dark ... | " | A. Holt ... | " 23.7.23 to 2.8.23 ... | 14.8.23. |
| <i>Teucer</i> ... | Hannev, T. W. ... | J. C. Norton ... | " | " ... | " 8.9.23 to 18.9.23 ... | 1.10.23. |
| <i>Themistocles</i> ... | Jermyn, W. M. ... | W. H. Harrison ... | " | Aberdeen ... | " ... | " |
| <i>Theseus</i> ... | Williams, D. T. ... | W. Cowperthwaite ... | " | A. Holt ... | Form 911 29.10.23 to 26.11.23 | 7.1.24. |
| <i>Titan</i> ... | Ireland, T. R. ... | J. F. Williams, A. C. H. Jones, D. J. Davies, A. Taylor. | M.L. | " ... | Met. Log. 3.6.23 to 7.10.23 ... | 10.10.23. |
| <i>Tolmie, S.F. Bqtne.</i> ... | Stewart, J. C. ... | F. Burch ... | No. | B. C. Mils Tug and Barge Co. ... | Form 911 4.11.22 to 17.1.23 ... | 1.3.23. |
| <i>Tottori Maru</i> ... | Karita, I. ... | S. Ariyoshi ... | " | Nippon Yusen Kaisha ... | " 7.10.23 to 16.11.23... | 1.1.24. |
| <i>Transmitter, C.S.</i> ... | Jones, L. T., M.B.E. | S. P. Sheldon ... | " | Eastern Tel. Co. ... | " 8.10.23 to 18.11.23... | 24.12.23. |
| <i>Traveller</i> ... | Jones, E. W. ... | ... .. | " | Harrison ... | " 4.8.23 to 8.10.23 ... | 18.10.23. |
| <i>Tredenham</i> ... | Evans, J. O. ... | C. Warren ... | " | Hain S.S. Co. ... | " 13.11.23 to 4.1.24 ... | 11.1.24. |

