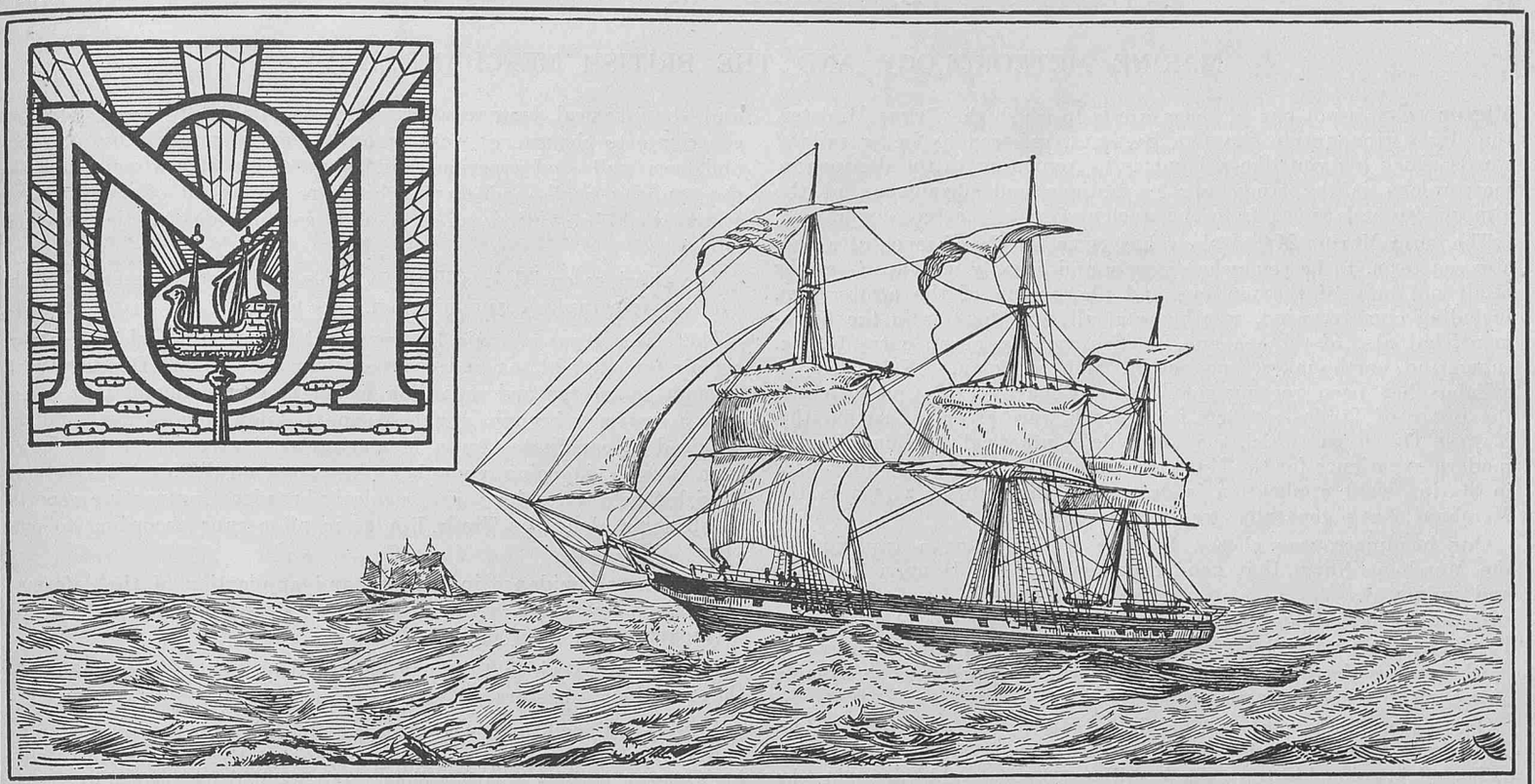
M.O. 262.



VOL. VI. No. 64. THE MARINE OBSERVER. APRIL, 1929.

TABLE OF PRINCIPAL CONTENTS.

UNVEILING OF THE WAR MEMORIAL OF THE MERCHANT NAVY AND FISHING FLEETS.

HER MAJESTY THE QUEEN most graciously unveiled the Memorial on Tower Hill, London, at 3 p.m. on Wednesday, December 12th, 1928, notwithstanding her great anxiety on account of the serious illness of HIS MAJESTY THE KING, representatives of every branch of the Service attending.

This Memorial is erected by the Imperial War Graves Commission, in honour of the Merchant Navy and Fishing Fleets, and records the names of 12,649 officers and men who lost their lives during the Great War through enemy action and who have no grave but the sea.

A photograph and description is given on pages 80-81 by a member of the Marine Division, who has been mainly responsible for illustrating the MARINE OBSERVER, and who, having served as a private soldier during the Great War, writes simply with the view of an onlooker of the work at sea.

Unveiling the Memorial HER MAJESTY used these 24 significant words :—

" To the glory of GOD and in honour of these brave men I unveil this Memorial on behalf of those for whom they died."

The International Code signal C J I—N L H—

" We will not forget "

was then hoisted at the flagstaff.

The Most Reverend the Lord ARCHBISHOP OF CANTERBURY then dedicated the Memorial, using the following words :—

" To the glory of GOD and in proud and thankful memory of the twelve thousand, six hundred and forty-nine officers and men of the Merchant Navy and Fishing Fleets who gave their lives for their country in the Great War, and who have no grave but the sea, we dedicate this Memorial ; In the Name of the FATHER and of the SON and of the HOLY GHOST.—Amen."

After the Benediction the Last Post was sounded, then one minute's Silence followed by Reveillé.

HER MAJESTY placed a wreath on the Memorial, some widows and relatives of officers and men whose names are on the Memorial were presented, and the great ceremony ended with the singing, and never more fervently sung :—

" GOD save our gracious KING,
Long live our noble KING,
GOD save the KING !

Send him victorious,
Happy and glorious,
Long to reign over us,
GOD save the KING ! "

(3827) Wt. 52—9 1050 & 200 3/29 P. St. G. 4/1

MARINE METEOROLOGY AND THE BRITISH MERCHANT NAVY.

METEOROLOGY is not one of those words to which the Prime Minister, the Right Honourable STANLEY BALDWIN, referred as being sailors' words which hit you like a hammer.* According to the dictionary, meteorology is the study of the motions and phenomena of the atmosphere and comes from the ancient Greek "meteorologia."

The term Marine Meteorology has come, in the absence of a concise sea term, to be somewhat loosely and broadly used to cover the study not only of the motions and phenomena of the atmosphere, including climate, wind, weather and all that there is in the firmament, but also of the sea and its disturbances, ocean currents, ice, submarine earthquakes, magnetism and so forth. Now that a syllabus has been recommended by a Departmental Committee of the Board of Trade—extracts from which were given in last month's MARINE OBSERVER—which may provide a practical test based upon modern experience for the Masters and Mates of the future, difficulties in stating what application is desired of this subject at sea in the Merchant Navy generally are largely removed.

Our headpiece was chosen because it illustrates a tradition of the Merchant Navy, that good seamanship depends upon foresight and judgment.

Here we have the ship *Hotspur* under the command of HENRY TOYNBEE reefing topsails under top-gallant sails with a quarterly wind. In those days the Blackwall ships were well manned and so capable of reefing all three topsails together.

On this occasion, probably at eight bells in the afternoon watch, TOYNBEE had observed signs of a coming storm, and by reefing topsails and keeping his top-gallant sails set he was able to make the best use of a fair wind and yet be prepared to get his ship under snug canvas, when the wind increased at night, without damage to spars, rigging and sails.

It is necessary to distinguish rather carefully between the general service of Marine Meteorology and the Specialist service performed by the Voluntary Corps of Marine Observers.

As we hope these notes will come to the notice of many besides our Corps, let us make it quite clear at the outset that the Voluntary Corps of Marine Observers and regular observing ships have provided and will continue to provide through the Marine Division of the Meteorological Office, information published and communicated by Wireless Telegraphy which is the basis upon which the whole Merchant Navy may work in the interests of safe and economical navigation. It is necessary that all Masters and Mates should be able to make accurate meteorological observations and provide information to all concerned when called upon to do so.

The General Service of Marine Meteorology in the Merchant Navy.

Marine Meteorology can only be of real value in navigation and in the performance of the duties of master and mate if it is given its proper place. That place is a branch of seamanship as an aid to navigation and not a primary study. That is, Marine Meteorology is necessary for the efficient working of a ship and should be used in connection with navigation just as ship stability, the prevention of fire at sea and all branches of seamanship must be used with a proper sense of proportion if a ship is to be safely and economically run.

The first essential is a uniform, but sufficiently elastic and simple system of observation.

This may be provided by cultivating the habit of accurate observation by adoption of the scales published in the MARINE OBSERVERS' HANDBOOK and by comparing the ships instruments with the readings of standards at observatories, or in regular observing ships which have tested instruments, and so finding their error and allowing for it, thereby making the ship's logbook a reliable and accurate meteorological record as well as a true record of all happenings which it is customary to log.

The second essential is knowledge and information of the winds and currents over the oceans and at the coasts, the laws of storms and the physical factors where they are definitely known, which contribute to changes of weather and ocean currents. This may be had from well used experience and observation at sea coupled with the study of books and charts which are the result of many years' systematic observation at sea and compilation in the Marine Division.

The third essential is ability to apply the first and second with wireless telegraphy communication as a practical aid to navigation.

There is not yet a single International system of wireless weather signals for ships at sea and coast stations such as the Departmental Committee foresee and regarding which they recommend that *when* such a system is brought about, a general knowledge of it should be required of candidates for a Master's Certificate. There are, however, already in being a number of systems on different coasts and British "selected ships" are regularly broadcasting routine reports to all ships along the Trade Routes in all oceans according to one plan.

For general guidance in the use and application of the information given by these signals WIRELESS AND WEATHER AN AID TO NAVIGATION has been published.

The extent to which this may be practical must rest mainly with the individual masters of ships.

A well-equipped and well-officered liner has better opportunity and better facilities for recording her own observations, intercepting reports, making weather charts and navigating according to the nature of the weather, currents, ice and conditions which these indicate that she will encounter, than a tramp steamer where watch and watch is kept by the navigating officers and the crew is small. Obviously in the latter, the Master must insist on this highly-skilled work being cut down to a minimum consistent with safety, and he must content himself with the use of reports, hurricane warnings and forecasts broadcast without the advantage of his own weather charts made on board. Then the coasting steamer constantly in and out of port, the small sailing vessel and the fishermen all have to be considered and especially with these, paper work on board is only practicable to the extent of noting wind, weather and barometer observed and forecasts and warnings made at meteorological centres and broadcast by R/T, word of mouth. Indeed, this work must be consistent with the needs of the service and the officer who attempts more thereby neglecting his other duties is doing as much harm as those who neglect it.

Now the whole Merchant Navy may benefit from the proper use of Marine Meteorology, each ship according to her capacity and trade. Such a great work must be led if it is to be effective and British experience and tradition clearly indicate that:—

> "The ways of commerce over the oceans and the hereditary chivalry of the sea are beyond doubt more adaptable to voluntary meteorological service than to obligatory service."

To provide the necessary routine data from which to compile information for publication for general use, and a service of reports by wireless telegraphy to all ships and meteorological centres, it is necessary that only a certain number of ships should be employed. That is not to say that ships outside this number should never make returns or report by wireless. Any ship observing unusual or abnormal phenomena should carefully record the observed facts and return them, and any ship observing the formation of a tropical revolving storm at any time which has not previously been reported by wireless telegraphy should do so by the best means at her disposal to all ships and the nearest appropriate coast station. At such times as there may not be sufficient selected ships in all parts of the oceans to provide an adequate service of reports, ships other than selected ships should fill the gaps by assisting in the service of routine wireless weather reports.

Hence for general efficiency it is essential that all Masters and Mates should have a knowledge of the system practised by the Corps of Voluntary Marine Observers in regular observing ships, for it is the latter who provide the basis of the information upon which all may work.

* See page 126, Vol. V, No. 55, quotations from a speeeh by Prime Minister to Honourable Company of Master Mariners in notes entitled The Marine Observer's Log.

The Corps of Voluntary Marine Observers and Regular Observing Fleet.

This organisation is purely voluntary, the work being done by the officers of regular observing ships whose commanders, with the consent of their owners, have undertaken a patriotic service in the interests of mankind. It is a task which means additional work to that required in the ordinary course of their employment, and in doing which they assist in a general survey of the atmosphere and the sea, work which has been going on ever since ships sailed the seas, but only generally organised last century. The Corps of Voluntary Marine Observers are specialists, and their work may be said to consist of three branches; they perform one or two, and many perform all three branches of the work.

(1) The regular recording and return of accurate meteorological observations for statistics and research.

(2) The regular broadcasting of accurate meteorological observations by wireless telegraphy by selected ships for the general purposes of meteorology and navigation afloat and ashore.

(3) The carrying out of experimental work, testing new instruments, making special observations and investigations and generally leading by example in the practical application of Marine Meteorology to navigation by making weather charts and so on.

The Corps of Voluntary Marine Observers, for the time being, are the commanders and officers of the Regular Observing Fleet of 500 ships. This fleet has been organised and is maintained by a process of selection from ships offering to undertake the work. Under present-day conditions of keen competition and commercial rivalry, transfer of officers from ship to ship and transfer of ships to different trades are all too frequent, but yet, to quote from a reviewer of "The Organisation and Value of Marine Meteorology" in Lloyd's List, they "have been loosely (and in the looseness of the organisation lies its strength) organised into a corps of voluntary observers at sea." That part of our organisation with which the Merchant Navy at sea is most immediately concerned are the "Selected Ships." This term originated from words used by the late Captain ISDALE, Marine Superintendent of the British India S.N. Co., and it is to "Selected Ships" which the Merchant Navy should look along all the main trade routes in every ocean for routine wireless weather reports made on a definite plan and containing accurate observations.

The International organisation which is aimed at was described in my note, "Intelligence of Weather, Tide Current and Ice and Safety of Life at Sea," in the October, 1928, number. The Weather Shipping Bulletins of the various Maritime Countries supply the data of observations made at the coast which are the foundation upon which to extend a weather chart.

The British Merchant Navy is the main link of the system of communication between all parts of the British Empire, which is being supplemented and accelerated by aviation, and it is also international, serving as it does every country in the world. Mr. J. W. DAVIS, the Ambassador of the United States of America, said on 25th February, 1921: "I deem it no exaggeration to say that, whether in War or Peace, the British Mercantile Marine has rendered more service to more men of more nations than any other human agency."

The substance of the representations made in stating the views of a great many Marine Observers are that:—

> "If the maritime nations and the British Dominions could see their way each to work on one uniform system under certain agreed lines, then the needs of International Marine Meteorology regarding ships' wireless weather telegraphy would be served, and at the same time each meteorological service would retain control of its own national organisation; and the seamen of the different nations would each preserve that pride of race and their sea traditions in serving their own country while at the same time working for the mutual benefit of all nations."

This is a high ideal which is difficult of accomplishment because in a service which has so many aims, there is necessarily diversity of view.

The Corps of Voluntary Marine Observers, while supplying information for the sea and air services, also supplies a great deal of data for the many general purposes of World Meteorology, and this must never be forgotten. No branch of meteorology can be developed to full advantage without the highly scientific work which is done by professional meteorologists, and so we have ever to consider what their needs are and to give them every possible assistance consistent with the work of merchant ships. Herein there are difficulties, but these are being overcome as we progress, and work in contact is begetting better understanding. Knowledge of Marine Meteorology is one thing, but without understanding, not only of Marine Meteorology, but of the spirit, the traditions and customs of those who go down to the sea in ships upon their lawful occasions, is of less moral and practical value than is knowledge with understanding.

In the regular observing fleet we have up to 10 of His Majesty's ships, usually surveying vessels and cruisers on foreign stations and those making ocean passages, which join in our work to the good of both the Royal and Merchant Navies, but the requirements of His Majesty's Fleet are in many respects different from those of the Merchant Service, and so there is another organisation to which we will refer later.

Seamanlike Methods.

With the great developments which are taking place in all branches of science there is more need than ever for seamen to see that developments of science made in all matters appertaining to our calling are adapted in such a way that they can best be used in seamanship. By seamanship, we use the word in the broadest sense, the profession of seamanship, sea craft.

Take Wireless, for instance. The Departmental Committee of the Board of Trade, while definitely including Meteorology in the recommended syllabus, have given at considerable length their reasons for not including Wireless in the examination for masters and mates, and qualification in this subject remains voluntary, and being voluntary many will make a study of the subject.

Who can see where this great invention will ultimately lead? It is only for a few years that the human voice has been heard at great distances by Radio Telephony; and now they are developing Radio Photography so that it may be possible, without great expense, in the future for ships to see by this means Weather Charts made at Meteorological Centres. Hence we should see to it that we develop Weather Charting along lines which are seamanlike. And who prefers more than the seaman plain, straightforward drawings and charts which do not require undue explanation? To secure a suitable plan for sea use we cannot do better than develop weather charting at sea by the individual and collective efforts of the officers of the sea services.

It is not always remembered that in the days of sail, before the invention of the many mechanical aids to navigation and seamanship which are now in use, there were many sea officers of scientific attainment. These men developed and organised Marine Meteorology, and it is due to them that it has become a recognised branch of seamanship in the British Merchant Navy.

The Marine Division.

The Meteorological Department was established at the Board of Trade under Admiral FITZROY in 1854, its function being to collect meteorological observations taken at sea in all parts of the world. FITZROY not only commenced this work, but also established a forecast and gale warning service for the British Isles with some success.

At his death, his department was reorganised with two branches, one to do the marine work and the other the land work. The Marine Division is the original and oldest part of the Meteorological Office and not a growth of recent years. It is an integral part of the Sea Services and the Meteorological Service. It is officered and manned by full-time employees of the State, its staff consisting of the Marine Superintendent, a Master Mariner appointed from the Corps of Voluntary Marine Observers, as are his two nautical assistants, one at headquarters and one at Liverpool. There is a professional meteorological assistant who advises the Marine Superintendent on matters of scientific meteorology, a junior nautical assistant for visiting duties in the Port of London, 12 clerks specially trained in Marine Meteorology, 11 in London and one at Liverpool. Then there are agents who are Master Mariners or Naval officers specially

interested in Marine Meteorology at 11 of the principal ports in the British Empire, their appointments being practically upon an honorary basis.

The Marine Division is not responsible for forecasting weather in Home Waters, as many have supposed, this work being done by the Forecast Division with whom we are in close touch. The Marine Division drew up the plan on which forecasts for shipping are made, advises the Forecast Service as required in nautical matters and makes all arrangements with shipping and seamen required for central forecasting. Mr. Dines, the present Superintendent of the Forecast Division, is transferring to another Division of the office: his period of office as Superintendent of Forecasts will stand for all time as that in which a regular wireless service of forecasts and weather reports was first established for shipping and seamen on the British coasts, and to him and his assistants the Merchant Navy and Fishing Fleets are much indebted.

The principal work of the Marine Division is the organisation of the Regular Observing Fleet and the instruction and guidance of the Corps of Voluntary Marine Observers, the extraction and compilation of marine data for research and the publication of charts and literature for seamen.

The Royal Naval Service Division.

As already stated, the requirements of His Majesty's Fleet and the Merchant Navy differ in many respects. The interests of His Majesty's Fleet as regards meteorology are cared for by a special division set up for the purpose in charge of a naval officer, at this time a retired commander who commenced sea life in the Merchant Navy, Commander L. Garbett, R.N., of great experience in the British Royal Naval Hydrographic Survey service. His Majesty's ships are undertaking much work which by its nature would be unsuitable for merchantmen, and Captain Garbett has been instrumental in getting a system of upper air soundings and observations at sea established in His Majesty's Fleet which will undoubtedly lead to practical developments in several directions, including aids to aerial navigation. The close contact of the Marine and Royal Naval Division leads to the mutual advantage of the Royal and Merchant Navies, in that, where our requirements are similar, we are able in some measure to influence the all important matter, uniformity of scales, codes and methods.

The Marine Observer

"Is primarily intended for seamen and conforms to the language of the sea rather than to the technical language of scientific meteorology. It will appeal to those interested in navigation and meteorology. Its aim is to promote accurate meteorological observation and safety of life and property at sea."

So says the advertisement on the green slip order form for this journal and this is a true description. All officers of the Merchant Navy, shipowners and others interested in these aims are referred to the fleet list published monthly in this journal with names of the Corps of Voluntary Marine Observers, the specialists of the Service to whom we are all indebted.

There are many who are not really familiar with the British system and who inquire why all and sundry are not recording and returning observations to the Marine Division and why charts and literature are not given to them. This journal and other necessary literature for doing the work in the interests of the whole service are sent regularly to every observing ship on our list in recognition and acknowledgment, and as some small return for their valuable work. The tendency in the past has been to collect more data than could be suitably dealt with and this has been harmful to the service. Regular returns from 500 ships are the most that can be efficiently dealt with, with the means at our disposal. The Corps of Marine Observers have now definitely proved that there is a great deal more in the work than returning records of observations. What is most needed is the intelligent and seamanlike application of the knowledge and information, which is the outcome of the work of our corps for three-quarters of a century, by means of wireless communication.

This JOURNAL, the MARINE OBSERVERS' HANDBOOK, WIRELESS AND WEATHER AN AID TO NAVIGATION, Meteorological Charts of the Oceans and other literature may be purchased at His Majesty's Stationery Office and the Admiralty Chart agents. In them, the Merchant Navy will find much useful information, but it is not possible to represent on paper all the accumulated information and knowledge which is the outcome of the work of our Corps, that can only accrue by practice at sea.

MARINE SUPERINTENDENT.

London.
1st January, 1929.

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.

REVERSE SETS IN THE GULF STREAM.

THE following is an extract from the Meteorological Report of S.S. *Canadian Winner*, Captain W. P. HOCKING, Panama to Quebec, observer Mr. R. J. WATSON, 3rd Officer.

"April 22nd, 1928. The noon position by observation being Latitude 39° 15′ N., Longitude 65° 20′ W., the course was set to make N. 32° E. True; 5° being allowed for the set of the Gulf Stream. At 7.10 p.m. the position obtained by stellar observations was Latitude 40° 01′ N., Longitude 64° 58′ W., the run in the interval being 70 miles, measured by log. This gave the current experienced during the seven hours run, S. 43° W. at 3.05 knots (22 miles). The temperatures at noon were, air 56°, sea surface 62°; at 4 p.m. air 60°, sea 62°, and at 7 p.m. air 42°, sea 44°.

According to the chart in this position we should have been well within the average limits of the Gulf Stream, and experiencing a current setting approximately ENE at 2 knts.

The weather at the time was: wind hauling from WNW to ENE, force 3; slight sea, cloudy and clear."

NOTE.—Reference to the Chart published for this region in Volume III, No. 27 MARINE OBSERVER, indicates that the resultant of 116 observations gave a set and drift of ENE 21.1 miles per day and that occasional sets to the SW had been recorded between 1916 and 1924. The attention of navigators is invited to the variations as well as the resultant arrows clearly given on the Charts of Currents being published for the main trade routes in all Oceans in this Journal.

The following is an extract from the Meteorological Report of S.S. *Atreus*, Captain G. G. RUNDLE, Port Said to Boston, observer Mr. H. NICHOLSON, 3rd Officer.

"At midnight on April 3rd, 1928, the ship entered the ordinary Southern limit of the Gulf Stream current as shown in Admiralty Chart 2060 B. Latitude 38° 58′ N., Longitude 56° 42′ W., Sea Temperature 62° F., Air 55°, Moderate ENE wind, Barometer 30.50 in. Ships course was 293° speed 12½ knots. From this time an allowance was made in the course for an expected Easterly set.

At 9.30 a.m. April 4th the sea temperature 64° F., wind E.N.E. 4 moderate sea and slight swell, a low bank resembling steam was

observed rising from the water to the westward and moving in a N.E.'ly direction.

At 10 a.m. the sea temperature dropped to 44° F. and the low bank observed previously thinned out and finally disappeared to the North. At noon excellent observations were obtained placing the ship in Latitude 39° 51′ N., Longitude 59° 35′ W., thus giving a current N.54½°W. 11 miles contrary to the direction of the Gulf Stream in this latitude.

The following observations of sea temperature were made until the vessel finally passed the Northern limit of the stream in Latitude 41° 42′ N., Longitude 64° 01′ W. 2 p.m. 48°. 4 p.m. 48°. 6 p.m. 46°. 8 p.m. 61°. 10 p.m. 42°. Midt. 42°.

April 5th, 2 a.m. 42°. 4 a.m. 42°.

The D.R. positions were carefully calculated by the revolutions. The vessel was at a light draft with propeller wholly immersed."

CURRENT IN NEIGHBOURHOOD OF KADAWAR ISLAND, NEW GUINEA.

South Pacific.

THE following is an extract from the Meteorological Log of S.S. *Montoro*. Captain D. J. WILLIAMS, Sydney, N.S.W., to Australian Mandated Territory of New Guinea. Observer Mr. R. M. BLUNT, 2nd Officer:—

"2nd April, 1928, 1.55 a.m. Standard Time (M.T. Longitude 150° E). See Admiralty Chart 2766. S.S. *Montoro*—N.E. Coast of New Guinea bound from Boram anchorage towards Madang—course 101° approaching Kadawar Is. found ship setting strongly towards the north'd. To pass 1¼ mls. to south of Kadawar finally had to steer 112° (to make 101°) allowing for set.—Wind S.E. force 2.—Being at time opposite mouth of Sepik River (Kaiserin Augusta R.). I thought possibly ebb tide or flood waters from same might be cause of set. A sample of sea-water was found to be density 1014, temperature 83°, and of a dirty yellowish colour; thus proving the presence of comparatively fresh water. It tasted slightly brackish.

Position of ship at 1.55 a.m. Latitude 3° 40′ S., Longitude 144° 36′ E. (by Cross bearings), or approximately 11 miles north of Sepik R. mouth. Frequently in this locality floating logs and trees are plentiful, especially during the rainy season ("N.W. Monsoon"—local name) from early December to about middle of March. Last voyage (on the 19th February, 1928) a large tree fouled the stern of this vessel necessitating stopping of vessel before it freed itself. Captain WILLIAMS has experienced this on almost every occasion he has passed this locality."

UNUSUAL PHOSPHORESCENCE.

China Sea.

THE following is an extract from the Meteorological Report of S.S. *Laomedon*. Captain W. Beswick, Shanghai to Miike. Observer Mr. H. A. STANDFIELD, 3rd Officer.

"April 24th, 1928, on a passage from Shanghai to Miike, off the Me Sima or Danjo Group of Islands observed patches of reddish brown substance floating on the water. These patches after sundown, but while the light was still good, showed the bluish green glare of phosphorescence, and when darkness set in it was found that the sea was unusually phosphorescent, not only in the turn of the water from the bow and sides of the ship, but in separate patches as far as the eye could see, this even though the sea was smooth.

At 10 p.m. we observed what appeared to be a string of lights close ahead, but which on closer inspection proved to be a long streak of phosphorescent matter stretching in a N.W. and S.E. direction and about 20 feet in width. The phosphorescence of this streak was so bright, that on being turned by the ship's passage, the light thrown up was sufficient to eclipse lights of passing vessels and to light up the whole of the ship. It was also noticed that the streak had an oily appearance on the surface of the water.

Altogether we passed six streaks all of the same character and all running in about the same direction, while the general phosphorescent character lasted until midnight off Kaba Sima Point.

The weather throughout the observations was calm with light southerly airs, sky overcast with thin Cirro-Stratus clouds. Visibility very good, temperature of both sea and air 62° F. barometer 30.16 ins. falling slowly."

DISCOLOURED WATER.

North Atlantic Ocean.

THE following is an extract from the Meteorological Report of S.S. *Egori*, Captain P. SOLA, D.S.O. Liverpool to West Africa. Observer Mr. R. M. PATTINSON, 3rd Officer.

"April 24th, 1928, during the forenoon watch when in Latitude 20° 15′ N., Longitude 18° 03′ W. encountered discoloured water, closely resembling shoal water in colour and appearance, and extending as far as the eye could see. The line of demarcation was most pronounced, the temperature of the discoloured water normal, i.e. 64° F., and in a canvas bucket appeared quite clear and free from foreign bodies, but had rather a sickly sweetish taste; could not determine density owing to lack of reliable hydrometer. About 11 a.m. when in Latitude 19° 50′ N., Longitude 18° 02′ W. the water commenced to assume its usual aspect and by 1.30 p.m. no trace of discolouration remained."

Off Brazilian Coast.

THE following is an extract from the Meteorological Report of S.S. *Hubert*, Captain W. BRISCOE, Norfolk Va. to Para, Brazil. Observer Mr. E. C. MCGUINNESS, 3rd Officer.

"The line of discoloured water off the Brazilian Coast which was crossed at noon on April 8th in Latitude 2° 15′ N., Longitude 47° 38′ W. was very clearly marked, the water changing from dark blue to bottle green. The line, trending in a N.W. and S.E.'ly direction, could be seen stretching from horizon to horizon owing to the disturbed state of the water at the place of meeting, the water being mostly disturbed just inside the line. Weather at the time:—Wind N.E. force 4, Sea N.E., disturbance 4, slight to moderate E.N.E. swell."

SUDDEN RISE OF AIR TEMPERATURE.

Western North Atlantic Ocean.

THE following is an extract from the Meteorological Report of S.S. *Middlesex*, Captain A. B. MACRAE, Colon to New York. Observer Mr. C. W. ROBERTS, 4th Officer:—

"On April 19th, at 7.15 p.m. A.T.S. in Latitude 39° 52′ N., Longitude 73° 45′ W., the temperature of the air suddenly rose from 58° to about 78°, for about five minutes, then dropped back to 58°. The Wind was W.S.W. force 6. Barometer 29.67 in., temperature of Sea 44°, no clouds, hazy sky over horizon. Rough W.S.W. sea, no swell. Colour of water—dark green."

Captain MACRAE remarks:—"The sun set just a few minutes before the occurrence, like a ball of fire, haze wisps crossing it, considerable sea running with white tops, but in the area of warm air, sea had an oily appearance. Sea still rough but not breaking white as outside this area. Wind was southerly all the morning gradually hauling to westward all the afternoon finished at N.W. on arrival Scotland Light Vessel at 10 p.m."

"SUMATRA" SQUALL
at Singapore.

THE following is an extract from the Meteorological Report of S.S. *Mongolia*. Captain G. H. S. FURLONG, R.D., R.N.R., Japan to London. Observer Mr. E. ALLEN, apprentice:—

"While the *Mongolia* was moored in Keppel Harbour, Singapore, on morning of April 20th, 1928, a *Sumatra* squall of considerable violence was experienced. At 4.0 a.m. local time, wind S. force 1, Barometer 29.90 in., temperature air 79° F. sky overcast. Precipitation in sight, heavy Cu-Nb & Nb clouds moving up from W.S.W. At 4.10 a.m. wind suddenly set in from W.S.W. and within four minutes had increased to a moderate gale accompanied by very heavy rain and a little lightning. If there were any thunder, it was drowned in the noise of the wind around the ship. At 4.20 a.m. wind began to decrease, although the rain continued falling very heavily until about 4.50 a.m. when it began to moderate, the wind then being force 2. The rain ceased about 6.0 a.m. although occasional intermittent light rain fell for several hours afterwards. 8.0 a.m. wind—light air from S.W., barometer 29.91 in., temperature air 80° F. According to the Admiralty Malacca Strait Pilot Book, 1st Edition 1924, "Sumatras" or squalls from the S.W. occur more often during the S.W. than in the N.E. Monsoon and generally during the first part of the night, showing that the one mentioned above was peculiar in both respects, although strictly speaking the N.E. Monsoon was at an end, and the S.W. Monsoon was just about to commence (in April or May), during which period of change the winds at Singapore are principally from S.W. to S.E."

SQUALLS.
Eastern Mediterranean.

THE following is an extract from the Meteorological Log of H.M.S. *Argus*. Captain C. St. C. CAMERON, R.N. Hong Kong to Portsmouth, via Suez:—

"April 22nd, 1928. Latitude 33° 11′ N., Longitude 26° 00′ E. 1210 to 1225. Two squalls came from the West. They were plainly visible on the water when still some distance ahead of the ship. The first struck the ship at 1210. The wind flicked round to W.N.W. and increased to force 7; it then lulled till the second squall arrived at 1225. With the arrival of the first squall the barometer rose sharply about 1½ mb., and fell again. The temperature also rose 3° F., fell again. After the passage of the second squall the wind went round to S.S.E. again; the sky cleared. At 1700 (Zone — 1½) two similar squalls struck the ship. The barometer again rose sharply about 1 mb., and the wind blew from W. by N. force 7. After the second squall arrived the temperature dropped 4° F. The wind remained at W.N.W. force 4. No rain actually fell but there was an arch of cloud across the sky from which rain appeared to be falling although it never reached the surface. There had been an inversion all day at about 100 feet, evidence of which was provided by the ship's smoke which lay close to the surface and was visible as a dark line extending as far as the horizon. The arrival of the squalls broke the inversion, the 1210 and 1225 ones temporarily, the 1700 ones, permanently.

"These squalls came as rather a surprise as, except for the fact that the barometer was distinctly low and had been falling since ship left Port Said, there was little indication in the appearance of the sky, of unsettled weather. A synoptic received from Rome in the evening showed a depression over the Gulf of Lyons and another over the Adriatic."

Bay of Bengal.

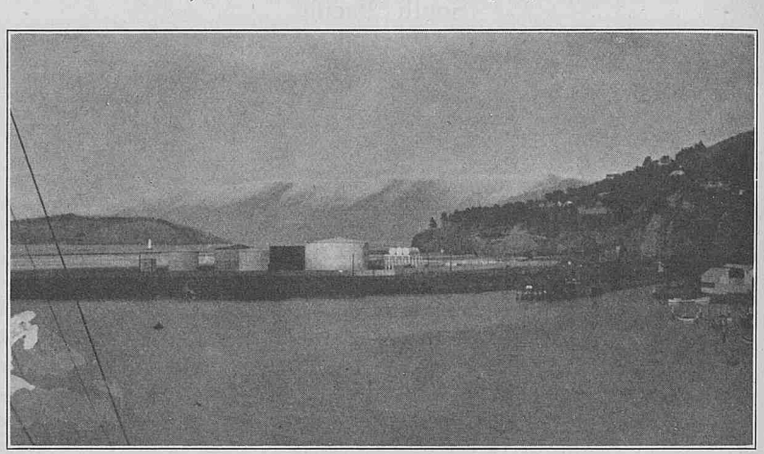
THE following is an extract from the Meteorological Report of S.S. *Stockwell*. Captain W. SMITH, Suez to Calcutta. Observer Mr. R. A. KNEEN, 3rd Officer:—

"April 15th, 8.15 p.m. at Ship 1420 G.M.T. in Latitude 17° 34′ N., Longitude 84° 50′ E. Barometer 29.78 in., wind variable force 1 detached Cumulus from East, wind dropped entirely and after an interval of three minutes arose in the N.W. increasing rapidly in velocity and reaching gale force at 1428 G.M.T. followed by a series of violent wind squalls from N.W. accompanied by vivid forked lightning extending at times across the entire sky, which became heavily overcast; rain followed at 14.40 G.M.T. At 14.55 G.M.T. the wind moderated, rain ceased and sky commenced to clear. 1505 G.M.T. the wind backed to S.W. and eventually backed right around to S.E. where the principal wind had come from during the day.

"This is the Nor' Wester which usually occurs at this season (The Break of Monsoon) in these parts, and usually is experienced at Sunrise and Sunset. (North West Bay of Bengal.)."

MIST ON THE HILLS—LOCAL WEATHER SIGN
at Lyttleton Harbour, New Zealand.

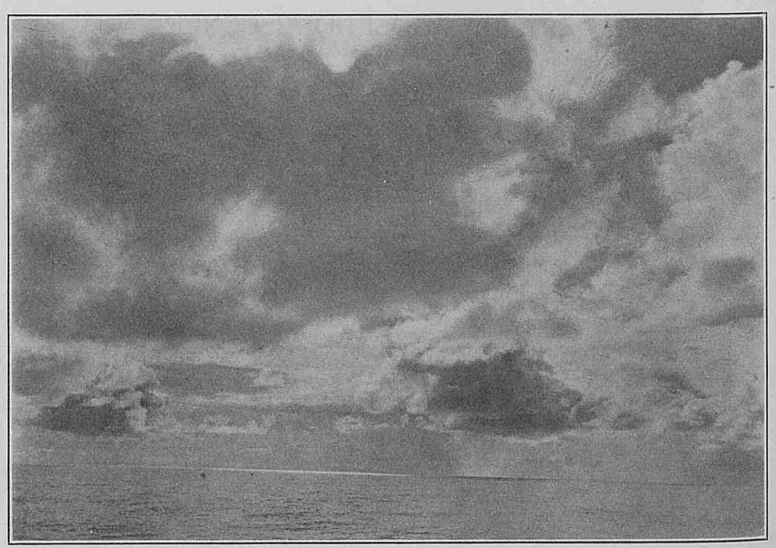
THE accompanying photograph was taken by Captain C. R. KETTLEWELL S.S. *Piako*, at 8 a.m. on the 15th April, 1928.



Captain KETTLEWELL remarks that the mist covering the tops of the hills in the background is considered by the local authorities to be a sure indication of strong south-westerly weather imminent.

