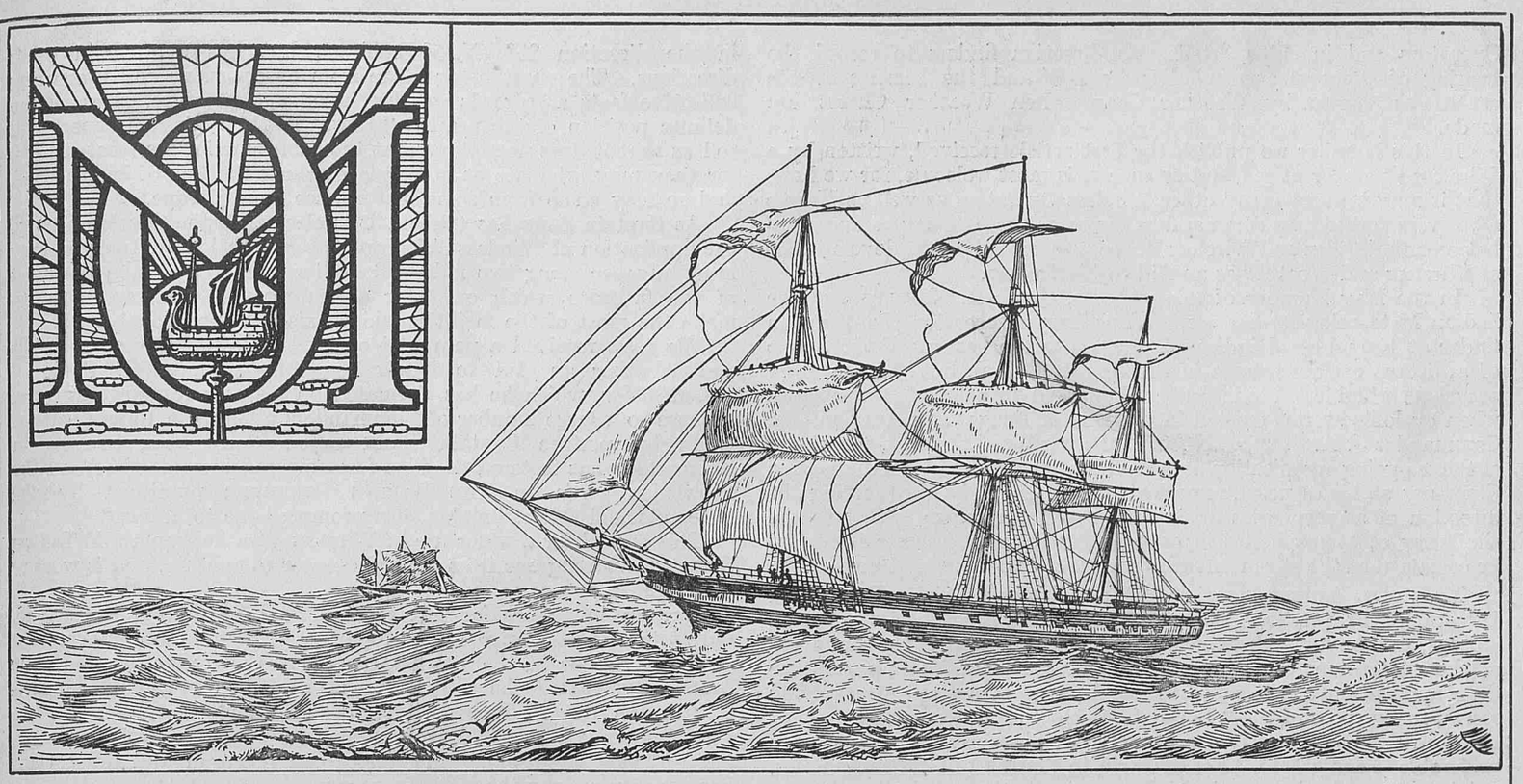

VOL. III. No. 32. THE MARINE OBSERVER. AUGUST 1926.

TABLE OF PRINCIPAL CONTENTS.

WIRELESS TELEGRAPHY AND TROPICAL REVOLVING STORMS.

MANY regular observing ships will be proceeding to Northern Tropical Seas when the Hurricane Season is at its height when their commanders and officers read this Number.

In THE MARINE OBSERVER sufficient proof has already been published to convince the most sceptical of the value of Wireless weather reports in cyclone navigation; indeed, it will be admitted by many that there is a moral responsibility to those who have the necessary equipment and are so placed as to be in a position to give the required information to all ships able to receive it.

Whether signs of the formation or existence of a Tropical Revolving Storm are evident or not, daily reports in areas where these storms may be experienced are most essential as a matter of routine and, therefore, it is desirable that those ships on our list indicated as having Mercurial Barometers should make reports to "All Ships" of observations taken at the routine G.M.T. for observation of the nearest coast, in accordance with the plan given in "Weather Signals" in the January Number each year.

In September last year we published an account of the West India Hurricanes of August and September, 1924, accompanied by Weather Charts such as may be made in ships at sea; this year there are not sufficient observations to produce such an article. Accounts of Hurricanes compiled from the observations taken by many ships encountering them are always valuable, for if they do not bring to light any new facts with regard to Typhoons, Hurricanes and Cyclones, for the improvement of the "Laws of Storms," they impress the importance of these laws upon us.

Observations from ships of the regular voluntary observing fleet encountering Hurricanes are always forthcoming, but more are needed, and so the Corps of regular voluntary marine observers is asked to bring Form 905, Report of Cyclones, to the notice of the commanders of ships not on our list who have encountered these storms, so that we may be provided with sufficient observations. These forms are not confined, as are the Meteorological Log and ships' Meteorological Report, to the use of regular marine observers; they may be supplied to any ship and can be obtained from the Marine Agents.

In the August Number last year Marine Observers were invited to record notes upon the intensity of atmospherics observed by Wireless

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Operators and in ships fitted with direction finders to record the bearing of greatest atmospherics by D/F and the bearing of the centre as shown by Weather Chart when Weather Charts are made.

In this Number we publish the first article received, written by a Wireless Operator at sea, and as such it is most welcome, for we hope that it may interest many other Wireless Operators as well as Marine Observers and so help commanders to promote the hearty co-operation between the Bridge and Wireless House, so essential for the development of Wireless and Weather as an Aid to Navigation.

In the May Number of this year Dr. C. W. B. NORMAND, of the Indian Meteorological Service, told us how on occasion the direction finder at Karachi had indicated practically the bearing of the centre of a distant cyclonic storm in the Bay of Bengal, but that on other occasions it had failed to indicate any marked direction of atmospherics when cyclonic storms existed in the Bay of Bengal and Arabian Sea. Commander J. A. SLEE, R.N., with the results of the vast experience of the sea-going organisation of the International Marine Communication Company at his disposal, remarked on the difficulty of observing the direction of atmospherics arising from a storm centre, owing to the similarity of atmospherics in other directions, and because it cannot be certain that the storm centre is invariably a source of atmospherics.

Mr. CECIL ASHWIN'S article "Atmospherics: Origin, Range and Directional Properties," the observations of atmospherics reported in Logs, and the remarks above referred to, all go to prove the soundness of the contention, that, investigation of atmospherics at sea rather than application of their position or bearing in a tropical revolving storm, for purpose of the "Laws of Storms" is necessary first.

Then when observations are available, observed facts are always preferable to conjecture. For example, in FIGURE 1 of "Atmospherics, Origin, Range and Directional Properties" the wind direction at ships A and B and the supposed area of low pressure about the region X are given as an imaginary example to explain a theory. According to BUYS BALLOT'S Law the barometer would be lower than at A to the right of an observer facing the wind at that ship in North Latitude, and the same rule applying to B, would give us two "Lows." The navigator and the Wireless officer, each working with their own special knowledge as Seaman and Telegraphist, can combine their efforts to solve problems of immense practical importance to all concerned. For example, take the WEATHER CHART FOR THE MORNING OF AUGUST 21ST, 1925, EASTERN NORTH ATLANTIC, No. XVII. No atmospherics were reported in the vicinity at the time, but supposing that when obtaining a bearing of the Lands End W/T station by D/F, *Adriatic* had heard atmospherics very marked in the direction 85° (N.85° E., True), but less marked in other directions. The chart being made from observations and presenting collective facts as regards weather, wind and pressure, gives us the definite position of the nearest "Low," but the wireless expert will tell us that it does not follow that the atmospherics are located here, for they may originate at other places along the line of bearing 85°, and so may come from some disturbance over Europe.

As Captain SLEE has told us, it is clear that the development of the application of Wireless Telegraphy to navigation and meteorology must advance along two independent lines, firstly to make the most of the facilities which exist for communication and, secondly, to make the most of the facilities which exist for directional work.

We have received a pamphlet entitled "Bay of Bengal Wireless and Weather an Aid to Navigation" by Captain G. PARK of S.S. *Risaldar*, which he has circulated on his own responsibility and expense to a large number of Commanders of ships in Indian waters.

In his preface Captain PARK says: "My keen interest in Meteorology has fostered the idea for some considerable time, and the knowledge given in THE MARINE OBSERVER published by the Meteorological Office, London, has prompted me to action."

This appeal for a wider use of Wireless Weather reports in Indian Waters is a strong one from one shipmaster to another, and is worthy of support.

Written in straightforward seamanlike language, it rings true, and at the present stage of development gives valuable information to the navigator in the Bay of Bengal in the cyclone season, but Captain PARK also looks well ahead, as is evident from the following:—

"In the Bay of Bengal, if my proposition is accepted, we are simply making a start. Development will come too rapid, perhaps, and so bring confusion. Any vessel can listen in and draw their own conclusion from the Weather reports."

The times of observations suggested in this pamphlet do not coincide with those in use at Indian Land Stations. We think that whatever local advantage there may be to ships at sea in the Bay of Bengal in the times advocated by Captain PARK, in the end it will be found that observations at sea and at the coast, both taken at the same time, will prove of the greatest service to both those afloat and ashore. In the July Number, in his article "Cyclones of the Bay of Bengal," Commander J. HENNESSY, R.N.R., summarized general facts of practical use to seamen from the works of Captain HENRY PIDDINGTON and Sir JOHN ELIOT, and showed by Weather Charts very clearly what was to be gained by Wireless Weather reports of observations taken at the same time both at sea and ashore.

MARINE SUPERINTENDENT.

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.

ATLANTIC EQUATORIAL CURRENT.

On the Cape Route.

THE following is an extract from the Meteorological Report of S.S. *Mahana*, Captain W. A. R. KERSHAW, Durban to Brest *viâ* Teneriffe. Observer, Mr. J. C. K. ROGERS, 4th Officer:—

"August 12th, 1925. By taking a series of hourly sights (sun) it appeared that the westerly stream of the Equatorial Current continued until about Lat. 2° 47′ N., Long. 10° 47′ W. Between this position and Lat. 3° 07′ N., Long. 11° 02′ W., no east-west set was observed, but at P.M. stellar sights (Lat. 3° 40′ N., Long. 11° 17′ W.) the easterly stream had commenced. The set shown between Noon and 6.30 p.m. is probably a combination of the last of the Equatorial Current, a short period of no current and the start of the Guinea Current. No appreciable difference in surface, temperature or colour of water was observed when passing from the westerly to the easterly stream.

"August 15th–17th. Between C. Verde and C. Blanco an easterly set was experienced. Passing C. Blanco the surface temperature fell from 80° to 73° in four hours, afterwards falling gradually to 67°. A westerly set was noticed soon after passing C. Blanco, and in about 23½° N., the surface water again rose to 70°, remaining at about this temperature to Teneriffe."

CURRENTS.

South of Ceylon.

THE following is an extract from the Meteorological Report of S.S. *Glenamoy*, Captain J. ANGIER, Suez to Penang:—

"I beg to draw your attention to the currents as noted in the report for August 8th and 9th, 1925.

"The weather on both days was fine, clear and cloudy, with slight to moderate beam wind, sea and swell.

"Except for brief squalls of rain and the amount of cloud, conditions were ideal for stellar and solar observations, refraction being apparently normal.

"It is, therefore, puzzling to account for these successive and contrary sets (although the August Current Chart notes the southerly one at this precise position), and I would consider it a favour to know if you have received any other report from a vessel observing in this locality at the same time."

The currents experienced were from 6.33 p.m., August 8th, 1925, Latitude 5° 34′ N., Longitude 84° 04′ E., to Noon, August 9th, Latitude 5° 30′ N., Longitude 87° 12′ E., S. 12 miles. From Noon, August 9th to Noon, August 10th, Latitude 6° 05′ N., Longitude 91° 23′ E., N. 8 miles.

S.S. *Atreus*, Captain G. H. SALTER, logged between Noon, 8th, Latitude 5° 47′ N., Longitude 89° 01′ E., and Noon, 9th, Latitude 5° 30′ N., Longitude 84° 26′ E., a set of S. 18° E., 18 miles.

S.S. *Nyanza*, Captain F. W. J. CARPENDALE, logged between Noon, 8th, Latitude 11° 07′ N., Longitude 83° 57′ E., and Noon, 9th, Latitude 6° 50′ N., Longitude 82° 02′ E., a set of S. 26° W., 11 miles.

ABNORMAL CURRENT.

Gulf of Benin.

THE following remarks from H.M.S. *Dwarf*, Lieutenant-Commander H. F. M. PETO, R.N., have been received from the Hydrographer of the Navy :—

"An easterly set between Lagos and Cape Formosa cannot be relied upon even in summer or rainy season.

"In August, 1925, H.M.S. *Dwarf* experienced no set between Latitude 5° 00′ N., Longitude 5° 00′ E., and Latitude 6° 00′ N., Longitude 4° 15′ E., but was set in a direction 330° at between 2 and 2.5 knots while in the vicinity of and crossing Avons Deep (Latitude 6° 15′ N., Longitude 3° 57′ E.).

"A S.W'ly breeze, force 4 to 5, had been blowing for at least three days previously.

"When proceeding from Bight of Brapa to Sierra Leone, and particularly during the "Rainy Season," it is well worth while to hug the coast between Cape Three Points and Cape Palmas.

"Most ships of the ELDER DEMPSTER LINE cut straight across to Swarton Corner, and then follow the Coast, but even so doing, S.S. *Adda*, on August 31st, 1925, reported having experienced an average easterly set of 1 knot, and *Dwarf* at the same time had a slightly favourable current, or none at all, up to Grand Bassam; 0·3 knot, Grand Bassam to Swarton Corner, and $\frac{3}{4}$ knot thence to Tafu Pt.; 2 knots easterly being experienced while off Cape Palmas."

LOCAL WIND CHANGES.

Beaufort Sea, N. Alaska.

THE following account has been received from Mr. STEWART JACKSON, 3rd Officer, S.S. *Baychimo*, Captain S. A. CORNWALL :—

"During the months June to October, 1925, between Pt. Barrow, Alaska, and Coronation Gulf, I observed two conditions which were of great value in predicting the weather. Firstly, with a high barometer and a wind anywhere between N. and E., within 24 hours of the barometer commencing to fall, the wind invariably shifted to N.W., and very occasionally to W. or S.W. It was not usual for the wind to back, instead it fell light for a few hours, then freshened from the new direction. This falling barometer on no occasion indicated a stronger blow from the first direction. Similarly, with a westerly wind and a rising barometer the wind shifted to the eastward within 24 hours, but instead of falling light as in the first case, it usually hauled.

