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THE MARINE OBSERVER.

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MARINE METEOROLOGY AND SAFE NAVIGATION.

In the October number last year we showed how necessary Intelligence of Weather, Tide, Current and Ice were for Safety of Life at Sea, and we outlined the required organization for all Oceans with "Selected Ships" of all nations, including method of Wireless Communication, requiring a generally recognised schedule for "Selected Ships" to report to all ships and certain shore stations in daylight twice daily. We said that exact details might not be published for some little time, and that a world wide scheme could not be fully completed until after the International Conference on Safety of Life at Sea.

We now reproduce from the International Convention for Safety of Life at Sea, which was signed on May 31st, 1929, by the

Plenipotentiaries of the Governments of eighteen nations to come into force on July 1st, 1931, after ratification, certain articles and regulations of interest to the Corps of Voluntary Marine Observers.

It should be noted that no schedule for ships' Wireless Weather reports is included in the regulations. This, with other details of organization, has now been referred to the International Marine Meteorological Commission with a view to assisting in obtaining the uniform procedure which the International Conference on Safety of Life at Sea finds essential.

MARINE SUPERINTENDENT.

London,
5th July, 1929.

EXTRACTS FROM THE CONVENTION (MAY 31ST, 1929) OF THE INTERNATIONAL CONFERENCE ON SAFETY OF LIFE AT SEA, 1929.*

Chapter V.—Safety of Navigation.

Article 33.

APPLICATION.

THE provisions of this Chapter referring to ships, unless otherwise expressly provided, apply to all ships on all voyages.

Article 34.

DANGER MESSAGES.

The master of every ship which meets with dangerous ice, a dangerous derelict, a dangerous tropical storm or any other direct danger to navigation is bound to communicate the information, by

* International Convention for Safety of Life at Sea, 1929. Signed at London, May 31, 1929 [Printed prior to ratification by the United Kingdom of Great Britain and Northern Ireland], Board of Trade, London. Printed and published by H.M. Stationery Office. Price 4s. net.

all the means of communication at his disposal, to the ships in the vicinity, and also to the competent authorities at the first point of the coast with which he can communicate. It is desirable that the said information be sent in the manner set out in Regulation XLVI.

Each Administration will take all steps which it thinks necessary to ensure that when intelligence of any of the dangers specified in the previous paragraph is received, it will be promptly brought to the knowledge of those concerned and communicated to other Administrations interested.

The transmission of messages respecting the dangers specified is free of cost to the ships concerned.

Article 35.

METEOROLOGICAL SERVICES.

The Contracting Governments undertake to encourage the collection of meteorological data by ships at sea, and to arrange for their examination, dissemination and exchange in the manner most suitable for the purpose of aiding navigation.

In particular, the Contracting Governments undertake to cooperate in carrying out, as far as practicable, the following meteorological arrangements:—

(a) to warn ships of gales, storms and tropical storms, both by the issue of wireless messages and by the display of appropriate signals at coastal points;

(b) to issue daily, by radio, weather bulletins suitable for shipping, containing data of existing weather conditions and forecasts;

(c) to arrange for certain selected ships to take meteorological observations at specified hours, and to transmit such observations by wireless telegraphy for the benefit of other ships and of the various official meteorological services; and to provide coast stations for the reception of the messages transmitted;

(d) to encourage all ship-masters to inform surrounding ships whenever they experience wind force of 10 or above on the Beaufort scale (force 8 or above on the Decimal scale).

The information provided for in paragraphs (a) and (b) of this article will be furnished in form for transmission in accordance with Article 31, §§ 1, 3 and 5, and Article 19, § 25, of the General Regulations annexed to the International Radiotelegraph Convention, Washington, 1927, and during transmission "to all stations" of meteorological information, forecasts and warnings, all ship stations must conform to the provisions of Article 31 (2) of those General Regulations.

Weather observations from ships addressed to national meteorological services will be transmitted with the priority specified in Article 3, Additional Regulations, International Radiotelegraph Convention, Washington, 1927.

Forecasts, warnings, synoptic and other meteorological reports intended for ships shall be issued and disseminated by the national service in the best position to serve various zones and areas, in accordance with mutual arrangements made by the countries concerned.

Every endeavour will be made to obtain a uniform procedure in regard to the international meteorological services specified in this Article, and, as far as is practicable, to conform to the recommendations made by the International Meteorological Organization, to which organization the Contracting Governments may refer for study and advice any meteorological questions which may arise in carrying out the present Convention.

Article 36.

ICE PATROL, DERELICTS.

The Contracting Governments undertake to continue a service of ice patrol and a service for study and observation of ice conditions in the North Atlantic. Further, they undertake to take all practicable steps to ensure the destruction or removal of derelicts in the northern part of the Atlantic Ocean east of the line drawn from Cape Sable to a point in Latitude 34° N., Longitude 70° W., if this destruction or removal is considered necessary at the time.

The Contracting Governments undertake to provide not more than three vessels for these three services. During the whole of the ice season they shall be employed in guarding the south-eastern, southern and south-western limits of the regions of icebergs in the vicinity of the Great Bank of Newfoundland for the purpose of informing trans-Atlantic and other passing vessels of the extent of this dangerous region; for the observation and study of ice conditions

in general; for the destruction or removal of derelicts; and for the purpose of affording assistance to vessels and crews requiring aid within the limits of operation of the patrol vessels.

During the rest of the year the study and observation of ice conditions shall be maintained as advisable, and one vessel shall always be available for the search for and destruction or removal of derelicts.

Article 37.

ICE PATROL. MANAGEMENT AND COST.

The Government of the United States is invited to continue the management of these services of ice patrol, study and observation of ice conditions, and derelict destruction and removal. The Contracting Governments specially interested in these services, whose names are given below, undertake to contribute to the expense of maintaining and operating these services in the following proportions:—

	Per cent.
Belgium	2
Canada	3
Denmark	2
France	6
Germany	10
Great Britain and Northern Ireland	40
Italy	6
Japan	1
Netherlands	5
Norway	3
Spain	1
Sweden	2
Union of Socialist Soviet Republics	1
United States of America	18

Each of the Contracting Governments has the right to discontinue its contribution to the expense of maintaining and operating these services after the 1st September, 1932. Nevertheless, the Contracting Government which avails itself of this right will continue responsible for the expense of working up to the 1st September following the date of giving notice of intention to discontinue its contribution. To take advantage of the said right it must give notice to the other Contracting Governments at least six months before the said 1st September; so that, to be free from this obligation on the 1st September, 1932, it must give notice on the 1st March, 1932, at the latest, and similarly for each subsequent year.

If, at any time, the United States Government should not desire to continue these services, or if one of the Contracting Governments should express a wish to relinquish responsibility for the pecuniary contribution defined above, or to have its percentage of obligation altered, the Contracting Governments shall settle the question in accordance with their mutual interests.

The Contracting Governments which contribute to the cost of the three above-mentioned services shall have the right by common consent to make from time to time such alterations in the provisions of this Article and Article 36 as appear desirable.

Article 38.

SPEED NEAR ICE.

When ice is reported on, or near, his course, the master of every ship at night is bound to proceed at a moderate speed or to alter his course so as to go well clear of the danger zone.

Article 39.

NORTH ATLANTIC ROUTES.

The practice of following recognised routes across the North Atlantic in both directions has contributed to safety of life at sea, but the working of these routes should be further investigated and studied with a view to the introduction of such variations as experience may show to be necessary.

The selection of the routes and the initiation of action with regard to them is left to the responsibility of the steamship companies concerned. The Contracting Governments will assist the companies, when requested to do so, by placing at their disposal any information bearing on the routes which may be in the possession of the governments.

The Contracting Governments undertake to impose on the companies the obligation to give public notice of the regular routes which they propose their vessels should follow and of any changes

made in these routes; they will also use their influence to induce the owners of all vessels crossing the Atlantic to follow, so far as circumstances will permit, the recognised routes, and to induce the owners of all vessels crossing the Atlantic bound to or from ports of the United States via the vicinity of the Great Bank of Newfoundland to avoid, as far as practicable, the fishing banks of Newfoundland north of latitude 43° N. during the fishing season, and to pass outside regions known or believed to be endangered by ice.

The Administration managing the ice patrol service is requested to report to the Administration concerned, any ship which is observed not to be on any regular, recognised or advertised route, or which crosses the above-mentioned fishing banks during the fishing season, or which, when proceeding to or from ports of the United States, passes through regions known or believed to be endangered by ice.

Article 47.

DIRECTION-FINDING APPARATUS.

Every passenger ship of 5,000 tons gross tonnage and upwards shall, within two years from the date on which the present Convention comes in force, be provided with an approved direction-finding apparatus (radio compass), complying with the provisions of Article 31 (17) of the present Convention.

Annexe I.

Regulation XLVI.

TRANSMISSION OF INFORMATION.

The transmission of information regarding ice, derelicts, tropical storms or any other direct danger to navigation is obligatory. The form in which the information is sent is not obligatory. It may be transmitted either in plain language (preferably English) or by means of the International Code of Signals (Wireless Telegraphy Section). It should be issued **CQ** to all ships, and should also be sent to the first point of the coast to which communication can be made with a request that it be transmitted to the appropriate authority.

All messages issued under Article 34 of the present Convention will be preceded by the safety signal **TTT** followed by an indication of the nature of the danger, thus: **TTT** Ice; **TTT** Derelict; **TTT** Storm; **TTT** Navigation.

INFORMATION REQUIRED.

The following information is desired, the time in all cases being Greenwich Mean Time:—

(a) ICE, DERELICTS AND OTHER DIRECT DANGERS TO NAVIGATION.

- (1) the kind of ice, derelict or danger observed;
- (2) the position of the ice, derelict or danger when last observed;
- (3) the time and date when the observation was made.

(b) TROPICAL STORMS.—(Hurricanes in the West Indies, Typhoons in the China Seas, Cyclones in Indian waters, and storms of a similar nature in other regions.)

(1) A STATEMENT THAT A TROPICAL STORM HAS BEEN ENCOUNTERED.

—This obligation should be interpreted in a broad spirit, and information transmitted whenever the master has good reason to believe that a tropical storm exists in his neighbourhood.

(2) METEOROLOGICAL INFORMATION.—In view of the great assistance given by accurate meteorological data in fixing the position and movement of storm centres, each shipmaster should add to his warning message as much of the following meteorological information as he finds practicable:—

- (a) barometric pressure (millibars, inches or millimetres);
- (b) change in barometric pressure (the change during the previous two to four hours);
- (c) wind direction (true not magnetic);
- (d) wind force (Beaufort or decimal scale);
- (e) state of the sea (smooth, moderate, rough, high);
- (f) swell (slight, medium, heavy) and the direction from which it comes.

When barometric pressure is given the word “millibars”, “inches” or “millimetres”, as the case may be, should be added to the reading, and it should always be stated whether the reading is corrected or uncorrected.

When changes of the barometer are reported the course and speed of the ship should also be given.

All directions should be true, not magnetic.

(3) TIME AND DATE AND POSITION OF THE SHIP.—These should be for the time and position when the meteorological observations reported were made and not when the message was prepared or despatched. The time used in all cases should be Greenwich Mean Time.

(4) SUBSEQUENT OBSERVATIONS.—When a master has reported a tropical storm it is desirable, but not obligatory, that other observations be made and transmitted at intervals of three hours, so long as the ship remains under the influence of the storm.

EXAMPLES.

ICE.

TTT Ice. Large berg sighted in 4605 N., 4410 W., at 0800 G.M.T. May 15.

DERELICT.

TTT Derelict. Observed derelict almost submerged in 4006 N., 1243 W., at 1630 G.M.T. April 21.

DANGER TO NAVIGATION.

TTT Navigation. Alpha lightship not on station. 1800 G.M.T. January 3.

TROPICAL STORM.

TTT Storm. Experiencing tropical storm. Barometer corrected 994 millibars, falling rapidly. Wind N.W., force 9, heavy squalls. Swell E. Course E.N.E., 5 knots. 2204 N., 11354 E. 0030 G.M.T. August 18.

TTT Storm. Appearances indicate approach of hurricane. Barometer corrected 29.64 inches falling. Wind N.E., force 8. Swell medium from N.E. Frequent rain squalls. Course 35°, 9 knots. 2200 N., 7236 W. 1300 G.M.T. September 14.

TTT Storm. Conditions indicate intense cyclone has formed. Wind S. by W., force 5. Barometer uncorrected 753 millimetres, fell 5 millimetres last three hours. Course N. 60 W., 8 knots, 1620 N., 9302 E. 0200 G.M.T. May 4.

TTT Storm. Typhoon to south-east. Wind increasing from N. and barometer falling rapidly. Position 1812 N., 12605 E. 0300 G.M.T. June 12.

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.

CURRENTS, FLOATING ICE AND WEATHER CONDITIONS ALONG THE TRACKS FROM LATITUDE OF THE PLATE TO CAPE HORN.

The following remarks are in reply to the notes under this heading which were published on page 27, Volume VI, No. 62.

Captain J. Ross,—M.V. *Losada*.

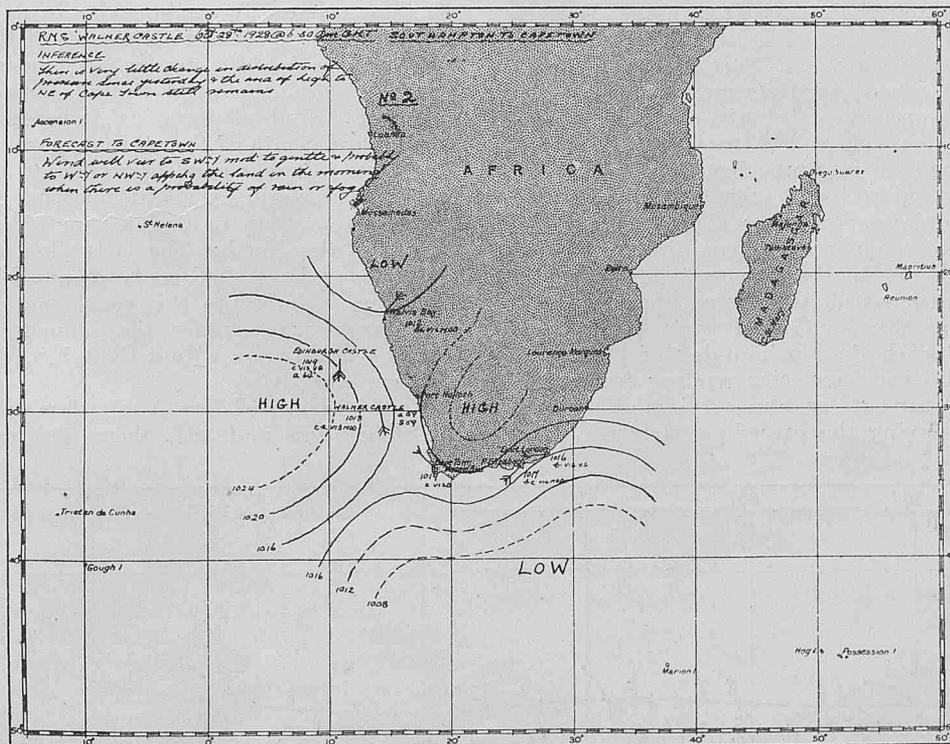
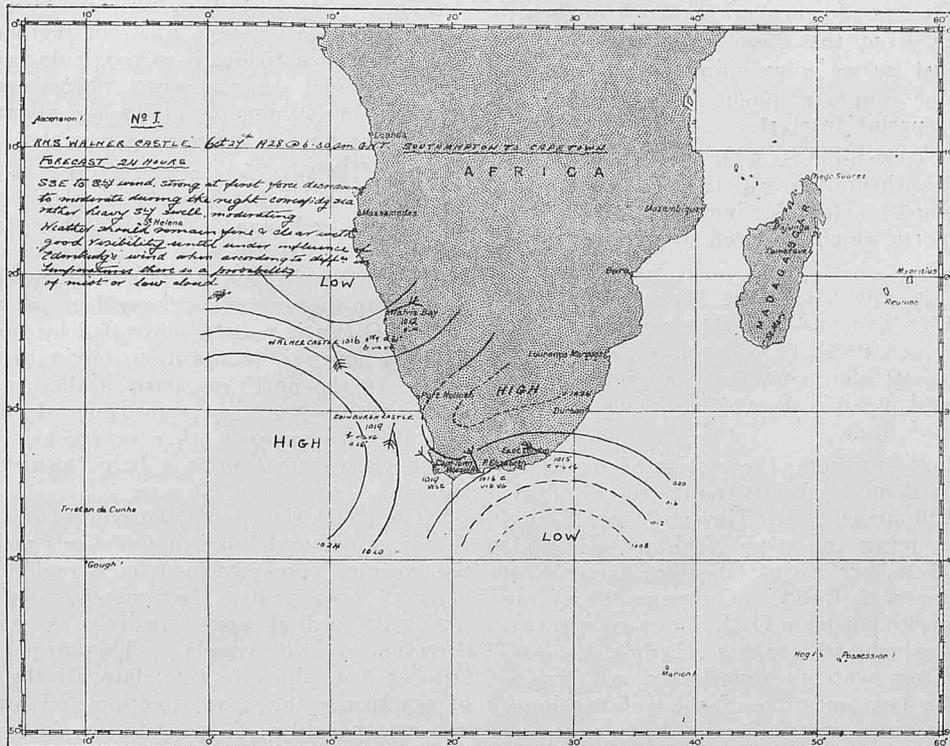
“I have read with great interest your notes in the January and February numbers of the *MARINE OBSERVER*.

“I regret that I cannot speak from lengthy or continuous experience of the Currents, Ice and Weather conditions met with on the track between the River Plate and Cape Horn, as since the Panama Canal was opened, the ships of this Line only make occasional voyages, in the Wool season, via Magellan Straits and Falklands.

“Since 1923, in three passages I have made homewards in the months of March and April from Magellan Straits to U.K., I have found the current nil or running as charted, except that in January of this year a S.E. set of eight miles was experienced for 24 hours

South African Waters.

Weather Charts made at sea on board S.S. *Walmer Castle*, Captain W. MORTON BETTS, Southampton to Cape Town, by Mr. G. H. PICKERING, 3rd Officer.



According to *Walmer Castle's* Meteorological Report, the wind was S.S.E. force 6 during the 27th October, moderating to force 5 at midnight and force 4 at 4 a.m. on 28th October. Patches of fog were experienced from 5 a.m. to 8 a.m. 28th. Approaching Cape Town at 5 a.m. on the 29th October wind became light and variable with distant fog banks and much low cloud.

EXCHANGE OF W/T WEATHER REPORTS BETWEEN THE GERMAN S.S. "KÖLN," N.D.L. BREMEN (CAPT. VOGT) AND OTHER SHIPS.

By Captain EMIL BOY-ED.

The following account of Wireless Meteorological Work on board a German ship on a passage from the Cape of Good Hope to Australia in 1927, received just as we were going to press, from Captain L. SCHUBART, Marine Superintendent of the German Meteorological Service, is of special interest.

Captain EMIL BOY-ED of the German S.S. *Köln* shows how useful the practice of Wireless and Weather as an aid to Navigation may be and he makes a very strong case for the inclusion of set and drift of current in routine reports which has been so strongly advocated in these pages.

Referring to Volume V, No. 58, page 205, of the MARINE OBSERVER, a weather chart for 0000 G.M.T., October 7th, 1927, will be found, made on board S.S. *Baradine*, Captain W. ROLLO, by Mr. C. B. ROCHE, Chief Officer, giving proof that the weather charts which Captain EMIL BOY-ED considered possible were actually being made in some ships at sea.

At the time Captain EMIL BOY-ED wrote, the custom of reporting Apparent Noon observations predominated, but thanks to the efforts of British "Selected Ships" Routine G.M. Times of observation which synchronize are now becoming the established custom in all oceans. For information of these, see Ships' Weather Signals in the January, 1929, number, pages 17 to 19. On page 199 of the October, 1928, number the proposed uniform G.M. Times of observation for all parts of the world which will make a schedule for communication fitting W/T operators watches practicable, are given. These will be considered at the next meeting of the International Marine Meteorological Commission as stated in the Marine Superintendent's note in this number.

TRANSLATION.

"The German S.S. *Köln* and the British S.S.'s *Baradine*, *Mahia*, *Ulysses* and *Nuddea* were making their way from Cape Town to Australia. The destination of S.S. *Sörvard* (October 3rd) was not given in the W/T message picked up; S.S. *Port Hobart* (October 10th) was bound for Suez on her homeward voyage.

"W/T weather reports were exchanged between the first three of the above-named vessels from September 26th to October 9th, i.e., for 14 days; S.S. *Ulysses* joined in on September 29th, whilst S.S. *Nuddea* only sent out weather reports on September 28th and 29th.

"As S.S. *Nuddea* was two days' reckoning ahead of the other vessels, the exchange of weather reports between this vessel and those behind her would have been to their mutual advantage, in that the vessels following astern would have been informed of the weather conditions ahead, and the *Nuddea* of those astern. The W/T reports were exchanged each day at mid-day and gave the position and weather for that time, barometer reading (corrected), direction and force of wind, state of sea and swell, and at times also the shift of the current during the preceding 24 hours. Thus

there was a constant exchange of meteorological observations which provided information as to the weather prevailing in the neighbourhood to captains of the various ships. No less than 57 W/T telegrams were transmitted during the period in which the exchange of W/T weather reports was undertaken by the above-mentioned vessels.

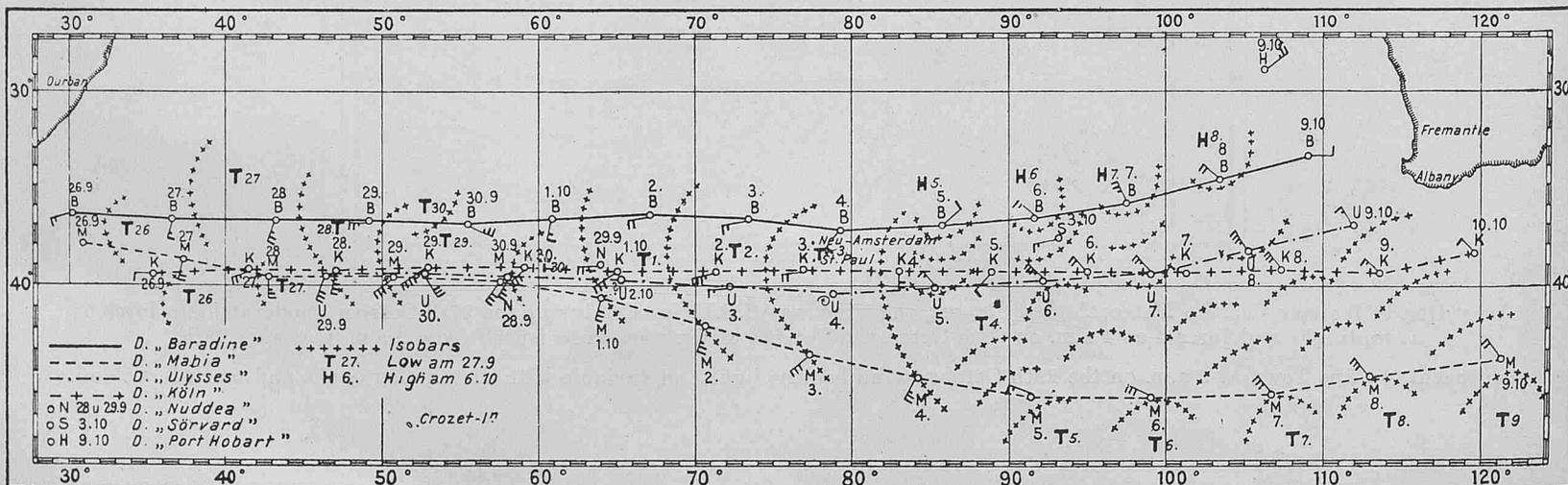
"This is a practice to be commended and one which can be of advantage to all vessels when in regions where a knowledge of the atmospheric conditions is of particular value, for instance, in regions where tropical storms occur. Ships' captains should make it their very particular duty to utilize the advantages of W/T to the fullest possible extent in these regions, since it adds greatly to the safety of navigation.

"The route of the different vessels given in the sketch clearly shows that by an exchange of W/T weather reports on the lines indicated, weather information over a vast area can be obtained to the advantage of every ship in the area. In the case under consideration this hardly applies since the weather in these latitudes over the S. Indian Ocean is mostly controlled by fresh to strong westerly winds. It may, however, be useful to navigators to know what the weather is like to the north or south of their position. It is also quite as important to know the conditions of current to be met with, since they differ from each other very considerably in different latitudes, and such information is a help towards the best utilisation of the currents.

"The sketch shows that the general weather conditions, particularly the direction and force of the winds met with by the vessels during the voyage, were governed by a region of low pressure which was of small area at first, but subsequently extended very considerably and advanced at approximately the same speed and in the same direction as the vessels. This appears particularly marked on October 3rd, since on this date all the vessels report a west wind of practically the same direction and force, the distance between the two extreme ships, *Sörvard* to the East, and the *Ulysses* to the West, being about 1,050 nautical miles.

"From the different directions of the wind encountered by the first-named vessels on September 26th and 27th it is evident that there must have been two lows lying closely side by side. On September 28th they apparently combined to form a more extensive low, since all the vessels report a wind almost of the same direction and force, including the *Nuddea* nearly 500 nautical miles to the East. On September 30th, the wind shifted, *Baradine* and *Ulysses* report a S.E.-S.S.E. wind of force 5-6, whereas the three other vessels to the East and South of the others report a S.W.-W. wind of force 5-6. From these different wind directions it may be concluded that either the low split again, one half forming a second low to the rear of the first two vessels, or that a new wedge of low pressure thrust its way in on the North. The latter low either could not persist for long—it may have dispersed—or possibly its rate of advance was slow. One is forced to this conclusion since on October 1st all the vessels were again under the influence of a uniform low. The *Baradine* in a region with a light S.S.W. wind feeling this influence only very slightly.

"As the islands of New Amsterdam and St. Paul were approached on October 2nd and 3rd, there was no noticeable change in the



weather or in the low, in spite of the fact that usually the presence of land such as these islands, in the path of a vessel, has an effect on the low and consequently also on the wind. It was only after these islands had been passed, from October 3rd to 4th, that any change occurred in the hitherto persistent easterly direction of the wind within the low. The low shifted in a south-easterly direction into which it was forced apparently by a high approaching from the north, and as yet not felt by the *Baradine* which was farthest to the North although its full force was to be experienced the following day. A more comprehensive idea of the weather conditions as a whole in this region was obtained only on October 5th, solely because the *Mahia* changed to a more Southerly course. The high which had become noticeable on October 4th pushed the low almost due South up to mid-day on October 5th, so that its centre at this time was still to the south of *Mahia*, whereas the vessels to the North were in the region dominated by the high. From October 5th to 9th, the two lows moved practically parallel to each other in an easterly direction, and imparted a uniform character, to the weather conditions as a whole.

"The shift of the low which began on October 3rd, and was first in a S.E. direction and from the 4th to 5th almost due South, may, however, also be regarded as the consequence of the air masses in front of the low being banked up before the coast of Australia, the obstruction presented by this large continent causing the deviation of the low in the South direction, particularly since after passing the obstruction, the low appears to have resumed the due Easterly direction.

"It has not been possible in this paper to compare the daily observations on currents, since only those of S.S. *Köln* are available. The other vessels included the results of observations of currents only spasmodically in reports, and besides being scarce the information is so conflicting as to be of no real value. For this reason none of these observations are given. We can point out, however, that when analysing observations of currents in order to obtain the shift of the current in a clear and definite manner, all the forces which have to be taken into account in maintaining an accurate course must be traced back. If the reduction of the inferred values is not carried out the result obtained is incorrect and leads to false and therefore valueless conclusions. It is up to those in command of ships to supply such material for a continuous check on the existing current charts and those still in preparation, since no other sources are available. For this reason it is to their own interest to find out the actual shift of the currents so that practical application of the knowledge gained can be made later on.

"The author hopes that the above account of the exchange of W/T weather reports between the vessels referred to may prove an incentive for others to do the same over other ocean routes, so that weather charts can be drawn up on board these vessels similar to the one shown in the present article. With plenty of material it would naturally be possible to extend these weather charts considerably, so as to give a comprehensive whole on lines similar to the weather charts published from meteorological stations."

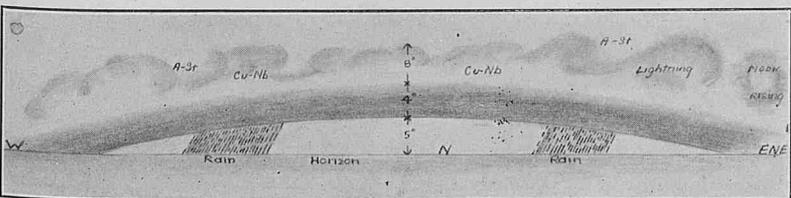
SQUALL.

North Atlantic Ocean.

THE following is an extract from the Meteorological Log of S.S. *Northumberland*, Commander H. L. UPTON, D.S.C., R.D., R.N.R., Colon to London, Observer Mr. W. J. GLASSBOROW, 3rd Officer.

"October 3rd, 1928, 9.15 p.m. (October 4th 0045 G.M.T.). Observed well defined arch of cloud extending from the west point of horizon through north to east-north-east, approximate angular dimensions given in accompanying sketch.

"Temperature Air, Dry Bulb 80.2° F., Wet Bulb 77.3° F. Wind W.N.W., force 3-4. 9.25, Wind N.N.W., force 4, vessel approaching

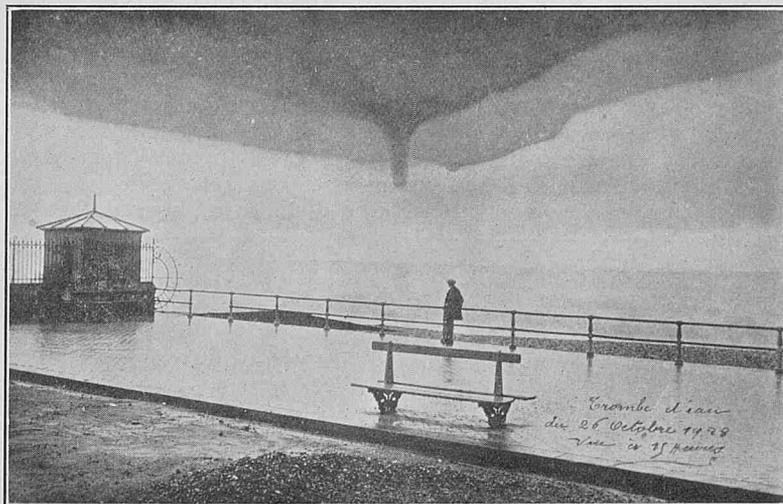


arch. 9.28, Cloud overhead, wind N. by E., force 4-5 Temperature, Dry 78° F. Rain visible ahead and astern, vivid lightning. 9.36, overcast (St-Cu/Cu-Nb), arch of cloud still visible on horizon to the southward. Temperature, Dry Bulb 77.2° F., Wet Bulb 74.8° F. Barometer 1018.3 mb. (fall of 1.2 mb.)."