RAIN SQUALL PASSING OVER SUN.

THE accompanying photograph taken by Captain J. F. MCCHRISTIE, S.S. *Glensloy*, on a voyage from Cardiff to River Plate, has been forwarded by the Hydrographer of the Navy.



The photo was taken at 4.10 p.m., 20th April, 1927, in Latitude 2° 00′ N., Longitude 28° 40′ W. Wind light variable N.E. to S.E. force 1-2, Barometer 29.92 in. Air Temperature 85° F. sea smooth. The sun is just behind the cloud.

SIGNIFICANCE OF LOW BAROMETER
at or off Port Nolloth, South Africa.

THE following remarks are by Mr. G. H. PICKERING, 4th Officer, S.S. *Arundel Castle*, Captain A. KNIGHT:—

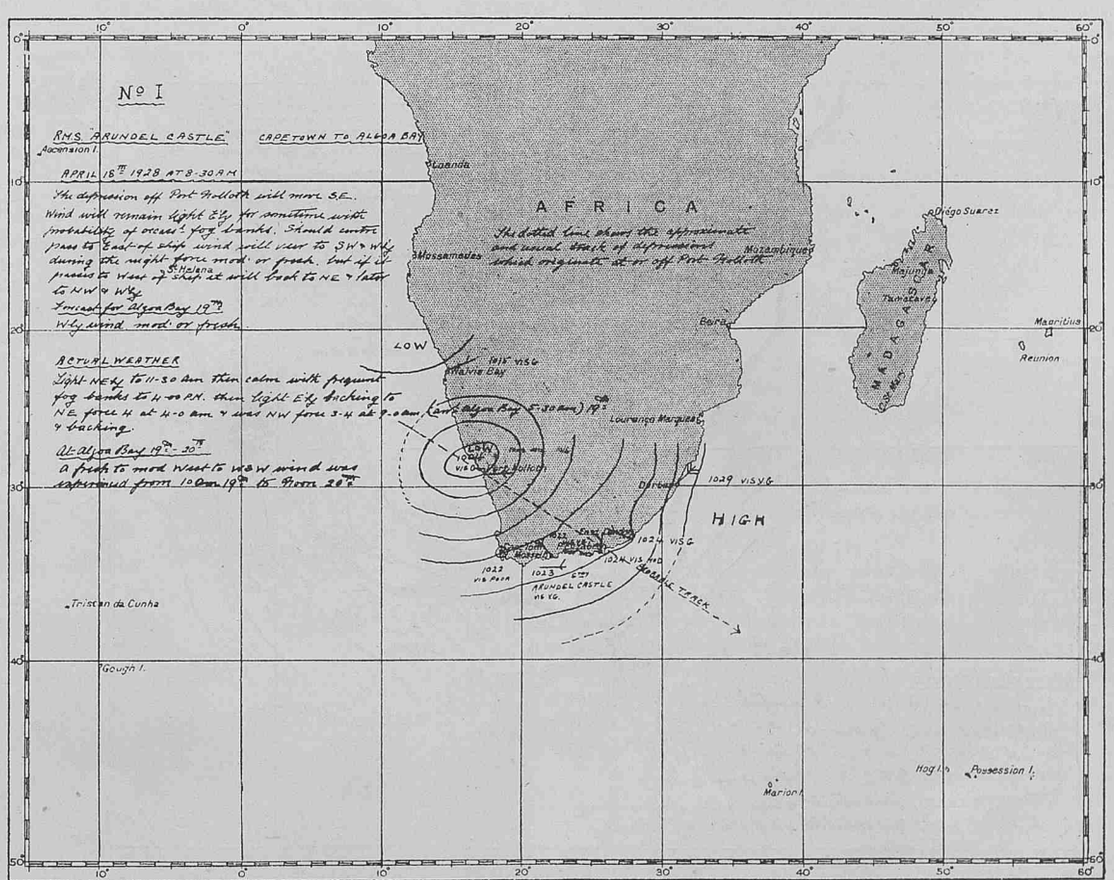
"Depressions which cause winds between south-west and west of a force varying from moderate breeze to a gale, on the south to the south-east coast of Africa, appear to originate at or off Port Nolloth. They travel in a south-easterly direction at a speed varying from 20 to 25 miles per hour, so that within 24 hours the centre is invariably situated to the south or south-east of Algoa Bay. A vessel anywhere between Cape Agulhas and East London, on receipt of the coded weather report from Pretoria, and observing a low barometer at Port Nolloth, may expect within 24 hours a wind between west and south-west, of a force varying from moderate to a gale, with cloudy and, probably, showery weather at first as the centre approaches, clearing later as the wind force increases. Vessels lying at Algoa Bay would find that the change in the direction of the wind and the behaviour of the barometer is as follows:—If the centre of the depression is going to pass to the eastward—wind at first northerly, veering gradually to south-easterly and later to south-westerly, the barometer falling until the wind becomes south-westerly, and it will then commence to rise. If the centre of the depression is going to pass to the westward—wind at first northerly or north-easterly, backing to north-west and later to south-westerly, with the barometer falling until the wind becomes south-westerly, when it will then commence to rise.

"It is highly probable that these depressions are the cause of south-west winds, strong to a gale, which occur on the Natal and Pondoland coast within 48 hours of the depression forming off Port Nolloth. A careful watch of the barometer and the rate at which it falls will give a good indication as to what force of wind may be expected."

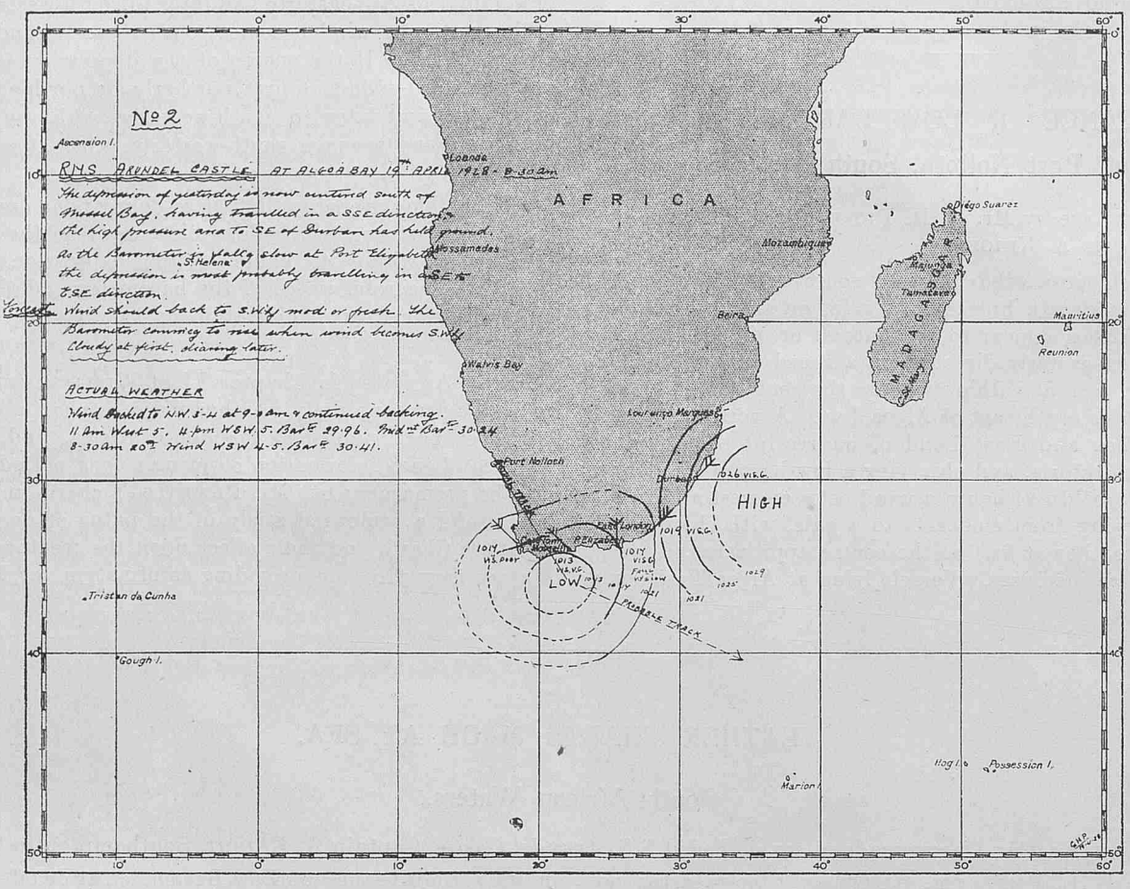
NOTE.—As stated in Chapter VI of WIRELESS AND WEATHER AN AID TO NAVIGATION, no daily weather maps or charts of types of weather have yet been published for South Africa, and, therefore, in the absence of such information covering a long period, these conclusions may be premature; but Mr. PICKERING'S charts and remarks indicate how useful a prolonged study of the paths of depressions shown by Weather Charts and their effect upon the weather in South African Waters may prove in providing information for Mariners.

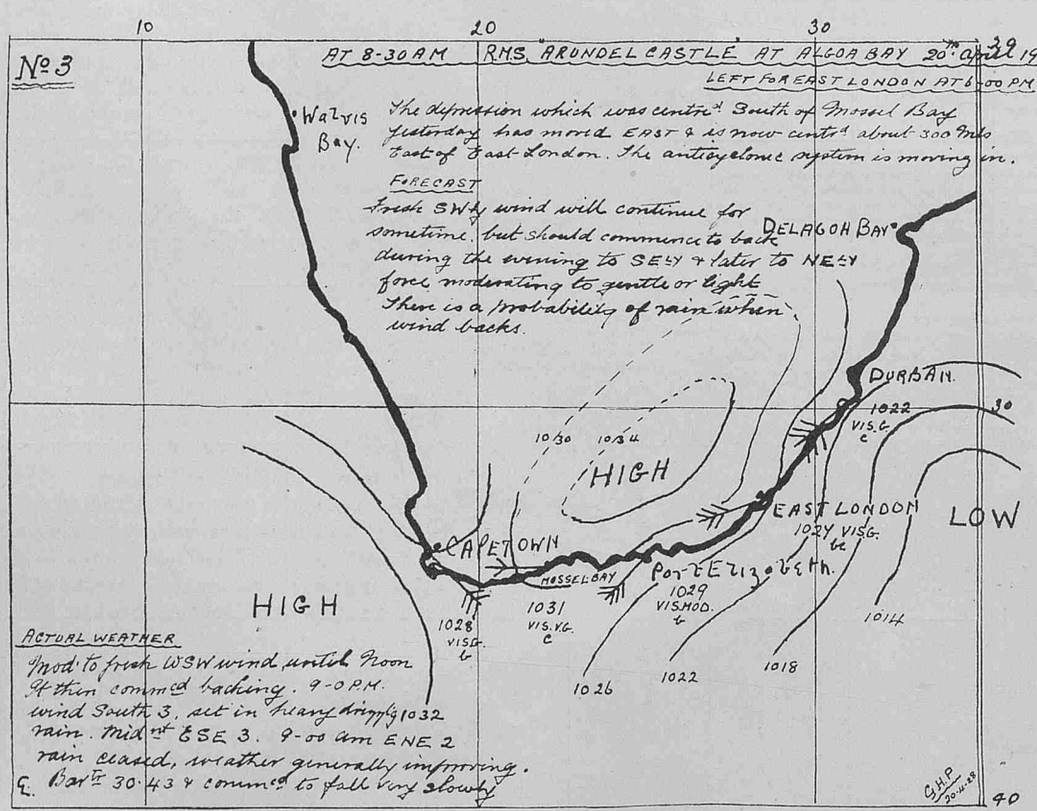
WEATHER CHARTS MADE AT SEA.
South African Waters.

The accompanying Weather Charts made at sea on board S.S. *Arundel Castle*, Captain A. KNIGHT, Southampton to South African Ports, by Mr. G. H. PICKERING, 4th Officer, illustrate the note on the "Significance of Low Barometer at or off Port Nolloth, South Africa."



South African Waters (*continued*).





VOLCANIC ISLAND IN NEIGHBOURHOOD OF FALCON SHOAL.

South Pacific Ocean.

THE following is an extract from the Meteorological Report of S.S. *Clan Alpine*, Captain A. B. LYALL, Nukualofa to Haapai (Tonga Islands). Observer, Mr. K. BANKS, 3rd Officer:—

"17th April, 1928.

"On passing the site of Falcon Shoal (Latitude 20° 19′ S., Longitude 175° 25′ W.) an island was observed approximately in that position.

"It appeared to be 2 to 3 miles long in a northerly and southerly direction, and would have a height of about 500 feet.

"Passing at a distance of 20 miles eastward of it, several columns of smoke were observed rising from the water's edge at the middle of the island." (See sketch.)

Falcon Island 289° distant 20 miles.

DUST STORM AT KAMARAN.

Red Sea.

THE following is an extract from the Meteorological Log of H.M.S. *Endeavour*, Commander E. F. B. LAW, R.N. Observer, Lieutenant C. S. E. LANSDOWN, R.N.:—

"At 1715 on 29th April, 1928, when at anchor in Kamaran harbour, a dust storm was seen to be approaching from over the mainland. At 1800 it had the appearance of a large number of columns of water spread over Kamaran Bay, extending as far north and south as the mainland was visible. About 1815 the cloud assumed the appearance of a smoke screen approaching rapidly from the N.E. and E'd.

"By 1900 the storm had enveloped the ship, and most of the shore lights were invisible at a distance of only 2½ cables. Fine dust sand was deposited on the upper deck, and it could be clearly seen in suspension in the air along beams of light. The atmosphere felt damp and oppressive at the time.

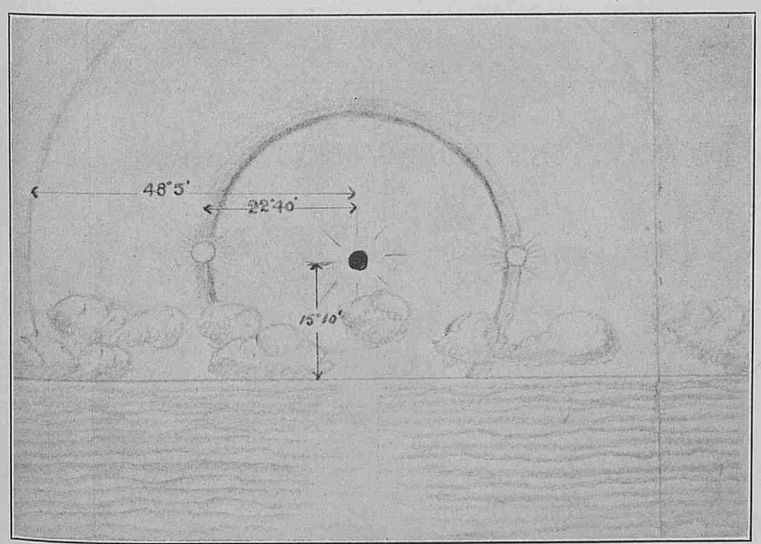
"The visibility was greatly improved by 1945, and the storm had dispersed to the westward by 2030.

"It is interesting to note that in the afternoon the visibility was very exceptional, the mountains in the hinterland being clearly visible."

DOUBLE SOLAR HALO AND MOCK SUNS.

North Pacific Ocean.

THE following is an extract from the Meteorological Report of S.S. *Teucer*, Captain R. DODDS, Yokohama to Victoria. Observer, Mr. J. M. KIRK, 4th Officer:—



"At 7 a.m. on the 3rd April, 1928, while in Latitude 49° 24′ N., Longitude 134° 57′ W., observed a bright halo round the sun, distance off 22° 40′, with a second and lighter one 48° 05′ off; on the first halo and with the same altitude as the sun there were two very bright spots, or mock suns, one on either side; the colour was a dark brownish red on the inside and purple outside, the second being just a very light white. Sun's true bearing 97° 54′. True altitude 15° 10′.

"Clouds Cumulus 3, G.M.T. 1603, and was visible from 6.55 a.m. to 7.30 a.m."

NOTE.—The large halo, the diameter of which is usually given as 46°, is of rather rare occurrence.

METEORS.

North Atlantic Ocean.

THE following is an extract from the Meteorological Report of S.S. *Dryden*, Captain W. T. MAJOR, Monevideo to Liverpool. Observer, Mr. E. W. HARDIE, 3rd Officer.

"April, 21st, 1928, at 10.40 p.m. A.T.S. in Latitude 18° 07′ N., Longitude 20° 21′ W., observed several large meteors in the heavens. One was particularly noticeable on account of its size and brilliance. Commencing its flight in the northern sky just below Alphecca (α Coronæ), it proceeded in a south-easterly direction travelling as a ball of fire to a point just below Antares (α Scorpii). Here it burst into a dazzling blue and green flame, which lit up the sea as bright as day for about two seconds. Its course was marked by what appeared to be a trail of smoke which remained visible in the heavens for about fifteen minutes. The night was clear and cloudless with brilliant stars, and there had been a marked drop in the temperature since noon. Barometer was steady at 29.95 in. Temperature, air, 67° F. Sea and swell, moderate."

North Atlantic Ocean.

THE following is an extract from the Meteorological Report of S.S. *Orduna*, Captain T. DANIEL, Vigo to West Indies. Observer, Mr. W. PEARCE, 2nd Officer:—

"April 22nd, 1928, at 3.54 a.m. at ship, corresponding to 0854 G.M.T., while traversing the N.W. Providence channel, and in approximately Latitude 26° 00′ N., Longitude 78° 00′ W., observed a brilliant meteor which moved rapidly from a position a little south of Altair, in a general S. by E. direction, to a point whose altitude would be about 8° of Arc, and bearing 150°.

"The track, which was very bright, was at first almost straight but became remarkably zigzagged at its end (). After some few seconds it had paled somewhat and had become even more zig-zagged, resembling a corkscrew throughout its whole length ().

"The track remained visible to the naked eye for six minutes. Wind, S.S.E., force 3. Air, 72° F."

WATERSPOUT.

Mediterranean Sea.

THE following is an extract from the Meteorological Report of S.S. *Malda*, Captain T. N. GRAY, London to Beira. Observer, Mr. S. G. JAMES:—

"April 22nd,, 1928, in Latitude 41° 00′ N., Longitude 10° 23′ E., Tyrrhenian Sea 1004 G.M.T., 10.45 A.T.S. Waterspout struck ship. This was preceded by a torrent of rain from heavy Cu-Nb clouds. Wind suddenly increased to gale force and water appeared to be ascending. This lasted for one minute, during which time barometer stood at 29.813 in. Temperature 62°. The line of waterspout was from S. to N., and its progress was marked by a vivid white streak of about 100 feet in diameter, and a noise like an express train; it shook the ship. After the waterspout, little rain fell, but heavy Cu-Nb clouds formed to the N.E. The ship appeared to break this spout as it seemed to dry up about a mile past ship. It was preceded by vivid fork lightning to the W.N.W. and vivid sheet lightning followed to the E.S.E. Ship's steering course, 127° at 11 knots."

THE WAR MEMORIAL OF THE MERCHANT NAVY AND FISHING FLEETS.

THE WAR MEMORIAL OF THE MERCHANT NAVY AND FISHING FLEETS.

THE Memorial to the men of the Merchant Navy and Fishing Fleets is situated in a prominent position on the south side of the garden of Trinity Square, on Tower Hill, near the Tower of London and facing the Pool, a most appropriate site since this locality is often referred to as the hub of Maritime England.

It was designed by the eminent architect, Sir EDWIN LUTYENS, the designer of the Cenotaph in Whitehall.

The Memorial was erected as a token of the deep gratitude and appreciation of the magnificent service rendered by the 12,000 officers and men who sacrificed their lives for the honour of the country during the Great War 1914-1918.

For one who has not served at sea it is difficult to realize all the varied and hazardous tasks carried out by the officers and men of the Merchant Navy and Fishing Fleets, and to endeavour to accomplish the task of recording here the inestimable services carried out by them is almost impossible.

Many books have been written describing the work done by the merchant seamen serving in naval and merchant ships on duty as Transports, Mine-Layers, Auxiliary Cruisers, etc., and of the hardy and courageous fishermen who served in the trawlers and drifters on patrol and in minesweeping, but we have seen fewer books describing the work of those merchant seamen and fishermen who carried on commerce by sea without which the Empire cannot stand in war or peace. To those of the Merchant Navy who died in doing this the Memorial stands in remembrance.

A brief description, with the accompanying photograph, will, it is hoped, help those who are unable to see the actual Memorial, to form an idea of its appearance.

It is constructed of white stone in the form of an archway through which the public are able to pass. The eight square pillars, which appear dark in the photograph, accommodate the numerous bronze tablets on which are recorded in alphabetical order the names of ships with their ports of registry, and in similar order, the names of the 12,469 officers and men. Where the commander of the vessel perished his name is given immediately under the name of the ship, followed by the word Master or Skipper.

The masonry surmounting the centre of the archway is inscribed in bronze lettering with the following:—

1914—1918

TO THE GLORY OF GOD
AND IN THE HONOUR OF
TWELVE THOUSAND
OF THE MERCHANT NAVY
AND FISHING FLEETS
WHO HAVE NO GRAVES BUT THE SEA.

To the left of this inscription is depicted the anchor and crown enclosed in a sheaf of laurel representing the Merchant Navy, while on the right, an anchor, fish and net, also enclosed in laurel, which stands for the Fishing Fleets.

Standing as it does in this busy thoroughfare with a continual stream of people passing, many may be seen to stop and search the bronze tablets for the name of some relative or friend, and it is then that one feels what an enormous amount we owe to the personnel of that great Service and how absolutely dependent the Empire is upon them. Without their help neither the work of the Navy or Army, the production of munitions or the feeding of our people could have been possible during the Great War. A.J.T.

ICE IN THE WESTERN NORTH ATLANTIC.

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

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

There are two main types of ice found in the Western North Atlantic constituting a danger to navigation, namely, pack or sea ice and berg or glacier ice. The following definitions correctly describe all ice derived from these two types which may be met with at sea.

Slush or Sludge.—The initial stages in the freezing of sea water when it is of gluey or soupy consistency. The term is also occasionally used for "brash ice" still further broken down.

Pancake Ice.—Small floes of new ice approximately circular and with raised rims.

Hummocking.—The results of pressure upon sea ice.

Hummocky Floes.—Floes composed wholly or partly of re-cemented pressure ice.

The Pack.—The term used to denote the main belt of derived ice which in the Antarctic girdles the Continent south of the zone of the "westerlies" and in the Arctic fills the Polar Sea and escapes southward from the oulets of the sea (French, "Banquise de derive").

The term "pack" is used more generally to mean any area of pack ice however small.

Close Pack.—Pack composed of floes mainly in contact.

Open Pack.—The floes for the most part do not touch.

Drift Ice.—Loose very open pack where water predominates over ice.

Brash.—Small fragments and rounded nodules the wreck of other kinds of ice.

Berg.—A large mass of glacier ice.

Bergy Bits.—Medium sized pieces of glacier ice or of heavy floes or hummocky-pack washed clear of snow (typical bergy bits have been described as about the size of a cottage).

Growlers.—Similar pieces of ice to the above, but so small as barely to show above sea level.

Rotten Ice.—Floes which have become much honey-combed in course of melting or which appear black through saturation with water (thin sheets of newly formed very thin ice also appear black and may easily be confused with the last type when met in the pack).

Level Ice.—All unhummocked ice, no matter of what age or thickness, which has platy structure and fibrous appearance when broken.

Fast Ice.—Sea ice while remaining fast in the position of growth. True fast ice is only met along coasts where it is attached to the

shore or over shoals where it may be held in position by islands or stranded icebergs.

Pack Ice.—Sea ice which has drifted from its original position.

A Floe.—An area of ice other than fast ice whose limits are within sight. Floes up to two feet in thickness may for convenience of description be termed " light floes " ; floes thicker than this " heavy floes."

A Field.—An area of pack ice of such extent that its limits cannot be seen from a ship's masthead.

A Crack.—Any fracture or rift in sea ice.

A Lead or Lane.—A navigable passage through pack ice.

A Pool.—Any enclosed water area in the pack other than a crack or a lead or lane.

Water Sky.—Dark streaks on the sky due to the reflection of water spaces or the open sea in the neighbourhood of large areas of sea ice.

Ice Blink.—The white or yellowish white glare on the sky produced by the reflection of large areas of sea ice. (The antithesis of water sky).

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

Formation and Drift of Sea Ice.—Towards the end of autumn, in the Arctic Sea and on the coasts of Labrador and Newfoundland, owing to the fall in temperature, the suface cooling of the sea causes numberless small ice plates called frazil crystals to form. During calm weather these crystals collect and form a thin scum on the surface which at first has little stiffness owing to heat conduction from the water below, preventing the brine remaining between the crystals which are themselves fresh from freezing. As the season progresses the sheet of ice and brine thickens, the temperature being reduced to a sufficient extent to allow the brine to freeze, when the whole becomes a rigid sheet of ice. During the summer much of the Arctic pack ice is set free, and drifting southward, arrives off the N.E. coast of Labrador in November at the same time as sludge ice is forming there. By the end of November the waters around the whole Labrador coast have generally frozen over and the whole pack drifts south arriving off the east coast of Newfoundland about the end of January.

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

The thickness of pack ice ranges from about 15 feet in the Arctic to about 6 feet on the coast of Newfoundland, but these thicknesses may be greatly exceeded owing to the interposal of capes in the way of moving ice-fields, and to the unequal movement between the floes exerting pressure on the ice, causing it to hummock. Navigation within the Gulf of St. Lawrence is completely suspended, usually from the beginning of December to the end of April. During the winter months the ice increases rapidly forming extensive sheets. These are, however, frequently broken across by the wind, leaving leads of open water between the separated parts. At other times the wind presses the sheets of ice together forming a close pack extending for many miles.

At the break-up of winter conditions, towards the end of April, the ice commences to move out of the Gulf sometimes causing a block between St. Paul Island and Cape Ray. This block, known as " the Bridge," sometimes continues for three weeks completely closing the Cabot Straits to navigation. On leaving the Gulf, the movement of the ice is chiefly dependent on the prevailing winds, but if the winds are light or variable the movement is affected by current alone, and it will move in the direction of the Banquereau Bank, where it quickly melts under the influence of the sun and warm winds.

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

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

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

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

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

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

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

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

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

The highest berg measured by the International Ice Patrol was 248 feet above water while the longest berg measured 1,690 feet from end to end. During the 1928 season ships steaming on the Belle Isle tracks reported many bergs of such dimensions as have hitherto been thought to exist only in Southern waters. One berg reported was of tabular form approximately 100 feet in height and six and a half miles in length.

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

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

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

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

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

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

At the break-up of the Arctic winter in the Spring of the year, the bergs calved from the glaciers on the east coast of Greenland drift south in the East Greenland current, arriving off Cape Farewell in early summer. Continuing in the current, they round Cape Farewell and drift north to about the 63rd parallel, where they are caught in the westerly branch of the current and drift into the centre of the Davis Strait. In the centre of the Strait the water is comparatively warm and the majority of these bergs disintegrate, very few of them reaching the Labrador current on the western side of the Strait. The majority of the bergs which reach the Great Bank are calved from the ice tongues of the glaciers on the west coast of Greenland, north of the 68th parallel. The bergs are carried up the west coast of Greenland to the head of Baffin Bay where they are caught in the southerly drift setting out of Smith Sound down the western side of Baffin Bay.

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

The following tables compiled from the records of the United States Hydrographic Office and those of the International Ice Patrol, for the years 1900-1926, show the average number of bergs that drift south of the 48th parallel during each month of the year.

Normal number of icebergs south of the 48th parallel (menace to the Cape Race Tracks).

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

Normal number of icebergs south of the Great Bank (menace to the United States to Europe Tracks).

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

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

Chart A shows the general drift of ice in the ice bearing currents, and the position of the glaciers in Greenland from which the majority of the bergs which reach the Great Bank of Newfoundland are calved. Chart B shows the actual drift of bergs in the vicinity of the Great Bank as compiled by the International Ice Patrol in the years 1914-1926.

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

CHART C shows the monthly limits within which reports of ice have been received by the Meteorological Office during the year 1928, also the monthly limits reached by ice over the period 1901-1928. It must be understood that the limits defined on this CHART are obtained from reports of ice sighted by vessels, the majority of which are following tracks specially laid down to avoid ice; it is therefore possible that ice may exist outside these limits. The following list gives the particulars of all reported ice which has made phenomenal drifts. It is not possible to indicate, even approximately, the drift followed by the ice. The position of this ice, when reported, is shown on CHART D.

Phenomenal positions of ice.

No.	Date.	Source of Report.	Position of ice.		Remarks.
			Latitude N.	Longitude W.	
1	14.1.1836	H.M.S. *Cove* ...	60° 55′	5° 50′	Two bergs.
2	9.1.1913	S.S. *Oriflamme* ...	48° 37′	34° 42′	Berg 40 ft. high, 400 ft. long.
3	27.1.1916	S.S. *Rio Verde* ...	33° 34′	70° 32′	Hummock 2 ft. high, 30 ft. in circumference.
4	3.2.1922	S.S. *Weehawken*...	41° 42′	58° 59′	Ice (sustained bow damage).
5	24.3.1913	S.S. *Floride* ...	46° 21′	34° 05′	Berg 60 ft. high, 200 ft. long
6	20.3.1915	S.S. *Wanaby* ...	36° 55′	48° 32′	Piece; supposed portion of a berg 5 ft. high, 60 ft. long.
7	21.3.1920	U.S.Hyd.,Bulletin	38° 02′	40° 38′	3 ft. high, 30 ft. long.
8	21.3.1921	S.S. *Hollandia* ...	37° 50′	47° 23′	Berg.
9	6.4.1909	S.S. *Trafalgar* ...	35° 54′	31° 47′	Two pieces 18 ins. in diameter.
10	11.4.1914	S.S. *Erodiade* ...	32° 55′	62° 11′	Apparently river ice about the size of a lifeboat.
11	24.4.1916	S.S. *Communipaw*	49° 05′	36° 48′	4 ft. high, 50 ft. wide, and 100 ft. long.
12	4.4.1921	S.S. *Hollandia* ...	43° 35′	35° 57′	Large berg.
13	16.4.1926	Trawler *Orizaba*...	61° 03′	10° 30′	Floating ice about 40 ft. long, and 3 ft. high.
14	20.5.1907	S.S. *Lord Landsdowne.*	31° 00′	38° 00′	Two small pieces 6 ft. by 6 ft. and 12 ft. by 4 ft. out of water.
15	6.5.1908	S.S. *Oceano* ...	150–200 miles North of Bermuda.		Pieces.
16	27.5.1909	S.S. *Reventazon*	32° 28′	44° 10′	60 ft. long, 10 ft. high.
17	15.5.1911	S.S. *Camillo* ...	10 miles East of Nantucket Shoal Lt.-V.		Small berg.
18	11.5.1914	S.S. *Indradeo* ...	42° 18′	62° 43′	Large slabs of field ice and growlers 100-150 ft. long, 5 ft. out of water.
19	17.5.1915	S.S. *Pola*	38° 16′	61° 50′	Some field ice.
20	15.5.1920	U.S.Hyd.,Bulletin	45° 11′	36° 42′	Berg.
21	25.6.1886	Brig. *Blanch* ...	48° 40′	15° 22′	Large berg.
22	5.6.1907	S.S. *Kingswell* ...	32° 37′	64° 25′	Several bergs.
23	–.6.1907	Bque. *Silverstream*	80 miles West of Fastnet.		Berg.
24	11.6.1912	S.S. *Valetta* ...	37° 30′	74° 24′	Three pieces of ice.
25	7.6.1913	S.S. *Holtby* ...	39° 35′	64° 50′	Berg 10 ft. high,
26	27.6.1915	S.S. *Stella* ...	36° 28′	57° 45′	Small piece.
27	30.6.1921	U.S. Navy Dept....	33° 20′	49° 16′	Berg 10 ft. high.
28	16.6.1924	S.S. *West Irmo* ...	38° 03′	63° 20′	Growler.
29	25.6.1926	S.S. *Baxtergate*...	30° 20′	62° 32′	Large piece about 30 ft, long and 15 ft. wide, showing about 3 ft. above water.
30	–.7.1890	S.S. *Slavonia* ...	48° 53′	24° 11′	Last remnants of berg.
31	–.7.1902	Two reports by fishermen.	56° 30′ (appx.).	6° 30′	40-50 ft. long, 15 ft. wide, 2 ft. 6 ins. out of water,
32	31.7.1909	S.S. *Shimosa* ...	36° 59′	30° 01′	25 ft. long, 3 to 8 ft. wide.
33	10.7.1913	S.S. *Lothian* ...	37° 27′	36° 48′	Piece, 6 ft. high, 50 ft. in circumference.
34	18.7.1916	U.S.Hyd.,Bulletin	32° 09′	54° 26′	Piece of berg, 3 or 4 ft. out of water.
35	23.7.1916	S.S. *San Giorgio*...	42° 09′	63° 24′	Berg 60 ft. long.
36	23.7.1918	U.S.Hyd.,Bulletin	44° 25′	35° 01′	Large berg.
37	18.7.1921	„ „	44° 30′	39° 26′	Small berg about 15 ft. square.
38	21.7.1921	„ „	39° 09′	40° 39′	Berg.
39	31.7.1921	„ „	37° 37′	27° 29′	Berg.
40	10.7.1926	S.S. *Chelatros* ...	42° 42′	36° 45′	Two pieces of ice.
41	12.8.1903	S.S. *Saxon Prince*	37° 52′	71° 30′	Piece, 3 ft. high, 40 ft. long.
42	7.8.1908	S.S. *Caronia* ...	50° 31′	18° 55′	Two pieces, 10 ft. square, and 15 ft. square.
43	2.8.1909	S.S. *Shimosa* ...	37° 16′	42° 06′	Piece, 18 ft. by 5 ft., 2 ft. out of water.
44	14.8.1912	S.S. *Ulstermore* ...	43° 55′	39° 16′	Piece.
45	27.8.1912	S.S. *Lux*	42° 30′	15° 26′	50 ft. square, 4 ft. out of water.
46	10.8.1915	S.S. *St. Louis* ...	41° 02′	48° 00′	Berg.
47	16.8.1915	S.S. *St. Leonards*	41° 09′	56° 43′	Berg.
48	21.8.1915	S.S. *Strathgarry*...	40° 46′	68° 20′	Growler.
49	–.8.1915	„ „	39° 00′	46° 20′	Piece, 20 ft. long, 4 ft. high.
50	29.8.1920	U.S.Hyd.,Bulletin	40° 30′	47° 52′	Berg.
51	2.9.1883	Bque., *Olivette* ...	35° 40′	30° 00′	Lump of ice.
52	–.9.1895	S.S. *Gulf of Taranto*	36° 35′	71° 36′	Two bergs 30 ft. high, 300-400 ft. long, and much field ice over two miles area.
53	19.9.1906	S.S. *Lord Landsdowne.*	54° 20′	22° 00′	Small berg 20 ft. by 6 ft.
54	10.9.1908	S.S. *Deutschland*	45° 28′	27° 18′	Two small bergs and one large.
55	6.9.1920	U.S.Hyd.,Bulletin	47° 10′	38° 04′	Bergs.
56	2.9.1922	S.S. *Hallgjerd* ...	50° 00′	40° 05′	Berg.
57	15.9.1922	S.S. *Empress of Britain.*	52° 52′	40° 12′	Large berg.
58	3.9.1923	S.S. *Djambi* ...	40° 10′	31° 36′	Piece of ice about 30 ft. long, 1½ ft. out of water.
59	15.10.1883	S.S. *Elenora* ...	37° 00′	18° 00′	Piece ice.
60	8.10.1912	S.S. *Putney Bridge*	35° 15′	44° 50′	Small berg 35 ft. long, 6 ft. high.
61	27.10.1916	S.S. *Montreal* ...	51° 17′	41° 17′	Small berg.
62	2.10.1918	U.S.Hyd.,Bulletin	50° 10′	40° 50′	Large berg.
63	19.10.1920	„ „	45° 22′	40° 09′	Berg.
64	19.10.1920	„ „	45° 24′	40° 07′	Berg.
65	17.10.1921	S.S. *Mount Vernon*	48° 23′	42° 19′	Berg about 70 ft. high, 400 ft. long.
66	6.10.1922	S.S. *Christian Krogh*	50° 43′	40° 42′	Berg 60 ft. high.
67	7.10.1923	S.S. *Eastern Dawn*	40° 46′	65° 54′	Large growler about 100 ft. square.
68	23.10.1927	Trawler, *Grecian Empire.*	30 miles E.S.E. of the Outer Skerries, Shetland Islands.		Piece of ice 100 ft. long, 6 ft. above water.
69	7.11.1922	Cape Race, W/T Station.	47° 38′	40° 04′	Berg and growlers.
70	–.12.1903	S.S. *Lord Antrim*	42° 00′	55° 00′	Ice.
71	22.12.1915	S.S. *Carolyn* ...	42° 53′	57° 39′	Large berg.
72	16.12.1920	S.S. *Oriana* ...	43° 53′	44° 39′	Berg.
73	16.12.1927	S.S. *Ascania* ...	47° 52′ (approximate).	40° 50′	Four large bergs.