"Secondly, on a calm day, Alto-Stratus clouds of a very oily appearance and greenish colour always preceded a strong nor'-westerly gale."

WATERSPOUTS.

In the Gulf of Paria, Trinidad.

THE following are extracts from the Meteorological Log of H.M.S. *Ormonde*, Commander C. H. KNOWLES, D.S.O., R.N., survey work in West Indies. Observers, Lieutenants C. W. HAMLEY, R.N., and A. M. HUGHES, R.N. :—

"August 5th, 1925. 1418. While surveying in the centre of the Gulf of Paria, observed a waterspout bearing E.S.E., distant 5 miles, just clear to the southward of a heavy rain-storm—the top was connected to the ragged edge of a heavy Nimbus cloud, the bottom being in the midst of a considerable disturbance in the water. The spout was bowed, with the elbow to the southward of the top and bottom.

"The spout, which was stationary, lasted about 3 minutes and appeared to fade away from the bottom.

"No reliable estimate of the height can be given.

"Weather at time of observation : o.c.r.

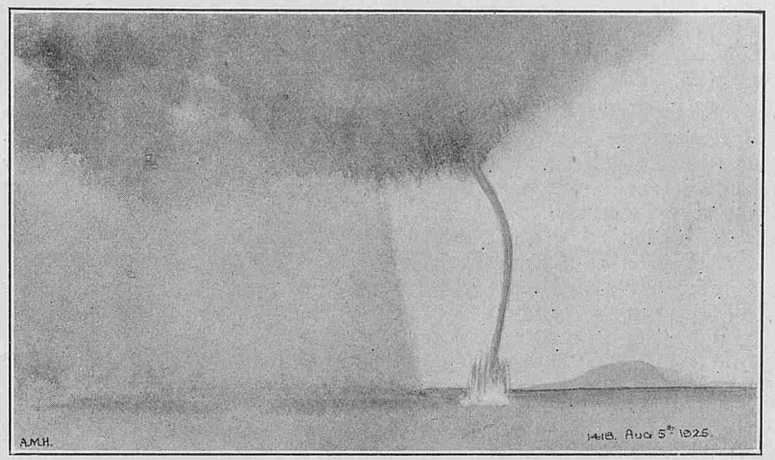
"Wind : S.E., Force 3.

"Clouds : Cu and Nb—mostly Nb.

"Proportion of sky covered : 8.

"Visibility : 6.

"There were many local rain-storms at the time, some passing over the ship from E., E.S.E. and S."



"August 6th, 1925. 0900. Observed a waterspout bearing E.N.E., distant 8 miles, just clear to the eastward of a heavy rain-storm—the top was connected to the ragged lower edge of a heavy Nb. cloud—there was the commencement of another spout close to the westward which faded upwards after about a minute (*see* sketch); several of these false starts had been observed since 0800 in the same place. The bottom of the spout was in a greater disturbance of water than that of the spout of the previous day.

"The spout, which appeared to be moving slowly westwards, remained practically straight the whole time it was visible—about 5 minutes—and was tapered towards the bottom.

"It seemed to burst and recede from about $\frac{1}{4}$ of the way up.

"The height was estimated at approximately 1,100 feet.

"Weather at time of observation : c.

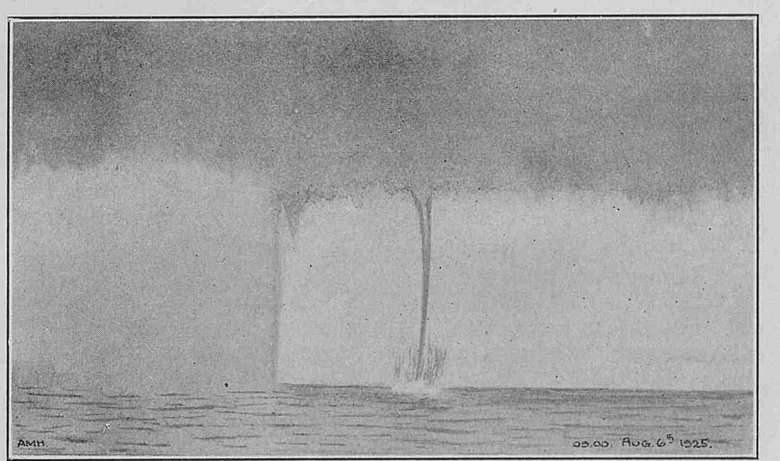
"Wind : S., Force 2.

"Clouds : Cu/Nb/St—mostly Cu and Nb.

"Proportion of sky covered : 8.

"Visibility : 6–7 (though 2 hours later it increased to 9 to the southward).

"Numerous local showers."



PHOSPHORESCENCE.

In the Arabian Sea.

THE following is an extract from the Meteorological Report of S.S. *Malda*, Captain T. N. GRAY, London to Calcutta. Observer, Mr. R. F. WEATHERSEED, 3rd Officer :—

"On the passage Aden to Colombo, and after passing north of Sokotra, we experienced a strong S.W. Monsoon until we arrived in Latitude 11° 39′ N., Longitude 60° 47′ E., on August 8th, 8.35 p.m.,

when the ship was enveloped in a thick haze ; at 8.55 p.m. the haze lifted and the appearance of the sea was a milky white, the horizon was dense black, wind and sea had dropped and merely the swell remained. The moon had not risen, at 9.10 p.m., the sea again appeared normal. The conditions from then to Colombo were gentle to moderate westerly winds. The vessel's speed was 12.5 knots."

The following is an extract from the Meteorological Log of S.S. *Clan Malcolm*, Captain C. J. HIGGINS, Tuticorin to London :—

"August 1st, 1925, 00 a.m. to 3 a.m. Steamed through an area of remarkably luminous sea, causing the effect of pale moonlight. Apparently due to phosphorescence well below the surface. The steamer's wake and wave crests were not even visible. The horizon was very distinct.

"Position at 00 a.m., Latitude 9° 40′ N., Longitude 62° 10′ E.

"Position at 3 a.m., Latitude 9° 51′ N., Longitude 61° 40′ E.

"August 19th, 1925, 7.20 p.m. to 8.20 p.m. Conditions similar to above but less brilliant.

"Position at 7.20 p.m., Latitude 10° 35′ N., Longitude 59° 11′ E.

"Position at 8.20 p.m., Latitude 10° 43′ N., Longitude 59° 03′ E."

The following is an extract from the Meteorological Log of S.S. *Port Hunter*, Captain S. C. COTTELL, Colombo to Port Sudan. Observer, Mr. C. F. POST, 3rd Officer :—

"During the night watches on August 18th, 19th, 20th and 21st, 1925, between Latitude 10° N., Longitude 65° E. and Latitude 13° N., Longitude 50° E., most extraordinary phosphorescence in the sea was observed. The sea became luminous from horizon to horizon each evening between 8.30 p.m. and 9.00 p.m., and disappeared in the morning about an hour before daylight. It gave an effect of the ship sailing in a sea of milk, and at times was very bright, and it was possible to read the Azimuth Tables on the bridge by the light, usually between the hours of 2 a.m. and 4 a.m. The horizon was perfectly sharp and distinct except for a point each side of magnetic north."

The following is an extract from the Meteorological Report of S.S. *Oxfordshire*, Captain W. E. CRUMPLIN, Liverpool to Rangoon. Observer, Mr. F. C. BROOKS, 4th Officer :—

"August 20th, 1925.

"At 0.30 a.m. A.T.S. in Latitude 13° 00′ N., Longitude 54° 56′ E., the whole sea assumed a curious milky appearance, as though light was being projected to the surface by some submarine agency. Irregular black streaks resembling spawn were observed. The sea was not breaking and the wind S.W., force 3–4.

"Barometer 1009 mbs. Air Temperature, 76°. Sky cloudless.

"At 1.30 a.m. the phenomena gradually disappeared and the wind increased to force 6. Sea disturbance 5, vessel having opened the eastern end of the island to the monsoon."

The following is an extract from the Meteorological Report of S.S. *Theseus*, Captain A. E. BATT, Batavia to Suez. Observer, Mr. J. T. FETTES, 3rd Officer :—

"August 24th, 1925.

"11.00 p.m. Latitude 9° 05′ N., Longitude 52° 00′ E. Sea suddenly became luminous. This phosphorescence reached on all sides as far as the horizon, and lasted until 3.00 a.m. 25.8.25. During this period the ship had steamed N. 16° W., 36 miles. Unlike the usual appearance of phosphorescence there was no sparkle, as the ship broke the water and none from any water thrown on deck. From the appearance of the water the phosphorescence was thought to be deep down. At first sight this phenomenon made it appear as though the ship had run into shoal water, but a cast gave over 75 fthms. Water temperature, 69° F."

The following is an extract from the Meteorological Log of S.S. *Somersetshire*, Captain P. DE LEGH, Suez to Calcutta. Observer, Mr. P. HAWKINS, 2nd Officer :—

"At 9.20 p.m. August 13th, 1925 (1750, G.M.T.), when steering S. 78° E., speed 10½ knots; in Latitude 12° 38′ N., Longitude 55° 28′ E., on a bright, starlight, moonless night, wind S.W. by S., force 5; swell south, rough, the horizon to the eastward suddenly became very clear, and a white line seemed to be coming towards the ship at a tremendous speed from the eastward, which had the appearance of breakers; very shortly after, the whole sea was quite white, with now and again circular and streaky black patches, and the whole surroundings were brilliantly lighted up.

"The sea was so white that one was not able to distinguish the ship's wake nor the wash of the water against the ship's side. During this time (9.20 p.m. till 10.40 p.m.) the atmospheric conditions were extraordinary, no sound was heard, not even the wind nor the breaking of the sea, no swell was visible, and the vessel, which had previously been rolling heavily, had practically no movement on her: in fact, one could almost have imagined the vessel was in dock.

"During the time the vessel was in this white water there appeared to be at an altitude from the horizon of about 10′ pitch black clouds, whereas there were no clouds at all.

"At 10.15 p.m. a sample of sea water was taken, Temp. 75°, Specific Gravity 25, and contained quantities of phospheric particles in various shapes, some of the threads ranging from ¼ inch to 1 inch long.

"At 10.30 p.m. the sea to the westward gradually became normal again, but that to the eastward was still white. At 11.00 p.m. the whole of the sea became normal, the whiteness just disappearing very gradually.

"On August 14th, 8.30 p.m. (1643 G.M.T.), in Latitude 11° 40′ N., Longitude 59° 23′ E. Luminous water was again seen. Particulars much the same, except that on this occasion the whiteness of the water, which was even brighter than the night before, only lasted 20 minutes and disappeared suddenly. As the vessel came out of the white water into normal coloured water, one could see a very distinct line between the two, and on looking astern, it had the appearance of a vessel coming out of a dense fog.

"Particulars as follows :—

"Wind S.W. by S., force 4, sea S.W. by S., 4. Swell S.S.W. Mod. Temp., dry bulb 78°, wet bulb 74°·9, sea 77°. Specific Gravity 25.5. Barometer 1007·6 mbs."

PHOSPHORESCENCE.

In the China Sea.

THE following is an extract from the Meteorological Report of S.S. *Glenamoy*, Captain J. ANGIER, Singapore to Hong Kong. Observer, Mr. R. L. V. BISHOP, 2nd Officer :—

"August 27th, 1925, 4.30 a.m. in Latitude 14° N., Longitude 112° E. (approximately). The weather being gloomy, with steady wind and rain, just ahead appeared a luminous streak of water closely resembling a submerged reef. It proved to be phosphorescence and, as nearly as could be judged, of only 2 cables extent.

"As the ship passed through the patch, the water was noted to be of milky appearance, and waves of luminous air seemed to rise above the sea almost to the height of the main deck.

"Almost immediately the ship passed clear and no further indications were observed elsewhere."

ILLUMINATION OF THE SEA.

In the East Indies.

THE following is an extract from the Meteorological Log of H.M.A.S. *Moresby*, Captain J. A. EDGELL, O.B.E., R.N., Singapore to Thursday Island. Observer, Lieutenant J. DONOVAN, R.A.N. :—

"At 0230, August 27th, 1925, when in estimated position 8° 29′ S., 128° 10′ E., the following unusual phenomenon was observed : The sea suddenly appeared to be illuminated by a soft lambent light as far as the horizon on all sides. At and above the horizon to an elevation of 2° there was a dark band of very deep blue, which abruptly faded to an exceptionally light and clear sky.

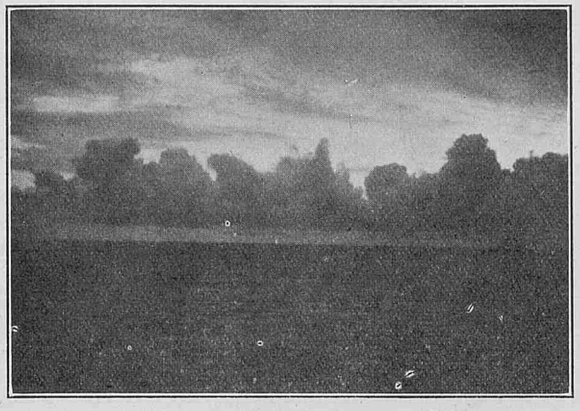
"At this time the sky was clear, with brilliant stars, and the moon had set. There was no phosphorescence. Sea surface temperature

was 77° and Specific Gravity 1011·00. Wind E.S.E., force 3. Sea surface: waves E.S.E., disturbance 4, with a slight easterly swell.

"The phenomenon lasted until 0305, fading away quickly."

CLOUD PHOTOGRAPH.

In the China Sea.



THE accompanying photograph has been received from S.S. *Glenamoy*, Captain J. ANGIER, Singapore to Hong Kong. Observer, Mr. R. L. V. BISHOP, 2nd Officer, the following particulars being given:—

"August 27th, 1925. Latitude 14° 30′ N., Longitude 112° 24′ E. Weather for past 2 days gloomy and rainy with westerly winds. Shift of wind to N.W. occurred at daybreak and brighter conditions followed.

"Photograph was taken immediately before sunrise and shows the Cu-Nb moving from N.W., revealing upper clouds Ci-Cu moving from N.E. A-St/St-Cu were also present.

"Barometer 1005·7 mb. Temperature 80° F. Wind N.W., force 4. Slight sea. Moderate confused swell."

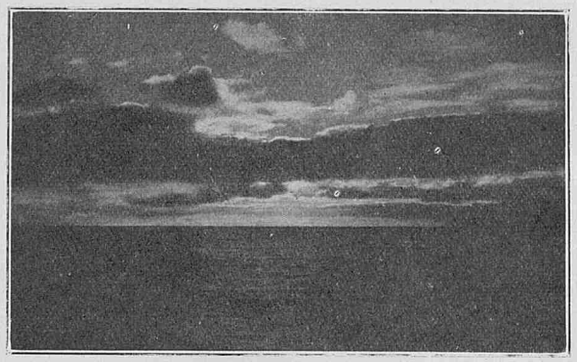
CLOUD PHOTOGRAPHS.

In the South Indian Ocean.

THE accompanying photographs have been received from S.S. *Euripides*, Captain T. V. ROBERTS, Cape Town to Albany, W. Australia and Melbourne.

