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THE MARINE OBSERVER.

APRIL 1924.

VOLUNTARY CO-OPERATION WITH THE MINISTRY OF AGRICULTURE AND FISHERIES.

A SMALL number of steamers in the West Indian and South American trades observe sea temperature and weather, and take water samples regularly for the Fisheries Laboratory at Lowestoft, the Port Meteorological Officer at Liverpool arranging and supervising the work.

At present the number of ships regularly contributing to this work is strictly limited.

The following article, written by Lieutenant J. R. LUMBY, R.N. (retired), of the Fisheries Laboratory, will be of special interest to the officers of these ships; moreover, it will interest all Marine Observers, for to learn more of ocean currents we must know more of the depths as well as the surface of the ocean.

The Marine Division of the Meteorological Office is responsible for the compilation of surface observations only; it collects observations for the Fisheries Laboratory in order to save overlapping of work.

If Marine Observers send in observations or remarks which will be useful to the Fisheries Laboratory they will be forwarded to the Director of that Institution.

MARINE SUPERINTENDENT.

THE STUDY OF CURRENTS IN THE NORTH ATLANTIC.

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

ALTHOUGH the main features in the surface circulation of the North Atlantic have been known for some considerable time, yet it is only in comparatively recent years that improvement of apparatus and methods has enabled a more detailed study to be made.

Of the earlier attempts in this respect the best known, perhaps, to those interested in the study of the sea is that of BENJAMIN FRANKLIN (1770), who, besides publishing a chart of the Gulf Stream, recommended the use of the thermometer to enable shipmasters to benefit by this great stream on easterly voyages and to avoid it on westerly voyages. At this time, too, the cold waters of the Labrador Current were differentiated from those of the warm Gulf Stream.

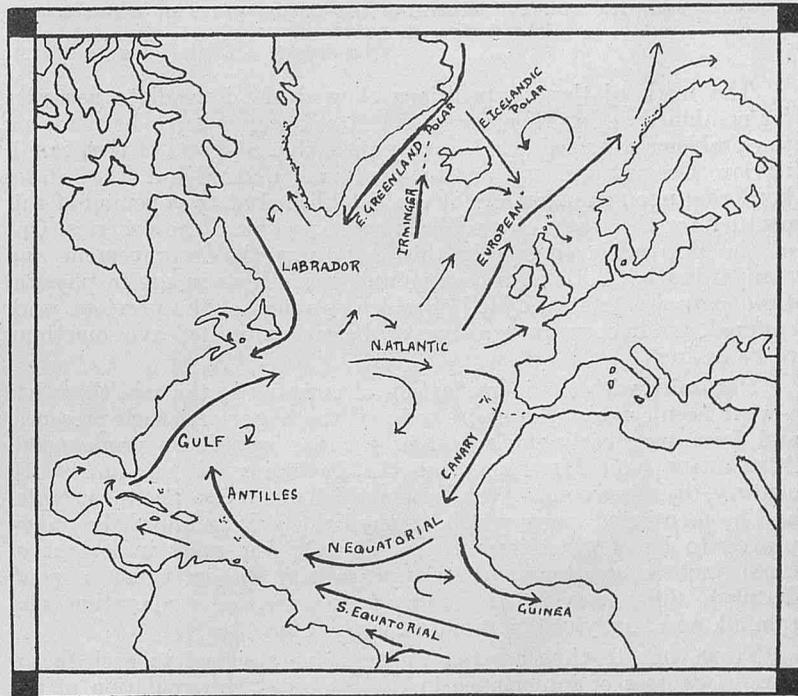


Fig. 1.—Main features of the surface circulation of the North Atlantic Ocean.

To an American Naval Officer, M. F. MAURY by name, is due the very notable advance in Oceanography which occurred in the middle of the last century. The scheme, which was brought about by his efforts, for the organisation and study of the logs kept in ships is still in operation, providing a wealth of material upon which is based so much of our present knowledge of the conditions both in the air and in the sea.

The results of his own studies of the observations so made were, amongst other things, applied to the saving of time on ocean voyages, and must have proved of immense value, not only to those who served at sea, but to the community in general.

The step following the impetus given to Oceanography by MAURY'S work was the equipment of expeditions with apparatus designed for the investigation of conditions below the surface of the sea, and the results of the *Challenger* expedition, whose observations at sea occupied nearly four years, form the groundwork of much of our present-day knowledge in this respect.*



Fig. 2.—The Nansen-Pettersson water-bottle, an instrument used to collect samples and to determine the temperature of water from below the surface.

The work of these expeditions showed the immediate necessity for combined action, if a successful attack was ever to be made on the problems so raised; and, largely through the efforts of the Scandinavian Oceanographers, an International Council (of the States bordering upon the North Sea) was established at the opening of this century for the study of problems connected with the fisheries. One of the first achievements of this body was the improvement and standardisation both of apparatus and of methods in use in physical Oceanography, from the lack of which so much of the previous work suffered, and in consequence some of the earlier results leave something to be desired.

Naturally, with the identification of currents in the sea, there has always been associated a desire to know the reasons for their presence, and from very early times various theories have been propounded. ALEXANDER VON HUMBOLDT, at the beginning of the nineteenth century, discussed some of the factors which might give rise to currents, and he mentioned many which, in the light of later knowledge, have proved to be of great importance. Briefly, the most important of these factors are temperature and salinity (upon which depend density), differences in atmospheric pressure, in evaporation and rainfall, and finally the melting of the polar ice.

From time to time oceanographers have assigned to each factor various degrees of importance in conditioning the circulation of the North Atlantic. MAURY held the view, apparently, that difference between the density of the water in polar and in equatorial regions was the Gulf Stream's principal *raison d'être*, and he has since been largely upheld by CARPENTER and later by NANSEN. He declined to accept the suggestions that the *vis a tergo* of the waters blown into the Caribbean Sea by the trade winds provided the necessary impulse to the issue of the Gulf Stream as a mighty current from the Florida Strait. The fact that, in addition, he had to consider the opinions of those who thought of the Gulf Stream as the effluent of the Mississippi may serve to show how far his ideas were in advance of those of his period.

* An interesting account of the life and work of some of the Oceanographers of this period has been published quite recently. "Founders of Oceanography and their Work." Sir W. HERDMAN. (Arnold, 1923.)

The importance of the influence of the winds has always been emphasised as a factor of circulation, but it is realised that the reaction of the trade winds does not provide all the energy necessary to set in motion such a volume of water as the Gulf Stream includes.

As one might suppose, the ways in which currents may be studied are somewhat numerous, but it must suffice to mention here only a few of the most important. They may be roughly classed under two headings, namely, direct and indirect methods, the first category implying an observation of the movement of the water, such as is made by the aid of current meters, and floating objects; indirect methods depend upon the study of the characteristics peculiar to waters of different origin, and also, perhaps, conclusions based upon purely theoretical considerations may be included under this heading.

The results of current meter observations in shallow waters have proved valuable indeed, but the disadvantage of most of the instruments at present in use is that they cannot conveniently be used in the open ocean. Such attempts have been made, it is true, but one is forced to admit, at any rate for the present, a limitation of their scope of utility.

Perhaps the earliest known method for the investigation of currents in the sea was the study of the set of ships as obtained from the difference of their estimated and observed positions. Upon such observations are based the current charts prepared from the Meteorological Office data, and it may be of interest to mention here the compendious set of charts recently published by the Dutch Meteorological Institute.*

There are, however, innumerable objects floating in or upon the water, the observation of whose movements offers a very ready material for research. From the movements of the derelicts which from time to time have drifted in the N. Atlantic for considerable periods, an illustration may be drawn of a possible cause of error which might ensue from the reliance solely upon such data as an indication of the water movements. The schooner *Fred Taylor*, which was wrecked in 1892 south-east of Nantucket Island, broke into two pieces, which moved in entirely opposite directions. A reason given for this curious occurrence is that the forepart of the ship, which was deep in the water, was carried south by the current, and that the wind drove the after part to the north.

These apparent anomalies are generally to be found, but one is forced to assume that the errors so brought in, will, given a large enough material, disappear in the long run.

Forms of floats, especially designed for the purpose, have frequently been used both in the study of surface and bottom currents; those destined for the surface are weighted so that when liberated they are just awash, in order that wind effect may be minimised. The use of bottom trailers, whose name explains their function, is more or less restricted to those areas in which trawl fishing is carried on, that is to say, where there is a reasonable chance of recovery. This method, of course, gives us only the positions of liberation and recovery of each float, the intermediate journey having to be filled in as best we may.

Three of the most important of such experiments are those made in the Atlantic by the U.S. Hydrographic Bureau,† and the PRINCE OF MONACO,‡ and by FULTON,§ in the North Sea.

Finally, there remains a natural form of float, namely, the plankton. Innumerable small organisms, animal and vegetable, are everywhere to be found in the surface layers of the sea, and the distribution of their several types is partly determined by the physical conditions of the water which they inhabit. Broadly speaking, Arctic differs from tropical plankton, and it follows that so long as the waters of a current retain sufficient of their original characteristics to render possible the retention of their proper plankton, an indication of the water movements is offered by a study of the plankton distribution.

Direct and indirect methods really merge at this point, for the investigation of temperature and salinity is but the investigation of

* "Oceanographische en Meteorologische Waarnemingen in den Atlantischen Ocean." Koninklijk Nederlandsch Met. Inst.

† Monthly Pilot Charts. Hydrographic Office, Navy Department, Washington.

‡ "Les Mines errantes sur l'Atlantique Nord." Comptes rendus de l'Académie des Sciences. Paris, 1919.

§ "The Currents of the North Sea and their Relation to Fisheries." Fish. Scot. Sci. Invest., 15th Ann. Rep., 1897.

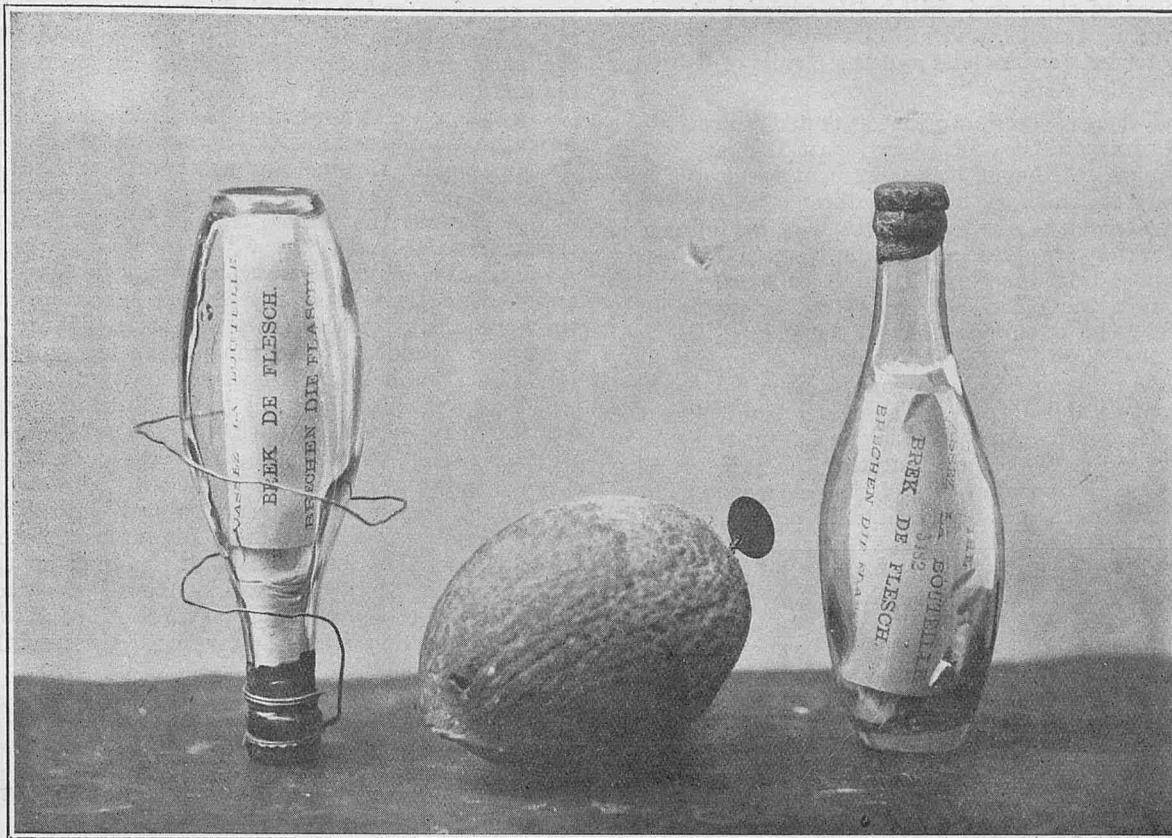


Fig. 3.—Drift Bottles. The bottle on the left is a bottom trawler, and is weighted in the neck so that it floats neck downwards. The wire "tail" is straightened out before the bottle is liberated, so that it hangs vertical and keeps the bottle off the bottom. The bottle on the right is a surface drifter, weighted to flow with the top just awash. In the centre is a type of float used in the early stages of the experiments—a coconut to which is joined a metal tally.

some of the physical characteristics of the different types of sea water, and from their distribution currents can be deduced, though the line of demarcation between types of sea water is somewhat arbitrary as compared to that between the types of plankton. These methods offer, however, the greatest possibilities for research, since samples of water are comparatively easily collected, the temperature can be determined accurately, and waters of different origin can be distinguished by their salinity. Furthermore, the limitations of this method are few; wherever a ship can go, there we can obtain some idea of the conditions in the water, not only in the surface, but in all intermediate layers.

HELLAND-HANSEN and SANDSTROM have adapted a theory of atmospheric circulation, due to BJERKNES, by which good use can be made of a knowledge of salinity and temperature, or rather of density, which is determined by these two factors, in the calculation of the direction and speed of a current.

Lastly, there have been carried out experiments in tanks, such as those of Professor PETTERSSON, in which he demonstrated the importance of the melting of the polar ice in any consideration of oceanic circulation. At one end of a large tank was placed a quantity of ice, and the movements of the water in the tank, consequent upon the introduction of the ice, were studied both by direct observation (colouring materials in the water) and by the continuous determination of the temperature and salinity at various points in the tank. The accompanying diagram, Fig. 5, illustrates the results. The main body of the water moving towards the ice can be taken to represent the North Atlantic Drift, with the Irminger current diving below the East Greenland Polar Stream, the latter being the return current on the surface moving away from the ice. The bulk of the cold heavy water sinks to the bottom and returns towards "equatorial regions." But proof of the existence of this last current is somewhat lacking; for it is in actual practice very difficult to identify, since its movements are likely to be extremely slow and the variations in its physical properties are so small as to be almost unnoticeable.

There has recently been some controversy as to the reality of Rennell's current, and as to the direction of water movement off the south European coasts, a matter which must be of some interest to navigators. Those who have studied these movements from the

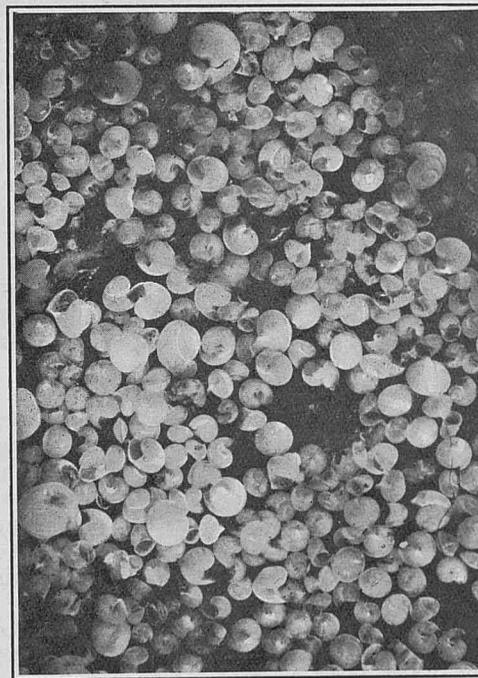


Fig. 4.—These animals, normally inhabiting the open sea in about Latitude 40° N., were found in plankton samples taken from the North Sea in 1921. Magnified 11 times.

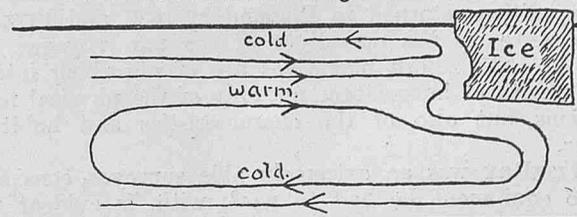


Fig. 5.—Currents due to the melting of ice in sea-water. After Pettersson.

point of view of the set of ships and drift-bottle experiments deny the existence of Rennell's current, and are of the opinion that the movements of the water between Ireland and the Straits of Gibraltar is southerly.

On the other hand, it has been shown that at stated seasons of the year salt water flows into the Bay of Biscay, past Ushant, and so into the English Channel. Although this movement is not yet fully understood, it appears to be more in the nature of a periodical strengthening and weakening of the current, than of an influx and reflux of water. MATHEWS* gives information, too, in his report upon the surface samples from the North Atlantic collected with the valuable co-operation of the officers of ships trading regularly in these waters, which lead one to suppose that off the coast of Portugal salt water sets to the North. The distribution of temperature, however, in these waters does not lead to conclusions which at first sight appear consistent in this respect. There is a bending of the isotherms to the south, but NANSEN† has suggested an explanation of this anomaly, a suggestion which, necessitating the presence of a north-going current, supposes an upwelling of the colder waters from below. Furthermore, NANSEN has demonstrated conclusively the

* "The Surface Waters of the North Atlantic Ocean South of 60° Lat., September, 1904-December, 1905." N. Sea Fish. Invest., S. Area, 2nd Report, 1907.

† Int. Rev. d. ges. Hydrobiol. u. Hydrog. Supp. to Vol. IV., July, 1913.

presence of water from the Mediterranean in the lower layers of water in the Rockall Channel, so that we may be certain that there is, below the surface at any rate, a north-going current off the coasts of Southern Europe.

It is now well known that the direction of the wind is extremely important in determining the normal water movement in the Bay of Biscay, English Channel and southern North Sea. But it is further becoming clear that local easterly winds are not on every occasion able to reverse the normal set of the water into the Channel and through to the North Sea.

A possible middle course, then, may be taken between these two antagonistic views, especially when it is borne in mind that although the movements of the most superficial of the upper layers may generally depend upon the wind's influence, yet the mixing effect of the wind is probably felt down to considerable depths. Thus, ships which expose so large an area to the direct influence of the wind, and drifting floats which are always at the very surface, may yet move in these regions to the south, while the main body of the water has a northward direction.

This problem may well serve to illustrate the nature of the many kindred problems which remain for future solution, and though, in these days of ships independent of the wind for their motive power, the results of this work cannot be of the same importance to navigators of the present day as to those of MAURY'S time, it is to be hoped that they will yet prove not entirely without value.

BIOGRAPHICAL NOTES OF SOME LEADERS OF MARINE METEOROLOGY.

IV.—ADMIRAL ROBERT FITZROY, C.B., F.R.S.

As a result of the Conference of Maritime Nations at Brussels in 1853 on the subject of international co-operation in marine meteorology, the English Government decided to establish a state meteorological department, and Captain ROBERT FITZROY was placed in charge.

Born at Ampton Hall, Suffolk, on the 5th July, 1805, ROBERT FITZROY was trained at the Royal Naval College, then a school for cadets, and entered the Navy in 1819. He was gazetted Lieutenant in 1824 and appointed to the frigate *Thetis*, serving in the Mediterranean and on the coast of South America under the command of Sir JOHN PHILLIMORE and Captain BINGHAM. In 1828 he was transferred to the *Ganges*, and became flag-lieutenant to Admiral Sir ROBERT OTWAY, in command of the South American Station.

He was given his first command in August, 1828, in the *Beagle*, a 235-ton brig engaged with the *Adventure*, Captain PHILIP PARKER KING, in survey work off the coasts of Patagonia and Tierra del Fuego.

He returned to England in 1830, bringing with him five Fuegians, who, he hoped, after a short sojourn in England, would return to their native land, carrying with them some rudimentary notions of civilisation. The expenses of this project he defrayed out of his own pocket.

In 1831, the *Beagle* was again commissioned to continue the survey, and FITZROY again given command. He set sail in December, 1831, carrying CHARLES DARWIN as supernumerary and taking back with him his five Fuegians.

During the next five years he surveyed the Straits of Magellan and the coasts of South America, and also ran a chronometric line round the world, "forming," to quote his report, "a connected chain of meridian distances around the globe, the first that has ever been completed, or even attempted, by means of chronometers alone."

FITZROY was advanced to the rank of Captain in 1835.

The expedition returned to England in 1836, and FITZROY proceeded to write up the narratives of the two voyages, which he published in 1839. Both narratives are of absorbing interest and contain a wealth of information, not only of the physical features of these regions, but also of the characteristics and habits of the inhabitants.

That FITZROY was an extremely able surveyor, considering the inadequate equipment he had to work with, is evident from the

remarks of Sir FRANCIS BEAUFORT, then Hydrographer to the Navy, in a Report to the House of Commons, 1848, namely, "from the Equator to Cape Horn and from thence round to the River Plata on the eastern side of South America, all that is immediately wanted has been already achieved by the splendid survey of Captain ROBERT FITZROY."

In 1841 he stood for Parliament, and was returned as member for Durham. He also accepted the Conservancy of the Mersey, and in his double capacity obtained permission to introduce a bill for the improvement of conditions in the Mercantile Marine. Although his measure was not accepted, it was the means of bringing about the introduction of the voluntary certificate of the Board of Trade in 1845, and formed the groundwork of some important clauses in the Mercantile Marine Act of 1850.

He was appointed Governor of New Zealand in 1843, but owing to his stern attitude towards the settlers in their often unscrupulous dealings with the natives, he became very unpopular and was recalled in 1845.