CLOUD PENDANT AND RAIN CLOUDS.

Dieppe, France.

THE accompanying photographs have been received from Captain S. MARMERY, S.S. *Worthing*, Cross Channel Service, Newhaven to Dieppe.



The first photograph was taken from the West end of the front at Dieppe at 1500 G.M.T. on 26th October, 1928, looking N.W. There was a flat calm at the time.

The second photograph was taken at 1504 G.M.T.

WATERSPOUTS.

Mediterranean Sea.

THE following is an extract from the Meteorological Report of S.S. *Clan Ranald*, Captain R. K. FRASER, Birkenhead to Colombo, Observer Mr. K. G. TUCKER, 3rd Officer.

"October 6th, 1928, at 0702 G.M.T., Latitude 36° 49' N., Longitude 1° 50' E., a waterspout was observed bearing North distant 3 miles; when it was first observed it was in a straight line from clouds to sea surface. The cloud at its summit was Cu-Nb.; the rest of the sky

had slight Ci-St. It was travelling in an anti-clockwise direction and broke just off surface; the top half of the waterspout moved with clouds to the Westward, while the lower half stayed in the same position. When the top of the waterspout was roughly 60°-70° to the base, a white Cu. cloud formed at its summit and worked to half way down, then disappeared; the disturbance on the sea surface ceased four minutes after the Cu. cloud disappeared."

Mediterranean Sea.

The following is an extract from the Meteorological Report of S.S. *Malwa*, Captain W. A. NORMAN, London to Yokohama, Observer Mr. F. D. SHAW, 4th Officer.

"At 1440 (S.T.) on October 13th, when proceeding S. 59° E. at 16 knots, observed dense Cu-Nb. approaching from S.W. (Wind W.S.W. 2) and beneath it, apparently on the horizon, two small cloudlike objects at a short distance apart. Then shortly afterwards (1441) noticed two buds of smooth formation projecting from the rather ragged base of the cloud, immediately over the surface commotions. These two latter, during the next 5 minutes assumed the appearance shown in FIG. 1, while the surface commotion increased and drew appreciably nearer. Very gradually the two waterspouts depended downwards, while two threads from their lower portions extended downwards into the sea, each into the centre of one of the commotions. The distance off seemed then to

gradually subsided; and an internal upward motion of their lower portions became distinctly visible so that they assumed the forms shown in FIG. 4, being blown out like streamers in the direction to which the wind was blowing. Meanwhile a third spout had commenced to form in a precisely similar manner about a mile away. This third spout assumed very much the shape and appearance of the second, having a pale core and a fairly normal waterspout outline. Its angular height was about 10°. The first two waterspouts withdrew into the cloud, while the third passed through all the phases undergone by its larger companions. One other spout formed as the cloud passed astern of the vessel but was short-lived. After the passage of the cloud some rain fell for seven minutes—when the weather cleared—and the phenomena were followed by thunder and lightning from the N.N.W. Many migratory birds (chiefly martins) appeared from the north during and after the passage of the cloud.

"Barometer Readings:—Noon, 29.846 in., 1445—29.788 in., 1454—29.777 in., 1540—29.770 in., 1630—29.769 in., Therm. 71° F. Wind W.S.W. 3, freshening on passage of cloud to force 5, and veered at 1615 to N.W. by W. 5—1634—heavy rain commenced until 1644, after which frequent rain squalls thunder and lightning."

SQUALL AND WATERSPOUTS.

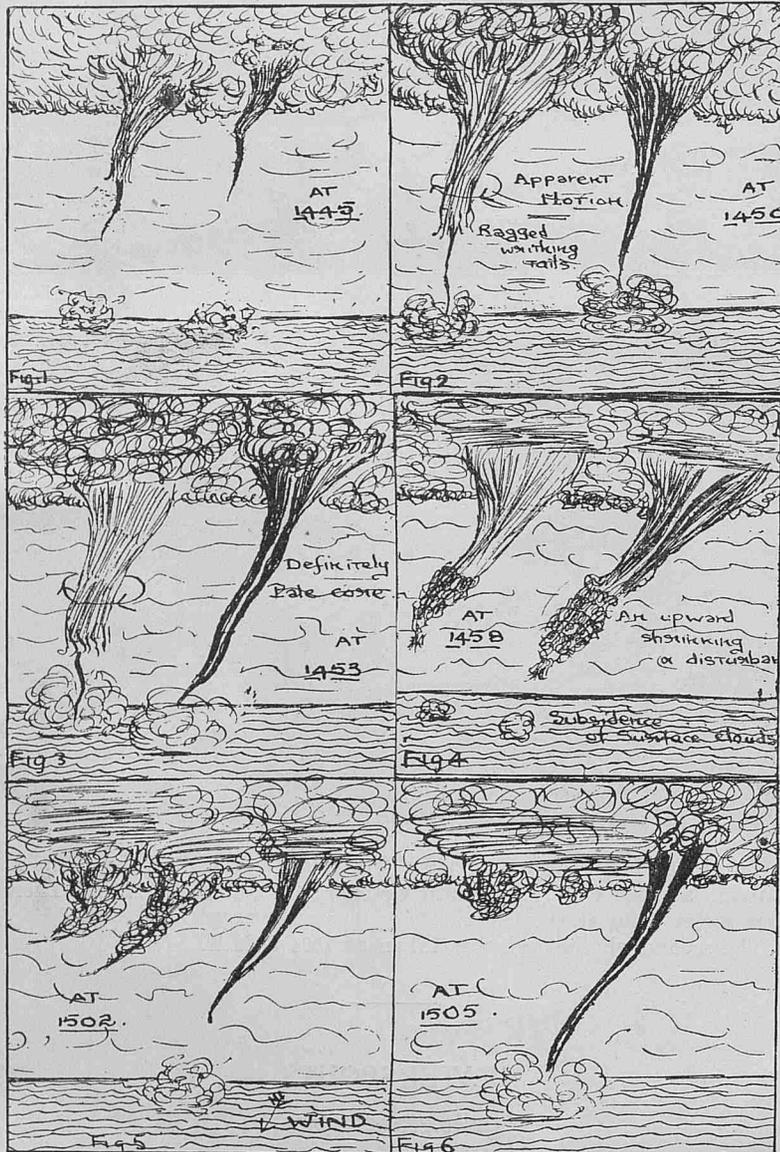
Mediterranean Sea.

The following is an extract from the Meteorological Log of S.S. *Clan Malcolm*, Captain L. S. GEORGE, Port Said to London, Observer Mr. J. F. HUBBARD, 3rd Officer.

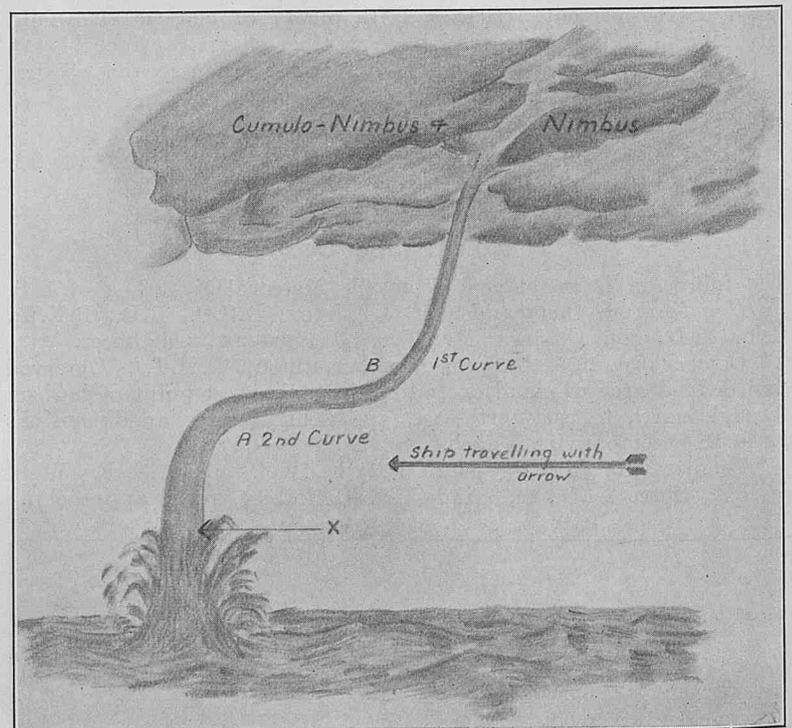
"October 16th, 1928, 8.05 A.T.S. 21 miles North of Cape Tenez, a squall extending as a distinct line from horizon to horizon passed over the vessel, in a S.E. direction. Wind increased from force 3 to 5. Barometer 1018.2 mb. 8.9 A.T.S. squall rapidly approaching land. 8.10 A.T.S. observed three patches of disturbed water in S.S.E. direction, and then observed clouds forming into three conical points directly over disturbed areas of water. These points slowly extended until they resembled long tails pointing earthwards, and as they neared the water, the latter appeared to rise to form contact, which being completed, the water subsided and the tails of cloud being slowly drawn skywards again. Each tail of cloud appeared to be less dense through its centre than on the outside edges. The phenomenon lasted 20 minutes and was followed by a light rain squall."

Indian Ocean.

The following is an extract from the Meteorological Report of S.S. *Alipore*, Captain H. ELLIS SMITH, Colombo to East Indies, Observer Mr. C. H. STOKES, 4th Officer.



be about 3½ miles. Five minutes later (1455—FIG. 3) the two spouts had assumed very dissimilar forms. One had an appreciable vertical motion in the direction shown in FIGS. 2 AND 3, and was of very thick appearance, the other was blacker, thinner and longer, and had a definitely paler core extending throughout its length. When about 2 miles distance (angular height 7°) both simultaneously commenced to retract from the surface, the commotions of which



"October 6th, 1928, Noon A.T.S., Latitude $4^{\circ} 08' S.$, Longitude $100^{\circ} 39' E.$ Cloudy to overcast (Cu.Nb. and Nb. 8 to 9). Frequent heavy rain throughout morning. A large waterspout began to form on Starboard quarter in close proximity to ship. The disturbance seemed to commence at the water, the first impression being that a cloud of steam was rising from the sea. The spout, while forming, travelled along at the speed of the ship, keeping its relative bearing. When actually formed, it assumed a curious shape (as in diagram), having two right-angled curves (A and B) and flowing for a short distance perfectly horizontally. The whistle was blown in an attempt to break the spout, it being so close, but with no noticeable result. After lasting about seven or eight minutes the break came at the position X and the column of water disappeared. It was quite possible to see the water falling into the sea as the tube gradually worked upwards."

The diagram is supposed to illustrate the appearance of the waterspout when at its maximum.

X=Point at which the waterspout broke and working upwards disappeared.

THE WEATHER AT ST. HELENA BAY, CAPE COLONY.

From 17th October, 1928, to 19th January, 1929.

The following is an extract from the Meteorological Log of H.M.S.A.S. *Protea*, Lieutenant-Commander J. DALGLEISH, S.A.N.S., Observer Lieutenant F. J. DEAN, S.A.N.S.

"From the time of the ship's arrival at St. Helena Bay on the 17th October, light S.W'y winds were experienced during the early mornings and forenoons.

"From 2.30 p.m. to 3.00 p.m. the wind generally backed to the southward and south-east, freshening very quickly.

"No indication was noticed of any change in pressure, so that the Barometer could not be definitely used as a guide, as to when this wind would freshen.

"During October this afternoon wind had freshened to Force 5-6 by 5.00 p.m. moderating again to a light breeze by midnight.

"Later in the season towards the end of November, this afternoon breeze came away usually before 2.00 p.m. freshening much quicker than earlier in the season; often blowing a moderate gale, Force 7, and on several occasions to Force 8 and 9, and even 10 during the squalls. At this time and as the season advanced, this breeze continued blowing till 4.00 a.m. the following morning.

"During these strong winds the Barometer read between 1008 mb. and 1020 mb. which is nearly the full range of the barometer during the above mentioned period.

"It is suggested that, in most cases, these afternoon winds are of a purely local character; caused, quite possibly, by the warm air rising from the heated sandy country which extends for approximately twenty miles inland.

"Shore parties found the reflected heat from the sand dunes during the forenoon very intense. The heat of the sand itself being so great that the men were unable to go barefooted.

"During the time these winds were blowing attempts were made, on many occasions, to plot from the reports of various stations and ships, but only later in the season (January) with exceptionally high winds, could the local conditions be made to form any part of the usual atmospheric disturbances, and even then in no very definite degree.

"During January, when the winds continued throughout the night and often into the following day, it was considered that they were not the same local winds as above mentioned, but rather part of the seasonal S.E. gales experienced at the Cape, at this time of the year.

"Usually, for half an hour before these afternoon breezes came away, vivid mirage was observed along the whole coasts of the bay. (The air often showing saturation by hygrometer.)

"The mirage usually began low down on the sand dunes but often later throwing hills 700 feet in height into the most fantastic shapes. This mirage on several occasions was so vivid that the work of surveying had to be suspended.

"On several occasions, with the afternoon winds of Force 6-7 thick dust storms were experienced. These dust storms were always of such a density as to make a bad landfall for any ship making the bay or the high mountains of the Piket Berg range.

"In several cases, as noted in the log, visibility became so low, in one case as low as three hundred yards, that a ship entering the bay would have to navigate with great caution, and in the case of a stranger, it would be safer to lay off for an hour or two, till the wind moderated, and the visibility became better.

"Up till January the weather was very clear, with the exception of one day when light mist was experienced during the morning. Generally the visibility was very good and often exceptional; the sky being usually cloudless except when the afternoon wind reached Force 7 and above, when torn cirrus was observed at a very high altitude.

"In February fog was experienced, beginning early in the month, in the late evening and early morning continuing till 10.00 a.m. in the morning.

"Later in the month, towards the end of the period reviewed, the fog often continued till noon or 1.00 p.m."

AURORA BOREALIS.

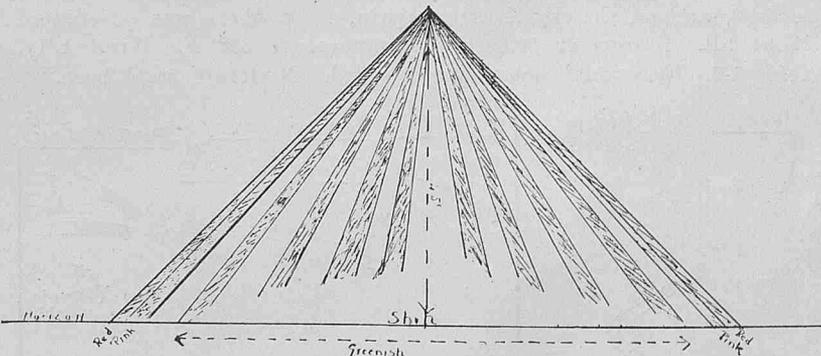
North Atlantic.

The following report has been received from S.S. *Montrose*, Captain J. F. DOTT, Southampton to Canada, Observer Mr. J. A. COLDWELL, 4th Officer.

"On the morning of the 18th October, 1928, at 0800 G.M.T., steering West (true) in Latitude $50^{\circ} 00' N.$, Longitude $61^{\circ} 30' W.$, wind W.N.W., force 3, barometer 1020.6 mb., a faint glow of a greenish colour was observed ahead. In a North Easterly direction a similar light was visible and rising to an altitude of 45° . Bright rays of a reddish and greenish colour were then observed in a cone shape from an altitude of 45° and in a South West and North East direction. These rays then spread in a cone shape with the peak of the cone at an altitude of 45° with bright red and pink rays in a North East and South West direction and green in all other directions and lasted till 0930 G.M.T., when they partly disappeared, leaving only half a cone from North East through South to South West.

"As dawn broke the rays gradually disappeared. The sky was cloudless and stars very brilliant and visibility abnormal.

"Daylight broke with a few high scattered cirrus clouds and low dawn. Throughout the morning visibility was abnormal with slight mirage."



AURORA AUSTRALIS.

Australian Waters.

The following is an extract from the Meteorological Report of S.S. *Waiotapu*, Captain D. TODD, Los Angeles to Wellington, N.Z., and Australia, Observer Mr. F. H. G. CLARK, 3rd Officer.

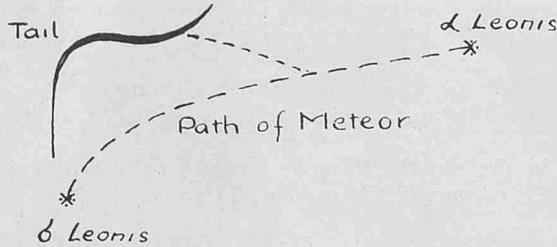
"On Thursday evening, 18th October, 1928, when off Montague Island on N.S. Wales coast of Australia, Aurora Australis was visible to the Southward over an arc of 8 points from S.E. to S.W. Whole sky blood red over this arc from 8.50 p.m. to 9.00 p.m. N.S.W. Standard Time and sky tinted from then onwards until 11.40 p.m."

METEORS.

North Atlantic Ocean.

THE following is an extract from the Meteorological Log of S.S. *Newfoundland*, Captain A. W. FOXWORTHY, Halifax to Boston, Observer Mr. R. F. HANDLEY, 2nd Officer.

"October 22nd, 1928, at 0800 G.M.T., Latitude 42° 46' N., Longitude 68° 15' W. Observed a brilliant meteor originating at α Leonis and travelling to β Leonis. Exceptionally brilliant and on apparent contact gave off a perfect display of stars. The tail closed over β Leonis in following manner—



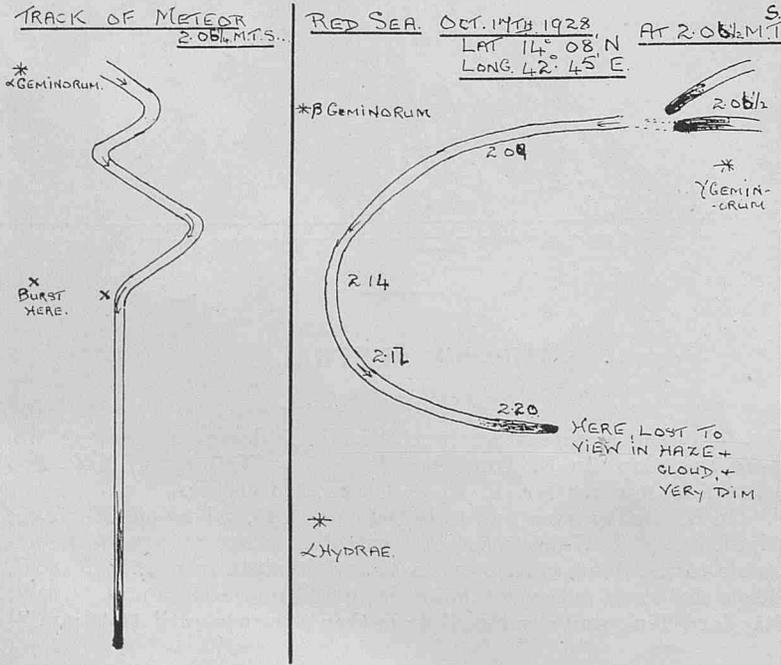
"This tail was visible for at least 5 seconds when it then began to waver a little, and a light cirrus film covered it. The sky fine and clear with this very thin cirrus from S.W. slowly passing over."

Red Sea.

THE following report has been received from S.S. *Novara*, Captain A. J. MORTON, Suez to Aden, Observer Mr. C. H. MOULTON, 2nd Officer.

"17th October, 1928, at 2.06½ M.T.S., in Latitude 14° 09' N., Longitude 42° 46' E., observed meteor near α Geminorum, which travelled in a zig-zag manner, appearing to burst as shown in accompanying sketch. On bursting there was much brilliance, the whole heavens being lit up as by a flash of forked lightning. The meteor then travelled directly downwards, disappearing from view about 15 degrees above the horizon.

"At 2.06½, what appeared to be two tails were observed near γ Geminorum, which quickly converged, quite bright at first and travelling quickly, gradually diminishing in speed and intensity. Rough idea of its track is shown in diagram. It was lost to view at 2.20, and on the sky clearing again, later, there was no sign of it at all. Barometer 30.00 in. Temperature 89° F. Wind E'ly, force 1-2. Occasional hot gusts of wind. Moderate sand haze."



NOTE.—In the case of the bright meteor near α Geminorum the sinuous curve was probably the end of the meteor's free flight through the atmosphere, the vertical drop after the point at which it burst being the falling to earth of the remnants under the force of gravity only. The second meteoric phenomenon was a very remarkable one and no explanation can be offered. It well deserves to be placed on record.

Indian Ocean.

THE following is an extract from the Meteorological Report of S.S. *Forsdale*, Captain A. V. RICHARDSON, Melbourne to Port Said, Observer Mr. F. VAUGHAN, 3rd Officer.

"October 25th, 1928, 9.50 p.m. A.T.S., Latitude 3° 10' S., Longitude 72° 02' E. Observed a meteorite bearing approximately N.W. x W. Came into view at Alt. 30° 00' and disappeared at Alt. about 7°. Duration of flight about 2 seconds. This was seen through a veil of Ci-St cloud and appeared as a broad band of whitish green bordered on each side by a band of dark red-brown. At the same time a lunar halo was observed 22°, no colours visible."

North Pacific Ocean.

THE following is an extract from the Meteorological Log of S.S. *Protesilaus*, Captain T. W. QUIRK, Yokohama to Victoria, B.C., Observer Mr. E. A. H. GEPP, 4th Officer.

"25th October, 1928, at 4.22 a.m. (A.T.S.), 1559 G.M.T., in a dead reckoning position of Latitude 48° 14' N. and Longitude 178° 43' W., observed a very brilliant meteor to the North and North Eastward.

"This meteor made its appearance near the constellation of Cassiopeia and travelled rapidly, in a large arc, towards the star *Ursae Majoris* (*Benetnasch*), near which a portion of the meteor, in size approximately one quarter of the whole, apparently split off the main body. The meteor then disappeared, leaving the small portion referred to visible for a further half second, travelling on in the same direction.

"The time of flight was three seconds, the meteor, having a brilliancy equal to that of Venus, illuminating a large portion of the heavens. In flight the meteor left a brilliant but rapidly disappearing trail behind it. The sky to the North and North Eastward was clear at the time, and the whole passage of the meteor was plainly observed.

"Weather at time of observation: Wind N.W., force 4, temperature (dry bulb) 41.5° F., clouds Cu/Cu-Nb., N.W. 2, amount 4, visibility 8, with passing hail squalls.

"Several other meteors, moving in the same general direction, but of lesser brilliancy, were observed during the watch."

NIGHT VISIBILITY.

Near Singapore.

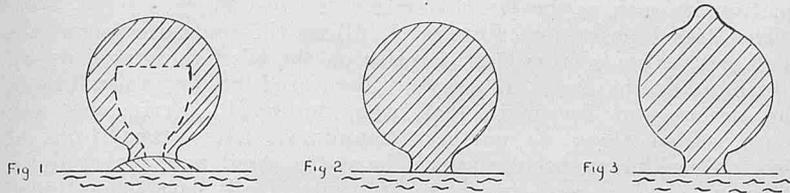
THE following is an extract from the Meteorological Log of S.S. *Marella*, Captain S. MORTIMER, Australian Ports to Singapore, Observer Mr. A. G. HILL, 2nd Officer.

"29th October, 1929, at 2.49 a.m. Saya Island abeam 8.1 miles. Cloudy but abnormally clear weather. The outline of the hills and Mt. Lanjut (1,688 ft.) on Singkep Island were clearly visible to the naked eye at a distance of 40 miles. The latter was frequently used for one of 3 line cross bearings. Although the moon was two days after full, and consequently very bright, I have never seen these conditions before in four years."

ABNORMAL REFRACTION.

Red Sea.

THE following is an extract from the Meteorological Report of S.S. *Ningchow*, Captain H. E. BEALE, East Indies to Suez, Observer Mr. M. H. VINCENT, 4th Officer.



"12th October, 1928, 6.12 a.m. A.T.S., off the Daedalus Reef, at sunrise. Course 346, speed 11 knots. A mirage of the sun was observed at sunrise, lasting for about 20 seconds, of the form shown in FIGURE 1. Wind N.W. x N., force 4, air 79° F., sea 84° F., dry 79° F., wet 70° F., cloud Ci, small amount around eastern horizon, visibility 8. At sunset on October 10th and October 11th, slight distortions, lasting for about 5 seconds, were observed as shown in FIGURES 2 and 3."

FIG. 1. Sunrise October 12th.

The shaded portions were quite bright, while the white section in the centre was of little greater brilliancy than the surrounding sky.

FIG. 2. Sunset October 10th.

FIG. 3. Sunset October 11th.

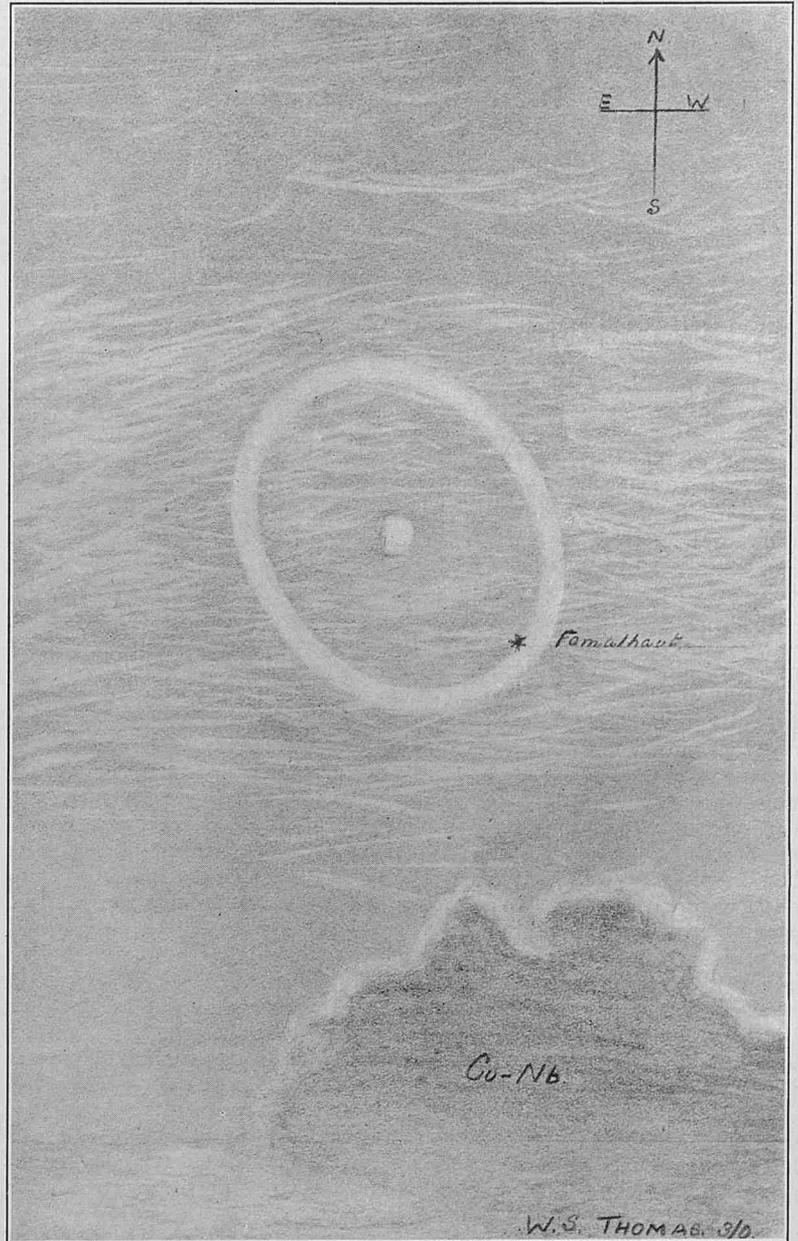
ELLIPTICAL LUNAR HALO.

North Atlantic.

THE following is an extract from the Meteorological Log of S.S. *Culebra*, Commander C. J. GOBLE, R.D., R.N.R., London to Bermuda, Observer Mr. W. S. THOMAS, 3rd Officer.

"25th October, 1928, 9.50 p.m. A.T.S. (0313 G.M.T.), Latitude D.R. 34° 08' N., Longitude D.R. 56° 33' W. A lunar halo was formed by the passage of a patch of Cirrus clouds across the moon. This phenomenon was specially interesting in that the halo took the distinct form of an ellipse. Careful measurements were taken and found to be as follows, viz.: Moon $\frac{3}{4}$ full. Altitude 48° bearing S.1° W. Halo major axis 25°, minor axis 20°. Temperature, dry bulb 75.4° F., wet bulb 72.4° F. Sea 76° F. Wind W.S.W., force 2. The halo maintained this elliptical form for about ten minutes."

NOTE.—Elliptical halos have occasionally been observed, but are among the rarest of halo phenomena.



ICE OF THE SOUTHERN OCEAN.

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

THE ice met with in the waters of the Southern Hemisphere constituting a menace to navigation may be divided into two broad classes, namely, land ice in the form of Bergs and sea ice in different forms arising from a common origin.

As will be seen from FIGURE 1 there are vast tracks within the Antarctic Continent remaining to be explored, and at the present time three expeditions are preparing to penetrate these unknown regions, using aeroplanes as a means of transport in place of the sledges used on previous expeditions.

During the British Antarctic Expedition 1910-13 a special study of the Meteorology and Glaciology of the Antarctic Continent was undertaken, and it is from the published works of this expedition that most of the data used in this article has been obtained.

The South Pole is situated on a snow covered Plateau, approximately 9,172 feet above sea level. The edge of the plateau is very steep and bordered on the Pacific side by a narrow range of high mountains which is intersected at right angles by numerous valleys leading down to the sea.