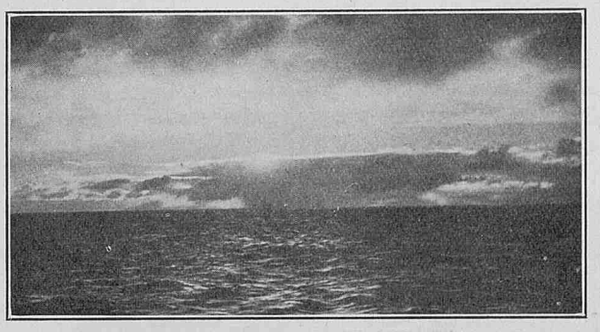
"August 5th, 1925, afternoon off Cape Town.

"The first entry in log after leaving Cape Town is 8 p.m. August 5th, in Latitude 34° 29′ S., Longitude 18° 26′ E., when wind was S. by E., force 1. Barometer 1020·0 mb. Air Temperature 59°. Sea Temperature 58°; St-Cu, cloud amount 10, overcast.



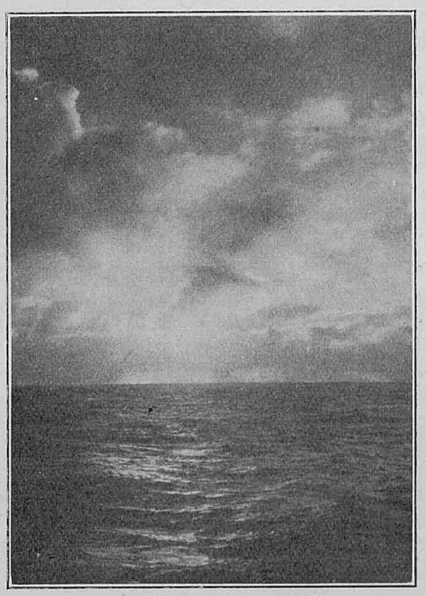
"August 8th, 1925, sunrise.

"8 a.m. August 8th, in Latitude 38° 19′ S., Longitude 34° 37′ E. Wind S.W., force 1. Barometer 1031·0 mb. Air Temperature 51°. Sea Temperature 60°; St-Cu, cloud amount 8, cloudy.



"August 11th, 1925, sunset.

"4 p.m. August 11th, in Latitude 40° 07′ S., Longitude 58° 53′ E. Wind W.N.W., force 4. Barometer 1034·8 mb. Air Temperature 54·5°. Sea Temperature 57°; St-Cu, cloud amount 3, weather b.



"August 22nd, 1925, sunset.

"4 p.m. August 22nd, in Latitude 37° 13′ S., Longitude 132° 16′ E. Wind S.S.W., force 4–5. Barometer 1017·8 mb. Air Temperature 54°. Sea Temperature 55°; Ci-Cu, Cu-Nb, cloud amount 5, weather bc.p."

REFLECTION OF CAPE VILLANO LIGHT.

THE following is an extract from the Meteorological Log of S.S. *Oriana*, Captain T. MANDER, Coruña to Vigo. Observer, Mr. R. D. ECKFORD, 3rd Officer:—

"August 10th, 1925, at 2200 G.M.T., off Cape Villano in Latitude 43° 11′ N., Longitude 9° 17′ W. Wind N.N.W., force 3.

Clouds nil. Weather bv, visibility 9. Cape Villano Lighthouse, situated at an elevation of 336 ft. above high water mark, is a bright electric light of great power and shows two flashes of ½ second each every 10 seconds. When rounding this Cape at the time stated, on a passage from Coruña to Vigo, we noticed that the flashes were reproduced beam for beam at a point of the horizon bearing 180° from the light itself. The phemomenon, although not nearly so bright as the parent beam, showed perfectly clear for some 20 minutes under observation, and appeared much as the loom of a light appears to an observer below the horizon. The beams of the light and of the reflection each moved from west through the zenith to east. We are unable to explain the reason for this phenomenon. There were several vessels in the offing at the time, any one of which may have been an observing ship, and who also may have considered the incident worthy of comment."

NOTE.—The explanation of this phenomenon is probably the following: The lighthouse emitting an intense parallel beam of light, which, on account of the abnormal clearness of the atmosphere, penetrated to an unusual distance. There was, however, sufficient scattering of the light for the path of the beam to be seen even after it had passed the ship. Looking along the beam away from the lighthouse, perspective caused the beam to appear to contract into a point right opposite the lighthouse. A similar effect is occasionally seen when rays from the setting sun appear to unite in a point on the eastern horizon. The illusion is sometimes so strong that it looks as though a sun were on the eastern horizon sending out beams towards the west. *See* page 148, No. 21, Vol. II, also page 62, No. 5, Vol. I.

ATMOSPHERICS: ORIGIN, RANGE AND DIRECTIONAL PROPERTIES.*

BY MR. CECIL ASHWIN, WIRELESS OPERATOR, S.S. PORT PIRIE, CAPTAIN W. G. HIGGS.

FOR many years the attention of all those engaged in the science of Radio-Telegraphy and Radio-Telephony has been centred in overcoming the effect of electrical disturbances in the ether. These disturbances vary, with regard to name, in different countries: X's or strays in Britain; static in America and the language equivalent of "Atmospherics" in other countries. But whatever their designation, the characteristic—an irregular noise in the telephones, preventing good reception of aural, and mutilation of tape recorded messages, is the same. With the many ingenious devices used to overcome or annul the effect of static, it is not proposed to deal; a review of the latest patent list, however, will reveal the fact that we are still far from a simple practical solution of this difficulty, particularly so in the case of ships, where space is limited and mechanical vibration another factor against the use of sensitive instruments.

Numerous theories have been advanced regarding the origin of static: but, since so many factors enter into their composition, it is by no means an easy matter to conjecture from what source any particular atmospheric originates. Patient investigation, extending over a number of years, has produced a certain amount of data by which the various classes of X's may be tabulated and an estimate made of their origin.

For general purposes, then, we may consider static to be divided into four broad classes: "Clicks," "Hisses," "Grinders" and "Freaks."

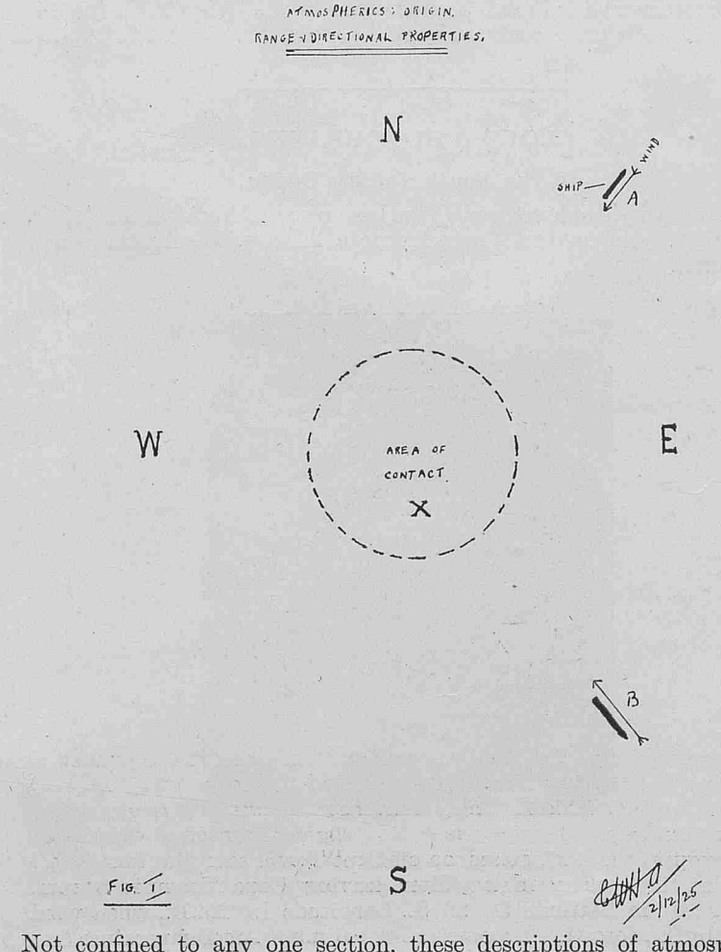
"Clicks," as their name implies, and when heard in the telephones, consist of sharp short clicks repeated at irregular intervals. They are produced by sudden electrical discharges in the atmosphere—lightning or the electrical discharge from a falling meteor will give this effect.

"Hisses" are atmospherics that produce a constant hiss in the 'phones or line on tape. They are produced by electrically charged snow, rain or hail striking the aerial, whereon the charge is transferred and proceeds to earth *viâ* the receiver. Heavy falls of snow or rain may occur without producing this effect, but the fall of hail is practically a sure indication that "hisses" are present. This is probably due to the peculiar composition of hail which allows it to retain a charge longer than either rain or snow. In connection with this form of static it may be mentioned that on one occasion, during a heavy hail squall, telephones were connected directly in the aerial circuit, producing a hiss audible several feet away and proving the disturbance to be of **low frequency.**

"Grinders," a form of static producing a rough grinding noise, are most frequent and troublesome. Their origin is still obscure, and has been the subject of numerous discussions and theories. Changes of temperature; rainfall; electrically charged clouds; ionization and de-ionization of the atmosphere—the latter theory has held considerable ground by virtue of the fact that during hours of daylight (when the atmosphere is ionized by the sun's rays), grinders are by no means as prevalent as at night when de-ionization is taking place. Any of the foregoing may produce electrical disturbances, but there remain occasions upon which the prevalence of grinders cannot be attributed to any of these conditions and their origin must be traced to some other factor. A probable theory will be discussed later.

"Freaks" are irregular atmospheric discharges belonging to no particular class. Beginning as a "hiss," they rapidly end in a "click" or "grinder." Their origin is possibly an accumulative charge on the aerial, discharging through the receiver.

In spite of their disadvantages the first two and the last of the foregoing forms of static may be neglected since their period is comparatively short. It is the grinder class of atmospheric that necessitates such high-powered transmitters and even then suspends working for hours at a time, especially in tropical countries. After years of study no simple practical solution has been found. From this, it would appear that grinders are an integral part of the atmosphere and can no more be eliminated than sunshine or shadow. Personal experiments in all parts of the world have strengthened this theory in the mind of the writer; but so minute is the data obtained, in comparison to the vastness of the field to be covered, that publication has been withheld pending further details of this interesting subject. Recently, however, whilst on a voyage to New Zealand on the S.S. *Port Pirie*, the writer had, by kind permission of the Commander, Captain W. G. HIGGS, access to the first volume and succeeding numbers of this very interesting publication, THE MARINE OBSERVER. In this work are recorded many details required by the writer in confirmation of his own theory and experiments.



Not confined to any one section, these descriptions of atmospheric disturbances emanate from all parts of the world.

* This article will, we hope, stimulate interest in an important matter, but it should be noted that the Editor does not take responsibility for the opinions and theories expressed in this section of THE MARINE OBSERVER.

As mentioned above, the result of several years' experiments has led the writer to the conclusion that grinders, and in fact all atmospherical disturbances, are produced by an atmospherical condition over which we have no control. This condition will hereafter be referred to as **wind friction.** It is the opinion of the writer that the atmosphere, composed of numerous gases, which, by combination or friction, when in rubbing contact, manifests such combination or friction in the form of slight electrical discharges—grinders. Hence, static is produced, not by a **steady** wind of high or low velocity, but by changes in direction: at the **points of contact** between opposing winds, or by combination of gaseous elements under pressure, *i.e.*, areas of very high pressure may produce combination of atoms to a small degree.

To take a simple case, let A (FIGURE 1) represent a ship encountering N.E'ly winds. Seventy miles away is B, where the wind is S.S.E. This would indicate an area of low pressure about the region X. Since these winds are progressing at practically right angles we should expect to find them combining in the vicinity of the dotted circle where, under the present theory, we have frictional contact of various gases, components of the atmosphere, producing slight but continuous discharges—grinders. This state will continue until the area of low pressure is filled. This area of contact, being localized, may be ascertained by some form of direction-finding apparatus. Had the vessels in question been able to obtain bearings of this disturbance, the " fix " would have placed the point of contact in the vicinity of X, *i.e.*, the area of low pressure.

Whilst proceeding from Bermuda to Key West (the hurricane region), tests were caried out with a view to locating, by means of

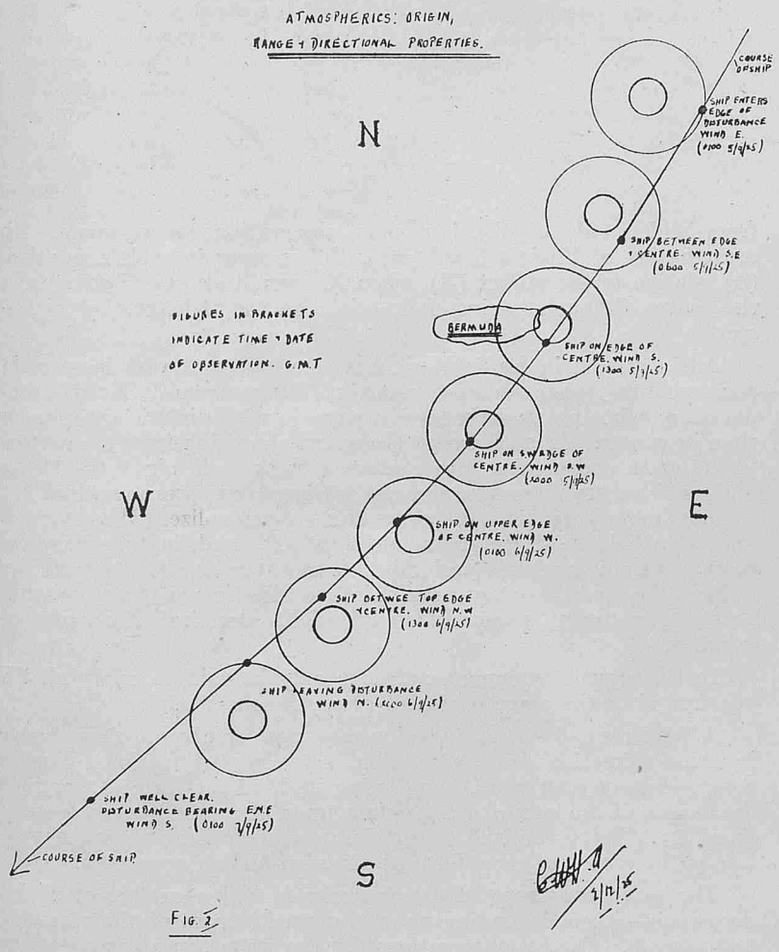


FIG. 1.

the Marconi-Bellini-Tosi direction-finding apparatus, the proximity of hurricanes. No actual hurricanes were encountered, but the following may prove of interest and assistance to other experimenters. Approaching Bermuda from the N.E., a slight disturbance was located in the vicinity of that island bearing S.W. Nearing the island, X's increased to about strength 7, but decreased slightly when abeam. Passing to the southward, atmospherics again increased, but swung round to the east through south, till the disturbance was left astern bearing E.N.E. These observations, taken independently of the navigating officers were, upon comparison with report of the navigating officer, Mr. W. JONES, found to coincide with a shift of wind from E.S.E. to S., and N. through W., finally returning, *viâ* light variable airs, to S.E. Visual observations of clouds, etc., gave every indication of the passage through an area of very low pressure (probably a weak hurricane) moving slowly S.E. The observations are illustrated diagrammatically in FIGURE 2.