Three years later he was appointed to the post of Superintendent of the Dockyard at Woolwich, and later took command of the *Arrogant*, an early screw frigate fitted out under his supervision, in order to carry out experiments. These completed he asked to be superseded on account of ill-health and private affairs, and in 1850 he was placed on half-pay. This marks the end of his active sea career, although he was subsequently advanced to Rear-Admiral in 1857 and Vice-Admiral in 1863 by order of seniority.

FITZROY had always evinced an interest in weather conditions, and his "Voyages of the *Beagle*" contains many references to weather phenomena. When, therefore, in 1854 it was decided to organise a department to deal with the collection of weather data at sea, FITZROY, on the recommendation of the President of the Royal Society, was appointed its chief, with the title of Meteorological Statist to the Board of Trade.

He issued a circular to captains of ships, inviting their co-operation in the work of observing, and in 1855 a number of tested instruments were loaned to the Royal Navy and captains in the Mercantile Marine.

After consultation with the Royal Society as to the best method of utilising these observations, a programme of work was drawn up



Vice-Admiral Robert FitzRoy, C.B., F.R.S.

which confined itself solely to the computation of marine data. Some divergence from this original plan was, however, afterwards made. The occurrence of a terrific storm in 1859 off the British Isles, which caused the loss of the *Royal Charter*, led FITZROY to see the possibility of visualising weather conditions at any given time by means of a synoptic chart, and from this chart the possibility of foretelling or, as FITZROY termed it, forecasting the weather.

With this end in view, fifteen land stations were established which telegraphed to London daily their weather at certain hours, thus enabling a forecast to be made. These forecasts were utilised for the benefit of seamen by the inauguration, in 1861, of the system of hoisting storm-warning cones at the principal ports when a gale was to be expected. This service has proved of inestimable value to shipping, and, if forgotten for all else, FITZROY's name will always be remembered with gratitude in association with this gale-warning service.

In 1863 FITZROY published his "Weather Book," a text book which was far in advance of the scientific opinion of his time.

Although immersed in the organisation of this new weather service, FITZROY made opportunity to devote considerable time and energy to the work of the lifeboat institutions, for whose improvement he laboured unceasingly.

In time, however, the strain of the two pursuits told on his health. Naturally of a highly strung temperament, his health had been much impaired by the strain and anxiety of his survey work off South America. The subsequent responsibility of carrying on the meteorological department, and, in particular, of maintaining the efficiency of the gale-warning service at a time when little or nothing was known of the conditions governing the weather of these isles, proved too great, with the result that he died on the 30th April, 1865, at the early age of fifty-nine. Thus was ended prematurely a life that had been devoted to the interests and advancement of his fellow seamen.

Although with the change of conditions from the days of sailing ships to those of the modern ocean liner and the general use of wireless telegraphy at sea, marine meteorology had had to adjust its outlook from FITZROY's day, the seafarer must always look back with a feeling of gratitude for the magnificent work done by Admiral FITZROY, the founder of the British Meteorological Service.

Acknowledgment is made to The Encyclopædia Britannica and National Dictionary of Biography.

(To be continued.)

THE MARINE OBSERVER'S LOG.

It is hoped that these pages will be filled each month with a selection of the contributions of Mariners in manuscript, or remarks from the Logs and Reports of regular Marine Observers.

Responsibility for statements rests with the contributor.

EASTERLY SET NEAR ST. PAUL'S ROCKS.

DURING May, 1921, a very pronounced easterly set was found in the Doldrums, near St. Paul's Rocks. Such a set is most unusual, and an investigation was made, the result of which was published on the April, 1922, Meteorological Chart of the North Atlantic Ocean. It was found that in April-May, 1862, a similar easterly set had occurred, and on comparing the conditions on the two occasions it was noticeable that the position of the Doldrums on both occasions was decidedly to the southward of the normal position.

In April, 1923, S.S. *Highland Warrior*, Captain W. BROOKE, Observer Mr. H. W. BENNETT, River Plate to London, stopped for engineer's purposes between 6.45 p.m., April 17th, and 3.25 a.m., April 20th, in Latitude $0^{\circ} 55' S.$, Longitude $29^{\circ} 35' W.$ During that time the ship was set to the northward and eastward.

Captain BROOKE, in a letter, stated that on May 28th-29th, 1921, between Latitude $1^{\circ} 25' S.$, Longitude $31^{\circ} 01' W.$, and Latitude $1^{\circ} 59' N.$, Longitude $25^{\circ} 21' W.$, S.S. *Highland Warrior* was set S. $72^{\circ} E.$ 62 miles in the day, and that on one other occasion when passing St. Paul's Rocks he noticed the current flowing very slowly to Westward—not more than $\frac{1}{4}$ knot. During the course of many voyages, he states, these three occasions are the only ones on which he failed to encounter a Westerly set in the equatorial regions adjacent to St. Paul's Rocks.

From other reports it was seen that there was confirmation of the easterly set occurring in both April and May, 1923. CHARTLETS A and B were made for each of these months.

When the position of the Doldrums during the same period on the South American Track came to be examined, it was found that they were well to the southward of their normal position throughout April and between May 22nd and 25th. Between April 8th and May 1st, and again on May 23rd and 25th, the North-East Trade blew right down to the Equator, and between April 4th and 20th the South-East Trade did not penetrate further north than Latitude $4^{\circ} S.$ When these dates are compared with those of the currents plotted on CHARTLETS A and B they form a very satisfactory confirmation of the view put forward in the article on the currents of May, 1921, *i.e.*, that an easterly set is found near St. Paul's Rocks when the Doldrums are south of their normal position in the months of April and May.

It is hoped that in the near future it may be possible to extract the currents on the South American Track for a number of years and discuss the fluctuation of the Counter Equatorial Current more fully.

SEA TEMPERATURES IN THE NORTH ATLANTIC.

THE following are extracts from letters received from Captain H. F. DAVID, R.D., R.N.R., S.S. *Olympic*, New York to Southampton.

"Our passage eastward was marked by fine weather generally, but one point of interest was that on the 8th April, 1923, during the forenoon when between Longitude 65° and $63^{\circ} W.$, on the 40th parallel the temperature of sea fell from 62° to $41^{\circ} F.$, remaining at that level for some 70 minutes and gradually rising again to 62° and to 70° in two hours more. During this period the horizon to the eastward was apparently raised some 30 to 50 minutes of arc and ended on starboard bow to the south with a distinct Z-shaped appearance.

"A.M. sun observations showed appreciable errors when compared with P.M. results under normal conditions."

"I enclose tabulated form of temperature observations of air and water experienced on our last westbound trip to New York.

"The sudden drop in water was very marked; both I and the Chief Officer were engaged in taking stellar observations at the time. We had observed the Pole on starboard side, and felt no appreciable drop of temperature but on going over to the port side, to take a Hydræ on the meridian to the southward, the chilled atmosphere felt like the air coming out of a refrigerated chamber.

"In view of the locality I thought these notes would be of interest to you.

"No appreciable drop of temperature was experienced when crossing the 47 to 50 meridians West, in Latitude $40\frac{1}{2}^{\circ} N.$, the Gulf Stream maintaining an average of $60^{\circ} Fahr.$, which makes the other cold tongue the more marked.

"The *Mongolia*, westbound in company, about 2 miles on our starboard bow, gave Latitude $40^{\circ} 35' N.$ by Pole and $40^{\circ} 35' N.$ by moon half an hour before, so that it would appear to be a comparatively narrow tongue of cold water that we were in at the time mentioned."

Date.	Time.		Latitude.	Longitude.	Air.	Water.	Wind.	Corrected. Bar.	Clouds.	Sea.
	A.T.S.	G.M.T.								
23/4/23	Noon	3.50 p.m.	40° 30' N.	57° 34' W.	60	62	South 6	29.58	Cu. 7	Rough.
"	2.00 p.m.	5.50 "	40° 30' N.	58° 32' W.	63	62	South 5	29.54	Cu. Nb. 9	"
"	4.00 "	7.50 "	40° 30' N.	59° 29' W.	56	41	South 4	29.50	Cu. Nb. 9	"
"	6.00 "	9.50 "	40° 35' N.	60° 27' W.	57	47	S.S.E. 4	29.50	Cu. Nb. 3	Mod.
"	7.00 "	10.50 "	40° 35' N.	60° 56' W.	50	36	E.S.E. 3	—	—	—
"	8.00 "	11.50 "	40° 35' N.	61° 25' W.	53	37	E.S.E. 3	29.45	Cu. Nb. 9	Mod.
"	9.00 "	12.50 a.m.	40° 35' N.	61° 54' W.	48	43	Var. 1	29.42	Cu. Nb. 9	"
"	10.00 "	1.50 "	40° 35' N.	62° 23' W.	55	68	West 3	29.40	Cu. Nb. 9	"
"	11.00 "	2.50 "	40° 35' N.	62° 52' W.	60	67	West 4	29.40	Cu. Nb. 9	Rough.
"	12.00 "	4.25 "	40° 35' N.	63° 38' W.	55	67	West 3	29.32	Cu. Nb. 9	"

" Range of temperatures experienced westbound between 57½° W. and 63½° W. on 40° 35' N. parallel. Showing unusual developments of Arctic currents into Gulf Stream. *Olympic* steering 270°, speed 22 knots, average. 7.15 p.m. A.T.S. Pole Star and *a* Hydræ on meridian to southward gave 40° 30' N. and 40° 41' N. respectively; mean, 40° 35' N. The S.S. *Mongolia* westbound in company, 2' away on starboard bow, gave Latitude Pole Star 40° 35' N. and the same Latitude by moon ¾ hour earlier."

ATMOSPHERIC DISTURBANCE.

EXTRACT from Meteorological Log kept on board H.M.S. *Mutine*, Captain H. P. DOUGLAS, C.M.G., R.N., off Old Harbour Bay, Portland Bight, Jamaica.

"The following general conditions prevailed up to 3 p.m. during the afternoon of April 8th (1923):—

"Wind S., force 3, mercurial barometer at noon 1014.9 (29.97), dropping slightly; clouds—cumulus and nimbus; sky half covered.

"Distant thunder was heard during the watch, over the hills, and a prolonged shower passed over between 1.40 p.m. and 2.30 p.m.

"At 3.26 p.m. the quartermaster, who was mounting the bridge ladder, saw a brilliant flash. This was accompanied by a violent explosion, and a cloud of grey smoke and a splash about ten feet high were visible about thirty yards off the starboard quarter. The water around this position, when the splash had subsided, was covered in thin foam.

"A heavy shower occurred between 3.30 and 4.30, during which time the wind veered to N.W. and dropped to a calm. Very distant thunder was still heard, and lightning was seen over the hills to the north during the last dog and first watches.

"The rating on watch in the W.T. office at the time gave the following details:—

"The atmospherics were bad during the afternoon.

"At 3.26 a very loud explosion was heard in the telepads. A large spark occurred across the micrometer gap and the valves stopped oscillating for nearly a minute.

"The gear was immediately earthed, and it was found that no damage had been done, as at 5 p.m., when the set was again connected up, reception was normal."

Captain Douglas adds a note:—

"I was in my cabin at the time and considered the explosion to cause an exactly similar noise to an aeroplane bomb of considerable size.

"The force of the explosion was sufficient to shake the whole ship.

"No lightning was observed, and the thunder was very distant, so there was no question of this being an ordinary clap of thunder.

"It is regretted that no one else saw the splash, &c., so that the evidence cannot be corroborated."

In this connection some accounts of Ball Lightning given in the Meteorological Magazine of December, 1923, are of interest.

In one case, investigated by the Rev. H. D. DALE, vicar of Hythe, the ball lightning occurred during a very heavy hail shower in the evening of April 26th, 1923. No sign of an approaching thunderstorm was observed, but suddenly, at 7h. 30m., a ball of fire, which

appeared to be about 6 to 12 ins. in diameter, fell and burst almost instantaneously, penetrating the metal road to a depth of 2 ft. 8 ins., then running along the metal water main. This was followed by a tremendous thunderclap. The road immediately after the explosion appeared filled with sparks, followed by smoke. Windows were broken in houses 150 to 300 yards away, and the electric lighting affected in houses half a mile away, while the wire netting on the palings close by fused, and lines were scored on the bark of trees 2 to 8 yards from the hole, which was about 1½ ins. in diameter.

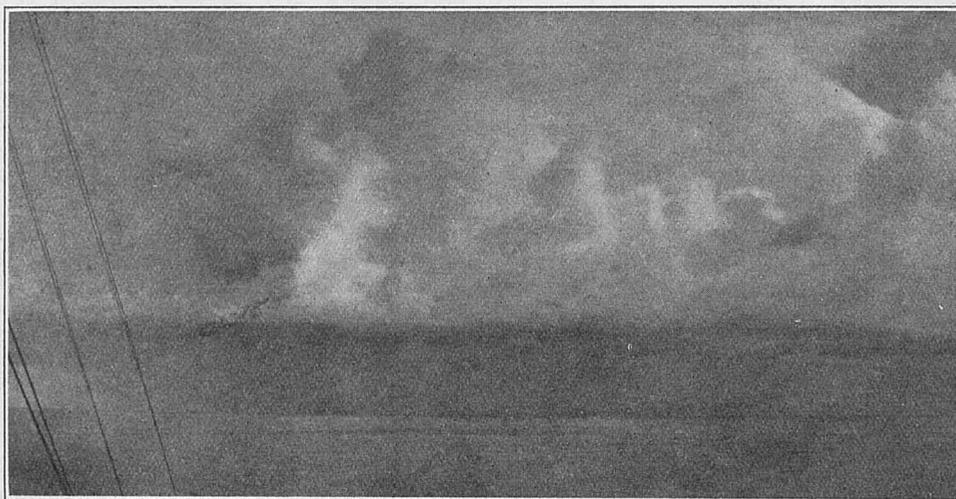
Another account of ball lightning comes from Mr. J. MINTERN, of Killmurry, Passage West, co. Cork, who reports that he observed ball lightning during a severe thunderstorm on the evening of May 2nd, 1923. The first ball of fire was seen about 21h. 30m.; it was clear yellow in colour, and its edges were defined. It was visible for a few seconds, and then seemed to drop slowly, in the north apparently, into the River Lee. A few minutes later a vivid flash was seen, "like a rope of fire-coloured blue, green and yellow." A little later still a second ball of fire was seen to fall more to the eastwards, where the storm was travelling. This ball was not so distinct as the first, and "looked as if seen through a fog." The storm was not associated with heavy rainfall; only a few moderate showers fell while it was at its height.

On another occasion the ball lightning was seen in a church. The "Daily Express" states that the Rev. T. PEACOCK, vicar of Hemingborough, was giving an address at Selby to the Yorkshire Association of Bellringers during a thunderstorm on the afternoon of September 2nd, 1923, when a ball of fire appeared in the church, ran up the aisle and then exploded. The air was pungent with the smell of sulphur. One curious thing about the fireball was that it rolled up the carpet in the aisle.

In his inaugural address on October 18th, 1923, as President of the Institution of Electrical Engineers, Dr. ALEXANDER RUSSELL recorded among his personal experiences that, when watching a thunderstorm at sea from a small boat on a calm day, where the lightning seemed to strike the sea, a narrow column of spray, or probably steam, rose suddenly, the effect being similar to that produced by a gannet when diving. Dr. RUSSELL had also the good fortune to see globular lightning. He was on the coast of Ayr many years ago, when two spheres of a dull reddish colour, about 20 to 30 feet up, moved slowly in from the sea, each about a foot in diameter. One hit the wall of a building, but did no apparent damage, although it made a loud report. The other drifted away.

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

CUMULO-NIMBUS CLOUD.



CUMULO-NIMBUS CLOUD.

THE photograph above was taken in Latitude $14^{\circ} 40' N.$, Longitude $92^{\circ} 38' E.$, at noon on April 18th, 1922, by Mr. A. L. ROWLANDS, 2nd Officer S.S. *Arracan*, Captain W. Y. HAMILTON, Bassein to Colombo.

The wind and weather reported at the time by *Arracan* were:— Wind S.E. 1, Bar 1009.8 (29.82), Dry-bulb $80^{\circ} \cdot 6$, Wet-bulb $76^{\circ} \cdot 1$, Cloud st-cu, cu-nb 10, weather o.u.q., sea S.E. 1, Swell S.W. slight, sea temperature $84^{\circ} \cdot 5$.

At Port Blair, Andaman Islands, the rainfall was 2.11 inches between 8 a.m. of the 18th and 8 a.m. of the 19th.

At 8 a.m. of the 20th a severe storm had formed to the S.W. of Port Blair. This storm moved northward over the Bay until by the 25th it had broken up in the hills of Upper Burma.

PHOSPHORESCENCE.

THE following is an extract from the log of S.S. *Kurmark*, Captain G. E. CARTMER, Bushire to Perim.

18th April, 1923. (Lat. $25^{\circ} N.$, Long. $57^{\circ} E.$)

“9 p.m.—Ran into phosphorescence extending from horizon to horizon. The light was very pale blue in colour and of a cloudy nature. It covered about 75 per cent. of the sea, and in the intervening dark patches there were innumerable points of light of a darker blue. The light was mainly in the form of a revolving spiral, rotating very rapidly, but was varied at times by parallel bands moving from various directions. At about 9.40 the illumination began to diminish in extent and intensity, and at a few minutes before ten all phosphorescence disappeared suddenly.”

WIRELESS AND WEATHER. AN AID TO NAVIGATION.

CHAPTER V.

Tracking Depressions by Isolated Observation and Casual Reports versus Routine Standardised Reports.

MR. N. A. LINE, second officer, S.S. *Vellavia* (Lieut. Commander T. S. M. POOLEY, R.D., R.N.R.), in forwarding a report of weather conditions experienced during part of passage from Portland, Maine, to London in April last year, wrote:—

“The data commence on April 6th (1923); previous to this various winds were experienced and the barometer remained high and steady. On April 6th ship evidently entered into an area which affected her nearly all the way across.

“As to the area of low depression that was influencing the winds experienced by us, two opinions prevail as to the position of its centre when ship entered into area on April 6th.

“One opinion is that storm centre was behind the vessel then, and that it overtook the vessel.

“The other is that centre was ahead of ship at noon, April 6th, and at no time after then was it astern of ship, but path of storm and ship's course converged, and at one time ship was actually overtaking storm-centre, or, if not, then storm centre was travelling at about the same speed as the ship.

“This storm apparently did not reach the English coast.

“It is suggested that the storm centre filled in on April 11th.

“It will be noticed that the barometer was steady from 4 a.m. on April 11th until 4 p.m., when it commenced to fall, and with the wind backing there appeared to be another depression forming behind ship, and which began to exert its influence from about noon, April 12th.

“I should be interested to know the cause of the sudden veering of the wind (S.S.E. to W.S.W.) which occurred at 1.30 a.m. on April 13th. It is suggested that ship was fairly close to storm centre, which passed ahead of us at about 1.30 a.m. and to the northward, the wind having previously been steady from the S.S.E. for 6 or 7 hours.”

A brief investigation by means of Weather Charts will not only answer Mr. Line's questions, but serve to give further proof of the value of routine Wireless Weather reports.

In the forenoon of April 6th, 1923, *Vellavia* was in favourable position to intercept the Arlington U.S.A. Weather Bureau report, of which particulars are given in Weather Signals. By plotting a few of the Station reports with ship's reports of observations which synchronised with those of the American Coast, CHART IX. is made. By it we see that there is a cyclonic depression of some intensity centred over New Brunswick, and that *Vellavia* is on the northern edge of the North Atlantic anti-cyclone. *Digby*, some 130 miles N.N.E., and *Cassandra*, 12° further west, are in the wind circulation of the depression.

With falling barometer at East Port, where the wind is westerly, and, slowly rising barometer at New York, where the wind is reported N.W., force 7, an easterly movement of the depression will be expected.

Though *Montrose* is steaming towards the trough at 17 knots her quickly falling barometer gives some support to this conclusion, while the fact that *Vellavia's* high and steady glass had commenced to fall, though she was steaming at $11\frac{1}{2}$ knots on a N. 54° E. course, is an indication that the depression may be overhauling her.

Vellavia therefore expects the wind to back somewhat at first and then to gradually increase in force.

During the next 24 hours the observations recorded show a falling barometer and freshening breeze, but the wind did not back appreciably. On the morning of April 7th, *Vellavia* is east of the 40th meridian of West Longitude, in a favourable position to receive the British and Eiffel Tower reports, together with ships' reports of observations synchronising with those of the West Coast of Europe and the Azores; CHART X. is made.

It is now seen that the western depression has spread, that there is a wedge of high pressure in about Longitude $25^{\circ} W.$, while a large depression is situated over the eastern North Atlantic with two centres, one west of Ireland and the other just south-west of Scilly. With the barometer tendencies reported by Horta, Azores, and those reported by ships westward of Longitude $29^{\circ} W.$, allowing for course

and speed, together with her own falling glass, on a N. 67° E. course at 10 knots, *Vellavia* will expect the depression to continue its easterly movement and therefore westerly winds during the next 24 hours.

The wind was logged west, force 6, with a falling barometer throughout the day.

On the morning of April 8th, with CHART XI., the series becomes more valuable because we are now able to make better comparisons.

From this chart, with our previous information, we infer that the western depression has travelled some 1,500 miles east in the last two days, and is now centred to the northward of *Vellavia*, as her glass is still falling. As she steams to the E.N.E. she is probably in advance of the trough, though this may be caused by a deepening gradient.

Vellavia also notes that the large eastern North Atlantic depression of yesterday has travelled S.E. and is now centred near the Gulf of Lyons, making the pressure distribution favourable for a south-easterly movement of the western depression. She will expect an increasing wind veering to the north-west as the trough passes.

CHART XII., morning of April 9th, shows the depression centred in about Latitude 49° N., Longitude 22° W., with a complete cyclonic wind circulation up to gale force. It has now overhauled and passed *Vellavia*.

The barometer tendency of shore stations and those of the reporting ships, allowing for course and speed, give indications of the movement or change in this great weather system, from which it would be inferred that the depression would probably continue to move slowly S.E., with possibly (judged by *Celtic's* barometer tendency, course and speed) a steepening gradient.