Detection of Ice.—Up to the present there has been no means devised whereby the presence of ice can be detected in the dark hours, or during fog. Experiments carried out by the Ice Patrol during past years have shown that seamen can depend upon no forewarning of a berg beyond the limit of their visibility. No reliance can be attached to echoes from the steam whistle or syren giving a warning of ice, nor does the presence of a berg have any appreciable effect on the temperature of the air or water, but it has been found that when navigating in the vicinity of the Great Bank, if the temperature of the sea remains at or about 60° Fahr. the chances of meeting ice are greatly reduced. The approximate temperature of the warm water abutting the cold wall is as follows: Throughout the winter and up to April, 54°, April 54°—56°, May 58°—60°, and from June throughout the summer to November, 61°—63°, when it falls to a minimum in February. On ordinary clear days the average berg can be picked up by the masthead look-out when 18 miles distant and will be seen from the bridge when between

12 to 15 miles away. On a cloudy day with good visibility deduct about 2 miles from the foregoing.

In clear weather with hazy horizon the tops of bergs have been observed 11 miles. During light fog or drizzling rain, bergs are visible at from 2 to 3 miles. In light low fogs bergs are generally picked up by the look-out aloft before observed from the bridge.

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

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

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

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

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

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

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

The practical utility of the work carried out by the Patrol has reduced the danger of ice to vessels trading between European and United States ports to a minimum, so much so that ice is rarely seen by these vessels throughout the year.

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

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

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

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

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

Ice Warnings from Shore Stations.—The following W/T shore stations issue Ice Warnings to shipping during the ice season as follows:—

Station.	Latitude N.	Longitude W.	Call Sign.	Wave length (Metres).	G.M.T. of issue.
Norfolk	36° 50′	76° 18′	NAM	2,458 (I.C.W.)	0900 1545 2100
Washington (Arlington).	38° 52′	77° 05′	NAA	2,653 (C.W.) 2,653 (C.W.)	0200 1700
New York... ...	40° 27′	74° 00′	NAH	2,939 (C.W.)	1530 2130
Boston	42° 22′	71° 03′	NAD	2,939 (C.W.)	1600 2200
St. John, N.B. ...	45° 14′	66° 03′	VAR	600 (Spk.)	On request.
Lurcher L.-V. ...	43° 49′	66° 32′	VDR	600 (Spk.)	On request.
Yarmouth... ...	43° 46′	66° 07′	VAU	600 (Spk.)	0200 1400
Chebucto Head ...	44° 30′	63° 31′	VAV	600 (Spk.)	0130 1330
Sable Island ...	43° 56′	60° 02′	VCT	600 (Spk.)	On request.
North Sydney ...	46° 13′	60° 15′	VCO	600 (Spk.)	On request.
Grindstone Island	47° 24′	61° 51′	VCN	600 (Spk.)	On request.
Fame Point ...	49° 07′	64° 36′	VCG	600 (Spk.)	0145 1345
Father Point ...	48° 31′	68° 28′	VCF	600 (Spk.)	0200 1400
Heath Pt. L.-V....	49° 03′	61° 30′	VCI	600 (Spk.)	On request.
Cape Race ...	46° 39′	53° 05′	VCE	600 (Spk.)	0215 1415
Pt. Amour ...	51° 27′	56° 50′	VCL	600 (Spk.)	On request.
Belle Isle	51° 53′	55° 22′	VCM	600 (I.C.W.)	0230 1430

The Marion Expedition.

During the summer of 1928 the United States Government fitted out and despatched under the direction of the United States Coast Guard U.S.C.G. Cutter *Marion* to Baffin Bay and Davis Straits to investigate the currents, weather, and other conditions responsible for the drift of the ice south across the North Atlantic Lane Routes.

The "ship" was equipped with every modern appliance for all branches of oceanography and placed under the command of Lieutenant-Commander E. H. SMITH, U.S.C.G., who since 1922 has been oceanographer of the International Ice Patrol.

Lieutenant N. G. RICKETTS, U.S.C.G., who has had considerable experience in the work of the Ice Patrol, was appointed Executive Officer, and several trained observers were transferred from the Patrol Cutters to the *Marion*.

The ship sailed from New London on July 7th and returned on September 18th after a most interesting and successful voyage.

The expedition cruised 8,100 miles covering with an oceanographic survey a 450,000 square mile area. The published report of the expedition is not yet to hand but some of the main conclusions and facts brought out by the survey are as follows:—

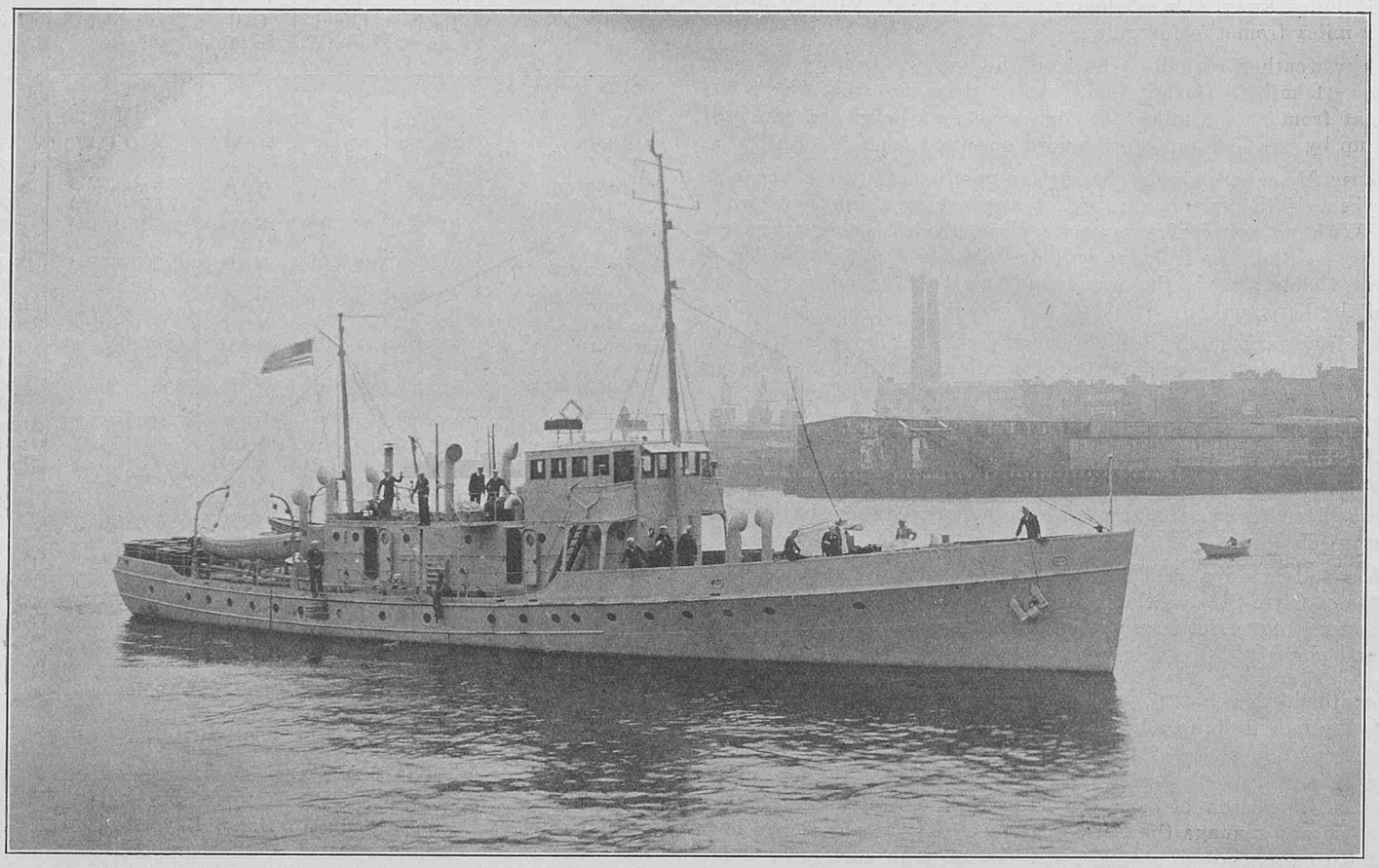
(1) "A surface layer 100 metres in thickness covering an ocean area 100,000 square miles, five degrees warmer than normal. An additional heat reservoir of tremendous proportions which is bound to have far-reaching climatic effects. This supports the assertion of many that Arctic climate has undergone recent temporary amelioration."

(2) "Bottom water was found in the trough between Greenland and Labrador temperature 2.6 degrees Centigrade and 34.90 salinity. The observations showed that this water was not produced on surface or by ice melting as suggested in theories of Nansen and Petterson, but indications point to a slow bottom creep from the Antarctic as the source of such water even off the coast of Greenland."

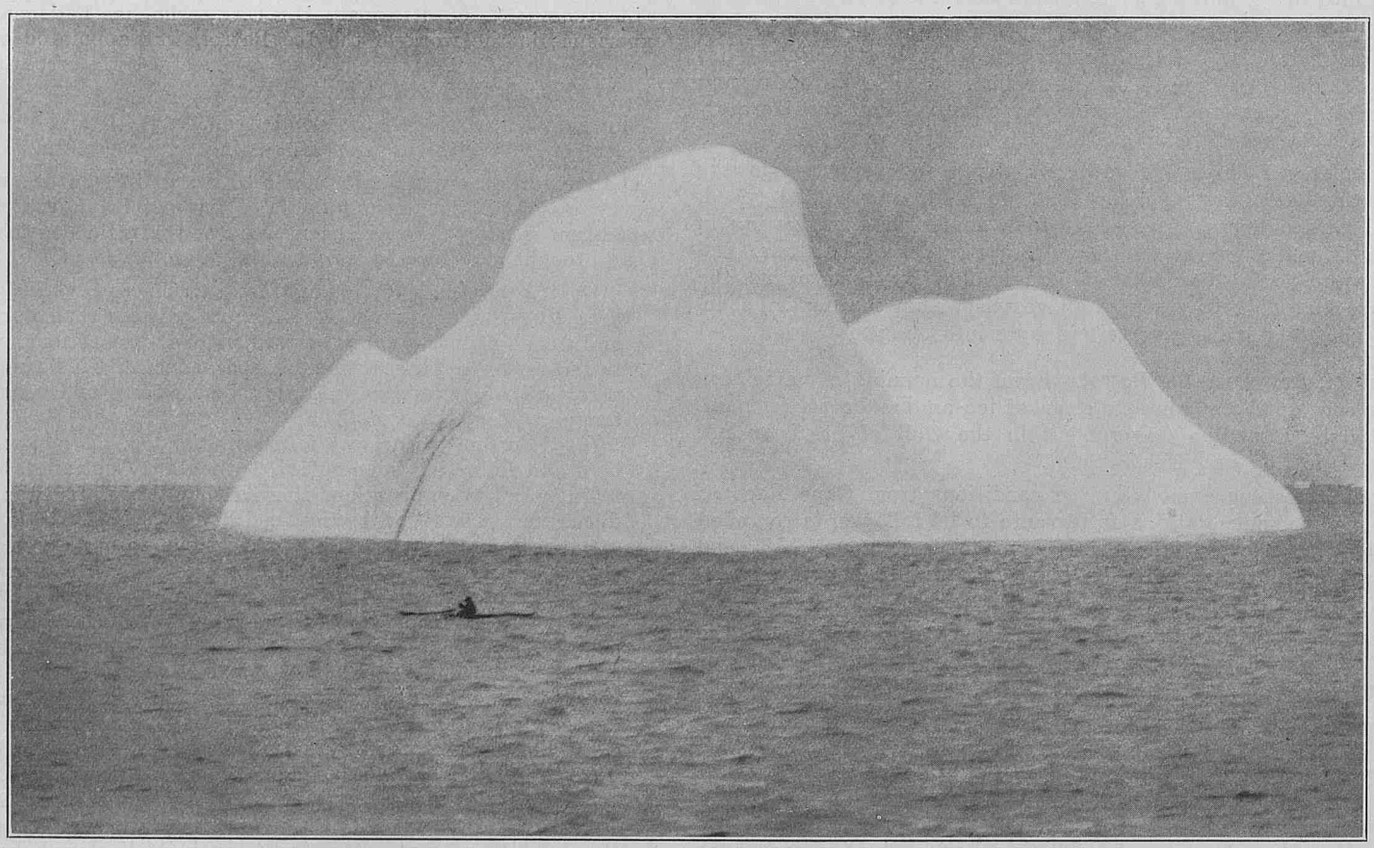
(3) "Coastal shelves of Greenland are much narrower than shown on present day maps while the Labrador shelf reveals itself to be wider."

(4) "Three headlands sighted by the *Marion* North of 60 degrees latitude indicate discrepancies in location of Baffin Land coast line on the maps by as much as 20 miles in some cases."

(5) Arctic waters were extremely open this summer. About 1,000 bergs in Disko Bay near the glacier front and 200 bergs stranded on Labrador Coast near Cape Harrison is practically the only ice present. The Arctic pack itself shrank back to 20 miles off Cape Dier, Baffin Land.

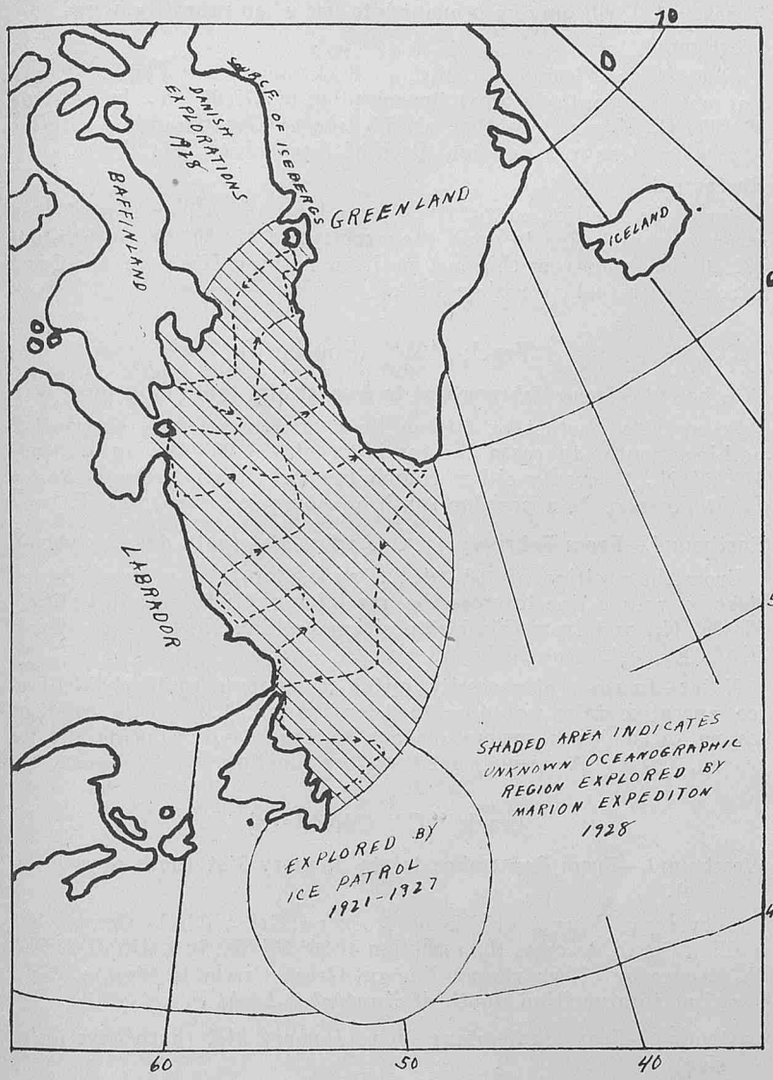


(1) Photo of U.S.C.G. Cutter "Marion," 125 ft. in length, speed, 10 knots. Fuel capacity sufficient for six thousand miles steaming. She has twin screws and is driven by Diesel Engines. Electricity is the motive power for all deck machinery and scientific apparatus.

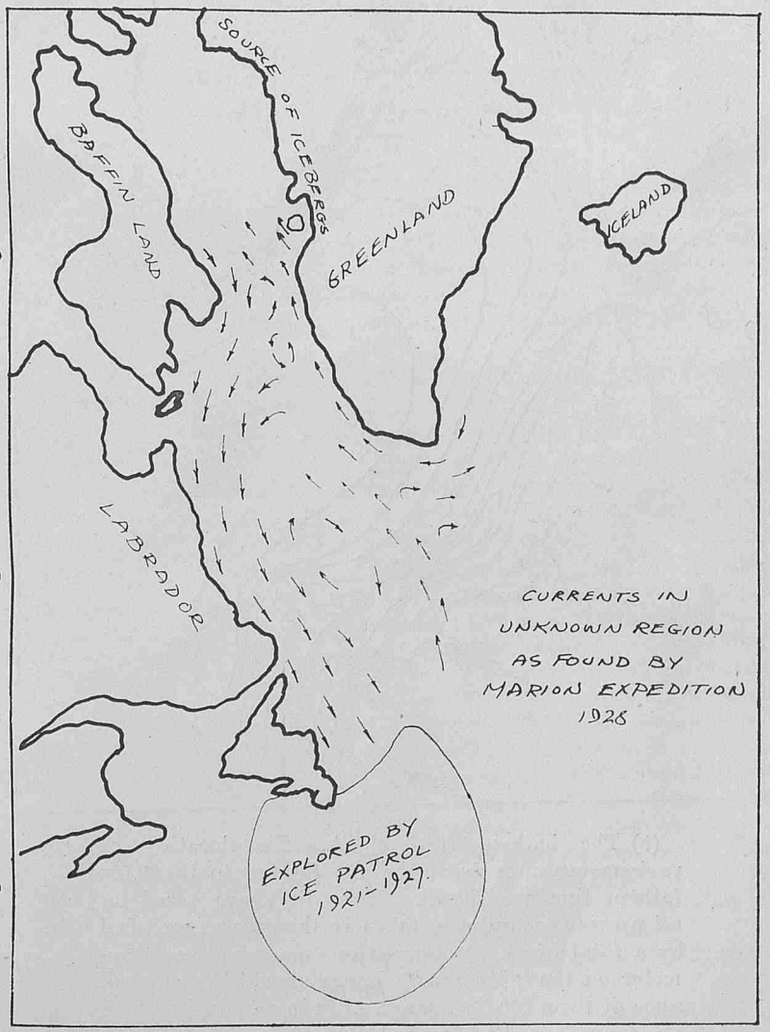


(2) A Greenland native in a kayak on the berg dotted waters of Disko Bay. The boat is a tiny

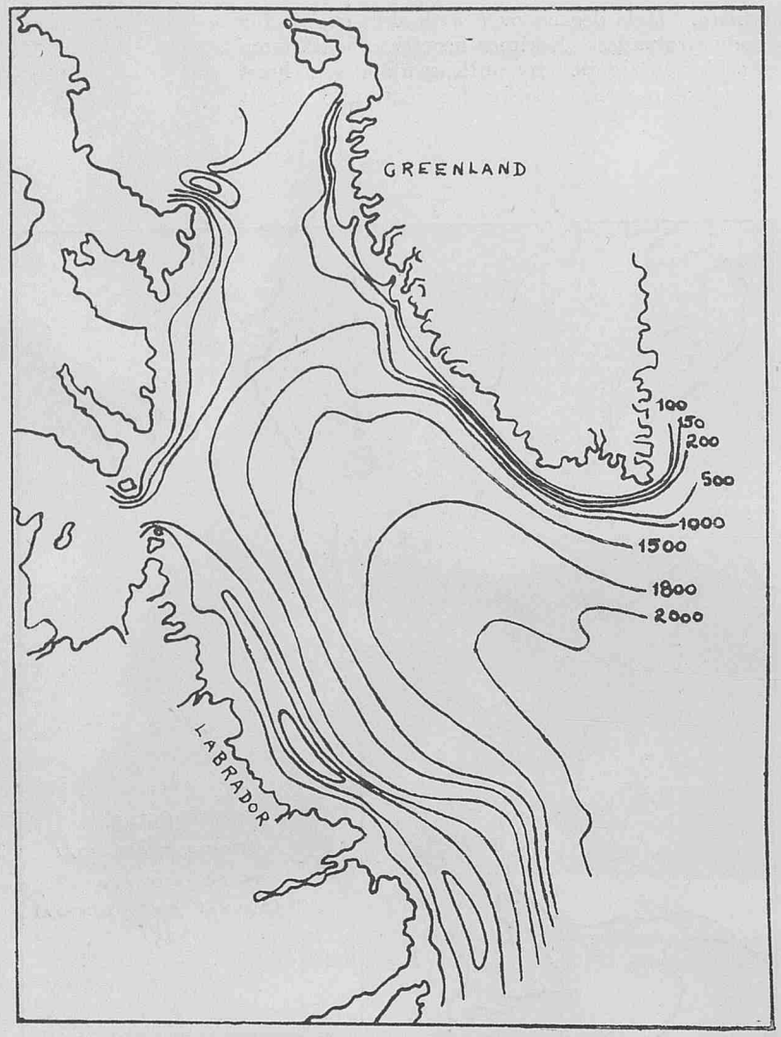
skin covered canoe just large enough to support one man. It is decked over with skin except for a central opening through which the seated man's body protrudes. Eskimos use these boats from childhood, and balance themselves subconsciously like bicycle riders. By pulling up a skin hood about the waist and putting on special clothing a kayak expert can capsize his craft and roll it over and over without harm.



(3) Chart showing the track along which the Marion Expedition made oceanographic observations. The courses were laid out with the idea of covering the shaded sea area as effectively as possible with the cruising of the least possible number of miles. Stops were made at 190 stations at sea along the route. Two thousand observations of the temperature and salinity of the water column were made at these stations and the currents have been computed for the shaded area. In 1913 the "Scotia" did a a little oceanographic work off Newfoundland and a few yachtsmen have made observations off the Labrador Coast, but the Marion Expedition was the first one to make a thorough dynamic survey of the whole region of Davis Straits.



(4) Chart showing how the ocean currents were running between Greenland and North America in the summer of 1928. Note the cold extension of the East Greenland current flowing North along the lower west coast of Greenland. Offshore in the centre of the basin are several large eddies. The big current that brings the Arctic ice down to low latitudes is the Labrador current. The arrow shows it very plainly as it passes close along the shores of Baffinland, Labrador and Newfoundland.



(5) The bathymetrical chart. The location of various contours from the 100 fathom to the 2,000 fathom line are shown. These lines are based on all previous soundings, taken in the area as modified by a total of 21,000 observations made by the fathometer on the "Marion." Large areas were crossed, some of them 500,000 square miles in extent, in which no soundings had ever been taken before. The Labrador continental shelf, as a result of the Expedition, is revealed considerably wider than shown on the present-day charts. Another characteristic feature is a trough-like depression forty miles distant offshore extending nearly all the way from Hudson Straits to Newfoundland. On the other hand, the slope of the sea bottom was found to be remarkably steep off the Southern coast of Greenland. The Greenland continental shelf is only half as wide as shown on the charts to-day.

North Atlantic Tracks.

The principal International shipping companies engaged in the Trans North Atlantic trade have laid down and agreed to follow the prescribed routes given below. These tracks are revised from time to time as necessary and are laid down so as to avoid as far as possible the normal ice zone during the different seasons of the year.

Admiralty Route Charts showing these tracks are published in two sections.

Chart No. 2058b, showing Lane Routes, south of Ireland and English Channel.

Chart 2058c, showing Lane Routes, North of Ireland.

The section of the routes running through the ice region in operation for the month is shown on the Ice Chart, published with each Number of THE MARINE OBSERVER.

North Atlantic Lane Routes—United States.

Track "A" (extra Southern).

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

Westbound.

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

Eastbound.

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

Track "B" (Southern).

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

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

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

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

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

Track "C" (Northern).

Westbound.—From September 1st to January 31st (both days inclusive).

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

Eastbound.—From Septembuer 1st to January 31st (both days inclusive).

From the position of 70° 00′ W., in 40° 10′ N., or from Boston, steer by rhumb line, **to cross the meridian of 50° 00′ W., in Latitude 42° 00′ N.**, and from this last position nothing North of the Great Circle to Fastnet or Bishop Rock.

General Instructions

Vessels bound to or from United States ports calling at Halifax have the option of following either the Canadian or United States Seasonal Tracks to or from that port, passing 40 miles South of Sable Island Westbound, and 60 miles South of Sable Island Eastbound, when proceeding on United States Tracks, or 20 miles South of Sable Island Eastbound, when proceeding on Canadian Tracks.

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

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

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

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

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

North Atlantic Lane Routes, Canada,

Track "D."

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

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

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

Track "E."

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

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

NOTE.—The DONALDSON LINE reserve the right to cross Longitude 45° West in Latitude 45° North on this track.

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

Track "F."

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

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

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

Track "G."

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

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

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

General Instructions.

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

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

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

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

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

Summary of Ice Conditions during 1928.

The following monthly summary of ice conditions in the Western North Atlantic during 1928 is compiled from Ice Reports returned by ships of the Voluntary Observing Fleet using the Trans-North Atlantic routes from the Bulletins issued by the International Ice Patrol Service and reports received through other sources.

During the season Track B which normally becomes operative on February 1st was not brought into force until April 14th and owing to the ice not drifting so far south throughout the season as to menace Track B there was no necessity to bring Track A into force.

January.—No ice was reported in the Western North Atlantic during this month.

February.—No bergs were reported during the month, but, from the second week, frequent reports of field ice were received over the Great Banks North of the parallel of Cape Race and North of Latitude 44° 30′ N. between the meridian of 58° W. and the Cape Breton and Nova Scotia Coasts.

March:—During the first half of the month heavy fields of ice were reported North of the 45th parallel, between Longitude 58° W. and the coast of Cape Breton. On February 28th and March 1st the S.S. *City of Carlisle*, bound from North Shields to Louisburg, encountered heavy fields of ice, some of which were unnavigable from Latitude 45° 45′ N., Longitude 58° 35′ W. to Louisburg. The upper part of Louisburg Harbour was frozen over with ice about 1 foot thick, but ice breakers kept a clear channel to the piers.

Throughout the month heavy field ice was reported on the Eastern edge of the Great Bank North of Latitude 46° N. During the second half of the month bergs were reported on the Eastern edge of the Bank, the southernmost berg being reported on the 31st in Latitude 44° 56′ N., Longitude 48° 40′ W. On the 20th of the month the United States Coast Guard Cutter *Mojave* commenced the 1928 ice patrol for the protection of the North Atlantic Lane Routes.

On March 23rd the Danish Meteorological Institute reported: "Ice free 50 miles off Cape Farewell."

April:—The River and Gulf of St. Lawrence was reported clear of ice from Quebec to Anticosti on the 12th. Above Quebec the river was clear of ice to Lake St. Peter. Heavy close packed ice was reported in the vicinity of Cape Ray, and loose heavy ice in Cabot Strait. The Government Ice Breaker *Montcalm* left Sydney on the 11th to take up Ice Patrol duties in the Gulf of St. Lawrence. The port of Charlestown, Prince Edward Island, opened to navigation on the 19th, Cabot Straits being then reported free of ice. Navigation of the Gulf opened on the 22nd with the arrival at Quebec of the S.S. *Wenchita* from Antwerp. Ships were able to proceed up the river to Montreal on the 25th.

In the Western North Atlantic numerous reports of bergs and some field ice were received during the month over an area extending from the Eastern side of the Great Bank to Longitude 42° 30′ W. The Southernmost ice was reported on the 28th in Latitude 42° 43′ N., Longitude 50° 12′ W. On April 14th Track B was brought into force.

A large berg was reported west of the Grand Bank in Latitude 45° 06′ N., Longitude 56° 52′ W., and on the 29th a growler was reported in Latitude 47° 00′ N., Longitude 56° 57′ W.

On April 10th the Danish Meteorological Institute reported: "Limit of ice 50 miles south of Cape Farewell; the ice is open with icebergs outside. Bergs southward to Latitude 58° N."

On April 9th the S.S. *Montrose*, from St. Johns to Liverpool, collided with a growler, causing extensive damage to her stem and bows, and killing two of her crew, but vessel was able to continue her voyage without assistance.

May:—On May 12th the Canadian Signal Service reported, "Belle Isle, heavy open ice everywhere, Point Amour heavy close packed ice in shore, other points no ice in sight." On May 28th Belle Isle reported 24 bergs and six growlers, and Point Amour reported numerous bergs and growlers, with heavy open ice distant.

In the Western North Atlantic, North of the 46th parallel reports of bergs were numerous extending over an area situated between the East Coast of Newfoundland and the 44th meridian. South of the 46th parallel all bergs reported were in the vicinity of the Eastern side and tail of the Great Bank. The southernmost berg was reported on the 31st in Latitude 40° 47′ N. Longitude 48° 54′ W.; but on the 17th a small piece of ice about 1 ft. square was reported in Latitude 40° 19′ N. Longitude 47° 51′ W.

June:—In the Gulf of St. Lawrence the only ice reported was in Belle Isle Straits. Throughout the month both Belle Isle and Point Amour reported numerous bergs and growlers in sight.

On June 3rd the Danish Meteorological Institute reported "Limit of ice 5 miles off Cape Farewell. Edge closed, packed with icebergs outside. Icebergs down to Latitude 59° N. On the 7th S.S. *Hans Egede* reported "Free of ice 75 miles off Cape Farewell."

Ships using the Belle Isle route reported numerous bergs and growlers each side of track extending to Longitude 51° W. Over the Great Bank North of Latitude 46° N. bergs were freely scattered between the Newfoundland coast and the 48th meridian but south of the 46th parallel. No ice was reported after the 11th of the month. The southernmost ice was a small berg reported on the 3rd in Latitude 38° 59′ N. Longitude 48° 57′ W.

The North Atlantic United States tracks being clear of ice the International Ice Patrol Service was discontinued for the season on June 21st.

On June 7th the trawler *Hergelia*, whilst trawling, sighted a berg in Latitude 66° 29′ N. Longitude 20° 40′ W.

July:—On July 10th the Danish Meteorological Institute reported "Free of ice 50 miles off Cape Farewell."

Throughout the month both Belle Isle and Point Amour reported several bergs in the Straits and ships navigating the Belle Isle tracks reported numerous bergs both North and South of the tracks from Belle Isle to Longitude 50° W. On June 9th S.S. *Laurentic* steaming on track G reported 60 bergs and numerous growlers between Latitude 52° 16′ N. Longitude 53° 26′ W. and Latitude 52° 36′ N. Longitude 52° 12′ W. One of these bergs was of much greater size than is usually met with in the North Atlantic, being approximately 100 feet in height and six and a half miles in length. On the same day S.S. *Carmia* passed this berg at a distance of two miles reporting it to be regular in shape with a flat top. Close to it were 15 other bergs. A strong backwash from the berg was experienced, giving ship a very lively motion. On July 24th S.S. *Montrose* reported four large island bergs each approximately 1 mile in length in Latitude 52° 35′ N. Longitude 53° 09′ W.

During the month a few reports of ice were received on the Cape Race route in the vicinity of Cape Race and on the 28th a berg was reported in Latitude 48° 47′ N. Longitude 49° 07′ W. No ice was reported south of the 46th parallel during the month.

August:—The Danish Meteorological Institute reported ice ranging from 10 to 40 miles off Cape Farewell during the month. On the 24th Julianehaab Bay was reported free of ice.

Belle Isle reported numerous bergs within the Straits throughout the month and all ships on the Belle Isle route reported large numbers of bergs both North and South of the Tracks extending from Belle Isle to the 51st meridian. On August 15th in the vicinity of Latitude 52° 00′ N. Longitude 53° 31′ W. S.S. *Nubian* sighted 30 bergs, one of which was approximately four and a half miles in length.

On the Cape Race Route 3 reports were received of ice situated between Cape Race and the 52nd meridian. One berg was reported on the 1st in Latitude 48° 41′ N. Longitude 49° 08′ W. and two growlers in Latitude 48° 41′ N. Longitude 48° 57′ W. No ice was reported during the month south of the 46th parallel.

September:—No ice was reported during the month other than on the Belle Isle routes. The Straits were free of ice throughout the month, but on the tracks each of Belle Isle bergs, though not so numerous as in the two previous months, were freely scattered as far east as the 52nd meridian. Some of the bergs reported were of huge dimensions. The Danish Meteorological Institute on the 7th reported "Free of ice 20 miles off Cape Farewell."

October:—A few bergs were reported within the Straits during the month, but only one berg was reported on the Belle Isle Tracks in Latitude 52° 39′ N. Longitude 52° 43′ W. on the 4th. On the same date a small berg was reported in Latitude 50° 05′ N. Longitude 54° 22′ W.

A few bergs were reported on the track from St. Johns to Cape Race and also North of Track F. between the 49th and 50th meridians. South of the Virgin Rocks no ice was reported.

November:—A few bergs were reported in the Southern side of the Straits but no ice was reported on the tracks east of Belle Isle.

During the first half of the month several reports of bergs were reported both sides of the Cape Race routes between the 45th and 51st meridians.

No ice was reported south of Latitude 47° N.

December:—On December 12th the Canadian Signal Service reported "Montreal to Murray Bay light open ice everywhere. Eastward to Cape Race and Belle Isle, no ice in sight." No reports of ice in the Western North Atlantic were received during the month.

SUMMARY OF THE STATE OF THE ICE IN DANISH WATERS 1927-28.

By Captain C. I. Speerschneider.

On November 22nd and 23rd a belt of coast ice some 50 to 100 m. wide was formed off Rodby Havn. The temperature of the water was 0.7° and the salinity was 12.4°/oo. As the current was running towards the west this cold water has probably come from the Rodsand shoals.

From December 11th, when the frost set in, the temperature of the water was sinking, and on the 17th the surface temperature was negative and pancake ice was observed in Laeso Rende. For a few days the temperature of the water rose a little, but then it sank again, and on the 27th formation of ice might be feared in the northern part of the Kattegat as the temperature of the water at a depth of 5 m. was below 0° and coast ice was forming between Saeby and Tangen. In the southern waters the temperature was still above 0°.

On the 28th ice was formed all over the Kattegat north of Anholt and also in the Sound, in the southern part of the Great Belt and in Smaalandshavet. On the 30th the ice was already so thick that the steamers could not get through between Laeso Rende and Fornaes but had to pass by Osterrenden, which, however, was closed for sailing vessels even if they had motors. There was drift ice in the Belts and brash and pancake ice with open lanes in the Sound.

On the 31st the ice in the little Belt reached southward to a little south of Assens and in the Great Belt to Albuen, whereas the relatively warm water from the Baltic (Christianso + 2.4° on the 31st) kept the waters free of ice from the Baltic northward to Amager and through the Femer Belt to north of Als.

On January 1st, in the evening, a stiff southerly breeze drove the ice northward, and at Hals and in Laesco Rende the drift of the ice was so fast that the main fairways were partly free of ice on the 2nd except for a mass of ice that remained between Fredericia and Aebelo until the 6th.

On January 5th the ice drifted out of the great bights, and therewith the ice period in the main fairways had finished while the ice kept lying in the inner waters. Smaalandsfarvandet became free of ice on January 18th, and on February 18th all the Danish waters were free of ice.

During the last frosty period, which occurred in March, ice was again formed in the inner waters from the 6th and especially after the 13th. The fiords, however, became free of ice again between March 18th to 21st.

During this period the main fairways kept free of ice.

SOUTHERN ICE REPORTS

During the Years 1917 to 1928.

April.