With regard to the directional properties of such discharges, the writer has pleasure in quoting an extract from the observations of Professor E. GHERZI, of Zi-Ka-Wei Observatory, China, who, by means of a large frame aerial has kept track of continental storms originating in China or Siberia. Noting that a typhoon or other high wind produced static having more or less directional properties, he states,

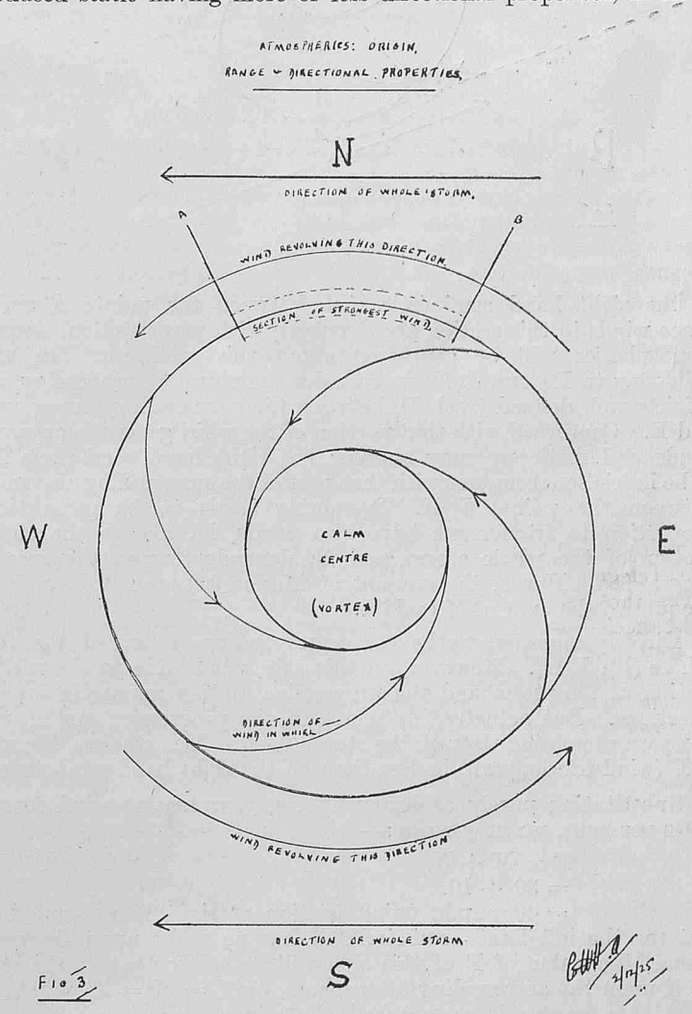


FIG 3.

" Possibly the typhoon whirl, composed at first only of equatorial air, becomes in some way electrified by the **impact** with the anti-cyclone (polar air) hurrying along down against it from the Siberian or Chinese region." (MARINE OBSERVER, Vol. II, No. 20.)

Assuming such electrification to take place, a short study of typhoons, hurricanes or whirling storms will show the possibilities of utilizing the atmospheric disturbances produced as a warning, and, by following the track of such storms, give information that will allow vessels to keep well clear. It is well known that typhoons (hurricanes) consist of immense whirls of air revolving in an anti-clockwise direction (in southern hemisphere the direction is clockwise) about a calm centre, and at the same time having a general progressive movement. Now, the wind at any place within the whirl is made up of two constituents, that due to the general motion of the whole storm, and that due to the spin within the whirl itself, and since, to points at right of the path of the storm, these components move in the **same** direction (whilst to the left, they are in opposite directions), we may expect the strongest winds to be generated in the right hand semi-circle of the storm. FIGURE 3 illustrates a typical typhoon or hurricane. The arrows within the large circle indicate the direction of the wind from the edge towards the centre. With the path of progress as shown it will be seen that the strongest winds are generated

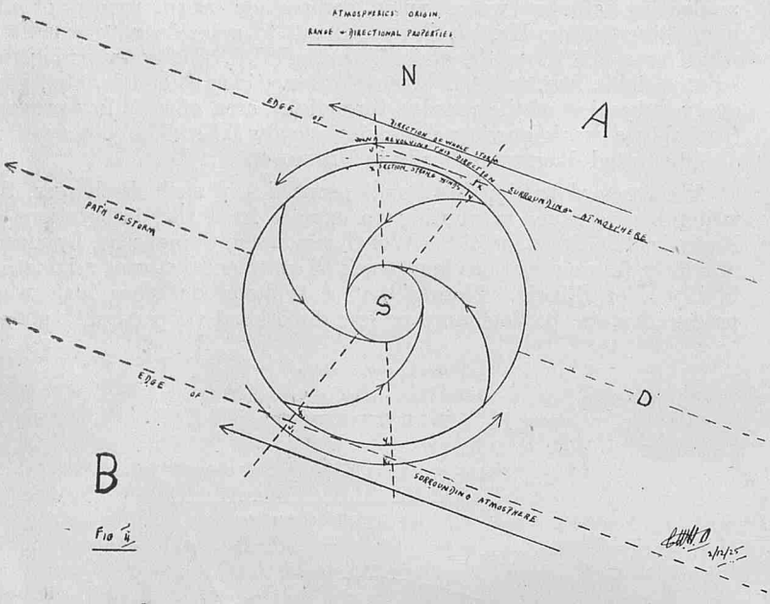


FIG 4.

in the right hand semi-circle, *i.e.*, between the points A and B. Since winds in this section are strongest, with most friction, strongest atmospherics will be generated about this section of the whirl. Referring to FIGURE 4, let us consider the storm S, proceeding along a fairly well defined track D, between the surrounding atmosphere A and B. Concerned with that portion of the whirl generating strongest winds and static we may suppose the right hand semi-circle X Y to be in frictional contact with that part of the surrounding atmosphere between the points J K. Presuming static to be generated in proportion to friction we have two winds, M, due to the circular motion of the whole storm, and N, dependent upon the speed of progression. Hence, the amount of friction between X Y and J K is equal to the sum of M and N.

Directly opposite, we have a corresponding section of the atmosphere (B), $J_1 K_1$. However, on this side, winds, due to the whirling motion of the storm and the progressive motion appear in opposite directions. But actually this is not so, the progressive motion wind in no way opposing that of the storm itself. Nevertheless, the value of F (wind friction) will be less than on the right hand semi-circle.

Substituting purely arbitrary figures, representing wind force in miles per hour, we may write :—

$$F = M + N,$$
$$= 30 + 10.$$
$$= 40 \text{ m.p.h. (wind friction of right hand semi-circle).}$$

But for the left hand-semi-circle, N has no effect upon the storm. Hence, the value of F of this side will be solely that of the storm itself upon the surrounding atmosphere, or F = M = 30 m.p.h.

As the centre is approached the winds, decreasing, encounter less and less resistance until the actual vortex is reached with an entire absence of static. Examination of similar disturbances has led GHERZI to state, " A decrease in atmospherics, when navigating in the neighbourhood of a typhoon, may indicate the ship to be nearing the centre of the storm."

This is borne out by the experience of the Italian S.S. *Trieste* some time ago when sucked towards the centre of a typhoon; the operator reporting bad X's at the beginning of the storm, gradually decreasing till the centre or vortex was reached, when static was nil for six hours. Reports from vessels navigating some 220 miles from the centres of typhoons all indicate strong static, gradually decreasing as the centre approached.

In possession of the foregoing it can thus be seen that the direction-finding apparatus installed aboard ship may be of tremendous assistance in aiding the navigator when in the vicinity of whirling storms. Nevertheless, the information with regard to such storms and atmospheric disturbances is still slight and led Senator G. MARCONI in March, 1925, to state, " The only record is a report from a ship with D.F. apparatus just outside the track of a hurricane in the West Indies last summer when the operator stated atmospherics appeared to come from the *centre* of the storm." This would appear to contradict the preceding theory until we consider that it is not stated

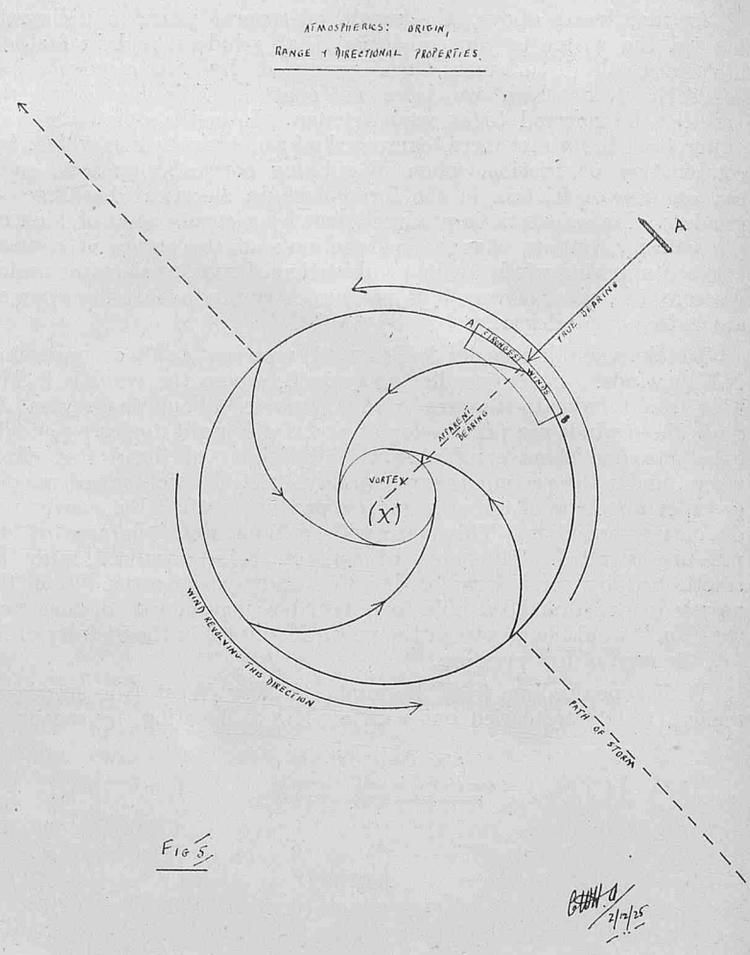


FIG 5.

from which *side* of the hurricane observations were taken. An examination of FIGURE 5 will show the steamer in such a position, (A) relative to the vortex (X), when X's would *appear* to come from the centre although having their origin on the right of the track—section A B.

All interested in Radio Work have noticed the great increase in atmospherics during summer months. Apart from " Clicks," produced by lightning, we have more *changes* in wind direction in summer than in winter. In addition to the warm airs rising from the surface of the earth and coming into contact with the cold air of the higher regions there are numerous areas of high and low pressure which the surrounding air is constantly tending to neutralize. Warm air is known to hold more water vapour than cold, and, in the process of cooling, produces clouds and rain. This procedure has a tendency to keep the air in constant motion in one direction or the other with, as we have seen, a generation of slight electrical discharges or grinders.

In the tropics, summer conditions may be said to apply all the year round to the accompaniment of continuous static.

A brief resumé of the foregoing may now be given. Any change in wind direction creates friction between the various gaseous components of such wind, manifesting itself in the form of electrical discharges of an intensity depending upon the velocity and general humidity. Being confined to certain areas such disturbances may be located by means of some form of direction-finding apparatus.

The estimated range of atmospherics is still a subject of varied discussion—much depending upon the sensitiveness of the receiving instruments. Careful observations, by the writer, in all parts of the world, would indicate that each particular form of static has a definite field of disturbance. Thus, the area affected by a " click " or lightning discharge is far greater than that of a " hiss," due to falling hail. Owing to their persistence, " grinders " have the greatest area and may affect stations 200 miles from their source. In the present day of super-sensitive receivers and world-wide ranges this figure may be greatly exceeded.

After noting the atmospheric effect upon long and short-wave-lengths, the writer puts forward the theory, with regard to static,

that any receiving station has an area of maximum intensity about the aerial **equal to the radius of the wave-length received.** Thus, when receiving on 25,000 metres the radius of this field is approximately 15½ miles, giving an area of over 700 sq. miles, wherein any electrical or atmospherical disturbance taking place will affect the receiver.

Following this theory to its natural conclusion, we find that any receiver is affected by static directly as the wave-length received. On 100 metres this area is reduced to about ·012 sq. mile, *i.e.*, it will only be affected by purely local disturbances. Experiments with very short wave-lengths have demonstrated their immunity from static and, by introducing the " beam " system, to still further reduce the field of atmospheric intensity, we may be well on the road to perfect wireless communcations, utilizing wave-lengths of from one metre to two hundred metres. Above the latter wave the field of intensity increases very rapidly.

In conclusion, the writer would urge all interested in this particular branch of Radio-electrics, wherever they may be situated, to tabulate any experience or experiment in connection with static; for it is only by a complete knowledge of the subject that we can hope to overcome the greatest hindrance to successful wireless communcation.

TIDES AND CURRENTS, AND THE EFFECT OF THE WIND ON THE WATER LEVEL NEAR THE SHORE WITH SET AND DRIFT ASSOCIATED.

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

THE rhythmical rising and falling of the water, caused by the direct effect of the attraction of the moon and sun, is known as Tides. In the ocean where the depth is great, the tides cause very little horizontal movement of the water, the height of the tidal undulation or tide wave being ony a few feet, while its length is some hundreds of miles., When, however, a tide wave meets a submarine plateau, its height increases considerably, its length diminishes, and its speed decreases; the consequence being that the gradient from crest to trough becomes sufficiently great to allow the water to flow from the higher to the lower level, and such a flow of water is generally known as a tidal stream.

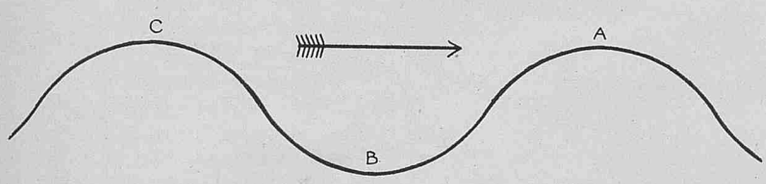


Figure 1.

In FIGURE 1, the curve represents a tide wave moving in the direction shown by the large arrow, which we will suppose to be east. A and C are crests, and B a trough.

In the ocean, there is a flow of the surface water only, but when the tide wave reaches shallower water, the horizontal movement extends to a considerable depth, and finally, if the depth is sufficiently small, the whole mass is in motion.

As the tide wave passes a point of land, the crest, trough and intermediate portions move along in succession. While the wave form extending from A to B is passing there is a westerly stream, and this continues to flow after the trough B has passed, till its momentum has been checked by the gradient between B and C, when an easterly stream begins to flow. It is easily seen from the above that, in general, the tidal stream at any place will not turn at the times of high and low water at that place; in fact, it usually happens that in open channels, the tidal stream ordinarily overruns the turn of the vertical movement of the tide by as much as three hours, the effect of which is that at high and low water by the shore the stream is running at its greatest velocity.