Vellavia will therefore expect the wind to veer to the north during the next 24 hours and that it will continue at gale force.

CHART XIII., for the morning of April 10th, shows that the depression is centred in about Latitude 45° N., Longitude 14° W. A wedge of high pressure in its rear is indicated by the winds and barometers reported by *Saturnia* and *Mauretania*.

The barometer tendencies reported seem to indicate that the depression may be filling in somewhat. *Vellavia* will expect a continuance of north-easterly winds, probably moderating in the next 24 hours.

On the morning of April 11th, CHART XIV., the depression had moved little to the eastward since the previous day; it had filled in somewhat and taken up an elongated form extending over a great distance in a north and south direction off the west coast of Europe; the wedge observed yesterday, though less intense, has now spread further west.

The winds and barometer tendencies indicate that the depression is filling in, while there are indications of another depression to the westward of the wedge, advancing eastward. *Vellavia* will expect the wind to continue from the northward for a time, falling light, and later it may back as the new western depression overhauls her.

The steady barometer from 4 a.m. to 4 p.m. on this day referred to by Mr. LINE was due to *Vellavia*, though steaming athwart the trend of the isobars, preserving the moving position of equal pressure. That would be accomplished if the ship steamed east at the same rate as an unchanging depression, or if she closed the low at the same rate as the gradient shallowed. The latter was probably the case.

CHART XV., the morning of April 12th, shows a depression centred over Ireland, with an irregular extension covering the Bay of Biscay and coast of Portugal, where there are secondaries. The original western depression has partly filled in, and the new western depression is probably coalescing with it; hence an irregular distribution of pressure. *Vellavia* will expect variable westerly winds.

CHART XVI., morning of April 13th.

The depression is now centred near the Hebrides, and a secondary is indicated to the north-westward of Scilly.

The sudden shift of wind from S.S.E. to W.S.W., of which Mr. LINE asks the cause, was due to this secondary. At midnight on April 12th *Vellavia* had a fresh S.S.E. breeze, squally, with heavy rain, barometer 996 (29.42). Low pressure was now to the westward or astern of the ship.

At 1.30 a.m. the wind veered to W.S.W., taking about 5 minutes to shift, and then gradually veered to W. by N. Sky cleared and wind increased to gale force until 3 a.m., when it moderated. During this time low pressure passed eastward, very close to the northward of the ship.

At 8 a.m. *Vellavia* was distant 123 miles from Scilly, her point of landfall, and would be specially interested in visibility, which was recorded as good at 7 a.m. at St. Mary's Weather Telegraphic reporting station.

The barometer tendencies reported at all stations on the western coasts of the British Isles to the eastward of the main depression are falling or falling slowly, while that reported by *Saturnia* in rear of the trough, with ship proceeding N. 64° E., 13 knots, is steady, all indicating an easterly movement of the depression.

As the depression moves east the wind in the vicinity of Scilly will veer round to a direction to the northward of west, and will probably freshen somewhat, with conditions favourable to improving visibility, though it will be noted that passing showers are reported in the rear of this advancing depression, where hail may be expected at this season.

Vellavia therefore forecasts very good visibility generally, with occasional obscurity by rain or hail squalls.

6.30 p.m. is logged as the time when the Bishop Rock was abeam, but the distance at which it was sighted is not given. At 6 p.m. St. Mary's, Scilly, recorded wind west, force 6, b.c., cu-nb 4, visibility 10 miles.

In a future chapter we hope to show how much more may be done in forecasting visibility when reports of temperatures of the air and sea surface are used.

To summarise the answers to Mr. LINE's inquiry. The opinion which placed the depression astern of *Vellavia* on April 6th, and that this depression overhauled and passed her, is correct.

The suggestion that the depression filled in on April 11th is supported by the charts, but this weather system certainly reached the English coast, influencing the weather over the British Isles from April 9th, until it filled in on April 11th.

With a suitably organised system of ships' long-range reports, all this and more would be revealed at the time, to those who are directly concerned, and by themselves, *i.e.* the commanders and officers of ships.

The Use of Wireless Weather Reports in the North Sea.

Normally, weather systems travel eastward in the latitude of the British Isles, and therefore reports from British land stations may be as useful to ships in the North Sea as those of ships to the westward are to ships further east in the Atlantic, or to the forecasters at the Meteorological Office.

In the North Sea trades the officers usually have little time to spare for W/T weather reporting or making charts; moreover, it is not desirable to increase W/T traffic in these waters. Hence ships in the North Sea may usually prefer to rely upon the forecasts issued along with the coded Coast Station weather reports in the Weather Shipping Bulletin broadcast by the Air Ministry W/T Station. The utility of these reports may be enhanced by the recipients' knowledge of Weather Charting, and as many marine observers may prefer to make their own charts and forecasts, the following example is given:—

On the evening of March 25th, 1922, S.S. *Kovno*, Captain H. E. FRENCH, bound from Christiansand to Hull, charts the British Coast station observations with her own; she receives no reports from other ships, and CHART XVII. is made.

This chart shows her that there is a depression centred over the Northern Midlands. The rising barometer at stations to the northward, falling barometers to the south-westward, and steady barometers to the south-east of the depression indicate the probable southerly movement, with tendency to fill in.

As *Kovno* steams to the S.W. at 11½ knots with a falling barometer she expects to close the low in its rear. She will therefore expect the wind to freshen somewhat, and to back to the eastward with indifferent visibility as she approaches the low with an easterly wind.

On the morning of March 26th, the operation is repeated, and *Kovno* sees from CHART XVIII. that the depression has moved S.E. and is centred over N.E. France. The rising barometer reported at the British stations in its rear indicates that the depression may continue moving S.E.

Kovno, steaming S.W. at 11½ knots, will expect the wind to back to the N.E. as she comes in rear of the depression approaching the Humber, and that the visibility may improve.

(To be continued.)

WEATHER SIGNALS.

II.—WIRELESS WEATHER BULLETINS.

UNITED STATES OF AMERICA (ATLANTIC COAST).

Washington.—Arlington W/T Station, approximate Latitude 38° 52' N., Longitude 77° 05' W., call sign NAA, transmits a weather bulletin at 0330 G.M.T. on a wave length of 2,655 metres (C.W.), and at 1530 G.M.T. on a wave length of 5,996 metres (C.W.).

The bulletin is divided into *two parts*, and begins with the letters U S W B (United States Weather Bureau).

Part I. of the 0330 and 1530 G.M.T. transmissions consists of surface weather conditions based upon observations taken at 0100 and 1300 G.M.T., respectively, at the following stations. Upper air observations begun at 1200 G.M.T. are also included in Part I. of the latter transmission.

Indicator Letters.	Station.	Position (Approx.) Lat. Long.	Indicator Letters.	Station.	Position (Approx.) Lat. Long.
J	St. Johns, N.F.	47°34' N. 52°42' W.	P	†Pensacola, Fla.	30°21' N. 87°19' W.
S	Sydney, N.S.	46°10' N. 60°10' W.	MG	Montgomery, Ala.	32°21' N. 86°23' W.
CK	Cochrane, Ont.	49°20' N. 81°00' W.	VK	Vicksburg, Miss.	32°22' N. 90°47' W.
FP	Father Point, Que.	48°31' N. 68°19' W.	NO	New Orleans, La.	29°57' N. 90°02' W.
ML	Montreal, Que.	45°30' N. 73°35' W.	LR	Little Rock, Ark.	34°45' N. 92°13' W.
E	Eastport, Me.	44°53' N. 67°02' W.	GV	Galveston, Tex.	29°19' N. 94°48' W.
N	Northfield, Vt.	44°08' N. 72°42' W.	NV	Nashville, Tenn.	36°08' N. 86°47' W.
T	Nantucket, Mass.	41°17' N. 70°05' W.	CN	Cincinnati, Ohio	39°03' N. 84°24' W.
NY	†New York, N.Y.	40°28' N. 74°00' W.	PB	Pittsburg, Pa.	40°27' N. 80°01' W.
AC	†Atlantic City, N.J.	39°21' N. 74°26' W.	F	Buffalo, N.Y.	42°52' N. 78°54' W.
WA	†Washington, D.C.	38°52' N. 77°03' W.	D	Detroit, Mich.	42°21' N. 83°45' W.
NF	†Norfolk, Va.	36°50' N. 76°18' W.	L	Alpena, Mich.	45°05' N. 83°28' W.
LB	Lynchburg, Va.	37°18' N. 79°01' W.	M	Marquette, Mich.	46°30' N. 87°20' W.
AV	Asheville, N.C.	35°32' N. 82°28' W.	CH	Chicago, Ill.	41°53' N. 87°40' W.
H	Hatteras, N.C.	35°14' N. 75°32' W.	DU	Duluth, Minn.	46°51' N. 92°12' W.
C	†Charleston, S.C.	32°43' N. 79°52' W.	LC	La Crosse, Wis.	43°45' N. 91°18' W.
B	Bermuda	32°17' N. 64°46' W.	SL	St. Louis, Mo.	38°36' N. 90°18' W.
CO	†Columbia, S.C.	34°02' N. 80°57' W.	KC	Kansas City, Mo.	39°07' N. 94°38' W.
JA	Jacksonville, Fla.	30°19' N. 81°51' W.	O	†Omaha, Nb.	41°23' N. 96°01' W.
K	†Key West, Fla.	24°33' N. 81°43' W.	OK	Oklahoma City, Okla.	35°32' N. 97°28' W.
AT	Atlanta, Ga.	34°42' N. 84°26' W.	DA	Dallas, Tex.	32°46' N. 96°31' W.
TA	Tampa, Ga.	27°35' N. 82°29' W.	EP	El Paso, Tex.	31°47' N. 106°20' W.

The stations are indicated by the key letters given above and are followed by two or more groups of five figures in each group. The first two groups contain surface observations. Additional groups, giving upper air data, are only given for the stations marked with a dagger (†), and are represented in the third and succeeding groups.

If upper air observations are not possible these groups will be substituted by the words "foggy," "rain," or "snow," as the case may be.

An X will be substituted for any missing data.

Explanation of Groups.

First Group.—1st three figures give the barometer reading corrected in inches and hundredths, the first 2 or 3 being omitted. (To convert to millibars, see Table XXX.)

4th figure gives the wind direction (Table XXV.).

5th figure gives the wind force by Beaufort scale; 9 is sent for force 9 and above.

Second Group.—1st figure gives the present weather (State of weather at surface (Table XXVI.).

2nd figure gives the pressure change‡ in hundredths of an inch during the two hours preceding observation (Table XXVII.).

3rd figure gives the cloud amount‡ (number of tenths of the sky obscured, 10 tenths being total cloudiness (Table XXVIII.).

4th figure gives the cloud form‡ and speed (Table XXIX.).

5th figure gives the direction, from, of cloud movement (Table XXV., where 0 in this case means no movement observable).

NOTE.—When both upper and lower clouds are observed, only the amount, kind, and direction of the lower clouds will be sent. In such cases the amount of the upper clouds, if any, can be determined, approximately, by taking the difference between the tenths of cloudiness interpreted from the figures showing "present weather" and "amount of clouds."

Remaining groups, if sent, refer to upper air observations.

Part II. of the bulletin is in plain language, and consists of a synopsis of general pressure distribution, including the location of high and low areas, and the barometer readings at their centres;

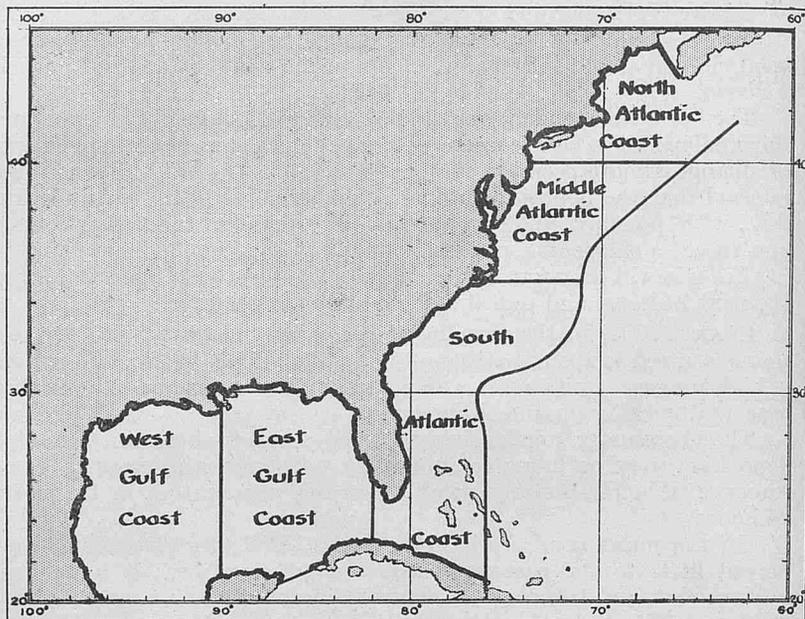
‡ Reports of Pressure Change are not received from all stations, and no cloud reports from the Alaskan, Canadian and some United States Stations.

The missing data in this group will be represented by an appropriate number of X's.

wind and weather forecasts covering a period of 24 hours, commencing at 0500 G.M.T. in the 0330 G.M.T. bulletin, and 1700 G.M.T. in the 1530 G.M.T. bulletin, for the areas shown on the chartlet below.

A system of local distributions of forecasts and weather messages for various coastal areas of the United States Atlantic Seaboard is maintained by the W/T stations given on page 58.

CHARTLET OF U.S. MARINE FORECAST AREAS.



DAILY WEATHER BULLETINS TRANSMITTED BY WIRELESS TELEGRAPHY FROM THE UNITED STATES TO FRANCE.

WASHINGTON—ANNAPOLIS W/T STATION.

The "Angot" Weather Bulletin.—The United States Weather Bureau sends each evening, Sundays and holidays included, to the French Meteorological Service at Paris, a bulletin containing observations taken at a number of stations in the United States, Alaska, Canada, Nova Scotia, Newfoundland and Bermuda, the position at the same hour of dominating high and low pressure areas, and weather reports from a limited number of ships in the North Atlantic Ocean. All land observations are taken at 0100 G.M.T., except Alaskan reports, which are taken at 2100 G.M.T., current date. The bulletin is addressed to "Angot, Paris," and is forwarded through the United States Naval W/T station at Annapolis to Lyons (Y.N.) W/T station. The transmissions are made as the first message in the Annapolis schedule with France. This schedule begins at 0530 G.M.T., and transmission commences as soon thereafter as communication with Lyons can be established.

The messages are coded in a modified form of the International Meteorological Code, except that a date word immediately following the address is used to show the day of the month and the period of the day (a.m. or p.m.) that the land observations were taken, and key letters instead of numerals to designate the stations.

For meaning of date words, see page 9, United States Weather Bureau Radiographic Code, which can be obtained from the U.S. Weather Bureau, Washington, D.C.

The arrangement of the messages is in coded groups, as follows:—

Land Stations.—I. (II. or III. key letters), BBBDF.

Ship reports.—Ship call sign, JQLLL, III GG, BBBDF, TTC.

Centre of predominating high and low pressure areas.—Name of station, BBBDF.

Meaning of Symbols.

BBB = pressure reduced to sea level, in ins. (initial figure, 2 or 3, omitted). To convert to millibars, see Table XXX.

D = wind direction (Table XXV.).

F = wind force by Beaufort scale.

J = day of week, numbered 1 to 7, beginning with Sunday.

Q = quarter of globe in which ship is situated (always in N. latitude represented by figure 1, for ship reports included in Angot message).

LLL = latitude in degrees and minutes. The actual minutes are determined by multiplying the third coded figure by 6.

III = longitude in degrees and minutes. Minutes are determined in same manner as for latitude.

GG = Time of observation, G.M.T.

TT = temperature in Fahrenheit to nearest even degree.

C = state of sky and weather (Table XXVI.).

For List of Land Observation Stations, giving their key letters and approximate positions, see page 27, February number ("France, W/T Weather Bulletins," under "List of Observation Stations in Part III.>").

The American reports are also broadcast from the Eiffel Tower for the benefit of other European meteorological services and ships in European waters. The transmission is in similar form to that in which the bulletins are transmitted from Annapolis, and follow immediately after the regular European weather report bulletins. See page 28, February number ("France W/T Weather Bulletins," under "Part III.>").

Although the "Angot" bulletins are specially addressed to the French Meteorological Service, they are intended for general benefit, and ships may intercept them during transmission from Annapolis to Lyons and use the information contained therein.

Position.—Washington—Annapolis W/T station, 38° 59' N., 76° 27' W. Call sign, NSS. Wave-length, 17,150 metres (C.W.).

Code Tables and their Meanings, used in connection with the "Arlington" and "Angot" Bulletins (U.S.A.).

Table XXV.

Wind Direction True, Table.

Code Figure.	Code Figure.
0 = calm or no movement.	5 = south.
1 = north.	6 = south-west.
2 = north-east.	7 = west.
3 = east.	8 = north-west.
4 = south-east.	

The above table can also be used to decode direction of cloud movement.

Table XXVI.

Present Weather (State of Sky and Weather at Surface Table).

Code Figure.	Code Figure.
1 = clear (3 tenths or less).	5 = snowing.
2 = partly cloudy (4 to 7 tenths).	6 = thunderstorm.
3 = cloudy (8 to 10 tenths).	7 = sleeting or hailing.
4 = raining.	8 = dense fog.

Table XXVII.

Pressure Change during two hours preceding Observation Table.

Code Figure.	Code Figure.
0 = change of less than .04 inch.	6 = decrease of .08 inch.
1 = increase of .04 inch.	7 = increase of .10 inch.
2 = decrease of .04 inch.	8 = decrease of .10 inch.
3 = increase of .06 inch.	*9 = increase or decrease of .12 inch or more.
4 = decrease of .06 inch.	
5 = increase of .08 inch.	

Table XXVIII.

Cloud Amount Table—Number of Tenths of the Sky obscured (10 Tenths is Total Cloudiness).

Code Figure.
0 = 1 tenth or less of sky covered.
2 = 2 to 3 tenths of sky covered.
4 = 4 to 5 tenths of sky covered.
6 = 6 to 7 tenths of sky covered.
8 = 8 to 10 tenths of sky covered.

Table XXIX.

Cloud Form and Speed Table.

Code Figure.
0 = 1 tenth clouds or less (kind not indicated).
1 = upper clouds (cirrus, cirro-stratus, cirro-cumulus, alto-cumulus, or alto-stratus), rapidity not indicated.
2 = strato-cumulus moving slowly.
3 = strato-cumulus moving rapidly.
4 = cumulus moving slowly.
5 = cumulus moving rapidly.
6 = stratus moving slowly.
7 = stratus moving rapidly.
8 = nimbus or cumulo-nimbus moving slowly.
9 = nimbus or cumulo-nimbus moving rapidly.

(See note at end of explanation of "second group," page 56.)

Table XXX.

Conversion Table.

To convert Inches into Millibars.

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

* NOTE.—Whether it is an increase or decrease can be determined by barometric tendency shown at surrounding stations.

WIRELESS STORM WARNINGS.

UNITED STATES OF AMERICA (ATLANTIC COAST).

Storm warnings are broadcast when necessary by the following stations, at the times indicated.

W/T Station.	Call Sign.	Position. Latitude. Longitude. (Approx.)	Time. (G.M.T.)	Wave. (Metres.)
*Jupiter, Fla. ...	NAQ	26° 57' N. 80° 05' W.	1630†, 2300†	1,305 (spark).
*St. Augustine, Fla.	NAP	29° 53' N. 81° 17' W.	0000, 1630†	2,100 (spark).
*Savannah, Ga. ...	NEV	32° 05' N. 81° 07' W.	1600†, 2300	1,806 (spark).
*Charleston, S.C. ...	NAO	32° 51' N. 79° 58' W.	1530†, 2300	2,600 (spark).
*Norfolk, Va. ...	NAM	36° 50' N. 76° 18' W.	0100†, 1545 2100†	1,360 (spark). " "
Washington (Arlington).	NAA	38° 52' N. 77° 05' W.	0130†	1,395 (spark).
Philadelphia ...	NAI	39° 52' N. 75° 11' W.	0330†, 1655 1530†, 2200†	2,655 (C.W.). 5,996 (C.W.).
New York ...	NAH	40° 28' N. 74° 00' W.	1530†, 2200	1,540 (C.W.).
Boston, Mass. ...	NAD	42° 21' N. 70° 57' W.	1600†, 2200	1,363 (C.W.).
Portland, Me. ...	NAB	43° 34' N. 70° 12' W.	0100, 1700†	800 (spark).

* These stations transmit hurricane warnings, when necessary, which are repeated every two hours until 0500 G.M.T.
The areas to which warnings refer are given in the text of the messages.
† After the weather bulletin.

Explanation of Warnings.

The Small-Craft Warning.—A red pennant indicates that moderately strong winds that will interfere with the safe operation of small craft are expected. No night display of small-craft warnings is made.

The North-East Storm Warning.—A red pennant above a square red flag with black centre displayed by day, or two red lanterns, one above the other, displayed by night, indicate the approach of a storm of marked violence, with winds beginning from the *North-East*.

The South-East Storm Warning.—A red pennant below a square red flag with black centre displayed by day, or one red lantern displayed by night, indicates the approach of a storm of marked violence, with winds beginning from the *South-East*.

The South-West Storm Warning.—A white pennant below a square red flag with black centre displayed by day, or a white lantern below a red lantern displayed by night, indicates the approach of a storm of marked violence, with winds beginning from the *South-West*.

The North-West Storm Warning.—A white pennant above a square red flag with black centre displayed by day, or a white lantern above a red lantern displayed by night indicates the approach of a storm of marked violence, with winds beginning from the *North-West*.

Hurricane or Whole-Gale Warning.—Two square flags, red with black centres, one above the other, displayed by day, or two red lanterns, with a white lantern between, displayed by night, indicate the approach of a tropical hurricane or of one of the extremely severe and dangerous storms which occasionally move across the Great Lakes and Northern Atlantic Coast.

ERRATUM.

PAGE 46. MARCH NUMBER.