Year.	Day.	Position of Ice. Latitude.	Position of Ice. Longitude.	Description.	Remarks.	Name of Ship reporting.
1917		No reports received.				
1918	1 to 4	From 59° —′ S. to 56° —′ S.	124° —′ W. to 113° —′ W.	19 bergs	Highest berg 200 feet	4 mst. Barque *Elginshire.*
1922	12	44° 06′ S.	58° 52′ W.	Berg		S.S. *Kia Ora.*
	11	44° 00′ S.	58° 34′ W.	2 large bergs	About 300 feet high	S.S. *Tuscanstar.*
	28	45° 40′ S.	50° 50′ W.	Bergs	Ship completely surrounded by bergs which were visible as far as could be seen from masthead. Took the whole day to get clear of ice.	Bktn. *Katherine Mackall.*
	1	46° 55′ S.	42° 11′ W.	5 bergs		Bktn. *Hesperian.*
	23	54° 01′ S.	38° 45′ W.	Berg		R.Y.S. *Quest.*
	5	54° 29′ S.	37° 54′ W.	24 bergs	Many lumps	do.
	6	South Georgia		9 bergs		do.
1923	4	50° 40′ S.	125° 00′ W.	Berg		S.S. *Karamea,*
	5	51° 26′ S.	122° 30′ W.	Berg		do.
	8	54° 02′ S.	121° 19′ W.	Large berg	About 1 mile long and between 800 and 1,000 feet high. Flat top, slightly higher at its eastern end.	S.S. *Aymeric.*
	2	51° 40′ S.	119° 15′ W.	Berg		S.S. *Karamea.*
	1	52° 40′ S.	105° 55′ W.	Bergs		S.S. *Armagh.*
	7	52° 50′ S.	105° 36′ W.	Berg		S.S. *Karamea.*
1924	26	55° 58′ S.	129° 21′ W.	Large berg	About 400 feet high and 1,200 feet long	S.S. *Maimoa.*
	27	56° 14′ S.	120° 45′ W.	Large berg		do.
1925	27	55° 25′ S.	103° 44′ W.	Berg	About 300 feet high and 450 feet long, with pinnacles	S.S. *Port Kembla.*
	28	55° 22′ S.	103° 42′ W.	Berg	1,000 feet long, 300 feet high (estimated)	S.S. *Tairoa.*
1926	7	Grytviken Harbour, South Georgia			Harbour full of small ice	R.R.S. *Discovery.*
1928	1	49° 44′ S.	37° 10′ W.	Berg		M.V. *Alynbank.*
		From 49° 47′ S. to 49° 46′ S.	37° 10′ W. to 36° 27′ W.	Skirted the southern border of a large agglomeration of bergs.	This Southern margin ran irregularly in an East and West direction and the line of ice was almost unbroken, large bergs of from 200 to 500 feet high and up to 1 mile in length being interspersed with smaller ones. Beyond this line could be seen other large ice extending to the Northward as far as vision permitted and apparently thickly distributed. The majority of the large bergs were of tabular form, having vertical sides and flat tops, smaller ones were, in many cases, ridges, peaked, rounded and castellated, and showed the action of water, having evidently turned over.	do.
		49° 52′ S.	35° 54′ W.	Enormous tabular berg	Between 14 and 15 miles long, 250 grading to 400 feet high, about 4 miles thick.	do.
		From 49° 44′ S. to about 49° 40′ S.	35° 54′ W. to 34° 00′ W.	Large detached bergs were passing continually.	In all directions large bergs were to be seen on the horizon. In the vicinity of large bergs, large pieces of sludge ice.	do.
		49° 37′ S.	33° 26′ W.	Berg		do.
	2	49° 38′ S.	31° 27′ W.	Tabular berg	Approximately 1,000 feet long and 250 feet high	do.
		49° 37′ S.	31° 03′ W.	Large tabular berg		do.
		49° 38′ S.	30° 13′ W.	Large berg		do.
		49° 16′ S.	27° 55′ W.	Group of several large bergs		do.
	3	48° 30′ S.	24° 20′ W.	Tabular berg	About 2,000 feet long and 250 feet high, several others to the South.	do.
	4	48° 23′ S.	23° 39′ W.	Large tabular berg		do.
		48° 02′ S.	22° 54′ W.	Large tabular berg		do.
		From 48° 01′ S. to 47° 36′ S.	22° 54′ W. to 20° 48′ W.	Large number of bergs	Mostly of tabular form	do.
	5	47° 11′ S.	19° 08′ W.	High tabular berg	Approximately 1,500 feet long and 350 feet high	do.
		46° 24′ S.	15° 09′ W.	Small conical berg		do.
		46° 21′ S.	14° 09′ W.	Small loose ice	Extending about 1 mile	do.
	6	46° 05′ S.	13° 48′ W.	Large berg		do.
	8	42° 16′ S.	2° 33′ W.	Small jagged berg	About 300 feet long and 100 feet high	do.
	9	41° 15′ S.	3° 14′ E.	Small jagged berg	Approximately 150 feet long and 50 feet high, accompanied by small loose ice for about 2 miles on its N.W. side.	do.
	13	40° 00′ S.	10° 35′ E.	Large berg		S.S. *Alness.*

Reports of ice previous to April, 1917, will be found on the back of Monthly Meteorological Chart of the East Indian Seas, April 1917, No. 132.

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

WEATHER SIGNALS.

FRANCE.

II.—WIRELESS WEATHER SIGNALS.

WIRELESS WEATHER BULLETINS.

The Key and Decode Tables of the International Weather Telegraphy Code will be found on pages 21 to 25 of Volume VI, No. 61. (The January, 1929, Number.)

The method of decoding station weather reports made in code was described in the British "Weather Shipping" Bulletin, on pages 45 to 47 of Volume VI, No. 62. (The February, 1929, Number.)

The same method of decoding weather reports applies in all cases where the International Code is used.

The letters given in the descriptions which follow give the key to the tables for decoding the figures.

Where *other* than International code tables are used they are published along with the signals described and an explanation is given.

C.W. Issues "International Collective Reports."

Paris—Eiffel Tower W/T Station, approximate latitude 48° 51′ N., Longitude 2° 18′ E., call sign **FLE,** broadcasts weather bulletins, in code, as follows:—

Times of broadcast.	Wavelength.	Observations of
0845 G.M.T.	7,200 m. (C.W.)	Ships and Syrian Land Stations.
0945 G.M.T.	7,200 m. (C.W.) and 1,485 m. (C.W.)	Land Stations.
2055 G.M.T.	73·5 m. (C.W.)	Ships and Land Stations.

All bulletins commence with the letters "O.N.M."

0845 G.M.T. Bulletin.

This bulletin is preceded by the words "Météo Atlantique," and is divided into four parts, viz.:—

Part I.—Commencing with the words "Atlantique oriental," contains observations from ships. It is broadcast in International Code, represented by "Key letters" as follows:—

PQ″LLL lllGG BBDDF wwvKd.

It will be noted that these symbols and their meanings are similar to those given in that part of the "Decode Form" named "International Weather," published on p. 20 of Vol. VI, No. 61 of this Journal, with the exception of Q″, Quarter of the Globe in which ship is (Table XXVI).

Part II.—Commencing with the words "Atlantique occidental," contains observations from American ships in the Western North Atlantic. It is broadcast mostly in International Code represented by "Key letters" as follows:—

I_nI_n PQ″LLL lllGG BBDDF TTTw′

Q″ = Quarter of the globe in which ship is (Table XXVI).

w′ = Present weather (Table XXVII).

Part III.—Commencing with the words "Service Jacques Cartier," contains observations from ships in the same form as Part I of this bulletin.

Part IV.—Commencing with the words "Syrie 0600," contains observations of 0600 G.M.T. taken at stations in Syria.

0945 G.M.T. Bulletin.

This bulletin is divided into two parts, viz.:—

Part I.—Preceded by the words "Météo Europe," contains observations of 0700 G.M.T. taken at a selection of 50 to 60 of the stations given in the list on pp. 92–94. It is broadcast in International Code, represented by "Key letters" as follows:—

$l_nl_nl_n$ BBDDF w_1TTK′R.

Part II.—Preceded by the words "Météo Amerique," contains observations of 0100 G.M.T. taken at various stations in the United States and Canada.

2100 G.M.T. Bulletin.

This bulletin is divided into four parts, viz:—

Part I.—Preceded by the words "Météo Europe," contains observations of 1800 G.M.T. taken at a selection of 50 or 60 of the stations given in the list on pp. 92–94. It is broadcast in International Code, represented by "Key letters" as follows:—

$l_nl_nl_n$ BBDDF w_1TTK′R

Part II.—Preceded by the words "Atlantique Oriental," contains observations from ships. It is broadcast in International Code, represented by "Key letters" as follows:—

PQ″LLL lllGG BBDDF wwvKd.

Q″ = Quarter of the globe in which ship is (Table XXVI).

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

Part III.—Preceded by the words "Syrie 1800," contains observations of 1800 G.M.T. taken at stations in Syria.

Part IV.—Preceded by the words "Amerique du Sud 1200," contains observations of 1200 G.M.T. taken at stations in South America.

The Pressure and Temperature units used in the bulletins explained above are indicated by the letter Q″, *see* Table XXVI. To convert mbs to ins. *see* Table XXVII and centigrade temperatures to Faht., Table XXIX.

Observation Stations.

Code No.	Station.	Position. Latitude.	Longitude.
	Norway.		
000	Mygbugten	73° 30′ N.	21° 30′ W.
001	Jan Mayen	70° 59′ N.	8° 18′ W.
002	Spitsbergen	78° 02′ N.	14° 15′ E.
003	Bear Island	74° 28′ N.	19° 17′ E.
004	Vardö	70° 22′ N.	31° 06′ E.
005	Ingöy	71° 04′ N.	24° 09′ E.
006	Loppa	70° 20′ N.	21° 27′ E.
007	Kautokeino	68° 59′ N.	23° 07′ E.
008	Tromsö	69° 39′ N.	18° 57′ E.
009	Andenes	69° 19′ N.	16° 07′ E.
010	Borgvaer	68° 20′ N.	13° 48′ E.
011	Röst	67° 30′ N.	12° 04′ E.
012	Myken	66° 46′ N.	12° 29′ E.
013	Brönnöysund	65° 28′ N.	12° 12′ E.
014	Nordöyan	64° 48′ N.	10° 33′ E.
015	Nordli	64° 28′ N.	13° 35′ E.
016	Vallersund	63° 52′ N.	9° 45′ E.
017	Trondhjem	63° 26′ N.	10° 25′ E.
018	Titran	63° 40′ N.	8° 19′ E.
019	Ona	62° 52′ N.	6° 33′ E.
020	Runde	62° 24′ N.	5° 39′ E.
021	Kinn	61° 33′ N.	4° 48′ E.
022	Bergen	60° 24′ N.	5° 19′ E.
023	Rundemannen	60° 24′ N.	5° 22′ E.
024	Fanaraaken	61° 31′ N.	7° 55′ E.
025	Slireaa	60° 36′ N.	7° 32′ E.
026	Svandalsflona	59° 50′ N.	6° 59′ E.
027	Slotteröy	59° 55′ N.	5° 04′ E.
028	Utsire	59° 18′ N.	4° 53′ E.
029	Obrested	58° 39′ N.	5° 34′ E.
030	Lister	58° 06′ N.	6° 34′ E.
031	Lindesnes	57° 59′ N.	7° 05′ E.
032	Oksöy	58° 04′ N.	8° 04′ E.
033	Byglandsfjord	58° 40′ N.	7° 48′ E.
034	Gvarv	59° 24′ N.	9° 10′ E.
035	Lyngör	58° 38′ N.	9° 07′ E.
036	Ferder	59° 02′ N.	10° 32′ E.
037	Horten	59° 20′ N.	10° 20′ E.
038	Aas	59° 40′ N.	10° 46′ E.
039	Oslo	59° 55′ N.	10° 43′ E.
040	Tryvannshöiden	59° 59′ N.	10° 41′ E.
041	Kjeller	59° 58′ N.	11° 02′ E.
042	Flisa	60° 37′ N.	12° 01′ E.
043	Kutjern	60° 34′ N.	10° 33′ E.
044	Lillehammer	61° 07′ N.	10° 28′ E.
045	Dombaas	62° 05′ N.	9° 07′ E.
046	Fokstua	62° 14′ N.	9° 16′ E.
047	Röros	62° 34′ N.	11° 23′ E.
048	Nesbyen	60° 35′ N.	9° 06′ E.

Code No.	Station.	Position. Latitude.	Longitude.
	SWEDEN.		
050	Haparanda	65° 50′ N.	24° 09′ E.
051	Östersund	63° 11′ N.	14° 39′ E.
052	Karlstad	59° 23′ N.	13° 30′ E.
053	Jönköping	57° 47′ N.	14° 10′ E.
054	Visby	57° 39′ N.	18° 18′ E.
055	Abisko	68° 21′ N.	18° 49′ E.
056	Stensele	65° 04′ N.	17° 10′ E.
057	Härnösan	62° 37′ N.	17° 57′ E.
058	Särna	61° 41′ N.	13° 07′ E.
059	Stockholm	59° 21′ N.	18° 04′ E.
060	Grimskar	56° 39′ N.	16° 22′ E.
061	Gällivare	67° 08′ N.	20° 40′ E.
062	Bjuröklubb	64° 28′ N.	21° 34′ E.
063	Storlien	63° 19′ N.	12° 06′ E.
064	Linköping	58° 25′ N.	15° 38′ E.
065	Ölands norra udde	57° 22′ N.	17° 06′ E.
066	Brämö	62° 13′ N.	17° 44′ E.
067	Falun	60° 37′ N.	15° 38′ E.
068	Karlshamn	56° 10′ N.	14° 52′ E.
069	Karesuando	68° 27′ N.	22° 30′ E.
070	Holmogadd	63° 35′ N.	20° 45′ E.
071	Orebro	59° 16′ N.	15° 13′ E.
072	Goteborg	57° 42′ N.	11° 58′ E.
073	Kiruna	67° 51′ N.	20° 14′ E.
074	Sveg	62° 03′ N.	14° 25′ E.
075	Landsort	58° 44′ N.	17° 52′ E.
076	Hoburg	56° 55′ N.	18° 09′ E.
077	Suorva	67° 32′ N.	18° 14′ E.
078	Bjuråker	61° 52′ N.	16° 34′ E.
079	Gotska Sandön	58° 23′ N.	19° 11′ E.
080	Växjö	56° 53′ N.	14° 49′ E.
081	Kvikkjokk	66° 57′ N.	17° 45′ E.
082	Knon	60° 10′ N.	13° 47′ E.
083	Skara	58° 24′ N.	13° 27′ E.
084	Halmstad	56° 40′ N.	12° 52′ E.
085	Boden	65° 49′ N.	21° 42′ E.
086	Uppsala	59° 51′ N.	17° 38′ E.
087	Vanersborg	58° 23′ N.	12° 20′ E.
088	Malmö	55° 37′ N.	13° 02′ E.
089	Gaddede	64° 30′ N.	14° 07′ E.
090	Vasterås	59° 37′ N.	16° 33′ E.
091	Västervik	57° 46′ N.	16° 39′ E.
092	Ystad	55° 25′ N.	13° 49′ E.
093	Ljungbyhed	56° 05′ N.	13° 13′ E.
	GREAT BRITAIN AND IRELAND.		
101	Valentia	51° 56′ N.	10° 15′ W.
102	Roches Point	51° 47′ N.	08° 15′ W.
103	Birr Castle	53° 06′ N.	07° 56′ W.
104	Blacksod Point	54° 06′ N.	10° 04′ W.
105	Malin Head	55° 23′ N.	07° 24′ W.
107	Aldergrove	54° 39′ N.	06° 13′ W.
108	Donaghadee	54° 38′ N.	05° 32′ W.
110	Lerwick	60° 09′ N.	01° 08′ W.
111	Stornoway	58° 11′ N.	06° 22′ W.
112	Wick	58° 27′ N.	03° 06′ W.
113	Tiree	56° 31′ N.	06° 55′ W.
115	Nairn	57° 36′ N.	03° 52′ W.
116	Aberdeen	57° 10′ N.	02° 06′ W.
117	Leuchars	56° 23′ N.	02° 53′ W.
118	Renfrew	55° 52′ N.	04° 24′ W.
119	Inchkeith	56° 02′ N.	03° 08′ W.
120	Eskdalemuir	55° 19′ N.	03° 12′ W.
124	Tynemouth	55° 01′ N.	01° 25′ W.
126	Holyhead	53° 18′ N.	04° 39′ W.
127	Liverpool	53° 24′ N.	03° 04′ W.
128	Sealand	53° 14′ N.	03° 00′ W.
130	Harrogate	54° 00′ N.	01° 36′ W.
132	Spurn Head	53° 34′ N.	00° 07′ E.
133	Birmingham	52° 28′ N.	01° 56′ W.
135	Cranwell	53° 02′ N.	00° 31′ W.
136	Bircham Newton	52° 52′ N.	00° 40′ E.
137	Yarmouth	52° 35′ N.	01° 43′ E.
139	Pembroke	51° 41′ N.	05° 11′ W.
140	Ross-on-Wye	51° 54′ N.	02° 34′ W.
141	Leafield	51° 50′ N.	01° 33′ W.
143	Upper Heyford	51° 56′ N.	01° 15′ W.
144	Cardington	52° 06′ N.	00° 25′ W.
145	Duxford	52° 06′ N.	00° 08′ E.
147	Worthy Down	51° 07′ N.	01° 19′ W.
149	Farnborough	51° 15′ N.	00° 45′ W.
150	Kew	51° 28′ N.	00° 19′ W.
151	Croydon	51° 21′ N.	00° 07′ W.
153	Shoeburyness	51° 32′ N.	00° 47′ E.
154	Clacton	51° 47′ N.	01° 09′ E.
155	Felixstowe	51° 57′ N.	01° 20′ E.
158	Scilly	49° 56′ N.	06° 18′ W.
159	Falmouth	50° 09′ N.	05° 03′ W.
160	Plymouth	50° 22′ N.	04° 08′ W.
162	Portland Bill	50° 32′ N.	02° 27′ W.
163	Calshot	50° 49′ N.	01° 18′ W.
165	Dungeness	50° 55′ N.	00° 58′ E.
166	Lympne	51° 05′ N.	01° 01′ E.
167	Manston	51° 21′ N.	01° 21′ E.
168	Guernsey	49° 26′ N.	02° 33′ W.
	ICELAND.		
170	Reykjavik	64° 09′ N.	21° 55′ W.
171	Stykkisholm	66° 05′ N.	22° 46′ W.
172	Isafjord	66° 15′ N.	23° 30′ W.
173	Blönduös	65° 40′ N.	20° 19′ W.
174	Akureyri	65° 40′ N.	18° 04′ W.
175	Raufarhöfn	66° 28′ N.	15° 57′ W.
176	Seydisfjord	65° 20′ N.	13° 40′ W.
177	Holar	64° 18′ N.	15° 05′ W.
178	Vestmannö	63° 26′ N.	20° 15′ W.
179	Grindavik	63° 50′ N.	22° 26′ W.
	DENMARK, ETC.		
181	Copenhagen	55° 42′ N.	12° 37′ E.
182	Skagen	57° 44′ N.	10° 38′ E.
183	Hanstholm	57° 07′ N.	08° 36′ E.
184	Blaavandshuk	55° 33′ N.	08° 05′ E.
185	Hammeren	55° 17′ N.	14° 46′ E.
190	Scoresbysund	70° 29′ N.	21° 58′ W.
191	Thorshavn	62° 03′ N.	06° 45′ W.
196	Julianehaab	60° 43′ N.	46° 03′ W.
197	Godthaab	64° 10′ N.	51° 45′ W.
198	Godhavn	69° 14′ N.	53° 31′ W.
199	Angmagsalik	65° 36′ N.	37° 34′ W.
	FRANCE.		
201	Rochefort	45° 55′ N.	00° 59′ W.
202	Socoa	43° 23′ N.	01° 41′ W.
203	Bordeaux	44° 50′ N.	00° 42′ W.
204	Beauvais	49° 27′ N.	02° 06′ E.
205	Cherbourg	49° 38′ N.	01° 39′ W.
206	Clermont Ferrand	45° 47′ N.	03° 09′ E.
207	Dijon	47° 16′ N.	05° 06′ E.
208	St. Inglevert	50° 52′ N.	01° 44′ E.
209	Paris	48° 52′ N.	02° 18′ E.
210	Lyons	45° 44′ N.	04° 55′ E.
211	Brest	48° 22′ N.	04° 30′ W.
212	Nîmes	43° 51′ N.	04° 24′ E.
213	Mainz	49° 59′ N.	08° 16′ E.
214	Compiegne	49° 23′ N.	02° 55′ E.
215	Le Bourget	48° 57′ N.	02° 26′ E.
216	Perpignan	42° 44′ N.	02° 52′ E.
217	Er Hastellic	46° 54′ N.	03° 16′ W.
218	Rennes	48° 07′ N.	01° 43′ W.
219	Strasbourg	48° 33′ N.	07° 38′ E.
220	Cuers	43° 15′ N.	06° 08′ E.
221	Toulouse	43° 33′ N.	01° 23′ E.
222	Tours	47° 25′ N.	00° 42′ E.
223	Antibes	43° 35′ N.	07° 07′ E.
224	Cette	43° 24′ N.	03° 41′ E.
225	Pau	43° 22′ N.	00° 24′ W.
226	Ajaccio	41° 55′ N.	08° 45′ E.
227	Argentan	48° 45′ N.	00° 01′ W.
228	St. Cyr	48° 47′ N.	02° 02′ E.
229	La Hague	49° 43′ N.	01° 56′ W.
230	Le Havre	49° 31′ N.	00° 04′ E.
231	Marignane	43° 26′ N.	05° 12′ E.
232	Metz	49° 06′ N.	06° 12′ E.
233	Montelimar	44° 35′ N.	04° 43′ E.
234	Romilly	48° 30′ N.	03° 45′ E.
235	Valenciennes	50° 20′ N.	03° 32′ E.
236	Abbeville	50° 08′ N.	01° 50′ E.
237	Nancy	48° 42′ N.	06° 14′ E.
238	Belfort	47° 38′ N.	06° 52′ E.
239	Epinal	48° 10′ N.	06° 25′ E.
240	St. Raphael	43° 25′ N.	06° 45′ E.
241	Avord	47° 02′ N.	02° 39′ E.
242	Angoulême	45° 40′ N.	00° 13′ E.
243	Orléans	47° 56′ N.	01° 53′ E.
244	Portiers	46° 45′ N.	00° 18′ E.
245	Le Puy	45° 03′ N.	03° 53′ E.
246	Puy-de-Dôme	45° 46′ N.	02° 58′ E.
247	Pic-du-Midi	42° 56′ N.	00° 08′ E.
248	Mont-Ventoux	44° 10′ N.	05° 17′ E.
249	Mont-Aigoual	44° 07′ N.	03° 35′ E.
250	Toul	48° 41′ N.	05° 52′ E.
251	La Courtine	45° 42′ N.	02° 15′ E.
252	Chateauroux	46° 49′ N.	01° 46′ E.
253	Remorantin	47° 19′ N.	01° 41′ E.
254	Chartres	48° 27′ N.	01° 30′ E.
255	Mourmelon	49° 07′ N.	04° 21′ E.
256	Istres	43° 25′ N.	04° 57′ E.
257	Cazaux	44° 32′ N.	01° 08′ W.
258	Angers	47° 29′ N.	00° 34′ W.
259	Sanguinaires	41° 52′ N.	08° 35′ E.
260	Cap Corse	43° 01′ N.	09° 21′ E.
261	Pertusato	41° 22′ N.	09° 10′ E.
262	Besançon	47° 15′ N.	05° 59′ E.
263	Bréhat	41° 51′ N.	03° 00′ W.
264	Ouessant	48° 27′ N.	05° 07′ W.
265	Penmarch	47° 47′ N.	04° 22′ W.
266	Thionville	49° 21′ N.	06° 12′ E.
267	Saverne	48° 44′ N.	07° 21′ E.
268	La Chiappa	41° 35′ N.	09° 21′ E.
269	La Coubre	45° 41′ N.	01° 14′ W.
270	St. Julian en Genevois	46° 08′ N.	06° 08′ E.
271	Neustadt	49° 19′ N.	08° 13′ E.
272	Coblence	50° 21′ N.	07° 37′ E.
273	Treves	49° 45′ N.	06° 39′ E.
274	Nantes	47° 15′ N.	01° 34′ W.
	BELGIUM.		
275	Ostend	51° 12′ N.	02° 54′ E.
276	Brussels	50° 48′ N.	04° 21′ E.
277	St. Hubert	50° 02′ N.	05° 24′ E.
	SWITZERLAND.		
281	Zürich	47° 23′ N.	08° 33′ E.
282	Berne	46° 57′ N.	07° 26′ E.
283	Geneva	46° 12′ N.	06° 09′ E.
284	Lugano	46° 00′ N.	08° 57′ E.
285	Säntis	47° 15′ N.	09° 20′ E.
286	Jungfraujoch	46° 32′ N.	07° 58′ E.
	HOLLAND.		
291	Helder	52° 58′ N.	04° 45′ E.
292	Flushing	51° 26′ N.	03° 34′ E.
293	De Bilt	52° 06′ N.	05° 11′ E.
294	Groningen	53° 13′ N.	06° 33′ E.
297	Maastricht	50° 51′ N.	05° 41′ E.
298	Noord-Hinder	51° 35′ N.	02° 37′ E.
	ITALY.		
301	Turin	45° 04′ N.	07° 41′ E.
302	Milan	45° 28′ N.	09° 11′ E.
304	Padua	45° 24′ N.	11° 52′ E.
305	Trieste	45° 39′ N.	13° 45′ E.
306	Genoa	44° 24′ N.	08° 55′ E.
307	Florence	43° 46′ N.	11° 15′ E.
308	Leghorn	43° 33′ N.	10° 18′ E.
309	Anconà	43° 37′ N.	13° 32′ E.
311	Rome	41° 54′ N.	12° 28′ E.
312	Maddalena	41° 15′ N.	09° 25′ E.
313	Naples	40° 52′ N.	14° 08′ E.
315	Cagliari	39° 13′ N.	09° 05′ E.
316	Messina	38° 12′ N.	15° 33′ E.
317	Palermo	38° 07′ N.	13° 20′ E.
319	Taranto	40° 29′ N.	17° 15′ E.
322	Zara	44° 07′ N.	15° 13′ E.
	TRIPOLI.		
330	Tripoli	32° 58′ N.	13° 20′ E.
331	Benghasi	32° 06′ N.	20° 04′ E.
	MEDITERRANEAN STATIONS.		
340	Gibraltar	36° 06′ N.	05° 21′ W.
341	Malta	35° 54′ N.	14° 31′ E.
	SPAIN.		
350	San Sebastian	43° 09′ N.	01° 38′ W.
351	Gijon	43° 33′ N.	05° 39′ W.
352	Vigo	42° 14′ N.	08° 43′ W.
353	Madrid	40° 24′ N.	03° 41′ W.
354	Seville	37° 23′ N.	05° 59′ W.
355	Almeria	36° 51′ N.	02° 28′ W.
356	Alicante	38° 21′ N.	00° 29′ W.
357	Mahon	39° 53′ N.	04° 16′ E.
358	Barcelona	41° 23′ N.	02° 10′ E.
359	Valencia	39° 28′ N.	00° 23′ W.
360	Zaragossa	41° 39′ N.	00° 53′ W.
361	Santauder	43° 29′ N.	03° 47′ W.
362	Corunna	43° 23′ N.	08° 22′ W.
363	Burgos	42° 20′ N.	03° 42′ W.
364	Valladolid	41° 38′ N.	04° 44′ W.
365	Badajoz	38° 54′ N.	06° 58′ W.
366	Còrdoba	37° 53′ N.	04° 49′ W.
367	Malaga	36° 43′ N.	04° 23′ W.
368	Los Alcazares	37° 44′ N.	00° 51′ W.
369	San Fernando	36° 26′ N.	06° 12′ W.
370	Tenerife	26° 19′ N.	16° 30′ W.
371	Izaña	28° 15′ N.	16° 40′ W.
372	Guadalajara	40° 38′ N.	03° 10′ W.
373	Granada	37° 11′ N.	03° 36′ W.
	PORTUGAL.		
381	Oporto	41° 12′ N.	08° 43′ W.
382	Coimbra	40° 12′ N.	08° 25′ W.
383	Berlenga	39° 25′ N.	09° 30′ W.
384	Lisbon	38° 44′ N.	09° 11′ W.
385	St. Vincent	37° 01′ N.	09° 00′ W.
386	Faro	37° 01′ N.	07° 56′ W.
387	Alverca	38° 54′ N.	09° 01′ W.
395	Madeira	32° 48′ N.	17° 16′ W.
396	Ponta Delgada	37° 44′ N.	25° 40′ W.
397	Angra	38° 39′ N.	27° 14′ W.
398	Horta	38° 32′ N.	28° 38′ W.
399	Flores	39° 27′ N.	30° 08′ W.
	GERMANY.		
401	Borkum	53° 36′ N.	06° 45′ E.
402	Nordhorn	52° 26′ N.	07° 06′ E.
403	Hamburg	53° 33′ N.	09° 59′ E.
404	Stettin	53° 25′ N.	14° 30′ E.
405	Danzig	54° 21′ N.	18° 40′ E.
406	Warnemund	54° 11′ N.	12° 06′ E.
407	Aachen	50° 46′ N.	06° 08′ E.
408	Magdeburg	52° 08′ N.	11° 38′ E.
409	Berlin-Stadt	52° 35′ N.	13° 25′ E.
410	Dresden	51° 03′ N.	13° 45′ E.
411	Breslau	51° 06′ N.	17° 02′ E.
412	Frankfurt	50° 07′ N.	08° 41′ E.
413	Karlsruhe	49° 02′ N.	08° 23′ E.
414	Munich	48° 09′ N.	11° 37′ E.
415	Bamberg	49° 53′ N.	10° 53′ E.
416	Zugspitze	47° 25′ N.	11° 00′ E.
417	Kahler Asten	51° 11′ N.	08° 30′ E.
418	Brocken	51° 41′ N.	10° 38′ E.
419	Fichtelberg	50° 27′ N.	12° 53′ E.
420	Grünberg	51° 56′ N.	15° 30′ E.
421	Hanover	52° 22′ N.	09° 45′ E.
422	Königsberg	54° 43′ N.	20° 30′ E.
423	Wasserkuppe	50° 31′ N.	09° 57′ E.
424	Feldberg Taunus	50° 13′ N.	08° 27′ E.
425	Lindenberg	52° 13′ N.	14° 07′ E.
426	Fürth	49° 30′ N.	10° 59′ E.
427	Feldberg Schwarzw	47° 52′ N.	08° 02′ E.
428	Schneekoppe	50° 44′ N.	15° 44′ E.
429	Rügenwalder-mund	54° 25′ N.	16° 25′ E.
430	Wilhelms-haven	53° 32′ N.	08° 09′ E.
431	Wehnde	51° 27′ N.	10° 20′ E.
432	Borkumriff	53° 45′ N.	06° 04′ E.
435	Norderney	53° 42′ N.	07° 10′ E.
436	Cologne	51° 00′ N.	07° 00′ E.
437	Essen	51° 31′ N.	07° 27′ E.
438	Dortmund	51° 30′ N.	07° 30′ E.
439	Lüdenscheid	51° 13′ N.	07° 37′ E.
440	Berlin (Aerodrome)	52° 29′ N.	13° 26′ E.
441	Herford	52° 10′ N.	08° 40′ E.
442	Bremen	53° 05′ N.	08° 47′ E.
443	Stuttgart	48° 41′ N.	09° 03′ E.
444	Friedrichs-hafen	47° 39′ N.	09° 29′ E.
445	Inselsberg	50° 51′ N.	10° 28′ E.
446	Erfurt	50° 58′ N.	11° 04′ E.
447	Dessau	51° 50′ N.	12° 12′ E.
448	Rostock	54° 05′ N.	12° 06′ E.
449	Halle	51° 30′ N.	12° 00′ E.
450	Leipzig	51° 11′ N.	12° 37′ E.
451	Hof	50° 20′ N.	11° 55′ E.
452	Aldergrund	54° 50′ N.	14° 22′ E.
453	Dt. Krone	53° 17′ N.	16° 38′ E.
454	Gleiwitz	50° 20′ N.	18° 40′ E.
455	Elbing	54° 10′ N.	19° 25′ E.
456	Würzburg	49° 45′ N.	09° 50′ E.
457	Mannheim	49° 30′ N.	08° 30′ E.
458	Plauen	50° 30′ N.	12° 08′ E.
459	Stolp	54° 28′ N.	17° 03′ E.
460	Kiel	54° 23′ N.	10° 11′ E.
461	List	55° 01′ N.	08° 27′ E.
462	Amrumbank	54° 33′ N.	07° 23′ E.
463	Altenwalde	53° 49′ N.	08° 20′ E.
464	Arkona	54° 41′ N.	13° 26′ E.
465	Heligoland	54° 11′ N.	07° 54′ E.
	LITHUANIA.		
466	Kovno	54° 55′ N.	23° 56′ E.
467	Memel	55° 42′ N.	21° 10′ E.
468	Telsh	55° 59′ N.	22° 15′ E.
469	Birshe	56° 12′ N.	24° 45′ E.
	LATVIA.		
470	Riga	56° 59′ N.	24° 05′ E.
471	Libau	56° 31′ N.	21° 00′ E.
472	Malnova	56° 47′ N.	27° 44′ E.
473	Windau	57° 24′ N.	21° 34′ E.
474	Dvinsk	55° 53′ N.	26° 30′ E.
	ESTONIA.		
475	Revel	59° 26′ N.	24° 48′ E.
476	Dorpat	58° 23′ N.	26° 43′ E.
477	Filsand	58° 23′ N.	21° 49′ E.
478	Hungerburg	59° 28′ N.	28° 04′ E.
479	Pakerort	59° 24′ N.	24° 04′ E.
	FINLAND.		
481	Helsingfors	60° 10′ N.	24° 57′ E.
482	Sortavala	61° 42′ N.	30° 41′ E.
483	Vaasa	63° 05′ N.	21° 32′ E.
484	Kuopio	62° 54′ N.	27° 40′ E.
485	Sodankylä	67° 22′ N.	26° 39′ E.
486	Kajaani	64° 13′ N.	27° 46′ E.
487	Tampere	61° 30′ N.	23° 46′ E.
488	Abo	60° 27′ N.	22° 16′ E.
489	Inari	68° 57′ N.	26° 49′ E.
490	Hanko	59° 49′ N.	22° 56′ E.
491	Maarian-hamina	60° 06′ N.	19° 57′ E.
	AUSTRIA.		
501	Vienna	48° 15′ N.	16° 22′ E.
502	Klagenfurt	46° 37′ N.	14° 18′ E.
503	Sonnblick	47° 03′ N.	12° 57′ E.
504	Villach	46° 35′ N.	13° 50′ E.
505	Graz	47° 04′ N.	15° 28′ E.
506	Obir	46° 30′ N.	14° 29′ E.
507	Innsbruck	47° 16′ N.	11° 24′ E.
508	Salzburg	47° 48′ N.	13° 02′ E.
	CZECHOSLOVAKIA.		
520	Prague	50° 04′ N.	14° 26′ E.
521	Cheb	50° 05′ N.	12° 24′ E.
522	Olomouc	49° 36′ N.	17° 16′ E.
523	Vajnory	48° 12′ N.	17° 13′ E.
524	Kosice	48° 42′ N.	21° 16′ E.
	HUNGARY.		
541	Budapest	47° 30′ N.	19° 02′ E.
542	Szombathely	47° 15′ N.	16° 36′ E.
543	Kaposvár	46° 22′ N.	17° 48′ E.
544	Szeged	46° 15′ N.	20° 09′ E.
545	Debreczen	47° 31′ N.	21° 38′ E.
	POLAND.		
551	Posen	52° 25′ N.	16° 51′ E.
552	Warsaw	52° 11′ N.	21° 01′ E.
553	Vilna	54° 41′ N.	25° 15′ E.
554	Lodz	51° 46′ N.	19° 29′ E.
555	Lublin	51° 15′ N.	22° 34′ E.
556	Cracow	50° 05′ N.	20° 01′ E.
557	Tarnopol	49° 33′ N.	25° 36′ E.
558	Lemberg	49° 50′ N.	24° 00′ E.
559	Kielce	50° 53′ N.	20° 38′ E.
560	Bromberg	53° 08′ N.	18° 00′ E.
561	Zakopane	49° 17′ N.	19° 58′ E.
562	Pinsk	52° 07′ N.	26° 06′ E.
563	Danzig	54° 24′ N.	18° 40′ E.
564	Puck	54° 43′ N.	18° 25′ E.
565	Brzesc	52° 06′ N.	23° 40′ E.
566	Dgbem	51° 34′ N.	21° 52′ E.
567	Suwalki	54° 06′ N.	22° 56′ E.
568	Grudziadz	53° 29′ N.	18° 45′ E.
569	Torun	53° 01′ N.	18° 37′ E.
570	Bialystok	53° 08′ N.	23° 10′ E.
571	Lida	53° 53′ N.	25° 18′ E.
572	Pohulanka	55° 02′ N.	25° 52′ E.
573	Kalisz	52° 46′ N.	18° 06′ E.
574	Kiwerce	50° 47′ N.	25° 23′ E.
	ROUMANIA.		
575	Bucharest	44° 25′ N.	26° 06′ E.
576	Craiova	44° 19′ N.	23° 48′ E.
577	Bolgrad	45° 41′ N.	28° 37′ E.
578	Kishinev	47° 02′ N.	28° 48′ E.
579	Czernowitz	48° 17′ N.	25° 57′ E.
580	Piatra Neamt	46° 56′ N.	26° 22′ E.
581	Sulina	45° 09′ N.	29° 40′ E.
582	Constantsa	44° 11′ N.	28° 39′ E.
583	Tecuci	45° 49′ N.	27° 26′ E.
584	Râmnicu Sărat	45° 23′ N.	27° 03′ E.
585	Sibiu	45° 47′ N.	24° 09′ E.
586	Turnu Severin	44° 38′ N.	22° 33′ E.
587	Temisoara	45° 47′ N.	21° 17′ E.
588	Caransebes	45° 25′ N.	22° 13′ E.
589	Jassy	47° 10′ N.	27° 36′ E.
590	Cluj	46° 46′ N.	23° 34′ E.
591	Galatz	45° 26′ N.	28° 02′ E.
592	Baltchik	43° 24′ N.	28° 10′ E.