Formation of Land Ice.—Research on the formation of glaciers in the Antarctic 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 the diminution of 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 Neve. The subsequent change from Neve to Ice takes place in exactly the same manner as the change from snow to Neve. In the course of time the crystals grow so as to include the air cavities which in the form of Neve 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 Antarctic the process is a very slow one, years passing before the snowfall of any season is converted into ice. On the Ross Barrier, where the mean yearly temperature is about 15° F. below zero, it was found that at a depth of two feet the individual crystals still retained their form after a period of two years. Further south, on the Plateau at a height of over 9,000 ft. above sea level, since in the month of January the mean temperature was found to be 20° F. below zero, the change from snow to ice will take place much more slowly than on the Barrier.

Glaciers.—The King Edward VII Plateau on which the Pole is situated is covered with an ice sheet formed from snow in the above manner. This ice is flowing outwards in all directions, but mainly where its motion is least obstructed. The chief flow is therefore down the sloping valleys between the mountains fringing the Plateau in the form of glaciers.

The direction of movement of a glacier is governed by the direction of greatest slope and the thrust occasioned by the weight of the glacier higher up the slope.

When a glacier meets an obstruction it develops an increase of pressure from behind, causing the molecules within the ice to move away from the points of maximum strain. This in the case of the narrowing of the glacier bed causes the upper layers of ice of the glacier to move bodily over the layers below, thereby forming longitudinal pressure ridges and increasing the depth of the glacier. If an obstruction in the form of a transverse bank across the glacier bed is met, pressure ridges are formed parallel to and above the obstruction. Tension strains, such as when one portion of the glacier moves faster than the other, cause the ice to be divided by crevices or sheer cracks running at right angles or parallel to the general direction of flow respectively. When the ice of a glacier reaches the coast it continues to move seaward, its weight being taken by the ocean bed, until the water deepens sufficiently to make the ice buoyant when it becomes water-borne. Such an extension of glacier ice from the shore seaward is called an Ice Tongue.

Unlike the glaciers of North Polar regions those of the Antarctic, due chiefly to the lower summer temperature of both sea and air, have floating ice tongues extending for many miles seaward at right angles to the coast bounded on their seaward side by vertical cliffs varying in height from a few feet to 160 feet. The longest ice tongue yet discovered is the Termination Tongue on the coast of Mary land which projects seaward for a distance of about 200 miles. The rate of advance of individual glaciers in the Antarctic varies

considerably, but it is found that glaciers with a floating extension into the sea have a greater rate of advance than others. Observations made of the Makay Ice Tongue showed it to be moving seaward about three feet daily.

In places where a number of Ice Tongues converge, sheets of ice form in the areas between them, and with the constant addition of snow, in the course of time, the whole becomes a huge flat mass of floating ice such as the Ross Barrier.

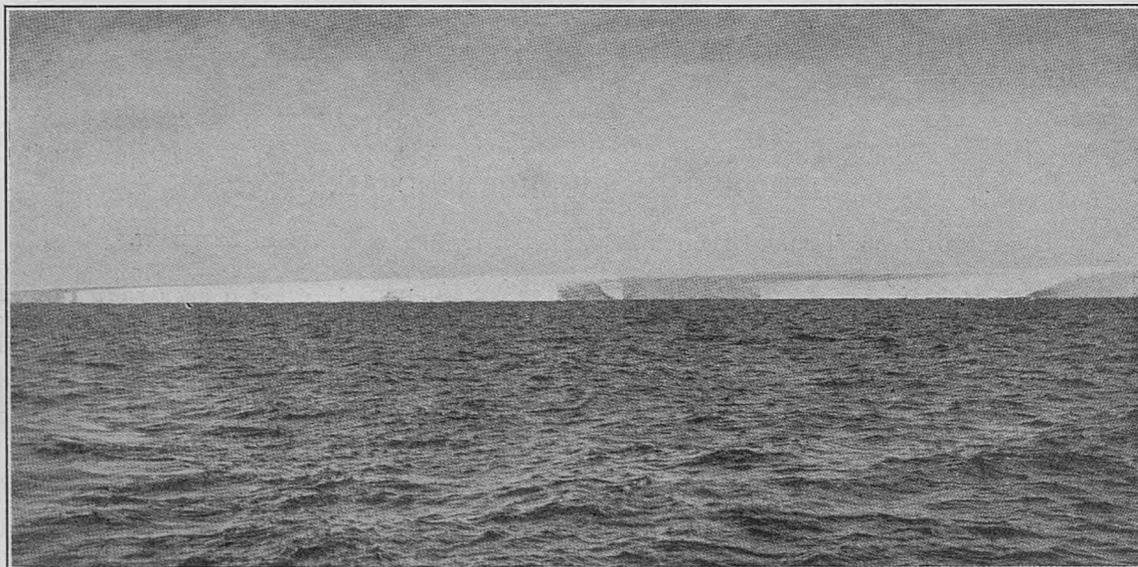
The Ross Barrier (see FIGURE 1), filling the southern end of the Ross Sea, extends from Cape Crozier on the West to King Edward VII Land on the East. It was first discovered by Sir James Ross in the Erebus and Terror in 1841, who, finding it barring his way south, sailed along its northern boundary. Later expeditions of Scott, Shackleton and Amundsen have traversed and surveyed the Barrier, which is now known to be a practically level snow laden floating sheet of ice, approximately 500 miles wide by 400 miles broad by 1,400 feet thick. Its height at the northern or seaward end varies from six feet to 160 feet, while its average surface is 170 feet above sea level.

Calving of Icebergs.—The calving of icebergs may take place in several ways and for one of several reasons, but 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 swells and wind pressure.

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 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., but for the above reasons some bergs may have more and others less than the normal proportion of the ice above water.

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, as is usual in the Antarctic, 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 tinge like the appearance of frosted glass. 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.

Dimensions of Icebergs.—The majority of bergs seen on Scott's last Expedition varied in height from 40 to 120 feet, while the greatest measured height was 140 feet, but by the time bergs reach



Ross Barrier.

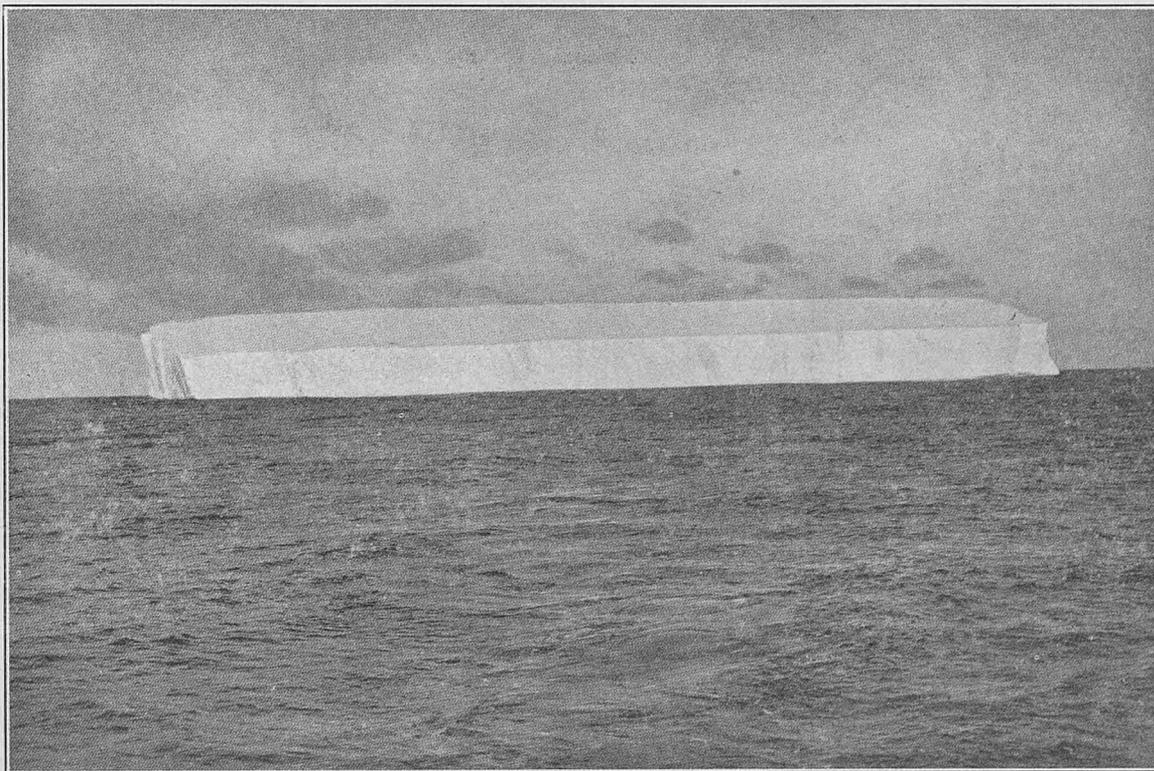
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the shipping routes they may exceed this height owing to unequal melting below the water line causing them to tilt. The largest bergs are the tabular bergs which are derived from the Ross Barrier and other similar form of land ice formation. They are rectangular in shape and have been measured up to 20 and 30 miles in length, while bergs with twice this length have been reported.

The glacier bergs which are derived from the ice tongues of glaciers are irregular in shape and smaller than the tabular bergs. They are usually of a greenish tint, but appear dazzling white under certain conditions of light. Compared with glacier bergs, tabular bergs have a relatively large air content concentrated with the ice

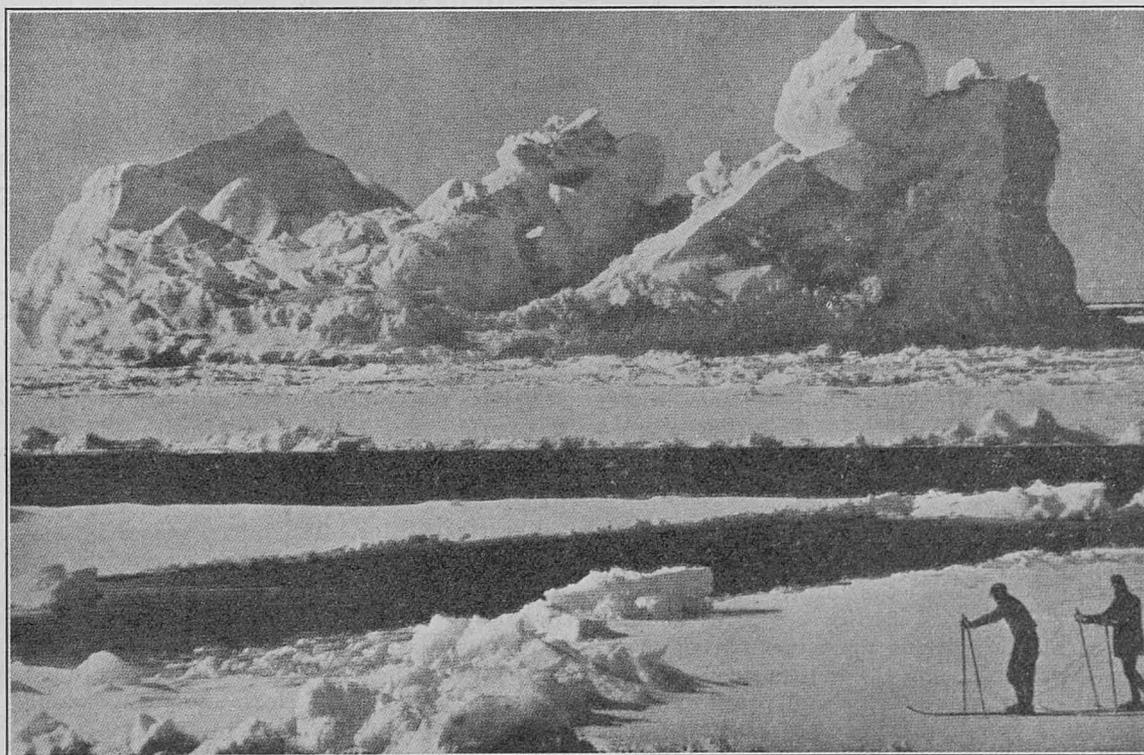
granules, and at a distance appear as if formed of plaster of paris owing to their white colour and lustre.

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



Tabular Berg.

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Glacier Berg.

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the Director, Polar Research Institute, Cambridge.*

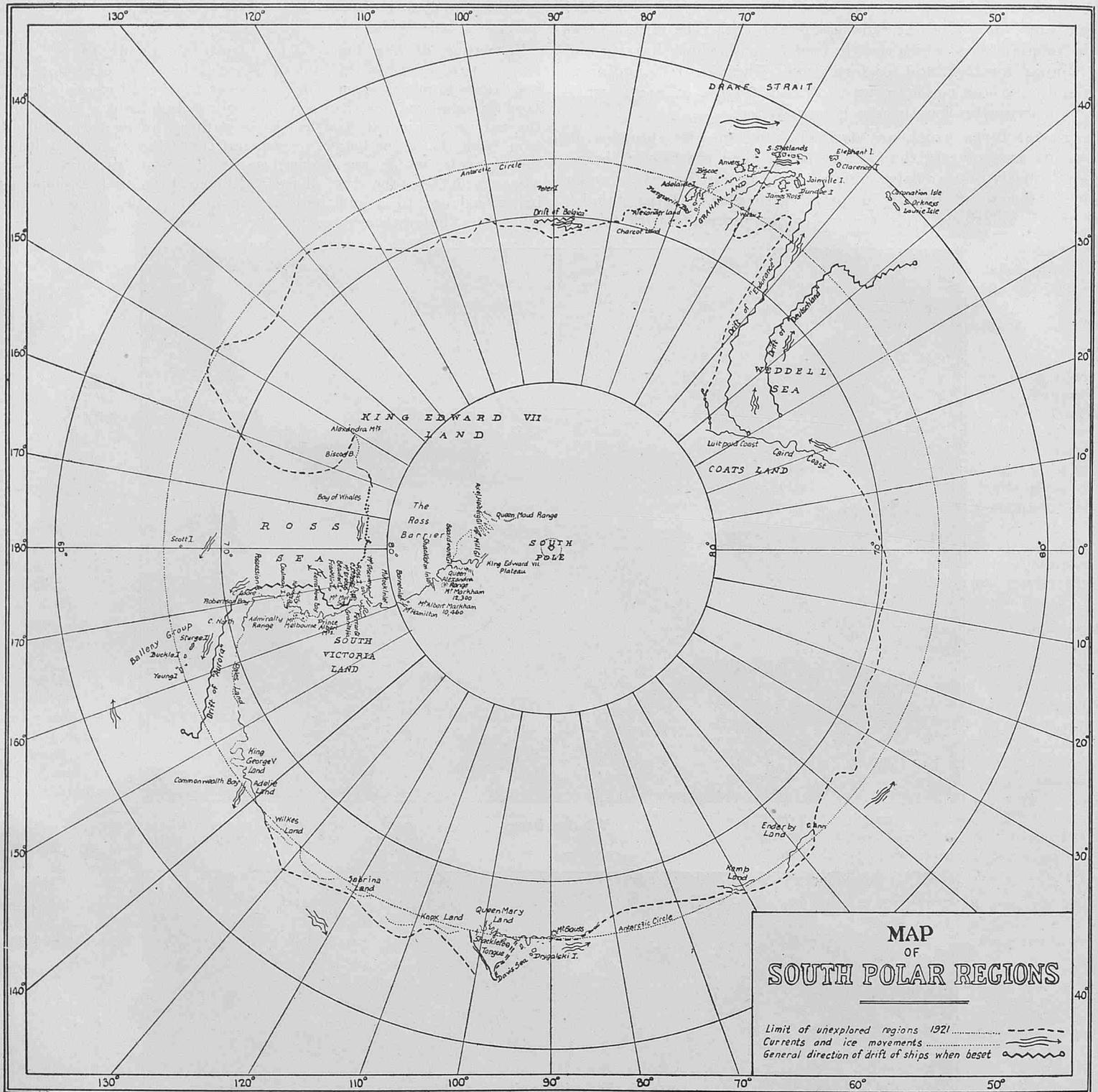


Figure 1.

Antarctic Pack Ice.—The shores of the Antarctic continent are surrounded by a medley of floating ice extending north to about the 60th parallel, forming a barrier the forcing of which is attended with great difficulty and danger to ships endeavouring to make the Antarctic continent.

The pack is composed partly of sea ice formed in the open sea, partly of fast ice formed along the Antarctic coast line and partly of land ice broken away from the Antarctic continent. The interposal of capes and ice tongues in the way of moving ice fields and the unequal movement between the floes due to the various kinds of ice that constitute the pack exert pressure on the ice, causing it to raft and hummock. The height of hummocky floes and pressure ridges met with in the pack may reach a maximum of about 30 feet. Captain Scott described such ice when navigating the pack in the Terra Nova in 1910 as follows: "We first got among the very thick

floes at 1 a.m., and jammed through some of the most monstrous I have ever seen. The pressure ridges rose 24 feet above the surface—the ice must have extended at least 30 feet below."

The following definitions correctly describe all ice met with in the pack.

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

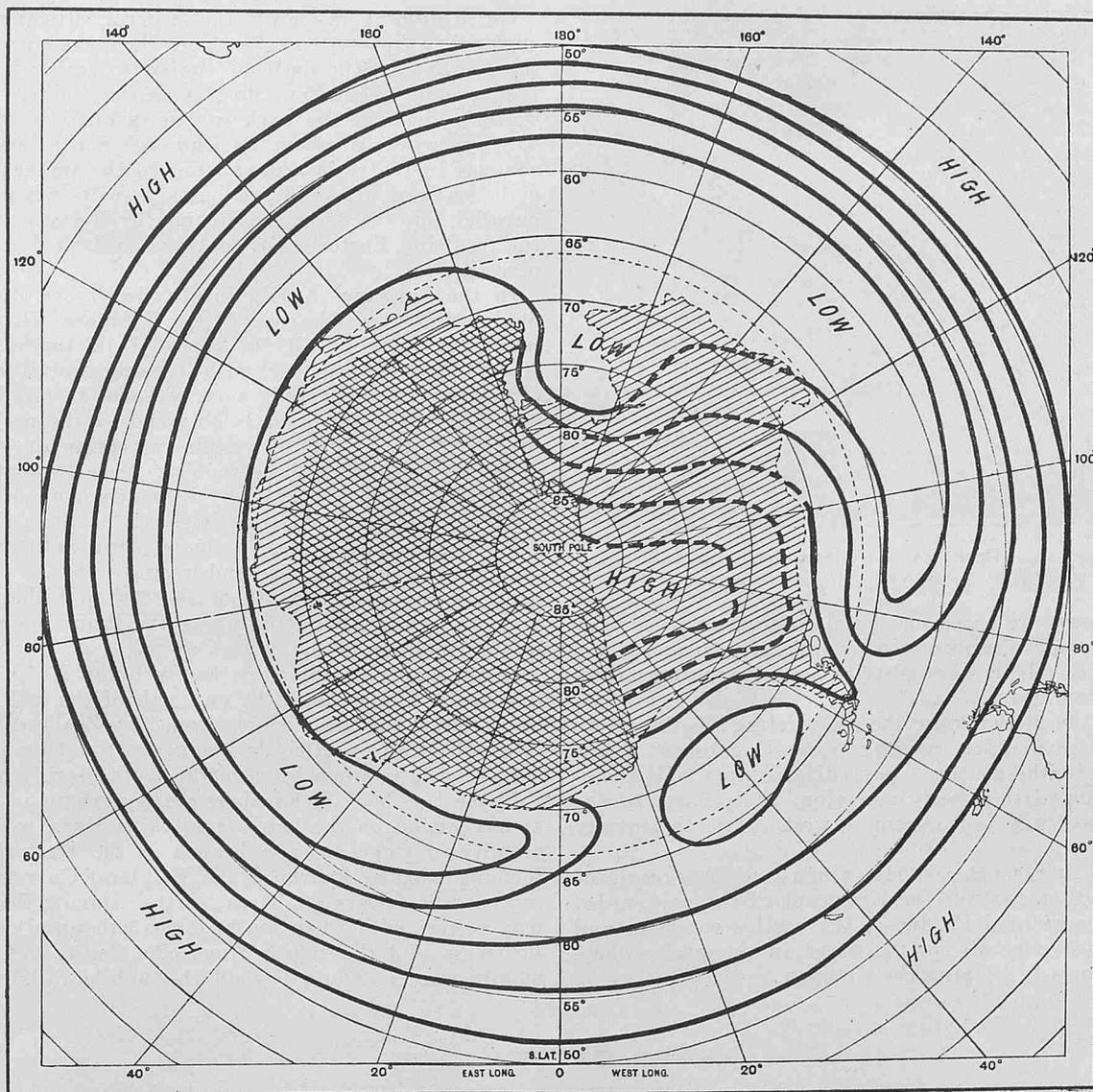


Figure 2. Probable Antarctic Pressure, sea level.

the "Westerlies" and in the Arctic fills the Polar Sea and escapes southward from the outlets 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.

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 honeycombed in the course of melting, or which appear black through saturation with sea 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.

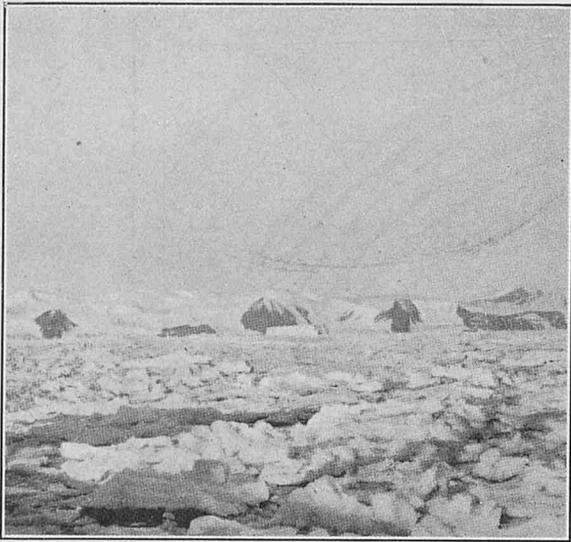
A Pool.—Any enclosed water area in the pack other than a crack or a lead or lane.

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.—Most of the ice contained in the pack has its origin at or near the shores of the Antarctic Continent, and this ice is constantly feeding the main ice belt lying further off the coast. 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.

FIGURE 2 shows the probable atmospheric pressure of the Antarctic at sea level as defined by Dr. G. C. SIMPSON, C.B., F.R.S., Meteorologist to SCOTT'S last Antarctic Expedition, and now Director of the British Meteorological Office. In the figure the single hatched area on the Pacific side of the great escarpment is supposed to be at sea level or nearly so, while the area on the Atlantic and Indian sides shown by cross hatching is high tableland, the highest region being near the South Pole. The greatest



Pack Ice. *Reproduced by kind permission of the Director, Polar Research Institute, Cambridge.*

part of the isobars shown are based on actual observations and may be taken as correct; these are represented by full lines. The dotted lines represent hypothetical pressure distribution over regions from which there are no observations.

From the figure it is seen that over the sea circling the Antarctic continent there is an area of low pressure extending to 60° South Latitude. The winds in the southern part of this area will therefore be from an east or south-easterly direction, while north of the 60th parallel the winds will blow from a west or north-westerly direction.

It is the predominating south-easterly winds and the resultant westerly surface drift that controls the movement of the pack aided by the westerly component of drift due to the earth's rotation, and the effect of deep water currents on the bergs in the pack, whose surging to and fro assists in keeping the ice open.

On FIGURE 1 is shown the general direction of drift of ships engaged in Antarctic exploration when beset in the ice demonstrating the North-westerly drift of the pack, which is estimated to be at the rate of about four to five miles a day. The steady north-westerly drift of the pack continues until it reaches the region of westerly winds in about Latitude 60° South, when the general drift changes to the eastward. Owing to the increase in temperature of both sea and air field ice quickly melts when North of the 60th parallel, but the bergs, acted upon by the prevailing Westerlies and the resulting Easterly set, continue to drift, but in an East to N.E. direction.

In the January, April, July and October, 1929, numbers of this publication, Ice Charts of the Southern Hemisphere have been published showing all ice reported in the Southern Hemisphere from 1902-1928, together with revised limits for each month. In examining these charts it must be borne in mind that the data from which they are compiled is obtained in the majority of cases from reports of ice sighted by vessels traversing the trade routes, and as in recent years, with the passing of sail, steamers follow a more northerly track, icebergs may be much more numerous between the 45th and 60th parallels than is shown on these charts.

The charts show that ice is more prevalent from October to March than from April to September and that it may be encountered throughout the year South of the 35th parallel, with the exception of in the Southern Pacific where the limits generally do not extend so far North as in the other Oceans.

In the South Pacific ice is rarely found North of the 45th parallel during the summer months or north of the 50th parallel in winter; as, however, the trade routes from New Zealand to the Horn extends below the 50th parallel the danger of meeting ice is always prevalent, especially when between the 130th Meridian and Cape Horn.

In the Southern Hemisphere ice is perhaps of the greatest menace to navigation on the track from Cape Horn to the Brazils. In the vicinity of Cape Horn a branch of the Westerly drift turns N.E. forming what is known as the Falkland Current and this ice bearing current carries the bergs North. During the summer months ice may be met with when south of the 30th parallel between Longitude 40° West and the South American Coast, but during the winter months rarely extend beyond the 40th parallel.

WIND AND TIDAL HEIGHT IN THE IRISH SEA.

PREPARED BY M. CRESSWELL, PORT METEOROLOGICAL OFFICER, LIVERPOOL.

The levels obtained from a tide gauge show the resultant effect of astronomical, atmospheric pressure, and wind influence. The tide due to astronomical forces can be accurately computed, while observations extended over a long period can to a great extent get rid of the irregular effects of wind and pressure by averages.

The tides for the standard ports of the United Kingdom are predicted by the aid of a number of constants which are given in the preface to the Admiralty Tide Tables, or by the aid of a method known as the harmonic analysis of tides; and the utmost that can reasonably be expected of such tide tables is that they shall be correct under normal seasonable weather and pressure conditions. But such conditions are very variable in the latitude of the British Isles, where the great inconstancy of the meteorological elements must of necessity render tidal prediction somewhat uncertain.

The atmosphere resting on the earth exercises a variable pressure, as shown by the varying height of the barometer, which ranges through nearly two inches. This means that each square yard of sea surface supports a weight greater by 1,260 lbs., when the barometer is very high than when it is very low.

The level of the sea is generally higher when the barometer is low, and lower when the barometer is high; an inch of mercury corresponding to rather more than a foot of sea water. The pressure of the atmosphere depresses the sea in those places where the barometer is high, and allows it to rise where the opposite condition prevails; also low pressure should increase the height of an advancing tide wave, and high pressure have a contrary effect.

Regarding the sea as a negative water barometer, it might be concluded from the foregoing that, if the normal atmospheric pressure

is known (as shown upon a monthly meteorological chart of normals and frequencies) the difference in height of tide due to a variation of that pressure, could be estimated with considerable precision.

It is true that in tropical regions where the weather is very uniform, the meteorological tides produced by the regular periodic variations of atmospheric pressure and wind can be allowed for with considerable exactness; but unfortunately this does not appear to be a practical method for the area under consideration, as it has not been found possible to lay down any general law applying to all parts of tidal waters as to the effect of atmospheric pressure alone upon tidal height. Results show that the atmospheric pressure affecting the tides operates over so wide an area that local indications given by the barometer at any particular port do not afford any reliable guide as to the effect on the tide at that port, hence in order to forecast the variation in the range of tide for the day, it would be necessary to know the atmospheric pressure gradient, as ascertained from a weather chart. Although on board the modern vessel a simple weather chart is often available, pilots and the masters of small craft may not have that advantage, so that actual wind direction and force serve as a more ready guide for the immediate purpose of navigation.

The separation of the meteorological disturbances of sea-level from the ordinary tidal oscillations is a formidable task, but a lengthy comparison of actual and predicted high water in conjunction with wind force and direction provides a fairly close approximation to the meteorological influences.

The predicted tidal height includes allowances for seasonal meteorological conditions, meaned over long periods, thus the excess

above or deficiency below predicted high water may be, for practical purposes, considered as due to the effect of wind influence.

Continuing the investigations, results of which have appeared in this journal, further comparisons between predicted and actual tidal heights have been made, using the Irish Sea ports of Holyhead, Fleetwood, Preston, and Belfast. As before local wind and pressure conditions from Meteorological Office records were compared with the excess or deficiency in height between the tide gauge readings obtained by courtesy of the respective Harbour Authorities, and the predicted height of high water from the Admiralty tide tables; tabulations being made so that it was possible to compare the conditions at all four ports for each high water required.

Before proceeding further it is as well to briefly mention the tidal circulation of the Irish Sea. The main tidal wave from the Atlantic approaches the British Isles from the South-Westward, and divides on reaching the south-western extreme of Ireland, one portion passing up to the Irish Sea through St. George's Channel, and the other passing up the west and north coasts of Ireland, and entering the Irish Sea by the North Channel; finally these tide waves meet again in the neighbourhood of the Isle of Man. The direction of the principal flood lines of the tidal streams in the Irish Sea is shown by FIGURE 1.

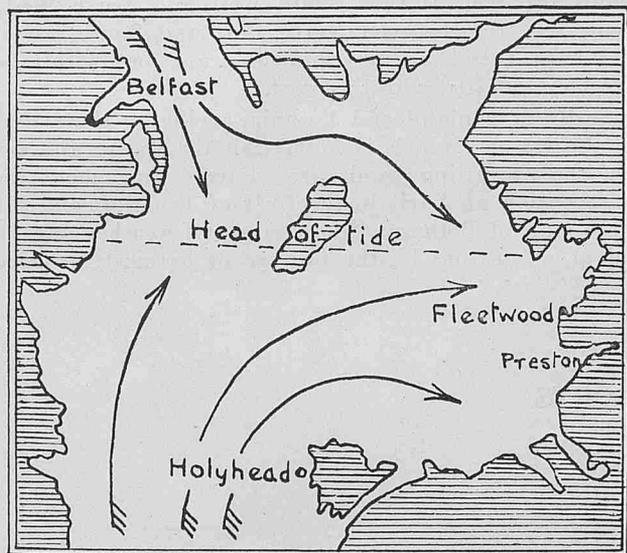


Figure 1.

From FIGURE 1 it can be seen that the triangular disposition of the ports used is such that Holyhead comes under the influence of the tide wave which flows up through St. George's Channel, Belfast, under that which enters by the North Channel, and Fleetwood and Preston under the combined influence of both tide waves, being near the line known as the "Head of Tide."