III. Visual Storm Warnings.

Belgium, Holland, Germany, Denmark, Norway, Sweden.

Day Signals; seventh line, **delete** the words after *black ball*, when a gale is probable but its direction is uncertain.

Night Signals; Holland and Germany, seventh line, **delete** the words after one *red light*, Caution, gale probable.

Seventeenth line **delete** the words after one *red light*, Gale without information as to direction and in each case **substitute** the following, "*Atmospheric disturbance, be alert, and look out for further information.*"

Special Notices regarding Personnel.

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

Captain A. H. Rostron, C.B.E., R.D., A.-d.-C., R.N.R.

The appointment of Captain A. H. ROSTRON, C.B.E., R.D., R.N.R., of R.M.S. *Mauretania* as Aide-de-Camp to His Majesty the King has been announced.

Captain ROSTRON has been a member of the Corps of Marine Observers for a number of years.

Captain W. H. P. Sweny, C.B.E., R.D., A.-d.-C., R.N.R.

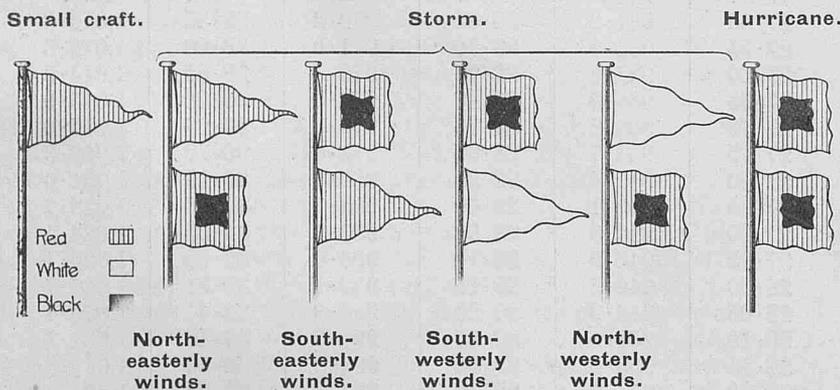
The appointment of Captain W. H. P. SWENY, C.B.E., R.D., R.N.R., of the P. & O. S. N. Company's service as Aide-de-Camp to His Majesty the King has been announced.

Captain SWENY was a member of the Corps of Marine Observers from 1893.

Marine Observers will join the Marine Division in congratulating these officers.

UNITED STATES OF AMERICA.

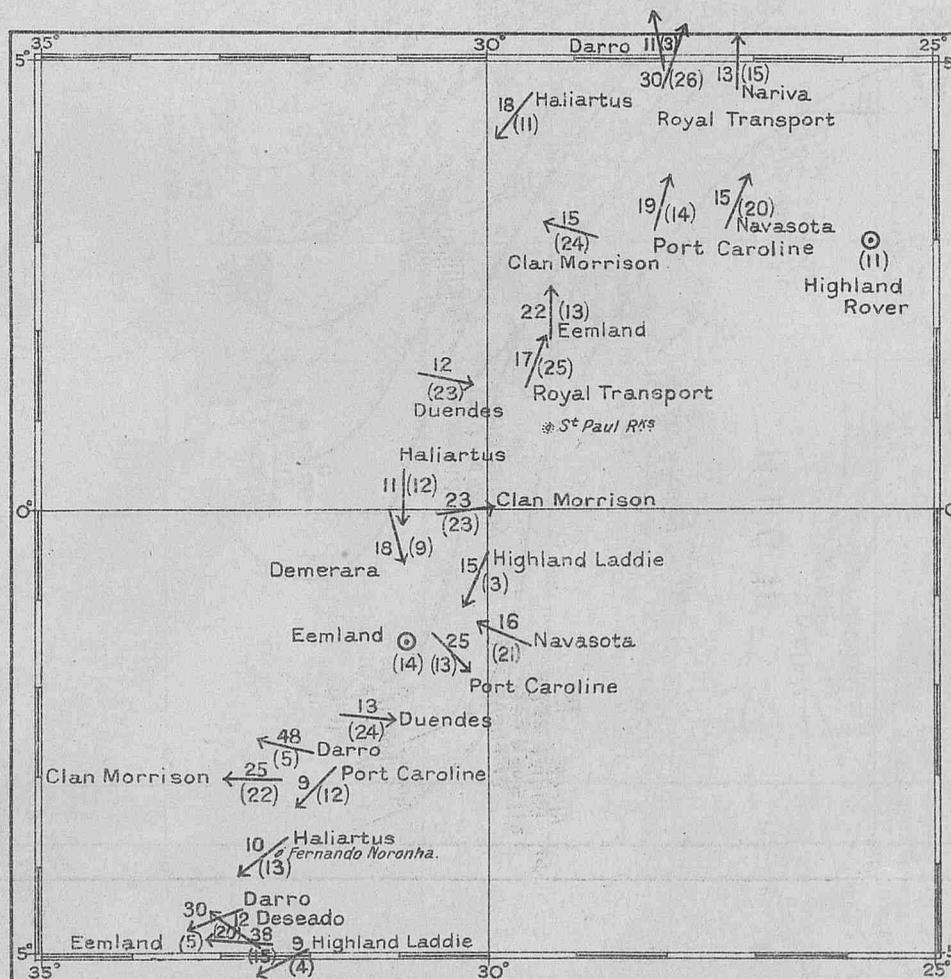
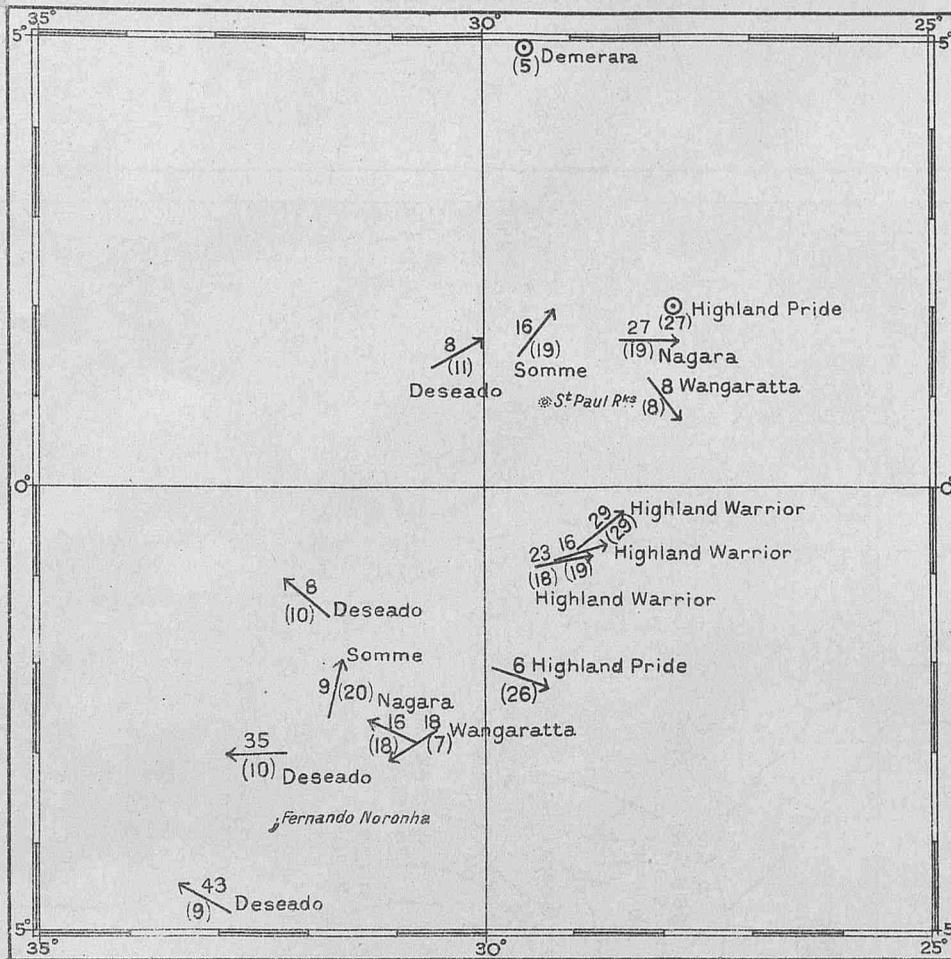
III.—Visual, Small-Craft, Storm and Hurricane Warnings.



Flags, 8 feet square. Pennants, 8-foot hoist, 15-foot fly.

Storm warnings are displayed by the U.S. Weather Bureau at some 380 stations on the Atlantic, Gulf and Pacific coasts of the United States, and on the Great Lakes.

EASTERLY SET ON THE EQUATOR 1923.



The arrows show the current experienced with figures to denote the velocity in miles per day. The figures in brackets indicate the date.

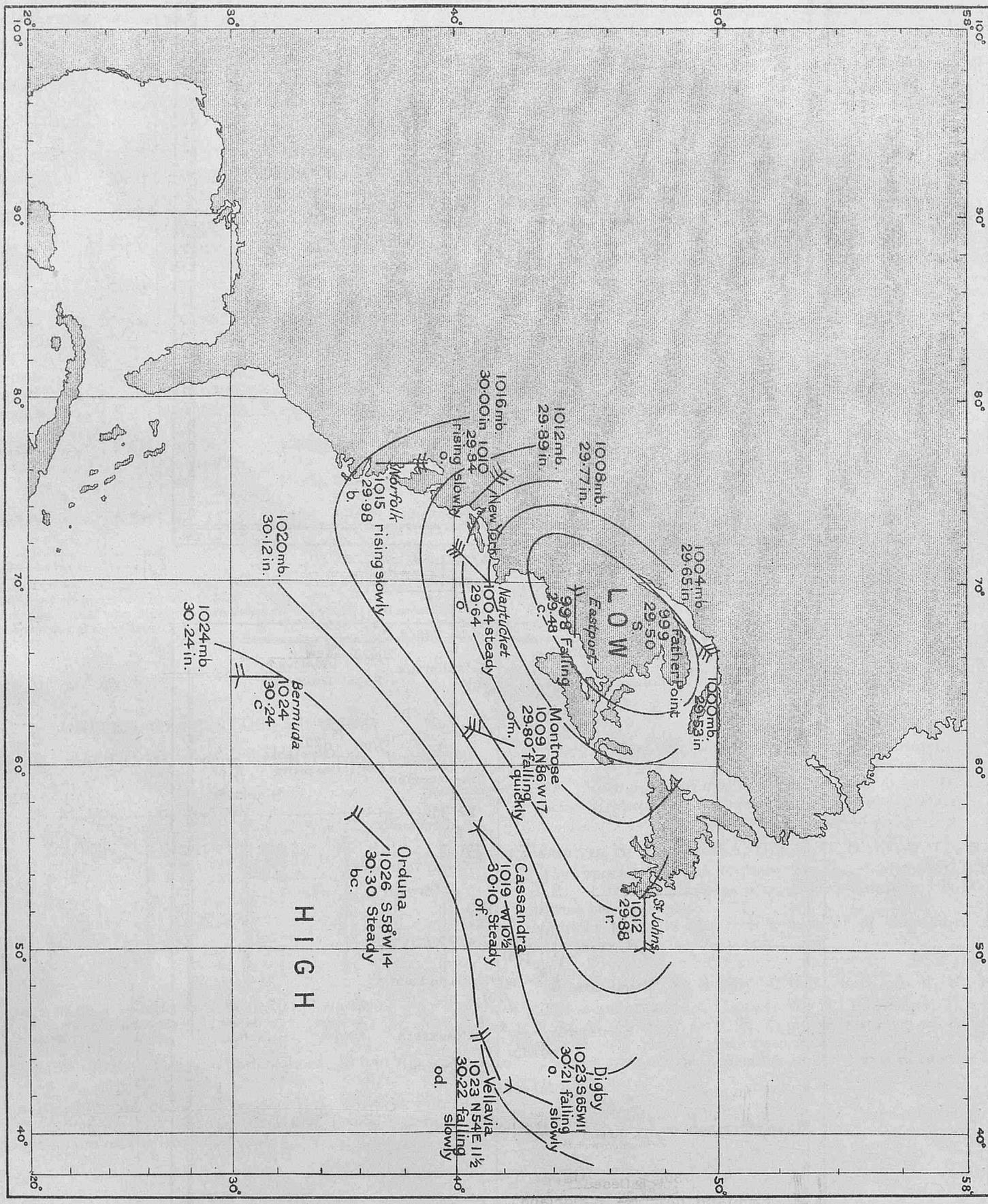


Chart IX,—"WIRELESS AND WEATHER."

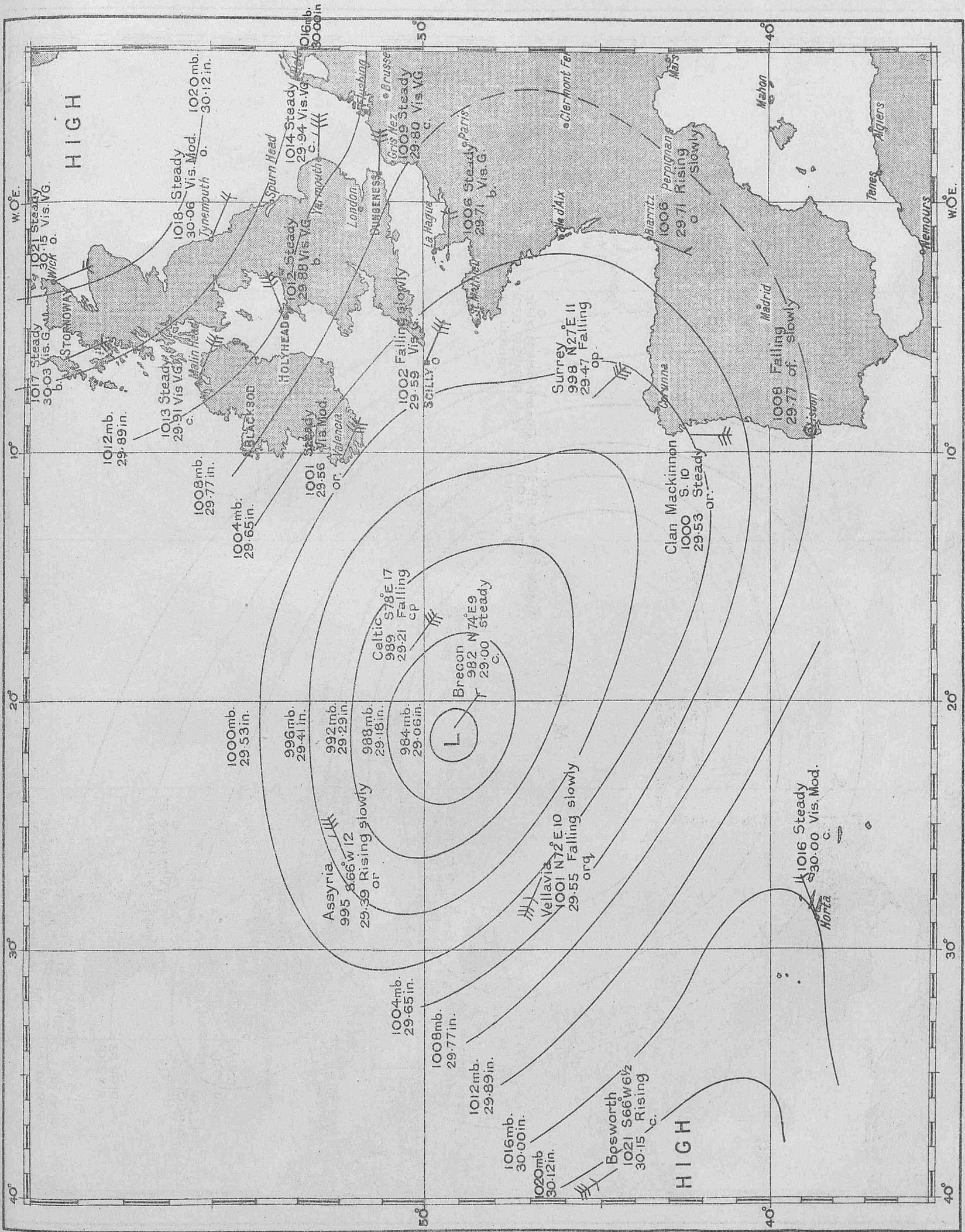


Chart XII, "Wireless and Weather."

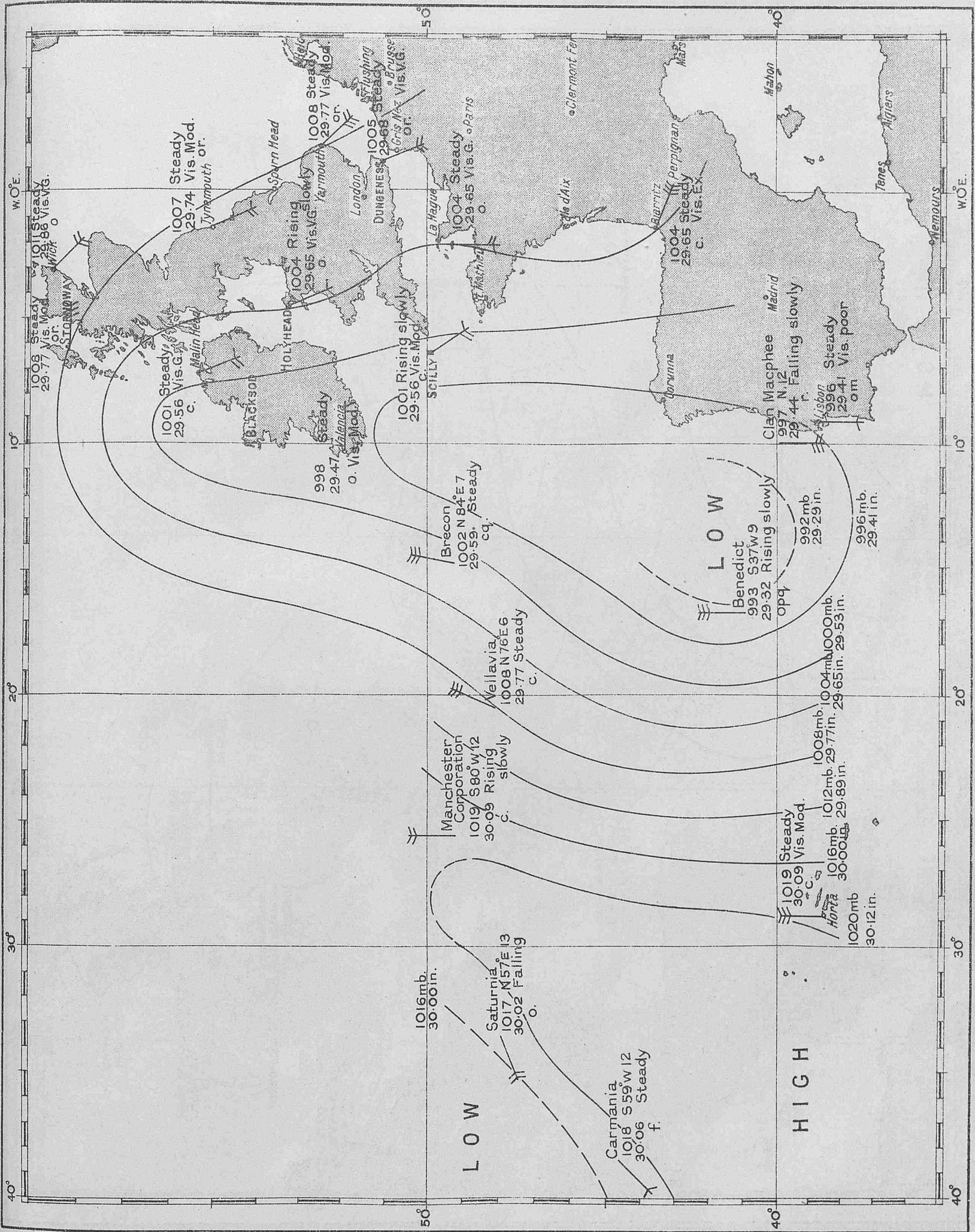


Chart XIV, "Wireless and Weather."

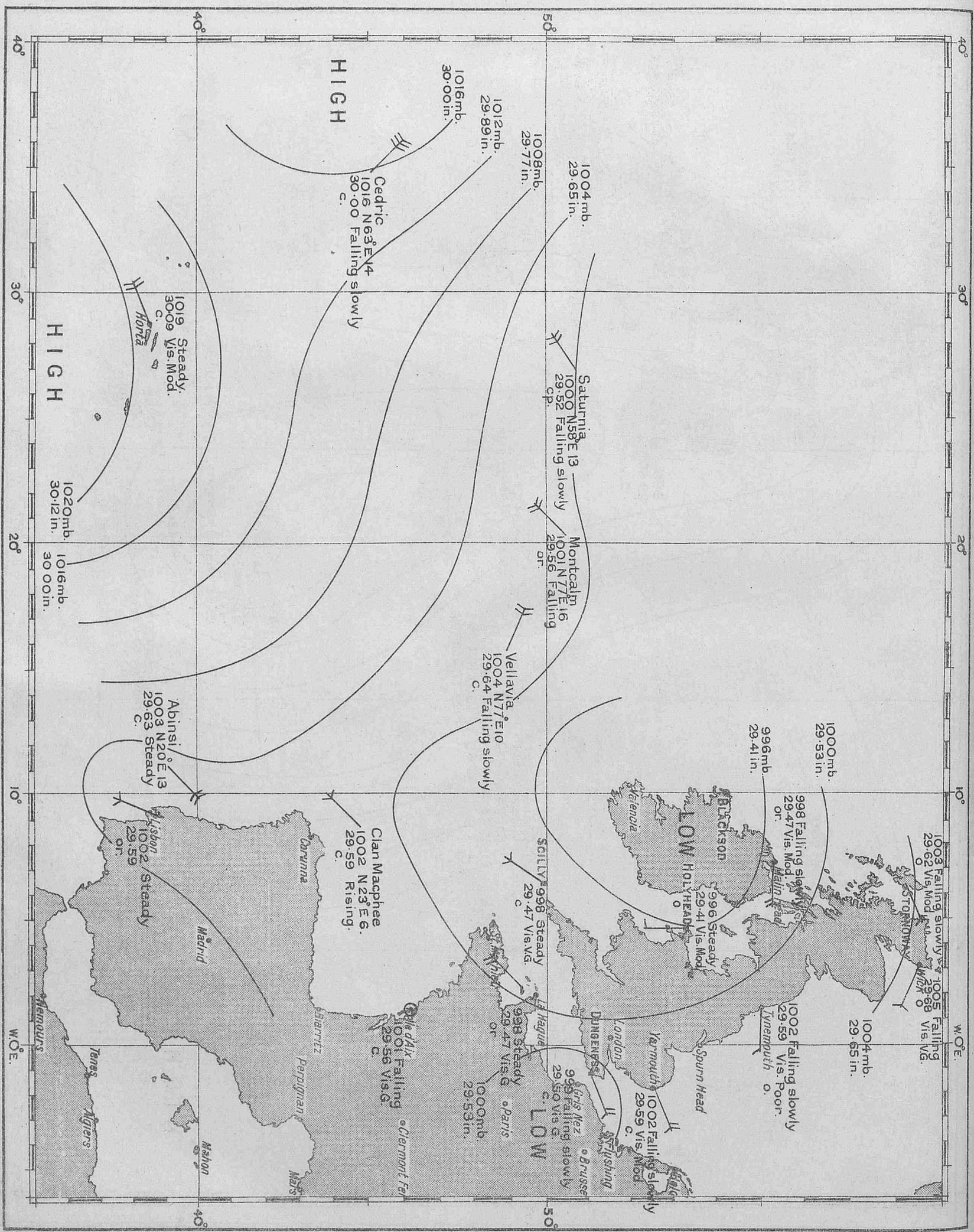


Chart XV,—"WIRELESS AND WEATHER."