Code No.	Station.	Position. Latitude.	Longitude.
	Morocco.		
601	Tangier	35° 47′ N.	05° 51′ W.
603	Rabat	34° 02′ N.	06° 45′ W.
604	Casablanca	33° 35′ N.	08° 39′ W.
607	Agadir	30° 28′ N.	09° 32′ W.
608	Beni Malek	34° 48′ N.	05′ 34′ W.
609	Meknes	33° 55′ N.	05° 35′ W.
610	Fez	34° 05′ N.	05° 03′ W.
611	Taza	34° 14′ N.	04° 02′ W.
612	Oujda	34° 41′ N.	01° 56′ W.
613	Marrakesh	31° 39′ N.	08° 01′ W.
614	Midelt	32° 36′ N.	04° 46′ W.
615	Bou Denib	32° 00′ N.	04° 54′ W.
616	Kasbah Tadla	32° 37′ N.	06° 18′ W.
618	Timadit	33° 15′ N.	05° 10′ W.
620	Tangier (Spain)	35° 47′ N.	05° 49′ W.
621	Melilla	35° 17′ N.	02° 59′ W.
622	Tetuan	35° 32′ N.	05° 24′ W.
623	Larache	35° 03′ N.	06° 05′ W.
624	C. Juby	27° 56′ N.	13° 00′ W.
625	Rio de Oro	23° 40′ N.	15° 54′ W.
	Algeria.		
631	Oran	35° 38′ N.	00° 39′ W.
632	Algiers	36° 46′ N.	03° 03′ E.
633	Setif	36° 20′ N.	05° 33′ E.
634	Biskra	34° 51′ N.	05° 44′ E.
635	Touggourt	33° 06′ N.	06° 04′ E.
636	Ouargla	31° 55′ N.	05° 10′ E.
637	In-Salah	27° 08′ N.	02° 27′ E.
638	Colomb-Béchar	31° 38′ N.	02° 13′ W.
639	Béni-Abbès	30° 00′ N.	02° 21′ W.
640	Timimoun	29° 12′ N.	00° 02′ E.
641	Laghouat	33° 48′ N.	02° 53′ E.
642	Aïn-Sefra	32° 48′ N.	00° 36′ W.
643	El-Goléa	30° 33′ N.	03° 04′ E.
644	El-Oued	33° 21′ N.	06° 54′ E.
645	Ghardaïa	32° 29′ N.	03° 40′ E.
646	Adrar	27° 28′ N.	00° 05′ E.
647	Cap Carbon	36° 45′ N.	05° 00′ E.
648	Ouallen	24° 30′ N.	00° 50′ E.
649	Fort Flatters	28° 00′ N.	07° 20′ E.
650	Fort Polignac	26° 30′ N.	08° 40′ E.
651	Djanet	24° 30′ N.	10° 00′ E.
652	Tamanrasset	22° 45′ N.	05° 00′ E.
653	Bone	36° 50′ N.	07° 50′ E.
654	Le Kreider	34° 09′ N.	00° 05′ E.
655	Cap de Garde	36° 59′ N.	07° 45′ E.
656	Cap Tenes	36° 36′ N.	01° 19′ E.
657	Cap Bougaroni	37° 09′ N.	06° 29′ E.
658	Cap de Fer	37° 07′ N.	07° 08′ E.
	Tunisia.		
661	Tunis	36° 48′ N.	10° 30′ E.
662	Bizerta	37° 17′ N.	09° 52′ E.
663	Sfax	34° 44′ N.	10° 45′ E.
664	Médenine	33° 14′ N.	10° 05′ E.
665	Tozeur	34° 10′ N.	08° 06′ E.
666	Ben Gardane	33° 08′ N.	11° 10′ E.
667	Sousse	35° 50′ N.	10° 34′ E.
668	Metlaoui	34° 20′ N.	08° 22′ E.
669	Gabes	33° 53′ N.	10° 13′ E.
670	Bir Kecira	——	——
671	Kebili	33° 40′ N.	09° 10′ E.
672	Kairouan	35° 41′ N.	10° 04′ E.
673	La Galite	——	——
674	Fort Saint	——	——
675	Cap Bon	37° 00′ N.	11° 10′ E.
	Egypt, Sudan and Cyprus.		
681	Helwan	29° 52′ N.	31° 20′ E.
682	Alexandria	31° 12′ N.	29° 53′ E.
683	Sollum	31° 33′ N.	25° 11′ E.
684	Mersa Matruh	31° 22′ N.	27° 14′ E.
685	Port Said	31° 16′ N.	32° 19′ E.
686	Siwa	29° 12′ N.	25° 29′ E.
687	Suez	29° 56′ N.	32° 33′ E.
688	Tor	28° 14′ N.	33° 37′ E.
689	Hurghada	27° 14′ N.	33° 51′ E.
690	Assiut	27° 11′ N.	31° 13′ E.
691	Aswan	24° 02′ N.	32° 53′ E.
692	Wadi Halfa	21° 55′ N.	31° 19′ E.
693	Port Sudan	19° 37′ N.	37° 13′ E.
694	Khartoum	15° 37′ N.	32° 33′ E.
695	Limassol	34° 41′ N.	33° 03′ E.
696	Aboukir	31° 18′ N.	30° 06′ E.
697	Heliopolis	30° 05′ N.	31° 22′ E.
698	Ismalia	30° 36′ N.	32° 14′ E.
	Yugo-Slavia.		
701	Belgrade	44° 48′ N.	20° 27′ E.
702	Petrovaradin	45° 15′ N.	19° 52′ E.
703	Zagreb	45° 49′ N.	15° 58′ E.
704	Ljubljana	46° 03′ N.	14° 30′ E.
705	Sarajevo	43° 52′ N.	18° 26′ E.
706	Mostar	43° 20′ N.	17° 49′ E.
707	Vis	43° 02′ N.	16° 07′ E.
708	Vela Luka	42° 57′ N.	16° 42′ E.
709	Gravosa	42° 40′ N.	18° 05′ E.
710	Kumbor	42° 26′ N.	18° 36′ E.
711	Spalato	43° 31′ N.	19° 26′ E.
712	Veliko Gradište	44° 45′ N.	21° 31′ E.
713	Koviljača	44° 31′ N.	19° 10′ E.
714	Nish	43° 19′ N.	21° 54′ E.
715	Kosovska Mitrovica	42° 53′ N.	20° 53′ E.
716	Skoplje	41° 59′ N.	21° 27′ E.
	Bulgaria.		
720	Sofia	42° 46′ N.	23° 12′ E.
721	Varna	43° 11′ N.	27° 53′ E.
722	G. Oréhovitza	43° 07′ N.	25° 42′ E.
723	Kazanlik	42° 37′ N.	25° 24′ E.
724	Yamboli	42° 29′ N.	26° 31′ E.
725	Rustchuk	43° 52′ N.	25° 56′ E.
726	Plevna	43° 24′ N.	24° 37′ E.
	Greece.		
730	Athens	37° 58′ N.	23° 43′ E.
731	Salonika	40° 40′ N.	22° 52′ E.
732	Alexandroupolis	40° 51′ N.	25° 52′ E.
733	Corfu	39° 37′ N.	19° 57′ E.
734	Larissa	39° 37′ N.	22° 21′ E.
735	Chios	38° 23′ N.	26° 09′ E.
736	Zante	37° 47′ N.	20° 55′ E.
737	Syra	37° 27′ N.	24° 55′ E.
738	Calamate	37° 02′ N.	22° 08′ E.
739	Candia	35° 19′ N.	25° 09′ E.
	Turkey.		
740	Angora	39° 58′ N.	32° 48′ E.
741	Edirne	41° 40′ N.	26° 38′ E.
742	Smyrna	38° 27′ N.	27° 15′ E.
743	Stambul	41° 02′ N.	28° 47′ E.
744	Adana	36° 58′ N.	35° 18′ E.
745	Kaisarieh	38° 41′ N.	35° 27′ E.
746	Rise	41° 02′ N.	40° 32′ E.
747	Erzerum	39° 55′ N.	41° 17′ E.
	Palestine.		
760	Haifa	32° 48′ N.	34° 59′ E.
761	Gaza	31° 30′ N.	34° 27′ E.
762	Ramleh	31° 54′ N.	34° 54′ E.
763	Amman	31° 57′ N.	35° 57′ E.
764	Ma'an	30° 11′ N.	35° 39′ E.
	Iraq.		
770	Mosul	36° 20′ N.	43° 08′ E.
771	Kirkuk	35° 28′ N.	44° 22′ E.
772	Baiji	34° 55′ N.	43° 34′ E.
773	Palkanah	34° 49′ N.	44° 44′ E.
774	Hinaidi	——	——
775	Diwaniya	31° 58′ N.	44° 51′ E.
776	Rutbah	——	——
777	Shaibah	30° 26′ N.	47° 41′ E.
	Syria.		
781	Damascus	33° 31′ N.	36° 14′ E.
782	Muslimie	36° 21′ N.	37° 08′ E.
783	Deir-es-Zoor	35° 20′ N.	40° 11′ E.
784	Rakka	35° 36′ N.	39° 03′ E.
785	Hasseitje	36° 12′ N.	40° 50′ E.
786	Palmyra	34° 18′ N.	38° 34′ E.
787	Homs	34° 46′ N.	36° 46′ E.
788	Deraa	32° 40′ N.	36° 08′ E.
789	Sorveida	32° 45′ N.	36° 25′ E.
790	Rayack	33° 52′ N.	36° 00′ E.
791	Ksara	33° 49′ N.	35° 53′ E.
792	Djedeide (Beirut)	33° 54′ N.	35° 34′ E.
793	Latakia	35° 36′ N.	35° 48′ E.
794	Alexandretta	36° 38′ N.	36° 11′ E.
795	Jerablus	36° 48′ N.	37° 58′ E.
796	Merdjayoun	33° 23′ N.	35° 33′ E.
	Russia and Siberia.		
801	Alexandrowsk	69° 12′ N.	33° 28′ E.
802	Kandalaksha	67° 08′ N.	32° 26′ E.
803	Kem	64° 57′ N.	34° 39′ E.
804	Archangel	64° 33′ N.	40° 32′ E.
805	Mezen	65° 50′ N.	44° 16′ E.
806	Kanin Nos.	68° 39′ N.	43° 18′ E.
807	Oust-Tzylma	65° 27′ N.	52° 10′ E.
808	Matotchkin-Shar	73° 16′ N.	56° 24′ E.
809	Vaigach	70° 24′ N.	58° 48′ E.
810	Morra Sale	69° 43′ N.	66° 48′ E.
811	Dickson	73° 30′ N.	80° 23′ E.
812	Obdorsk	66° 31′ N.	66° 35′ E.
813	Tomp (Gdov)	58° 45′ N.	27° 49′ E.
814	Kargopol	61° 30′ N.	38° 57′ E.
815	Leningrad	59° 56′ N.	30° 16′ E.
816	Petrozavodsk	61° 47′ N.	34° 33′ E.
817	Shenkursk	62° 08′ N.	42° 54′ E.
818	Vologda	59° 13′ N.	39° 54′ E.
819	Oust-Sysolsk	61° 40′ N.	50° 51′ E.
820	Tcherdyn	60° 24′ N.	56° 31′ E.
821	V. Louki	56° 21′ N.	30° 31′ E.
822	Yaoslav	57° 37′ N.	39° 55′ E.
823	Vjatka	58° 37′ N.	29° 40′ E.
824	Minsk	53° 54′ N.	27° 33′ E.
825	Novozibkov	52° 32′ N.	31° 56′ E.
826	Moscow	55° 46′ N.	37° 40′ E.
827	N. Novgorod	56° 20′ N.	44° 00′ E.
828	Kazan	55° 47′ N.	49° 08′ E.
829	Ekaterinbourg	56° 50′ N.	60° 38′ E.
830	Kiev	50° 27′ N.	30° 30′ E.
831	Koursk	51° 45′ N.	36° 12′ E.
832	Zemetchino	53° 30′ N.	42° 37′ E.
833	Ufa	54° 43′ N.	55° 56′ E.
834	Zinovievsk	48° 31′ N.	32° 17′ E.
835	Kamenetz Podolsk	48° 40′ N.	26° 34′ E.
836	Kharkov	50° 00′ N.	36° 14′ E.
837	Lugansk	48° 35′ N.	39° 20′ E.
838	Saratow	51° 32′ N.	46° 03′ E.
839	Bezenchuk	52° 59′ N.	49° 29′ E.
840	Orenbourg	51° 45′ N.	55° 06′ E.
841	Odessa	46° 29′ N.	30° 44′ E.
842	Guenitchesk	46° 11′ N.	34° 49′ E.
843	Rostov on Don	47° 13′ N.	39° 43′ E.
844	Stalingrad	48° 42′ N.	44° 31′ E.
845	Sevastopol	44° 37′ N.	33° 31′ E.
846	Feodosia	45° 02′ N.	35° 24′ E.
847	Novorossiisk	44° 43′ N.	37° 46′ E.
848	Stavropol	45° 03′ N.	41° 39′ E.
849	Astrakhan	46° 21′ N.	48° 02′ E.
850	Gouriev	47° 07′ N.	51° 55′ E.
851	Uel	49° 04′ N.	54° 41′ E.
852	Sotchi	43° 34′ N.	39° 36′ E.
853	Poti	42° 08′ N.	41° 36′ E.
854	Tiflis	41° 43′ N.	44° 48′ E.
855	Petrovsk	43° 00′ N.	47° 30′ E.
856	Baku	40° 21′ N.	49° 51′ E.
857	Enzeli	37° 30′ N.	49° 26′ E.
858	Samarovskoe	60° 58′ N.	69° 04′ E.
859	Tobolsk	58° 12′ N.	68° 14′ E.
860	Kustanai	53° 14′ N.	63° 41′ E.
861	Omsk	54° 59′ N.	73° 22′ E.
862	Akmolinsk	51° 12′ N.	71° 50′ E.
863	Semipalatinsk	50° 24′ N.	80° 13′ E.
864	Tourgai	49° 38′ N.	63° 27′ E.
865	F. Alexandrovsky	44° 30′ N.	50° 16′ E.
866	Kizil Orda	44° 51′ N.	65° 27′ E.
867	Krasnovodsk	40° 00′ N.	52° 59′ E.
868	Askhabad	37° 57′ N.	58° 23′ E.
869	Novaia Bokhara	39° 47′ N.	64° 33′ E.
870	Tashkent	41° 20′ N.	69° 18′ E.
871	Alma-Ata	43° 15′ N.	76° 53′ E.
876	Tomsk	56° 30′ N.	84° 58′ E.
877	Barnaul	53° 20′ N.	83° 48′ E.
878	V. Imbatskoe	63° 07′ N.	88° 01′ E.
879	Eniseisk	58° 27′ N.	92° 06′ E.
880	Kansk	56° 12′ N.	95° 41′ E.
881	Minousinsk	53° 43′ N.	91° 41′ E.
882	Bratski-Ostrog	56° 04′ N.	101° 50′ E.
883	Kirensk	57° 47′ N.	108° 07′ E.
884	Irkutsk	52° 16′ N.	104° 19′ E.
889	Yakutsk	62° 01′ N.	130° 43′ E.
895	Blagovyeshchensk	50° 15′ N.	127° 31′ E.
897	Khabarovsk	48° 28′ N.	135° 03′ E.
899	Vladivostock	43° 07′ N.	131° 55′ E.

SPECIAL WEATHER TELEGRAPHY TABLES, NOT INTERNATIONAL CODE.

Table XXVI.

Q′′—Quarter of the Globe.

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

Table XXVII.

w′—Present Weather.

Code Figure.		Code Figure.	
0 =	Sky clear.	5 =	Rain.
1 =	„ ¼ clouded.	6 =	Snow.
2 =	„ ½ clouded.	7 =	Mist.
3 =	„ ¾ clouded.	8 =	Fog.
4 =	„ Overcast.	9 =	Thunderstorm.

Table XXVIII.

Conversion of Millibars to Inches.

Equivalent in Mercury Inches at 32°, and Latitude 45° of Millibars.

Mb.	In.	Mb.	In.	Mb.	In.	Mb.	In.	Mb.	In.	Mb.	In.	Mb.	In.
925	27·32	940	27·76	960	28·35	980	28·94	1000	29·53	1020	30·12	1040	30·71
926	27·35	941	27·79	961	28·38	981	28·97	1001	29·56	1021	30·15	1041	30·74
927	27·38	942	27·82	962	28·41	982	29·00	1002	29·59	1022	30·18	1042	30·77
928	27·41	943	27·85	963	28·44	983	29·03	1003	29·62	1023	30·21	1043	30·80
929	27.44	944	27·88	964	28.47	984	29·06	1004	29·65	1024	30·24	1044	30·83
930	27·46	945	27·91	965	28·50	985	29·09	1005	29·68	1025	30·27	1045	30·86
931	27·49	946	27·94	966	28·53	986	29·12	1006	29·71	1026	30·30	1046	30·89
932	27·52	947	27·97	967	28·56	987	29·15	1007	29·74	1027	30·33	1047	30·92
933	27·55	948	28·00	968	28·59	988	29·18	1008	29·77	1028	30·36	1048	30·95
934	27·58	949	28·03	969	28·62	989	29·21	1009	29·80	1029	30·39	1049	30·98
935	27·61	950	28·05	970	28·65	990	29·24	1010	29·83	1030	30·42	1050	31·01
936	27·64	951	28·08	971	28·67	991	29·26	1011	29·86	1031	30·45	1051	31·04
937	27·67	952	28·11	972	28·70	992	29·29	1012	29·89	1032	30·48	1052	31·07
938	27·70	953	28·14	973	28·73	993	29·32	1013	29·92	1033	30·51	1053	31·10
939	27·73	954	28·17	974	28·76	994	29·35	1014	29·94	1034	30·53	1054	31·13
		955	28·20	975	28·79	995	29·38	1015	29·97	1035	30·56		
		956	28·23	976	28·82	996	29·41	1016	30·00	1036	30·59		
		957	28·26	977	28·85	997	29·44	1017	30·03	1037	30·62		
		958	28·29	978	28·88	998	29·47	1018	30·06	1038	30·65		
		959	28·32	979	28·91	999	29·50	1019	30·09	1039	30·68		

Table XXIX.

Conversion of Centigrade Temperatures to Fahrenheit.

Cent.* Transmitted.	Fahr.	Cent. Transmitted.	Fahr.	Cent. Transmitted.	Fahr.	Cent. Transmitted.	Fahr.
—	—	00	32	10	50	21	70
51	30	01	34	11	52	22	72
52	28	02	36	12	54	23	73
53	27	03	37	13	55	24	75
54	25	04	39	14	57	25	77
55	23	05	41	15	59	26	79
56	21	06	43	16	61	27	81
57	19	07	45	17	63	28	82
58	18	08	46	18	64	29	84
59	16	09	48	19	66	30	86
				20	68		

* 50 is added to the amounts to indicate minus temperatures Centigrade.

WIRELESS STORM WARNINGS.

C.W. Issues.

Eiffel Tower W/T Station, call sign FLE, broadcasts wireless storm warnings immediately after the daily weather bulletins at 0220 G.M.T. on a wavelength of 1,485 m. C.W. and at 0820 G.M.T. on a wavelength of 7,200 m. C.W.

St. Pierre des Corps W/T Station, call sign FYG., also broadcasts wireless storm warnings immediately after the daily weather bulletin at 1920 G.M.T. on a wavelength of 6,000 m. C.W.

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

The signals refer to the following French coastal areas:—

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

Form of Message.

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

Example.

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

Explanation.

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

Spark Issues.

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

Cherbourg ... Approximate Latitude 49° 37′ N., Longitude 1° 36′ W., call sign FUC.

Brest ... ... Approximate Latitude 48° 22′ N., Longitude 4° 34′ W., call sign FUE.

Lorient (Pen-Mané) Approximate Latitude 47° 44′ N., Longitude 3° 21′ W., call sign FUN.

Rochefort (Soubise) Approximate Latitude 45° 56′ N., Longitude 1° 00′ W., call sign FES.

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

Porquerolles ... Approximate Latitude 42° 59′ N., Longitude 6° 12′ E., call sign FUQ and

Ajaccio ... ... Approximate Latitude 41° 56′ N., Longitude 8° 46′ E., call sign FUI.

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

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

III.—WIRELESS TIME SIGNALS.

C.W. Issues.

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

Paris—Eiffel Tower W/T Station.

Position, Latitude 48° 51′ 30″ N., Longitude 2° 17′ 43″ E.

Call Sign FLE. Wavelengths 32.50 m. (C.W.) and 2,650 m. (I.C.W.).

New International Time-Signals.

W/T Time-Signals are transmitted automatically from the Standard Clock at Paris Observatory, Latitude 48° 50′ 11″ N., Longitude 2° 20′ 14″ E., in accordance with the New International System of W/T Time-Signals as follows:—

		h.	m.	s.		h.	m.	s.			
(1)	From	7	56	00	to	8	00	00	on	32·50 metres.	(C.W.)
(2)	,,	9	26	00	,,	9	30	00	,,	2,650 ,,	(I.C.W.)
(3)	,,	19	56	00	,,	20	00	00	,,	32·50 ,,	(C.W.)
(4)	,,	22	26	00	,,	22	30	00	,,	2,650 ,,	(I.C.W.)

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

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

59 06 „ 59 10 — — ·
59 16 „ 59 20 — — ·
59 26 „ 59 30 — — ·
59 36 „ 59 40 — — ·
59 46 „ 59 50 — — ·
7 59 55 „ 8 00 00 — 55 56 57 58 59 60 — · · · · · · *Time signal.*

— = 1 sec.; · = 0·2 sec.

Bordeaux—La Fayette W/T Station.

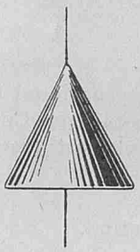
Position, Latitude 44° 42′ 00″ N., Longitude 0° 48′ 00″ W.
Call Sign LY. Wavelength 18,900 m. (C.W.).

New International Time-Signals.

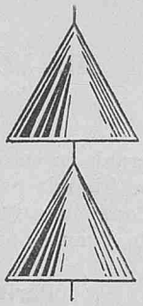
Time-Signals in accordance with the New International System of W/T Time-signals are broadcast twice daily, at 8h. 00m. 00s. G.M.T. and 20h. 00m. 00s. G.M.T. The signals are transmitted automatically by the Standard Clock at Paris Observatory. For procedure, *see* Eiffel Tower New International System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

IV.—VISUAL GALE WARNINGS.

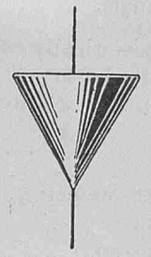
Day Signals.



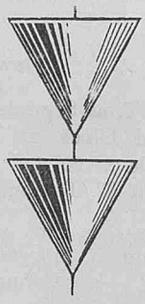
Hoisted when a gale is probable from N.W.



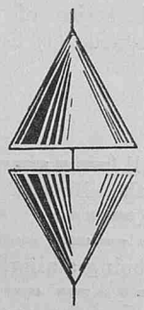
Hoisted when a gale is probable from N.E.



Hoisted when a gale is probable from S.W.



Hoisted when a gale is probable from S.E.



Hoisted when gales of hurricane force are probable.

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

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

NEW ZEALAND—AMENDMENT.

II. Wireless Weather Signals.

Page 215, Volume V, No. 58.—A general weather bulletin is now issued through **Wellington** W/T Statiom, **ZLW**, at 0930 G.M.T., particulars of which will be given in the appropriate number of this Journal for this year.

IV. Visual Storm Warnings.

Page 219, Volume V, No. 58.—*Delete* Matangi Island, *add* Castle Point.

Special Notices regarding Personnel.

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

Obituary.

The death of Captain Bertram Nevile Williams, of the British India S.S. *Nerbudda*, which occurred suddenly at his home at Streatham, on Sunday, February 3rd, is noted with regret.

Captain Williams joined the British India Steam Navigation Company as a junior officer in 1902 and prior to his appointment to the *Nerbudda* commanded several of the Company's vessels mainly employed in the Indian coastal service.

Commander T. L. Mills, O.B.E., R.D., R.N.R.

Captain T. L. Mills, Commander of the British India Steam Navigation Company's S.S. *Morvada*, retired on Februay 15th, 1929, owing to ill-health, after 37 years' service afloat. Captain Mills served his apprenticeship in the ship *Roderick Dhu*, owned by Messrs. Williamson Milligans & Co. of Liverpool, which he joined in 1891. On completing his time he served as third mate of Messrs. Fernie & Son's four-masted barque *Eulomeni*. Transferring to steam he joined the British India Steam Navigation Co. For the past nine years of his services he was in command of their S.S. *Morvada*. As a Royal Naval Reserve Officer Captain Mills has done considerable service in the Royal Navy, and for his services during the Great War received the Order of the British Empire (Military).

He was a member of the Voluntary Corps of Marine Observers from 1920 until retired. Marine Observers will join with the Marine Division in wishing Captain Mills a speedy return to health and happiness in his retirement.

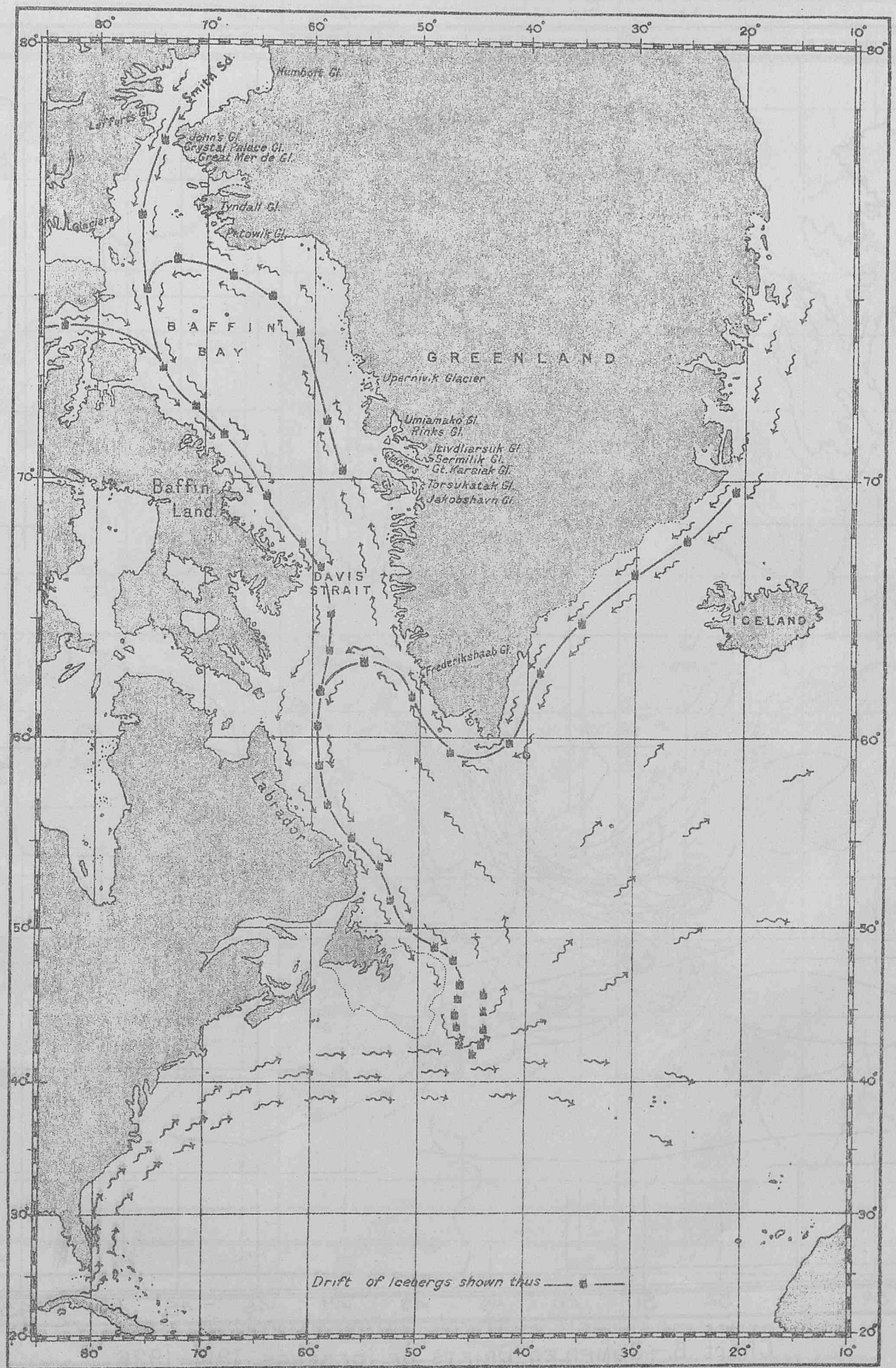


Chart A.- General Drift of Icebergs.

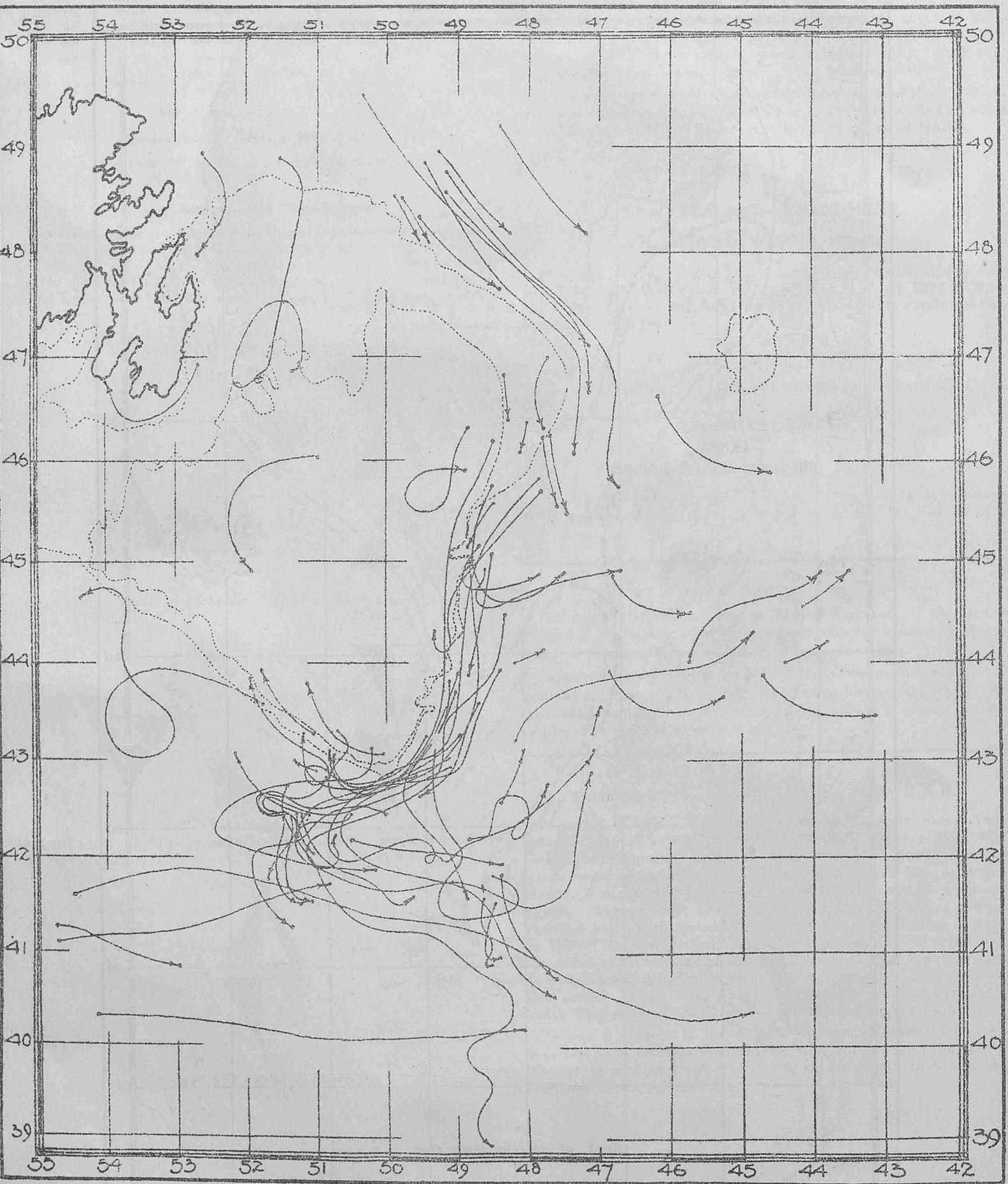


Chart B.— Compiled Drifts of Icebergs, 1914-1926.

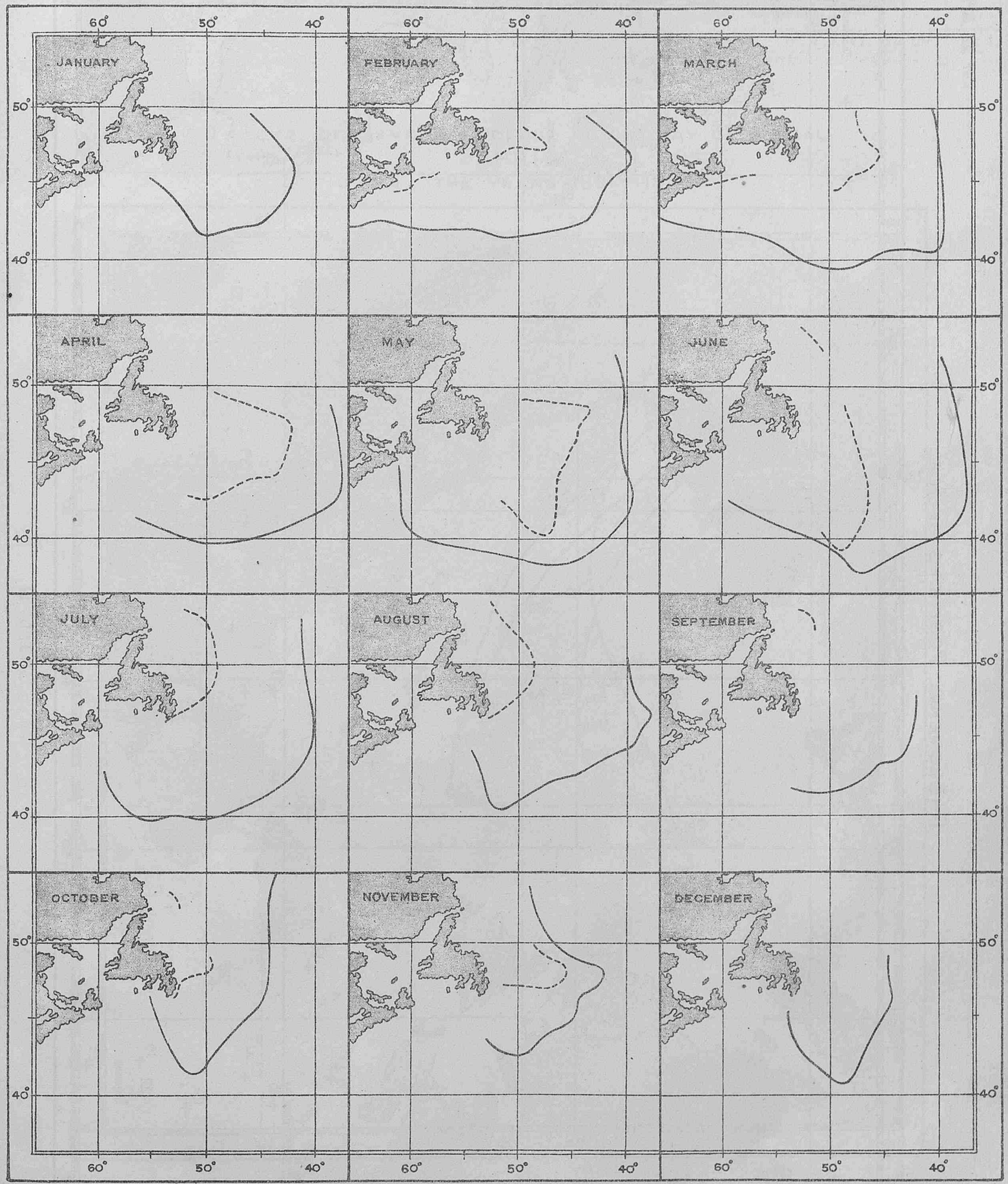


Chart C.– Limits of Ice, Western North Atlantic.

Limit from 1901 to 1928 shown thus ————————

Limit for 1928 shown thus - - - - - - - - - - - - - -

Phenomenal Positions of Ice.