Now, if the Irish Sea was entirely landlocked, it is evident that if, for example, an excess of high water above prediction was noted at one or two of the ports used, a deficiency would be bound to occur at the others; and although the Irish Sea is only partially landlocked it might still be expected that, say an excess above prediction on one side, would cause some deficiency on the other, but the results of these investigations from 1921 onwards show that there is, in the majority of cases, a close similarity between the variations of predicted height of high water at the ports mentioned in all positions at the same time.

The results obtained for wind influence may be summarised by saying that at Irish Sea ports there is usually an excess above prediction with wind from between west and south-west by way of south, and a deficiency with wind from between east and north-west by way of north.

It is also noted that the effect of wind force associated with a rapid change of pressure (i.e., sudden gale) alters the sea level more

quickly and to a greater extent than with a more gradual change of wind and pressure.

In some cases, where wind influence is found not to have produced its expected effect, it can only be supposed that it had been blowing previously in such a way as to raise or depress the water at the observation ports, when wind from another direction might only restore the water to its normal level, and the two effects mask one another.

To give some recent illustration to the foregoing remarks a few examples from the writer's data book for the month of October, 1928, are given. Gales occurred in Western Districts on the 19th, 24th, and 31st. Weather charts No. XI, 0100 G.M.T., morning of October 20th, and No. XII, 0100 G.M.T., morning of October 24th, show Southerly gales over the Irish Sea. An excess above prediction was experienced at all observation ports, with the following results:

October 20th a.m.	{	Holyhead 2 ft. 2 ins.	Belfast 1 ft. 8 ins.
		Fleetwood 3 ft. 11 ins.	Preston 4 ft. 7 ins.
October 24th a.m.	{	Holyhead 1 ft. 7 ins.	Belfast 2 ft. 1 in.
		Fleetwood 2 ft. 2 ins.	Preston 1 ft. 7 ins.

The rapid effect of wind force upon sea-level was well demonstrated by the above, as on the days previous to the passage of the depressions responsible for these gales there had only been a few inches of departure from the predicted heights of high water.

Weather chart No. XI, 0100 G.M.T., morning of October 20th, 1928, is of great comparative interest. The chart shows a depression centred north-west of Ireland, with a Southerly gale reported over the Irish Sea. This cyclone was of almost tropical intensity, its wind circulation being extremely vigorous, the wind at the surface on the outskirts of the storm reached 91 miles per hour at Holyhead. This system afterwards sheered off Northwards, which was fortunate, for if it had moved in a more Easterly direction phenomenal excesses of high-water height with widespread damage, equalling or exceeding that of the great gale of October 29th, 1927, would undoubtedly have been experienced. The actual result was a considerable excess at all observation ports, which it is interesting to compare with the huge excesses of nearly a year before, when the storm centre moving in a north-easterly direction approached much closer to the Irish Sea. Except for this difference Weather chart No. XI, resembles closely Weather chart No. XXII, 1800 G.M.T., evening of October 28th, 1927, published in the October, 1928, number of this journal.

October 29th, 1927	{	Holyhead 3 ft. 4 ins.	Belfast 3 ft. 2 ins.
		Fleetwood 7 ft. 8 ins.	Preston 10 ft. 2 ins.
October 20th, 1928	{	Holyhead 2 ft. 2 ins.	Belfast 1 ft. 8 ins.
		Fleetwood 3 ft. 11 ins.	Preston 4 ft. 7 ins.

Weather chart No. XIII, 1800 G.M.T., evening of October 31st, 1928, shows a depression centred over England, with Northerly gales reported over the Irish Sea, and the following deficiencies below prediction were recorded:

October 31st, 1928	{	Holyhead 2 ft. 7 ins.	Belfast 0 ft. 10 ins.
		Fleetwood 1 ft. 8 ins.	Preston 1 ft. 8 ins.

These deficiencies were not as great as might have been expected from a study of this chart alone, the reason being that for two days previously, during the slow passage of this cyclone in a south-easterly direction from a position north-west of Ireland, an excess had been experienced, due to the south-westerly and westerly winds associated with the southern semi-circle of an advancing depression. This case well illustrates the remark referring to the effect of winds from different directions masking one another in their influence upon tidal levels.

The year 1928 seems to have provided a lucky October for Irish Sea ports, for in addition to the case previously mentioned, some of the highest tides of the year were predicted to occur upon the 31st, when the gale experienced resulted in a deficiency of high-water below prediction, thus probably averting considerable damage.

LOCAL WINDS—NORTH SEA AND BALTIC.

PREPARED IN THE MARINE DIVISION BY MR. H. KEETON, PRINCIPAL CLERICAL ASSISTANT.

The winds over the North Sea and Baltic are mainly dependent on the distribution of atmospheric pressure. The general direction may be locally modified to some extent by a tendency to follow the direction of the coasts and valleys, especially during fine settled weather; while land and sea breezes are developed on the east coast of England in fine weather during summer, the sea breeze commencing to blow directly on shore about mid-day, and veering during the afternoon until by sunset it blows parallel with the coast.

Atmospheric pressure is on the average lowest in the neighbourhood of Iceland, so that the prevailing winds over the British Isles and North Sea are from West or S.W. The actual pressure distribution, however, varies from day to day, often very markedly, with consequent changes of wind and weather. Depressions often follow one another in an Easterly or North-Easterly direction along nearly the same track at intervals of a few days, the track most frequently followed lying between Scotland and Iceland. In these cases the winds remain westerly for a time, being South-West, with dull or bad weather while the barometer is falling, and North-West with bright weather when the barometer rises again.

Depressions, however, often cross England or pass along the English Channel or across the Bay of Biscay, in which cases, to the northward of their centres, there is a similar sequence of weather changes, with winds backing from South-East to North-East. This easterly type of weather is most common in March, April, May, and November, while the westerly type is most common from December to February, and from July to September, but either type may occur at any season.

In autumn and winter the low pressure area near Iceland is well developed, and depressions usually pass well to the northward of

the British Isles, giving persistent strong winds of the westerly type and sometimes widespread gales.

Anticyclones are usually stable and of slow movement, giving considerable periods of light winds or calms and fine dry weather, or fogs during autumn and winter.

Off the South-East coast of Norway the wind nearly always follows the direction of the fiords, blowing straight up or down them.

The winds and weather of Denmark and the Western Baltic are similarly governed by the passage of barometric depressions. Seventy per cent. of these pass to the northward, giving south-westerly or westerly winds; and 30 per cent. pass across or to the southward, giving variable or easterly winds. The depressions of winter are often large and deep, sometimes several thousand miles in diameter, causing gales over great stretches of coast. In summer, depressions are usually small and irregular, and gales are few and local in character.

Over the coasts of the Kattegat and Western Baltic, 44 per cent. of all winds are from between South West and North West, while 29 per cent. are from between North East and South East. Local departures from these average conditions are met with, the wind tending to blow parallel with the coast.

In the Gulfs of Finland and Bothnia, owing to the average distribution of pressure, which is highest in the south, and lowest in the north, the prevailing winds are westerly throughout the year, with the exception of April in the Gulf of Finland, and May and June in the Gulf of Bothnia. The winds and weather are, however, controlled at all seasons by the passage of barometric depressions.

SOUTHERN ICE REPORTS

During the Years 1917 to 1928.

October.

Year.	Day.	Position of Ice.		Description.	Remarks.	Name of Ship reporting.
		Latitude.	Longitude.			
1917		No reports received				
1920	—	500 miles E.N.E. of Cape Horn		Group of ice islands	Largest of which was about 5 miles long and 300 feet high	Barque <i>William T. Lewis.</i>
	—	Between above position and a		Ice islands	Sighted daily	do.
	—	position 1,000 miles E.N.E.		3 ice islands .. .. .	.. .. .	do.
		39° —' S.	5° —' E			
1921	5	37° 21' S.	24° 48' E.	Berg	½ mile long, 500 feet high. Several small floes in close proximity.	S.S. <i>Port Nicholson.</i>
	16	37° 50' S.	27° —' E.	Berg .. .. .	.. .. .	S.S. <i>Australia.</i>
	5	38° 04' S.	27° 42' E.	Berg	Pyramid shaped, 400 feet high, 1,000 feet long	S.S. <i>Boorah.</i>
		38° 04' S.	27° 44' E.	Small berg .. .. .	.. .. .	do.
	27	40° 58' S.	27° 54' E.	Berg	Height about 300 feet in 3 conical pinnacles, also 3 pieces standing about 60 feet high with flat tops and wall-sided on the eastern end of the berg, highest part being to West.	Barque <i>Bellands.</i>
					Length from end to end about ½ mile.	
	24	38° 56' S.	28° 12' E.	Ice mountains .. .. .	.. .. .	S.S. <i>Doonholm.</i>
	17	38° —' S.	28° 15' E.	Berg .. .. .	.. .. .	S.S. <i>Kalfarli.</i>
	6	38° 33' S.	28° 16' E.	2 large bergs	About 450 feet high (calculated), 1 mile apart	S.S. <i>Otira.</i>
	17	37° 55' S.	33° 10' E.	Berg .. .. .	.. .. .	S.S. <i>Kalfarli.</i>
	24	39° 25' S.	36° 12' E.	Ice mountains .. .. .	.. .. .	S.S. <i>Doonholm.</i>
1922	20	55° 13' S.	132° 33' W.	Berg, 8 growlers in vicinity	Size of berg, 400 feet long, 70 to 100 feet high	S.S. <i>Port Napier.</i>
	15	50° 48' S.	131° 48' W.	Berg	Low and flat top	S.S. <i>Whakatane.</i>
	20	56° 38' S.	119° 57' W.	Growler .. .. .	.. .. .	S.S. <i>Port Napier.</i>
		56° 38' S.	119° 39' W.	Berg and growler .. .. .	.. .. .	do.
1924	4	50° 56' S.	127° 32' W.	} 2 bergs and growlers	160 feet high	S.S. <i>Ionic.</i>
		51° 01' S.	127° 31' W.			
	20	53° 16' S.	120° 51' W.	5 small growlers .. .. .	.. .. .	S.S. <i>Maimoa.</i>
1925	27	61° 22' S.	62° 41' W.	Ice .. .. .	.. .. .	Oil Refinery S.S. <i>Solstreif.</i>
	23	58° 36' S.	62° 19' W.	Pack ice	Ice slack to S.E.	S.S. <i>Southern Queen.</i>
	24	59° 35' S.	61° 28' W.	Pack ice .. .. .	.. .. .	do.
	25	59° 35' S.	61° 28' W.	Ice floes	Damage to vessel's stern	do.
	22	57° 14' S.	59° 32' W.	Small ice packs .. .. .	.. .. .	do.
	26	60° 57' S.	59° 13' W.	Slack ice .. .. .	.. .. .	do.
	27	61° 15' S.	58° 52' W.	Large ice	Found advisable to stop and drift with ice	do.
	28	61° 47' S.	57° 26' W.	Ice packs .. .. .	.. .. .	do.
	29	—	—	Firm ice .. .. .	.. .. .	do.
	30	—	—	.. .. .	Entrance Admiralty Bay covered with firm ice	do.
	31	63° —' S.	55° 20' W.	.. .. .	Macfarland Strait icebound	do.
				.. .. .	Deception open	do.

Year.	Day.	Position of Ice.		Description.	Remarks.	Name of Ship reporting.	
		Latitude.	Longitude.				
1926	31	49° 40' S. 49° 26' S.	14° 00' W. 13° 20' W.	Several small pieces of ice Irregular three-peaked berg of medium size.	Cleft right through centre	R.S.S. <i>William Scoresby</i> do.	
	27	47° 34' S.	8° 12' W.	Berg	Large dome shaped	do.	
		47° 18' S.	7° 25' W.	Berg	Large peaked	do.	
		45° 48' S.	4° 05' W.	Berg		do.	
		45° 40' S. 45° 20' S.	4° 00' W. 3° 09' W.	Berg Berg		do. do.	
1927	17	42° 41' S. 42° 40' S.	58° 25' W. 58° 20' W.	Large berg and numerous growlers Berg	200 feet high, 1,000 feet long	S.S. <i>Niobe</i> U.S. Hydrographic Bulletin.	
	27	43° 40' S.	57° 50' W.	Berg		do.	
		43° 36' S.	57° 45' W.	Bergs	From this position to a point about 100 miles South-westward, passed several bergs, the largest of which was 375 feet high and about 800 feet long.	Barque <i>Peking</i> .	
	18	46° 14' S.	57° 30' W.	Berg	200 feet high and 500 feet long	S.S. <i>Orita</i> .	
		46° 03' S.	57° 10' W.	Berg	200 feet high and 500 feet long	do.	
		47° 12' S.	57° 09' W.	Berg	200 feet high, 1 mile long and a quantity of ice stretching 2 miles E. of berg.	do.	
	17	44° 17' S.	56° 53' W.	Berg	300 feet high by 700 feet long	do.	
	18	45° 50' S.	56° 51' W.	Berg	80 feet high by 150 feet long	do.	
	17	44° 20' S.	56° 49' W.	Berg	150 feet high by 500 feet long	do.	
	18	44° 41' S.	56° 47' W.	Berg	150 feet high by 500 feet long	do.	
	17	41° 08' S.	56° 42' W.	Berg	100 feet high by 1,300 feet long	do.	
		42° 18' S.	56° 42' W.	Berg	200 feet high by 500 feet long	do.	
	18	43° 23' S.	56° 39' W.	Berg	280 feet high	do.	
		43° 23' S.	56° 36' W.	1 growler		do.	
		43° 55' S.	56° 33' W.	Berg	200 feet high by 700 feet long	do.	
		42° 04' S.	56° 32' W.	Berg	200 feet high by 1,000 feet long	do.	
		45° 29' S.	56° 32' W.	Berg	200 feet high by 500 feet long	do.	
		44° 36' S.	56° 30' W.	Berg		do.	
		17	43° 11' S.	56° 29' W.	Berg	250 feet high by 1,100 feet long	do.
			42° 53' S.	56° 29' W.	Berg	215 feet high by 800 feet long	do.
		18	43° 23' S.	56° 26' W.	2 medium sized bergs		do.
			41° 18' S.	56° 25' W.	Berg	100 feet high by 500 feet long	do.
	43° 05' S.		56° 25' W.	Berg	215 feet high by 800 feet long	do.	
	41° 15' S.		56° 24' W.	Berg	100 feet high by 1,000 feet long	do.	
	45° 28' S.		56° 24' W.	Berg	200 feet high by 500 feet long	do.	
	43° 30' S.		56° 22' W.	Berg	300 feet high by 1,000 feet long	do.	
	43° 11' S.		56° 20' W.	Berg	Very large, about 10 miles long	do.	
	42° 55' S.		56° 19' W.	Berg	215 feet high by 1,000 feet long	do.	
	42° 04' S.		56° 11' W.	Berg	200 feet high by 800 feet long	do.	
	40° 30' S.		55° 16' W.	Berg		S.S. <i>Port Caroline</i> .	
	14	39° 57' S.	55° 00' W.	Berg		do.	
		39° 41' S.	54° 38' W.	Berg	Height 200 feet	do.	
		39° 40' S.	54° 32' W.	Berg	Height 200 feet by 1,000 feet length	do.	
		39° 49' S.	54° 19' W.	Berg		do.	
		39° 38' S.	54° 05' W.	Berg	Height 230 feet by 1,500 feet length	do.	
		39° 35' S.	54° 03' W.	Berg	Height 150 feet by 800 feet length	do.	
		39° 32' S.	54° 00' W.	3 small bergs		do.	
		39° 27' S.	53° 48' W.	Berg		do.	
		39° 04' S.	53° 30' W.	Berg	Small, low and flat.	do.	
		30 } 31 }	47° 00' S.	52° 00' W.	Extraordinary number of bergs	All dimensions measured by 4 point bearings and sextant angles.	
	All large bergs surrounded by small detached pieces of ice evidently broken off from parent berg and drifting to leeward.						
	11 12	48° 15' S.	48° 56' W.	Berg	Estimated to be 100 feet high and 900 feet long	S.S. <i>Port Hunter</i> .	
		44° 45' S.	43° 36' W.	Berg	Estimated to be 50 feet high and 100 feet long	do.	
	1928	4	55° 25' S.	32° 33' W.	Small and loosely scattered ice	Appeared to be ragged edge of the pack ice	R.R.S. <i>William Scoresby</i> .
		5	55° 27' S.	32° 22' W.	Heavy pack ice	The general direction of the ice stream, so far as the eye could see was W.S.W. and E.N.E. and the ice was tightly packed at this position probably due to a light N.Wly wind then blowing.	do.
		6	55° 00' S.	32° 08' W.	Pack ice	The edge was well defined, resembling a low wall and composed of irregular pieces of ice averaging in size from 5 to 15 feet across and floating from 3 to 5 feet in height above the water.	do.
			55° 18' S.	32° 05' W.	Pack ice	Within the pack and some distance away several bergs, including 5 or 6 of tabular formation and some very irregular pinnacle bergs.	do.
55° 07' S.			31° 57' W.	Pack ice	Very irregular—no open spaces or leads could be discerned from a height of 50 feet (9 miles range).	do.	
6		54° 57' S.	31° 50' W.	Pack ice	Two miles from ship—50 bergs all round horizon	do.	
		54° 51' S.	31° 20' W.	Pack ice	Filled the horizon from W. by N. through S. to E. by S. 67 bergs counted, 18 tabular, clean and unweathered, remainder weathered, irregular and pinnacle.	do.	
7		54° 42' S.	30° 50' W.	Pack ice	Cape at edge of pack ice	do.	
		54° 29' S.	30° 36' W.	Pack ice	Ice cape two miles distant;—from aloft it was seen that this closely packed ice was free of bergs whilst some miles beyond to the S.W. open water was seen.	do.	
6		54° 56' S.	30° 32' W.	Pack ice and bergs	Ice cape bearing S.W. by W. 2 miles. Pack retreated Southward and was lost in distance.	do.	
7		54° 19' S.	30° 31' W.	Pack ice	Good deal of small ice and growlers, of a dangerous size, 132 bergs in sight.	do.	
6		55° 00' S.	30° 19' W.	Pack ice	Ice cape at edge of pack ice	do.	
8		54° 04' S.	30° 18' W.	Pack ice	4 miles distant	do.	
6		55° 00' S.	30° 15' W.	Pack ice	Pack cape appeared, bearing E.S.E. distant 2 miles	do.	
8		53° 58' S.	30° 11' W.	Pack ice	Ice cape sighted	do.	
7		54° 44' S.	29° 49' W.	Small ice promontory and bergs	Pack ice ahead—prominent ice cape visible distant 5 miles on starboard beam—numerous growlers of a dangerous size.	do.	
8		53° 59' S.	28° 50' W.	Pack ice	147 bergs counted in distance to the S.W. and N.W.	do.	
		54° 00' S.	28° 38' W.	Pack ice	Edge of pack ice and few distant bergs Main body of pack	do.	

Reports of ice previous to October, 1917, will be found on the back of the Monthly Meteorological Chart of the East Indian Seas, October 1917, No. 138.

WEATHER SIGNALS.

II.—WIRELESS WEATHER SIGNALS.

WIRELESS WEATHER BULLETINS.

Australia.

WEATHER reports and forecasts issued by the Commonwealth Meteorological Bureau are broadcast *en clair* by Australian W/T stations as follows, special reports and warnings being broadcast immediately on receipt by the W/T Stations serving the area affected, when dangerous weather prevails or is expected.

Perth W/T Station.

Approximate, Latitude 32° 02' S. Longitude 115° 49' E.

Call sign, **VIP**. Wavelength 600 metres (I.C.W.).

At 0415 and 1100 G.M.T., Mondays to Saturdays, inclusive, weather forecasts are broadcast.

Each forecast is for the following 24 hours, except on Saturdays when it is for 48 hours.

At 0415 and 1100 G.M.T., on Sundays, supplementary forecasts for the following 24 hours are broadcast.

In addition to the above, 0100 and 0700 G.M.T. observations of barometric pressure, wind direction and force, weather, and state of the sea at Fremantle and Cape Leeuwin on week-days and 0100 and 1000 G.M.T. observations of the same elements on Sundays, are broadcast. Other coastal reports and reports from shipping are included when necessary.

At 0030 G.M.T., on 2,400 metres (C.W.), weather forecast of the previous evening is broadcast for the information of distant shipping. The 0100 G.M.T. observations of barometric pressure, wind and weather from Kupang (Timor) are included when available.

Geraldton W/T Station.

Approximate, Latitude 28° 47' S. Longitude 114° 36' E.

Call sign, **VIN**. Wavelength 670 metres (spark).

At 0200 and 1200 G.M.T., Mondays to Fridays, inclusive, weather forecasts for the following 24 hours are broadcast.

At 0200 G.M.T. on Saturdays, a weather forecast for the following 48 hours is broadcast.

In addition to the above 0000 and 0600 G.M.T. observations of barometric pressure, wind direction and force, weather and state of the sea, at Fremantle and Cape Leeuwin are broadcast, Mondays to Fridays; 0100 G.M.T. observations on Saturdays; 0000 and 0900 G.M.T. observations on Sundays. When available, the 0000 G.M.T. observations of barometric pressure, wind and weather, at Kupang (Timor) are also broadcast.

Broome W/T Station.

Approximate, Latitude 18° 00' S. Longitude 122° 12' E.

Call sign, **VIO**. Wavelength 600 metres (spark).

Weather forecasts are broadcast at 1400 G.M.T.

From 16th April to 16th December no separate forecast is broadcast for Sundays; the forecast issued on Saturdays is therefore for the following 48 hours.

When available, the 0000 G.M.T. observations of barometric pressure, wind and weather at Kupang (Timor) are also broadcast.

Wyndham W/T Station.

Approximate, Latitude 15° 35' S. Longitude 128° 18' E.

Call sign, **VIW**. Wavelength 720 metres (I.C.W.).

At 0130 and 1130 G.M.T., Mondays to Fridays, inclusive, weather forecasts for the following 24 hours are broadcast.

At 0130 G.M.T. on Saturdays, a weather forecast for the following 48 hours is broadcast.

When available, the 0000 G.M.T. observations of barometric pressure, wind and weather at Kupang (Timor) are also broadcast.

Darwin W/T Station.

Approximate, Latitude 12° 27' S. Longitude 130° 48' E.

Call sign, **VID**. Wavelength 600 metres (spark).

At 1200 G.M.T., broadcasts a 24 hours Weather forecast for the N.W. coast of Western Australia, Gulf of Carpentaria and E. coast of Queensland. From 16th December to 16th April the 2300 G.M.T. weather report for the coast of Queensland, and a forecast for the ensuing 24 hours, are issued by Brisbane Weather Bureau on Sunday mornings. During the remainder of the year Sunday forecasts are suspended. The forecast broadcast on Saturdays is therefore for the following 48 hours.

Thursday Island W/T Station.

Approximate, Latitude 10° 35' S. Longitude 142° 13' E.

Call sign, **VII**. Wavelength 720 metres (I.C.W.). Ships may obtain the 0500 G.M.T. weather report for the coast of Queensland and a forecast for the ensuing 24 hours upon application to the above W/T Station.

Cooktown W/T Station.

Approximate, Latitude 15° 28' S. Longitude 145° 15' E.

Call sign, **VIC**. Wavelength 760 metres (spark).

Ships may obtain weather information similar to above (Thursday I.) upon application to Cooktown W/T Station.

Townsville W/T Station.

Approximate, Latitude 19° 15' S. Longitude 146° 50' E.

Call sign, **VIT**. Wavelength 2,400 metres (C.W.).

At 1100 G.M.T. The 0500 G.M.T. weather report for the coast of Queensland and a forecast for the following 24 hours is broadcast daily, except Sundays.

At 1100 G.M.T. on Sundays, from 16th December to 16th April, only, the 2300 G.M.T. weather report for the coast of Queensland, and a 24 hours' forecast issued by the Brisbane Weather Bureau are broadcast. If an atmospheric disturbance is mentioned the broadcast is made immediately upon receipt of the information from the Weather Bureau. The forecasts on Saturdays from 16th April to 16th December are for the ensuing 48 hours.

Willis Islets W/T Station.

Approximate, Latitude 16° 18' S. Longitude 149° 59' E.

Call sign, **VIQ**. Wavelength 600 metres (spark).

From about mid November to 30th April this W/T station broadcasts particulars of barometric pressure, wind direction and force, amount of cloud, weather, state of sea and swell at Willis Island, *en clair*, as follows:—

At 0645 G.M.T., containing observations of 0600 G.M.T.

At 1045 G.M.T., " " " 0800 "

At 2330 G.M.T., " " " 2200 "

During stormy weather the 1045 G.M.T. broadcast will contain 1000 G.M.T. observations.

Rockhampton W/T Station.

Approximate, Latitude 23° 25' S. Longitude 150° 31' E.

Call sign, **VIR**. Wavelength 720 metres (spark).

Ships may obtain the 0500 G.M.T. weather report for the coast of Queensland and a forecast for the ensuing 24 hours, upon application to the above W/T Station.

Brisbane W/T Station.

Approximate, Latitude 27° 26' S. Longitude 153° 07' E.

Call sign, **VIB**. Wavelength 600 metres (I.C.W.).

Between 0200 and 0230 G.M.T., broadcasts, the 2300 G.M.T. coastal weather report and a 6 hours' forecast. Ships can also obtain this information on request.

At about 1200 G.M.T. daily (except Sundays), or earlier if requested, the 0500 G.M.T. coastal weather report and a forecast for the ensuing 24 hours are broadcast. On Saturday the forecast is for 48 hours.

Sydney W/T Station.

Approximate, Latitude 33° 46' S. Longitude 151° 03' E.

Call sign, **VIS**. Wavelengths as given below.

Between 2300 and 0030 G.M.T. this W/T station broadcasts on a wavelength of 600 metres (I.C.W.) a 2300 G.M.T. weather report of coastal conditions and a 24 hours' forecast if the Weather Bureau is in receipt of sufficient information in time; if not, the report and forecast will be broadcast between 0200 and 0300 G.M.T. on a wavelength of 2,400 metres (C.W.). The foregoing broadcasts are made daily, except Sundays.

At 1030 G.M.T., repeated at 2230 G.M.T., on wavelengths of 2,400 metres (C.W.) and 600 metres (I.C.W.), respectively, a summary of the coastal weather reports and a 24 hours' forecast are broadcast. Ships may also obtain this information on application to Sydney W/T Station after 0630 G.M.T. daily, except on Saturdays and Sundays. On Sundays at 1030 G.M.T., repeated at 2230 G.M.T., a 24-hour forecast and coastal weather report are broadcast on 2,400 metres (C.W.) and 600 metres (I.C.W.) respectively.

Melbourne W/T Station.

Approximate, Latitude 37° 50' S. Longitude 144° 59' E.

Call sign, **VIM**. Wavelength 600 metres (I.C.W.).

At 0200 G.M.T. (1) The 2300 G.M.T. observations of barometric pressure, wind direction and force, weather, state of the sea at Cape Borda, Cape Northumberland, Wilson's Promontory, Bruni Island and Jervis Bay. Reports from other coastal stations or from ships are on occasion broadcast in lieu of reports from one or more of the usual stations, or may be supplied in addition thereto.

(2) Brief information regarding any disturbance affecting, or likely to affect, weather in the Great Australian Bight, south-eastern Australian waters, or the Tasman Sea.

(3) A forecast for the ensuing 24 hours.

The foregoing broadcasts are made daily except on Sundays.

At 2300 G.M.T. daily, including Sundays, a weather forecast for the ensuing 24 hours is broadcast. In special circumstances this forecast is sometimes accompanied by reports from selected coastal stations.

Flinders Island W/T Station.

Approximate, Latitude 40° 01' S. Longitude 147° 54' E.

Call sign, **VIL**. Wavelength 740 metres (spark).

Soon after 2300 G.M.T. broadcasts the 2300 G.M.T. observations of barometric pressure, wind direction and force, weather, state of the sea in the Commonwealth word code.

King Island W/T Station.

Approximate, Latitude 39° 56' S. Longitude 143° 52' E.

Call sign, **VZE**. Wavelength 600 metres (spark).

Transmits weather report on request.

Hobart (Tasmania) W/T Station.

Approximate, Latitude 42° 52' S. Longitude 147° 19' E.

Call sign, **VIH**. Wavelength 600 metres (spark).

Ships may obtain a summary of 2300 G.M.T. coastal weather reports on application to the W/T Station, after about 0030 G.M.T.,

daily (Sundays excepted). A 24 hours' forecast may also be obtained on application after about 0330 G.M.T. The forecast issued on Saturdays is for the ensuing 48 hours.

Adelaide W/T Station.

Approximate, Latitude 34° 52' S. Longitude 138° 31' E.

Call sign, **VIA**. Wavelength 600 metres (I.C.W.).

Ships may obtain a summary of 2330 G.M.T. coastal weather reports and a 24 hours' forecast on application to the W/T Station, after 0230 G.M.T. daily, except on Sundays.

A later forecast is broadcast at 1130 G.M.T. for the following 24 hours preceded by a statement of meteorological conditions at 0530. On Saturdays the forecast is for 48 hours and the statement omitted.

Esperance W/T Station.

Approximate, Latitude 33° 53' S. Longitude 121° 54' E.

Call sign, **VIE**. Wavelength 680 metres (spark).

At 0300 and 1300 G.M.T., Mondays to Fridays, inclusive; Saturdays at 0300 only; broadcasts weather forecasts for the following 24 hours. Saturday's forecast is for the following 48 hours.

In addition to the forecasts, observations of barometric pressure, wind direction and force, weather, state of the sea at Fremantle and Cape Leeuwin are broadcast. These observations are taken at 0100 and 0700 G.M.T., Mondays to Fridays; at 0100 G.M.T. on Saturdays; and at 0100 and 1000 G.M.T. on Sundays.

British New Guinea (Papua).**Port Moresby W/T Station.**

Approximate, Latitude 9° 28' S. Longitude 147° 09' E.

Call sign, **VIG**. Wavelength 720 metres (spark).

Soon after 2300 G.M.T., daily. The 2300 G.M.T. observations of barometric pressure, temperature (dry and wet bulb, maximum and minimum) amount of rainfall, wind direction and force, state of the sea, are transmitted in the Australian Commonwealth word code. Ships may obtain the 0500 G.M.T. weather report for the coast of Queensland and a 24 hours' forecast on application to the W/T Station.