WEATHER CHART, MORNING OF APRIL 13TH. 1923.

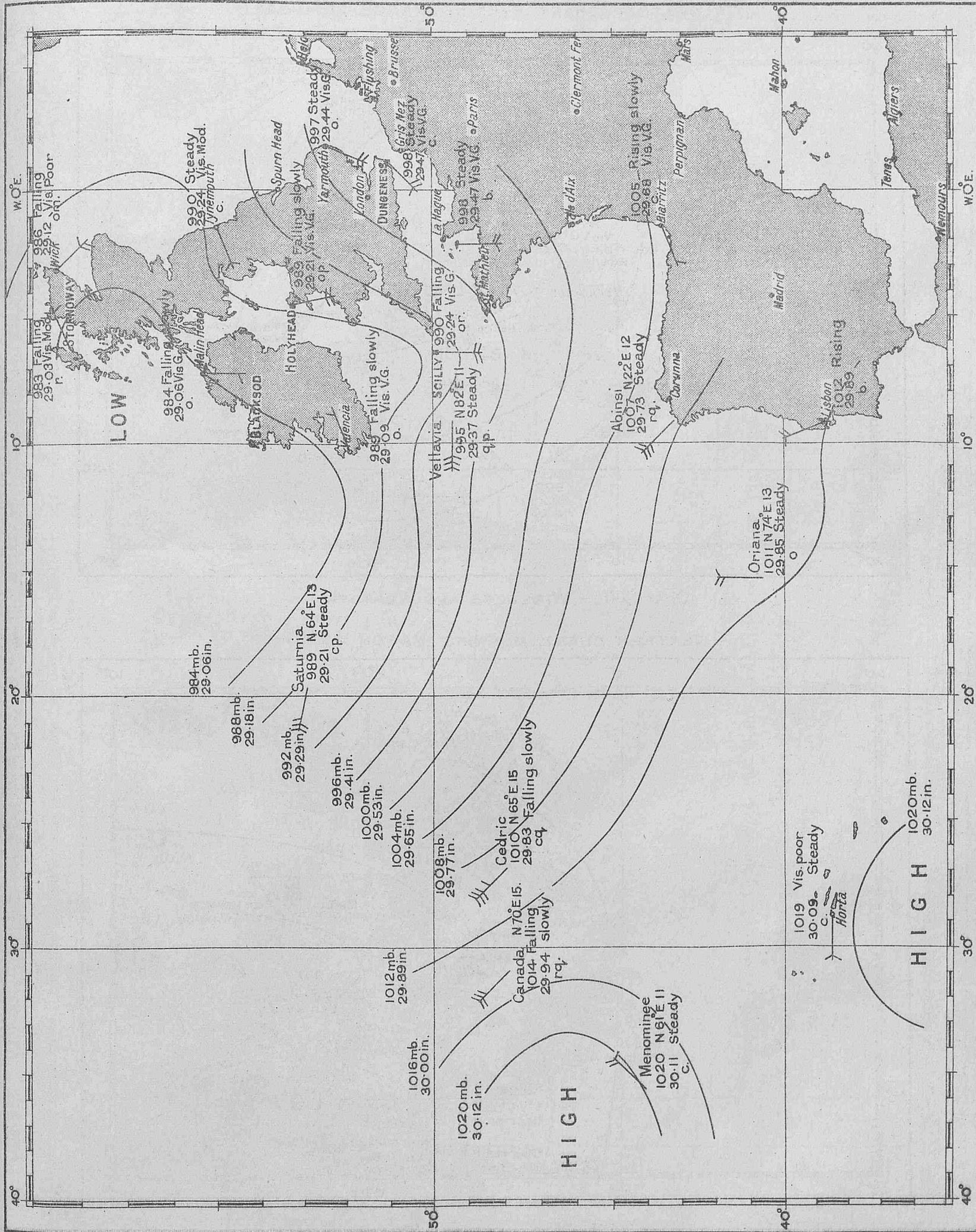


Chart XVI,—"WIRELESS AND WEATHER."

WEATHER CHART, EVENING MARCH 25TH. 1922.

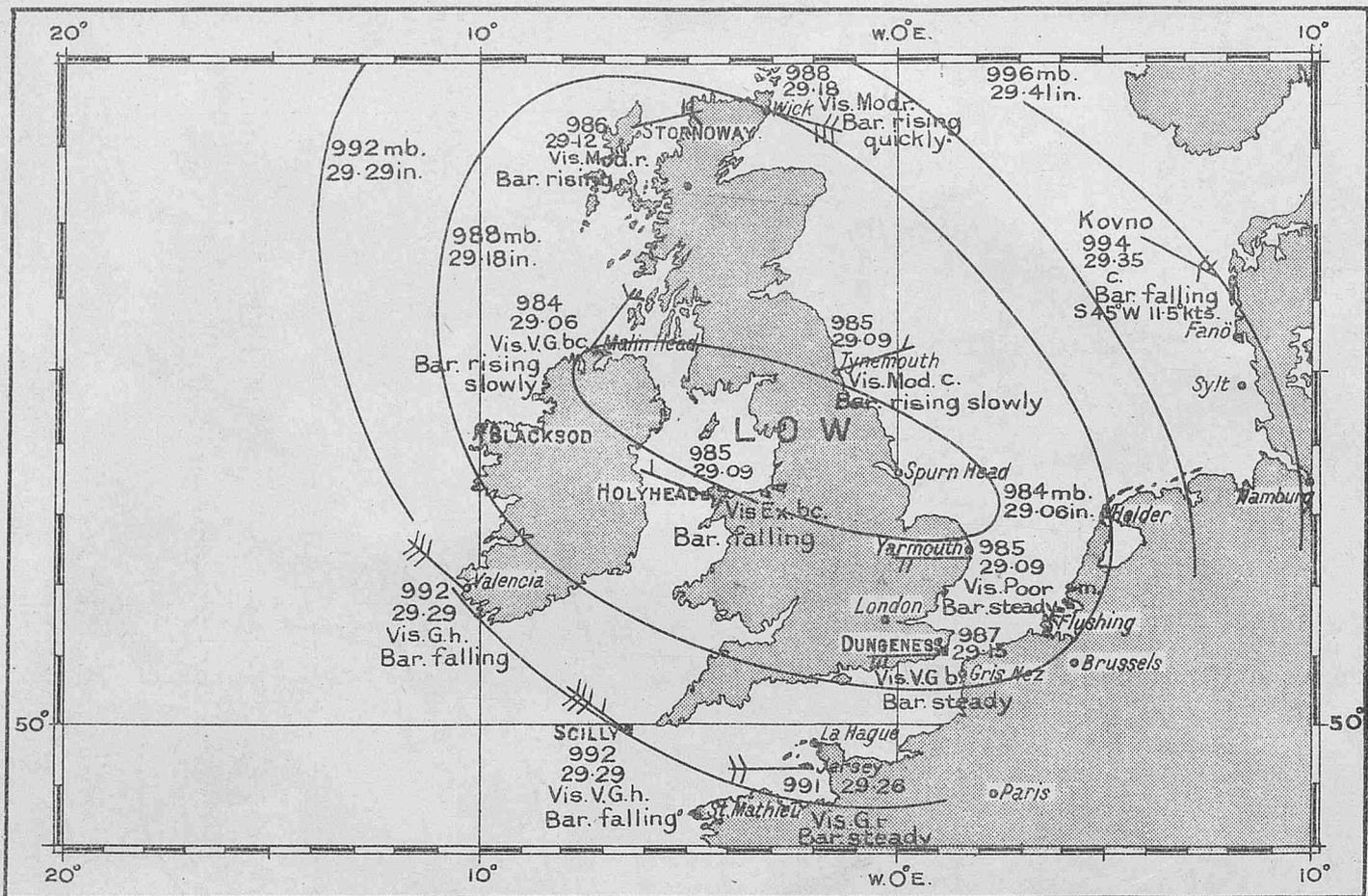


Chart XVII,—"WIRELESS AND WEATHER."

WEATHER CHART, MORNING MARCH 26TH. 1922.

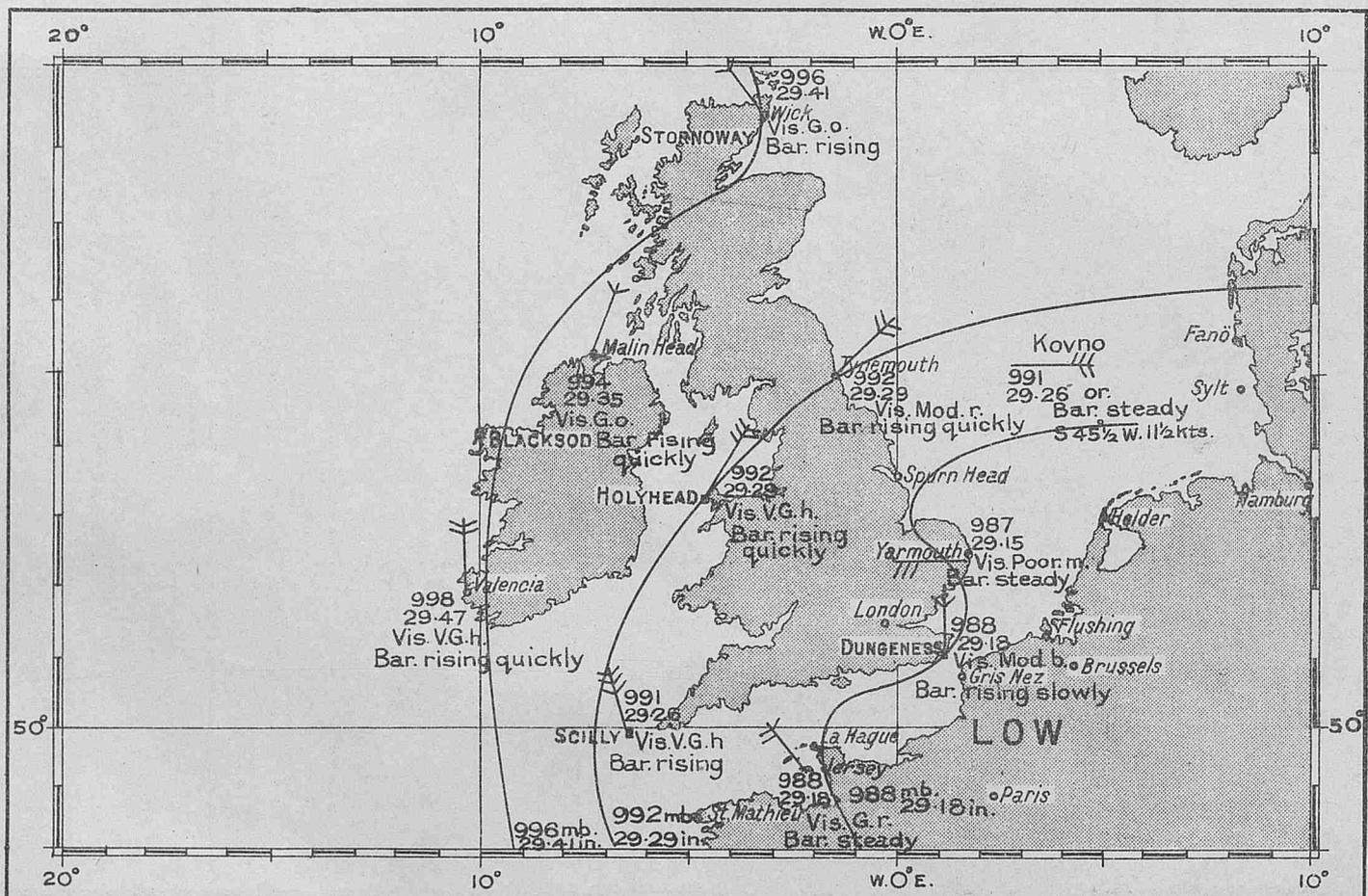
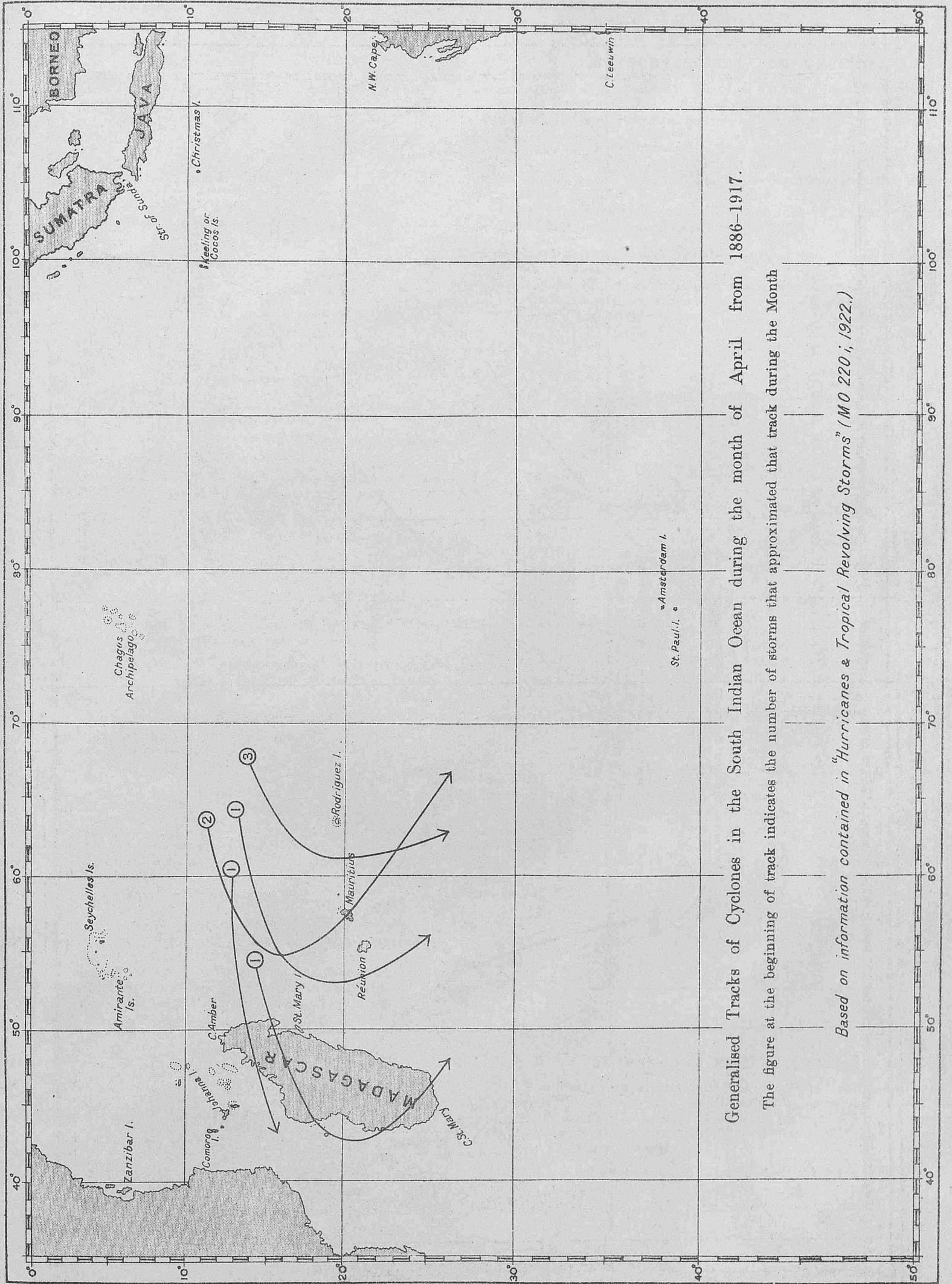


Chart XVIII,—"WIRELESS AND WEATHER."

CYCLONE TRACKS OF THE SOUTH INDIAN OCEAN.

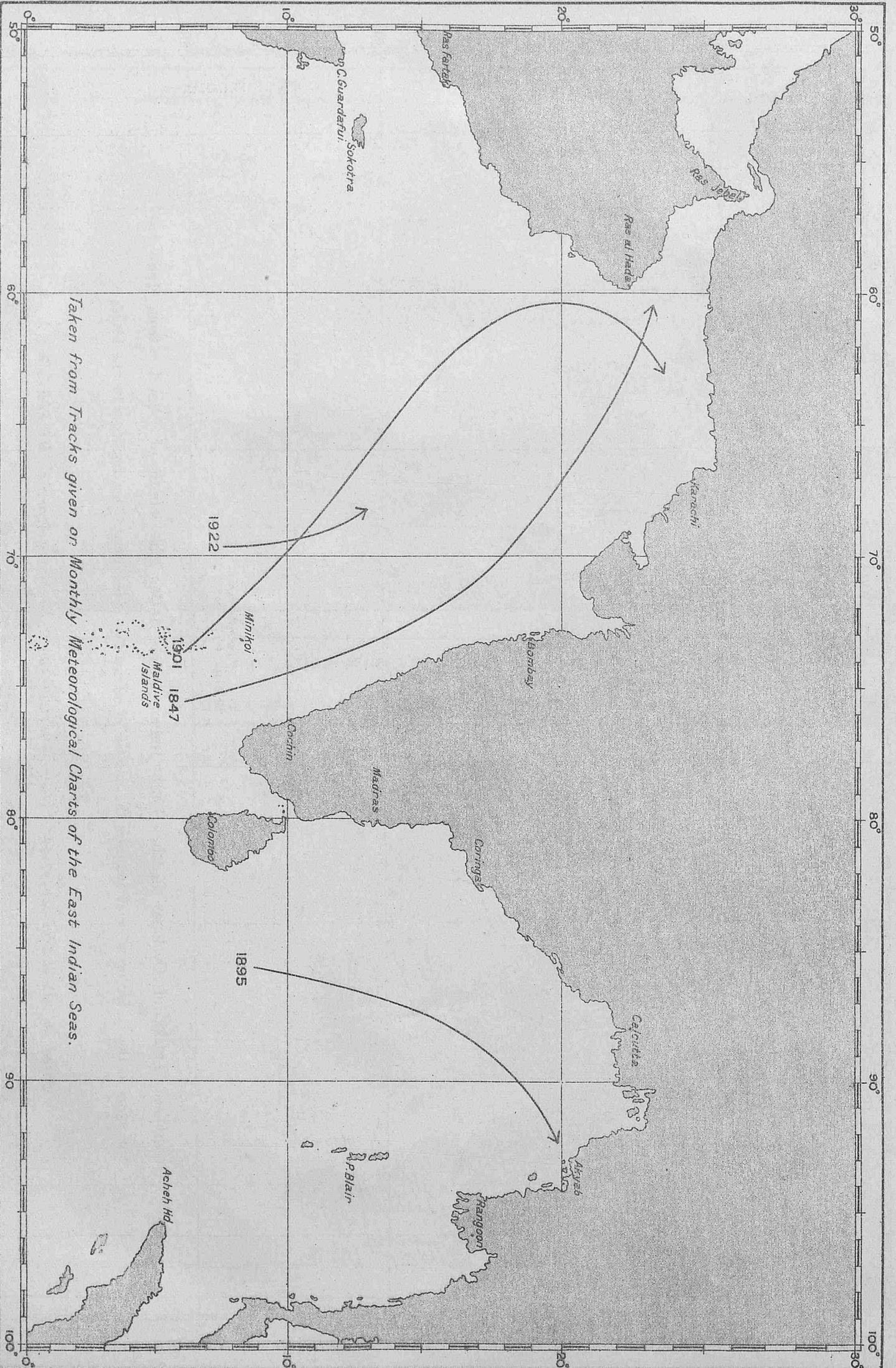


Generalised Tracks of Cyclones in the South Indian Ocean during the month of April from 1886-1917.

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

Based on information contained in "Hurricanes & Tropical Revolving Storms" (MO 220 i, 1922.)

CYCLONE TRACKS OF THE ARABIAN SEA AND BAY OF BENGAL.



Taken from Tracks given on Monthly Meteorological Charts of the East Indian Seas.

Tracks of cyclones which have occurred in the Arabian Sea and Bay of Bengal during the month of April. The year is indicated by the figures at commencement of track.

NOTICES.

IMPORTANT.

The following notice was received from the Cunard SS. Co., under date 1st February, 1924 :—

NORTH ATLANTIC TRACKS.