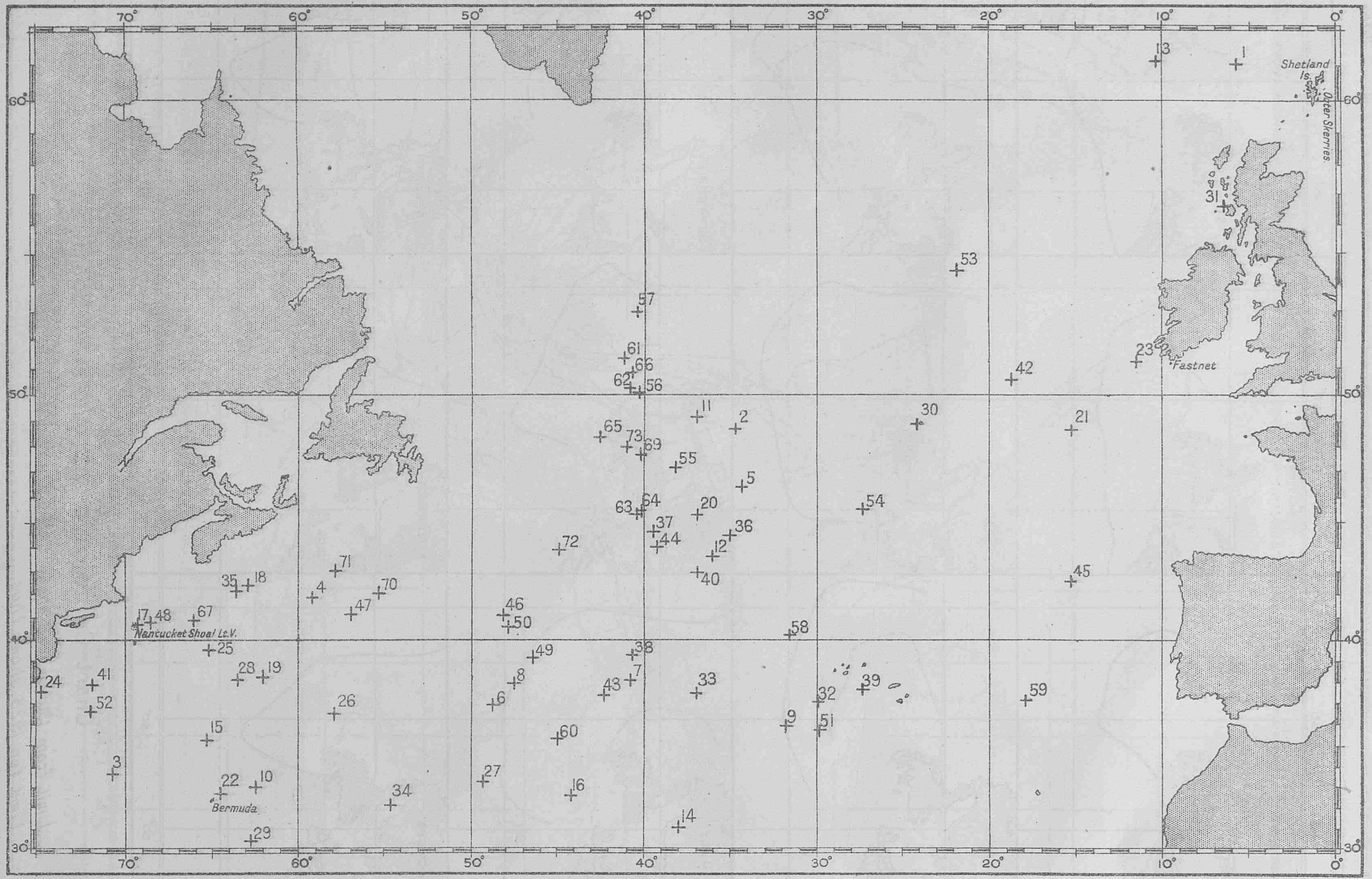
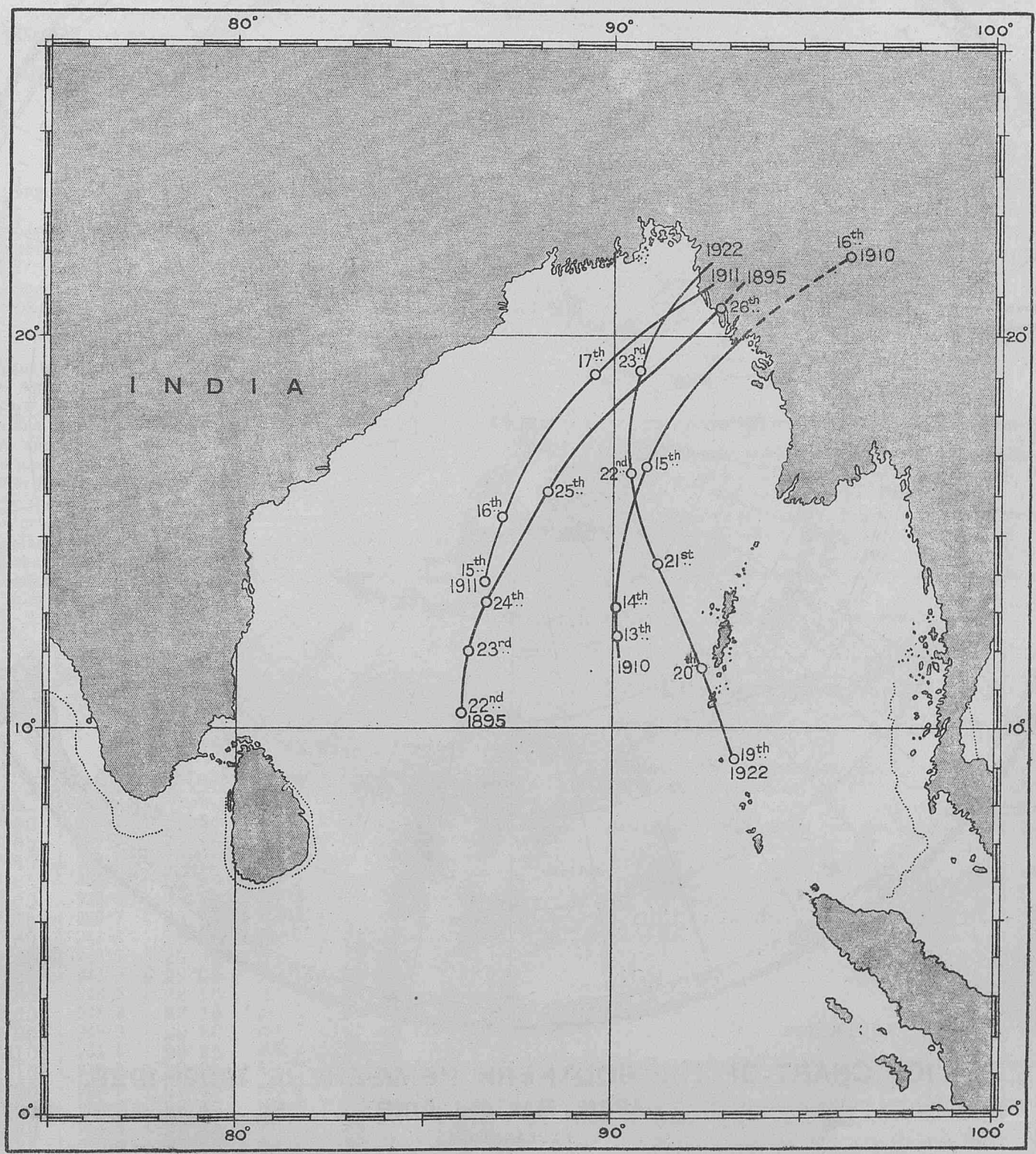
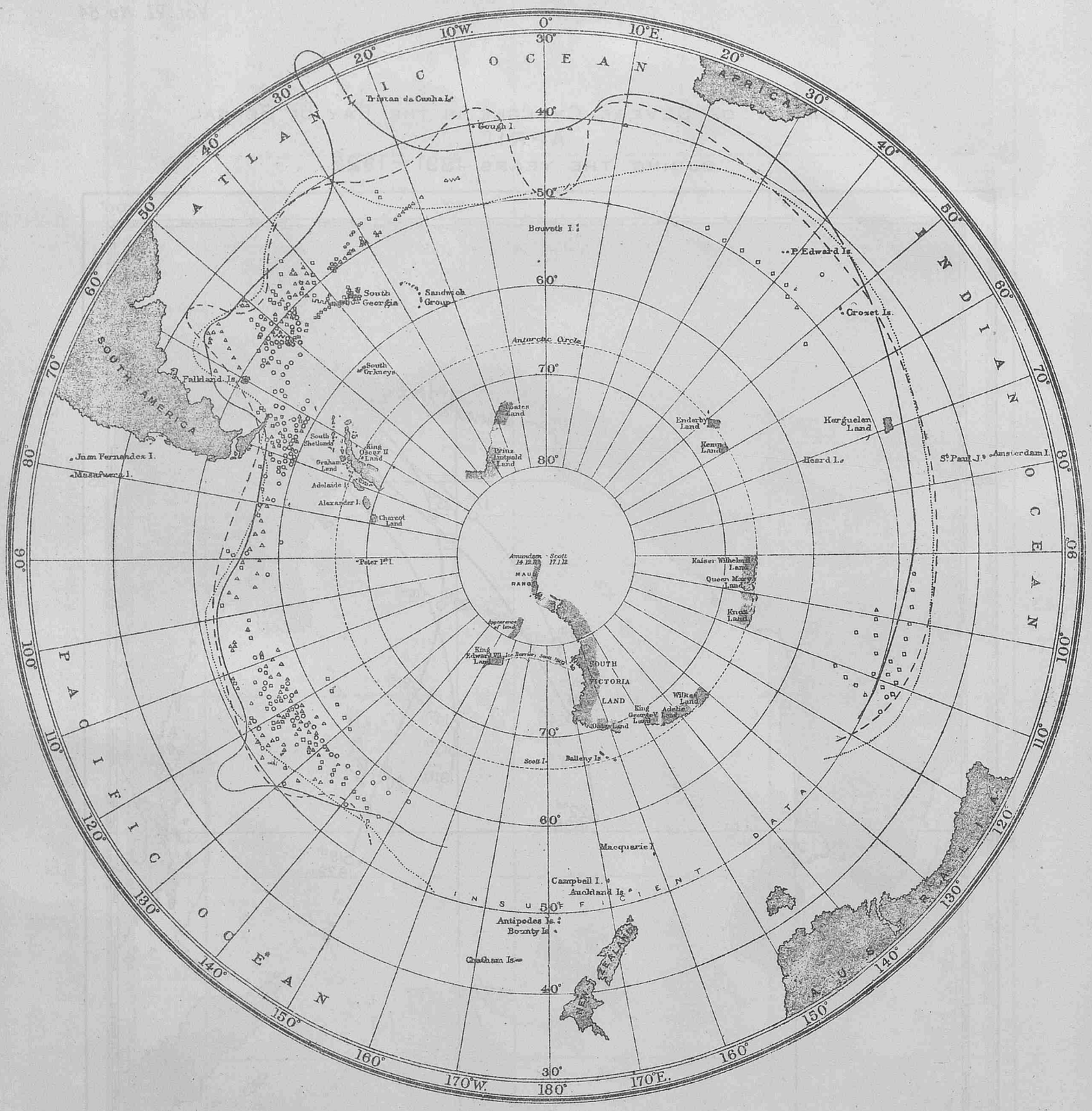


Chart D.

TRACKS OF SEVERE CYCLONE IN THE BAY OF BENGAL
APRIL.
DURING THE YEARS 1891 — 1923.



The above are tracks of severe storms taken from "Storm Tracks in the Bay of Bengal" compiled by Dr. C.W.B. Normand and published by the India Meteorological Department.



ICE CHART OF THE SOUTHERN HEMISPHERE, 1902—1928.

APRIL, MAY and JUNE.

EXPLANATION.

The symbols used to distinguish the records of each of the three months represented during the period 1902—1928, are as follows:—April, bergs △ , pack ice, ~~~~~ ; May, bergs □ , pack ice, ⊓⊓⊓⊓⊓ ; June, bergs ○ ; pack ice o-o-o-o-o . Extreme limits are given thus:— April, ———— ; May, — — — — — — ; June, ... ; these include ice reported since 1772.

A list of Southern Ice Reports during the years 1917–1928 for the month of April will be found on p.91 of this Number.

Similar lists for the months of May and June will be published in the appropriate issues, Numbers 65 and 66 of this Volume.

H.M.Stationery Office Press, Kingsway W.C.2.

P.S.987/1847. Wt. 5214. D.S. 1300. 2/29.

NOTICES.

VERY IMPORTANT.

TEMPORARY ARRANGEMENTS FOR WIRELESS WEATHER REPORTS BY SELECTED SHIPS

IN THE

MEDITERRANEAN AND RED SEAS.

When in the Mediterranean and Red Sea, westward of longitude 40° E., the following are the temporary arrangements for selected ships to report weather by wireless:—

From the Straits of Gibraltar to longitude 20° E. the observation times are:—

0700 and 1800 G.M.T.

In this area ships should address their reports as usual to "all ships" C.Q. and also to

GHA. Malta (Calafrana W/T)

These reports should be transmitted on:—

600 m. Spark from 0730 to 0745 G.M.T.
and from 1830 to 1845 G.M.T.
and on
2400 m. C.W. from 0748 to 0800 G.M.T.
and from 1848 to 1900 G.M.T.

From longitude 20° E. to 40° E. at sea the observation time is—

0600 G.M.T.

In this area reports should be made as usual to "all ships" CQ and also to—

GHK Ismalia W/T

These reports should be made on

600 m. Spark from 0630 to 0645 G.M.T.
and on
2400 m. C.W. from 0618 to 0630 G.M.T.

The form of report is the same as for all parts of the World and is given in Appendix I, page VI of WIRELESS AND WEATHER AN AID TO NAVIGATION and on page 19 of the January, 1929, MARINE OBSERVER.

These arrangements are temporary and selected ships within range of Malta and Ismalia are asked to do all in their power to ensure that the messages are received at the stations by obviating jamming each other in making the transmission.

Usually the greater the range from the station within these limits, the greater the value of the report. Selected ships fitted for C.W. transmission are especially asked to use 2400 m. C.W.

These shore stations receive these reports only and do not answer. It is therefore most important that the times and wave lengths given should be strictly adhered to.

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		

DESPATCH OF INFORMATION REQUIRED IMMEDIATELY FOR THE CONDUCT OF THE WORK AT SEA.

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

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

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

POSTAL ARRANGEMENTS.

THE MARINE OBSERVER is published, when circumstances permit, on the first Wednesday of the month previous to that to which the number refers.

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

S.S...... *Captain*.....

Port of Call.....

Date of Homeward Departure.....

Postal Address.....

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

ICE REPORTS.

Commanders of ships in the Trans-North Atlantic and Southern Ocean Trades are earnestly requested to have the Ice Report Form 912 completed and returned at the end of each passage. A nil return is desired if no ice is seen.

These forms are supplied with THE MARINE OBSERVER each month to regular observing ships in these Trades.

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

ICE CHART.

WESTERN NORTH ATLANTIC.

LETTERS OF TRANSATLANTIC TRACKS INDICATE.

NOTE.—In case of necessity owing to extreme southerly drift of ice, operative dates will be fixed for Track A.

(B) From 1st February to 31st August, inclusive.

(D) From 15th February to 10th April, inclusive.

(E) From 11th April to 15th May, or until the Cape Race route clear of ice.

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

ROUTE NOTICES.

For latest information *re* Tracks *see* pages 88–9, of this Number

SYMBOLS USED ON THE CHART

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

Reports of Ice sighted between February 1st and February 28th, 1929, which have been received by the Meteorological Office, are shown by the Symbols plotted in the position reported, the figures indicating the day of the month.

PHENOMENAL POSITIONS OF ICE.

Date.	Ship or Source of Report.	Position. Lat.	Long.	Remarks.
April 6, 1909	S.S Trafalgar ...	35°54′N.	31°47′W.	2 pieces 18 in. in diameter.
„ 11, 1914	S.S. Erodiade ...	32°55′N.	62°11′W.	Apparently river ice about the size of a lifeboat.
„ 24, 1916	S.S. Communipaw...	49°05′N.	36°48′W.	4 ft. high 50 ft. wide, and 100 ft. long.
„ 4, 1921	S.S. Hollandia ...	43°35′N.	35°57′W.	Large berg.
„ 16, 1926	Trawler Orizaba ...	61°03′N.	10°30′W.	Floating ice, about 40ft. long, and 3 ft. high.

Ps.987/1847. Wt.52A. D.9. 1100. 2/29.

APRIL M.O., 1929. H.M.S.O. Press, Kingsway, W.C.2.

NOTICES.

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, Ship's Meteorological Report, using the ship's instruments, the barometer being compared with Standards. The number of ships regularly contributing approved forms of all descriptions to the Marine Division is limited to 500.

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

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

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

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

Vessels making voyages of less than two months' duration are requested to retain their logs until nearly filled up, but the log should be returned in all cases at least twice yearly.

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

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

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

Ships on the List of Voluntary Observers to the Meteorological Office which have a mercurial barometer are indicated by the letters M.L., W.T. and M.

These are selected ships for reporting weather observations made at specified times by W/T to "All Ships," and they are *invited* to perform this service, which is for the benefit of all shipping fitted for W/T reception.

For sample weather report message see Chapter I. of "Wireless and Weather an Aid to Navigation," page 6, and page 19 of Vol. VI., No. 61.

THE MARINE OBSERVER is sent monthly to all ships regularly contributing Logs, Forms and W/T Registers to the Meteorological Office. It is hoped that each ship will preserve *all* her copies. Personal copies of Numbers are sent to those whose special contributions are published in them. A suitable cover may be obtained from H.M. Stationery Office, price 2*s*.

LATE PRESS.

DERELICTS AND FLOATING WRECKAGE.

Date.	Position. Latitude.	Position. Longitude.	Description.
	NORTH SEA.		
7.2.29	56°27′N.	2°52′E.	Burning derelict *Vestmar*.
12.2.29	53°43′N.	4°50′E.	Drifting buoy marked *W* and some more letters, covered with ice, dangerous to navigation.
24.2.29	52°09′N.	1°50′E.	Red conical buoy adrift marked *NGNR 2* in white letters, dangerous to navigation.
25.2.29	57°50′N.	9°20′E.	Drifting derelict.
	MEDITERRANEAN.		
3.2.29	37°40′N.	15°52′E.	Obstruction—dangerous to navigation.
21.2.29	36°08′N.	14°39′E.	Extinguished bell buoy adrift.
	NORTH ATLANTIC.		
2.2.29	38°51′N.	70°03′W.	Large black can buoy.
4.2.29	41°15′N.	52°27′W.	Gas buoy painted red.
4.2.29	26°11′N.	17°26′W.	Mast with two flags indistinguishable, which was attached to submerged wreck.
5.2.29	28°20′N.	72°49′W.	Part of a vessel's deck about 75 ft. long awash.
6.2.29	39°20′N.	74°14′W.	Wreckage consisting of part of wooden vessel with frames showing. Obstruction is about 30 ft. by 15 ft. wide.
6.2.29	34°43′N.	68°58′W.	Spar abont 30 ft. long and covered with marine growth.
7.2.29	35°50′N.	75°03′W.	Broken spar projecting vertically about 15 ft. out of water, apparently attached to submerged wreckage.
10.2.29	32°53′N.	57°11′W.	Derelict 3 masted (auxiliary) schooner *Quaco Queen* of St. John (N.B.) in a waterlogged condition; deck partly submerged; rudder gone.
11.2.29	38°15′N.	67°28′W.	Large obstruction, apparently a capsized schooner.
13.2.29	34°42′N.	48°06′W.	Iron cylinder about 20 ft. long and 4 ft. in diameter showing 2 ft. out of water.
13.2.29	38°55′N.	73°52′W.	Piece of heavy wreckage about 30 ft. long and 15 ft. wide awash; this obstruction consisted of part of a vessel's deck and bulwarks.
18.2.29	50°29′N.	19°58′W.	Red gas buoy staff and globe on top; dangerous to navigation.
19.2.29	44°30′N.	42°05′W.	Dangerous obstruction.
22.2.29	48°27′N.	22°44′W.	Large can buoy, painted white on top with large figure *3* painted black; considerable amount of marine growth; dangerous to navigation.
	GULF OF MEXICO.		
2.2.29	24°30′N.	88°—′W.	Can buoy with a white top.
4.2.29	28°31′N.	90°55′W.	Heavy log about 30 ft. long.
12.2.29	28°11′N.	92°07′W.	Red nun buoy, heavily covered with barnacles.
	CARIBBEAN SEA.		
5.2.29	17°46′N.	82°44′W.	Large tree trunk about 8 ft. in diameter with roots and branches awash.

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(*Telephone No.: Seymour 3309*).

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

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

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

Only in special cases will individual letters be sent.

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

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

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

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

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

Explanation of Abbreviations.

Unless otherwise stated, vessels on the following list are s.s.—M.V. indicates Motor Vessel.

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

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

No. = No Meteorological Office instrumental equipment on board.

M = Ship's barometer *mercurial.*

A = Ship's barometer *aneroid.*

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

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

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

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

** = Short range transmission and reception.

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

Selected Ships.

Those ships in this list which have the letters M.L., W.T. or M. after their names in the equipment column are "Selected ships" invited to make by W/T, standard form reports of observations taken at arranged G.M. Times to "All Ships." See "Wireless and Weather an aid to Navigation."

Name of Vessel.	Captain.	Observing Officers.	Meteoro-logical Equipment.	Line.	Last Log, Register, or Report Contributed. Received up to 15.2.29.	Date Received.
Abinsi	Allen, E. E.	L. B. Silvester	No. A.	Elder Dempster ...	Form 911 27.12.28 to 3.2.29 ...	13.2.29
†† *Accra*	Wright, J. B.	R. Jones, R. B. Ellis, J. R. Radley, B. C. Haigh, S. H. Griffiths.	M.L.	„ „ ...	Met. Log. 26.9.28 to 5.2.29.. ...	12.2.29
*† *Achilles*	Williams, D. T. ...	A. G. Phillips, N. Anderson, F. W. Hilton.	„	A. Holt	„ 17.6.28 to 29.10.28 ...	29.11.28
*† *Actor*	Haylett, E. ...	E. Pearce, F. M. Eales, G. Morrice.	„	Harrison	„ 27.8.28 to 9.11.28 ...	22.11.28
†† *Adda*, M.V. ...	Toft, J. T.	A. E. Lovgreen, J. B. Wright, A. J. Kennedy.	M.L.	Elder Dempster ...	Form 911 6.6.28 to 20.10.28 ...	1.2.29
††50 *Adriatic* ...	Hickson, V. W., R.D., Lt.-Commr. R.N.R.	O. V. Lucas, H. R. Wilkinson, D. W. Chamberlain.	W.T.	White Star ...	W.T. Reg. 30.12.28 to 18.1.29 ...	24.1.29
					Form 911 29.12.28 to 19.1.29 ...	24.1.29
Aeneas	Wallace, W. K. ...	... ...	No. A.	A. Holt	„ 12.11.28 to 15.12.28 ...	21.1.29
Agapenor	Ramsay, J. ...	B. Bell	„ A.	„	„ 4.12.28 to 14.12.28 ...	28.12.28
Aidan	Evans, L.	R. A. Broad	„ A.	Booth	„ 20.11.28 to 4.12.28 ...	28.12.28
Alban	Buck, R. H.	G. M. Duff	„ A.	„	„ 20.8.28 to 2.10.28 ...	12.10.28
*† *Alipore*	Dawson, E. E. N. ...	C. H. Stokes	„ M.	P. and O.	„ 14.12.28 to 3.1.29 ...	4.2.29
Almanzora ...	Huff, G. F.	G. K. Elliott, K. H. Whitaker	„ A.	R.M.S.P.	„ 1.12.28 to 14.1.29 ...	16.1.29
††63 *Albertic*	Summers, F. F., R.D., Commr., R.N.R.	J. W. Paine, W. Hill, J. Allingham.	W.T.	White Star	W.T. Reg. 21.10.28 to 9.11.28 ...	16.11.28
Alexa, Barquentine	G. H. Heyen	... ...	No. A.	On Chong & Co. ...	Form 911 11.7.28 to 27.10.28 ...	28.12.28
Alondra	Scott, L. S.	H. Peters	No. A.	Yeoward	Form 911 1.1.29 to 19.1.29... ...	6.2.29
Alynbank	Clayton, W. E. ...	R. H. B. Ardley...	„ A.	A. Weir & Co. ...	„ 18.11.28 to 5.12.28 ...	28.12.28
Ambuscade... ...	Abbay, A. T. N., D.S.O., Commr. R.N.	F. G. Bullock	M.L.	His Majesty's Ship...	... ...	...
†† *Andalucia* ...	Thomas, R. J. ...	H. Austen	No. M.	Blue Star	Form 911 28.11.28 to 8.1.29 ...	14.1.29
Anchises	Woodgett, R. J. ...	R. Fountain, T. Coyne ...	„ A.	A. Holt	„ 18.1.29 to 4.2.29... ...	13.2.29
†† *Andes*	Smith, W. E., D.S.O., R.D., Capt., R.N.R.	H. Whittle, H. Sang, A. Nicholls, J. E. P. Matthews.	M.L.	R.M.S.P. Co.	Met. Log. 7.7.28 to 16.10.28 ...	29.10.28
Antillian	Hannaford, W. T. ...	... ...	No. A.	Leyland	Form 911 11.5.28 to 24.7.28 ...	26.7.28
Antilochus ...	Salter, G. H.	A. C. Abbott	„ A.	A. Holt	„ 19.12.28 to 15.1.29 ...	7.2.29
*† *Aorangi* ...	Crawford, R. ... Hill, T. V.	E. V. Bilger, R. Kendall, W. J. Weber.	M.L.	Canadian-Australasian	Met. Log. 27.6.28 to 10.10.28 ...	19.11.28
††30 *Aquitania* ...	Diggle, E. G., R.D., Capt., R.N.R.	R. W. Bee, J. Locke, G. Duguid.	W.T.	Cunard	W.T. Reg. 25.1.29 to 7.2.29... ...	13.2.29
††62 *Arabic*	Bulman, J. B. ...	W. Hesketh, T. W. Wills, W. N. Jenkins.	„	White Star	„ 30.12.28 to 19.1.29 ...	21.1.29
** *Arafura*	Gordon, A. S.... ...	F. R. Miller, B. W. Dun, C. Stratford.	M.L.	Eastern and Australian	Met. Log. 4.5.28 to 2.11.28... ...	21.12.28
*† *Argyllshire* ...	Wallace, J. ...	R. W. Cook, C. Reeder ...	No. M.	Federal	Form 911 9.12.28 to 24.12.28 ...	28.1.29
*† *Ariguani*	Scudamore, J. H. H., D.S.C., R.D., Commr., R.N.R.	G. McKee. J. W. Dodd, W. Ireland, A. Crone.	M.L.	Elders & Fyffes ...	Met. Log. 30.7.28 to 25.11.28 ...	13.12.28
Ariosto	Biggins, R. L.	... ...	No A.	Ellerman Wilson ...	Form 911 17.12.28 to 29.12.28 ...	4.2.29
†† *Armadale Castle* ...	Imlah, C. B., Stuart, C. E., R.D., Capt. R.N.R.	... ...	M.L.	Union Castle	Met. Log. 16.3.28 to 8.7.28... ...	11.9.28
*† *Arracan*	Duncan, S. S. ... ... Macfarlane, W. M. F.	J. Summers, J. Henderson, C. C. Weir, E. W. Stubbs, J. Morrison.	„	P. Henderson ...	„ 28.3.28 to 6.10.28 ...	29.10.28
Arundel	Short, H.	Mr. Hill...	C.C.	Southern Rly. ...	Telegraphic Report 14.2.29 ...	14.2.29

Name of Vessel.	Captain.	Observing Officers.	Meteorological Equipment.	Line	Last Log, Register, or Report Contributed. Received up to 15.2.29.	Date Received.
Arundel Castle ...	Owen, S. H.	S. E. Aldam	No. A.	Union Castle ...	Form 911 7.12.28 to 27.1.29 ...	1.2.29
*† *Astronomer* ...	Richards, J. ...	A. Frew, E. B. Stephens, W. B. Littlechild.	M.L.	Harrison	Met. Log. 5.9.28 to 31.1.29... ...	14.2.29
*† *Ascanius*	Wilson, C. A.	T. Robb, W. F. Cook E. M. Robb.	„	A. Holt	„ 13.5.28 to 16.9.28 ...	27.9.28
Atreus	Rundle, G. G. ...	H. Nicholas	No. A.	A. Holt	Form 911 19.7.28 to 28.9.28 ...	2.10.28
*† *Auditor*	Owen, W. T. ...	D. O. Percy	„ M.	Harrison	„ 17.11.28 to 18.12.28 ...	22.12.28
Autolycus	Dunlop, J. K. ...	... ...	„ A.	A. Holt...	„ 26.10.28 to 11.11.28 ...	28.11.28
†† *Avon*	Spriddell, F. G., R.D., Commr., R.N.R.	R. H. East	„ M.	R.M.S.P.	„ 17.2.28 to 28.3.28 ...	29.3.28
Balmoral Castle ...	J. H. Kerbey	H. A. Deller	„ A.	Union Castle	„ 2.11.28 to 23.12.28 ...	5.1.29
*† *Balranald*	Townshend, W. P., Capt., R.N.R.	H. Stinn, G. Owen, F. Ward, L. Bailey.	M.L.	P. & O. Branch ...	Met. Log. 13.9.28 to 10.1.29 ...	23.1.29
††51 *Baltic*	Warner, G. E., R.D., Capt., R.N.R. ...	A. C. I'Anson, W. F. Dennison, H. Phillips.	W.T.	White Star ...	W.T. Reg. 27.11.28 to 17.12.28 ... „ 24.12 28 to 14.1.29 ... Form 911 27.11.28 to 14.1.29 ...	19.12.28 16.1.29 16.1.29
Bampton Castle ...	Hutchings, A. H. ...	E. Hamlyn	No. A.	Union Castle	„ 28.4.28 to 4.8.28 ...	23.8.28
*† *Banffshire*	Westropp, T. G.	A. Mc L. Pilcher	„ M.	Turnbull Martin ...	„ 21 1.29 to 31.1.29 ...	8.2.29
*† *Baradine*	Rollo, W.	C. B. Roche, B. H. Pollitt, P. Haworth, J. H. Anderson.	M.L.	P. & O. Branch ...	Met. Log. 19.7.28 to 20.11.28 ...	22.11.28
*† *Barpeta*	Chandler, H. V. ...	N. Apps	No. M.	British India	Form 911 27.11.28 to 4.1.29 ...	29.1.29
*† *Barrabool*	Rhodes, H. R. ...	T. G. Davies	„ M	P. & O. Branch ...	„ 23.12 28 to 9.1.29 ...	29.1.29
Baychimo	Cornwall, S. A. ...	... ...	„ A	Hudson's Bay Co. ...	„ 5.10.28 to 19.11.28 ...	3.12.28
††69 *Belgenland* ...	Morehouse, W. A. ...	F. Good, C. H. Otterson. F. Clitty.	W.T.	Red Star ...	W.T. Reg. 7.12.28 to 13.12.28 ... Form 911 24.6.28 to 9.8 28 ...	8.1.29 13.8.28
*† *Beltana*	Allin, C. H. C. ...	D. M. Stafford	No. M.	P. & O. Branch ...	„ 10 11.28 to 28.12.28 ...	1.1.29
Benalder	Fairweather, J. J. ...	D. T. McCullum	„ A.	Ben Line	„ 15.12.28 to 2.1.29 ...	4.2.29
*† *Benalla*	Sheepwash, J. H. ...	J. E. Hills	„ M.	P. & O. Branch ...	„ 25.10.28 to 13.12.28 ...	20.12.28
†† *Bendigo*	Nicholl, R. N. C. ...	G. G. Mason	„ M.	„ „ ...	„ 9.8.28 to 28.9.28 ...	3.10.28
*† *Benefactor*	Jones, C. W.	... ...	„ M.	Harrison	„ 25.4.28 to 26.5.28 ...	14.6.28
Bengloe	McCorquodale, A. ...	G. Davidson	„ A.	Ben Line	„ 11.4.28 to 21 5.28 ...	8.6.28
††31 *Berengaria* ...	Rostron, Sir A. H., K.B.E., R.D., Capt. R.N.R.	J. A. Myles, S. A. T Bullock	W.T.	Cunard ...	W.T. Reg. 6.12.28 to 20.12.28 ... „ 28.12.28 to 12.1.29 ...	27.12.28 14.1.29
*† *Berrima*	Short, C. E.	G. H. Durrant	No. M.	P. & O. Branch ...	Form 911 25.5.28 to 3.6.28 ...	27.8.28
Brenda	Lamont, A.	N. Ross	„ A.	Scottish Fishery Brd.	„ 2.1.29 to 27.1.29 ...	11.2.29
Brighton	Hill, A.	Mr. Munton	C.C.	Southern Railway ...	Telegraphic Report 15.2.29 ...	15.2.29
*† *British Colonel* ...	Taylor, R. J.	F. W. Sherlock	No. M.	British Tankers ...	Form 911 13.10.28 to 26.12.28 ...	14.1.29
Bronte	Crapper, J. S.... ...	J. B. Scott	„ A.	Lamport & Holt ...	„ 25.3.28 to 26.4.28 ...	8.6.28
Bruyere	Birch, A.	... ...	„ A.	„ „ ...	„ 16.8.28 to 8.11.28 ...	26.11.28
*† *Bulysses* M.V. ...	Head, B. P.	A. J. Clatworthy, J. S. Pike.	„ M.	Anglo-Saxon Petroleum Co	„ 1.1.29 to 20.1.29 ...	14.2.29
††65 *Calgaric*	Western, W.	C. Cochrane, A Thompson, E. Hughes.	W.T.	White Star ...	„ 12.1.29 to 27.1.29 ... W.T. Reg. 12.1.29 to 19.1.29 ...	11.2.29 11.2.29
Cambria	Copland, C. P. ...	O. W. Ll. Jones	C.C.	L.M. & S. Rly	Telegraphic Report 26.1.29 ...	26.1.29
†† *Cameronia*	Gemmell, W.	D. Chamberlain	M.L.	Anchor	Met. Log. 28.4.28 to 15.9.28 ...	6.11.28
†† *Camito*	Forrester, W. T., O.B.E.	H. H. Dunning, W. E. Grant, G. M Roberts.	„	Elders & Fyffes ...	„ 5.6.28 to 3.10.28 ...	9.10.28
Canadian Importer	Forson, A.	E. Hamilton	No. A.	Canadian Gov. Mercantile Marine.	Form 911 6.10.28 to 31.10.28 ...	22.11.28
** *Canadian Winner*	McConechy, W. G. ...	J. M. Lang	„ M.	„ „ „	„ 17.9.28 to 13.10.28 ...	27.11.28
*† *Canonesa*	Brodie, W. H. ...	T. Wetherall	„ M.	Furness Houlder ...	„ 13.2.28 to 3.4.28 ...	11.4.28
Cape of Good Hope	Lamont, J.	W. S. Bartlett	No. A.	Lyle S.S. Co.	„ 12.10.28 to 17.11.28 ...	26.11.28
††35 *Carmania* ...	Brown, F. G., R.D., Capt., R.N.R.	W. M. Stewart, E. R. Taylor, E. Gleave.	W.T.	Cunard	W.T. Reg. 29.10.28 to 17.11.28 ...	20.11.28
†† *Carnarvon Castle* M.V.	Stanley, W. F., R.D., Commr., R.N.R.	W. G. Smith, T. C. Goldstone, S. S. Smith.	M.L.	Union Castle ...	Met. Log. 14.7.28 to 4.11.28 ...	26.11.28
††34 *Caronia*	Hossack, W. H., R.D., Capt., R.N.R.	H. G. Hayward, T. Parry, J. Chapman.	W.T.	Cunard ...	W.T. Reg. 15.10.28 to 2.11.28 ... Form 911 15.10.28 to 2.11.28 ...	7.11.28 7.11.28
Casanare	Browne, S.	W. Hannah	No. A.	Elders & Fyffes ...	„ 15.12.28 to 20.1.29 ...	28.1.29
Cavina	Riseley, A. D.... ...	R. L. Stevenson...	„ A.	„ „ ...	„ 17.11.28 to 22.12.28 ...	5.1.29
††52 *Cedric*	Smith R. G.	W. Walker, S. Fieldwood, N. E. Banks.	W.T.	White Star " ...	W.T. Reg. 4.11.28 to 25.11.28 ... Form 911 21.1.29 to 10.2.29 ...	1.12.28 13.2.29
*† *Centaur* ...	Rose, A. F. ... ... Ward Hughes, J. ...	A. Bowlt, N. L. Thompson, J. Cockburn.	M.L.	A. Holt & Co. ...	Met. Log. 14.2.28 to 15.7.28 ...	29.10.28
Ceramic	Musgrave, T.	H. A. R. Daman	No. A.	White Star	Form 911 6.11.28 to 11.12.28 ...	28.12.28
** *Changte*	Gambrill, F. C. ...	J. Thomas, T. Tyer, W. Allan, D. H. O'Hulton.	M.L.	Yuill & Co.	Met. Log. 13.4.28 to 30.8.28 ...	21.11.28
Changuinola ...	Thorburn, R. A., R.D., Commr., R.N.R.	W. G. Chanter	No. A.	Elders & Fyffes ...	Form 911 16.11.28 to 18.12.28 ...	28.12.28
Chindwin	Paterson, G.	... ...	„ A.	Henderson	„ 18.7.28 to 17.10.28 ...	3.11.28
*† *Chinkiang*	Stringer, C. B. L. ...	R. J. Powerie	M.L.	China Navigation Co	Met. Log. 10.4.28 to 29.7.28 ...	6.9.28
*† *Chirripo*	McColm, F.	... ...	No. A.	Elders & Fyffes ..	Form 911 9.12.28 to 10.1.29 ...	23.1.29
*† *City of Baroda* ...	McMillan, J.	J. E. Jenkins, W Faichney, F. T. Mallett.	M.L.	Ellerman	Met. Log. 20.7.28 to 31.12.28 ...	2.2.29
City of Benares ...	Anderson, W. W. ...	P. C. Wilson	No. A.	„	Form 911 28.8.28 to 27.9.28 ...	26.11.28
*† *City of Bombay* ...	Brown, O. C.	E. H. Roberts	„ M.	„	„ 24.12.28 to 13.1.29 ...	29.1.29
City of Brisbane ...	Seaborne, F. O., D.S.C	R. Jones	„ A.	„	Form 911 3.2.28 to 1.4.28 ...	10 4.28
*† *City of Bristol* ...	Jenkins, D.	K. G. Crockett	„ M.	„	„ 11.11.28 to 1.12.28 ...	7.1.29
City of Canterbury	Bremner, D. M. ...	R. H. Hodgson	„ A.	Ellerman	„ 30.12.28 to 9.1.29 ..	22.1.29
City of Carlisle ...	Mordue, J. A. ...	... ...	„ A.	„	„ 10.12.28 to 30.12.28 ...	29.1.29
*† *City of Chester* ...	Letton, F. W. ...	C. C. Duncan, A. J. Barnett, R. Mowbray.	M.L.	„	Met. Log. 31.3.28 to 27.8.28 ...	30.8.28
*† *City of Edinburgh*	Wyper, J.	G. H. Hummell...	No. M.	„	Form 911 21.10.28 to 20.11.28 ...	7.12.28
City of Hong Kong	Walton, H. L., O.B.E., R.D., Commr., R.N.R.	H. Saunders	„ A.	... ...	„ 10.1.29 to 3.2.29 ...	9.2.29
City of Khios ...	... ...	... ...	„	„	... ...	...
City of London ...	Parker, F. W., R.D., Commr., R.N.R.	... ...	No. A	„	Form 911 28.9.28 to 4.12.28 ...	7.1.29
*† *City of Osaka* ...	Smith, W. H.	R. K. Walker	No. M.	„	„ 10.8 28 to 2.9.28 ...	10.10.28
*† *City of Rangoon* ...	Jones, P.	E. R Wildermuth, R. H. Stewart, F. E. Broadbent.	M.L.	„	Met. Log. 28.3.28 to 9.7.28 ...	1.8.28
City of Venice ...	Lee, A.	... ...	No. A.	„	Form 911 18.2.28 to 1.3.28 ...	12.3.28
City of Yokohama	Singleton, J. G. ...	... ...	„ A.	Ellerman	„ 5.12.28 to 15.1.29 ...	11.2.29
Clan Alpine ...	Lyall, A. B.	P. Sargent	„ A.	Clan	„ 23.10.28 to 15.11.28 ...	20.12.28
Clan Kenneth ...	Young, A. H., Commr. R.D., R.N.R.	... ...	„ A.	„	„ 3.11.28 to 28.11.28 ...	1.1.29
ClanLindsay ...	Giles, H J., R.D., Commr., R.N.R.	J. P. Dunkley	„ A.	„	„ 17.11.28 to 14.12.28 ...	7.1 29
Clan MacBean ...	Worthington, J. H. ...	W. A. Nicholas	„ A.	„	„ 11.12.28 to 13.1.29 ..	9.2.29
Clan Macbeth ...	Hannay, L. G, ...	J. C. Robertson	„ A.	„	„ 24.11.28 to 26.12.28 ...	14.1.29