Samarai W/T Station.

Approximate, Latitude 10° 37' S. Longitude 150° 40' E.

Call sign, **VIJ**. Wavelength 720 metres (spark).

Soon after 2300 G.M.T., the 2300 G.M.T. observations of barometric pressure, wind direction and force, and weather, are transmitted in the Australian Commonwealth word code. Ships may obtain a weather forecast on application to the W/T Station.

New Britain—Rabaul (Bitapaka) W/T Station.

Approximate, Latitude 4° 24' S. Longitude 152° 18' E.

Call sign, **VJZ**. Wavelength 2,400 metres (C.W.).

At about 0600 G.M.T., daily. The 2300 G.M.T. weather report for the coast of Queensland and a 24 hours' forecast are broadcast. Ships may also obtain this information on application to the W/T Station. From 16th April to 16th December, no forecast is broadcast on Sundays; the forecast issued on Saturdays is therefore for 48 hours.

New Zealand.

Wellington W/T Station, Latitude 41° 16' S., Longitude 174° 46' E. (approximate), call sign **ZLW.**, now issues a general weather bulletin* at 0930 G.M.T. on a wavelength of 600 metres (I.C.W.).

The message contains a general statement of the weather systems affecting New Zealand waters, forecasts for New Zealand, New Zealand waters and the Tasman Sea, followed by reports from the 17 stations given below, containing observations of barometric pressure in inches, air temperature in degrees F., wind direction and force, weather by Beaufort notation and the state of the sea, in plain language.

Station.	Position (approx.).	
	Latitude.	Longitude.
Norfolk Island	29° 04' S.	167° 58' E.
Awanui	37° 50' S.	178° 27' E.
Auckland	36° 50' S.	174° 50' E.
East Cape	37° 42' S.	178° 33' E.
Cape Egmont	39° 17' S.	173° 46' E.
Napier	39° 29' S.	176° 55' E.
Farewell Spit	40° 33' S.	173° 01' E.
Stephens Island	40° 40' S.	174° 01' E.
Wellington	41° 17' S.	174° 46' E.
Cape Campbell	41° 43' S.	174° 17' E.
Greymouth	42° 26' S.	171° 13' E.
Akaroa Lighthouse	43° 49' S.	172° 59' E.
Nugget Point	46° 27' S.	169° 51' E.
Puysegur Point	46° 10' S.	166° 38' E.
Chatham Islands	43° 52' S.	176° 42' E.
Sydney	33° 52' S.	151° 12' E.
Hobart	42° 53' S.	147° 20' E.

* Marine Observers report that the time of observations used in this Bulletin appears to be 0430 G.M.T.

South Pacific Ocean Islands.

Fiji Islands.

Suva W/T Station, approximate Latitude 18° 09' S., Longitude 178° 28' E., call sign **VPD**, broadcasts a weather bulletin, containing observations taken at 0330 and 2030 G.M.T., at the following stations, on a wavelength of 600 metres (spark), directly after the Apia broadcast (see below) at 0845 and 2345 G.M.T., Sundays 0845 only:—

	Latitude (approx.).	Longitude (approx.).
Apia, Samoa	13° 51' S.	171° 48' W.
Nukualofa (Tonga Islands) ...	21° 08' S.	175° 12' W.
Fila (New Hebrides)	16° 00' S.	168° 00' E.
Norfolk Island	28° 58' S.	168° 03' E.
Suva (Fiji Islands)	18° 09' S.	178° 28' E.
Awanui (New Zealand)	35° 05' S.	173° 15' E.
Vavau (Tonga Islands)	18° 39' S.	173° 59' W.
Rarotonga (Cook Islands)	21° 12' S.	159° 48' W.
Papeete	17° 29' S.	149° 29' W.

NOTE.—Only the 0330 G.M.T. observations are included from Rarotonga and Papeete.

The bulletin is sent *en clair* and consists of:—
 Name of the observation station.
 Barometer reading (corrected) in inches and hundredths.
 Dry and wet bulb thermometer readings (in whole degrees F.).
 Direction (True) and force of the wind (Beaufort Scale).
 State of weather by Beaufort Scale.

Example:—

Suva 30.08 79 75 E.N.E. 5 or, break sign (— — — — —)

Apia 30.16 80 78 E.N.E. 3 bc, break sign

Nukualofa, etc., etc., the bulletin ending with the observation time, 0330 or 2030 G.M.T., as the case may be.

Samoa.

Apia W/T Station, approximate Latitude 13° 51' S., Longitude 171° 48' W., call sign **ZMA**, broadcasts a similar bulletin to that explained above at 0830 and 2330 G.M.T. on a wavelength of 600 metres and 2,000 metres (spark) (Sundays excepted).

During the period May 1st to October 31st.

Only one bulletin is broadcast by Apia at 0830 G.M.T. containing observations taken at 0330 G.M.T.

I.—Ships' Wireless Weather Signals.

"Selected Ships," i.e., ships in the Fleet List with the Letters W.T., M.L. or M. appearing in the equipment column when at sea in the South Pacific are invited to make their routine weather reports to "all ships" as usual.

When within range of **Suva** or **Apia W/T Stations** "Selected Ships" should address their reports to **VPD** or **ZMA** as well as to **CQ.**

The times of Wireless Weather Telegraphy **Observation** from Longitude 160° E. to Longitude 130° W. between the Equator and Latitude 30° S. are 0330 and 2030 G.M.T.

For particulars and sample of Ship's Wireless Weather reports see Chapter I of "Wireless and Weather an Aid to Navigation" and pages 17-19, Vol. VI, No. 61, of this Journal.

Any ship at any time observing the formation of a dangerous Tropical Revolving Storm should report to "All Ships" and the appropriate Wireless Station and continue to report at intervals of three hours so long as the ship remains under the influence of the storm.

WIRELESS STORM WARNINGS.

Australia.

Storm warnings are broadcast by the Australian W/T stations as follows:—

For approximate positions of the Stations see pp. 230-1.

Geraldton, call sign **VIN**, wavelength 670 metres (spark).

Broome, " **VIO**, " 600 " "

Wyndham, " **VIW**, " 720 metres (I.C.W.).

These W/T Stations broadcast special warnings of the approach of cyclonic storms of tropical origin, including information regarding barometric pressure at stations on the N.W. coast of W. Australia, immediately upon receipt from the Weather Bureau.

Darwin, call sign **VID**, wavelength 600 metres (spark), broadcasts special warnings of the approach of cyclonic storms of tropical origin immediately upon receipt from the Weather Bureau. In the case of cyclonic storms affecting the tropical seaboard of W. Australia the warnings include information of barometric pressure at stations on the N.W. coast of W. Australia.

Thursday Island, call sign **VII**, wavelength 720 metres (I.C.W.).

Cooktown, " **VIC**, " 760 metres (spark).

Rockhampton, " **VIR**, " 720 " "

Brisbane, " **VIB**, " 600 " "

These W/T Stations broadcast special storm warnings, immediately upon receipt from the Weather Bureau, and thereafter during the regular W/T watches kept by coastal vessels until receipt of later information from Brisbane Weather Bureau.

Special storm warnings may also be obtained, if the information is available, upon application to any of the W/T stations.

Sydney, call sign **VIS**, wavelength 600 metres I.C.W., broadcasts special storm warnings, immediately on receipt. They are repeated at intervals until receipt of later information from the Weather Bureau.

Melbourne, call sign **VIM**, wavelength 600 metres (I.C.W.), broadcasts special storm warnings immediately on receipt from the Weather Bureau.

King Island, call sign **VZE**, wavelength 760 metres (spark), broadcasts storm warnings immediately on receipt.

Flinders Island, call sign **VIL**, wavelength 740 metres (I.C.W.), broadcasts storm warnings immediately on receipt.

Hobart (Tasmania), call sign **VIH**, wavelength 720 metres (spark), broadcasts special storm warnings, immediately on receipt from the Weather Bureau and at hourly intervals thereafter until 1000 G.M.T.

Adelaide, call sign **VIA**, wavelength 600 metres (spark).
Esperance, ,, **VIE**, ,, 600 metres (,,),
 broadcast special storm warnings immediately on receipt from the Weather Bureau.

British New Guinea (Papua).

Port Moresby, call sign **VIG**, wavelength 720 metres spark, broadcasts special warnings of disturbances on the Queensland coast on any hour when occasion warrants.

Samarai, call sign **VIJ**, wavelength 720 metres (spark), broadcasts special storm warnings immediately on receipt and thereafter in the regular watches kept by coastal vessels, until further information is received from the Brisbane Weather Bureau.

Special storm warnings may also be obtained, if the information is available, upon application to any of the W/T stations.

New Britain.

Rabaul, call sign **VJZ**, wavelength, 2,400 metres (C.W.) broadcasts special warnings of disturbances on the Queensland coast at any hour when occasion warrants.

New Zealand.

Awanui W/T Station, call sign **VLA**, repeats the hurricane warnings broadcast by Apia (Samoa) W/T station, after the New Zealand Weather Report at 1000 G.M.T. on a wavelength of 600 metres (spark).

South Pacific Ocean Islands.

During the Hurricane Season (November 1st to April 30th).

Fiji Islands.

Suva W/T Station, call sign, **VPD**, broadcasts hurricane warnings, when necessary, immediately after the weather bulletins which are transmitted soon after 0830 and 2330 G.M.T., on a wavelength of 600 metres (spark) and 2,000 metres (spark).

Samoa.

Apia W/T Station, call sign **ZMA**, broadcasts, when necessary, information concerning hurricanes in addition to the weather bulletins at 0830 and 2330 G.M.T., on a wavelength of 2,000 metres (spark). The message is sent *en clair* and commences with the general call to all stations, e.g. :--

QST. "Hurricane centre 200 miles N.W. of Suva at noon, 27th February, Apia time and date, travelling south."

French Oceania.

Papeete (Tahiti), approximate Latitude 17° 29' S., Longitude 149° 29' W., call sign **FPB**, broadcasts information concerning hurricanes &c. at 0500 and 2200 G.M.T. and at other times when necessary. The safety signal **TTT**, repeated at short intervals ten times on full power, is first sent out followed by the message which is repeated three times with intervals of ten minutes.

III.—WIRELESS TIME SIGNALS.

Australia.

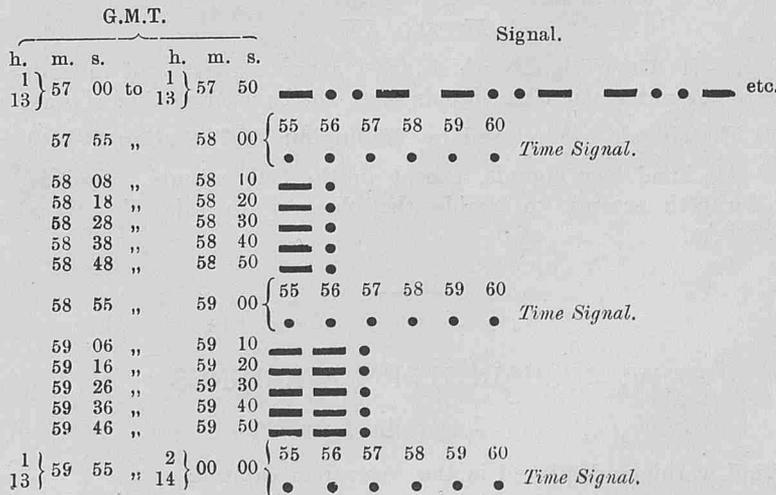
Station.	Call Sign.	Wave-length (metres).	G.M.T.	System.
Perth Lat. 32° 01' 51" S. Long. 115° 49' 31" E.	VIP	600 (I.C.W.)	0057-0100 1257-1300	(See Time Signal Figure, p. 136, Vol. VI, No. 66). Controlled by Perth Observatory. (See Fig. as above). Transmitted automatically by the standard clock of the Adelaide Observatory.
Adelaide Lat. 34° 51' 14" S. Long. 138° 31' 55" E.	VIA	600 (I.C.W.)	0027-0030 1227-1230	

Melbourne W/T Station, Latitude 37° 46' 56" S., Longitude 144° 52' 09" E., call sign, **VIM**, wavelength 600 metres (I.C.W.).

Wireless time signals are broadcast from Melbourne W/T Station in accordance with the New International System of W/T time signals at the following times:—

G.M.T.						
h.	m.	s.	h.	m.	s.	
1	57	00	to	2	00	00
13	57	00	,,	14	00	00

The transmission of each series of signals is similar, the procedure being as follows:—



Numbers representing Ports :

10. Torres strait.	48. Corner inlet.	80. Keppel bay.
11. Cleveland bay.	49. Port Phillip.	81. Port Denison.
37. Wilson promontory.	54. Launceston.	82. Wollongong.
40. Sydney.	55. Hobart.	83. Wide bay.
41. Moreton bay.	56. Gulf of Carpentaria.	84. Port Curtis.
42. Clarence river.	61. Shoalhaven.	88. Port Fairy or
43. Port Macquarie.	68. Richmond river.	Warrnambool.
44. Port Stephens.	70. Macleay river.	97. Hawke bay.
45. Newcastle.	72. Gabo island.	98. Kiama.
46. Jervis bay.	75. Manning river.	99. Wallaroo.
47. Twofold bay.	76. Circular head.	101. Port Mackay.

NOTE.—Other numbers signify ports outside the eastern colonies from which a vessel arrives; they are not inserted as they would not be used for storm signals.

These signals are also used to indicate the place from which a vessel arrives.

Queensland.

Storm signals are shown from the following stations in Queensland: Cape Moreton and Cowan Cowan Point, in Moreton bay; Double Island point; Woody Island; Sandy Cape, Goode island, Torres Strait.

The signals are made from the quarters of the yards; the balls and cones are of large size and must not be mistaken for tidal signals, which are made from the yard-arms.

Symbols as follows:—



Indicates strong winds from S.S.W. or south, through S.E. to E. or E.N.E.



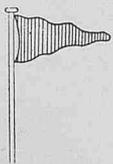
Indicates strong winds from W.N.W. or west, through S.W., to south or S.S.E.



Indicates strong winds from N.N.W. or north, through N.E., to east or E.S.E.



Indicates strong winds from N.N.E., or north, through N.W., to west or W.S.W.



Red Pennant.

Indicates that a weather report concerning a tropical disturbance or a storm warning is available. (See below.)

The red pennant when hoisted at certain coastal stations indicates that a weather report concerning a tropical disturbance is available at the local Post Office.

When hoisted at the following lighthouse stations, viz.:—Goode island, Archer point, Cape Cleveland, Cape Capricorn, Bustard head, Sandy cape, Double Island point, Caloundra head, and Cape Moreton, the red pennant indicates that a storm warning will be signalled to vessels *on demand*.

When hoisted in the port of Brisbane by day or if a red light is hoisted at Fort Lytton by night, it indicates to vessels leaving port that a storm warning is available to them, at the Pile light, *on demand*.

New Zealand.

Storm signals are exhibited from the following Lighthouses: Cape Maria Van Diemen, Tiri Tiri Matangi, Cape Campbell, Farewell Spit, Nugget Point, and Stephens Island. They are not to be considered as covering a distance greater than 200 miles from the place at which they are hoisted, those hoisted with the red pennant below as covering only a distance of 50 miles from the place at which they are hoisted.

Symbols used and their Meanings.



Northerly gales.

Hoisted when strong winds or gales are probable from N., that is, from about N.E., changing through north towards west.

NOTE.—This change of wind is usually followed by strong winds or gales from the southward.



Westerly gales.

Hoisted when strong winds or gales are probable from W., that is from about N., changing through W. towards S.W.

NOTE.—After these gales have moderated the wind generally shifts to N.W. or to N.



Easterly gales.

Hoisted when strong winds or gales are probable from E., that is, from about N., changing towards E. and S.E.

NOTE.—This change of wind denotes a "black North-Easter" and an approaching cyclone.



South-easterly gales.

Hoisted when strong winds or gales are probable from E., changing, through S., towards S.W.



Southerly gales.

Hoisted when strong winds or gales are probable from about W., changing, through S., towards S.E.



Unusual gales.

Hoisted when strong winds or gales are probable from about S., changing, through E., towards N.

MODERATE WEATHER is indicated by the International code signals, but only in reply to inquiry and if meteorological conditions admit.

NOTE.—(1) A red pennant hoisted below any of the above signals made between the hours of 8 a.m. and noon indicates that the signal refers to the previous day.

(2) Signals hoisted without the red pennant refer to the day on which they are hoisted.

(3) The red pennant when hoisted alone, indicates that the forecast for the day has not been received at the station from the Meteorological Office, Wellington.

(4) Whenever the wind at any of the signal stations has changed in such manner that the forecast for the previous day will not apply no signal is displayed until the forecast for the day has been received at the station.

(5) When it is observed that the storm signals are not being shown at a storm signal station, the Dominion meteorological forecast for the same day may be obtained by hoisting the signal ZK.

South Pacific Ocean Islands.

Fiji Islands.

During the hurricane season (from November 1st to April 30th) storm signals as defined below will be exhibited at the signal station, Suva, and at the Government Wharf, to denote that a dangerous depression in the atmospheric pressure appears to be approaching the group. The signals will be displayed until conditions improve.

Between sunrise and sunset: Two *black* circles disposed vertically.

Between sunset and sunrise: Two *red* lights disposed vertically.

At the Wharf, Suva, attention will be drawn to the first exhibition of the signals by a detonator being fired twice, with an interval of one minute.

Weather reports are posted up outside the Harbour Master's office during the hurricane season.

SHANGHAI—AMENDMENT.

II.—Wireless Weather Signals.

Wireless Weather Bulletins.

VOL. VI, No. 67, PAGE 158, column 2.

line 34:—

For wavelength 750 metres spark substitute 650 metres I.C.W. repeated immediately on 1500 metres I.C.W.

line 44:—

For wavelength 34 metres substitute 28.5 metres C.W.

VOL. VI, No. 67, PAGE 161, column 2.

line 7:—

For wavelength 750 metres spark substitute 650 metres I.C.W. repeated immediately on 1500 metres I.C.W.

line 14:—

For wavelength 34 metres substitute 28.5 metres C.W.

III.—Wireless Time Signals.

VOL. VI, No. 67, PAGE 162, column 1, lines 1 to 25, *delete* and *substitute*:—

China.

Wireless time signals controlled by Zikawei Observatory are broadcast by **Shanghai W/T Station**, Latitude 31° 13' 16" N., Longitude 121° 27' 47" E., call sign **FFZ**, on a wavelength of 650 metres, I.C.W. after the general call (CQ de FFZ) in the following manner:—

G.M.T.						Signal.	
h.	m.	s.	h.	m.	s.		
2	55	00	to	2	56	45	—————
8	57	00	„	57	50		————— etc.
	57	55	„	58	00	{ 55 56 57 58 59 60	Time signal.
	58	08	„	58	10	— —	
	58	18	„	58	20	— —	
	58	28	„	58	30	— —	
	58	38	„	58	40	— —	
	58	48	„	58	50	— —	
	58	55	„	59	00	{ 55 56 57 58 59 60	Time signal.
	59	06	„	59	10	— — — —	
	59	16	„	59	20	— — — —	
	59	26	„	59	30	— — — —	
	59	36	„	59	40	— — — —	
	59	46	„	59	50	— — — —	
2	59	55	„	3	00	{ 55 56 57 58 59 60	Time signal.
8				9	00		

— = 1 sec. ; ■ = 0.2 sec.

Special Notices Regarding Personnel.

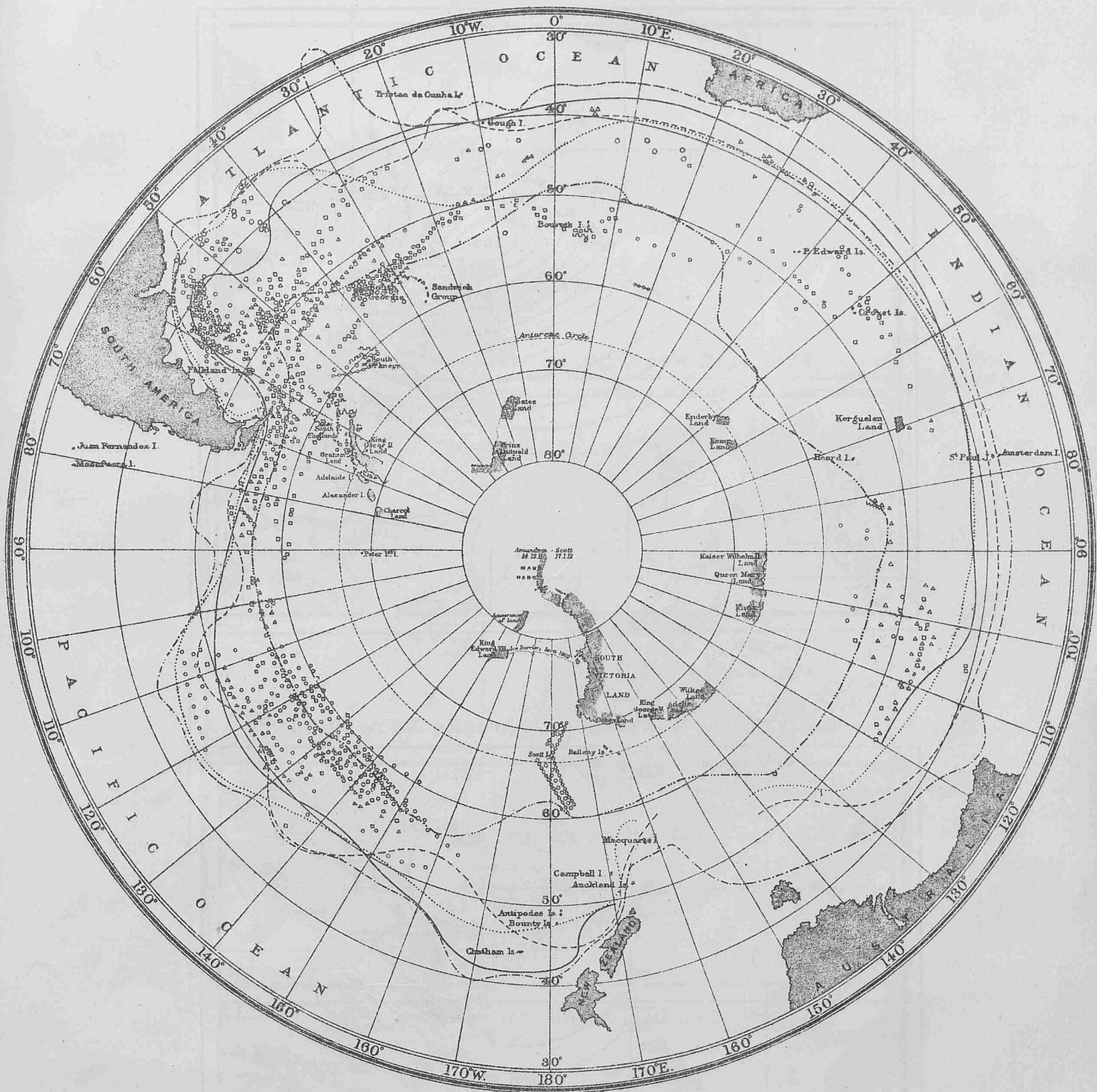
The Marine Superintendent will be glad to receive information of special distinctions gained and retirements, &c., of Marine Observers.

CAPTAIN B. W. ADAMSON.

Captain B. W. ADAMSON of S.S. *Shropshire* has recently been appointed Marine Superintendent of the BIBBY LINE Fleet.

Captain ADAMSON has been a member of our Corps since 1907 and in 1922 when he commanded *Oxfordshire* he became a pioneer in the development of Wireless and Weather an Aid to Navigation and in the establishment of the "Selected Ship" system for the purpose of Marine Meteorological Wireless Telegraphy. The ships under his command have contributed no less than 22 excellent logs and he has always been a strong advocate of Marine Meteorology as a branch of seamanship.

The Corps of Voluntary Marine Observers and the Marine Division join in wishing Captain ADAMSON success in his appointment.



**ICE CHART OF THE SOUTHERN HEMISPHERE, 1902-1928.
OCTOBER. NOVEMBER, AND DECEMBER.**

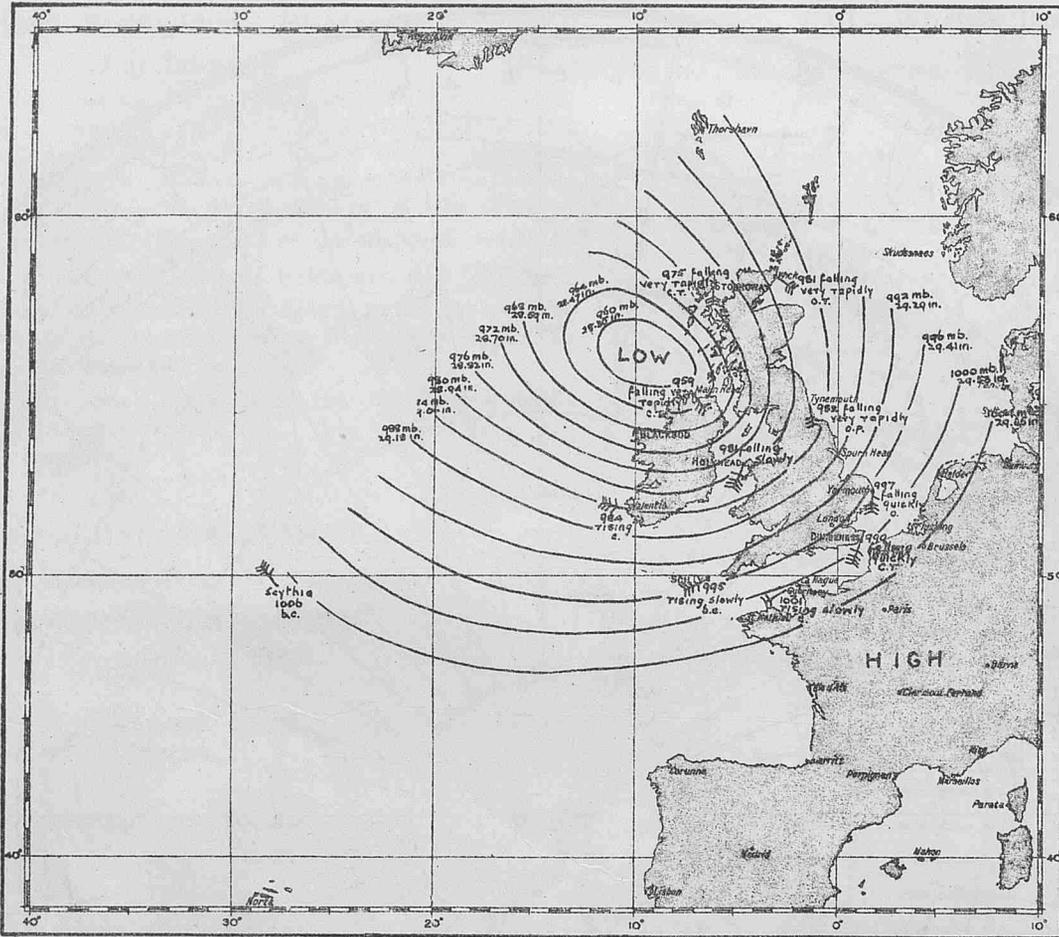
EXPLANATION.

The symbols used to distinguish the records of each of the three months represented during the period 1902-1928, are as follows:—October bergs \triangle , pack ice, $\sim\sim\sim\sim$ November bergs \square , pack ice, $\sim\sim\sim\sim$ December bergs \circ ; pack ice $\circ\text{---}\circ\text{---}\circ$. Extreme limits are given thus:—October $\text{---}\text{---}\text{---}$; November $\text{---}\text{---}\text{---}$; December $\text{---}\text{---}\text{---}$; these include ice reported since 1772.

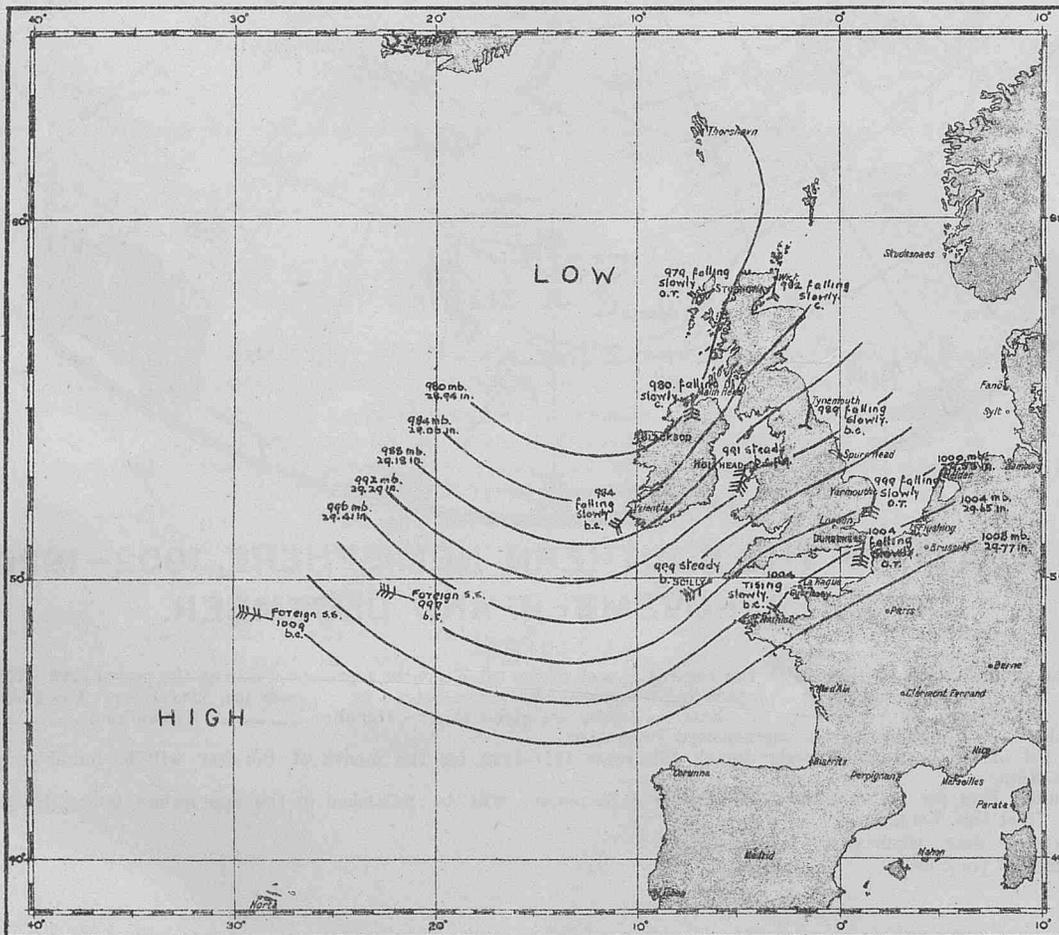
A list of Southern Ice Reports during the years 1917-1928 for the month of October will be found on p.228 of this Number.