| Name of Vessel. | Captain. | Observing Officers. | Official Meteorological Equipment. | Line. | Last Log, Register, or Report Contributed. | Date Received. |
|---|---|---|------------------------------------|-------------------------|--|----------------|
| <i>Trematon</i> ... | Hicks, F. H. ... | J. Christopher, D. Thomas, F. J. Webb. | M.L. | Hain S.S. Co. ... | Met. Log. 28.8.22 to 30.3.23 ... | 18.4.23. |
| <i>Tuscania</i> ... | Bone, D. W. ... | J. McGill Brown ... | No. | Anchor ... | Form 911 23.10.23 to 17.11.23 | 21.11.23. |
| <i>Tuscanstar</i> ... | Thomas, R. J. ... | W. H. Webster ... | " | Blue Star ... | " 29.5.23 to 3.7.23 ... | 11.7.23. |
| <i>Tyndareus</i> ... | Adcock, F. ... | F. Robinson ... | " | A. Holt ... | " 14.10.23 to 20.11.23 | 17.12.23. |
| <i>Ulysses</i> ... | Hazeland, J. H. D. ... | W. J. Peard ... | No. | A Holt ... | Form 911 2.11.23 to 17.11.23... | 11.12.23. |
| <i>Valacia</i> ... | Doyle, M. ... | J. W. Caunce ... | " | Cunard ... | " 27.9.23 to 15.12.23... | 24.12.23. |
| <i>Valdura</i> ... | Mitchell, A. ... | J. Campbell, J. Anderson, A. M. S. Well. | M.L. | Gow Harrison. | Met. Log. 19.4.23 to 20.10.23... | 20.12.23. |
| <i>Valemore</i> ... | Griffiths, J. ... | H. Miller... ... | No. | Furness Withy ... | Form 911 22.11.23 to 29.12.23 | 30.12.23. |
| <i>Vardulia</i> ... | Townley, J. C. ... | S. L. Carter ... | " | Cunard ... | " 12.11.23 to 18.12.23 | 24.12.23. |
| <i>Vasconia</i> ... | Inch, F. ... | P. S. Britten ... | " | " ... | " 3.7.23 to 12.7.23 ... | 18.7.23. |
| <i>Vellavia</i> ... | Birnie H. C., D.S.O., R.D., Commr., R.N.R. | " ... | " | " ... | " 4.11.23 to 16.11.23... | 24.11.23. |
| <i>Vennonia</i> ... | Gronow, S. ... | D. Butler ... | " | " ... | " 19.11.23 to 30.11.23 | 28.12.23. |
| <i>Ventura de Larrinaga.</i> ... | Echevarria, J. Vde. A. | G. W. E. Brazendale ... | " | Larrinaga ... | " 9.5.23 to 24.5.23 ... | 30.5.23. |
| <i>Venusia</i> ... | Stafford, W. ... | W. P. Armour ... | " | Cunard ... | " 3.6.23 to 4.7.23 ... | 10.7.23. |
| <i>Verbania</i> ... | Hatcher, W. H. ... | H. R. Rooper ... | " | " ... | " 15.10.23 to 30.11.23 | 5.12.23. |
| <i>Verentia</i> ... | Stafford, W., D.S.C., R.D., Lt-Commr., R.N.R. | A. S. W. Watts ... | " | " ... | " 5.11.23 to 13.12.23... | 17.12.23. |
| <i>Victoria</i> ... | Fisher, F. T. ... | J. Males, E. Peacock, J. Archer | M.L. | China-Australia | Met. Log. 29.3.23 to 29.8.23 ... | 6.10.23. |
| <i>Vindelia</i> ... | Henderson, J. L. ... | J. Noble ... | No. | Cunard ... | Form 911 28.7.23 to 9.11.23 ... | 16.11.23. |
| <i>Vittoria</i> ... | Jackson, G. W. ... | F. Galbraith ... | " | Vittoria S.S. Co. ... | " 10.5.23 to 20.6.23 ... | 26.6.23. |
| <i>Waihemo</i> ... | Showman, A. C. ... | G. Atwood ... | No. | Union S.S. Co., N.Z.... | Form 911 23.2.23 to 16.5.23 ... | 20.6.23. |
| <i>Waiotapu</i> ... | Ruxton, G. M. ... | F. A. Wilson ... | " | Canadian-Australasian | " 8.5.23 to 3.6.23 ... | 26.6.23. |
| <i>Walmer Castle</i> ... | Chave, Sir B., K.B.E. | E. E. Spradbrow ... | " | Union Castle ... | " 28.9.23 to 18.11.23... | 28.11.23. |
| <i>Wangaratta</i> ... | O'Connor, E. W., D.S.C. | T. W. Wordingham, M. Chant, W. Hunt. | M.L. | British India ... | Met. Log. 1.6.23 to 10.11.23 ... | 1.12.23. |
| <i>Warfela</i> ... | Steel, R. ... | W. A. Hughes ... | No. | " ... | Form 911 28.10.23 to 30.11.23 | 27.12.23. |
| <i>War Nizam</i> ... | Putt, R. O. ... | " ... | " | British Tankers ... | " ... | " ... |
| <i>Welshman</i> ... | Kollerson, W. ... | J. F. Spears ... | " | White Star-Dominion | Form 911 3.10.23 to 30.10.23... | 5.11.23. |
| <i>Winifredian</i> ... | Harrocks, W. ... | W. Baker ... | " | Leyland ... | " 26.10.23 to 25.12.23 | 29.12.23. |
| <i>Woodarra</i> ... | Reilly, J. V. ... | F. L. Sampson, L. D. Graham, F. W. Felgate A. V. Fisher | M.L. | British India ... | Met. Log. 10.2.23 to 9.8.23 ... | 23.8.23. |
| <i>Yorkshire</i> ... | Millson, G. C. ... | E. Jones ... | No. | Bibby ... | Form 911 13.10.23 to 12.12.23 | 24.12.23. |
| <i>Zeeland</i> ... | Thomas, A. J. ... | F. Chilman ... | No. | Red Star ... | Form 911 31.8.23 to 20.9.23 ... | 21.9.23. |
| Unless otherwise stated, vessels on the above list are S.S. | | | | | | |
| <i>Conway, H.M.S.</i> | Broadbent, H. W., R.D., Capt., R.N.R. | The Senior Cadets... | Cadets' M.L. | | Cadets' Met. Log. 23.9.23 to 15.12.23 | 19.12.23. |
| <i>Pangbourne Nautical College.</i> | Tracy, A. F. G., Commr., R.N. | " " ... | " | | Cadets' Met. Log. 24.9.23 to 15.12.23 | 20.12.23. |
| <i>Worcester, H.M.S.</i> | Sayer, M. B., O.B.E., R.D., Capt., R.N.R. | " " ... | " | | Cadets' Met. Log. 21.9.23 to 18.12.23 | 1.1.24. |
| <i>Abaco</i> ... | | The Keepers ... | Lighthouse Register. | | Lighthouse Register 1.1.23 to 30.6.23 | 12.9.23. |
| <i>Cay Lobos</i> ... | | " ... | " | | Lighthouse Register 1.1.23 to 30.6.23 | 12.9.23. |
| <i>Double Headed Shot</i> ... | | " ... | " | | Lighthouse Register 1.1.23 to 30.6.23 | 12.9.23. |
| <i>Inagua</i> ... | | " ... | " | | Lighthouse Register 1.1.23 to 30.6.23 | 12.9.23. |
| <i>Sombrero</i> ... | | " ... | " | | Lighthouse Register 1.1.23 to 30.6.23 | 10.8.23. |
| <i>Walling Island</i> ... | | " ... | " | | Lighthouse Register 1.1.23 to 30.6.23 | 12.9.23. |
| <i>Cape Pembroke (Falkland Is.).</i> | | " ... | " | | Lighthouse Register 1.1.23 to 30.6.23 | 27.8.23. |

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

| Name of Vessel. | Captain. | Observing Officer. | Line. | Last Case of Water Samples, Reports, etc., Received. | Date Received. |
|-----------------------|--------------------|---------------------|--------------------|--|----------------|
| <i>Alban</i> ... | Whayman, W. R. ... | R. Griffiths ... | Booth ... | Water Samples ... | 5.12.23. |
| <i>Hildebrand</i> ... | Maddrell ... | H. Sapsworth ... | " ... | " ... | 15.11.23. |
| <i>Patia</i> ... | Downes, F. J. ... | H. Welch ... | Elder & Fyffes ... | " ... | 29.10.23. |
| <i>Tortuguero</i> ... | Martin ... | S. A. Sapsworth ... | " ... | " ... | 28.12.23. |
| | | H. H. Dunning ... | " ... | " ... | |