The atmosphere resting on the earth exercises a variable pressure, as shown by the varying height of the barometer. The variation of pressure is much more considerable than one would be inclined to suspect off-hand. The height of the barometer 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, the difference in height of tide due to a variation of that pressure, could be estimated with considerable precision. Unfortunately, this does not appear to be a practical method, as wind and other influences contribute their quota; and, it is probable that in reality, the larger atmospheric inequalities do not usually linger long enough over particular areas to permit the sea to attain everywhere its due slope; and, therefore, the full difference of water-level can only be attained occasionally from this cause.

Also, the strength and direction of the wind, under certain conditions, considerably affects all tidal undulations; whilst the geographical element is of great importance, as tides are profoundly affected by the basin in which they are maintained.

The data obtained from a tide gauge contains the total effect due to tides from all origins. That is to say, astronomical, pressure distribution, and the effect of wind. The tide due to astronomical influences can be accurately computed, while observations extended over a long period can to a great extent get rid of the irregular effects of pressure and wind by averages; and in tropical regions where the weather is very uniform, the meteorological tides produced by the regular periodic variations of wind and atmospheric pressure can be allowed for with considerable exactness.

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 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 not usually attainable in the latitude of the British Isles, where the great inconstancy of the meteorological elements must of necessity render tidal prediction somewhat uncertain.

When we consider that the incessant variability of the tidal forces, the complex outlines of our coasts, the varying depth of the sea, and the earth's rotation are all involved, we can see that tidal prediction is one of the great triumphs of the theory of universal gravitation; and it is to be regretted that it must always be more or less complicated by the fact that it contains a further correction when unseasonable meteorological conditions prevail.

A comparison of monthly charts showing the general set of Ocean Currents, with those showing Wind and Pressure, indicate that the general oceanic circulation is largely due to wind influence, which may be considered as the dominating cause relatively to other influences; such as differences of temperature, defect due to evaporation or excess due to rain, rivers or melting ice, pressure at varying depths of the ocean, differences of specific gravity, and variations in the atmospheric pressure gradient.

The Currents of the Ocean are distinguished by the names Drift and Stream. A drift current is merely the effect of the wind on the surface of the water, as, for example, in the region of the Trade Winds, and is, therefore, shallow and slow, and usually runs in a direction to leeward. When a drift current comes in contact with some obstacle such as a shoal, or coast, or another current, it is deflected, and is then known as a stream current.

It should also be noted that the direction of a mass of moving water is not only affected by obstacles which it may approach, but, as in the case of the atmosphere, by the easterly or westerly movement which it acquires in consequence of the earth's rotation.

The earth as it rotates carries with it the ocean; the equatorial water is caried over a space of 25,000 miles in 24 hours, whereas the water in, say, latitude 60° is carried over only 12,500 miles in the same time. When, in the northern hemisphere, water flows from north to south, it passes from a place where the surface of the earth is moving slower, to where it is moving quicker; thus, as the water flows to the southward, it carries with it only the velocity adapted to the northern latitude, and so, in effect, it gets left behind by the earth. Since the earth rotates from west to east, a southerly current acquires a westward trend, and, conversely, when water flows northward it acquires an eastward trend. In the southern hemisphere, the conditions are of course exactly the reverse.

As is well known, the wind will set a film or skin of smooth water in motion in the same direction as the wind; but this surface skin friction cannot be accepted as an indication of the precise direction in which the resultant current will set.

In the open ocean it has been found by taking a large number of current observations, and correlating them with the wind experienced at the time, that, given deep water and a wind constant in force, the surface current developed is at an angle of about 45° to the right of the wind direction in the northern hemisphere, and to the left in the southern. This current has, by EKMAN and others, been attributed to the resultant effect of skin friction, in the same direction as the wind, and the flow due to the earth's rotation, which develops at right angles to the wind direction.

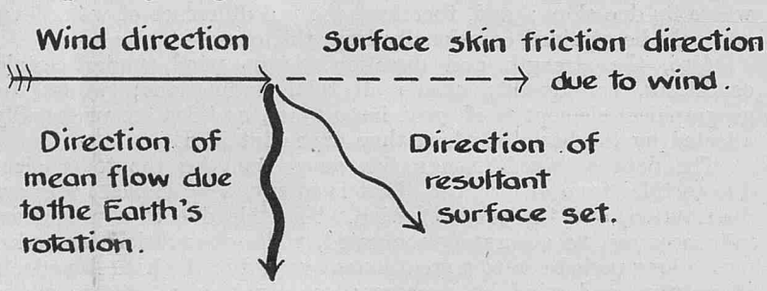


Figure 2.

From whatever source it may be derived, surface current is of primary importance to the seaman; and it is generally understood that surface current means the movement of the water at a depth of at least half the draught of an ordinary vessel; as the speed of the current at this depth represents its average effect.

The experience of navigators has proved that the anticipated set and drift of current is often influenced by winds prevailing, or which have prevailed at different parts of the ocean, especially so on coasts; and when out of the open ocean and near the shore, the level of the water is, under certain conditions, appreciably affected.

Some investigators dealing with the perturbations of sea-level on the continental coast of the North Sea, have found that the most effective winds for raising sea-level are those which blow towards their shores, and conclusions were formed that the effect is due to the local wind blowing the water towards the coast. It has, however, recently been found that the same winds which raise the sea-level on the continental coast, also raise the sea-level on the east coast of Britain, though blowing directly away from the land; so it is obvious that westerly winds raise the level of the whole of that sea in some degree or other.

This phenomenon is explained by FIGURES 3 and 4, which show the effects of wind blowing in different directions with reference to a shore.

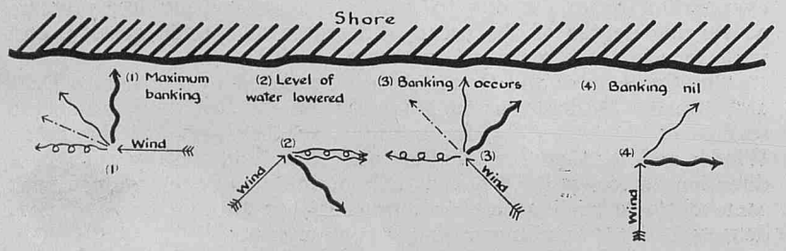
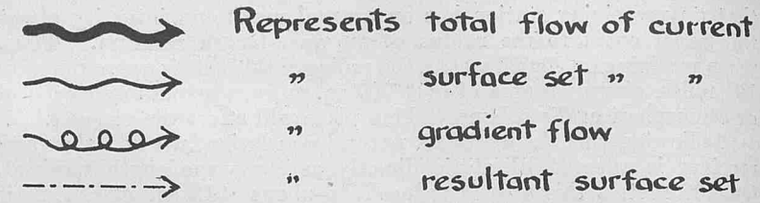


Figure 3.

Showing four different directions of wind blowing on, also parallel to, the shore.



Explanation of Figures 3 and 4.

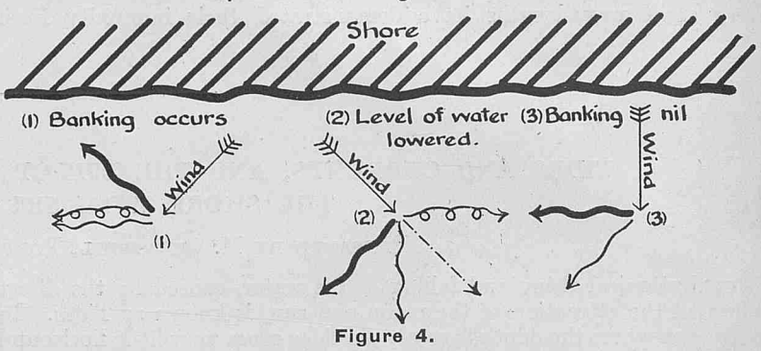


Figure 4.

Showing three different cases of wind blowing off shore.

It can be easily understood that when the level of the water is increased and banking occurs, that a water gradient is formed, decreasing from the shore; and by considering only that part of the body which is subject to wind frictional influences, we see in FIGURE 5 the effect of the water gradient due to banking.

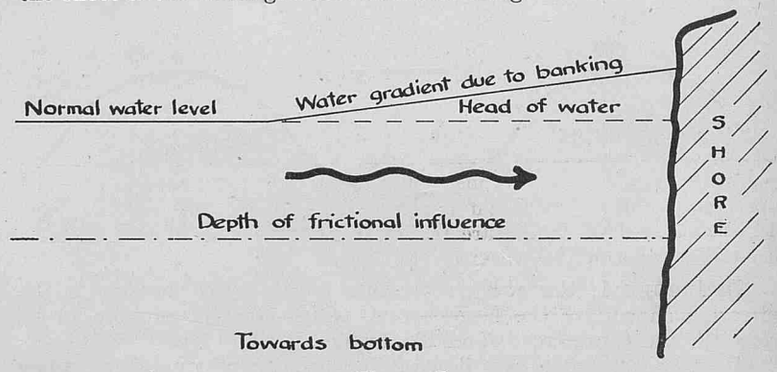


Figure 5.

Showing how cases (1) and (3) in Figure 3, and (1) in Figure 4, result in a flow of water towards the shore, and a flow along the shore, due to the water gradient effect.

It is evident that, so far as the effect of current upon a vessel near the shore is concerned, the effect experienced is made up of (1) a flow along the shore due to the water gradient, and (2) the surface drift due to the wind, which as before-mentioned, takes place at an angle of about 45° to the wind direction (right or left, according to hemisphere). The resultant current actually experienced in almost all cases, sets at a smaller angle than 45° to the wind direction, and is greater in velocity than a current produced in the open ocean.

In an endeavour to arrive at some practical verification of the foregoing remarks upon tides and currents, an investigation was recently carried out, in which a comparison was made between predicted and actual high water at the Irish Sea ports of Belfast, Holyhead and Fleetwood. Local wind and pressure conditions, also wind and pressure in 10° West Longitude (as to some extent representing Atlantic conditions) were correlated with the excess or deficiency noted between the difference of predicted and actual high water, throughout the whole of the year 1921.

The tide gauge readings were obtained by courtesy of the respective Harbour Authorities, the predicted heights of high water from the Admiralty Tide Tables, and the wind and pressure details from Meteorologial Office records. Tabulations were made whereby it was possible to compare the conditions and effects at all three ports, and in 10° west longitude, for each high water throughout the year.

Date 1921 Jan.	HOLYHEAD					FLEETWOOD					BELFAST					10° WEST LONGITUDE			
	HIGH WATER		Excess or Cut	Wind and Force	Bar.	HIGH WATER		Excess or Cut	Wind and Force	Bar.	HIGH WATER		Excess or Cut	Wind and Force	Bar.	VALENCIA		BLACKSOD	
	Predicted	Actual				Predicted	Actual				Predicted	Actual				Wind and Force	Bar.	Wind and Force	Bar.
	ft. ins.	ft. ins.	ft. ins.		mb.	ft. ins.	ft. ins.	ft. ins.		mb.	ft. ins.	ft. ins.	ft. ins.		mb.		mb.		mb.
1 AM	13 10	14 6	0 8	SW 4	1007	23 6	23 11	0 5	SSE 3	—	10 3	10 10	0 7	WSW 1	1005	S 4	1005	SW 4	980
1 PM	13 4	14 10	1 6	SSW 4	1008	23 11	24 2	0 3	S/E 3	—	11 1	11 10	0 9	SW 1	1007	S 2	1004	SW 2	1003

Table I.—Specimen of one day's observations from data book. NOTE.—For clearness in actual data book, " cuts " (deficiencies) were shown in red ink.

The separation of the meteorological disturbances of sea-level from the ordinary tidal oscillations is a difficult matter, but a lengthy comparison of actual and predicted high water in conjunction with wind direction and force, should provide a fairly close approximation to the meteorological influences; and observations extending over the whole of one year should give results of reasonable accuracy for our present purpose.

Predicted height includes allowance for seasonal meteorological influences, meaned over long periods, thus the excess above or deficiency below predicted high water may, for practical purposes, be considered as due to the effect of wind influence, provided the barometer reading is near normal.

Purely local wind is frequently an uncertain variable, and often does not adequately represent the wind over even a moderate area, so it would seem an important point to endeavour to settle, if possible, whether local wind effect is at all predominant in the Irish Sea, and if so, which are the most effective wind directions for raising and lowering the water-level.

Before proceeding further, it is as well to briefly describe the tidal circulation of the Irish Sea. The primary cause of the tides lies, of course, in the varying forces of gravitational attraction due to the moon and sun; but it is in the basin of the Atlantic Ocean that these forces really generate the tides, for as acting on the waters of the Irish Sea, they are practically negligible, the fact being that these tides are maintained by those of the Atlantic. If the Irish Sea were entirely landlocked, it is considered that its tides would be almost imperceptible.

The main tidal undulation from the Atlantic approaches the British Isles from the southwestward. In the open ocean it does not appear to exceed five feet in height from trough to summit, but on reaching the bank of soundings which forms the base on which the British Islands stand, its height increases, and still further augments as it reaches the coasts, so that in some parts it is as much as 25 feet from trough to crest of the undulation.

This undulation or tide wave 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 tide wave which flows up through St. George's Channel has the peculiarity of being higher at its south-eastern part than elsewhere. Its height varies from 9 to 12 feet on the Irish coast, and from 16 to 27 feet on the English side.

From the chartlet (FIGURE 6) it can be seen that the triangular disposition of the ports chosen 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, under the combined influence of both tide waves, as it is near the line known as the " Head of Tide."

Now, if the Irish Sea were entirely landlocked, it is evident that if, for example, an excess of water over prediction was noted at one or perhaps two of the ports used, a deficiency would be bound to occur at the other; 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 examination of the tabulated data indicates 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, and Table 2, which is a correlation table, giving the statistics for Belfast and Fleetwood, shows clearly the relationship between prediction and actuality at the two ports, in a manner we can leave the reader to examine for himself.

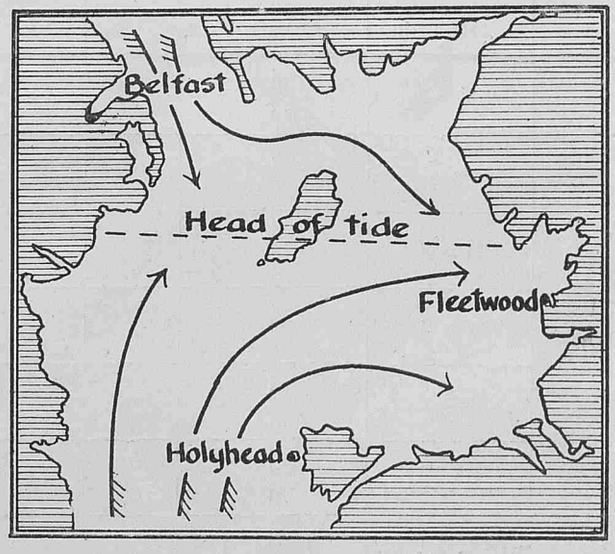


Figure 6.
Chartlet showing the direction of the principal flood lines of the tidal streams in the Irish Sea.

Broadly speaking, the results obtained for wind influence may be summarised by saying that all three ports usually show an excess over prediction with Atlantic and local wind from between west and south-east by way of south, and a deficiency with wind from between north-west and east by way of north. Numerous examples show the effect of local wind as might be expected from FIGURES 3 and 4, but it is evident that the predominating influence in raising or lowering the level of high water is the southerly or northerly wind operating over the Atlantic off the Irish coast.