Similar lists for the months of November & December will be published in the appropriate issues, Numbers 71 and 72 of this Volume.

Extreme limit (whole year) $\text{---}\text{---}\text{---}$
Limit of pack ice $\text{---}\text{---}\text{---}$

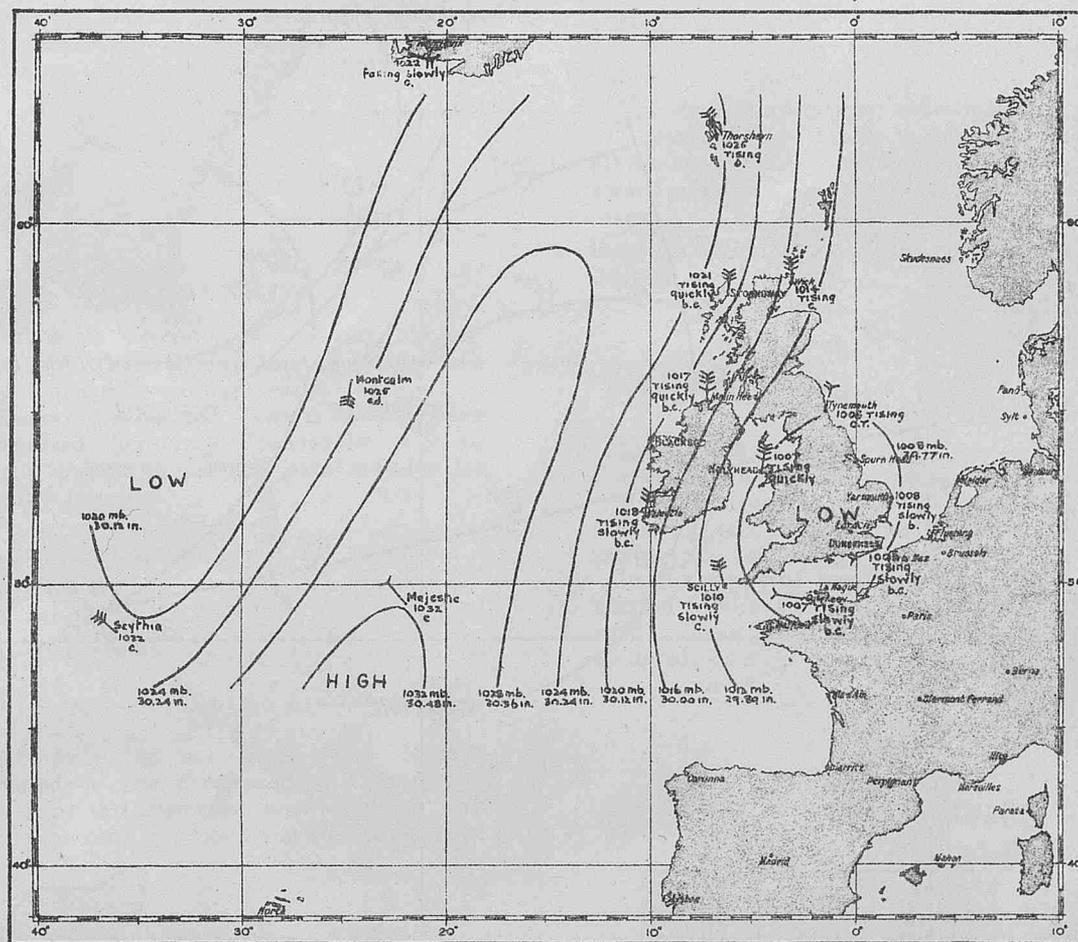


Weather Chart XI.



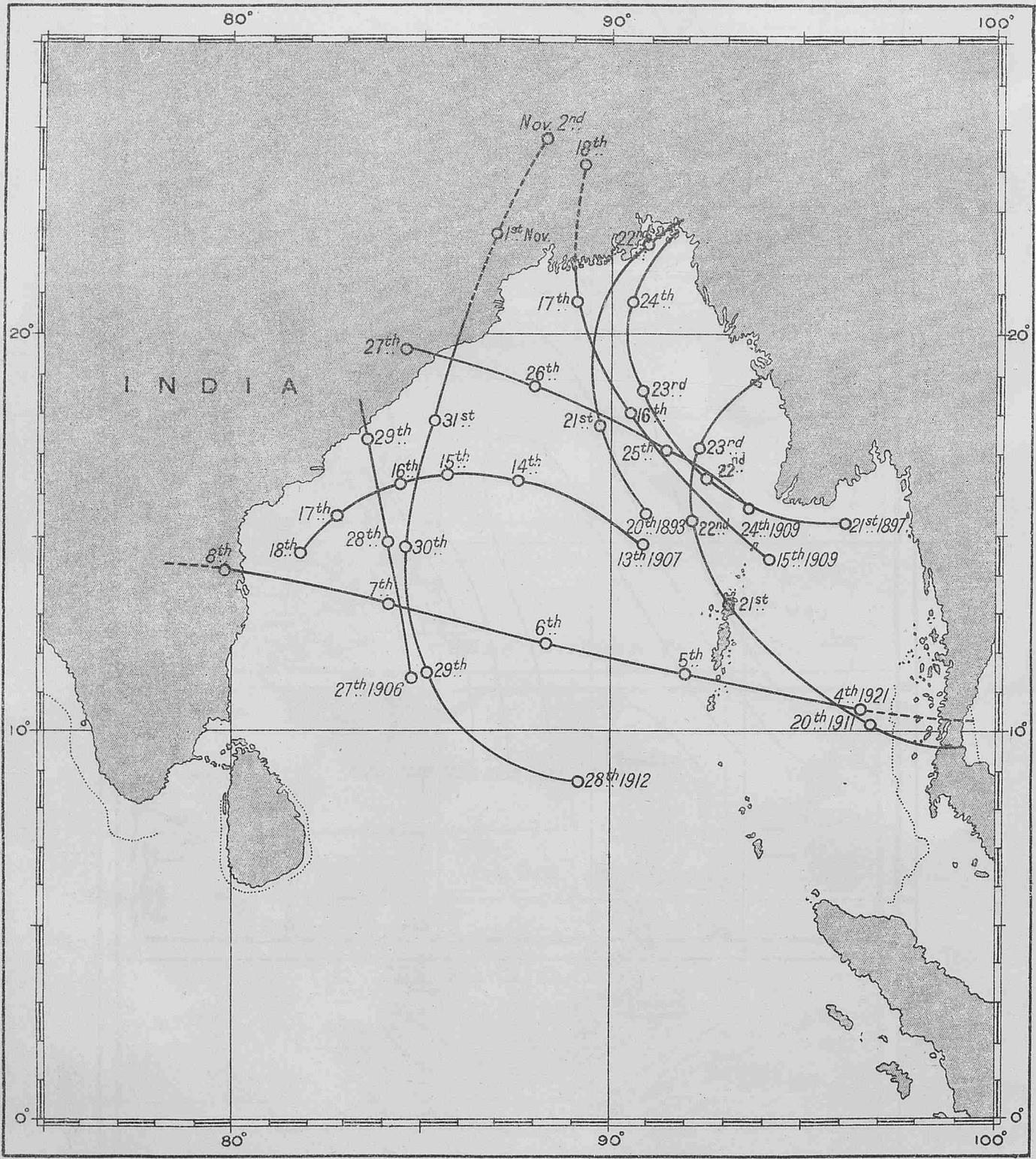
Weather Chart XII.

1800 G.M.T. EVENING OF OCTOBER 31st, 1928.



Weather Chart XIII.

TRACKS OF SEVERE CYCLONES IN THE BAY OF BENGAL OCTOBER, 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.

NOTICES.

THE SELECTED SHIP.

THE "Selected Ship" is the term used to define a ship selected in voluntary marine meteorological service for the purpose of making daily routine wireless marine meteorological reports to all ships and selected shore stations when at sea.

In the British Service "selected ships" are indicated monthly in the fleet list in the MARINE OBSERVER.

They are selected in accordance with the keenness and capacity of their officers as marine observers to provide the best reports, their sailing schedule and trade to provide the best distribution over all oceans, the nature of their wireless installation to provide the best communication, the nature of the meteorological instrumental equipment on board to ensure accuracy, and to supply the British complement in accordance with tonnage, 1,000 "selected ships" at present being the total aimed at for all maritime nations signatory to the International Convention for Safety of Life at Sea.

As statements have recently and frequently appeared which indicate that there is misconception as to the functions and number of selected ships, the British Corps of Voluntary Marine Observers are asked to make this definition known. For the indications of which ships in the British lists are "selected ships," see note at the commencement of the list in the MARINE OBSERVER.

POSTAL ARRANGEMENTS.

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

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

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

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

TROPICAL REVOLVING STORMS. OBSERVATIONS.

Marine Observers are requested to bring to the notice of Commanders and Officers of ships who are not on the Meteorological Office list, Form 905 which was reproduced in the June Number of this year, and to request those who encounter Tropical Revolving Storms to send in observations set out in this form, which may be obtained from the Marine Agents.

Observations of Hurricanes, Cyclones and Typhoons are required from as many ships as possible in the vicinity of these storms for the development of the "Laws of Storms."

IMPORTANT.

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

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

Photographs, sketches and weather charts will be most welcome.

ILLUSTRATIONS FOR THE MARINE OBSERVER.

When making sketches, charts or plans, Marine Observers will give us great assistance if they will give consideration to reproduction in THE MARINE OBSERVER.

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

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

CARE OF INSTRUMENTS.

Marine Observers are earnestly requested to exercise every precaution in the care of instruments lent by the Meteorological Office. It is requested that the Captains and Officers will give the Port Meteorological Officers assistance when they visit the ship, by having all instruments accessible for their inspection.

In the event of breakages or losses, the broken parts should be handed to the Port Meteorological Officer or Agent at the ports, with a brief and clear account of how the breakage or loss occurred.

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		

ICE CHART. WESTERN NORTH ATLANTIC.

LETTERS OF TRANSATLANTIC TRACKS INDICATE

- (C) From 1st September to 31st March, inclusive.
- (F) From 16th May to Opening of Belle Isle route, and to 30th November when not using the Belle Isle route.
- (E) Westbound, on approaching Cape Race steer a course to pass 10 miles S. of Cape Race. Eastbound, steer from position 25 miles S. of Cape Race.
- (G) From the opening of the Straits of Belle Isle to 14th November.

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.

SYMBOLS USED ON THE CHART

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

PHENOMENAL POSITIONS OF ICE.

Date.	Ship or Source of Report.	Position. Lat. Long.	Remarks.
Oct. 15, 1883	S.S. Elenora ...	37°00' N. 18°00' W.	Piece ice.
" 8, 1912	S.S. Putney Bridge...	35°15' N. 44°50' W.	Small berg 85 ft. long, 6 ft. high.
" 2, 1918	S.S. Montreal	51°17' N. 41°17' W.	Small berg.
" 19, 1920	U.S. Hyd. Bulletin	50°10' N. 40°50' W.	Large berg.
" 17, 1921	Do.	45°22' N. 40°00' W.	Berg.
" 8, 1922	S.S. Mt. Vernon ...	48°23' N. 42°19' W.	Berg about 70 ft. high, 400 ft. long.
" 7, 1923	S.S. Christian Krogh	50°43' N. 40°42' W.	Berg 80 ft. high.
" 23, 1927	S.S. Eastern Dawn...	40°48' N. 65°54' W.	Large growler about 100 ft. square.
" 23, 1927	Trawler, Grecian Empire.	30 mls. E.S.E. of Outer Shetland Is.	Piece of ice 100 ft. long, 8 ft. above water.

Reports of Ice sighted between August 1st and August 31st, 1929, which have been received by the Meteorological Office, are shown by the Symbols plotted in this position reported, the figures indicating the day of the month.

ICE IN GREENLAND WATERS.

SUMMARY OF INFORMATION FROM CABLEGRAMS RECEIVED FROM DANISH METEOROLOGICAL INSTITUTE, COPENHAGEN.

- August 12 "Off ARSUK, no Storis extending to 8 miles off shore."
- August 14 "Free of ice 40 miles off Cape Farewell."
- August 17 "Off NUNARSSUIT, no Storis extending to 30 miles off shore, a few icebergs."
- August 24 "Off NUNARSSUIT, no Storis extending to 20 miles off shore."

DERELICTS AND FLOATING WRECKAGE.

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 2s.

Date.	Position.		Description.
	Latitude.	Longitude.	
NORTH SEA.			
5.8.29	3 miles E. by S. of N. Hinder Lt. V.		Floating object resembling mast, about 10 feet above water.
8.8.29	56°54'N. | 0233'W.		Buoy.
9.8.29	6 miles N.W. of Haisbro. Lt. V.		Large raft of heavy timber.
17.8.29	51°42'N. | 2°45'E.		Black light buoy, occulting every 10 seconds, marked No. 2.
ENGLISH CHANNEL.			
1.8.29	49°50'N. | 5°31'W.		Waterlogged boat, mast and rigging attached.
1.8.29	48°45'N. | 4°57'W.		Spherical red buoy surmounted with red and blue flag.
19.8.29	50°15'N. | 2°35'W.		White painted yacht 30 feet long, apparently abandoned.
IRISH SEA.			
10.8.29	19 miles S.E. by E. from Maughold Head.		Dumb barge, 60 feet long, painted black.
MEDITERRANEAN.			
14.8.29	39°21'N. | 1°04'E.		Derelict black rowing boat, dangerous to navigation.
NORTH ATLANTIC.			
1.8.29	49°12'N. | 11°36'W.		Conical buoy, painted red.
3.8.29	33°52'N. | 9°32'W.		Red conical buoy with large top mast and flag, dangerous to navigation.
3.8.29	28°27'N. | 79°40'W.		Gray painted motor boat No. 418011, left adrift, disabled engine.
4.8.29	37°47'N. | 74°45'W.		Buoy showing about 10 feet out of water with a wooden superstructure painted white and showing a white flag, buoy marked D.S.
7.8.29	42°04'N. | 66°32'W.		Floating wreckage consisting of mast boom gaff and part sail.
8.8.29	40°40'N. | 69°11'W.		Unpainted fishing dory.
9.8.29	41°48'N. | 63°56'W.		Upright spar possibly attached submerged wreckage.
11.8.29	28°00'N. | 79°48'W.		Large piece of wreckage awash.
12.8.29	43°46'N. | 38°54'W.		Gas buoy projecting 15 feet out of water, light extinguished.
14.8.29	37°52'N. | 74°36'W.		Nun buoy.
15.8.29	43°50'N. | 9°18'W.		Red spherical buoy with staff and marked N.S.W. Telegraph buoy.
15.8.29	48°25'N. | 5°03'W.		Conical buoy, apparently red.
16.8.29	50°42'N. | 15°07'W.		New varnished spar 18 feet long, 1½ feet diameter, iron fittings.
16.8.29	48°06'N. | 20°09'W.		Bell buoy with square framework.
18.8.29	48°29'N. | 15°19'W.		Wreck about 20 metres long, both ends above water, dangerous to navigation.
19.8.29	45°33'N. | 5°44'W.		Wreck about 8 metres long, dangerous to navigation.
26.8.29	37°19'N. | 9°07'W.		Wreck of vessel's bridge deck with standard compass attached.
GULF OF MEXICO.			
2.8.29	26°58'N. | 89°15'W.		Tree trunk about 2 feet in diameter, 15 feet long, projecting about 1 foot out of water.
3.8.29	29°03'N. | 92°31'W.		Log about 30 feet long, 5 feet diameter.
6.8.29	24°46'N. | 85°11'W.		White upright spar, undoubtedly attached submerged wreckage, projecting 10 feet out of water.
7.8.29	26°36'N. | 87°06'W.		White upright spar buoy.
14.8.29	24°23'N. | 81°11'W.		Broken mast projecting 8 feet out of water, apparently attached to submerged wreckage.
CARIBBEAN SEA.			
4.8.29	7°21'N. | 82°56'W.		Spar, 3 feet diameter, projecting 4 feet above water.
SOUTH ATLANTIC.			
11.8.29	34°—S. | 52°27'W.		Four-masted schooner <i>San Luis</i> of Puerto Cortes, abandoned on fire in sinking condition, dangerous to navigation.
NORTH PACIFIC.			
2.8.29	10°—N. | 88°55'W.		Tree about 25 feet long, 2 feet in diameter.
7.8.29	36°29'N. | 126°41'W.		Log about 40 feet long, 2 feet diameter, covered marine growth.
9.8.29	16°16'N. | 69°25'W.		Log 30 feet long, 4 feet diameter.
9.8.29	41°20'N. | 124°40'W.		Very large log.

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

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

LIVERPOOL ... Lieut. Commander M. CRESSWELL, R.N.R., Port Meteorological Officer, Dock Office.
(Telephone No.: Bank 8959).

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

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

CLYDE ... Captain M. C. CORRANCE, Board of Trade Surveyor's Office, 73, Robertson Street, Glasgow.
(Telephone No.: Central 2283-4).

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

HONG KONG, China. Agents (*contd.*)
Lieut. Commander J. H. DRUMMOND, D.S.C., R.N., Superintendent, Admiralty Chart and Chronometer Depot, H.M. Dockyard.
(Telephone No.: 108 Dockyard).

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

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

SOUTHAMPTON Captain D. FORBES, Nautical Academy, 1, Albion Place.

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

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

VANCOUVER, British Columbia. Mr. T. S. H. SHEARMAN, 61, Exchange Building, 553, Granville Street.
(Telephone No.: Seymour 3309).

LIST OF VOLUNTARY OBSERVING SHIPS

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

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

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

Only in special cases will individual letters be sent.

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

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

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.	Meteorological Equipment.	Line.	Last Log, Register, or Report Contributed. Received up to 16.8.29.	Date Received.
<i>Abinsi</i> ...	Millson, H. E. ...	S. H. Worsley ...	No. A.	Elder Dempster ...	Form 911 17.4.29 to 6.5.29...	28.5.29
†† <i>Acera</i> ...	Wright, J. B. ...	R. B. Ellis ...	" M.	" "	" 19.6.29 to 22.7.29 ...	30.7.29
*† <i>Achilles</i> ...	Williams, D. T. ...	A. G. Phillips, N. Anderson, F. W. Hilton.	M.L.	A. Holt "	Met. Log. 1.12.28 to 13.4.29 ...	16.5.29
*† <i>Actor</i> ...	Nicholas, P. O. ...	E. Pearce, F. M. Eales, G. Morrice.	"	Harrison ...	" 2.12.28 to 14.6.29 ...	24.6.29
†† <i>Adda</i> , M.V. ...	Toft, J. T. ...	S. A. Boswell ...	No. M.	Elder Dempster ...	Form 911 5.6.29 to 8.7.29 ...	15.7.29
††50 <i>Adriatic</i> ...	Hickson, V. W., R.D., Lt.-Commr. R.N.R.	J. A. Holme, H. R. Wilkinson, D. W. Chamberlain.	W.T.	White Star ...	W.T. Reg. 1.7.29 to 20.7.29 ...	23.7.29
<i>Aeneas</i> ...	Wallace, W. K. ...	J. Holden...	No. A.	A. Holt ...	Form 911 30.6.29 to 20.7.29 ...	23.7.29
<i>Agapenor</i> ...	Christie, W. ...	B. Bell ...	" A.	" "	" 6.5.29 to 22.7.29... ..	24.7.29
<i>Aidan</i> ...	Evans, L. ...	N. Caris ...	" A.	Booth ...	" 24.6.29 to 8.7.29 ...	6.8.29
<i>Alban</i> ...	Saxton, G. ...	R. G. Cheshire ...	" A.	" "	" 2.6.29 to 16.6.29... ..	24.6.29
*† <i>Alipore</i> ...	Dawson, E. E. N. ...	W. L. Dobbin ...	" M.	P. and O. ...	" 19.6.29 to 1.7.29 ...	6.8.29
<i>Almanzora</i> ...	Clarke, E. C. ...	F. Deveson ...	" A.	R.M.S.P. ...	" 31.5.29 to 17.6.29 ...	22.7.29
††63 <i>Albertic</i> ...	Summers, F. F., R.D., Commr., R.N.R.	W. Hill, R. H. Shaw, H. Phillips.	W.T.	White Star ...	W.T. Reg. 17.5.29 to 4.7.29 ...	11.7.29
<i>Alondra</i> ...	Scott, L. S. ...	H. Peters ...	No. A.	Yeoward ...	Form 911 22.7.29 to 11.8.29 ...	14.8.29
<i>Alynbank</i> ...	Clayton, W. E. ...	R. M. Yates ...	" A.	A. Weir & Co. ...	Form 911 3.3.29 to 24.3.29... ..	26.3.29
†† <i>Andalucia Star</i> ...	Thomas, R. J. ...	R. Fountain, J. F. Browning	" M.	Blue Star ...	" 29.6.29 to 20.7.29 ...	23.7.29
<i>Anchises</i> ...	Woodgett, R. J. ...	R. N. Mayo.	" A.	A. Holt ...	" 3.7.29 to 17.7.29 ...	20.7.29
†† <i>Andes</i> ...	Matthews, G. P. ...	T. W. Stevens, L. A. Wood, R. N. Mayo.	M.L.	R.M.S.P. Co. ...	" 11.3.29 to 30.5.29 ...	31.5.29
<i>Antilochus</i> ...	Jones, E. ...	A. Pope ...	No. A.	A. Holt ...	Met. Log. 23.2.29 to 4.6.29 ...	13.6.29
*† <i>Aorangi</i> , M.V. ...	Crawford, R. ...	E. V. Bilger, E. M. Anderson, D. Richards.	M.L.	Canadian-Australasian	Form 911 22.4.29 to 1.6.29 ...	3.7.29
††30 <i>Aquitania</i> ...	Diggle, E. G., R.D., Capt., R.N.R.	R. W. Bee, J. Locke, G. Duguid.	W.T.	Cunard ...	Met. Log. 6.2.29 to 23.5.29... ..	25.6.29
††62 <i>Arabic</i> ...	Bulman, J. B. ...	W. Hesketh, F. Wills, C. Clark.	"	White Star ...	W.T. Reg. 21.7.29 to 6.8.29 ...	8.8.29
*† <i>Arafura</i> ...	Gordon, A. S. ...	F. R. Miller, B. W. Dun, C. Stratford, H. Nuzum.	M.L.	Eastern and Australian	" 22.7.29 to 7.8.29... ..	10.8.29
*† <i>Argyllshire</i> ...	Wallace, J. ...	R. W. Cook, C. C. Reeder.	No. M.	Federal ...	Met. Log. 5.11.28 to 17.4.29 ...	15.6.29
*† <i>Ariguani</i> ...	Scudamore, J. H. H., D.S.C., R.D., Commr., R.N.R.	G. McKee, J. W. Dodd, W. Ireland.	M.L.	Elders & Fyffes ...	Form 911 20.5.29 to 8.6.29... ..	8.7.29
<i>Ariosto</i> ...	Biggins, R. L. ...	" " " " " "	No. A.	Ellerman Wilson ...	Met. Log. 15.12.28 to 14.4.29 ...	26.4.29
†† <i>Armada Castle</i> ...	Owen, S. H. ...	" " " " " "	M.L.	Union Castle ...	Form 911 17.12.28 to 29.12.28 ...	4.2.29
*† <i>Arracan</i> ...	Macfarlane, W. M. F.	J. Henderson, J. Morrison, F. Scott.	"	P. Henderson ...	Met. Log. 12.4.29 to 1.6.29... ..	5.6.29
<i>Arundel</i> ...	Short, H. ...	Mr. Hill... ..	C.C.	Southern Rly. ...	" 18.10.28 to 7.3.29 ...	27.3.29
<i>Arundel Castle</i> ...	Owen, S. H. ...	P. Clissold. ...	No. A.	Union Castle ...	Telegraphic Report 5.7.29 ...	5.7.29
*† <i>Astronomer</i> ...	Richards, J. ...	A. Frew, E. B. Stephens, W. B. Littlechild.	M.L.	Harrison ...	Form 911 14.6.29 to 4.8.29... ..	7.8.29
*† <i>Ascanius</i> ...	Wilson, C. A. ...	T. Robb, E. M. Robb, W. H. Elliott.	"	A. Holt ...	Met. Log. 5.9.28 to 31.1.29... ..	14.2.29
<i>Atlantian</i> ...	Masters, W. ...	" " " " " "	No. A.	Leyland ...	" 28.10.28 to 1.3.29 ...	18.3.29