It has been agreed between the Lines Party to the North Atlantic Track Agreement to make several alterations in the existing Track Agreement.

The change in the Southern Tracks, now designated as "B," is in the dates of operation, viz.,

Westbound to cross 41°30' N. in 47°00' W., February 1st to March 31st and July 1st to August 31st, both days inclusive.

Eastbound to cross 40°30' N. in 47°00' W., February 1st to March 24th and July 8th to August 31st, both days inclusive.

The period of operation of the Extra Southern, now designated as "A" Tracks will therefore be as follows :—

Westbound to cross 40°30' N. in 47°00' W., April 1st to June 30th, both days inclusive.

Eastbound to cross 39°30' N. in 47°00' W., March 25th to July 7th, both days inclusive.

The Northern tracks as modified will now be :—

Westbound to cross 43°00' N. in 50°00' W. { September 1st to January 31st, both days inclusive.
Eastbound to cross 42°00' N. in 50°00' W. {

The Canadian Tracks remain unaltered with the exception that instead of being designated as "A," "B," "C," and "D," they will now follow on in alphabetical sequence after United States Tracks, Canadian Track "A" becoming "D," &c.

It has also been agreed that steamers bound to or from United States Ports calling at Halifax have the option of following either the Canadian Seasonal Tracks "D," "E," or "F," or the United States Tracks "A," "B," or "C."

For new designation of tracks, see Board of Trade Supplementary Summary of Notices to Mariners, 13th February, 1924.

POSTAL ARRANGEMENTS.

The Marine Observer is published, when circumstances permit, on the first Wednesday of the month previous to that to which the number refers.

If captains of observing ships will forward to the Office the particulars required hereunder, endeavour will be made as far as mails permit to post the latest number for use on their homeward passage.

S.S..... Captain.....
Port of Call.....
Date of Homeward Departure.....
Postal Address.....

When this information is not given the Marine Observer is addressed to the Commanding Officer, s.s..... c/o the owners, and captains are requested to make their own arrangements for forwarding.

METEOROLOGICAL LOG REPRINT.

A reprint of the Meteorological Log for use with official instruments is now being issued. In it a column is provided for both the uncorrected and corrected barometer readings.

The uncorrected barometer, and attached thermometer readings are required to be entered in all cases, but it will be of great assistance to the Marine Division if Observers will also enter the corrected reading using the method explained in the Marine Observer's Handbook, pages 16-19, or that in the February, 1924, number of the Marine Observer, pages 22-24.

Attention is also drawn to the page at end of log for recording Wireless Weather Reports made to other ships, and to the page allotted for Additional Remarks, where any interesting observations may be entered in detail, with a view to publication in the Marine Observer's Log of this journal.

CONVERSION TABLE.

To Convert Inches into Millibars.

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

Invitation to Marine Observers.

The Marine Superintendent will be pleased to see Captains of observing ships, who may be in London, between 10 a.m. and 4 p.m., at Room 319, Adastral House, Kingsway, W.C.2. Telephone No. :—Regent 8000. Extension 421. Telegrams, "Marine Superintendent, Weather, London."

(Nearest station—Temple, District Railway.)

ICE CHART.

WESTERN NORTH ATLANTIC.

LETTERS OF TRANSATLANTIC TRACKS INDICATE

- (A) Westbound 1st April to 30th June, inclusive.
- (A) Eastbound 25th March to 7th July, inclusive.
- (D) From 15th February to 10th April, inclusive.
- (E) From 11th April to 15th May, or until the Cape Race Route clear of ice.

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

ROUTE NOTICES.

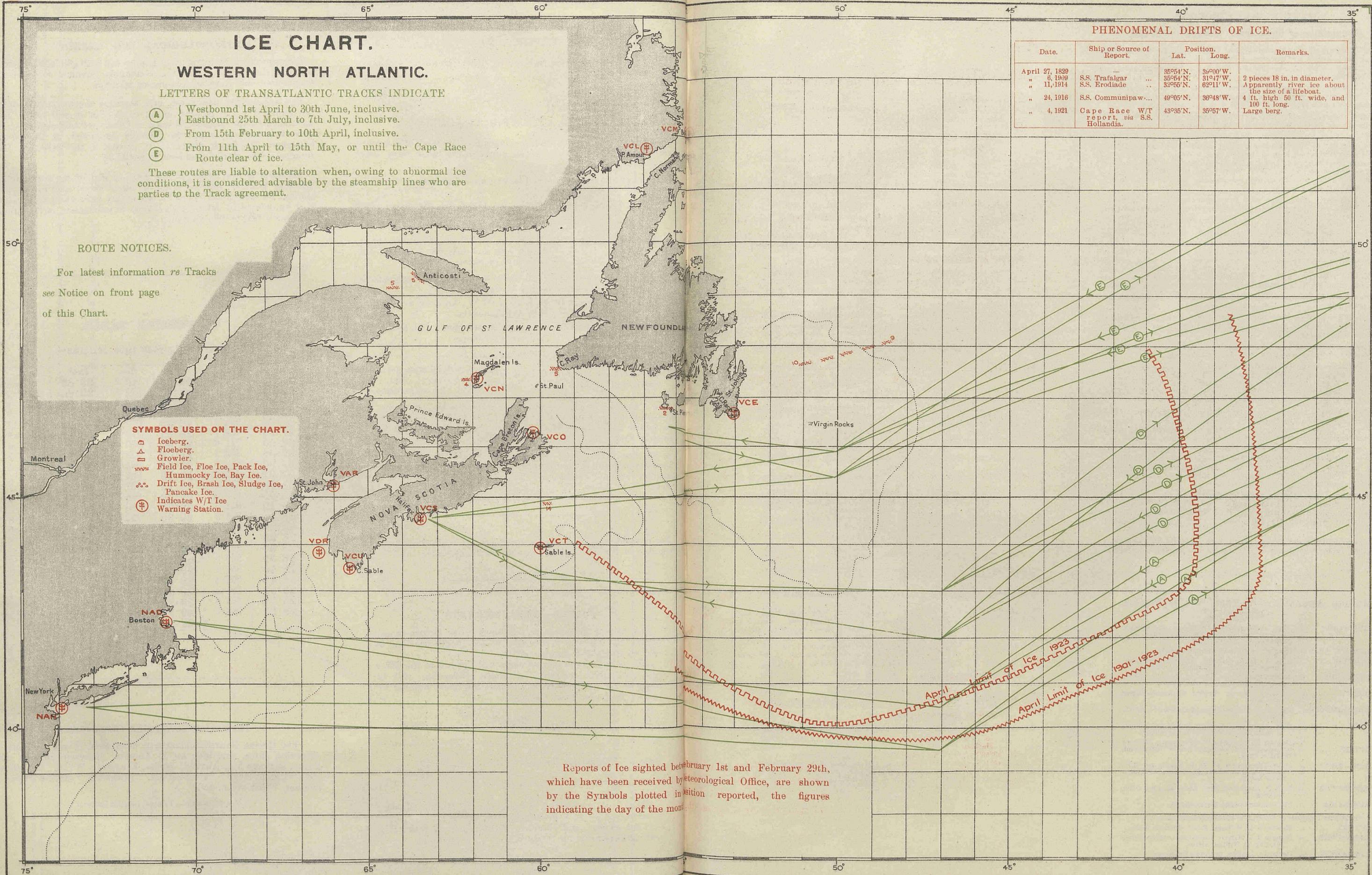
For latest information re Tracks see Notice on front page of this Chart.

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.		Remarks.
		Lat.	Long.	
April 27, 1829	—	35°54' N.	35°00' W.	2 pieces 18 in. in diameter. Apparently river ice about the size of a lifeboat.
" 6, 1809	S.S. Tratalgar	35°54' N.	31°17' W.	
" 11, 1814	S.S. Erodiade	32°55' N.	62°11' W.	4 ft. high 50 ft. wide, and 100 ft. long.
" 24, 1916	S.S. Communipaw...	49°05' N.	30°48' W.	Large berg.
" 4, 1921	Cape Race WT report, via S.S. Hollandia.	43°35' N.	35°57' W.	



Reports of Ice sighted between February 1st and February 29th, 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.

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

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

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

Vessels observing regularly for the Meteorological Office to which office instruments are not lent, keep Form 911, Ships Meteorological Report, using the ship's instruments, the barometer being compared with Standards.

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.

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

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

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 of 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. H. Lloyd, R.D., R.N.R., Dock Office. Telephone No.: Bank 3959.
CARDIFF	..	Captain T. Johnston, Technical College.
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.

DERELICTS AND LATE PRESS.

Date.	Position.		Description.
	Latitude.	Longitude.	
NORTH SEA.			
1.2.24	57°15'N.	8°48'E.	Derelict.
7.2.24	51°13'N.	2°20'E.	Floating wreck of fishing smack, "G 678."
9.2.24	54°43'N.	2°26'E.	Steamer, about 100 ft. long, awash.
19.2.24	53°32'N.	4°36'E.	Red painted can buoy, with staff.
23.2.24	54°45'N.	2°29'E.	Derelict, bottom up, awash, painted black, about 60 ft. long.
ENGLISH CHANNEL.			
7.2.24	49°01'N.	4°24'W.	Buoy, red, with white lettering, cage topmark surmounted by flag.
24.2.24	50°14'N.	2°43'W.	Wooden mast, broken, floating end up, 6 ft. above water, attached to submerged wreckage.
NORTH ATLANTIC OCEAN.			
1.2.24	28°46'N.	76°15'W.	Derelict, about 150 ft. long, bottom up.
1.2.24	43°16'N.	64°33'W.	Lighted buoy, adrift.
1.2.24	35°57'N.	74°30'W.	Large wooden rudder, painted grey, apparently from schooner.
2.2.24	38°37'N.	59°16'W.	Wooden vessel, bottom up.
3.2.24	36°07'N.	74°56'W.	Piece of wreckage, apparently top of a deckhouse, about 60 ft. long, 30 ft. wide.
3.2.24	40°25'N.	72°04'W.	Motor launch, <i>Anna J., No. 8176</i> , waterlogged and abandoned.
3.2.24	26°15'N.	79°48'W.	Iron cylinder, black, about 22 ft. long, 5 ft. in diameter.
3.2.24	41°15'N.	64°25'W.	Log or spar, about 25 ft. long, 15 ins. in diameter.
4.2.24	48°14'N.	32°02'W.	Mast, projecting out of water about 10 ft., apparently attached to submerged wreckage along with several planks, dangerous to navigation.
5.2.24	40°30'N.	56°25'W.	Red conical buoy.
5.2.24	42°47'N.	64°44'W.	Black buoy, with framework superstructure.
6.2.24	43°32'N.	57°38'W.	Large tree trunk, about 40 ft. long, 3 ft. in diameter.
7.2.24	27°00'N.	66°08'W.	Derelict, apparently bottom up.
7.2.24	36°10'N.	12°52'W.	Bell buoy.
7.2.24	39°15'N.	59°22'W.	Schooner, bottom up, painted red, several spars attached.
10.2.24	41°20'N.	65°48'W.	Small black can buoy marked "10" in white figures.
12.2.24	32°13'N.	13°55'W.	Ship on fire, become derelict, dangerous to navigation.
12.2.24	27°06'N.	66°37'W.	Can buoy, rusty, ring and chain attached.
13.2.24	37°42'N.	26°00'W.	Wreckage, consisting of spar probably attached to submerged wreckage.
14.2.24	39°24'N.	71°42'W.	Metal life raft painted black, marked "2."
15.2.24	47°32'N.	27°41'W.	Large black can buoy.
17.2.24	41°59'N.	58°04'W.	Floating raft, 8 ft. square, 14 ins. high, dangerous to navigation.
GULF OF MEXICO.			
1.2.24	28°15'N.	92°08'W.	Large tree top.
2.2.24	10 miles East of Tampico.		Large barge.
2.2.24	25°38'N.	80°03'W.	Apparently an iron pontoon about 15 ft. long and 5 ft. in diameter.
6.2.24	28°36'N.	88°34'W.	Tree trunk about 45 ft. long, 1½ ft. in diameter.
6.2.24	21°43'N.	86°53'W.	Wreckage of two-masted schooner. Masts standing about 25 ft. out of water, apparently attached to other wreckage.
6.2.24	28°12'N.	87°48'W.	Large tree trunk, partly submerged.
7.2.24	26°46'N.	86°32'W.	Red conical buoy, flat top, marked "2" in black.
12.2.24	27°24'N.	89°27'W.	Floating log or spar about 40 ft. long.
MEDITERRANEAN.			
13.2.24	31°49'N.	31°41'E.	Submerged object.
13.2.24	31°38'N.	31°46'E.	Derelict schooner, both masts gone, and awash
NORTH PACIFIC OCEAN.			
1.2.24	6 miles off entrance to Los Angeles Harbour.		Obstruction, which looked like a white spar buoy.
6.2.24	33°58'N.	119°08'W.	Log, 20 ft. long, 3 ft. in diameter.
7.2.24	45°40'N.	124°16'W.	Large log, end up, about 5 ft. out of water.
7.2.24	48°13'N.	124°43'W.	Heavy log, projecting about 3 ft. out of water.
7.2.24	48°18'N.	123°07'W.	Log, 25 ft. long, 5 ft. in diameter.

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. ...	V. Baddeley ...	"	Elder Dempster ...	" 12.12.23 to 18.1.24...	25.1.24.
<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. ...	A. E. Dyer, J. Collins, G. Howe, R. H. Shaw. Commr., R.N.R.	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 ...	" 27.12.23 to 12.1.24...	11.2.24.
<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 ...	" 15.12.23 to 6.2.24 ...	11.2.24.
<i>Albipore</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 ...	" 12.1.24 to 4.2.24 ...	11.2.24.
<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 19.2.24	19.2.24.
<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 ...	10.7.24.
<i>Aquitania</i> ...	Charles, Sir J. T. W., K.B.E., C.B., R.D., Commodore, R.N.R.	J. L. Croasdale, 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> ...	Matthews, J. E. P. ...	F. J. Elvy ...	"	R.M.S.P. ...	" 17.12.23 to 1.2.24 ...	8.2.24.
<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. Poole, D. Frame, A. Olding.	M.L.	P. Henderson ...	Met. Log. 6.10.23 to 25.12.23...	24.1.24.
<i>Arundel</i> ...	Short, H. ...	Mr. Hill ...	C.C.	Southern Rly. ...	Telegraphic Report 24.2.24	24.2.24.
<i>Arundel Castle</i> ...	Hague, J. W., Capt., R.N.R.	G. Blailhook, 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> ...	Jones, J. L. ...	A. C. I. Anson ...	No.	White Star ...	Form 911 3.12.23 to 24.12.23...	2.2.24.
<i>Atsuta Maru</i> ...	Saito, B. ...	S. Mizogucki ...	"	Nippon Yusen Kaisha ...	" 25.12.23 to 25.1.24...	30.1.24.
<i>Auldmuir</i> ...	Ramsay, J. D. ...	P. D. Thompson ...	"	Glen & Co. ...	" 26.1.24 to 10.2.24 ...	15.2.24.
<i>Ausonia</i> ...	Brown, F. G., R. D., Capt., R.N.R.	J. Ashcroft ...	"	Cunard ...	" 7.1.24 to 3.2.24 ...	6.2.24.
<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, L. C. Chapman, H. A. Deller, E. Crocker, C. B. Hoggan.	M.L.	Union Castle ...	Met. Log. 21.2.23 to 3.5.23 ... " 2.9.23 to 9.12.23 ...	28.1.24.
<i>Banffshire</i> ...	Wynne, R. H. ...	L. W. Evans ...	No.	Turnbull Martin ...	Form 911 17.12.23 to 29.1.24...	4.2.24.
<i>Barambah</i> ...	Mayne, W. ...	T. Swann ...	"	Commonwealth Govt. ...	" 4.8.23 to 5.9.23 ...	16.10.23.
<i>Baron Cawdor</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.C. ...	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>Berenaria</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.	Lampport & 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>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> ...	Dott, J. F. ...	K. Hutchings ...	No.	" ...	Form 911 6.1.24 to 24.1.24 ...	4.2.24.
<i>Braemar Castle</i> ...	Whitfield, G. I. ...	C. G. Dann ...	"	Union Castle ...	" 27.9.23 to 23.1.24 ...	31.1.24.
<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 23.2.24 ...	23.2.24.
<i>British Engineer</i> ...	Cook, C. ...	...	No.	British Tankers ...	Form 911 17.11.23 to 8.1.24 ...	14.1.24.
<i>British Lantern</i> ...	Piper, H. C. ...	A. Campbell ...	"	" ...	" 7.9.23 to 15.12.23 ...	7.1.24.
<i>Browning</i> ...	Taylor, R. J. ...	C. O. Tucker ...	"	" ...	" 13.3.23 to 9.4.23 ...	14.4.23.
<i>Bruyere</i> ...	Davies, G. W. ...	W. Simcox ...	"	Lampport & Holt ...	" 4.9.23 to 19.11.23 ...	23.11.23.
<i>Bulla</i> ...	Heasley, W. S. ...	W. S. Perry ...	"	Commonwealth Govt. ...	" 28.4.23 to 17.5.23 ...	5.6.23.
<i>Bulla</i> ...	Daniel, F. ...	...	"	" ...	" ...	" ...
<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 24.2.24 ...	24.2.24.
<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 & Fyfes ...	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 ...	Form 911 3.12.23 to 22.12.23...	24.12.23.
<i>Canadian Inventor</i> ...	Roberts, R. P. ...	S. M. Holinden ...	"	Canadian Govt. Mer- chant Marine.	" 19.9.23 to 22.10.23...	11.2.24.
<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> ...	McNeil, 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>Caudor Castle</i> ...	Purse, C. R. ...	J. A. Lowden, F. P. Wyeth, W. S. J. Aldous, C. B. Hoggan.	M.L.	Union Castle ...	Form 911 26.10.23 to 19.11.23	27.11.23.
<i>Cedric</i> ...	Metcalfe, G. R., Lt.- Commr., R.N.R.	T. F. P. Pratt, W. Pearson, J. W. Peters.	W.T.	White Star ...	W.T. Reg. 7.1.24 to 26.1.24 ...	31.1.24.
<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 6.1.24 to 27.1.24 ...	29.1.24.
<i>Celtic</i> ...	Marshall, W., D.S.O., R.D., Capt., R.N.R.	...	"	" " "	W.T. Reg. 18.11.23 to 9.12.23...	11.12.23.
<i>Ceramic</i> ...	Summers, A. H. ...	H. A. Billiard ...	No.	" " "	Form 911 17.12.23 to 5.1.24 ...	7.1.24.
<i>Changsha</i> ...	Frame, A. M. ...	...	M.L.	Yuill & Co. ...	Form 911 18.11.23 to 9.12.23...	12.12.23.
<i>Chimecto</i> ...	Green, J. ...	A. F. Walker, J. R. Mitchell	No.	R.M.S.P. Co. ...	Form 911 16.12.23 to 6.1.24 ...	7.1.24.
<i>China</i> ...	King, A. M., D.S.C.	E. Cox Walker ...	"	P. & O. ...	" 22.9.23 to 16.10.23...	27.11.23.
<i>Chindwara</i> ...	Jones, W. H. ...	C. E. Cara ...	"	British India ...	" 16.12.23 to 4.1.24 ...	7.1.24.
<i>Chindwin</i> ...	Esslemont, C. ...	J. Walker, W. Wilson, A. McCallum.	M.L.	P. Henderson ...	Met. Log. 17.11.23 to 23.12.23	12.2.24.
<i>Chinhua</i> ...	Bvers, G. ...	...	"	China Nav. Co. ...	Met. Log. 22.9.23 to 6.12.23 ...	12.12.23.
<i>City of Alexandria</i> ...	Bedford, G. B. ...	T. C. Higgins ...	No.	Ellerman ...	" 25.10.22 to 23.7.23...	6.9.23.
<i>City of Baroda</i> ...	Haddy, B. H. ...	A. V. Radcliffe, R. J. Witton, A. B. Carson.	M.L.	" ...	" ...	" ...
<i>City of Batavia</i> ...	Spencer, H. ...	B. Moloney ...	No.	" ...	Met. Log. 20.6.23 to 15.9.23 ...	4.10.23.
<i>City of Benares</i> ...	Macdonald, K., O.B.E.	A. A. Fullerton ...	"	" ...	Form 911 5.1.24 to 11.1.24 ...	4.2.24.
<i>City of Brisbane</i> ...	Pine, R. ...	W. Robinson ...	"	" ...	" 21.12.23 to 16.1.24 ...	11.2.24.
<i>City of Canterbury</i> ...	Bremner, D. M. ...	W. H. Matheson ...	"	" ...	" 23.11.23 to 14.12.23	12.2.24.
<i>City of Chester</i> ...	Teague, R. E. ...	F. S. Honeyman, P. C. Wilson, M. G. Fraser.	M.L.	" ...	Met. Log. 21.9.23 to 3.10.23 ...	8.10.23.
<i>City of Dunkirk</i> ...	Seaborne, F. O. ...	W. Leadbeater ...	No.	" ...	" 3.8.23 to 29.10.23 ...	31.10.23.
<i>City of London</i> ...	Martin, D. ...	C. Inglis ...	"	" ...	Form 911 21.9.23 to 4.10.23 ...	17.10.23.
<i>City of Marseilles</i> ...	Henderson, R. C. ...	G. M. Womersley ...	"	" ...	" 28.11.23 to 24.12.23	28.12.23.
<i>City of Newcastle</i> ...	Oliver, R. E., D.S.C.	C. Paton ...	"	" ...	" 31.10.23 to 19.12.23	24.12.23.
<i>City of Rangoon</i> ...	Williams, T. L. ...	W. Ibbotson, S. L. Hoare, T. A. Dexter.	M.L.	" ...	Met. Log. 26.9.23 to 22.10.23...	31.10.23.
<i>City of Valencia</i> ...	Williamson, W. A. ...	A. R. Muir ...	No.	" ...	" 25.4.23 to 9.8.23 ...	16.8.23.
<i>City of Yokohama</i> ...	Jinks, J. W. ...	J. C. McWhirter ...	"	" ...	Form 911 2.7.23 to 7.8.23 ...	14.8.23.
<i>Clan Buchanan</i> ...	George, L. S. ...	P. G. de Gruchy ...	"	Clan ...	" 23.10.23 to 12.11.23	24.11.23.
<i>Clan Lindsay</i> ...	Baker, C. W. ...	S. J. Shennan ...	"	" ...	" 11.10.23 to 10.1.24...	14.1.24.
<i>Clan Macgillivray</i> ...	Young, A. H. ...	A. Campbell ...	"	" ...	" 31.10.23 to 9.12.23...	14.12.23.
<i>Clan Macindoe</i> ...	Miller, W. ...	D. A. Stark ...	"	" ...	" 27.11.23 to 8.12.23...	13.12.23.
<i>Clan Macinnes</i> ...	Mee, F. T. ...	A. Lynch, R. Dando ...	"	" ...	" 6.9.23 to 29.11.23 ...	7.12.23.
<i>Clan Mackay</i> ...	Rayner East, H. ...	J. A. Forster, J. Steven, J. E. Gordon.	M.L.	" ...	" 4.12.22 to 25.3.23 ...	17.4.23.
<i>Clan Mackellar</i> ...	Cowie, J. G. ...	C. W. Banbury ...	No.	" ...	Met. Log. 30.6.23 to 25.10.23...	30.10.23.
<i>Clan Mackenzie</i> ...	Young, G. ...	W. G. Arthur, J. M. Lorimer	No.	" ...	Form 911 3.1.24 to 13.1.24 ...	24.1.24.
<i>Clan Mackinnon</i> ...	Thomson, W. ...	F. Elwell, W. S. Holden, T. Kay.	M.L.	" ...	" 17.11.23 to 13.12.23	24.12.23.
<i>Clan Maclaren</i> ...	Scott, G. ...	L. Copland ...	No.	" ...	Met. Log. 6.4.23 to 4.8.23 ...	17.8.23.
<i>Clan Maclaughlin</i> ...	Gray, J. N. ...	A. G. Storkey, F. Burnes	"	" ...	Form 911 21.1.23 to 15.2.23 ...	13.3.23.
<i>Clan Macphee</i> ...	Gourlay J. B. ...	P. H. Avdon, J. H. Mellor, J. Maedougall.	M.L.	" ...	" 23.11.23 to 12.1.24...	4.2.24.
<i>Clan Maieric</i> ...	Phillips, G. P. ...	J. O. Woodall ...	No.	" ...	Met. Log. 26.5.23 to 21.11.23...	17.1.24.
<i>Clan Malcolm</i> ...	Higgins, C. J. ...	T. G. Young, A. Cameron ...	M.L.	" ...	Form 911 28.11.23 to 30.12.23	2.1.24.
<i>Clan Morrison</i> ...	Porterfield, W. M. ...	D. A. Evans ...	No.	" ...	Met. Log. 5.8.23 to 10.11.23 ...	14.11.23.
<i>Clan Murdoch</i> ...	Pagan, Q. C. ...	R. E. Owen ...	"	" ...	Form 911 28.7.23 to 11.8.23 ...	22.8.23.
<i>Clan Ranald</i> ...	Henderson, C. W. ...	P. J. Green ...	"	" ...	" ...	" ...
<i>Clan Ross</i> ...	Christian, W. G. M. ...	S. M. Werrey Easterbrook ...	"	" ...	Form 911 8.12.23 to 22.1.24 ...	23.1.24.
<i>Clan Sinclair</i> ...	Neill, G. A. ...	F. B. Parker ...	"	" ...	" 3.8.23 to 8.10.23 ...	19.10.23.
<i>Clan Urquhart</i> ...	Sharpland, C. C. ...	R. M. MacDonald ...	"	" ...	" 12.1.24 to 25.1.24 ...	4.2.24.
			"	" ...	" 13.8.23 to 20.11.23...	5.12.23.