Cases are noted in which the wind influence does not produce its expected effect, and it can then 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.

In making this comparison of predictions and actualities, one cannot help but be impressed with the really surprising accuracy of the predictions, thus showing the very high standard to which

			FLEETWOOD												TOTAL
			EXCESS OVER PREDICTIONS						DEFICIENCY UNDER PREDICTIONS						
			1′ 11″ to 1′ 8″ & Over	1′ 7″ to 1′ 4″	1′ 3″ to 1′ 0″	0′ 11″ to 0′ 8″	0′ 7″ to 0′ 4″	0′ 3″ to Nil	Nil to 0′ 3″	0′ 4″ to 0′ 7″	0′ 8″ to 0′ 11″	1′ 0″ to 1′ 3″	1′ 4″ to 1′ 7″	1′ 8″ to 1′ 11″ & Under	
BELFAST	EXCESS OVER PREDICTIONS	1′ 8″ to 1′ 11″ and Over	1												1
		1′ 4″ to 1′ 7″	2	3	1	1									7
		1′ 0″ to 1′ 3″	3	1	1	5					1				11
		0′ 8″ to 0′ 11″	5	5	13	9	12	6	1	1			1		53
		0′ 4″ to 0′ 7″	4	2	12	13	20	19	11		1	1			83
		Nil to 0′ 3″	3	4	6	17	38	41	5	7	5				126
	DEFICIENCY UNDER PREDICTIONS	0′ 3″ to Nil			2	11	22	22	48	17	11	5	1		139
		0′ 7″ to 0′ 4″			3	6	18	22	46	26	21	7		1	150
		0′ 11″ to 0′ 8″					1	8	8	19	13	5	1		55
		1′ 3″ to 1′ 0″					1	3	2	5	6	4	2		23
		1′ 7″ to 1′ 4″							1	1	2	3	2		9
		1′ 8″ to 1′ 11″ and Under												1	1
		TOTAL - - -	18	15	38	62	112	121	122	76	60	25	7	2	658

Table 2.

Correlation table giving the statistics for Belfast and Fleetwood. Each square represents three inches of excess or deficiency of predicted height of high water, and the figures in the squares indicate the numbers of simultaneous observations at the two ports during the year 1921. The fact that the greatest frequency numbers occur about the diagonal from top left hand to lower right hand corner, shows clearly that there is close relationship between conditions at the two ports.

tidal work has risen in recent years; and it is unfortunate that it does not seem possible to formulate any certain system of allowance for wind and atmospheric pressure influence; although there are of course at each important harbour, rules of probability, the application of which will usually lead to improvement in the tidal prediction. Such rules, however, cannot be regarded as infallible, as not infrequently augmented error may result.

In tidal waters, the currents developed by wind influence will necessarily always be, to a certain extent, masked by the regular tidal currents, and their effects will either serve to augment or reduce the normal velocity, and cause the flow to follow the direction of the resultant of the two forces.

From the results quoted, no precise rules or indications of practical utility can be given to seamen, but it can perhaps the more clearly be seen how essential it is, when shaping a ccurse, to take into consideration the present and lately prevailing winds, in order to make allowance for the probable influence of any unusual current which may have developed.

Some use, however, may be made of the results obtained, for the benefit of seamen, as the following experiences serve to illustrate. Homeward bound Atlantic liners have frequently found themselves, when steering from the Tuskar Rock, northward, under the South Stack. The explanation being either one, or a combination of, the following causes: An unexpected set due to wind influence; or retained magnetism due to vibration in heavy weather after steering easterly courses for several days, a strong red pole being developed on the port side, which repels the north seeking end of the compass needle, and as a consequence, the vessel would be steered to the eastward of the course intended.

In the modern liner where the gyro compass is used, the possible cause due to retained magnetism does not exist, but as it is understood cases still occur where the easterly set is experienced, it follows that unsuspected current must be the predominating influence. It can thus be seen that a helpful indication of unusual current might be obtained by noting from the "Weather Shipping" Bulletin the direction of the wind at, for example, Valencia and Holyhead, from the recent reports, previous to proceeding up the Irish Sea. If the wind direction happens to be from between south and west, a current might be expected setting to the eastward, though until more is known it would be unwise to advocate allowance being made in shaping course.

The foregoing only intends to show how this knowledge might be made use of, and an account of any practical confirmatory cases would be most welcome.

NORTHERN AND SOUTHERN LIGHTS.

Prepared in the Marine Division by J. L. Thomas, Clerical Assistant.

These lights are the luminous phenomena seen in the sky at night, more especially in high latitudes. When they occur in the Northern Hemisphere, they are termed Aurora Borealis, or Northern Lights, and their appearance in the Southern Hemisphere is termed Aurora Australis, or Southern Lights. They are exceedingly varied in appearance and brightness.

Though there is no universally accepted classification of these lights, the following are the generally recognised types.

Diffuse Aurora.—Faint lights without well-defined form.

The extent of this light is very variable; sometimes it is very small and sometimes it covers a large portion of the sky. Often it is scarcely distinguishable from the "Milky Way"; at other times it just feebly illuminates the horizon. It is probable that under this form it frequently passes unnoticed, because it may be masked by a stronger light, as that of the moon. When it is more intense, it appears on the horizon as the glare of a distant fire.

Auroral Patches.—Lights frequently in the form of clouds.

Aurora of this type resembles streaks of smoke, or, more often, cirrus clouds. The resemblance between this type of aurora and cirrus clouds is so great that they are often mistaken for each other. To add to the confusion the two frequently appear together. Observers have also noted that what has been observed as cirrus before sunset, or at early twilight, has been seen as a patch of aurora at night, and that what has been seen as an auroral patch in the early morning, has been observed as cirrus after dawn. It would be well, therefore, to note the cloud forms at times of aurora and any observations likely to throw light on the alleged connection between aurora and cirrus.

Auroral patches are sometimes subject to curious variations. The light shines brilliantly for a moment while contracting in area, and then resumes its more diffuse and less brilliant appearance, very similar to the beam of a searchlight when thrown across the sky.

Bands and Ribbons.—These may be homogeneous or may be composed of rays. They have a variety of shapes. Many of them resemble broken portions of an arc, and they are nearly straight and regular in outline, whilst others take extraordinary twisting shapes. Generally, the length of a band tends to be perpendicular to the magnetic meridian, but the numerous shapes which they assume makes it difficult to give a definite position.

Arcs.—Aurora may be present simply as a circular arc of uniform light whose ends extend right down to the horizon. Sometimes instead of a single arc, two, or even more, arcs can be observed which are concentric. Arcs are often elliptical and several arcs of various shapes may appear at the same time. Instead of being homogeneous, the arcs may sometimes be composed of rays, and it is not uncommon for these arcs to be subject to rapid movements and changes. Generally, the summit of regular arcs is near the observer's magnetic meridian, but this is not always the case, especially in high latitudes.

An appearance which accompanies many auroras of this type is called the "dark segment." This is the portion of the sky below the lower border of the arc which appears to be of a darker shade than the rest of the sky. It is a disputed point whether this "dark segment," through which stars have been seen, represents a real atmospheric condition, or is merely a contrast effect.

The height of the arc is usually taken from the lower border because it is better defined.

Rays.—Besides forming arcs and bands, rays may appear alone. Often they extend from the upper border of an arc towards the zenith. The characteristic of auroral rays is their great rapidity of movement and variability. The up and down movement of these rays towards the zenith and the horizon, gives the appearance of darting or dancing. This appearance is known as "Marionettes" in Canada, and as "Merry Dancers" in the Shetland Isles.

At times, auroral rays may group round a common centre and thus resemble a large fan. At other times there may be several independent fan-shaped rays.

Corona.—When auroral rays converge upon a point, generally the magnetic zenith, a corona is formed. The centre of the corona is more or less dark. Outside the centre the light is bright and may be nearly homogeneous, or may be composed of rays. Further away, the light usually takes the form of rays. Frequently the rays which

Figure 1.
Double Auroral Arc, Vertical Rays in Upper Arc, August 29th, 1902, 2 a.m. (British Antarctic Expedition, 1901-4).
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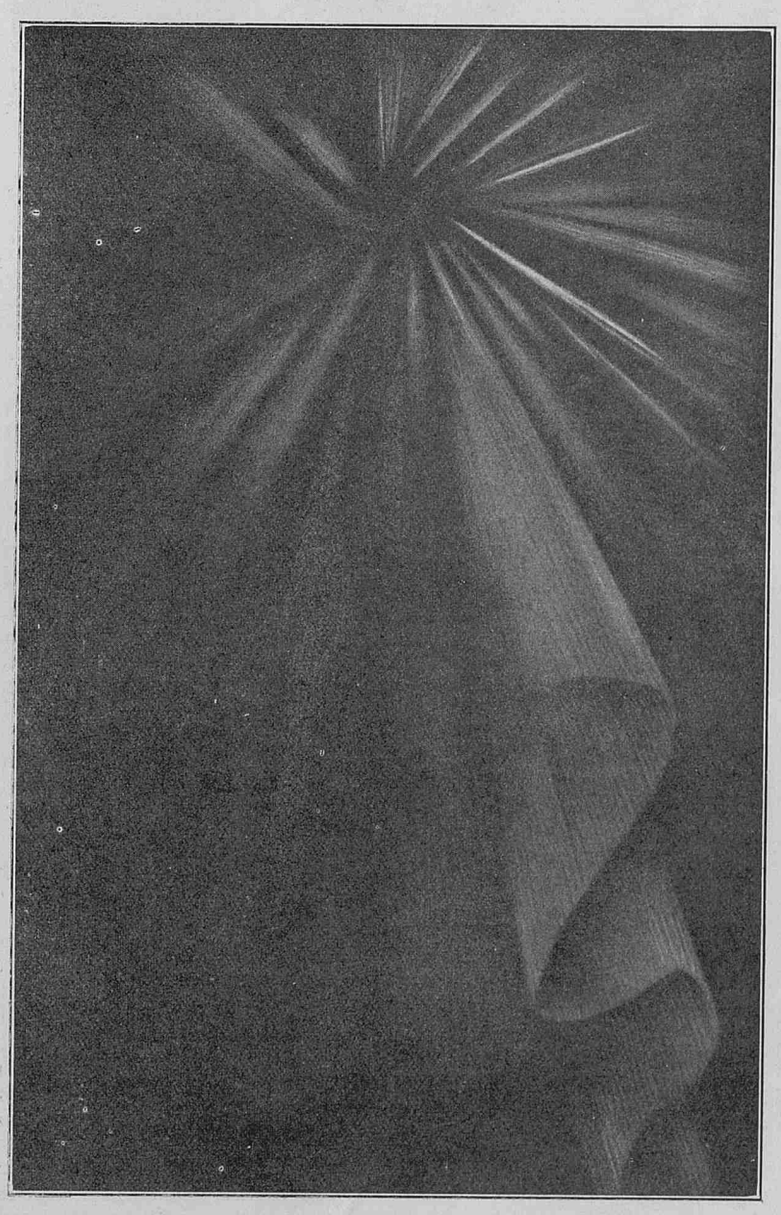


Figure 2.
Corona, April 8th, 1903, 2 a.m. (British Antarctic Expedition, 1901-4).
Reproduced by permission of the Royal Society.

compose the corona have rapid movements and a great brilliance, and in place of their usual yellowish-white colour, they become red or green.

Auroral Draperies and Curtains.—Of all auroras, the draperies are the most complicated and, perhaps, the most beautiful. The rays give the appearance of wide bands of waving drapery, resembling the folds of a flag fluttering in the wind. This type of aurora has infinite variations and often several draperies may appear at the same time, though they are rarely seen except in high latitudes.

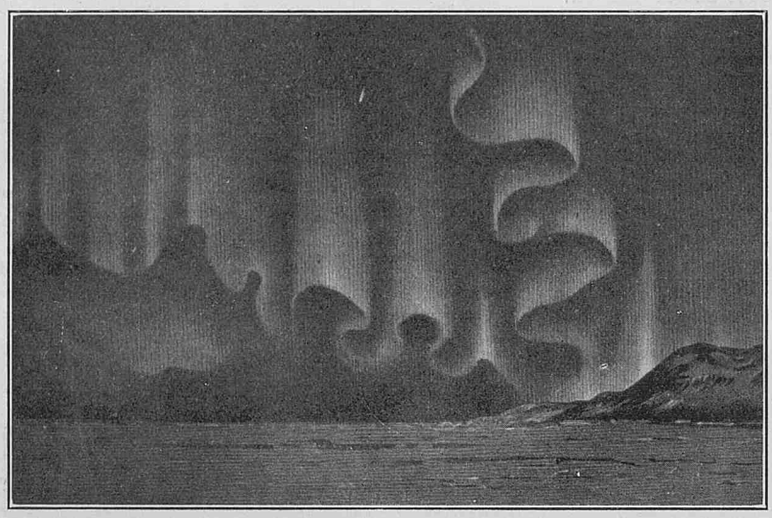


Figure 3.
Auroral Curtain, July 5th, 1902, 1 a.m. to 2 a.m., seen in N. (British Antarctic Expedition, 1901-4).
Reproduced by permission of the Royal Society.

All auroras in the shape of draperies are generally much better defined along their lower edge, whilst the brightness of the upper portion diminishes gradually and finally merges into the sky. They are often beautifully coloured. At the lower edge the rays are rose carmine, sometimes, but rarely, tinged with violet. The greater part is still of yellowish-white, but this colour may be absent. Above this the light is not so bright and has a green tint, and more rarely, a bluish tint. If we add to these colours the waving effect of the draperies, we can form an idea of the splendour of aurora.

Colour of Aurora.—Generally the colour is white more or less tinted with yellow. The colour next in order of frequent appearance is carmine red. Some auroras with more or less distinct borders and isolated rays are entirely of this colour.

The auroras with the richest colours are those composed of rays with rapid movements, such as rayed arcs, coronas, and draperies. In these cases the rays may present a red colour at the foot and a green at the top with yellow intervening. If the rays move downward, the colours become intensified to great brilliance, but, when the rays are moving upward, the colours become fainter. In very rapid moving auroras, the intermediate yellow tint may disappear entirely and only the red and green remain. This happens frequently in coronas, whose centre is then green and the surrounding portion red.

Although isolated rays are frequently entirely red, it is rare to see rays which are exclusively green. Some observers have noted that in certain aurora, the green colour may be replaced by blue, or even more rarely, violet.

Intensity of Auroral Light.—The intensity of the light is ordinarily very faint, even in the most brilliant aurora. Observers in the regions where the aurora is generally brightest, have agreed that the total illumination of the most beautiful aurora is less than that of the full moon, and even seldom surpasses that of the moon in its first quarter. An indirect proof of this fact can be traced in the comparison of the periods of appearance of aurora with the age of the moon at the times of observation. The frequency of aurora diminishes always with the period of full moon, which shows that the general lighting of the sky by the full moon masks a great number of auroras and hinders their observation. This influence of the age of the moon on the apparent frequency of aurora had been noted by the French scientist Mairan. He observed at least three times more auroras visible in the period between the beginning of the last quarter and the end of the first quarter, than in the period between the beginning of the first quarter and the end of the last quarter. Auroras during full moon are exceptional.