Name of Vessel.	Captain.	Observing Officers.	Meteorological Equipment.	Line.	Last Log, Register, or Report Contributed. Received up to 15.2.29.	Date Received.
Clan Macfadyen ...	Laird, C.	R. L. Smallbone	No. A.	Clan	Form 911 3.11.28 to 30.11.28 ...	23.12.28
Clan Macfarlane ...	Redford, L. F. ...	T. A. Pearson	„ A.	.. ..	„ 28.10.28 to 14.12.28 ...	21.1.29
Clan Macgillivray	Mackinlay, A. ...	J. Garis	„ A.	„	„ 17.11.28 to 6.12.28 ...	17.12.28
Clan Macindoe ...	Holman, W. G. ...	... ...	„ A.	„	„ 17.8.28 to 19.9.28 ...	26.9.28
Clan Mackellar ...	Smith, W. P.	E. Crowther	„ A.	„	„ 1.12.28 to 14.12.28 ...	28.12.28
** *Clan Macphee* ...	Gourlay, J. B. ...	E. H. Stone, K. C. Simpson, L. R. Legg.	M.L.	„	Met. Log. 11.6.28 to 12.12.28 ...	28.1.29
Clan Macnaughton	Simpson, A. W. ...	A. H. Hersee	No. A.	„	Form 911 9.11.28 to 7.12.28 ...	8.12.28
Clan Macquarrie ...	West, W. F.	T. P. Cranwill	„ A.	„	„ 5.1.29 to 7.2.29	12.2.29
Clan Mactaggart ...	Makepeace. F. ...	E. A. Hewson	„ A.	„	„ 19.10.28 to 8.1.29 ...	18.1.29
** *Clan Macwhirter* ...	Higgins C. J.... ...	F. B. Barker, H. M. Watkins	M.L.	„	Met. Log. 16.6.28 to 16.1.29 ...	11.2.29
** *Clan Malcolm* ...	George, L. S.	J. Masters, R. L. Ranford, J. F. Hubbard, R. L. Martin.	„	„	„ 7.7.28 to 21.10.28 ...	19.11.28
Clan Morrison ...	Porterfield, W. M. ...	L. C. Cuthbert	No. A.	„	Form 911 2.12.28 to 28.12.28 ...	21.1.29
Clan Murdoch ...	Calderwood, W. ...	J. B. Davies	„ A.	„	„ 27.9.28 to 10.1.29 ...	17.1.29
Clan Ranald ...	Fraser, R. K.	K. G. Tucker	„ A.	„	„ 13.10.28 to 24.12.28 ...	3.1.29
Clan Ross	Openshaw, L. G. ...	... ...	„ A.	„	„ 21.10.28 to 15.11.28 ...	26.11.28
Clan Sinclair ...	Taylor, P. V.	J. H. Dennis	„ A	„	„ 7.1.29 to 20.1.29 ...	11.2.29
Clan Urquhart ...	Baker, E. W.	J. O. H. Kirkwood	„ A.	„	„ 24.11.28 to 3.2.29 ...	5.2.29
*† *Colonial*	Worthington, B. ...	... ...	„ M.	T. & J. Harrison ...	... ...	...
†† *Comorin*	Borland, J. McI., C.B., D.S.O., R.D., Capt., R.N.R.	E. C. White	„ M.	P. & O.	„ 2.11.28 to 12.12.28 ...	21.1.29
†† *Corinthic*	Freeman, C. P. ...	E. M. Burt, M. Bennett, I. A. Macnaughton.	M.L.	White Star	Met. Log. 21.7.28 to 2.10.28 ...	12.11.28
Cornwall	Wilde, H. J.	H. M. Knight	No. A.	Federal	Form 911 27.3.28 to 9.5.28 ...	15.5.28
*† *Culebra*	Goble, C. J., R.D., Commr., R.N.R	K. Paterson, R. N. Fletcher, W. S. Thomas.	M.L.	R.M.S.P. Co.	Met. Log. 12.10.28 to 19.12.28 ...	2.1.29
*† *Cumberland* ...	Macmillan, D. ...	G. C. Saul, P. Shakespear, J. Marks.	„	Federal...	Form 911 29.4.28 to 30.8.28 ...	24.9.28
Cyclops	Cosker, W.	K. A. Owens	No. A.	A. Holt	„ 4.12.28 to 30.1.29 ...	6.2.29
*† *Daga*	Wiles, N.	A. Olding...	No. M.	P. Henderson... ...	„ 16.11.28 to 9.12.28 ...	22.12.28
Dakotian	Robb, J.	W. R. Atkinson	„ A.	Leyland	„ 9.11.28 to 30.12.28 ...	6.2.29
Dardanus	Glossop, S.	... ...	„ A.	A. Holt	„ 12.11.28 to 17.1.29 ...	29.1.29
†† *Darro*	Matthews, G. P. ...	... ...	„ M.	R.M.S.P. Co.	„ 26.1.29 to 11.2.29 ...	15.2.29
*† *Delphic*	Evans, W.	H. Williams	„ M.	White Star	„ 31.12.28 to 17.1.29 ...	29.1.29
†† *Demerara*	Willan, F. G. L., R.D., Capt., R.N.R.	J. C. Blake	„ M.	R.M.S.P. Co.	„ 29.11.28 to 15.12.28 ...	19.1.29
†† *Demosthenes* ...	Ogilvy, A.	H. Phillips	„ M.	Aberdeen Commonwealth	„ 25.9.28 to 11.11.28 ...	14.11.28
Denis	Harris, F. C. P. ...	J. H. Stokes	„ A.	Booth	„ 15.10.28 to 22.11 28 ...	7.12.28
†† *Deseado*	F. S. Hannam ...	V. Scott	„ M.	R.M.S.P. Co.	„ 28.10.28 to 21.12.28 ...	28.12.28
†† *Desna*	Green, J.	L. T. Peterson	„ M.	„	„ 3.9.28 to 24.10.28 ...	12.11.28
Deucalion	Melling, C. F.... ...	R. F. Dryden	„ A.	A. Holt	„ 2 .11.28 to 11.1.29 ...	11.2.29
*† *Devon*	Kinnell, G.	D. Clegg...	„ M.	Federal	„ 8.11.28 to 29 12.28 ...	3.1.29
Dieppe	Marmery, S.	Mr. Parsons	C.C.	Southern Railway ...	Telegraphic Report 16.1.29 ...	16.1.29
Dimboola	Dawson, J.	S. J. Griffith	No. A.	Melbourne S.S. Co. ...	Form 911 23.11.28 to 19.12.28 ...	21.1.29
*† *Domala*, M.V. ...	Kitson, A. G.	H. Robertson	„ M.	British India	„ 21.10.28 to 29.12.28 ...	14.1.29
†† *Dominia*, C.S ...	Campos, V., O.B.E., Lt.-Commr., R.N.R.	S. A. Garnham, A. S. Muir, L. J. Hegarty. W. F Anderson.	M.L.	Telegraph Construction & Maintenance.	Met. Log. 8.8.28 to 5 12.28... ...	27.12.28
Dominic	Saxton, C.	G. H. Clark	No. A.	Booth	Form 911 9.7.28 to 9.11.28 ...	12.12.28
†† 61*Doric*	Jones, W. H. .. ... Commr., R.N.R.	G. T. Kavanagh	W.T.	White Star ...	„ 21.10.28 to 10.11.28 ... W.T. Reg. 21.10 28 to 10.11.28 ...	14.11.28 15.11.28
Dorington Court ...	Clarke, E. J.	P. Jones	No. A.	Haldin & Co.	Form 911 3.10.28 to 7.12.28 ...	7.1.29
Dromore Castle ...	MacMahon, J., R.D., Commr., R.N.R.	J. A. Sowden	„ A.	Union Castle	„ 3.11.28 to 1.12.28 ...	1.1.29
*† *Dryden*	Major, T. W.	... ...	„ M	Lamport & Holt ...	„ 21.10.28 to 14.1.29 ...	7.2.29
Dunaff Head ...	Butt, H. L. R.D., Lt.-Commr., R.N.R.	D. Martin	„ A.	Ulster S.S. Co. ...	„ 20.12.28 to 8.1.29 ...	28.1.29
Dundrum Castle ...	Goodacre, R.W., R.D., Commr., R.N.R.	A. R. J. Tilston	„ A.	Union Castle	„ 13.4.28 to 11.5.28 ...	21.5.28
Dunluce Castle ...	Morgan, A. O., R.D., Commr., R.N.R.	W. M. Mulhall	„ A.	„ „	„ 19.10.28 to 27.12.28 ...	28.12.28
Dunrobin	Ramsay, J. D. ...	C. H. Kendall	„ A.	Glen & Co.	„ 27.11.28 to 14.12.28 ...	31.12.28
*† *Duquesa*	Owen, R.	W. E. Morriss	„ M.	Furness Withy ...	„ 10.10.28 to 15.12.28 ...	28.12.28
*† *Durenda*, M.V. ...	Beeching, P. H. ...	F. E. Liles	„ M.	British India	„ 8.12.28 to 17.12.28 ...	21.1.29
Edinburgh Castle ...	Gardner, G. F., O.B.E., Lt.-Commr., R.N.R.	C. P. Goode	„ A.	Union Castle	„ 23.11.28 to 13.1.29 ...	17.1.29
Egori	Sola, P., D.S.O. ...	R. W. Pattinson	„ A.	Elder Dempster ...	„ 26.11.28 to 22.1.29 ...	1.2.29
*† *Eldon Park* ...	Burns, R.	... ...	„ M.	Denholm S.S. Co. ...	... ...	...
*† *Ellora*	Baird, S. K.	W. M. Bain	„ M.	British India... ...	„ 12.12.28 to 31.12.28 ...	21.1.29
*† *Elpenor*	Gordon, A. L.... ...	C. Kavanagh, J. E. Iliff ...	M.L.	A. Holt	Met. Log. 7.7.28 to 2.11.28... ...	7.11.28
*† *Elstree Grange* ...	St. Pierre, P.	... ...	No. M.	Houlder	... ...	...
*† *Elysia*	Duncan, A. R. ...	D. Blair, G. S. Sinclair, W. Black.	M.L.	Anchor	Met. Log. 9.11.28 to 16.1.29 ...	25.1.29
** *Empress of Asia* ...	Hailey, A. J., Lt.-Commr., R.N.R.	L. M. Goddard, J F. Patrick. R. J. Hickey, E. Newell, R. K. Baker.	„	Canadian Pacific ...	„ 22.6.28 to 28.9.28 ..	7.1.29
†† *Empress of France*	Griffiths, E.	O. F. Pennington, E. Roberts, L. Outram.	„	„ „ „ ...	„ 31.10.28 to 21.12.28 ...	27.12.28
** *Empress of Russia*	Hosken, A. J.... ...	R. A. Leicester, J. G. McQuarrie, A. C. Jones.	„	„ „ „ ...	„ 2.8.28 to 10.11.28 ...	10.12.28
Endeavour	Law, E. F. B., Commr., R.N.	C. S. E. Lansdown, P. Barlow, W. H. Dickinson.	„	His Majesty's Ship ...	„ 14.3.28 to 11.7.28 ...	16.7.28
Enterprise ...	Pridham-Wippell, M.D., Capt., R.N.	... ...	„	„ „ „ ...	... ...	...
*† *Essequibo*	Kirkwood, J. H. ...	J. H. E. Evans	No. M.	R.M.S.P. Co.	Form 911 12.7.28 to 26.9.28 ...	16.11.28
Eumaeus	Read, J. W.	... ...	„ A.	A. Holt	„ 28.11.28 to 22.12.28 ...	12.2.29
Euryades	Findlay, J.	W. K. Hole	No. A.	A. Holt	„ 10.1.29 to 25.1.29 ...	4.2.29
*† *Explorer*	Ling, J. T.	H. W Gostage	„ M.	Harrison	„ 14.10.28 to 4.1.29 ...	9.1.29
Explorer	Allan, J.	A. Stout, F. O. Sheehy ...	„ A.	Scottish Fishery Board.	„ 4.12.28 to 20.12.28 ..	28.12.28
*† *Ferndale*	Thompson, W. ...	R. S. Hartrick	No. M.	Aberdeen Commonwealth.	„ 7.7.28 to 5.8.28 ...	23.8.28
*† *Fordsdale*	Richardson, A. V. ...	F. Vaughan	„ M.	Aberdeen Commonwealth.	„ 12.12.28 to 31.12.28 ...	22.1.29

Name of Vessel.	Captain.	Observing Officers.	Meteorological Equipment.	Line	Last Log, Register, or Report Contributed. Received up to 15.2.29.	Date Received.
Francisco	Scales, H.	J. C. Hammond	No. A.	Ellerman Wilson ...	Form 911 21.12.28 to 28.1.29 ...	4.2.29
Freya	Angus, W.	W. Pirrie	„ A.	Scottish Fishery Board.	„ 1.1.29 to 31.1.29... ...	4.2.29
Garth Castle ...	Linklater, H.	T. H. Whatley	„ A.	Union Castle	„ 1.11.28 to 29.12.28 ...	3.1.29
** *Gascoyne*	Johnson, L.	W. J. Macphedran, C. Melson, J. S. Macbryde.	M.L.	A. Holt & Co.... ...	Met. Log. 21.5.28 to 6.9.28... ...	29.10.28
*† *Glamorganshire* ...	Purvis, A.	E. A. E. Littlewood	No. M.	R.M.S.P. Co.	Form 911 17.9.28 to 19.10.28 ...	25.10.28
*† *Glenamoy*, M.V. ...	Homan, C. E.... ...	R. W. Emerson, R. W. Brooks, J. R. Taylor.	M.L.	Glen Line	Met. Log. 25.6.28 to 7.11.28 ...	6.12.28
Glenapp	Ingram, T. F.... ...	... ...	No. A.	„	Form 911 1.11.28 to 8.12.28 ...	28.12.28
Glenbeg	Newing, L.	A. D. Brown	No. A.	„	„ 27.10.29 to 18.1.29 ...	22.1.29
*† *Glengarry*	Angier, J.	F. C. White	„ M.	„	Form 911 7.1.29 to 16.1.29	24.1.29
Glenluce	Kennett, W. H. ...	H. B. Porter	„ A.	„	„ 1.11.28 to 14.1.29 ...	17.1.29
Glenshane	Kersley, L. W. ...	A. C. Radley	„ A.	„	„ 21.8.28 to 23.9.28 ...	29.10.28
Glentworth ...	Kilgour, H. A. ...	J. S. Armstrong...	No. A.	R. S. Dalgleish ...	„ 26.12.28 to 5.2.29 ...	14.2.29
Gloucestershire ...	Robin, E.	W. Moore	„ A.	Bibby	„ 1.12.28 to 8.2.29... ...	12.2.29
Gloxinia	Pool. F. G.	... ...	„ A.	Stag Line	„ 4.1.29 to 26.1.29... ...	30.1.29
Halesius	Samuels, C.	N. MacLeod	„ A.	R. P. Houston ...	„ 1.11.28 to 6.12.28 ...	8.12.28
Haliartius	Felton, W. J.	C. C. Reeder	„ A.	„ „ ...	„ 5.9.28 to 6.10.28... ...	8.10.28
*† *Hardwicke Grange*	Fowler, W. H. ...	... ...	No. M.	Houlder	... ...	...
Harmonides ...	Elwell, F. R. ...	R. H. Pape	„ A.	R. P. Houston ...	„ 13.12.28 to 25.12.28 ...	14.1.29
*† *Hatimura*	Dawes, H. F. C. ...	L. E. Heath	„ M.	British India	„ 5.10.28 to 2.11.28 ...	5.11.28
** *Hauraki*, M.V. ...	Norton, A. T.... ...	D. M. McLeish, C. H. George, F. C. Cochran.	M.L	Union S.S. Co., N.Z....	Met. Log. 17.4.28 to 25.10.28 ...	4.1.29
** *Henry Holmes*, C.S.	Bicker Caarten, A. ...	M. A. Green	No. M	W. I. & Panama Telegraph Co.	Form 911 13.10.28 to 31.10.28 ...	3.12.28
Herald	Turner, H. E., Lieut.-Commr.	W. H. Martin	M.L.	His Majesty's Ship ...	Met. Log. 31.10.28 to 28.11.28 ...	9.1.29
Herefordshire ...	Griffiths, C. H. ...	M. D. Louttill	No. A	Bibby	Form 911 17.11.28 to 24.1.29 ...	2.2.29
Herminius	Roberts, T. V. ...	D. W. MacGregor	„ A.	Aberdeen Commonwealth.	„ 24.10.28 to 6.12.28 ...	18.12.28
Herschel	Watson. W. W. ...	... ...	„ A.	Lamport & Holt ...	„ 13.11.28 to 2.12.28 ...	8.12.28
*† *Hertford*	Kettlewell, C. R. ...	A. J. Angell, C. J. Brewer, J. McCulloch, S. C. Bradley.	M.L.	Federal	Met. Log. 15.9.28 to 29.1.29 ...	2.2.29
Hibernia	Roberts. W. Ivor, M.B.E.	R. Woodall, A. Marsh ...	C.C.	L.M. & S. Railway ...	Telegraphic Report 14.2.29 ...	14.2.29
Highland Laddie ...	Jones, T. J.	E. F. Smart	No. A.	Nelson	Form 911 22.4.28 to 12.6.28 ...	9.7.28
*† „ *Piper* ...	Collings, D.	R. G. Owen, A. Southgate, W. Stephen.	M.L.	„	Met. Log. 23.6.28 to 10.1.29 ...	21.1.29
„ *Pride* ...	Robinson, R. H. ...	F. Quelch	No. A.	„	Form 911 8.9.28 to 3.11.28 ...	7.11.28
„ *Prince* ...	Taylor, F.	W. A. Hall	„ A.	Prince	„ 15.11.28 to 30.11.28 ...	7.12.28
„ *Rover* ...	McKinnon, H. ...	N. F. Seaton	„ A.	Nelson	„ 24.9.28 to 10 11.28 ...	3.12.28
Hildebrand ...	Peregrine, D.... ...	E. Jones	„ A.	Booth	„ 23.11.28 to 25.12.28 ...	3.1.29
*† *Hobson's Bay* ...	Kydd, O. J.	R. Pearce, J. Worrall, D. Horn, J. D. Loughnan.	M.L.	Aberdeen Commonwealth.	Met. Log. 14.6.28 to 22.9.28 ...	9.10.28
Holbein	Gough, W. A.... ...	F. Delaney	No. A.	Lamport & Holt ...	Form 911 30.9.28 to 16.12.28 ...	4.1.29
††54 *Homeric*	White, E. R., R.D., Commr. R.N.R.	H. G. Morgan. S. B. Morfee, W. T. Poustie.	W.T.	White Star ...	W.T. Reg. 17.1.29 to 31.1.29 ...	13.2.29
Hororata	Barnett, H.	E. A. Quick	No. A.	New Zealand S.S. Co.	Form 911 24.12.28 to 8.1.29 ...	18.1.29
Hubert	Briscoe, W.	... ...	„ A.	Booth	„ 9.9.28 to 28.11.28 ...	17.12.28
Huntingdon ...	Ashworth, W. ...	H. G. Letts	„ A.	Federal...	„ 11.11.28 to 17.12.28 ...	20.12.28
*† *Huntsman*	Russell, H.	J. Richardson	„ M.	Harrison	„ 13.4.28 to 15.8.28 ...	3.9.28
*† *Hydaspes*	Williams, P. E. ...	P. McMillan	No. M.	R. P. Houston ...	„ 8.12.28 to 28.12.28 ...	21.1.29
*† *Ingoma*	Gibbings, W.... ...	W. P. Baker, R. J. Mackinnon	„ M.	Harrison	Form 911 2.12.28 to 15.1.29 ...	21.1.29
Inkum	Meethan, J. T. ...	... ...	„ A.	J. H. Welsford ...	„ 10.10.28 to 24.10.28 ...	3.11.28
** *Iris*, C.S.	Hughes, H. R. ...	L. V. Vicker, D. MacDonald	M.L.	Pacific Cable Board...	Met. Log. 25.8.27 to 3.10.27 ...	21.3.28
Iroquois	Nares, J. D., D.S.O., Capt. R.N.	A. B. Fouleston...	„	His Majesty's Ship ...	„ 1.9.28 to 30.11.28 ...	8.1.29
*† *Ixion*	Collins, H. M.... ...	... ...	„	A. Holt	Form 911 9.10.28 to 26.10.28 ...	19.12.28
Javanese Prince ...	Marshall, F.	J. B. Morrison	No. A.	Prince	„ 28.12.28 to 15.1.29 ...	6.2.29
*† *Jervis Bay*	Chaplin, W. R. ...	R. W. Laycock	„ M.	Aberdeen Commonwealth.	„ 20.12.27 to 23.4.28 ...	14.5.28
Justin	Bush, H.	L. G. McMillan	„ A.	Booth	„ 28.12.28 to 10.1.29 ...	8.2.29
†† *Kaisar-i-Hind* ...	Manley, G.	R. H. Hand	„ M.	P. & O....	„ 16.11.28 to 17.1.29 ...	19.1.29
*† *Kalyan*	Cornewall Jones, B.	W. R. B. Noal	„ M.	P. & O....	„ 18.11.28 to 7.12.28 ...	1.1.29
** *Kangaroo*	Norris, H. C.	E. Hutchinson, J. Edward, H. Reynolds.	M.L.	State Service Australia.	Met. Log. 2.4.28 to 1.8.28 ...	29.10.28
*† *Karamea*	McIntosh, A.	... ...	„	Shaw, Savill & Albion	„ 15.9.28 to 17.1.29 ...	23.1.29
*† *Karapara*	Miller, A. C.	J. Smail	No. M.	British India... ...	Form 911 19.12.28 to 8.1.29 ...	4.2.29
*† *Kashgar*	... ...	R. P. Eddy	„ M.	P. & O.	... ...	...
*† *Kashmir*	Bent, E.	... ...	„ M.	P. & O....	Form 911 19.10.28 to 4.1.29 ...	17.1.29
*† *Khiva*	Britten, P. O.	C. E. Arundel, J. A. Ridley, H. V. Williamson.	M.L.	P. & O....	Met. Log. 23.8.28 to 2.12.28 ...	7.12.28
*† *Knight Companion*	Davis, A. L.	J. H. Isherwood	No. M.	A. Holt...	Form 911 27.11.28 to 31.12.28 ...	7.1.29
** *Koolinda*, M.V.	Buckeridge, J. ... Kavanagh, J. ...	... ...	„ M.	State Service, Australia.	„ 24.7.28 to 6.9.28... ...	15.10.28
*† *Kovno*	Dossor, W. A. ...	N. H. Hewetson	No.	Ellerman Wilson ...	Met. Log. 27.7.28 to 7.1.29... ...	21.1.29
††37 *Laconia*... ...	Doyle, M.	E. W. Connell, A. B. Fasting, F. G. Russell	W.T.	Cunard ...	W.T. Reg. 9.12.28 to 29.12.28 ... Form 911 9.12.28 to 29.12.28 ...	2.1.29 1.1.29
Laguna	Dunn, R. E., O.B.E....	... ...	No. A.	Pacific S.N. Co. ...	„ 5.12.28 to 23.12.28 ...	16.1.29
*† *Lahore*	Gordon, L. M., R.D., Commr. R.N.R.	E. B. Elcoate	„ M.	P. & O....	„ 15.5.28 to 29.6.28 ...	12.7.28
Lalande	Hamill, H.	.. ..	No. A.	Lamport & Holt ...	„ 30.10.28 to 27.1.29 ...	7.2.29
Lancashire ...	Crumplin, W. E. ...	R. Allen	„ A.	Bibby	„ 23.9.28 to 29.11.28 ...	5.12.28
††36 *Lancastria* ...	Townley, J. C. R.D., Commr., R.N.R.	G. Overton, P. L. Williams, J. W. Caunce.	W.T.	Cunard ...	W.T. Reg. 14.1.29 to 2.2.29 ... Form 911 13.1.29 to 3.2.29... ...	7.2.29 6.2.29
Laomedon	Hatfield, F.	R. L. Haldstock	No. A.	A. Holt...	Form 911 1.12.28 to 24.12.28 ...	3.1.29
*† *La Paz*, M.V. ...	Benson, C. W. ...	J. D Richards	„ M.	Pacific S N. Co. ...	„ 24.11.28 to 1.12.28 ...	31.12.28
††55 *Lapland*	Harvey, H.	B. Harries, L. A. Williams J C. Flett.	W.T.	Red Star ...	W.T. Reg. 26.11.28 to 15.12.28 ... Form 911 25.11.28 to 15.12.28 ...	19.12.28 18.12.28

Name of Vessel.	Captain.	Observing Officers.	Meteorological Equipment.	Line.	Last Log Register, or Report Contributed. Received up to 15.2.29.	Date Received.
*† *Largs Bay*	Beighton, J. N. ...	... ...	No. M.	Aberdeen Commonwealth.	Form 911 19.9.28 to 28.12.28 ...	12.2.29
††64 *Laurentic* ...	Trant, E. L., R.D., Commr. R.N.R.	J. W. Peters, R. Hawkyns ...	„	White Star ...	W.T. Reg. 8.1.29 to 26.1.29... ...	5.2.29
					Form 911 7.1.29 to 28.1.29... ...	5.2.29
*† *Lautaro*, M.V. ...	Leyne, R. W.	J. T. Denley	No. M.	Pacific S.N. Co. ...	„ 27.11.28 to 12.1.29 ...	22.1.29
*† *Leicestershire* ...	English, G. L. ...	R. S. Evans H. G. Walton, E. D. Brand, A. Thomson.	M.L.	Bibby	Met. Log. 27.10.28 to 9.1.29 ...	30.1.29
Leighton, M.V. ...	Lindesay, J. M. ...	... .	No. A.	Lamport & Holt ...	Form 911 1.5.28 to 20.5.28 ...	19.6.28
Leitrim	Robertson, A.... ...	S. J. Woodhouse	„ A.	Dowie, J., & Co. ...	„ 13.12.28 to 3.1.29 ...	4.2.29
*† *Limerick*	Molyneux, P. L. ...	H. F. C. Wilkinson	„ M.	Federal...	„ 25.10.28 to 26.11.28 ...	17.12.28
Llandaff Castle ...	Gilbert, E. F.... ...	W. A. Cooke	„ A.	Union Castle	„ 29.12.28 to 16.1.29 ...	12.2.29
*† *Llandovery Castle*	Stuart, C. E., Capt. R.N.R.	C. H. Williams, G. Moon, P. Clissold.	M.L.	„ „	Met. Log. 15.11.28 to 21.1.29 ...	1.2.29
*† *Lobos, M. V.* ...	Pape, E. R.	S. E. Ayland	No. M.	Pacific S.N. Co. ...	Form 911 17.12.28 to 5.1.29 ...	15.1.29
Loch Katrine ...	Schlanbusch, O. V. ...	D. A. Mallinson	No. A.	R.M.S.P. Co.	„ 8.10.28 to 4.1.29 ...	9.1.29
*† *Logician*	Gibbings, W.	A. G. S. Madrell	No. M.	Harrison	„ 22.6.28 to 15.10.28 ...	19.10.28
*† *London Importer* ...	Fowler, W. H. ...	F. F Feint, J. H. Metcalfe, J. G. Freeman.	M.L.	Furness Withy ...	Met. Log. 8.1.28 to 31.3.28 ...	14.4.28
Lord Antrim ...	Jarvis, F. E.	... ...	No. A.	Ulster S.S. Co. ...	Form 911 4.1.29 to 19.1.29... ...	23.1.29
Loriga, M.V. ...	Clapham, E. C. ...	D. P. Morgan	„ A.	Pacific S.N. Co. ...	„ 20.11.28 to 14.12.28 ...	3.1.29
*† *Losada*, M.V. ...	Ross, J....	D. Beamer	„ M.	„ „ ...	„ 1.11.28 to 20.11.28 ...	27.11.28
†† *Macedonia*	Harrison, R.	C. J. L. Hayward	„ M.	P. & O.	„ 10.1.29 to 19.1.29 ...	11.2.29
*† *Macharda*	Hanna, R. G.	T. Johnston, H. M. Russell ...	„ M.	Brocklebank	„ 12.11.28 to 26.1.29 ...	11.2.29
*† *Mahronda*	Addy, M. J.	J. Kettlewell	No. M.	„	„ 4.10.28 to 14.12.28 ...	17.12.28
*† *Mahsud*	Kershaw, R. W. ...	... ...	„ M.	„	... ...	...
*† *Maihar*	Charlton, W. L. ...	J. W. B. Robertson, C. Cadwallader, S. S. Slade.	M.L.	„	Met. Log. 27.1.28 to 21.4.28 ...	7.6.28
*† *Maimoa*	Johnson, J. W. ...	... ...	„	Shaw,Savill & Albion	„	...
Maimyo	Smith, G. C.	H. M. Drummond	No. A.	Brocklebank	Form 911 18.8.28 to 14.11.28 ...	29.11.28
††58 *Majestic*	Marshall, W, C.B., D. S. O., R. D., Commodore R.N.R.	W. W. Pearson, H. A. Fisher, W. T. Fitz Gerald, A. H. Young.	W.T.	White Star	W.T. Reg. 11.1.29 to 24.1.29 ...	28.1.29
*† *Makalla*	Maugham, J. W. ...	J. B Newman	No. M.	Brocklebank	Form 911 22.11.28 to 22.12.28 ...	28.12.28
*** *Makambo* ...	Williams, D. J. ...	R. Perry, R. A. Williams S. Sandison.	M.L.	Burns Philp	Met. Log. 30.6.28 to 20.11.28 ...	4.1.29
	McLean, J.					
** *Makura*	Martin, W.	J. Hood, J. Billingham, G. Edwards.	„	Canadian-Australasian	„ 17.5.28 to 27.9.28 ...	2.1.29
** *Malabar*, M.V. ...	Donaldson, A. ...	L. Millar	„	Burns, Philp & Co. ...	„ 5.5.28 to 14.10.28 ...	2.1.29
*† *Malakuta*	Adamson, F. L. ...	N. Grayson	No. M.	Brocklebank	Form 911 18.9.28 to 28.11.28 ...	6.12.28
*† *Malancha*	Whitham, F.... ...	... ...	„ M.	„ ...	„ 4.8.28 to 14.10.28 ...	3.12.28
*† *Malda*	Gray, T. N.	S. G. James	„ M.	British India ...	„ 2.9.28 to 21.11.28 ...	29.11.28
†† *Maloja*	Browning, J. B., R.D., Commr. R.N.R.	A. D. Dennis	„ M.	P. & O.	„ 22.11.28 to 11.12.28 ...	28.12.28
†† *Malwa*	Norman, W. A. ...	G. C. Case, F. D. Shaw ...	„ M.	„	„ 6.10.28 to 9.1.29 ...	22.1.29
*† *Manchester Brigade*	Stott, C. H.	J. H. Round, H. Boyce, E. E. Bonnaud.	M.L.	Manchester Liners ...	Met. Log. 25.8.28 to 4.2.29 ...	15.2.29
Manchester Corporation.	Makin, T.	... ...	No. A.	„ „ ...	Form 911 9.11.28 to 20.12.28 ...	28.12.28
*† *Manchester Hero*	Riley, J. E.	H. Anderton, J. H. Emmett, H. Dobson, A. Ricketts, A. Grant.	M.L.	„ „ ...	Met. Log. 24.3.28 to 12.10.28 ...	19.10.28
	Barclay, J.					
Manchester Producer	Struss, F. D.	J. W. Moss	No. A.	„ „ ...	Form 911 9.12.28 to 10.1.29 ...	18.1.29
Manchester Regiment	Foale, J. R.	P. D. Barr	„ A.	„ „ ...	„ 4.2.28 to 9.3.28	14.3.28
*† *Manipur*	Cochran, G. N. ...	R. Penston, G. B. Falconer ...	No. M	Brocklebank	„ 28.10.28 to 14.1.29 ...	24.1.29
Manistee	Pengelly, J.	... ...	No.	Elders & Fyffes ...	... ...	...
*† *Manora*	Hudson, H. T., R.D., Commr., R.N.R.	... ...	No. M.	British India... ...	Form 911 26.8.28 to 22.11.28 ...	17.1.29
†† *Mantua*	Davis, H. C., D.S.C., Commr., R.N.R.	... ...	„ M.	P. & O.	„ 5.8.28 to 26.9.28... ...	6.10.28
*** *Marella*	Mortimer, S.	... ...	M.L.	Burns Philp	Met. Log. 3.7.28 to 18.9.28... ...	19.1.29
*† *Marengo*	Curle, J.	H. Bryan, G. W. Revell, F. Foval, S. Butcher.	„	Ellerman Wilson ...	„ 18.7.28 to 6 1.29... ...	22.1.29
Maresfield	Berry, V.	T. Connolly	No. A.	Woods,Tyler & Brown	Form 911 3.5.28 to 19.5.28... ...	9.6.28
†† *Margha*	Hughes, C. G... ...	P. Wright, B. Ludgate ...	M.L.	British India... ...	Met. Log. 15.7.28 to 5.10.28 ...	12.10.28
*† *Marquesa*	Smiles, R. S.	L. Owen	No. M.	Furness Houlder ...	Form 911 15.10.28 to 22.12.28 ...	28.12.28
Marsina	Williams, G. E. ...	J. C. Reid	No. A.	Burns' Philp & Co. ...	„ 14.8.28 to 10.9.28 ...	15.10.28
*† *Matakana*	Thurston, H. P. ...	E. Davies, B. Forbes-Moffatt, J. Dickson.	M.L.	Shaw, Savill & Albion	Met. Log. 29.9.28 to 11.2.29 ...	13.2.29
Mataram	Vay, W.	R. M. Blunt	No. A.	Burns, Philp & Co. ...	Form 911 31.10.28 to 1.12.28 ...	7.1.29
†† *Mataroa*	Kershaw, W. A. R. ...	F. Eadon, J. J. Nicoll, C. Meyer.	M.L.	Shaw,Savill, &Albion	Met. Log. 28.9.28 to 4.1.29 ...	7.1.29
*† *Matheran*	Ison, W. A.	J. Richardson	No. M.	Brocklebank	Form 911 6.11.28 to 18.11.28 ...	23.11.28
*† *Matiana*	Green, F. V.	W. McInnes	„ M.	British India... ...	„ 4.8.28 to 23.10.28 ...	29.10.28
*† *Matra*	Cornish, N. P. ...	W. Gibson, Hodgson, G. G. ...	„ M.	Brocklebank	„ 23.10.28 to 3.11.28 ...	13.12.28
*** *Maunganui*...	Toten, A. T	A. J. Herbert	„ M	Union S.S. Co. of N.Z	„ 1.12.28 to 23.12.28 ...	28.1.29
††32 *Mauretania* ...	McNeil, S. G.S., R.D., Capt., R.N.R.	R. H. C. Crawford, C. B. Osborne B. J. P. Tuck.	W.T.	Cunard ...	W.T. Reg. 3.1.29 to 16.1.29 ...	21.1.29
††66 *Megantic*	Kearney, J.	F. E. Patchett	W.T.	White Star	Form 911 16.7.28 to 2.8.28 ...	13.8.28
††22 *Melita*	Stewart, A.	J. Shearer	W.T.	Canadian Pacific ...	W.T. Reg. 14.1.29 to 31.1.29 ...	6.2.29
Memnon	Watson, C. J.... ...	J. A. C. McGregor	No. A.	A. Holt...	Form 911 12.1.29 to 23.1.29 ...	28.1.29
††21 *Metagama* ...	Rothwell, A.	C. L. de H. Bell, J. Stewart, A. W. Patrick.	W.T.	Canadian Pacific	W.T. Reg. 3.1.29 to 18.1.29 ...	22.1.29
*† *Middlesex*	Wilde, H.	D. J. Murray, ...	No. M.	Federal...	Form 911 21.10.28 to 27.11.28 ...	18.12.28
Minna	Mackenzie, G. G. ...	A. M. Campbell	„ A.	Scottish Fishery Brd.	„ 6.1.29 to 31.1.29... ...	11.2.29
††23 *Minnedosa* ...	McQueen, D. S. ...	F. E. Williams, C. D. Watt, W. J. P. Roberts.	W.T.	Canadian Pacific ...	W. T. Reg. 20.1.29 to 8.2.29 ...	14.2.29
†† *Minnesota*	Finch, E., R. D., Commr. R.N.R.	... ...	No. M.	Atlantic Transport ...	Form 911 27.11.28 to 16.12.28 ...	28.12.28
†† *Minnetonka* ...	Gates, T. F., C.B.E. ...	H. E. D. McCartney	„ M.	„ „ ...	„ 20.1.29 to 9.2.29 ...	12.2.29
†† *Minnewaska* ...	Claret, F. H., C.B.E., Commr., R.N.R.	F. J. Mummery	„ M.	„ „ ...	„ 14.1.29 to 2.2.29... ...	12.2.29
*† *Mirror*, C.S. ...	Jones, T., M.B.E. ...	J. G. West	„ M.	Eastern Tel. Co. ...	„ 13.2.28 to 18.3.28 ...	10.4.28
Mississippi	Wylie, J. T. J.... ...	W. M. Shoesmith	No. A.	Atlantic Transport ...	„ 10.1.29 to 26.1.29 ...	7.2.29
*† *Modasa*	Gilchrist, J. W. ...	A. E. Baker, E. Crozier ...	„ M.	British India	„ 10.6.28 to 28.8 28 ...	18.9 28
Moeraki	Loriard, C.	F. E. Lucas	No. A	Union S.S. Co. of N.Z.	„ 30.11.28 to 17.12.28 ...	28.1.29
†† *Moldavia*	Burleigh, C. W., D.S.O., R.D., Capt., R.N.R.	C. B. Holmes	No. M.	P. & O.	„ 20.12.28 to 8.1.29 ...	22.1.29
†† *Mongolia*	Furlong, G. H. S., R D., Capt., R.N.R..	A. H. Cole	„ M.	„	„ 26.10.28 to 11.1.29 ...	15.1 29