LIST OF VOLUNTARY OBSERVING SHIPS

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>Colonia</i> ...	Barrow, R. K. ...	A. V. Jones ...	No.	Harrison ...	Form 911 15.9.23 to 29.11.23...	20.12.23.
<i>Colombian</i> ...	Gittins, R. P. ...	... ..	..	Leyland ...	.. 13.1.24 to 25.1.24 ...	13.2.24.
<i>Columbia</i> ...	Gemmell, W. ...	S. G. Taylor ...	..	Anchor ...	.. 5.1.24 to 27.1.24 ...	31.1.24.
<i>Comino</i> ...	Nuttall, E. L. ...	A. McVicar ...	..	Furness Withy ...	.. 6.9.23 to 16.10.23 ...	30.10.23.
<i>Coocoe</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>Corinthic</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 23.11.23 to 6.2.24 ...	8.2.24.
<i>Darian</i> ...	Masters, W. ...	J. L. McLaren ...	..	Leyland ...	.. 6.1.24 to 17.1.24 ...	22.1.24.
<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 ...	.. 21.12.23 to 25.1.24...	30.1.24.
<i>Delta</i> ...	Brooks, C., D.S.O., R.D., Commr., R.N.R.	J. O. V. Young ...	..	P. & O. ...	.. 29.12.23 to 18.1.24...	4.2.24.
<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 ...	.. ..	..
<i>Desado</i> ...	Wakeman, E. C. ...	T. Powell, F. Collinson ...	..	R.M.S.P. Co. ...	Form 911 8.12.23 to 26.1.24 ...	30.1.24.
<i>Desna</i> ...	Adam, C., R.D., Commr., R.N.R.	H. D. Jackman ...	..	..	.. 16.12.23 to 9.2.24 ...	14.2.24.
<i>Deucalion</i> ...	Batt, A. E. ...	W. G. Smith ...	..	A. Holt ...	.. 12.1.24 to 3.2.24 ...	14.2.24.
<i>Devon</i> ...	Gardner, H. W. ...	.. ..	..	New Zealand S.S. Co. ...	.. 23.8.23 to 13.10.23...	19.10.23.
<i>Dieppe</i> ...	Marmery, S. ...	Mr. Parsons ...	C.C.	Southern Railway ...	Telegraphic Report. 24.1.24 ...	24.1.24.
<i>Diegby</i> ...	Chambers, F. W., D.S.C.	J. Pascoe, J. W. Murphy, W. P. Paterson.	M.L.	Furness Withy ...	Met. Log. 29.3.23 to 22.9.23 ...	3.10.23.
<i>Director</i> ...	Watson, R. ...	L. Jones ...	No.	Harrison ...	Form 911 31.1.23 to 13.3.23 ...	21.3.23.
<i>Discoverer</i> ...	Sawyer, E. I. ...	J. Stanhope ...	..	..	.. 8.4.23 to 29.5.23 ...	8.6.23.
<i>Dogra</i> ...	Bland, S. ...	H. Hardwick ...	..	Asiatic S.N. Co. ...	.. 6.9.23 to 1.12.23 ...	27.12.23.
<i>Domala, M.V.</i> ...	Whittingham, W. E. ...	C. E. Merchant ...	..	British India ...	.. ..	..
<i>Doric</i> ...	Davies, J. ...	A. Thompson ...	..	White Star ...	Form 911 25.11.23 to 16.12.23	24.12.23.
<i>Dorington Court</i> ...	Barcham, H. C. ...	H. Tulloch ...	..	Haldin & Co. ...	.. 23.5.23 to 12.6.23 ...	19.6.23.
<i>Dramatist</i> ...	Gibbins, W. H. ...	R. W. Roberts ...	..	Harrison ...	.. 2.10.23 to 2.11.23 ...	8.11.23.
<i>Dromore Castle</i> ...	Linklater, H. ...	S. S. Smith ...	..	Union Castle ...	.. 11.11.23 to 1.12.23...	4.2.24.
<i>Duendes</i> ...	Pape, E. R. ...	B. M. Morris, Jenkins ...	..	Pacific S.N. Co. ...	.. 16.11.23 to 1.12.23...	24.12.23.
<i>Duquesa</i> ...	Jarvis, G. ...	C. Lockwood, R. Martin, D. Thornton.	..	Furness Withy ...	.. 7.10.23 to 8.12.23 ...	17.12.23.
<i>Durenda</i> ...	Wilson, W. ...	C. McFarlane ...	..	British India ...	.. ..	..
<i>Eastern</i> ...	Laing, J. D. ...	J. W. Kavanagh, F. R. Miller, H. H. Litchfield, W. McKeown	M.L.	Eastern and Australian ...	Met. Log. 14.2.23 to 16.8.23 ...	8.10.23.
<i>Ebani</i> ...	Fail, — ...	.. ..	No.	Elder Dempster ...	.. ..	..
<i>Edinburgh Castle</i> ...	{ Culverwell, J. N., Strong, H., R.D., Commr., R.N.R. }	— Perkins ...	M.L.	Union Castle ...	.. 13.7.23 to 13.11.23...	21.11.23.
<i>Eemland</i> ...	Van Noppen, C. D. ...	G. W. Yonwen ...	No.	Holland Lloyd ...	Form 911 26.8.23 to 18.11.23...	11.12.23.
<i>Egori</i> ...	McDowall, J. ...	K. Redmore ...	..	Elder Dempster ...	.. 25.11.23 to 10.12.23 ...	12.12.23.
<i>El Cordobes</i> ...	Noton, F. G. ...	N. H. Oldham ...	..	British & Argentine S.N. Co. ...	.. 4.1.24 to 4.2.24 ...	8.2.24.
<i>Elmina</i> ...	{ Evans, D., Millson, H. E. }	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>El Paraguay</i> ...	Ellis, F. ...	E. B. Sergeant ...	No.	Houlder Bros. ...	Form 911 14.10.23 to 11.12.23	17.12.23.
<i>Elpenor</i> ...	{ Evans, T. R., Evans, D. I. }	D. L. Evans, C. Houghton, L. Johnstone, C. Mock.	M.L.	A. Holt ...	Met. Log. 12.8.23 to 26.11.23...	1.12.23.
<i>Elysia</i> ...	Kinnaird, J. ...	A. Grant ...	No.	Anchor ...	Form 911 17.11.23 to 7.12.23...	1.1.24.
<i>Empress of Asia</i> ...	{ Douglas, L. D., R.D., Lt. - Commr., R.N.R. }	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 Australia</i> ...	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 Britain</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 Met. Log. 29.6.23 to 6.12.23 ...	{ 6.11.23. } 8.1.24.
<i>Empress of Canada</i> ...	{ Hailey, A. J., Robinson, S., C.B.E., R.D., Commr., R.N.R. }	.. ..	M.L.	.. ..	.. ..	..
<i>Empress of France</i> ...	Griffiths, E. ...	R. V. Everett, A. S. Phillips, B. Grant.	M.L.	.. ..	.. 13.6.23 to 17.11.23...	21.11.23.
<i>Empress of Russia</i> ...	Hosken, A. J. ...	A. B. Smith, J. D. Vosper, J. P. Napier, C. S. Morris, J. M. H. Twibill, R. H. Graham.	M.L.	.. ..	.. 12.7.23 to 17.12.23...	29.1.24.
<i>Endeavour</i> ...	{ Geary Hill, S. A., D.S.O., Commr., R.N. } Nares, J. D., D.S.O., Capt., R.N.	H. Exton Turner ...	M.L.	His Majesty's Ship ...	.. 3.7.22 to 8.6.23 ...	18.6.23.
<i>Essequibo</i> ...	Pearce, A. W. ...	G. Pattison ...	No.	R.M.S.P. Co. ...	Form 911 7.12.23 to 23.1.24 ...	4.2.24.
<i>Eumaeus</i> ...	Read, J. W. ...	G. A. Murray ...	..	A. Holt ...	.. 15.12.23 to 6.1.24 ...	23.1.24.
<i>Euripides</i> ...	Collins, P. J., O.B.E.	H. S. Cox, A. R. Payne, F. Fuller.	M.L.	Aberdeen ...	Met. Log. 25.8.23 to 12.12.23...	27.12.23.
<i>Eurybates</i> ...	Lloyd, R. ...	J. A. Havard ...	No.	A. Holt ...	Form 911 5.12.23 to 8.1.24 ...	12.2.24.
<i>Explorer</i> ...	Lamont, A. ...	Scientific Staff ...	M.L.	Scottish Fishery Board ...	Met. Log. 9.4.23 to 30.11.23 ...	8.1.24.
<i>Finland</i> ...	Newman, C. ...	A. B. Thompson ...	No.	Red Star ...	Form 911 3.3.23 to 11.3.23 ...	19.3.23.
<i>Fitzroy</i> ...	Woodhouse, A. F. B., Lt.-Commr., R.N.	C. W. Sabine ...	M.L.	His Majesty's Ship ...	Met. Log. 25.7.23 to 1.11.23 ...	10.11.23.
<i>Flandria</i> ...	Veldkamp, G. J. ...	H. D. Sicherer ...	No.	Holland Lloyd ...	Form 911 6.11.23 to 19.12.23...	24.12.23.
<i>Flinders</i> ...	Henderson, D. A., Lt.-Commr., R.N.	A. B. Foulleston ...	M.L.	His Majesty's Ship ...	Met. Log. 25.7.23 to 1.11.23 ...	10.11.23.
<i>Francisco</i> ...	Wilkins, J., O.B.E.	J. A. Vickers ...	No.	Ellerman Wilson ...	Form 911 16.12.23 to 22.1.24...	26.1.24.
<i>Francol</i> ...	Gatley, E. ...	H. J. Prout ...	..	Royal Fleet Auxiliary ...	.. 20.6.23 to 15.9.23 ...	27.11.23.
<i>Frankenfels</i> ...	Gardiner, J. ...	J. W. Allingham, T. Chernside, G. E. Thomas.	M.L.	India Office Shipping ...	Met. Log. 2.9.23 to 10.12.23 ...	18.12.23.
<i>Freienfels</i> ...	Cleugh, J. W. ...	C. F. Bennett ...	..	.. ..	Form 911 7.8.23 to 6.9.23 ...	1.2.24.
<i>Galic</i> ...	Summers, F. F., R.D., Commr. R.N.R.	H. C. Rugg ...	No.	White Star ...	.. 7.11.23 to 9.12.23 ...	14.12.23.

Name of Vessel.	Captain.	Observing Officers.	Official Meteorological Equipment.	Line.	Last Log Register, or Report Contributed.	Date Received.
<i>Galtymore</i> ...	Ledsome, J. S. ...	D. Wilson ...	No.	Furness Withy ...	Form 911 18.1.24 to 29.1.24 ...	1.2.24.
<i>Garret</i> ...	Visser, C. W. ...	S. de Boo ...	No.	Rotterdam Lloyd ...	" 17.12.23 to 12.1.24 ...	4.2.24.
<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.	Dalgely & Co. ...	Form 911 4.10.23 to 14.11.23 ...	30.12.23.
<i>Getria</i> ...	Kolkman, J. M. ...	... ..	No.	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 6.11.23 to 25.1.24 ...	11.2.24.
<i>Glenapp, M.V.</i> ...	Griffiths, J. E. ...	F. Poate ...	"	" ...	" 8.1.24 to 27.1.24 ...	4.2.24.
<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'Crux, A. B. ...	A. R. H. Barton ...	"	British India ...	" 2.11.23 to 13.11.23 ...	27.12.23.
<i>Gorogon</i> ...	Hughes, J. W. ...	J. E. Cooper ...	"	Dalgely & Co. ...	" 16.11.23 to 29.12.23 ...	11.2.24.
<i>Governor Musgrave</i> ...	Coalstad, 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. ... Clark, J. ...	P. Hays, M. C. Turner ...	M.L.	Furness Withy ...	Met. Log. 23.3.22 to 29.9.22 ...	25.10.22.
<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. ... Thompson, R. F. ...	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 27.10.23 to 4.1.24 ...	11.2.24.
<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.	" 1.12.23 to 2.1.24 ...	21.1.24.
<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.	Lampport & 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. 29.1.24 ...	29.1.24.
<i>Highland Enterprise</i> ...	Pond, R. H. ...	... ..	No.	Nelson ...	... ..	... ..
<i>" Glen</i> ...	Jones, T. J. ...	F. Abbott ...	"	" ...	Form 911 23.6.23 to 13.7.23 ...	27.7.23.
<i>" Heather</i> ...	Powell, G. A. ...	G. Watson, R. Sinclair Davies, J. C. Morton.	M.L.	" ...	Met. Log. 23.12.22 to 22.3.23 ...	28.3.23.
<i>" Laddie</i> ...	Alford, C. ...	A. H. Barnes ...	No.	" ...	Form 911 29.4.23 to 14.6.23 ...	3.7.23.
<i>" Laird</i> ...	Davis, G. O. ...	... ..	"	" ...	... ..	... ..
<i>" Piper</i> ...	Collings, D. ...	A. S. Jones, J. S. Collins, J. H. Cables.	M.L.	" ...	Met. Log. 1.9.23 to 14.1.24 ...	16.1.24.
<i>" Pride</i> ...	Robinson, R. H. ...	H. McKinnon, H. Devlin, R. R. Soanes.	"	" ...	" 16.8.23 to 1.1.24 ...	9.1.24.
<i>" Rover</i> ...	Ashby Graves, F. ...	W. Watson, S. G. King, F. Abbott.	"	" ...	" 14.6.23 to 7.11.23 ...	16.11.23.
<i>" Warrior</i> ...	Brooke, W. ...	H. W. Bennett ...	No.	" ...	Form 911 17.10.23 to 14.12.23 ...	17.12.23.
<i>Hobsons Bay</i> ...	Ogilvie, F. J. ...	G. Ronguie, J. E. Williams, E. Baillie.	M.L.	Commonwealth Govt.	Met. Log. 28.7.23 to 2.11.23 ...	19.11.23.
<i>Hobbein</i> ...	Symons, P. ...	G. P. Kitto ...	No.	Lampport & Holt ...	Form 911 25.11.23 to 15.12.23 ...	24.12.23.
<i>Homeric</i> ...	Howarth, F. B., Commr., R.N.R.	W. Hill, F. Patchett ...	W.T.	White Star ...	W.T. Reg. 27.9.23 to 13.10.23 ... Form 911 " " "	16.10.23.
<i>Honorius</i> ...	Samuels, — ...	... ..	No.	R. P. Houston ...	... ..	... ..
<i>Huanchaco</i> ...	Jenkins, J. H. ...	W. E. McMullen ...	W.T.	Pacific S.N. Co. ...	" 28.3.23 to 5.9.23 ...	12.9.23.
<i>Hubert</i> ...	Evans, T. G. ...	C. C. Beal ...	"	Booth ...	" 24.12.23 to 7.1.24 ...	11.2.24.
<i>Hurunui</i> ...	Burton Davies, J. ...	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>Ibez</i> ...	Langdon, C. ...	... ..	C.C.	G.W. Railway ...	Telegraphic Report. 23.2.24 ...	23.2.24.
<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>Tonic Star</i> ...	Wilson, G. ...	J. Sinclair ...	"	Blue Star ...	" 17.1.23 to 19.3.23 ...	22.3.23.
<i>Troquois</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. ...	" 12.12.23 to 5.1.24 ...	21.1.24.
<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. Buckenridge, R. J. Sinclair, F. Humble.	M.L.	State Service Australia	Met. Log. 4.6.23 to 1.11.23 ...	20.12.23.
<i>Karoo</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, T. ...	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.	J. Paice ...	"	P. & O. ...	" 6.1.24 to 12.1.24 ...	19.1.24.
<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>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> ...	Cartner, G. E., O.B.E.	J. R. Laursen, 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> ...	Mander, F. ...	F. W. Parker ...	"	Pacific S.N. Co. ...	Form 911 14.12.23 to 7.1.24 ...	4.2.24.
<i>Lalande</i> ...	Bambra, W. A. ...	N. Webster ...	"	Lampport & Holt ...	" 26.12.23 to 19.1.24 ...	4.2.24.
<i>Lancashire</i> ...	Beckett, F. W. ...	T. L. Owen ...	"	Bibby ...	" 29.9.23 to 6.12.23 ...	17.12.23.