Another proof of the small intensity of aurora is the ease with which they allow the light of the stars to pass without notably dimming it. The stars of the first, or even second, magnitude can be seen through the most brilliant aurora. When the aurora is faint, stars of the fourth and fifth magnitude can be seen.

Sounds accompanying Aurora.—It is believed in certain countries, more especially in the Orkneys, Finland, and the district around Hudson Bay, that aurora is accompanied by a sound similar to the rustling of silk, or to the crackling produced when electricity is discharging from points.

A great number of reliable observers state that they have heard this noise very clearly during very intense auroras. On the contrary, equally reliable observers have heard no such noise, even under very favourable conditions when sea and air were calm.

To avoid confusion with other sounds, many considerations have to be taken into account, such as noises produced by wind or water, and, in polar regions, the cracking of ice. In addition, the personal element must be taken into account, because persons differ in their susceptibility to sound, and, moreover, imagination may play a part in drawing a wrong conclusion.

Whilst the majority of claims of having heard a particular sound come from the Arctic regions, it is interesting to note similar claims from the Antarctic. During the British Antarctic Expedition (1910–1913), one of the seamen reported that a rustling sound accompanied an aurora, and Priestly, who directed the scientific work of the Northern Party, heard a sound which he firmly believed was associated with an aurora.

If the lowest height of aurora is about 50 statute miles (*see* below), it is quite permissible to assume that the observations made by those observers, who claim to have heard the sound, have been faulty. For if sound waves originate at the seat of auroral displays, they seem hardly likely to be heard on the Earth, unless the aurora comes much lower and great stillness is present at the time of observation. Dr. C. Chree also points out the possibility that aurora occasionally occurs simultaneously with the form of electrical discharge known as St. Elmo's Fire.

Height of Aurora.—The old method of finding the height of aurora was by measuring the angle of a certain point on the aurora at the same time from two distant stations. In practice the obstacles against exact measurements were the rapid movements and changes of many auroras, and the failure to fix upon a common point to measure. Even when telephones were employed for rapid communication between the two stations, it was found that the aurora appeared differently at the separate stations.

To overcome the difficulty of fixing upon the same point on the aurora, in Norway, Professor Störmer has made many measurements of the height by means of photographs. These are taken simultaneously from two stations distant from each other from 9 to 15 statute miles, and sometimes more than 150 statute miles, and the height calculated therefrom.

Other Norwegian observers have followed this method and a great number of height measurements have been made. Generally the lower border of an aurora has been taken because it is more distinct. The height of the lowest border has been estimated at from 56 statute miles to 75 statute miles, and the most common heights are from 62 statute miles to 69 statute miles. The height of the upper border is more difficult to calculate, because this border often fades into the sky, and, for this reason, more variable results have been obtained Sometimes the heights exceed 125 statute miles, and Professor Störmer, during a bright aurora on March 22nd—23rd, 1920, measured heights exceeding 375 statute miles.

Several observers have claimed that they have seen aurora at much lower heights, and some say that aurora has appeared between them and distant mountains. The reported cases during Captain Scott's last Antarctic Expedition have been dismissed by Dr. G. C. Simpson as optical illusions. The results of the Norwegians also throw doubt on these claims.

Frequency of Aurora.—To show the geographical distribution of aurora, H. Fritz devised a scheme of lines representing auroral frequency in the Northern Hemisphere, and this scheme is still considered as authoritative. The distribution is reproduced below.

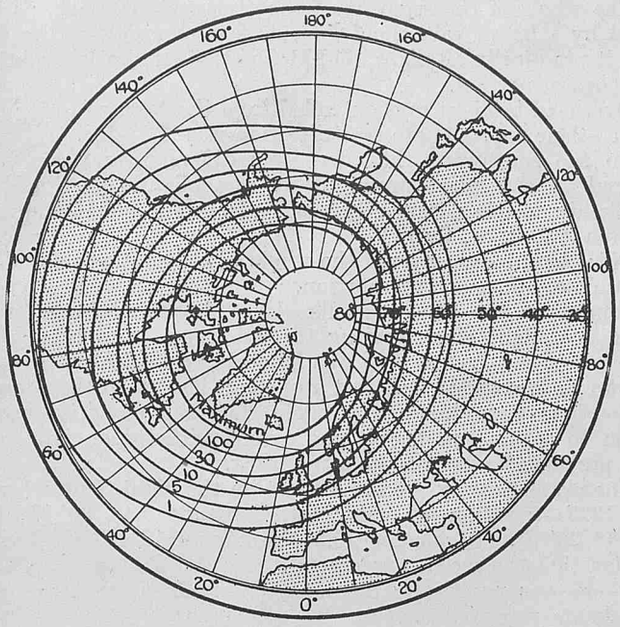


Figure 4.

Showing yearly frequency of Aurora Borealis.

It will be noticed that the curves of frequency are centred about Latitude 81° N., Longitude 70° W., which is termed the Auroral Pole. Aurora is rare in low latitudes, and the frequency increases northwards until a latitude is reached where there is a maximum frequency. The curve of maximum frequency does not strictly follow the line of latitude, but varies with the meridian. Roughly, it passes through Nova Zembla, north-east Siberia, Alaska, Hudson Bay, South of Greenland, and between the Shetlands and Iceland. North of this curve the frequency diminishes.

South of the curve of maximum frequency, aurora is generally visible to the north. In a zone to the north of this curve, aurora may be observed either to the north or to the south. Further north, in Polar regions, they are usually observed to the south.-

The number of observations for the Southern Hemisphere is insufficient for a similar plan of distribution to be drawn, but even in the Arctic there are large areas about which little is known.

The sun has to be a considerable distance below the horizon before an ordinary aurora can be seen. For this reason, it is difficult to know at what hour the conditions are favourable for an aurora to be visible after sunset. Faint aurora is liable to escape observation in moonlight or when the sky is overcast. Careful observations have shown that aurora seems to be most developed from one to three hours before midnight. But in the Antarctic it is believed to develop most in the early morning.

In very high latitudes the length of the day is very varied during the year and no aurora can be seen near mid-summer. Aurora is rare in latitudes much under 40°, and does not appear near the equator where the length of the day is fairly constant. In northern Europe and North America between latitudes 40° and 60° N. aurora has a maximum frequency at each equinox, but as latitude increases, the two maxima tend to disappear, as in northern Scandinavia, and one maximum appears, mid-winter.

It is difficult to compare aurora for different years owing to the lack of regular observations. But aurora seems to be more frequent in some years than in others. It is widely believed that auroral frequency seems to have a connection with sun-spot periods. In temperate latitudes, aurora tends to be more frequent in years of many sun-spots than in years of few sun-spots. But in some regions, especially in Greenland and the Arctic, the connection seems to be different from that noted elsewhere.

In this connection it may be remarked that 1926 and the two following years provide the maximum for the present sun-spot period, and displays of aurora should, therefore, be frequent.

Relation to Magnetic Storms.—In temperate latitudes there is an intimate connection between aurora and magnetic storms. A bright aurora visible over a large part of Europe seems always accompanied by a magnetic storm, and the largest magnetic storms and the most conspicuous auroral displays have occurred simultaneously. On the other hand, magnetic storms may take place independently of aurora. The compass is displaced in these circumstances and the deflection of the needle increases northwards, or on approaching the magnetic pole. On shore, telegraph wires are traversed by large currents which interfere with the despatch of messages. Possibly, aurora may have an influence on wireless.

Though in temperate latitudes aurora is nearly always accompanied by a disturbed state of the compass needle, in high latitudes, where both phenomena are most numerous, the connection is not so uniform. In high latitudes, magnetic storms tend to accompany only brilliant and rapid moving auroras.

The following phenomenon was seen by Lieutenant VEDEL at Scoresby Sound (east of Greenland) at least twenty times. An auroral curtain travelı ng with considerable velocity would approach from the south, pass right overhead, and retire to the north. As the curtain approached, the compass needle deviated to west, oscillated as the curtain passed the zenith, and then deviated to east. The behaviour of the needle is strongly suggestive of the passage of electric currents in a vertical direction from the earth to the space occupied by the drapery.

Cause.—Aurora is now universally believed to be caused by electric currents in the Earth's atmosphere, but opinions differ as to the cause of these currents. The view put forward by Professor BIRKELAND is that aurora is caused by cathode rays coming from the sun, probably from sun-spot areas. These rays are made up of carriers of negative electricity which travel with a velocity usually considerably less than that of light. Professor BIRKELAND has artificially produced phenomena exceedingly suggestive of actual aurora.

Dr. C. CHREE says, "It is well to bear in mind the possibility that there are still unknown secrets of Nature, the discovery of which precede the satisfactory explanation of aurora."

Reports on Aurora.

The following is an account taken from Captain SCOTT's "Voyage of the *Discovery*":—

"On the whole, the displays of Aurora Australis have been disappointing. In general, the light is so faint that stars of even a small magnitude can be seen distinctly through it. Lately, it has commenced about three, by a bright but low curtain to the E.N.E., where, unfortunately, the hills partly hide the view, but later, it seems to spread up and towards S., so that usually in the evening there are shafts and patches of light about in full view of the ship, with sometimes a well-formed corona to the south.

"There is something very weird and awe-inspiring in a phenomenon so fleeting, so intangible, and so difficult to describe. The light grows and wanes, but one cannot mark the moment of its coming or its going. It distinctly moves, but one cannot say how; sometimes it appears to roll forward or to the side, sometimes it seems to spread itself as though anxious for greater space. For no two instants is it the same, and yet the change is so subtle that one cannot grasp it until some new development has robbed one of the picture.

"As I arrived on the hill summit to-day, the sky was clear and dark, but as I walked forward a narrow arched band of light appeared across the east; it seemed to rise, to halt. Little fibrous shafts spread out above and below; a moment more, and the fibres became luminous cloud masses rolling towards the south; in the next they had ceased to move; the light was spreading and wandering, was gone. Then shafts of light flashed up like mighty search-light beams cast to the zenith; but before I could well note them, they were bent in fantastic convulsions, some curling to spiral columns. In a few moments all this had come and gone, and the broad clean arch of a corona seemed to be rushing towards me from the south. As it rose, a second arch flashed up beneath, then, as though some giant hand had swept across the skies, the whole scene was changed, and only some vague luminous patches remained. It appears to me that the sharpest contrasts are formed by the vertical shafts, or at the lower edge of the arches where the light is brightest, and is clearly outlined against the vaulted blue of the sky; elsewhere the light merges indefinitely into shade."

The following are observations recorded by Marine Observers since post-war re-organisation which have not been already

published :—

S.S. *Elpenor*, Captain W. K. Wallace. Observer, Mr. F. E. Holmes, Chief Officer.

"April 22nd, 1921, at 4.40 a.m. (Chinese Standard Time, 8 hrs. fast of G.M.T.).

"Latitude 27° 50′ N., Longitude 121° 45′ E.

"Arch Altitude 4°. Bearing 320°.

"All streamers moving from W.S.W. to E.N.E.—all streamers settled and faded in N.E. quarter. Eastern streamer very white and brilliant. Extended from arch to 10° above southern horizon, then curved down, forming an arch. Remainder of streamers rather faint—110° to 120° in length, extending to southward and all were white in colour and moved rapidly. In between streamers very fine rippled cirrus. No stars observed under base of streamers. Compass needle remained steady. Total period of display three minutes."

S.S. *Port Stephens*, Captain W. G. Higgs.

"March 14th, 1922. 0.50 a.m. Latitude 44° 41′ S., Longitude 97° 11′ E. (approx.).

"Observed Aurora radiating from point on horizon bearing 165°. Shafts of white light ascending towards Zenith (width ¼° to 1°), reaching altitude 15°.

"As many as 4 shafts appearing together, but generally in single beams, lasting 1 to 2 minutes. The full moon was near the meridian, so the Aurora lost much of its brilliance. Had the night been dark, an exceedingly imposing display would have been visible.

"March 14th, 1922. 9.40 p.m., Latitude 44° 41′ S., Longitude 102° 31′ E. (approx.).

"Observed Aurora in form of two arcs (concentric) one inside the other, altitudes of vertices being respectively 15° and 8°. Centre of arc bore 175°. This was visible for about two minutes, Aurora afterwards taking form of numerous rays of white light, width 1° reaching to 40° Altitude."

S.S. *Port Sydney*, Captain W. H. Lea.

"July 3rd, 1922. 8.15 p.m. Latitude 24° 53′ S., Longitude 9° 55′ E. (approx.).

"Aurora visible in the form of a pale diffused light from S.E. to S.S.W. Cloud proportion 4, with occasional showers of hail. Intensity of light was about equal to that which appears in the eastern horizon about 10 minutes before rising of a full moon. At 9.15 p.m. vertical rays were visible to an altitude of 10° and as brilliant as the beam of a searchlight. 9.30 p.m., rays ceased, but the light continued till 11.0 p.m., when the sky became clouded and the light was obscured. The brightest point of the Aurora bore S.E. by S. throughout the display."

S.S. *Astronomer*, Captain C. S. Rhodes.

"May 14th, 1921. 9 p.m. to 11 p.m. Latitude 37° 31′ N., Longitude 51° 43′ W.

"Display of Aurora consisting of three arches, centre one, altitude 18° to 20°, arches on either side of centre 8° to 10°, originating in N. true, and gradually expanding and waning as far as W.N.W. and E.N.E. Simultaneously sky brilliantly lighted, colour of streamers varying red and blue in zenith. No lateral movement observed, fresh beams occurring right to left in West and reverse to E. of N. Heavy bank of Cu-Nb right across N. horizon, gradually rising. Horizon clearly observed underneath free of Auroral lights, beams appearing from uppermost side of clouds only. Noticeable disturbance of Stand and Steer compass, taking the form of unsteadiness and sluggish swing up to 5°, principally to eastward. This disturbance continued to 8 a.m. on 17th, diminishing throughout."

S.S. *Marloch*. Observer, Mr. J. B. Hewson, 5th Officer.

"On the night of September 13th–14th, 1925, the effect of the Aurora was striking. Position at midnight, Latitude 52° 40′ N., Longitude 52° 40′ W. Barometer 29·80, steady. Wind N.W.4.

"In the northern sky a brilliant rayed arc was observed, extending from 285° to 355° true, the apex of which was approximately 320° true, or about N. (magnetic).

"From this arc rays of yellow light of extraordinary brilliancy shot up to the zenith, and then died down to steady rays, the altitudes of which were 45°–60°.

"These rays continued for about two hours, and then disappeared, and the arc changed from a yellow to a greenish-yellow light, which vanished on the approach of dawn.

"The ends of this arc did not touch the horizon, but remained at a more or less fixed altitude of 4°.

"The apex of the arc varied from 12°–15° above the horizon.

"The whole of the segment of the arc was very dark, as though covered by a heavy rain cloud, but stars were visible in the western half of it practically all night, and at times, stars of a lesser brilliancy in the eastern portion.

"Overhead brilliant rays extended from the western to the eastern horizon—their approximate true direction was 255°–75°.

"To the southward the effect was different, and can best be compared to the effect produced by searchlights on clouds—stars were plainly visible through these clouds. (The cloud amount this night was 2 to 3, St. Cu.)