Name of Vessel.	Captain.	Observing Officers.	Meteoro-logical Equipment.	Line.	Last Log, Register, or Report Contributed. Received up to 16.8.29	Date Received.
<i>Atreus</i> ...	Wilkinson, T. G. ...	H. Nicholas ...	No. A.	A. Holt ...	Form 911 3.7.29 to 20.7.29...	29.7.29
*† <i>Auditor</i> ...	Owen, W. T. ...	D. O. Percy ...	" M.	Harrison ...	" 9.3.29 to 29.3.29...	7.6.29
*† <i>Australia</i> ...	Scutt, W. ...	" ...	M.L.	British India ...	" ...	"
<i>Autolyceus</i> ...	Dunlop, J. K. ...	" ...	No. A.	A. Holt... ..	" 25.10.28 to 11.11.28	28.11.28
<i>Balmoral Castle</i> ...	J. H. Kerbey ...	H. A. Deller ...	" A.	Union Castle ...	" 10.5.29 to 26.5.29...	15.7.29
*† <i>Babunald</i> ...	Townshend, W. P., Capt., R.N.R.	H. Stinn, G. Owen, F. Ward, L. Bailey.	" M.	P. & O. Branch	Met. Log. 13.9.28 to 10.1.29	23.1.29
†51 <i>Baltic</i> ...	Kearney, J., Lt.- Commr. R.N.R.	R. S. Walker, A. C. P'Anson...	W.T.	White Star ...	W.T. Reg. 15.7.29 to 3.8.29... Form 911 14.7.29 to 3.8.29...	6.8.29 6.8.29
<i>Bampton Castle</i> ...	James, J. S., D.S.C.	W. A. Cooke ...	No. A.	Union Castle ...	" 10.5.29 to 3.6.29	6.8.29
*† <i>Banffshire</i> ...	Westropp, T. G. ...	A. Mc L. Pilcher ...	" M.	Turnbull Martin ...	" 14.7.29 to 24.7.29	1.8.29
*† <i>Baradine</i> ...	Allin, C. H. C. ...	C. B. Roche, B. W. Pollitt, P. Haworth, L. A. Hill.	M.L.	P. & O. Branch	Met. Log. 12.4.29 to 18.7.29	19.7.29
*† <i>Barpeta</i> ...	Rudge, J. G. ...	N. Apps ...	No. M.	British India ...	Form 911 29.5.29 to 21.6.29	22.7.29
*† <i>Barrabool</i> ...	Rhodes, H. R. ...	T. G. Davies ...	" M.	P. & O. Branch	" 11.1.29 to 28.1.29	5.3.29
*† <i>Barranca</i> ...	Edwards, A. C. ...	" ...	M.L.	Elders & Fyffes	" ...	22.7.29
<i>Baychimo</i> ...	Cornwall, S. A. ...	" ...	No. A.	Hudson's Bay Co.	" 28.4.29 to 6.6.29...	22.7.29
†59 <i>Belgenland</i> ...	Trant, A. W. ...	F. Good, C. H. Otterson, F. Clitty.	W.T.	Red Star ...	W.T. Reg. 14.7.29 to 3.8.29... Form 911 14.7.29 to 3.8.29	9.8.29 6.8.29
*† <i>Beltana</i> ...	Rollo, W. ...	G. V. Legassick, ...	No. M.	P. & O. Branch	" 2.3.29 to 12.6.29...	19.6.29
<i>Benalder</i> ...	Fairweather, J. J. ...	D. T. McCullum ...	" A.	Ben Line ...	" 12.6.29 to 29.6.29	6.8.29
† <i>Bendigo</i> ...	Nicholl, R. N. C. ...	G. G. Mason ...	" M.	P. & O. Branch	" 9.8.28 to 28.9.28	3.10.28
*† <i>Benfactor</i> ...	Jones, C. W. ...	S. M. Smith, R. Huntingdon	" M.	Harrison ...	" 15.4.29 to 13.5.29	23.5.29
†31 <i>Berengaria</i> ...	Rostron, Sir A. H., K.B.E., R.D., Capt., R.N.R.	S. A. T. Bullock, F. P. Col- lins, W. C. Robson.	W.T.	Cunard ...	W.T. Reg. 6.7.29 to 22.7.29 " 28.7.29 to 13.8.29	23.7.29 15.8.29
<i>Brenda</i> ...	Lamont, A. ...	N. Ross ...	No. A.	Scottish Fishery Brd.	Form 911 1.7.29 to 19.7.29...	3.8.29
<i>Brighton</i> ...	Hill, A. ...	Mr. Munton ...	C.C.	Southern Railway ...	Telegraphic Report 11.5.29	11.5.29
*† <i>British Dominon</i> , M.V.	Taylor, R. J. ...	H. B. Phillips ...	No. M.	British Tankers ...	Form 911 8.6.29 to 4.7.29 ...	8.7.29
*† <i>British Merchant</i>	Putt, R. O. ...	C. Low ...	" M.	"	" 9.5.29 to 20.6.29	28.6.29
<i>Bruyere</i> ...	Birch, A. ...	" ...	" A.	Lampart & Holt ...	" 27.11.28 to 24.2.29	4.3.29
*† <i>Bulysses</i> M.V.	Head, B. P. ...	A. J. Clatworthy ...	" M.	Anglo-Saxon Petroleum Co.	" 7.6.29 to 12.7.29	17.7.29
*† <i>Buteshire</i> ...	Page, W. J. ...	" ...	M.L.	Turnbull Martin ...	" ...	"
†65 <i>Calgarie</i> ...	Binks, J. W., R.D., Lt.-Commr. R.N.R.	G. Kavanagh, C. Cochrane, E. P. Hughes.	W.T.	White Star ...	" 12.6.29 to 11.7.29 W.T. Reg. 13.6.29 to 10.7.29	29.7.29 29.7.29
<i>Cambria</i> ...	Foy, C. A. ...	" ...	No.	W.I. and Panama Telegraph Co.	Form 911	"
<i>Cambria</i> ...	Copland, C. P. ...	O. W. Ll. Jones ...	C.C.	L.M. & S. Rly ...	Telegraphic Report 10.8.29	10.8.29
*† <i>Cambridge</i> ...	Williams, R. ...	J. V. Williams, H. M. Knight, H. C. Walker, R. A. Belfield.	M.L.	Federal ...	Met. Log. 6.3.29 to 27.7.29	31.7.29
† <i>Cameronia</i> ...	Gemmell, W. ...	J. Herbert, D. C. Shedden ...	"	Anchor ...	Met. Log. 27.1.29 to 17.6.29	24.6.29
† <i>Camito</i> ...	Forrester, W. T., O.B.E.	H. H. Dunning, G. M. Roberts, M. H. Thomson.	"	Elders & Fyffes ...	" 14.3.29 to 10.7.29	22.7.29
<i>Canadian Importer</i>	Forson, A. ...	C. Williams ...	No. A.	Canadian Gov. Mer- cantile Marine.	Form 911 4.7.29 to 4.8.29 ...	15.8.29
*† <i>Canadian Winner</i>	McConechy, W. G. ...	J. M. Lang ...	" M.	"	" 17.9.28 to 13.10.28	27.11.28
*† <i>Canonesa</i> ...	Brodie, W. H. ...	T. Wetherall ...	" M.	Furness Houlder ...	" 25.2.29 to 28.3.29	4.4.29
<i>Cape of Good Hope</i>	Jacobson, T. A. ...	W. S. Bartlett ...	"	Lyle S.S. Co. ...	" 27.3.29 to 14.6.29	15.7.29
†35 <i>Carmania</i> ...	Brown, F. G., R.D., Capt., R.N.R.	E. R. Taylor, E. Gleave, P. O. Davis.	W.T.	Cunard ...	W.T. Reg. 22.7.29 to 9.8.29...	14.8.29
† <i>Carnarvon Castle</i> M.V.	Stanley, W. F., R.D., Commr. R.N.R.	H. L. Shaw, G. D. Pennick, S. S. Smith.	M.L.	Union Castle ...	Met. Log. 19.1.29 to 12.5.29	23.5.29
†34 <i>Caronia</i> ...	Hossack, W. H., R.D., Capt., R.N.R.	T. Parry, E. R. B. Freeman, S. E. Clowser.	W.T.	Cunard ...	W.T. Reg. 9.7.29 to 26.7.29... Form 911 7.7.29 to 26.7.29...	30.7.29 30.7.29
<i>Casanare</i> ...	Browne, S. ...	W. Hannah ...	No. A.	Elders & Fyffes	" 8.7.29 to 11.8.29...	14.8.29
† <i>Cathay</i> ...	Griffin, R. H., O.B.E., R.D., Capt. R.N.R.	R. A. C. Beeching ...	" M.	P. & O ...	" 12.7.29 to 27.7.29	12.8.29
<i>Cavina</i> ...	Riseley, A. D. ...	R. C. Harradon... ..	" A.	Elders & Fyffes	" 1.7.29 to 2.8.29 ...	7.8.29
†52 <i>Cedrie</i> ...	Smith, R. G. ...	W. Nicoll, J. Law, J. G. Wallace.	W.T.	White Star ...	W.T. Reg. 8.7.29 to 28.7.29... Form 911 8.7.29 to 28.7.29...	30.7.29 30.7.29
*† <i>Centaur</i> ...	Ward Hughes, J. ...	N. L. Thompson, J. Cock- burn, B. L. Brind.	M.L.	A. Holt & Co.	Met. Log. 16.7.28 to 14.12.28	18.2.29
<i>Ceramic</i> ...	Musgrave, T. ...	H. A. R. Daman ...	No. A.	White Star ...	Form 911 13.4.29 to 20.5.29	22.5.29
*† <i>Change</i> ...	Gambrill, F. C. ...	D. Tyler, R. Baigent, D. N. Hulton, J. McLeod.	M.L.	Yuill & Co. ...	Met. Log. 18.1.29 to 10.6.29	23.7.29
<i>Changuinola</i> ...	Thorburn, R. A., R.D., Commr. R.N.R.	B. R. Coe... ..	No. A.	Elders & Fyffes ...	Form 911 14.6.29 to 17.7.29	19.7.29
<i>Chindwin</i> ...	Paterson, G. ...	" ...	" A.	Henderson ...	" 16.3.29 to 28.5.29	24.6.29
*† <i>Chitripo</i> ...	Sapsworth, S. A. ...	" ...	" A.	Elders & Fyffes	" 20.4.29 to 6.7.29...	11.7.29
*† <i>City of Baroda</i> ...	McMillan, J. ...	J. E. Jenkins, W. Faichney, F. T. Mallett.	M.L.	Ellerman ...	Met. Log. 1.1.29 to 22.4.29...	30.4.29
<i>City of Benares</i> ...	Anderson, W. W. ...	R. W. Kellie ...	No. A.	"	Form 911 6.5.29 to 18.5.29...	8.8.29
*† <i>City of Bombay</i> ...	Brown, O. C. ...	E. H. Roberts ...	" M.	"	" 23.5.29 to 19.6.29	17.7.29
*† <i>City of Bristol</i> ...	Jenkins, D. ...	K. G. Crockett ...	" M.	"	" 11.11.28 to 1.12.28	7.1.29
<i>City of Canterbury</i>	Stanley, A. ...	R. H. Hodgson ...	" A.	"	" 9.4.29 to 8.5.29 ...	21.5.29
<i>City of Carlisle</i> ...	Mordue, J. A. ...	" ...	" A.	"	" 7.6.29 to 14.7.29...	16.7.29
*† <i>City of Chester</i> ...	Letton, F. W. ...	C. C. Duncan, P. C. Arthur, M. J. Mc Nicol.	M.L.	"	Met. Log. 13.2.29 to 17.29	6.8.29
<i>City of Hong Kong</i>	Walton, H. L., O.B.E., R.D., Commr. R.N.R.	H. Saunders ...	No. A.	"	Form 911 1.5.29 to 25.5.29...	31.5.29
<i>City of Khios</i> ...	Reay, A. S. ...	R. E. Thornton ...	" A.	"	" 19.2.29 to 10.3.29	2.4.29
<i>City of London</i> ...	Nicoll, L. ...	" ...	" A.	"	" 2.2.29 to 17.4.29...	3.5.29
*† <i>City of Osaka</i> ...	Smith, W. H. ...	G. E. M. Jenkins, A. Niblock	" M.	"	" 9.6.29 to 4.7.29...	6.8.29
*† <i>City of Rangoon</i> ...	Jones, P. ...	" ...	M.L.	"	Met. Log. 6.10.28 to 27.7.29	6.8.29
<i>City of Yokohama</i>	Singleton, J. G. ...	H. Nish ...	No. A.	"	Form 911 31.5.29 to 20.7.29	12.8.29
<i>Clan Alpine</i> ...	Lyall, A. B. ...	J. O. H. Kirkwood ...	" A.	Clan ...	" 1.6.29 to 23.6.29...	6.8.29
<i>Clan Kenneth</i> ...	Young, A. H., Commr. R.D., R.N.R.	H. C. Carter ...	" A.	"	" 13.5.29 to 6.6.29...	1.7.29
<i>Clan Lindsay</i> ...	Giles, H. J., R.D., Commr. R.N.R.	" ...	" A.	"	" 12.6.29 to 27.7.29	8.8.29
<i>Clan MacBean</i> ...	Worthington, J. H. ...	W. A. Nicholas ...	" A.	"	" 28.4.29 to 26.5.29	17.6.29
<i>Clan Macbeth</i> ...	Hannay, L. G. ...	J. C. Robertson ...	" A.	"	" 19.3.29 to 9.4.29	30.5.29
<i>Clan Macfadyen</i> ...	Laird, C. ...	G. L. Roe ...	" A.	"	" 6.6.29 to 17.6.29	1.7.29
<i>Clan Macfarlane</i> ...	Redford, L. F. ...	T. A. Pearson ...	" A.	"	" 28.10.28 to 14.12.28	21.1.29
<i>Clan Macgillivray</i>	Mackinlay, A. ...	F. H. Thornton ...	" A.	"	" 17.6.29 to 6.7.29...	6.8.29
<i>Clan Macindoe</i> ...	Holman, W. G. ...	H. Lockyer ...	" A.	"	" 27.4.29 to 21.5.29	11.6.29
<i>Clan Mackellar</i> ...	Phillips, G. P. ...	" ...	" A.	"	" 30.6.29 to 12.8.29	14.8.29
*† <i>Clan Macphee</i> ...	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

LIST OF VOLUNTARY OBSERVING SHIPS

Name of Vessel.	Captain.	Observing Officers.	Meteoro-logical Equipment.	Line.	Last Log, Register, or Report Contributed. Received up to 16.8.29.	Date Received.
<i>Clan Macnaughton</i>	Clark, J.	A. H. Hersee	No. A.	Clan	Form 911 2.6.29 to 14.6.29...	15.6.29
<i>Clan Macquarrie</i>	West, W. F.	E. Gregory	" A.	"	" 10.7.29 to 13.8.29	15.8.29
<i>Clan Macgartart</i>	Higgins C. J.	D. McAllister	" A.	"	" 22.5.29 to 12.6.29	20.6.29
<i>Clan Macwhirter</i>	Low, A.	F. B. Barker, H. M. Watkins	M.L.	"	Met. Log. 18.6.28 to 16.1.29	11.2.29
<i>Clan Malcolm</i>	George, L. S.	F. B. Fairweather, H. E. Luxton, J. F. Hubbard.	"	"	" 18.11.28 to 25.5.29	13.6.29
<i>Clan Morrison</i>	Porterfield, W. M. Lt.-Commr., R.N.R.	L. C. Cuthbert	No. A.	"	Form 911 20.5.29 to 15.6.29	8.7.29
<i>Clan Murdoch</i>	Calderwood, W.	J. B. Davies	" A.	"	" 28.4.29 to 22.5.29	25.5.29
<i>Clan Ranald</i>	Fraser, R. K.	K. G. Tucker	" A.	"	" 10.5.29 to 4.7.29...	22.7.29
<i>Clan Ross</i>	Neill, G. A.	A. G. Beynon	" A.	"	" 7.5.29 to 2.6.29	25.6.29
<i>Clan Sinclair</i>	Baker, E. W.	C. W. Daish	" A.	"	" 25.5.29 to 11.6.29	1.7.29
<i>Colonial</i>	Worthington, B.	A. S. Milne	" M.	T. & J. Harrison	" 13.4.29 to 23.6.29	29.6.29
<i>Comorin</i>	Borland, J. McI., C.B., D.S.O., R.D., Capt., R.N.R.	E. C. White	" M.	P. & O.	" 16.4.29 to 30.5.29	15.6.29
<i>Corinthic</i>	Freeman, C. P.	E. M. Burt, M. Bennett, I. A. Macnaughton.	M.L.	White Star	Met. Log. 27.4.29 to 12.8.29	15.8.29
<i>Cornwall</i>	Lamb, C. B.	C. R. Brown	No. A.	Federal	Form 911 10.12.28 to 17.1.29	18.3.29
<i>Crawford Castle</i>	Conley, E. A.	"	" A.	Union Castle	"	"
<i>Culebra</i>	Goble, C. J., R.D., Commr., R.N.R.	H. D. Cooper, R. N. Fletcher, C. Blake.	M.L.	R.M.S.P. Co.	Met. Log. 9.4.29 to 8.6.29	26.6.29
<i>Cumberland</i>	Macmillan, D.	P. Shakespear, F. Loughhead, T. Shillito, J. Lennox.	"	Federal	" 29.10.28 to 29.3.29	5.4.29
<i>Custodian</i>	O'Connor, T.	"	No. M.	Harrison	"	"
<i>Cyclops</i>	Cosker, W.	C. B. P. Anderson	" A.	A. Holt	Form 911 24.4.29 to 14.5.29	15.6.29
<i>Daga</i>	Wiles, N.	I. B. Campbell	" M.	P. Henderson	" 4.3.29 to 10.6.29	15.6.29
<i>Dakotian</i>	Robb, J.	H. Arnold	" A.	Leyland	" 22.4.29 to 1.5.29	10.6.29
<i>Dardanus</i>	Glossop, S.	R. W. Ellis	" A.	A. Holt	" 20.5.29 to 10.7.29	12.7.29
<i>Darro</i>	Turner, E. H.	"	" M.	R.M.S.P. Co.	" 19.6.29 to 1.7.29	8.7.29
<i>Defender</i>	Haylett, E.	"	" M.	T. & J. Harrison	"	"
<i>Delilian</i>	Fulford, S. S., R.D., Commr. R.N.R.	"	" A.	Leyland	"	"
<i>Delphic</i>	Vaughan, P. R.	E. B. Clark	" M.	White Star	" 4.5.29 to 18.6.29	26.6.29
<i>Delta</i>	Townshend, W. P., R.D., Capt., R.N.R.	D. M. Stafford	" M.	P. & O.	" 24.4.29 to 19.6.29	11.7.29
<i>Demerara</i>	Willan, F. G. L., R.D., Capt., R.N.R.	P. W. Brundell	" M.	R.M.S.P. Co.	" 15.4.29 to 6.5.29	10.6.29
<i>Demosthenes</i>	Ogilvy, A.	S. A. Ferguson	" M.	Aberdeen Commonwealth	" 21.4.29 to 9.6.29	12.6.29
<i>Denis</i>	Harris, F. C. P.	J. H. Stokes	" A.	Booth	" 15.4.29 to 29.4.29	24.6.29
<i>Deseado</i>	F. S. Hannam	A. Barff, E. D. Smith	" M.	R.M.S.P. Co.	" 26.5.29 to 20.7.29	22.7.29
<i>Desna</i>	Green, J.	L. T. Peterson	" M.	"	" 3.9.28 to 24.10.28	12.11.28
<i>Deucalion</i>	Melling, C. F.	R. F. Dryden	" A.	A. Holt	" 28.6.29 to 7.8.29	9.8.29
<i>Devon</i>	Kinnell, G.	S. C. Bradley	" M.	Federal	" 19.4.29 to 14.7.29	17.7.29
<i>Dieppe</i>	Marmery, S.	Mr. Parsons	C.C.	Southern Railway	Telegraphic Report 22.7.29	22.7.29
<i>Dimboola</i>	Dawson, J.	"	No. A.	Melbourne S.S. Co.	Form 911 7.6.29 to 3.7.29	12.8.29
<i>Discovery, Auxy. Barque.</i>	King Davis, J.	W. R. Colbeck	M.L.	Douglas Mawson Expedition.	"	"
<i>Domala, M.V.</i>	Kitson, A. G.	H. Robertson	No. M.	British India	" 26.2.29 to 11.5.29	17.6.29
<i>Dominia, C.S.</i>	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
<i>Dominic</i>	Jackson, T. H.	G. H. Clark	No. A.	Booth	Form 911 6.5.29 to 29.7.29	15.8.29
<i>DLDoric</i>	Hulme, R.	F. E. Patchett, J. Farrell, S. A. Jones.	W.T.	White Star	" 30.6.29 to 20.7.29	23.7.29
<i>Dorington Court</i>	Clarke, E. J.	"	No. A.	Haldin & Co.	W.T. Reg. 30.6.29 to 20.7.29	24.7.29
<i>Dromore Castle</i>	MacMahon, J., R.D., Commr., R.N.R.	J. A. Sowden	" A.	Union Castle	Form 911 10.4.29 to 22.7.29	25.7.29
<i>Dryden</i>	Major, T. W.	"	" M.	Lampert & Holt	" 15.4.29 to 9.5.29	5.6.29
<i>Duchess of Atholl</i>	Griffiths, E.	"	" M.	Lampert & Holt	" 21.10.28 to 14.1.29	7.2.29
<i>Duchess of York</i>	Stuart, R.N., V.C., D.S.O., Commr. R.N.R.	A. Mansey	" M.	Canadian Pacific	" 14.7.29 to 1.8.29	7.8.29
<i>Dunaff Head</i>	Butt, H. L., R.D., Lt.-Commr., R.N.R.	D. Martin	" A.	Ulster S.S. Co.	" 7.7.29 to 25.7.29	29.7.29
<i>Dunluce Castle</i>	Jackson, C. R.	H. Colwill	" A.	Union Castle	" 22.1.29 to 6.2.29	18.2.29
<i>Dunrobin</i>	Ramsay, J. D.	W. Martin	" A.	Glen & Co.	" 15.6.29 to 3.7.29	23.7.29
<i>Dunessa</i>	Barker, A. W.	"	" M.	Furness Withy	" 28.5.29 to 15.6.29	3.7.29
<i>Durenda, M.V.</i>	Beeching, P. H.	J. E. Miles	" M.	British India	" 22.4.29 to 28.6.29	3.7.29
<i>Edinburgh Castle</i>	Gardner, G.F., O.B.E., Lt.-Commr., R.N.R.	A. R. J. Tilston	" A.	Union Castle	" 6.3.29 to 24.3.29	19.4.29
<i>Egori</i>	Sola, P., D.S.O.	J. T. Townson	" A.	Elder Dempster	" 31.5.29 to 21.7.29	24.7.29
<i>El Argentino</i>	Ellis, F., D.S.C.	C. H. Hughes	" M.	Houlder	" 2.5.29 to 16.7.29	17.7.29
<i>Eldon Park</i>	Burns, R.	D. Rankine	" M.	Denholm S.S. Co.	" 12.5.29 to 18.7.29	22.7.29
<i>Elmworth</i>	Dick, J.	"	" M.	R. S. Dalgleish	" 5.3.29 to 10.5.29	1.6.29
<i>Elpenor</i>	Gordon, A. L.	E. Roberts, A. Pearson, J. E. Hiff.	M.L.	A. Holt	Met. Log. 9.12.28 to 13.4.29	22.4.29
<i>Elstree Grange</i>	St. Pierre, P.	"	No. M.	Houlder	Form 911 10.2.29 to 16.5.29	30.5.29
<i>El Paraguayo</i>	Frost, C. R.	F. J. G. Rice	" M.	"	"	"
<i>El Uruguayo</i>	McNamara, T.	F. E. Hallstone	" M.	"	"	"
<i>Elysia</i>	Duncan, A. R.	D. Blair, G. S. Sinclair, W. Beveridge.	M.L.	Anchor	Met. Log. 1.5.29 to 8.7.29	31.7.29
<i>Empress of Asia</i>	Hailey, A. J., Lt.-Commr., R.N.R.	L. M. Goddard, J. F. Patrick, R. J. Hickey, E. Newell.	"	Canadian Pacific	" 17.2.29 to 31.5.29	19.7.29
<i>Empress of Canada</i>	Douglas, L. D.	"	"	"	"	"
<i>Empress of France</i>	Robinson, S., C.B.E., R.D., Commr., R.N.R.	A. G. Simmons	"	"	" 9.3.29 to 21.6.29	19.7.29
<i>Empress of Russia</i>	Hosken, A. J.	R. A. Leicester, J. B. Smith, H. B. Metcalf, A. C. Jones.	"	"	" 17.11.28 to 22.3.29	20.4.29
<i>Endeavour</i>	Law, E. F. B., Commr., R.N.	M. B. Thomas	"	His Majesty's Ship	" 15.3.29 to 8.7.29	18.7.29
<i>Enterprise</i>	Pridham-Wippell, H.D., Capt., R.N.	"	"	"	"	"
<i>Essequibo</i>	Roberts, E.	L. Marsland	No. M.	R.M.S.P. Co.	Form 911 13.6.29 to 30.7.29	15.8.29
<i>Eumaeus</i>	Read, J. W.	D. W. Stroud	" A.	A. Holt	" 18.5.29 to 31.7.29	3.8.29
<i>Euryades</i>	Findlay, J.	W. K. Hole	" A.	A. Holt	" 20.3.29 to 7.6.29	13.6.29
<i>Explorer</i>	Ling, J. T.	A. E. Rogers	" M.	Harrison	" 9.2.29 to 22.5.29	13.6.29
<i>Explorer</i>	Allan, J.	A. Stout, F. O. Sheehy	" A.	Scottish Fishery Board.	" 5.7.29 to 20.7.29	26.7.29

Name of Vessel.	Captain.	Observing Officers.	Meteorological Equipment.	Line.	Last Log, Register, or Report Contributed. Received up to 18.8.29.	Date Received.
*† <i>Fordsdale</i> ...	Richardson, A. V. ...	F. Vaughan ...	No. M.	Aberdeen Common-wealth.	Form 911 22.2.29 to 18.3.29 ...	4.4.29
<i>Francisco</i> ...	Scales, H. ...	B. Scholefield ...	" A.	Ellerman Wilson ...	" 7.6.29 to 19.7.29 ...	24.7.29
<i>Freya</i> ...	Angus, W. ...	W. Pirrie ...	" A.	Scottish Fishery Board.	" 3.7.29 to 27.7.29 ...	3.8.29
<i>Garth Castle</i> ...	Morgan, A.O., R.D., Commr. R.N.R.	G. L. Clarke ...	" A.	Union Castle ...	" 30.5.29 to 22.6.29 ...	30.7.29
** <i>Gascoyne</i> ...	Johnson, L. ...	W. J. Macphedran, C. Melson, J. S. Macbryde.	M.L.	A. Holt & Co. ...	Met. Log. 11.9.28 to 15.2.29 ...	24.4.29
*† <i>Glamorganshire</i> ...	Womersley, H. ...	R. E. E. Hadlow ...	No. M.	R.M.S.P. Co. ...	Form 911 13.6.29 to 22.7.29 ...	25.7.29
*† <i>Glenamoy, M.V.</i> ...	Homan, C. E. ...	R. K. Bishop, F. B. C. Wetherley.	M.L.	Glen Line ...	Met. Log. 24.12.28 to 5.5.29 ...	12.6.29
<i>Glenapp</i> ...	Ingram, T. F. ...	...	No. A.	"	Form 911 19.1.29 to 27.2.29 ...	2.4.29
<i>Glenbeg</i> ...	Newing, L. ...	F. B. Angier ...	" A.	"	" 5.3.29 to 9.7.29 ...	11.7.29
*† <i>Glenegarray</i> ...	Angier, J. ...	J. Tyler ...	" M.	"	" 24.6.29 to 2.7.29 ...	11.7.29
<i>Glenluce</i> ...	Kennett, W. H. ...	H. B. Porter ...	" A.	"	" 25.4.29 to 10.5.29 ...	21.5.29
<i>Glenlismore</i> ...	Suter, S. C. ...	...	" A.	"	" 10.11.28 to 1.4.29 ...	6.4.29
<i>Glenworth</i> ...	Kilgour, H. A. ...	W. C. Wright ...	" A.	R. S. Dalgleish ...	" 5.7.29 to 31.7.29 ...	15.8.29
<i>Gloucestershire</i> ...	Robin, E. ...	W. Moore ...	" A.	Bibby ...	" 1.12.28 to 8.2.29 ...	12.2.29
<i>Gloxinia</i> ...	Pool, F. G. ...	D. Coughlan ...	" A.	Stag Line ...	" 14.6.29 to 1.7.29 ...	23.7.29
<i>Guildford Castle</i> ...	Attwood, J. ...	...	" A.	Union Castle ...	" 8.6.29 to 18.7.29 ...	23.7.29
<i>Halesius</i> ...	Samuels, C. ...	N. MacLeod ...	" A.	R. P. Houston ...	" 5.5.29 to 23.5.29 ...	16.7.29
<i>Haliartus</i> ...	Felton, W. J. ...	F. D. Bonney ...	" A.	"	" 13.6.29 to 7.7.29 ...	8.8.29
*† <i>Hardwicke Grange</i> ...	Fowler, W. H. ...	...	" M.	Houlder ...	" 13.4.29 to 3.6.29 ...	19.6.29
<i>Harmonides</i> ...	Elwell, F. R. ...	R. H. Pape ...	" A.	R. P. Houston ...	" 4.5.29 to 1.6.29 ...	5.6.29
*† <i>Hatimura</i> ...	Hemmings, W. H. ...	L. E. Heath ...	" M.	British India ...	" 30.6.29 to 19.7.29 ...	25.7.29
** <i>Hawaki, M.V.</i> ...	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
<i>Herald</i> ...	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
<i>Hermintus</i> ...	Roberts, T. V. ...	D. W. MacGregor ...	No. A.	Aberdeen Common-wealth.	Form 911 9.4.29 to 18.5.29 ...	25.5.29
<i>Herschel</i> ...	Watson, W. W. ...	A. J. Corney ...	" A.	Lampport & Holt ...	" 4.5.29 to 19.7.29 ...	26.7.29
*† <i>Hertford</i> ...	Burton Davies, J. ...	...	M.L.	Federal ...	...	...
<i>Hestone</i> ...	McComish, A. B. ...	...	No. A.	R. P. Houston ...	Form 911 1.7.29 to 26.7.29 ...	1.8.29
<i>Hibernia</i> ...	Dudgeon, L. T. ...	A. Marsh ...	C.C.	L.M. & S. Railway ...	Telegraphic Report 15.8.29 ...	15.8.29
*† <i>Highland Chieftain, M.V.</i> ...	Robinson, R. H. ...	...	No. M.	Nelson ...	Form 911 20.5.29 to 8.7.29 ...	16.7.29
<i>Highland Pride</i> ...	Robinson, R. H. ...	F. Quelch ...	No. A.	"	" 8.9.28 to 3.11.28 ...	7.11.28
" <i>Prince</i> ...	Taylor, F. ...	W. A. Hall ...	" A.	Prince ...	" 30.3.29 to 11.4.29 ...	25.4.29
" <i>Rover</i> ...	McKinnon, H. ...	E. Smart ...	" A.	Nelson ...	" 1.1.29 to 18.2.29 ...	11.3.29
<i>Hildebrand</i> ...	Peregrine, D. ...	...	" A.	Booth ...	" 14.5.29 to 27.6.29 ...	2.7.29
*† <i>Hobson's Bay</i> ...	Kydd, O. J. ...	J. Worrall, D. Horn, G. Cook	M.L.	Aberdeen Common-wealth.	Met. Log. 6.3.29 to 14.6.29 ...	3.7.29
<i>Holbetn</i> ...	Gough, W. A. ...	F. Delaney ...	No. A.	Lampport & Holt ...	Form 911 6.1.29 to 17.3.29 ...	2.4.29
†† <i>Homeric</i> ...	Warner, G. E., R.D., Capt. R.N.R.	H. G. Morgan, W. T. Poustie, A. E. Dyer.	W.T.	White Star ...	W.T. Reg. 18.7.29 to 2.8.29 ...	8.8.29
<i>Hororata</i> ...	Barnett, H. ...	E. A. Quick ...	No. A.	New Zealand S.S. Co.	Form 911 17.1.29 to 8.2.29 ...	18.3.29
<i>Hubert</i> ...	Briscoe, W. ...	G. G. Westhorp ...	" A.	Booth ...	" 2.1.29 to 1.3.29 ...	23.3.29
<i>Huntingdon</i> ...	Field, H. G. B. ...	N. S. Lesmere ...	" A.	Federal ...	" 6.3.29 to 19.7.29 ...	29.7.29
*† <i>Huntsman</i> ...	Russell, H. ...	G. R. R. Lettin ...	" M.	Harrison ...	" 28.1.29 to 27.6.29 ...	3.8.29
*† <i>Hydaspes</i> ...	Williams, P. E. ...	P. McMillan ...	" M.	R. P. Houston ...	" 27.3.29 to 24.4.29 ...	2.5.29
*† <i>Ingoma</i> ...	Gibbings, W. ...	W. E. Williams, W. J. Green- halgh.	" M.	Harrison ...	Form 911 25.5.29 to 5.7.29 ...	12.7.29
<i>Inkum</i> ...	Meethan, J. T. ...	...	" A.	J. H. Welsford ...	" 12.7.29 to 27.7.29 ...	8.8.29
<i>Iranita, M.V.</i> ...	Adams, P. A. ...	E. Allen ...	" A.	Iranian Tanker Co. ...	...	...
** <i>Iris, O.S.</i> ...	Hughes, H. P. ...	...	M.L.	Pacific Cable Board ...	Met. Log. 23.2.29 to 19.3.29 ...	18.7.29
<i>Iroquois</i> ...	Nares, J. D., D.S.O., Capt. R.N.	A. B. Foulston ...	"	His Majesty's Ship ...	" 1.9.28 to 30.11.28 ...	8.1.29
*† <i>Ixton</i> ...	Collins, H. M. ...	D. Law ...	"	A. Holt ...	" 28.11.28 to 18.4.29 ...	28.6.29
<i>Japanese Prince, M.V.</i> ...	Smith, J. ...	J. B. Morrison ...	No. A.	Prince ...	Form 911 8.6.29 to 8.7.29 ...	6.8.29
*† <i>Jeyapore</i> ...	Cooper, C. P., O.B.E., R.D. Capt. R.N.R.	F. M. Squire ...	" M.	P. & O. ...	" 16.6.29 to 2.8.29 ...	7.8.29
<i>Justin</i> ...	Bush, H. ...	J. Stretch ...	" A.	Booth ...	" 23.4.29 to 15.7.29 ...	22.7.29
†† <i>Katsar-i-Hind</i> ...	Headlam, P. C., R.D., Commr. R.N.R.	W. T. Banks ...	" M.	P. & O. ...	" 22.6.29 to 11.7.29 ...	6.8.29
*† <i>Kalyan</i> ...	Cornwall Jones, B. ...	W. R. B. Noal ...	" M.	P. & O. ...	" 4.5.29 to 14.6.29 ...	24.6.29
** <i>Kangaroo</i> ...	Norris, H. C. ...	J. Sinclair, J. S. Airey, E. Hutchinson, J. Edward, H. Reynolds, V. L. Gilbert.	M.L.	State Service Aus- tralia.	Met. Log. 3.9.28 to 24.2.29 ...	27.5.29
*† <i>Karamea</i> ...	McIntosh, A. ...	K. D. Fisher, A. C. Jones, J. W. Thompson, H. M. Clark.	"	Shaw, Savill & Albion	" 10.3.29 to 1.7.29 ...	10.7.29
*† <i>Karapara</i> ...	Miller, A. C. ...	J. Smail ...	No. M.	British India ...	Form 911 5.6.29 to 22.6.29 ...	22.7.29
*† <i>Kashgar</i> ...	Sudell, F., R.D., Commr. R.N.R.	R. P. Eddy ...	" M.	P. & O. ...	" 4.5.29 to 10.8.29 ...	13.8.29
*† <i>Kashmir</i> ...	Mallalue, R., Lt- Commr. R.N.R.	D. S. Charles ...	" M.	P. & O. ...	Form 911 29.6.29 to 18.7.29 ...	13.8.29
*† <i>Khandalla</i> ...	Baird, S.K. ...	F. N. B. Johnson ...	" M.	British India ...	" 22.5.29 to 30.6.29 ...	6.8.29
*† <i>Khiva</i> ...	Britten, P. O. ...	C. E. Arundel, J. A. Ridley, H. V. Williamson.	M.L.	P. & O. ...	Met. Log. 10.1.29 to 20.4.29 ...	26.4.29
*† <i>Knight Companion</i> ...	Davis, A. L. ...	S. R. Evans ...	No. M.	A. Holt ...	Form 911 6.6.29 to 27.7.29 ...	12.8.29
** <i>Koolinda, M.V.</i> ...	Buckeridge, J. ... Kavanagh, J.	...	" M.	State Service, Aus- tralia.	" 24.7.28 to 6.9.28 ...	15.10.28
†† <i>Laconia</i> ...	Prothero, W. ...	E. W. Connell, A. B. Fasting, F. G. Russell ...	W.T.	Cunard ...	W.T. Reg. 15.7.29 to 4.8.29 ...	8.8.29
<i>Laguna</i> ...	Dunn, R. E., O.B.E. ...	R. W. Hanson ...	No. A.	Pacific S.N. Co. ...	Form 911 14.7.29 to 4.8.29 ...	8.8.29
*† <i>Lahore</i> ...	Charters, W. ...	N. Bell ...	" M.	P. & O. ...	" 9.4.29 to 28.4.29 ...	1.5.29
<i>Lalande</i> ...	Hamill, H. ...	...	" A.	Lampport & Holt ...	" 28.5.29 to 22.7.29 ...	26.7.29
<i>Lancashire</i> ...	de Legh, P. ...	W. H. Campe ...	" A.	Bibby ...	Form 911 30.10.28 to 27.1.29 ...	7.2.29
†† <i>Lancastria</i> ...	Townley, J. C., R.D., Commr. R.N.R.	G. Overton, P. L. Williams, J. W. Caunce.	W.T.	Cunard ...	W.T. Reg. 16.5.29 to 13.6.29 ...	15.6.29
<i>Laomedon</i> ...	Hatfield, F. ...	O. P. H. Wynne ...	No. A.	A. Holt ...	Form 911 19.5.29 to 6.6.29 ...	11.6.29
					" 7.7.29 to 23.7.29 ...	31.7.29