Name of Vessel.	Captain.	Observing Officers.	Meteoro-logical Equipment.	Line.	Last Log, Register, or Report Contributed. Received up to 15.2.29.	Date Received.
††24 *Montcalm* ...	Landy, E.	F. H. Steel, M. Williams, L Thornton.	W.T.	Canadian Pacific ...	W.T. Reg. 11.11.28 to 29.11.28 ...	4.12.28
††25 *Montclare* ...	Griffiths. J. N. ...	A. Mansey, C. Draper, T. Sargent.	„	„ „ „	„ 27.11.28 to 14.12.28 ...	18.12.28
					„ 23.12.28 to 10.1.29 ...	15.1.29
** *Montoro*	Williams, D. J. ...	D. J. L. Pemberton, R. M. Blunt, J. Campbell,	M.L.	Burns, Philp & Co. ...	Form 911 15.3.28 to 12.7.28 ...	3.1.29
††26 *Montrose* ...	Dott, J. F.	W. P. Haines, J. M. Roche ...	W.T.	Canadian Pacific ...	W.T. Reg. 13.1.29 to 31.1.29 ...	4.2.29
††:0 *Montroyal* ...	Freer, A.. R.D., Capt., R.N.R.	L. Outram, D. Ewing ...	„	„ „ „	„ 6.1.29 to 24.1.29... ...	29.1.29
					Form 911 8.12.28 to 27.12.28 ...	3.1.29
** *Moresby*	Henderson, D. A., Commr., R.N.	S. F. Bolton, G. A. Gould ...	M.L.	His Majesty's Australian Ship.	Met. Log. 17.4.28 to 14.8.28 ...	12.10.28
†† *Morvada*	Mills, T. L., O.B.E., R.D., Commr.R.N.R.	A. J. Norris, H. Maguire ...	No. M.	British India	Form 911 29.7.28 to 29.10.28 ...	31.10.28
†† *Mulbera*	Caffyn, F.	J. Rose	„ M.	„	„ 28.10.28 to 30.11.28 ...	7.12.28
*† *Nagara*	Miles, F. R., R.D., Capt. R.N.R.	G. Elliott	„ M.	R.M.S.P. Co.	„ 26.7.28 to 20.9.28 ...	25.9.28
*† *Nagoya*	Bedwell, L. A. ...	S. Gerrans	„ M.	P. & O.	„ 26.5.28 to 19.8 28 ...	23.8.28
†† *Naldera*	Randell, G. G. ...	C. H. Hand, M. F. Shute, J. C. Davies.	M.L.	„	Met. Log. 20.10.28 to 23.1.29 ...	8.2.29
*† *Nardana*	Moth, F. L.	F. G. Sharps	No. M.	British India	Form 911 8.10.28 to 13.11 28 ...	3.12.28
†† *Narkunda*	Collyer, R. M. M., R.D., Commr. R.N.R.	M. Boyd	„ M.	P & O.	„ 9.12.28 to 28.12.28 ...	4.2.29
*† *Nellore*	Hignett, A. H., R.D., Lt.-Commr., R.N.R.	A. J. Brown	„ M.	P. & O.	„ 15.12.28 to 30.12.28 ...	21.1.29
*† *Nerbudda*	Williams, B. N. ...	G. A. Farley, S. Henderson ...	„ M.	British India	„ 16.12.28 to 8.2.29 ...	11.2.29
*† *Nestor*	Houghton, G. K. ...	A. Caird, N. Anderson, R. T. Dryden.	M.L.	A. Holt	Met. Log. 8.1.28 to 13.5.28 ...	24.5.28
*† *Newby Hall* ...	Zeal, R. C.	E. M. Robertson. F. Wrigley, G. W. Sitwell, W. S. Smith.	No. M.	Ellerman	„ 22.3.28 to 16.8.28 ...	10.12.28
*† *Newfoundland* ...	Foxworthy, A. W.	R. F. Handley, E. Sainty, D. Hetherington.	M.L.	Furness Withy ...	„ 31.7.28 to 10.12.28 ...	22.12.28
** *Niagara*	Brown, J. F. S. ...	R. N. Turner, V. Knight, G. Webb.	„	Canadian-Australasian	„ 25.7.28 to 10.12.28 ...	11.12.28
Ningchow	Beale, H. E.	H. Morley	No. A.	A. Holt	Form 911 26.11.28 to 26.12.28 ...	4.2.29
*† *Nirvana*	Ayres, R. M.	... ...	„ M.	British India	... ...	...
Norfolk	Mead, G. F.	A. Hocken	„ A.	Federal	„ 30.12.28 to 6.2.29 ...	8.2.29
Norna	Wright, J. W.... ...	... ...	„ A.	Scottish Fishery Brd	„ 10.1.29 to 24.1.29 ...	5.2.29
*† *Norseman*, C.S. ...	Davis, E. R.	R. W. Greenfield	„ M.	Western Tel. Co. ...	„ 20.12.28 to 11.1.29 ...	9.2.29
*† *Northumberland* ...	Upton, H. L., D.S.C., R.D., Lt.-Commr. R.N.R.	A. J. Robertson, W. J. Glassborow, J. F. Clements.	M.L.	Federal	Met. Log. 12.5.28 to 13.10.28 ...	17.10.28
Nova Scotia ...	Furneaux, S.... ...	... ...	No. A	Furness Withy ...	Form 911 31.10.28 to 6.11.28 ...	20.11.28
*† *Nowshera*	Rowe, S. N.	W. Ashcroft	„ M.	British India	„ 8.1.29 to 18.1.29 ...	21.1.29
*† *Nuddea*	Morrison, W. C. ...	... ...	„ M	British India... ...	„ 19.11.28 to 4.12.28 ...	14.1.29
Oaklands Grange	St. Clair, C., D.S.C. ...	C. F. Foxwell	„ A.	Houlder Bros. ...	Form 911 1.1.29 to 25.1.29... ...	28.1 29
††7 *Olympic*	Parker, W. H., C.B.E., R.D., Capt. R.N.R.	A. E Harvey, A. J. Fisher, A. E. Weller.	W.T.	White Star ...	W.T. Reg. 13.12.28 to 27.12.28 ...	7.1.29
					Form 911 13.12.28 to 27.12.28 ...	5.1.29
†† *Orama*	Matheson, C. G., D.S.O., R.D., Capt., R.N.R.	J. M. M. Swanson.	M.L.	Orient	Met. Log. 22.7.28 to 23.10.28 ...	31.10.28
Oranian	Bolton, W.	.. ..	No. A.	Leyland	Form 911 2.9.28 to 17.9.28 ...	3.10.28
†† *Orbita*	Dominy, R. H., C.B.E. Commr., R.N.R.	J. R. Bubb	„ M.	R.M.S.P. Co.	„ 1.11.28 to 17.1.29 ...	25.1.29
†† *Orcoma*	Mander, T.	T. J. Waylor, R. H. Sissons, J. W Fraser, J. Allan.	M.L.	Pacific S.N. Co. ...	Met. Log. 31.5.28 to 14.8.28 ...	30.8.28
†† *Orduna*	Daniel, T.	R. D. Eckford	No. M.	„ „ „	Form 911 7.10.28 to 20.12.28 ...	28.12.28
Orestes	Flynn, G. A.	R. Martin...	„ A.	A. Holt...	„ 28.7.28 to 8.9.28 ...	26.11.28
†† *Orford*	Owens, A. L., Commr. R.D., R.N.R.	O. C. Davies	„ M.	Orient	„ 26.10.28 to 4.1.29 ...	19.1.29
†† *Orita*	Barkley, E	D. W. Hutchinson, G. W. Irvine, L. L. Hunter.	M.L.	Pacific S.N. Co. ...	Met. Log. 18.6.28 to 27.11.28 ...	4.12.28
†† *Ormonde*	Rice, W. V., D.S.O., D.S.C., Commr. R.N.	H. P. Price	„	His Majesty's Ship ...	„ 9.8.28 to 2.11.28 ...	8.1.29
†† *Oronsay*	Shelford, W. S., Lt.-Commr., R.N.R.	T. Fox Russell, R. S. Hawker, K. M. Morrison.	M.L.	Orient	„ 28.10.28 to 29.1.29 ...	31.1.29
*† *Oroya*	Ridyard, A.	P. H. Ray	No. M.	Pacific S.N. Co. ...	Form 911 21.11.28 to 29.1.29 ...	5.2.29
†† *Orsova*	Cameron, E. P., R.D., Commr., R.N.R	L. J. Vesty, A. Addison, N. W. Smith.	M.L.	Orient	Met. Log. 19.8.28 to 21.11.28 ...	23.11.28
†† *Orvieto*	O'Sullevan, F. R. ...	J. G. Goldsworthy, G. L. Carter, H. A. Whittle. C.D.Lane	„	„	„ 2.9.28 to 4.12.28 ...	7.12.28
Osterley	Sarson, M. J.	A. F. C. Gray	No. A.	„	Form 911 24.6.28 to 25.9.28 ...	5.10.28
Otaki	McNish, R.	G. Dibley	„ A.	New Zealand S.S. Co.	„ 8.11.28 to 24.11.28 ...	31.12.28
*† *Otira*	Wood, C., D.S.C. ...	S. Winton	„ M.	Shaw, Savill & Albion	„ 22.3.28 to 28.4.28 ...	8.5.28
†† *Otranto*	Staunton, H. G., C.B.E., R.D., Commr., R.N.R.	O. C. Davies	„ M.	Orient	„ 29.1.28 to 30.3.28 ...	14.4.28
Oxfordshire ...	Foster, W. L.	E. A. Insley	„ A.	Bibby Bros.	„ 8.9.28 to 18.11.28 ...	26.11.28
Pacific Shipper, M.V.	Goodwin, J.	... ...	„ A.	Furness Withy ...	„ 5.9.28 to 4.12.28... ...	28.12 28
*† *Pacuare*	Edwards, A. C. ...	... ...	M.L.	Elders & Fyffes ...	... ...	...
*† *Pakeha*	W. P. Clifton Mogg, Lt.-Commr., R.N.R.	H. C. Smith, G. Almond, W. Canner	M.L.	Shaw, Savill & Albion	Met. Log. 23.6.28 to 10.11.28 ...	15.11.28
*† *Pancras*	Reynolds, H. B. W....	W. Griffiths, C. C. Veal, J. Nichales.	M.L.	Booth	„ 13.12.27 to 14.6.28 ...	25.7.28
Pareora	Evans, J. O.	J. Greenaway	No. A.	Hain S.S. Co.	Form 911 7.8.28 to 7.9.28 ...	19.11.28
Paris	Cook, C. L.	Mr. Biles	C.C.	Southern Rly. ...	Telegraphic Report. 31.7.27 ...	31.7.27
Patia	Makepeace, S. ...	J. Green	No. A.	Elders & Fyffes ...	Form 911 18.8.28 to 22.9.28 ...	25.9.28
Peisander	Slater, H. N.	H. E. Readshaw	„ A.	A. Holt...	„ 29 12.28 to 28.1.29 ...	31 1.29
Pennland	Making, V.	... ...	„ A.	Red Star	„ 16.12.28 to 3.1.29 ...	7.1.29
*† *Peshawur*	Wilding, H. G. ...	K. A. H. Cummins, S. H. Baldwin, A. M. Tolfree.	M.L.	P. & O.	Met. Log. 20.5.28 to 17.10.28 ...	2.120.28

Name of Vessel.	Captain.	Observing Officers.	Meteorological Equipment.	Line.	Last Log, Register, or Report Contributed. Received up to 15.2.29.	Date Received.
Polycarp	Reynolds, W. H. B....	... ...	No. A.	Booth	Form 911 14.12.28 to 26.1.29 ...	8.2.29
*† *Port Adelaide* ...	Swan, L. H.	R. B. Linklater, C. J. Gorley, F. J. Lavers.	M.L.	Commonwealth & Dominion.	Met. Log. 20.7.28 to 14.12.28 ...	28.12.28
*† „ *Albany* ...	Hall, G. S.	A. G. Newbury, G. W. Horton, M. J. Dedman.	„	„ „ „	„ 8.8.28 to 21.1.29 ...	11.2.29
*† „ *Auckland* ...	Durham, R. S., D.S.C	C. F. Post, E. R. Rowlands, H. E. Braine.	„	„ „ „	„ 16.3.28 to 27.7.28 ...	7.8.28
„ *Bowen* ...	Hearn, G. W.	S. Ray	No. A.	„ „ „	Form 911 9.9.28 to 17.9.28... ...	26.10.28
*† „ *Campbell* ...	Needham, R.	J. G. Thom	M.L.	„ „ „	„ 15.8.28 to 6.1.29... ...	14.1.29
*† „ *Caroline* ...	Brown, A. H.	J. B. Bradley, L. M. Bayly, R. Forrest, J. Stannard.	„	„ „ „	Met. Log. 27.4.28 to 24.9.28 ...	9.10.28
*† „ *Darwin* ...	Sawbridge, I. R. ...	H. Pinkney, E. M. Fenton, S. Moate.	„	„ „ „	„ 2.9.28 to 3.1.29	7.1.29
** „ *Denison* ...	Ferris, J.	E. T. N. Lawrey, L. W. Cady. A. A. Cooper, J. Rowland-Hill.	„	„ „ „	„ 8.3.28 to 5.9.28.... ...	11.9.28
*† „ *Dunedin*, M.V.	Farmar, F.	E. G. Jones, H. M. Post, N. M. Muzzell.	„	„ „ „	„ 10.8.28 to 17.11.28 ...	21.11.28
„ *Fremantle*, M.V.	Kearney, F. J. ...	A. G. Rhind	No. A.	„ „ „	Form 911 5.5.28 to 8.6.28	15.6.28
„ *Gisborne*, M.V	Hayter, S. W.... ...	H. Boys-Smith	„ A.	„ „ „	„ 8.7.28 to 10.11.28 ...	15.11.28
*† „ *Hobart. M. V.*	Cottell, S. C.... ...	R. Carter, L. Copeland, G. G. Langford, C. L. Webb.	M.L.	„ „ „	Met. Log. 8.6.28 to 4.10.28 ...	9.10.28
*† „ *Hunter* ...	Robinson, C. A. ...	R.B. Stannard, A. McClounan. J. T. Weldin.	„	„ „ „	„ 1.8.28 to 23.12.28 ...	31.12.28
„ *Huon*	Compton, J. E. ...	... ...	No. A.	„ „ „	Form 911 5.12.28 to 7.1.29... ...	11.2.29
*† „ *Melbourne* ...	Kippins, T.	A. R. Martin, F. W. Elgar, W. E. Simpson.	M.L.	„ „ „	Met. Log. 12.5.28 to 8.10.28 ...	22.10.28
*† „ *Nicholson* ...	Jack, J.	J. G. Lewis, G. L. H. Dean, A. G. Newbury, W. B. Hopkins.	M.L.	„ „ „	Met. Log. 19.2.28 to 28.7.28 ...	17.8.28
*† „ *Pirie*	Hudson, J. J.	W. G. Jones, J. F. Martin. A. Brown.	„	„ „ „	„ 26.5.28 to 24.10.28 ...	10.11.28
*† , *Sydney* ...	Higgs, W. G.	E. E. Roswell, F. R. Gorman, R. D. Chamberlain.	„	„ „ „	„ 25.9.28 to 29.1.29 ...	8.2.29
*† „ *Victor* ...	Williams, R.	W. Pickup, C. Hodson, C. E. Midwinter.	„	„ „ „	„ 14.7.28 to 1.1.29... ...	23.1.29
„ *Wellington* ...	Jones, C. N.	L. J. Skails	No. A.	„ „ „	Form 911 14.10.28 to 18.11.28 ...	21.1.29
Protea, H.M.S.A.S.	Dalgleish, J., Lt.-Commr., S.A.N.S.	A. C. Matson	M.L.	South African Naval Service.	Met. Log. 1.2.28 to 10.5.28... ...	12.6.28
*† *Protesilaus*	Quirk, T. W.	J. Milbench, A. C. Abbott, A. E. Martin, E. A. H. Gopp.	„	A. Holt	„ 5.6.28 to 1.11.28... ...	10.12.28
Pyrrhus	Elford, W. J.	R. Singleton	No. A.	„	Form 911 26.12.28 to 14.1.29 ...	26.1.29
*† *Quiloa*	Cave, S.	... ...	No. M.	British India... ...	... ...	...
†† *Rajputana*	Parker, J. W., R.D., Commr. R.N.R.	R. E. Tucker	„ M.	P. & O.	„ 9.12.28 to 1.2.29 ...	5.2.29
†† *Ranpura*	King, A. M., D.S.C. ...	E. J. Spurling	No. M.	P. & O.	„ 5.1.29 to 24.1.29... ...	11.2.29
†† *Rawalpindi* ...	Thornton, E. J. ...	A. G. Stansfield...	„ M.	... ...	... ...	...
††60 *Regina*	Davies, E.	R. S. Walker, E. A. A. Crowley.	W.T.	White Star-Dominion	„ 2.12.28 to 21.12.28 ...	28.12.28
					W.T. Reg. 2.12.28 to 21 12.28 ...	28.12.28
Reindeer	Pitman, R. R.... ...	... ...	C.C.	G.W. Railway ...	Telegraphic Report 23.2.28 ...	23.2.28
*† *Remuera*	Cameron, J. J. ...	H. Harwood	M.L.	New Zealand S.S. Co.	Form 911 6.7.28 to 19.10.28 ...	8.11.28
Rhexenor	Davies, J.	A. Yarwood	No. A.	A. Holt...	„ 29.12.28 to 14.1.29 ...	24.1.29
Rhodesian Transport.	Bullock, F. W. H. ...	J. G. Freeman	„ A.	Houlder Bros. ...	„ 6.9.28 to 24.12.28 ...	28.12.28
*† *Rimutaka*	Holland, E.	F. Pretty. H. S. Cashmore, F. Cooke, E. Foster.	M.L.	New Zealand S.S. Co.	Met. Log. 31.8.28 to 3.1.29... ...	7.1.29
Ripley Castle ...	Aylen, C. E. H. ...	R. A. D. Cambridge	No. A.	Union Castle	Form 911 14.11.28 to 12.12.28 ...	17.12.28
Rother	Woodhead, T. H. ...	N. Thompson	„ A.	Goole Steam Shipping	„ 20.12.28 to 3.2.29 ...	7.2.29
*† *Rotorua*	Hunter, J. L. B. ...	A. D. Landles, L. Griffiths, T. M. Devitt.	M.L.	New Zealand S.S. Co.	Met. Log. 8.6.28 to 21.9.28 ...	3.10.28
Royal Transport ...	Oliver, R. C.	R. Hughes	No. A.	Houlder Bros. ...	Form 911 17.6.28 to 15.9.28 ...	21.9.28
*† *Ruapehu*	McKellar, A. W., R.D., Capt., R.N.R.	S. Butler, L. F. Malcouronne, H. N. Lawson.	M.L.	New Zealand S.S. Co.	Met. Log. 29.6.28 to 15.10.28 ...	17.10.28
** *St. Albans*	Diamond, S. L. ...	R. L. Harry, J. Moodie Heddle, J. D. Kavanagh. F. O. Colvin, R. Millington	„	Eastern and Australian.	„ 3.8.28 to 3.12.28... ...	8.1.29
St. Helier	... ...	C. Bell	C.C.	G.W. Railway ...	Telegraphic Report 14.2.29 ...	14.2.29
St. Julien	Richardson, L. ...	C. W. Sanderson	„	„ „ „ ...	„ „ „ 9.2.29 ...	9.2.29
St. Andrew	Bearpark, E. W. ...	J. Meade	No. A.	Rankin Gilmour ...	Form 911 7.10.28 to 15.12.28 ...	28.12.28
††38 *Samaria*	Malin, R. G., Lieut.-Commr., R.N.R.	F. D. Thomas, W. B. Tanner, P. G. Britten.	W.T.	Cunard	W.T. Reg. 8.1.29 to 26.1.29 ...	5.2.29
Sardinian Prince ...	Brown, J. F.	G. A. Davies	No. A.	Prince	Form 911 20.12.28 to 8.1.29 ...	1.2.29
Saxon	Shilston, P. G., R.D., Capt. R.N.R.	R. May	„ A.	Union Castle	„ 31.8.28 to 16.9.28 ...	17.9.28
*† *Scholar*	Peterkin, A. G. ...	G. Baker	„ M.	Harrison	„ 15.11.28 to 3.12.28 ...	7.12.28
Scotia	Prichard, S. D., M.B.E.	W. L. Hughes	C.C	L.M. & S. Railway ...	Telegraphic Report 9.2.29 ...	9.2.29
††33 *Scythia*	Irving, R. B., O.B.E., R.D., Capt. R.N.R.	R. Sell, G. H. Morris, J. G. Bradley.	W.T.	Cunard	W.T. Reg. 29 10.28 to 18.11.28 ...	22.11.28
					Form 911 28.10.28 to 19.11.28 ...	22.11.28
Sheaf Mount ...	Groves, C. V. ...	A. Macarthur	No. A.	W. A. Souter	„ 3.11.28 to 24.11.28 ...	7.12.28
*† *Sheaf Spear* ...	Whitfield, G. A., O.B.E.	P. L. Hay	M.L.	„	Met. Log. 2.9.28 to 17.1.29 ...	1.2.29
*† *Shropshire*, M.V. ...	Adamson, B. W. ...	W. L. Whiteside, R. Cuming, W. H. Brittain.	„	Bibby	„ 3.11.28 to 11.1.29 ...	15.1.29
Somerset	Howell Price, J. ...	W. Redwood	No. A.	Federal...	Form 911 14.10.28 to 23.11.28 ...	5.1.29
*† *Spero*	Montgomery, H. ...	H. W. Vickers	M.L.	Ellerman Wilson ...	Met. Log. 6.7.28 to 12.1.29... ...	22.1.29
*† *Statesman*	Mowat, J.	T. R. R. Letten	No. M.	Harrison	Form 911 27.10.28 to 5.1.29 ...	7.1.29
Stephen	Evans, L. G.	N. Caris	No. A.	Booth	„ 9.11.28 to 19 1.29 ...	31.1.29
Stockwell	Smith, W.	F. Moore	„ A.	Brocklebank	„ 26.10.28 to 22.11.28 ...	28.12.28
Surrey	Lamb, C. B.	... ...	„ A.	Federal...	„ 1.4.28 to 3.5.28	19.9.28
*†*Sutton Hall*... ..	Walmsley, R. J. ..	... ...	„ M.	Ellerman	... ...	..
Sylvafield, M.V ...	Biddick, E.	A. A. Tully	„ A.	Hunting & Son ...	„ 20.12.28 to 29.1.29 ...	7.2.29
Tainui	Elford, H. E.	L. J. Hopkins	„ A.	Shaw, Savill & Albion	„ 22.12.28 to 26.1.29 ...	2.2.29
Tahiti	Aldwell, B M. ...	C. R. Carlyon	„ A.	Union S.S. Co. of N.Z.	„ 30.11.28 to 20.12.28 ...	5.1.29
** *Taiping*	Frame, A. M.	F. Stratford, A. C. Kennedy, E. S. Birrell	M.L.	Yuill & Co.	Met. Log. 14.9.28 to 5.1.29 ...	13.2.29
*† *Takada*	Lindon, J.	... ...	No. M.	British India	... ...	...
*† *Talma*	Hocking, R.	... ...	„ M.	„	Form 911 28.10.28 to 2.1.29 ...	12.2.29
Talthybius	Wilson, R. J.	... ...	„ A.	A. Holt	„ 12.12.28 to 29.12.28 ...	17.1.29
†† *Tamaroa*	Hartman, W. H. ...	F. W. Lutyens	„ M.	Shaw, Savill & Albion	9.6.28 to 15.7.28 ...	19.7.28

Name of Vessel.	Captain.	Observing Officers.	Meteorological Equipment.	Line.	Last Log, Register, or Report Contributed. Received up to 15.2.29.	Date Received.
** *Tanda*	Pilcher, E. T., Lieut.-Commr., R.N.R.	G. C. Smith, H. Murday, H. Nuzum.	M.L.	E. & A. S.S. Co.	Met. Log 3.7.28 to 11.10.28	7.1.29
*† *Taranaki, M.V.*	Wood, C.	J. W. Hart, G. Campbell, P. Savill.	„	Shaw, Savill & Albion	„ 20.5.28 to 19.9.28	27.9.28
Tarantia	Munro, D., R.D., Commr. R.N.R.		No. A.	Anchor	Form 911 10.11.28 to 5.12.28	20.12.28
Tetresias	Wilkinson, W. H.	C. B. P. Anderson	„ A.	A. Holt & Co.	„ 22.9.28 to 25.10.28	29.10.28
*† *Tekoa*	Robinson, F. W.		„ M.	New Zealand S.S. Co.	„ 19.11.28 to 4.12.28	21.1.29
Telamon	Willcox, J. H.	F. A. Brown	„ A.	A. Holt	„ 15.9.28 to 8.12.28	17.12.28
Tetela	Brice, E. H.	F. L. Brealy	„ A.	Elders & Fyffes	„ 28.12.28 to 30.1.29	7.2.29
Teucer	Beswick, W., D.S.C., Lt.-Commr., R.N.R.	W. F. Cook	„ A.	A. Holt	„ 5.12.28 to 11.1.29	31.1.29
†† *Themistocles*	Young, A. D.		„ M.	Aberdeen Commonwealth	„ 12.12.28 to 20.1.29	28.1.29
Theseus	Jones, E.	W. A. Fyffe	„ A.	A. Holt	„ 10.8.28 to 7.10.28	18.10.28
*† *Tilawa*	Rowe, P. W.	E. A. Rabey	„ M.	British India	„ 4.11.28 to 14.12.28	7.1.29
*† *Tinhow*	Andoe, G.	J. S. King	„ M.	A. Weir & Co.	... ...	...
*† *Titan*	Power, J. J.	P. Cross, R. A. Shennan, C. F. Bailey.	M.L.	A. Holt	Met. Log. 19.8.28 to 3.1.29	14.1.29
*† *Tongariro*	Burton Davies, J	E. A. Burton, A. E. Williams, H. Wilkinson, D. Baldwin.	„	New Zealand S.S. Co.	Met. Log. 12.8.28 to 7.1.29	18.1.29
Transylvania	Erskine, R.	P. Middleton	No. A	Anchor	Form 911 23.9.28 to 10.11.28	20.11.28
Trefusis	Hunt, D.	R. H. Silley	„ A.	Hain S.S. Co.	„ 29.12.28 to 17.1.29	14.2.29
*† *Trematon*	Evans, B.	J. Jenkyn, C. M. Quick, R. Stitson.	M.L.	Hain S.S. Co.	Met. Log. 18.5.28 to 24.12.28	7.1.29
*† *Turakina*	Field, H. G. B.	J. D. B. Fisher	No. M.	New Zealand S.S. Co.	Form 911 1.12.28 to 28.12.28	14.1.29
††11 *Tuscania*	Rome, W. B.	J. Noble	W.T.	Anchor	W.T. Reg. 26.11.28 to 16.12.28 / Form 911 24.11.28 to 17.12.28	22.12.28 / 20.12.28
*† *Tyndareus*	Christie, W.	A. F. Barclay, T. R. Phillips, F. V. Smith, D. S. Bruce.	M.L.	A. Holt	Met. Log. 15.5.28 to 7.10.28	20.11.28
** *Ulimaroa*	Wylie, W. J.	W. Finch	No. M.	Huddart Parker, Ltd.	Form 911 23.11.28 to 17.12.28	4.2.29
Ulysses	Owen, R. D., O.B.E.	C. W. Jones	„ A.	A. Holt	„ 24.11.28 to 6.1.29	9.1.29
Umvolosi	Barnes, E. W.	R. Dyns	„ A.	Bullard King	„ 19.12.28 to 2.1.29	29.1.29
** *Valacia*	Inch, F.		„ M.	Cunard	„ 26.3.28 to 13.5.28	17.5.28
Vardulia	Fear, E. T. C.	W. H. Barker	„ A.	„	„ 1.12.28 to 11.1.29	15.1.29
Vigilant	Simpson, E. S. S.	J. H. Hennessey	„ A.	Scottish Fishery Board.	„ 1.1.29 to 30.1.29	5.2.29
** *Waiotapu*	Todd, D.	F. H. G. Clark	„ M.	Canadian - Australasian.	„ 3.11.28 to 26.11.28	28.12.28
** *Wairuna*	Ryan J.	J. E. Broughton, H. W. Jones, J. Ritchie.	M.L.	Union S.S. Co. of N.Z.	Met. Log. 12.6.28 to 15.9.28	23.11.28
Walmer Castle	Morton Betts, W.	G. H. Pickering	No. A.	Union Castle	Form 911 15.12.28 to 3.2.29	5.2.29
*† *Wangaratta*	Scutt, W.	T. W. Wordingham, S. R. Millard, A. G. Brooks, M. Harvey.	M.L.	British India	Met. Log. 22.4.28 to 1.10.28	6.10.28
Warfield	Steel, R.		No. A.	„ „	Form 911 4.11.28 to 17.11.28	26.11.28
*† *War Nizam*	Moncrieff, T.	F. J. Marshall	„ M.	British Tankers	„ 5.5.28 to 11.6.28	26.6.28
*† *Westmoreland*	Gardner, H. W.	G. A. Shepherd, K. S. Phillips, R. L. Warren.	M.L.	Federal	Met. Log. 3.8.28 to 22.11.28	29.11.28
†† *William Scoresby*, R.S.S.	De la Motte, J. B. B., Lieut., R.N.		„	Falkland Islands Government.		
†† *Windsor Castle*	Morton-Betts, W. / Chave, Sir B., K.B.E.	A. J. Tweddell, C. Gorringe, R. Tyser.	„	Union Castle	„ 17.2.28 to 12.8.28	11.9.28
*† *Winifredian*	Trant, A. W. V., O.B.E.		No. M.	Leyland	Form 911 30.12.28 to 8.1.29	14.1.29
** *Wonganella*	Suffern, H.	G. F. Phillips	„	W. Crossby & Sons	„ 16.10.28 to 17.11.28	28.12.28
*† *Woodarra*	Reilly, J. V.	H. Goater, L. J. C. Simpson, G. F. Alexander J. McPhail.	M.L.	British India	Met. Log. 15.7.28 to 31.12.28	4.1.29
Zent	Roberts, H.		No. A.	Elders & Fyffes	Form 911 15.12.28 to 19.1.29	22.1.29
Conway, H.M.S.	Richardson, F. A., D.S.C., Commr., R.N.	The Senior Cadets	Cadets' M.L.		Cadets' Met. Log. 23.9.28 to 15.12.28	19.12.28
Pangbourne Nautical College	Tracy, A. F. G., Commr., R.N.	„ „			Cadets' Met. Log. 24.9.28 to 14.12.28	31.12.28
Worcester, H.M.S.		„ „	„		Cadets' Met. Log. 21.9.28 to 19.12.28	21.12.28
Abaco		The Keepers	Lighthouse Register.		Lighthouse Register 1.1.28 to 30.6.28	14.9.28
Cay Lobos		„	„		Lighthouse Register 1.1.27 to 11.7.27	29.9.27
Double Headed Shot		„	„		Lighthouse Register 4.9.27 to 29.2.28	24.4.28
Inagua		„	„		Lighthouse Register 14.1.28 to 19.7.28	14.9.28
Sombrero		„	„		Lighthouse Register 1.7.28 to 31.12.28	5.2.29
Watling Island		„	„		Lighthouse Register 1.1.28 to 30.6.28	14.9.28
Cape Pembroke (Falkland Is.).		„	„		Lighthouse Register 1.1.28 to 30.6.28	22.8.28

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

Name of Vessel.	Captain.	Observing Officer.	Line.	Last Case of Water Samples, Reports, etc., received up to 31.1.29.	Date Received
Antillian	Hannaford, W.	J. L. Crighton	Leyland	Water Samples	2.11.28
Dakotian	Robb, J.	W. F. Sloan	„	„ „	7.1.29
Darro	Matthews, G. P.	J. Clark	R.M.S.P. Co.	„ „	5.10.28
Deseado	Hannan, F. S.	J. G. Scott	„	„ „	18.10.28
Hildebrand	Peregrine, D.	E. Jones	Booth	„ „	4.1.29
Oranian	Bolton, W.	T. J. Jones	Leyland	„ „	13.12.28

LIST OF SOME OF THE PUBLICATIONS PUBLISHED BY THE AUTHORITY OF THE METEOROLOGICAL COMMITTEE AND BY THE HYDROGRAPHIC DEPARTMENT OF THE ADMIRALTY.

MARINE METEOROLOGY, ATLASES, BOOKS AND MEMOIRS.

CHARTS :—

ATLANTIC :—

Monthly Current Charts for the Atlantic Ocean, from information collated and prepared in the Meteorological Office. (No. 132, 1897) (22½ × 18 in.) (Published by the Admiralty.)

Charts of Meteorological Data for the Nine 10° Squares of the Atlantic which lie between 20° N. and 10° S., and extend from 10° to 40° W., with accompanying Remarks, ending with the Best Routes across the Equator. (No. 27, 1876) 24*s.* (17 × 20 in.)

ATLANTIC (NORTH) :—

Meteorological Charts of the North Atlantic for each month of the year, giving normals of Pressure, Air and Sea Surface Temperature and Ocean Currents, with Frequencies of Winds, also Ice Limits. (No. 149A, 1923) 1*s.* each (35 × 22½ in.). Sold by J. D. Potter, 145, Minories, E.1.

Synchronous Weather Charts of the North Atlantic and the adjacent Continents, 1st August, 1882, to 3rd September, 1883. Parts I to IV (33 sheets each). (No. 71, 1886) 17*s. each* Part. (26 × 22 in.)

Charts of Meteorological Data for Square 3, Lat. 0°-10° N., Long. 20°-30° W. (20 × 13½ in.) and Remarks to accompany the Monthly Charts, which show the Best Routes across the Equator for each Month, &c. (17 × 16½ in.) (No. 20, 1874). 20*s.*

Discussion of the Meteorology of that Part of the Atlantic lying North of 30° N., for the eleven days ending 8th February, 1870. With Charts (No. 13, 1872). 5*s.* (4to.)

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