LIST OF VOLUNTARY OBSERVING SHIPS

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 ...	...	...
<i>La Paz, M.V.</i> ...	Ross, J. ...	R. Collister ...	"	Pacific S.N. Co. ...	Form 911 15.12.23 to 8.1.24 ...	11.2.24.
<i>Laplace</i> ...	Davies, G. W. ...	A. Hughes I. O. Jones ...	"	Lampport & Holt ...	" 11.11.23 to 3.12.23 ...	10.12.23.
<i>Lapland</i> ...	Howell, T. ...	B. T. Harris, H. H. Grace, J. M. Appleby.	W.T.	Red Star ...	W.T. Reg. 5.10.23 to 24.10.23 ...	2.11.23.
<i>Lassell, M.V.</i> ...	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. ...	K. 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. ...	" 8.12.23 to 17.1.24 ...	26.1.24.
<i>Levant C.S.</i> ...	West, G. W. ...	...	"	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. ...	...	"	Union Castle ...	Form 911 15.10.23 to 14.12.23 ...	17.12.23.
<i>Loch Katrina, M.V.</i> ...	Matthews, G. P. ...	P. Cooper ...	"	R.M.S.P. Co. ...	" 4.2.23 to 3.3.23 ...	8.3.23.
<i>London Commerce</i> ...	Young, H. J., D.S.O.	E. A. Bennett ...	"	Furness Withy ...	" 20.12.23 to 25.1.24 ...	31.1.24.
<i>Loreto, M.V.</i> ...	Splatt, W. A. ...	F. Binnion ...	"	Pacific S.N. Co. ...	Form 911 9.9.23 to 7.1.24 ...	14.1.24.
<i>Losada M.V.</i> ...	Barkley, E. ...	A. H. Turner ...	"	" ...	" 25.12.23 to 17.1.24 ...	23.1.24.
<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 ...	"	Brocklebank ...	Form 911 4.8.23 to 27.10.23 ...	31.10.23.
<i>Mahana</i> ...	Kershaw, W. A. R. ...	F. M. Smith ...	"	Shaw Savill & Albion ...	" 9.11.23 to 21.12.23 ...	11.1.24.
<i>Maharaja</i> ...	Hartock, L. ...	...	"	Asiatic S.N. Co. ...	" 23.9.23 to 29.10.23 ...	17.12.23.
<i>Mahopac</i> ...	Puttick, J. ...	F. J. Mummery ...	"	Atlantic Transport ...	" 23.4.23 to 3.8.23 ...	27.8.23.
<i>Maihar</i> ...	Rowe, J. P. ...	C. Straw, L. Robertson, R. G. Widdon.	M.L.	Brocklebank ...	Met. Log. 22.9.23 to 10.12.23 ...	26.1.24.
<i>Maimyo</i> ...	Hamilton, G. ...	R. A. L. Williams ...	No.	" ...	Form 911 5.1.24 to 28.1.24 ...	30.1.24.
<i>Maine</i> ...	Seymour, A. ...	J. W. Prier ...	"	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. 4.1.24 to 17.1.24 ...	21.1.24.
<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. ...	"	" ...	...	...
<i>Malancha</i> ...	Whitham, F. ...	J. Robertson ...	No.	Brocklebank ...	Form 911 13.12.23 to 12.1.24 ...	23.1.24.
<i>Malda</i> ...	Gray, T. ...	J. Hayward ...	"	British India ...	" 6.12.23 to 12.1.24 ...	16.1.24.
<i>Manchester Corporation.</i>	Everest, J. E. ...	V. R. Jeffrey ...	"	Manchester Liners ...	" 18.10.23 to 28.10.23 ...	6.11.23.
<i>Manchester Marine Merchant.</i>	Riley, J. E. ...	...	M.L.	" ...	Form 911 19.3.23 to 31.3.23 ...	8.5.23.
<i>Mandasor</i> ...	Kershaw, R. W. ...	W. Baxter ...	"	Brocklebank ...	" 1.12.23 to 7.1.24 ...	28.1.24.
<i>Manhattan</i> ...	Lazell, F. W. ...	...	"	Atlantic Transport ...	" 12.3.23 to 7.4.23 ...	11.4.23.
<i>Manipur</i> ...	Scurr, T. W. ...	G. W. Barker ...	"	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 ...	"	Atlantic Transport ...	" 3.12.23 to 10.1.24 ...	17.1.24.
<i>Mashobra</i> ...	Gallie ...	M. W. K. Bishop ...	"	British India ...	...	...
<i>Masirah</i> ...	Thowless, E. ...	R. C. Baker ...	"	Brocklebank ...	Form 911 30.7.23 to 26.8.23 ...	26.11.23.
<i>Massilia</i> ...	Caitness, J. B. ...	G. H. Squires ...	"	Anchor ...	" 12.5.23 to 4.6.23 ...	27.6.23.
<i>Matakana</i> ...	Bosdet, V. J. ...	H. C. Mont, S. Oswald ...	"	Shaw, Savill & Albion ...	" 20.6.23 to 31.7.23 ...	11.8.23.
<i>Matheran</i> ...	Cornish, N. P. ...	...	M.L.	Brocklebank ...	Met. Log. 14.10.23 to 9.1.24 ...	5.2.24.
<i>Mathura</i> ...	Hanna, R. G. ...	H. H. Armstrong ...	No.	" ...	Form 911 13.12.23 to 28.12.23 ...	11.2.24.
<i>Matiana</i> ...	Langlands, D. H. ...	W. G. E. D. Rawlingson ...	"	British India ...	" 28.12.23 to 21.1.24 ...	1.2.24.
<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.
<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>Melita</i> ...	Landy E. ...	Mr. Blair, Mr. Jones, Mr. Webster.	W.T.	Canadian Pacific ...	" 4.12.23 to 19.12.23 ...	1.1.24.
<i>Memnon</i> ...	Salter, G. H. ...	P. L. Pallot, T. F. Evans ...	No.	A. Holt ...	Form 911 14.1.24 to 26.1.24 ...	7.2.24.
<i>Menominee</i> ...	Finch, E. ...	H. E. McCartney ...	"	Atlantic Transport ...	" 19.8.23 to 17.9.23 ...	21.9.23.
<i>Mesaba</i> ...	Claret, F. H. ...	L. A. Williams ...	"	" ...	" 2.7.23 to 11.7.23 ...	27.8.23.
<i>Metagama</i> ...	Henderson, W. ...	H. A. MacCallum, M. Jack, H. Parry.	W.T.	Canadian Pacific ...	W.T. Reg. 21.1.24 to 9.2.24 ...	14.2.24.
<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 ...	"	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. Oxtan.	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, J. Soames.	W.T.	Canadian Pacific ...	W.T. Reg. 19.1.24 to 7.2.24 ...	11.2.24.
<i>Mirror, C.S.</i> ...	Sherwood, C. A. ...	C. E. F. St. John ...	No.	Eastern Tel. Co. ...	Form 911 18.1.24 to 8.2.24 ...	11.2.24.
<i>Mississippi, M.V.</i> ...	Wylie, J. T. J. ...	A. H. Middleton ...	"	Atlantic Transport ...	" 9.1.24 to 22.1.24 ...	6.2.24.
<i>Missouri</i> ...	Hutchison, J. G. ...	W. W. Howard ...	"	" ...	" 6.10.23 to 15.10.23 ...	23.10.23.
<i>Moena</i> ...	Morzer Bruyns, M. F. ...	J. H. Nieboer ...	"	Nederland ...	" 30.7.23 to 2.9.23 ...	6.9.23.
<i>Moklavru</i> ...	Burleigh, C. W., D.S.O., R.D., Capt., R.N.R.	E. T. Ferraby ...	"	P. & O. ...	" 8.12.23 to 12.1.24 ...	4.2.24.
<i>Mongolian Prince</i> ...	Chilvers, J. ...	H. A. Shaw ...	No.	Prince ...	Form 911 6.1.24 to 29.1.24 ...	11.2.24.
<i>Monkbarns, Ship</i> ...	Davies, W. ...	M. B. Glasier ...	"	J. Stewart & Co. ...	" 13.10.23 to 20.11.23 ...	21.1.24.
<i>Montcalm</i> ...	Rennie, A., O.B.E.	R. Antrobus ...	W.T.	Canadian Pacific ...	W.T. Reg. 29.12.23 to 17.1.24 ...	21.1.24.
<i>Montclare</i> ...	Webster, G. S., R.D., Commr., R.N.R.	E. J. Jones M. Cresswell, M. Jack.	W.T.	" ...	Form 911 29.12.23 to 18.1.24 ...	21.1.24.
<i>Montlaurier</i> ...	Turnbull, J., C.B.E., R.D., Capt., R.N.R.	...	No.	" ...	W.T. Reg. 24.11.23 to 18.12.23 ...	17.12.23.
<i>Montrose</i> ...	Parry, H. ...	H. McFadyen G. Marriott	W.T.	" ...	" 22.12.23 to 11.1.24 ...	14.1.24.
<i>Morrada</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. 8.12.23 to 28.12.23 ...	1.1.24.
					" 15.9.23 to 27.11.23 ...	29.11.23.

Name of Vessel.	Captain.	Observing Officers.	Official Meteorological Equipment.	Line.	Last Log, Register, or Report Contributed.	Date Received.
<i>Mulbera</i> ...	Steadman, W. R. ...	E. Holland ...	No.	British India ...	Form 911 6.12.23 to 26.12.23...	21.1.24.
<i>Musician</i> ...	Egerton, J. J. ...	O. Stanhope ...	"	Harrison ...	" 5.4.23 to 17.6.23 ...	2.8.23.
<i>Nagara</i> ...	Turner, E. A. ...	C. E. Mason ...	"	R.M.S.P. Co. ...	" 11.12.23 to 3.2.24 ...	6.2.24.
<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>Navarino</i> ...	Crichton, J. S. ...	J. Annam ...	No.	Glen & Co. ...	Form 911 13.12.23 to 12.1.24...	22.1.24.
<i>Navasota</i> ...	Willan, F. G. L. ...	P. R. Locks ...	"	R.M.S.P. Co. ...	" 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 ...	" 11.12.23 to 17.12.23 ...	11.2.24.
<i>Nevasa</i> ...	Swanson, C. J. ...	E. C. T. West ...	"	British India ...	" 12.10.23 to 2.12.23 ...	4.1.24.
<i>Neuby 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 21.11.23 to 31.12.23 ...	4.2.24.
<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, H. C. Slinn.	M.L.	P. & O. ...	Met. Log. 3.11.23 to 22.1.24 ...	26.1.24.
<i>Norfolk Range</i> ...	Moore, J. E. W. ...	R. F. Handley ...	No.	Furness Withy ...	Form 911 17.1.24 to 2.2.24 ...	14.2.24.
<i>Norman</i> ...	Morton Betts, W. ...	D. A. Hodgson ...	"	Union Castle ...	" 27.8.23 to 15.9.23 ...	19.10.23.
<i>Norseman, C.S.</i> ...	Barter, H. O., R.D., Commr., R.N.R.	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. Ardern.	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> ...	Villiamsen ...	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... " 22.11.23 to 6.12.23...	19.11.23. 10.12.23.
<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>Oranvan</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 ... Form 911 13.1.24 to 6.2.24 ...	17.12.23. 11.2.24.
<i>Orcoma</i> ...	Pleignier, H. T. S. ...	G. B. Wardall, J. J. Buckley, C. H. Wenton.	M.L.	Pacific S.N. Co. ...	Met. Log. 23.11.23 to 8.2.24 ...	14.2.24.
<i>Orduna</i> ...	Warner, G. E. ...	J. W. Carr, J. Vivian, J. Smith, A. A. Martin.	W.T.	R.M.S.P. Co. ...	W.T. Reg. 4.11.23 to 24.11.23... Form 911 3.11.23 to 26.11.23...	29.11.23. 30.11.23.
<i>Oriana</i> ...	Christian, G. H. ...	G. Pattison, Mason, G. F. Nicholson, Cruikshank.	M.L.	Pacific S.N. Co. ...	Met. Log. 26.1.23 to 14.8.23 ...	18.8.23.
<i>Orita</i> ...	Dominy, R. H., C.B.E., Commr., R.N.R.	F. W. Hockey, H. S. Roberts, —, Gale.	M.L.	" ...	Met. Log. 15.8.23 to 9.12.23 ...	12.12.23.
<i>Ormonde</i> ...	Douglas, H. P., C.M.G., Capt., R.N.	" ...	M.L.	His Majesty's Ship ...	" ...	" ...
<i>Ormonde</i> ...	Staunton, H. G., C.B.E., R.D., Commr., R.N.R.	T. G. McGregor, H. MacLean, F. J. L. Butler.	M.L.	Orient ...	Met. Log. 14.10.23 to 29.1.24 ...	5.2.24.
<i>Ormuz</i> ...	James, L. V., D.S.C.	J. S. Metcalf, A. J. Croft- Cohen, I. E. G. Golds- worthy, 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, N. Whinfield, J. C. Jackson.	M.L.	Orient ...	Met. Log. 20.9.23 to 3.1.24 ...	31.1.24.
<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>Orvioto</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 16.12.23 to 30.12.23 ...	21.1.24.
<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 23.12.23 to 2.2.24 ...	11.2.24.
<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. 19.2.24 ...	19.2.24.
<i>Patrol, C.S.</i> ...	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 20.12.23 to 29.1.24...	31.1.24.
<i>Peshawur</i> ...	Hester, C. ...	" ...	M.L.	P. & O. ...	" ...	" ...
<i>Philadelphum</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 ...	" 27.11.23 to 9.1.24 ...	6.2.24.
<i>Poona</i> ...	Cherry, W. G. W. ...	F. J. Ablewhite ...	"	P. & O. ...	Form 911 2.1.24 to 16.1.24 ...	28.1.24.
<i>Port Albany</i> ...	Robinson, C. A. ...	G. L. Hazlewood, A. W. Jenkyns, J. S. Beardshaw, W. B. Craig.	M.L.	Commonwealth & Do- minion.	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

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> ...	Jack, J. ...	E. T. N. Lawrey, E. W. R. Young.	No.	„ „ „	Form 911 1.12.23 to 9.1.24 ...	11.2.24.
„ <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, R. B. Linklater, T. L. Kidwell.	M.L.	„ „ „	„ 11.9.23 to 17.1.24 ...	28.1.24.
„ <i>Nicholson</i> ...	Hoad, A. C. ...	W. G. Jones, C. R. Townshend, G. G. Langford.	M.L.	„ „ „	„ 5.10.23 to 4.2.24 ...	11.2.24.
„ <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</i> , H.M.S.A.S. ...	Dalgleish ...	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 14.2.24 ...	14.2.24.
<i>Rhodesian Transport</i> ...	Fowler, W. H. ...	E. A. Insley ...	No.	Houlder Bros.	Form 911 19.9.23 to 9.1.24 ...	2.2.24.
<i>Rialto</i> ...	Mordue, J. A. ...	„ ...	„	Ellerman Bucknall ...	„ 1.11.23 to 2.1.24 ...	18.1.24.
<i>Rimutaka</i> ...	Hemming, F. A. ...	E. W. Smith, H. Horwood, R. S. Cox.	M.L.	New Zealand S.S. Co.	Met. Log. 22.9.23 to 6.2.24 ...	11.2.24.
<i>Romney</i> ...	Leicester, F. S. ...	E. S. Phillips ...	No.	Lampert & 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>Ruapahu</i> ...	McKellar, A. W. R.D., Capt., R.N.R.	„ ...	M.L.	New Zealand S.S. Co.	„ ...	...
<i>Sachem</i> ...	Furieux, S. ...	C. Waldron ...	No.	Furness Withy ...	Form 911 20.12.23 to 23.1.24...	26.1.24.
<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 ...	„	„ ...	„ 13.10.23 to 2.11.23...	16.11.23.
<i>Saairse</i> , Yacht ...	O'Brien, C. ...	H. S. Hodges ...	„	„ ...	„ 1.9.23 to 6.10.23 ...	7.11.23.
<i>Sardinia</i> ...	Cadiz, F. G., D.S.C.	A. F. Wiles ...	„	„ ...	„ 1.1.24 to 21.1.24 ...	4.2.24.
<i>Saturnia</i> ...	Black, J. ...	T. Ure ...	W.T.	Anchor Donaldson ...	W.T. Reg. 24.11.23 to 16.12.23	27.12.23.
„	„	„	„	„	Form 911 23.11.23 to 17.12.23	27.12.23.
„	„	„	„	„	„ 4.1.24 to 22.1.24 ...	26.1.24.
<i>Saxoleine</i> ...	Biddick, E. ...	C. S. Rodgers ...	No.	Hunting & Son ...	„ 16.11.23 to 7.1.24 ...	8.1.24.
<i>Saxon</i> ...	Stanley, W. F. ...	R. S. W. Harris ...	„	„ ...	„ 27.9.23 to 23.10.23...	2.11.23.
<i>Saxonia</i> ...	Storey, F. E., R.D., Capt., R.N.R.	E. S. Simmonds ...	„	Cunard ...	„ 26.8.23 to 4.12.23 ...	13.12.23.
<i>Scholar</i> ...	O'Connor, T. ...	H. Hall ...	„	Harrison ...	„ 19.10.23 to 1.1.24 ...	7.1.24.
<i>Scientist</i> ...	Hansen, W. A. ...	D. G. Russell ...	„	„ ...	„ 31.10.23 to 24.1.24...	28.1.24.
<i>Scindia</i> ...	Matthews, W. ...	H. D. Campsie ...	„	Anchor ...	„ 24.12.23 ...	24.12.23.
<i>Scotia</i> ...	Telfer ...	O. W. L. Jones ...	C.C.	L.M. & S. Rly. ...	Telegraphic Report 24.12.23	24.12.23.
<i>Scottish Bard</i> ...	McDonnell, S. ...	W. H. Campbell ...	No.	„ ...	Form 911 25.8.23 to 14.9.23 ...	1.10.23.
<i>Scottish Borderer</i> ...	Jeffrey, D. G., D.S.O.	G. F. Widger ...	„	„ ...	„ 8.11.23 to 26.11.23...	19.12.23.
<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.
„	„	„	„	„	Form 911 6.11.23 to 25.11.23...	3.12.23.
<i>Sheaf Mount</i> ...	Groves, C. V. ...	J. L. Forster ...	No.	Souter, W. A. ...	„ 4.12.23 to 31.12.23...	21.1.24.
<i>Sheaf Spear</i> ...	Whitfield, G. A., O.B.E.	A. E. Harvey, W. H. Grisewood.	M.L.	„ ...	Met. Log. 18.3.23 to 20.8.23 ...	8.10.23.
<i>Sicilia</i> ...	Miller, E. C. ...	H. Sanders ...	No.	P. & O. ...	Form 911 20.10.23 to 27.11.23	1.1.24.
<i>Socrates</i> ...	James, F. R. ...	E. R. Hartley ...	„	Lampert & Holt ...	„ 3.12.23 to 22.12.23...	30.1.24.
<i>Selkaboemi</i> ...	Ruhaak, G. H. ...	W. N. de Wijn ...	„	„ ...	„ 28.12.23 to 15.1.24...	8.2.24.
<i>Somerses</i> ...	Barnett, H. ...	C. H. Landfield ...	„	„ ...	„ 17.11.23 to 1.1.24 ...	4.1.24.
<i>Somme</i> ...	Miles, F. R., Commr., R.N.R.	B. K. Berry, C. C. Prosser, D. P. Larham.	M.L.	New Zealand S.S. Co. R.M.S.P. Co.	Met. Log. 24.4.23 to 28.11.23...	17.12.23.
<i>Songster</i> ...	Smith, D. P. ...	J. R. McIntyre, D. Richards, W. H. Hunt.	M.L.	Harrison ...	„ 16.7.22 to 23.10.22...	2.11.22.
<i>Spectator</i> ...	Owen, W. F. ...	L. Seddon ...	No.	„ ...	Form 911 25.10.23 to 14.11.23	5.12.23.
<i>Spero</i> ...	French, H. E. ...	„ ...	M.L.	Ellerman Wilson ...	„ ...	...
<i>Stephan</i> , C.S. ...	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.	„ ...	Form 911 27.7.23 to 7.9.23 ...	21.11.23.
<i>St. Albans</i> ...	„ ...	„ ...	„	Eastern and Australian ...	„ ...	...
<i>St. Patrick</i> ...	Bearpark, E. W. ...	W. P. Baker ...	„	Rankin Gilmour ...	Form 911 13.9.23 to 26.9.23 ...	7.11.23.
<i>Tairoa</i> ...	Summers, W. G. ...	J. Steele ...	No.	Shaw, Savill & Albion ...	Form 911 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.	Yull & Co. ...	Met. Log. 30.4.23 to 5.10.23 ...	20.11.23.
<i>Tambora</i> ...	Huisman, N. ...	H. Van Manen ...	No.	Rotterdam Lloyd ...	Form 911 23.11.23 to 12.1.24...	26.1.24.
<i>Teiresias</i> ...	Reynard, J. G. ...	W. F. Dark ...	„	„ ...	„ 23.7.23 to 2.8.23 ...	14.8.23.
<i>Teucer</i> ...	Hannev, T. W. ...	J. C. Norton ...	„	„ ...	„ 20.9.23 to 18.1.24 ...	4.2.24.
<i>Themistocles</i> ...	Jernyn, W. M. ...	R. H. Harrison ...	„	Aberdeen ...	„ ...	...
<i>Theseus</i> ...	Williams, D. T. ...	W. Cowperthwaite ...	„	„ ...	Form 911 1.12.23 to 8.2.24 ...	15.2.24.
<i>Titan</i> ...	Ireland, T. R. ...	J. P. Williams, A. C. H. Jones, D. J. Davies, A. Taylor.	M.L.	A. Holt ...	Met. Log. 3.6.23 to 7.10.23 ...	10.10.23.
<i>Tolmie</i> , S.F. Bqtnr.	Stewart, J. C. ...	F. Burch ...	No.	B. C. Mills 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</i> , C.S. ...	Jones, Ll. T., M.B.E.	S. P. Sheldon ...	„	„ ...	„ 8.10.23 to 18.11.23...	24.12.23.
<i>Traveller</i> ...	Jones, E. W. ...	„ ...	„	„ ...	„ 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. Counce ...	"	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. ...	E. Greave ...	"	Cunard ...	" 1.1.24 to 10.2.24 ...	13.2.24.
<i>Vasconia</i> ...	Inch, F. ...	W. P. Armour ...	"	" ...	" 9.1.24 to 19.1.24 ...	24.1.24.
<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. Vdc. 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. R.D., Commr. R.N.R.	H. R. Rooper ...	"	" ...	" 6.1.24 to 19.1.24 ...	25.1.24.
<i>Verentia</i> ...	Stafford, W., D.S.C., R.D., Lt.-Commr., R.N.R.	A. S. W. Watts ...	"	" ...	" 24.12.23 to 30.1.24...	6.2.24.
<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>Vittoria</i> ...	Jackson, G. W. ...	F. Galbraith ...	No.	Vittoria S.S. Co. ...	Form 911 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.	C. Hylem ...	"	Union Castle ...	" 11.12.23 to 23.1.24...	29.1.24.
<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>Warfeld</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> ...	Rollerson, W. ...	J. F. Spears ...	"	White Star-Dominion	Form 911 30.12.23 to 6.2.24 ...	11.2.24.
<i>Wimfredian</i> ...	Harrocks, W. ...	W. R. C. Baker ...	"	Leyland ...	" 5.1.24 to 4.2.24 ...	11.2.24.
<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 ...	Mr. Allan ...	" ...	" " ...	9.1.24.
<i>Patia</i> ...	Downes, F. J. ...	S. A. Sapsworth ...	Elder & Fyffes ...	" " ...	29.10.23.
<i>Tortuguero</i> ...	Martin ...	H. H. Dunning ...	" ...	" " ...	28.12.23.