LIST OF VOLUNTARY OBSERVING SHIPS

Name of Vessel.	Captain.	Observing Officers.	Meteoro-logical Equipment.	Line.	Last Log, Register, or Report Contributed. Received up to 16.8.29.	Date Received.
*† La Paz, M.V.	Benson, C. W.	E. Hicks	No. M.	Pacific S.N. Co.	Form 911 4.5.29 to 12.7.29...	15.7.29
††55 Lapland ...	Harvey, H. ...	J. C. Flett, J. Gladstone ...	W.T.	Red Star ...	W.T. Reg. 30.6.29 to 19.7.29	30.7.29
*† Largs Bay ...	Jenkyn, W. M.	... ..	No. M.	Aberdeen Common-wealth.	Form 911 30.6.29 to 20.7.29	22.7.29
††64 Laurentic ...	Trant, E. L., R.D., Commr., R.N.R.	J. W. Peters, R. Hawkyns ...	W.T.	White Star ...	W.T. Reg. 21.7.29 to 9.8.29... Form 911 21.7.29 to 9.8.29...	15.8.29 15.8.29
*† Lautaro, M.V.	Leyne, R. W. ...	J. T. Denley	No. M.	Pacific S.N. Co.	" 25.2.29 to 14.6.29	19.6.29
*† Leicestershire ...	English, G. L. ...	W. Walton, E. D. Brand, A. Thomson.	M.L.	Bibby	Met. Log. 18.5.29 to 27.7.29	31.7.29
*† Limerick ...	Molyneux, P. L. ...	G. Chaplin	No. M.	Federal... ..	Form 911 18.1.29 to 24.2.29	18.3.29
Llandaff Castle ...	Gilbert, E. F. ...	S. Drew, — Bayer, — Denn, W. Forsyth.	M.L.	Union Castle ...	Met. Log. 24.5.29 to 30.7.29	1.8.29
*† Llandoverly Castle	Stuart, C. E., Capt. R.N.R.	C. H. Williams, G. Moon, P. Clissold.	"	" " " "	" 15.11.28 to 21.1.29	1.2.29
Llanstephan Castle	Whitfield, G. J. ...	... ..	No. A.	" " " "	Form 911 15.6.29 to 2.7.29	6.7.29
*† Lobos, M. V.	Pape, E. R. ...	S. E. Aylard	" M.	Pacific S.N. Co.	" 22.5.29 to 9.6.29	12.6.29
Loch Katrine ...	Schlabusch, O. V. ...	D. A. Mallinson	" A.	R.M.S.P. Co. ...	" 3.2.29 to 5.5.29 ...	10.5.29
Logician ...	Herschel, R. F. ...	A. G. S. Madrell	" M.	Harrison	" 23.2.29 to 18.4.29	30.4.29
*† London Importer ...	Nuttall, E. L. ...	F. F. Feint, J. H. Metcalfe, J. G. Freeman.	" M.	Furness Withy ...	... ..	...
Lord Antrim ...	Jarvis, F. E. ...	W. A. Haddock... ..	" A.	Ulster S.S. Co.	Form 911 28.6.29 to 9.7.29...	20.7.29
Loriga, M. V. ...	Clapham, E. C. ...	D. P. Morgan	" A.	Pacific S.N. Co.	" 8.2.29 to 27.2.29...	3.6.29
*† Losada, M. V. ...	Ross, J. ...	D. Beamer	" M.	" " " "	" 5.6.29 to 22.6.29	17.6.29
†† Macedonia ...	Morton, A. J. ...	C. J. L. Hayward	" M.	P. & O.	" 9.5.29 to 20.6.29...	26.6.29
*† Macharda ...	Hanna, R. G. ...	A. C. Hocking	" M.	Brocklebank ...	" 19.6.29 to 28.6.29	8.7.29
Macquarie ...	Heyen, G. H. ...	... ..	No.	On Chang & Co. ...	... ..	...
*† Maharaja ...	Elliott, G. F. ...	... ..	" M.	Asiatic S.N. Co. ...	" 6.3.29 to 24.4.29...	10.6.29
*† Mahronda ...	Sharpe, G. ...	L. Lee	" M.	Brocklebank... ..	" 30.5.29 to 5.8.29 ...	15.8.29
*† Mahsud ...	Kershaw, R. W. ...	J. D. Paisley, B. K. Ward ...	" M.	" " " "	" 6.6.29 to 2.7.29 ...	6.8.29
*† Maidan ...	Robertson ... ..	... ..	" M.	" " " "	" 1.5.29 to 3.6.29 ...	11.6.29
*† Maihar ...	Charlton, W. L. ...	J. W. B. Robertson, C. Cadwallader, A. D. Spring, D. Aitchison, A. D. Masters, R. Belford.	M.L.	" " " "	Met. Log. 12.4.29 to 6.7.29...	12.8.29
*† Maimoa ...	Johnson, J. W. ...	D. Aitchison, A. D. Masters, R. Belford.	"	Shaw, Savill & Albion	" 11.11.28 to 15.3.29	19.3.29
Maimyo ...	Smith, G. C. ...	H. M. Drummond	No. A.	Brocklebank ...	Form 911 18.8.28 to 14.11.28	29.11.28
††58 Majestic ...	White, R. S. ...	A. Fisher, W. T. Fitz Gerald, A. H. Young, W. F. Denison.	W.T.	White Star ...	W.T. Reg. 4.7.29 to 15.7.29... " 26.7.29 to 7.8.29...	18.7.29 9.8.29
*† Makalla ...	Maugham, J. W. ...	A. L. Harrop	No. M.	Brocklebank ...	Form 911 25.3.29 to 2.5.29	10.5.29
*† Makambo ...	Williams, D. J. ...	R. Perry, R. A. Williams S. Sandison.	M.L.	Burns Philp ...	Met. Log. 24.11.28 to 9.4.29	22.6.29
*† Makura ...	(Martin, W. ... Brown, J. F. S. ...)	W. A. Todd, J. Billingham, G. Edwards.	"	Canadian-Australasian	" 3.10.28 to 16.2.29	16.4.29
*† Malabar, M.V.	Donaldson, A. ...	... ..	"	Burns, Philp & Co. ...	" 10.11.28 to 21.4.29	28.6.29
*† Malakuta ...	Adamson, F. L. ...	A. Horspool	No. M.	Brocklebank ...	Form 911 29.6.29 to 20.7.29	3.8.29
*† Malancha ...	Whitham, F. ...	... ..	" M.	" " " "	" 1.12.28 to 21.2.29	26.3.29
*† Malda ...	Wright, J. ...	E. H. Lidstone	" M.	British India ...	" 21.4.29 to 9.7.29	15.7.29
† Maloja ...	Browning, J. B., R.D., Commr. R.N.R.	A. D. Dennis	" M.	P. & O.	" 4.7.29 to 10.8.29...	13.8.29
† Malwa ...	Stringer, R. H., O.B.E., R.D., Commr. R.N.R.	F. D. Shaw	" M.	" " " "	" 16.6.29 to 5.7.29	29.7.29
*† 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. ...	J. F. Whitly	No. A.	" " " "	Form 911 3.5.29 to 13.6.29	20.6.29
*† 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
Manchester Producer	Struss, F. D. ...	T. J. Boyd	No. A.	" " " "	Form 911 6.7.29 to 2.8.29 ...	7.8.29
*† Manela ...	Maples, S. H. ...	P. D. Browning, J. H. Piatt... ..	" M.	British India... ..	" 14.7.29 to 24.7.29	1.8.29
*† Mangalore ...	Mulchay, G. ...	J. A. Leitch	" M.	Brocklebank ...	" 12.4.29 to 9.6.29	15.6.29
*† Manipur ...	Cochran, G. N. ...	R. Penston, G. B. Falconer ...	" M.	Brocklebank ...	" 27.4.29 to 23.5.29...	19.6.29
*† Manistee ...	Pengelly, J. ...	... ..	"	Elders & Fyffes ...	... ..	...
*† Manora ...	Hudson, H. T., R.D., Commr., R.N.R.	... ..	" M.	British India... ..	Form 911 30.12.28 to 28.3.29	2.4.29
† Mantua ...	Davis, H. C., D.S.C., Commr., R.N.R.	... ..	" M.	P. & O.	" 10.6.29 to 1.8.29...	8.8.29
*† Marella ...	Mortimer, S. ...	A. G. Hill, F. Vogelmann, B. Helen.	M.L.	Burns Philp ...	Met. Log. 19.11.28 to 28.3.29	22.6.29
*† Marengo ...	Curle, J. ...	H. Bryan, G. W. Revell, F. Foyal, S. Butcher.	"	Ellerman Wilson ...	" 18.7.28 to 6.1.29...	22.1.29
† Margha ...	Hughes, C. G. ...	P. Wright, H. Watkins ...	" M.	British India... ..	" 7.4.29 to 2.7.29	8.7.29
*† Marquesa ...	Smiles, R. S. ...	L. Owen... ..	No. M.	Furness Houder ...	Form 911 28.4.29 to 4.7.29	11.7.29
*† Marsina ...	Mitchie, W. ...	... ..	" A.	Burns, Philp & Co. ...	" 2.5.29 to 2.6.29	15.7.29
*† Malakana ...	Thurston, H. P. ...	E. Davies, B. Forbes-Moffatt, A. P. Winton, A. G. Collins.	M.L.	Shaw, Savill & Albion	Met. Log. 30.3.29 to 30.7.29	3.8.29
† Mataram ...	Voy, W. ...	R. M. Biunt	No. A.	Burns, Philp & Co. ...	Form 911 29.5.29 to 29.6.29	6.8.29
† Mataroa ...	Kershaw, W. A. R. ...	F. Eadon, J. J. Nicoll, C. Meyer.	M.L.	Shaw, Savill, & Albion	Met. Log. 1.2.29 to 15.5.29	21.5.29
*† 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. Mortimer	" M.	British India... ..	" 16.3.29 to 4.6.29	10.6.29
*† Matra ...	Cornish, N. P. ...	W. Gibson, R. V. Andrew ...	" M.	Brocklebank ...	" 21.4.29 to 13.7.29	17.7.29
*† Maunganui ...	Martin, W. ...	G. H. Edwards	" M.	Union S.S. Co. of N.Z.	" 15.6.29 to 4.7.29...	22.7.29
*†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. 14.7.29 to 29.7.29	1.8.29
††66 Megantic ...	Frank, F. A., D.S.O., R.D., Commr., R.N.R.	A. E. Dyer, J. F. Waltire, A. H. H. Griffiths.	W.T.	White Star	" 3.6.29 to 20.6.29	25.6.29
††22 Melita ...	Stewart, A. ...	J. Shearer	W.T.	Canadian Pacific ...	" 7.7.29 to 26.7.29	1.8.29
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 ...	Murray, M. P., R.D., Commr., R.N.R.	J. Hewson, J. H. Tudor, C. de H. Bell.	W.T.	Canadian Pacific	W.T. Reg. 8.7.29 to 25.7.29	27.7.29
*† Middlesex ...	Wilde, H. ...	S. J. Woodhouse	No. M.	Federal... ..	Form 911 29.6.29 to 14.7.29	29.7.29
*† Minna ...	Mackenzie, G. G. ...	A. M. Campbell	" A.	Scottish Fishery Brd.	" 5.7.29 to 4.8.29 ...	9.8.29
††23 Minnedosa ...	McCombie, G. F. R. D., Commr. R.N.R.	C. D. Watt, W. J. P. Roberts, H. M. Sanders.	W.T.	Canadian Pacific	W. T. Reg. 21.7.29 to 9.8.29... Form 911 20.7.29 to 10.8.29	14.8.29 13.8.29
† Minnesota ...	Finch, E., R. D., Commr. R.N.R.	L. C. Hill	No. M.	Atlantic Transport...	" 30.6.29 to 21.7.29	23.7.29
† Minnetonka ...	Gates, T. F., C.B.E. ...	D. K. Cracknell	" M.	" " " "	" 7.7.29 to 27.7.29...	1.8.29

Name of Vessel.	Captain.	Observing Officers.	Meteoro-logical Equipment.	Line.	Last Log, Register, or Report Contributed. Received up to 16.8.29.	Date Received.
†† <i>Minnewaska</i> ...	Claret, F. H., C.B.E., Commr., R.N.R.	G. Niblett	No. M.	Atlantic Transport ...	Form 911 22.7.29 to 9.8.29... ..	13.8.29
<i>Mississippi</i> ...	Pearce, H.	W. M. Shoemith	" A.	" " " " ...	" 13.5.29 to 26.5.29	7.6.29
*† <i>Modasa</i> ...	Gilchrist, J. W. ...	B. H. Bentall	" M.	British India	" 12.5.29 to 1.8.29... ..	13.8.29
<i>Moeraki</i> ...	Upward, H. P. ...	F. G. Harvey	" A.	Union S.S. Co. of N.Z.	" 7.6.29 to 24.6.29	29.7.29
†† <i>Moldavia</i> ...	Burleigh, C. W., D.S.O., R.D., Capt., R.N.R.	" " " "	" M.	P. & O.	" 6.6.29 to 3.7.29	29.7.29
†† <i>Mongolia</i> ...	Furlong, G. H. S., R.D., Capt., R.N.R.	A. H. Cole	" M.	" " " " ...	" 17.2.29 to 1.5.29... ..	6.5.29
††24 <i>Montcalm</i> ...	Rothwell, A.	E. N. Lloyd	W.T.	Canadian Pacific ...	W.T. Reg. 13.7.29 to 30.7.29 ...	1.8.29
††25 <i>Montclare</i> ...	Griffiths, J. N. ...	E. A. Shergold, T. L. Gillette, T. Sargent.	"	" " " " ...	" 22.6.29 to 8.7.29... ..	22.7.29
*†† <i>Montoro</i> ...	Hillman, E. J. ...	J. Middleton, J. Young, J. Campbell.	M.L.	Burns, Philp & Co. ...	Met. Log. 18.7.28 to 3.2.29... ..	22.6.29
†† <i>Montrose</i> ...	Dott, J. F.	J. Soame, J. M. Roche ...	No. M.	Canadian Pacific ...	W.T. Reg. 8.4.29 to 26.4.29 ...	30.4.29
††20 <i>Montroyal</i> ...	Freer, A. R.D., Capt., R.N.R.	A. H. Piggott, D. Ewing ...	W.T.	" " " " ...	" 28.7.29 to 13.8.29 ...	15.8.29
*†† <i>Moresby</i> ...	Henderson, D. A., O.B.E., Commr., R.A.N.	G. A. Gould	M.L.	His Majesty's Australian Ship.	Form 911 8.12.28 to 27.12.28 ...	3.1.29
†† <i>Morvada</i> ...	Mills, T. L., O.B.E., R.D., Commr., R.N.R.	A. J. Norris, H. Maguire ...	No. M.	British India	Met. Log. 7.8.28 to 13.12.28 ...	13.3.29
†† <i>Mulbera</i> ...	Caffyn, F.	B. Martyn	" M.	" " " " ...	Form 911 29.7.28 to 29.10.28 ...	31.10.28
*†† <i>Nagara</i> ...	Miles, F. R., R.D., Capt. R.N.R.	A. H. Frogbrook	" M.	R.M.S.P. Co.	" 27.4.29 to 23.6.29	26.6.29
*†† <i>Nagoya</i> ...	Cochrane, C. H. ...	S. Spring	" M.	P. & O.	" 23.12.28 to 15.3.29	2.5.29
†† <i>Naldera</i> ...	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
*†† <i>Nardana</i> ...	Gulliver, B.	F. G. Sharps	No. M.	British India	Form 911 1.4.29 to 28.7.29... ..	10.8.29
†† <i>Narkunda</i> ...	Parker, J. J. W., R.D., Commr. R.N.R.	S. M. Yates, D. H. Moulton ...	" M.	P. & O.	" 29.6.29 to 18.7.29	6.8.29
*†† <i>Nellore</i> ...	Hignett, A. H., R.D., Lt.-Commr., R.N.R.	T. A. Sergeant	" M.	P. & O.	" 8.4.29 to 7.6.29	12.6.29
*†† <i>Nerbudda</i> ...	Williams, B. N. ...	G. A. Farley, S. Henderson ...	" M.	British India	Met. Log. 16.12.28 to 8.2.29 ...	11.2.29
*†† <i>Nestor</i> ...	Houghton, G. K. ...	C. Mackinnon	M.L.	A. Holt	" 23.7.28 to 17.2.29	21.5.29
*†† <i>Newby Hall</i> ...	Gorst, W.	W. E. Owen	No. M.	Ellerman	" 17.2.29 to 1.4.29... ..	23.5.29
*†† <i>Newfoundland</i> ...	Foxworthy, A. W. ...	R. F. Handley, E. Saintry, D. Hetherington.	M.L.	Furness Withy	" 4.1.29 to 7.5.29	14.5.29
*†† <i>Niagara</i> ...	Hill, T. V.	V. Knight, R. N. Turner, J. Webb.	"	Canadian-Australasian	" 6.3.29 to 20.6.29... ..	19.7.29
<i>Ningchow</i> ...	Beale, H. E.	H. Morley	No. A.	A. Holt	Form 911 7.6.29 to 24.6.29 ...	29.7.29
*†† <i>Nirvana</i> ...	Ayres, R. M.	A. H. Baird	" M.	British India	" 29.7.29 to 7.8.29	15.8.29
<i>Norfolk</i> ...	Mead, G. F.	C. R. Wavish, T. M. Devitt, L. W. Fulcher.	M.L.	Federal	" 16.3.29 to 14.7.29	19.7.29
<i>Norna</i> ...	Wright, J. W.	T. R. Ness	No. A.	Scottish Fishery Brd	" 4.6.29 to 4.7.29	8.7.29
*†† <i>Norseman, C.S.</i> ...	Davis, E. R.	L. Cook	" M.	Western Tel. Co. ...	" 16.6.29 to 4.7.29	10.8.29
*†† <i>Northumberland</i> ...	Upton, H. L., D.S.C., R.D., Commr., R.N.R.	W. J. Glassborow, H. R. M. Smith, R. S. Miller.	M.L.	Federal	Met. Log. 26.11.28 to 15.4.29 ...	26.4.29
<i>Nova Scotia</i> ...	Furieux, S.	" " " "	No. A.	Furness Withy	Form 911 16.7.29 to 12.8.29 ...	13.8.29
*†† <i>Novshera</i> ...	Parker, A. A.	A. Baillie	" M.	British India	" 1.5.29 to 22.6.29... ..	17.7.29
*†† <i>Nuddea</i> ...	Morrison, W. C. ...	" " " "	" M.	British India	" 11.5.29 to 31.5.29	15.7.29
<i>Oaklands Grange</i> ...	Davis, Q. C.	J. C. Thomas	" A.	Houlder Bros.	Form 911 12.3.29 to 2.7.29... ..	5.7.29
††57 <i>Olympic</i> ...	Parker, W. H., C.B.E., R.D., Capt. R.N.R.	A. E. Harvey, J. Day, Crawford.	W.T.	White Star	W.T. Reg. 12.7.29 to 25.7.29 ...	27.7.29
†† <i>Orama</i> ...	Matheson, C. G., D.S.O., R.D., Capt., R.N.R.	J. M. M. Swanson, C. K. Blake, F. Gray.	M.L.	Orient	Met. Log. 3.3.29 to 4.6.29... ..	28.6.29
<i>Oranian</i> ...	Arkle, J.	" " " "	No. A.	Leyland	Form 911 13.6.29 to 1.7.29... ..	11.7.29
†† <i>Orbita</i> ...	Dominy, R. H., C.B.E., Commr., R.N.R.	J. R. Bubb	" M.	Pacific S.N. Co. ...	" 2.5.29 to 16.7.29... ..	23.7.29
†† <i>Orcoma</i> ...	Harvey, J. G.	E. B. Sandon	" M.	" " " " ...	" 30.5.29 to 19.6.29	8.7.29
†† <i>Orduna</i> ...	Daniel, T.	R. D. Eckford, W. Pearce ...	" M.	" " " " ...	" 14.4.29 to 17.6.29	24.6.29
†† <i>Orestes</i> ...	Flynn, G. A.	R. Martin	" A.	A. Holt	" 28.7.28 to 8.9.28	26.11.28
†† <i>Orford</i> ...	Owens, A. L., Commr. R.D., R.N.R.	O. C. Davies	" M.	Orient	" 14.2.29 to 26.4.29	11.5.29
†† <i>Orita</i> ...	Barkley, E.	D. W. Hutchinson, G. W. Irvine, L. L. Hunter.	M.L.	Pacific S.N. Co. ...	Met. Log. 18.12.28 to 22.5.29 ...	1.6.29
†† <i>Ormonde</i> ...	Rice, W. V., D.S.O., D.S.C., Commr. R.N.R.	H. P. Price	"	His Majesty's Ship...	" 11.1.29 to 30.5.29	13.6.29
†† <i>Oronsay</i> ...	Cameron, E. P., Commr., R.D., R.N.R.	T. Fox Russell, R. S. Hawker, K. M. Morrison.	"	Orient	" 7.2.29 to 21.5.29... ..	27.5.29
*†† <i>Oroya</i> ...	Ridyard, A.	P. H. Ray	No. M.	Pacific S.N. Co. ...	Form 911 21.5.29 to 30.7.29 ...	9.8.29
†† <i>Orsova</i> ...	Thorne, G. G., R.D., Commr., R.N.R.	L. J. Vesty, N. W. Smith, J. D. Birch, R. B. Stannard.	M.L.	Orient	Met. Log. 31.3.29 to 2.7.29... ..	11.7.29
†† <i>Orvieto</i> ...	Kennedy, G. S. ...	H. A. Whittle, C. D. Lane, C. W. Pinckney.	"	" " " " ...	" 27.4.29 to 31.7.29	2.8.29
†† <i>Osterley</i> ...	Sarson, M. J.	" " " "	No. M.	" " " " ...	Form 911 16.5.29 to 20.6.29 ...	24.6.29
<i>Otaki</i> ...	Clarke, C.	G. Dibley	" M.L.	New Zealand S.S. Co.	" 3.1.29 to 1.3.29	8.3.29
<i>Oxfordshire</i> ...	Foster, W. L.	E. A. Insley	No. A.	Bibby Bros.	" 24.1.29 to 21.2.29	4.3.29
<i>Pacific Shipper, M.V.</i> ...	Goodwin, J.	" " " "	" A.	Furness Withy ...	" 5.9.28 to 4.12.28... ..	28.12.28
*†† <i>Paneras</i> ...	Jones, W. C. H. ...	H. Atkinson, R. Parry ...	M.L.	Booth	Met. Log. 6.3.29 to 29.7.29 ...	15.8.29
<i>Parora</i> ...	Evans, J. O.	J. Greenaway	No. A.	Hain S.S. Co.	Form 911 7.8.28 to 7.9.28 ...	19.11.28
<i>Paris</i> ...	Cook, C. L.	Mr. Biles	C.C.	Southern Ry.	Telegraphic Report. 2.4.29 ...	2.4.29
<i>Pattia</i> ...	Bower, H. C.	R. Laycock	No. A.	Elders & Fyffes ...	Form 911 19.6.29 to 23.7.29 ...	24.7.29
<i>Petsander</i> ...	Slater, H. N.	H. E. Readshaw	" A.	A. Holt	" 4.4.29 to 4.6.29	11.6.29
<i>Pennland</i> ...	Making, V. L.	W. N. Jenkins	" A.	Red Star	" 7.7.29 to 27.7.29... ..	29.7.29
*†† <i>Peshawar</i> ...	McBryde, A. M. ...	K. A. H. Cummins, S. H. Baldwin, A. M. Tolfree.	M.L.	P. & O.	Met. Log. 10.12.28 to 1.5.29 ...	13.5.29
*†† <i>Piako</i> ...	Laird, J.	" " " "	No. M.	New Zealand Co. ...	" " " "	" " " "
<i>Polycarp</i> ...	Reynolds, W. H. B. ...	H. W. Taggart	" A.	Booth	Form 911 23.4.29 to 8.5.29... ..	27.5.29
*†† <i>Port Adelaide</i> ...	Swan, L. H.	R. B. Linklater, C. J. Gorley, F. J. Lavers.	M.L.	Commonwealth & Dominion.	Met. Log. 6.1.29 to 19.6.29... ..	15.7.29

Name of Vessel.	Captain.	Observing Officers.	Meteoro-logical Equipment.	Line.	Last Log, Register, or Report Contributed. Received up to 16.8.29.	Date Received.
†† <i>Tamaroa</i>	Hartman, W. H.	A. J. Galvin	No. M.	Shaw, Savill & Albion	Form 911 28.3.29 to 10.7.29 ...	15.7.29
** <i>Tanda</i>	Pilcher, E. T., Lieut-Commr., R.N.R.	H. Murday, J. F. Heddle, R. S. Millington.	M.L.	E. & A. S.S. Co. ...	Met. Log 26.2.29 to 29.5.29 ...	25.6.29
*† <i>Taranaki, M.V.</i> ...	Wood, C., D.S.C. ...	A. Chrystal, G. Campbell, F. Charnley.	"	Shaw, Savill & Albion	" 21.3.29 to 25.7.29 ...	7.8.29
<i>Tarantia</i>	Henderson, F. M. ...	N. H. King	No. A.	Anchor	Form 911 29.12.28 to 5.2.29 ...	1.3.29
<i>Tetrasias</i>	Wilkinson, W. H. ...	"	" A.	A. Holt & Co. ...	" 28.4.29 to 20.6.29 ...	29.7.29
*† <i>Tekoa</i>	McNish, R.	T. K. MacDonald	" M.	New Zealand S.S. Co.	" 18.5.29 to 18.6.29 ...	22.7.29
<i>Telamon</i>	Willcox, J. H.	F. A. Brown	" A.	A. Holt	" 4.5.29 to 6.6.29 ...	15.6.29
<i>Tetela</i>	Brice, E. H.	H. Holmes	" A.	Elders & Fyffes ...	" 9.6.29 to 12.7.29 ...	15.7.29
<i>Teucer</i>	Beswick, W., D.S.C., Lt.-Commr., R.N.R.	W. F. Cook, H. Rudd ...	" A.	A. Holt	" 31.1.29 to 30.3.29 ...	4.4.29
†† <i>Themistocles</i> ...	Young, A. D.	"	" M.	Aberdeen Common-wealth	" 12.12.28 to 20.1.29 ...	28.1.29
<i>Theseus</i>	Carnon, C. G.	H. C. Large	" A.	A. Holt	" 11.5.29 to 19.6.29 ...	11.7.29
** <i>Thistleglen</i>	Whitfield, G.A., O.B.E.	"	M.L.	Allan Black & Co. ...	"	"
*† <i>Tilawa</i>	Rowe, P. W.	E. A. Rabey	No. M.	British India ...	Form 911 31.3.29 to 11.5.29 ...	3.6.29
*† <i>Tinhow</i>	Newton	J. S. King	" M.	A. Weir & Co. ...	" 21.4.29 to 19.5.29 ...	17.7.29
*† <i>Titan</i>	Power, J. J.	P. Cross, R. A. Shennan, E. Saville.	M.L.	A. Holt	Met. Log. 3.2.29 to 18.6.29 ...	28.6.29
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*† <i>Turakina</i>	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
†† <i>Tuscania</i>	Rome, W. R.	J. Noble	W.T.	Anchor	W.T. Reg. 1.7.29 to 18.7.29 ...	24.7.29
*† <i>Tyndareus</i>	Hughes, R. T.	A. F. Barclay, F. V. Smith, D. S. Bruce.	M.L.	A. Holt	Form 911 30.6.29 to 18.7.29 ...	23.7.29
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