"This cloud effect covered the whole of the southern sky down to an altitude of 10° above the horizon.

"Sometimes the effect was like large detached clouds of steam with coils of light green waving through them—and they *appeared* to be very near. As the ship was labouring considerably in a heavy swell, it was impossible to detect any slight change in the compass.

"Bearings were frequently taken, but the deviation remained constant to within one degree, and agreed with the deviations found on the previous voyage on the same track.

"There was exactly the same effect on the night September 14th–15th, 1925—(position at midnight, Latitude 54° 20′ N., Longitude 44° 20′ W. Barometer 29.57, falling, wind N.W.6), with the exception that the arc was not rayed.

"There was practically no moon (New Moon on 18th), and no upper clouds were visible.

"On the night September 15th–16th, 1925—position at midnight, Latitude 55° 30′ N., Longitude 34° 50′ W. Barometer 29·35, falling slowly, wind W.6), nothing was observed, except a faint arc, which lasted for about two hours and gradually vanished, leaving the northern sky—above where it had been, very light—but the sky below where it had been remained gloomy and the horizon ill-defined.

The cloud amount this night, however, was 5 to 8 St. Cu : Cu-Nb."

S.S. *Amarna*, Captain C. R. Stewart. Observer, Mr. A. D. Henderson, 3rd Officer.

"At noon on February 17th, 1926, the following conditions prevailed : clear blue sky, visibility 10, wind northerly 3, barometer 30·25 inches, dry bulb 62°, hygrometer, wet bulb 56°, sea temperature 60°.

"During the 8 to 12 watch the atmosphere was extraordinarily clear, stars being visible practically to the horizon.

"At approximately 11.45 p.m. A.T.S., while steering a true north course, Latitude 40° 40′ N., Longitude 9° 45′ W., I observed a deep red glow suffuse the northern sky, over an arc of the horizon of four points of the compass from N.N.E. to N.N.W., being of arched formation and the zenith having an altitude of about five degrees. This light increased in intensity for some five minutes, and then started to die away. The time was about 2320 G.M.T.

Fishery Cruiser *Norna*, Captain J. W. Wright. Observer, Mr. T. Mather, 2nd Officer.

"Cruising between Tod Head and Montrose on February 11th, 1926, experienced heavy snow shower from 8 to 9.40 p.m., wind S.W. to W.S.W. 10.20 p.m. As snow cloud slowly passed to N.E., steady Aurora Borealis first appeared, increasing in power as snow cloud receded. This caused a perfect arch reflected directly overhead from the horizon in a N.W. by W. and S.E. by E. direction, finally disappearing at 10.40 p.m. Calm at the time, temperature 34°, barometer 29·89 inches, clear overhead.

"The curious part of this phenomenon was that, as the aurora gradually became brighter, from 10.25 p.m. to 10.38 p.m., when it finally disappeared, the whole reflected bow seemed to gradually topple over to an angle of 15° to 20° from the vertical to the southward. 11.15 p.m., wind came from N.W. by W., moderate, *i.e.*, the direction line of the reflected arc."

Observed from S.S. *Port Darwin*, Captain J. R. Sawbridge, bound from London to Melbourne, by Mr. E. T. N. Lawrey, 2nd Officer, assisted by Mr. C. A. Hodson, 3rd Officer, and Mr. J. L. Richardson, 5th Officer.

"March 4th, 1926. Ship's position at 1.00 a.m. A.T.S. (1821 G.M.T. March 3rd) :—

"Latitude 51° 00′ S. Longitude 102° 01′ E.

"Moon's Age 19 days, 1½ hours east of meridian, altitude, approx. 40°.

"Wind W.S.W. 6. Clouds Cu/Cu-nb, 4/10ths. No Cirrus visible.

"0.55 a.m. The southern part of sky became faintly illuminated by patches and streaks of auroral light.

"1.05 a.m. Patches and streaks formed an arc to the S.E. having an altitude of 25°. The eastern edge bore E.S.E., and the southern edge S.S.E. Both ends of arc extended down to the horizon. This formation persisted for two or three minutes, then dispersed within one minute. Shortly afterwards, the southern sky was again illuminated by rays and patches of light.

"1.13 a.m. A much larger arc formed—a sketch of which is appended. This arc was nearly a complete ellipse. Its altitude was 45°, the eastern edge bore S.E. by S., the western edge bore S.W., and the point where end of eastern part of arc touched horizon bore S. by E. This arc also persisted, without much change, for two or three minutes, then dispersed within one minute. In spite of the moon being visible, both arcs were very bright, the light being of a creamy-white colour. Stars could be seen through it.

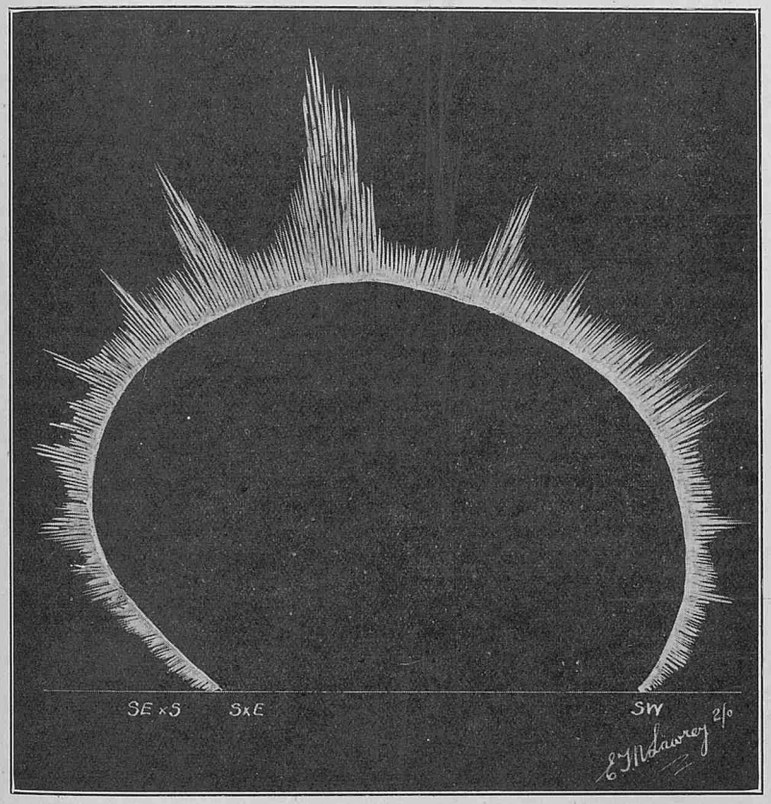


Figure 5.

Aurora Australis, 1.13 a.m., March 4th, 1926. Lat. 51° 00′ S., Long. 102° 01′ E.

"The arcs were formed by innumerable rays radiating from the centre, lengths of rays generally 3° to 5°, but in some cases much longer, those at the top extending nearly to the zenith. The process of formation of arcs may be described in the following manner :—

"The whole southern sky being illuminated by various rays and patches of light, imagine a very long invisible wire stretched across the sky in the shape of an ellipse. Then suppose a strong wind to commence blowing outwards from the centre, being first directed to the eastward, then gradually upwards to the top of ellipse, and then down to the westward, thus clearing the sky inside the ellipse of all the feathery patches and rays of light, which would catch on the imaginary wire and stream outwards from it, leaving as a result a comparatively dark portion of sky inside the ellipse—because denuded of auroral light—and a hard, clearly defined, inner edge.

"That is how the process appeared to us, the eastern part of arc forming first, then the arc gradually took shape towards the west.

"After the large arc had disappeared, various isolated rays and patches of light were visible for a quarter of an hour, then clouds obscured the southern sky. However, at 2.00 a.m., the southern edge of a Cumulus cloud was illuminated by a creamy light, so apparently the phenomenon was still in progress behind the clouds to the southward.

"At 3.00 a.m., the clouds having cleared somewhat, a faint light could be seen above some low-lying clouds on the southern horizon. That is the last we saw of the aurora on this date.

"The whole display was most imposing and a sight well worth seeing. Had the moon not been visible, we should have seen a much finer display.

"No disturbance of the compass needle was noticed as a result of this display of Aurora Australis.

"Note.—Bearings are True, but both bearings and altitudes are only approximate, being merely judged by eye.

"Throughout the night of March 5th–6th, 1926, we again witnessed a fine display of Aurora Australis. Ship's position by stellar observation at 0.37 a.m. A.T.S. (1705 G.M.T., March 5th) : Latitude 49° 07′ S., Longitude 116° 57′ E. Course and speed N. 74° E. true, 13 knots.

"**March 5th.** 6.30 p.m. The sun set. 7.45 p.m. Observed faint rays of light to the southward. 8.00 p.m. An arc formed from E. to W., passing through the zenith : this lasted a few minutes only, but afterwards, various rays and patches were visible all over the sky. 9.15 p.m. four big beams of light appeared to the southward, very bright and of a creamy colour. The beams quickly extended right across the sky, and those to the eastward then showed various colours; red predominating, but

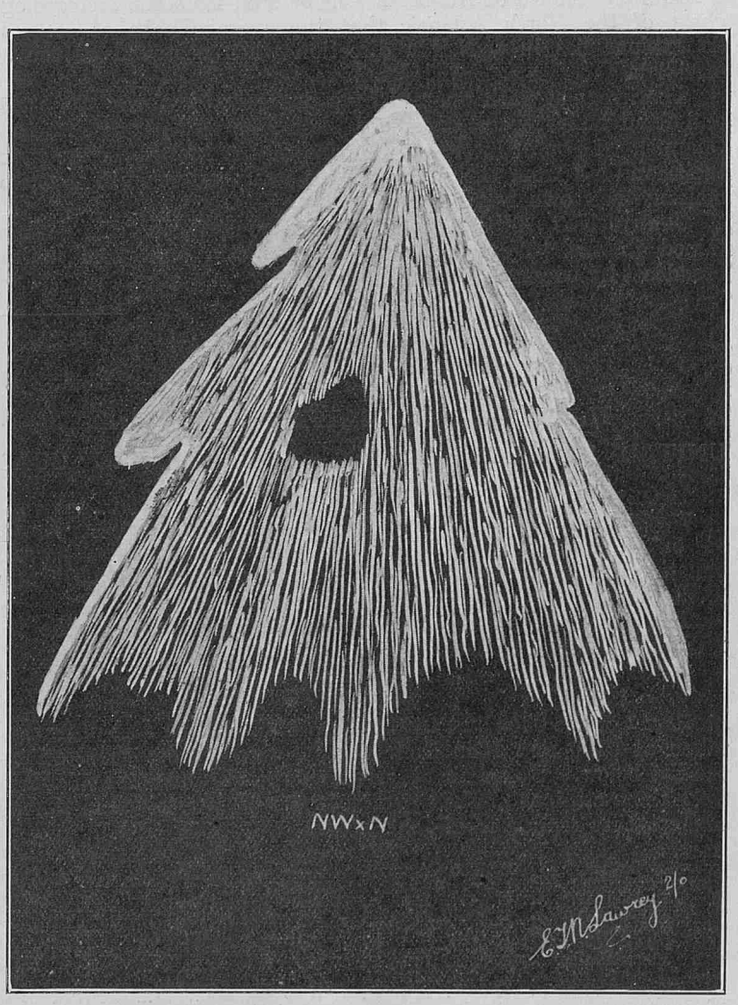


Figure 6.

Aurora Australis, 2.00 a.m., March 6th, 1926. Lat. 49° 03′ S., Long. 117° 17′ E.

violet was much in evidence at the higher altitudes.

"This bright colouring lasted 10 minutes, then the beams gradually lost shape.

"9.30 p.m. The moon rose. Various rays and patches of light remained visible in the sky.

"11.45 p.m. Aurora assumed a fan-shaped appearance to the southward, the point of the fan being in the zenith. This formation was in rapid motion and lasted five minutes.

"**March 6th.** 1.00 a.m. Beams of light visible all over the sky radiating from the zenith, they gradually dispersed 2.00 a.m. A large 'fan' took shape, bearing N.W. by N., and having an altitude of 75°. A sketch is appended (p. 145).

"This was composed of innumerable rays radiating from the point of the fan. The rays were in rapid motion, constantly disappearing and reappearing, thus leaving clear patches of sky in the fan. Also rays would shift laterally, behind or in front of others, making some parts of the fan more dense than other parts and indicating that if the fan could be viewed from a point directly below it, it would have a certain thickness and would not appear as a straight line like a single sheet of light seen edgeways.

"At the point of the fan and also at its eastern and western edges the rays were much closer together than in the centre. The lower edge was not well defined.

"This fan formation lasted five minutes, then dispersed, leaving rays and patches scattered over the sky. 3.00 a.m. Moon obscured by a Cumulus cloud. Rays to the E. and N. became red in colour; when the moon reappeared, the red was not so bright. No other colour could be distinguished. The red colour lasted 10 minutes, then rays reverted to the usual creamy-white colour.

"3.30 a.m. Cirrus haze began to overspread the sky and by 4.00 a.m. the sky was overcast.

"Throughout the night auroral light had been visible in some part of the sky, but did not always take any definite shape. When bright, the light was cream colour; when less intense, it was white. Stars could be seen through it, some of the stars for the 'fix' at 0.37 a.m. were observed through rays of auroral light.

"After midnight the display was more prevalent over the northern part of the sky.

"There does not seem any question about confusing Cirrus clouds with the patches of light we saw.

"Weather during the display: Wind W.S.W. 5. Clouds Cu and Cu-nb 2/10ths to 4/10ths.

"**Behaviour of Compass.**—The compass seemed very unsteady when taking azimuths of stars. This may have been due to rolling, yet the ship was rolling easy and the course was nearly East magnetic; the unsteadiness was more than we would ordinarily expect under the circumstances. Two azimuths at 0.15 a.m. gave deviations of $0\frac{1}{4}°$ W. and $1\frac{1}{4}°$ E. (mean $0\frac{1}{2}°$ E.), whereas two more at 0.39 a.m. gave 3° W. and $2\frac{1}{2}°$ W. (mean $2\frac{3}{4}°$ W.)—a difference of $3\frac{1}{4}°$ in the deviation."

The following books have been useful in the preparation of this article:—
"Les Aurores Polaires," by ANGOT.
Reports of British Antarctic Expeditions, 1901–1904 and 1910–1913.
Several Addresses by Dr. C. CHREE.

WEATHER CHARTS, EASTERN NORTH ATLANTIC.

DURING the month of August it will be seen from the meteorological chart of the North Atlantic that the average path of centres of depressions lies in a N.E'ly direction when eastward of the 30th meridian.

The irregular path pursued by a depression between August 21st and 22nd of last year, causing a fresh gale at the entrance to the Channel, will be of interest to Marine Observers who before making their land-fall from the southward or westward make a practice of making their own weather charts.

CHARTS NOS. XVII AND XVIII are constructed from data contained in the "Weather Shipping" Bulletin and from messages broadcast by wireless reporting ships.

At 0700 on the morning of the 20th a shallow depression moving east was situated south-west of Iceland. During the next 24 hours the depression deepened considerably and changed direction to S.E. On the morning of the 21st, CHART No. XVII, the depression was centred S.W. of Ireland and, as will be seen from the chart, contained winds of force 7 in the right hand semi-circle of the system.

CHART No. XVIII for 0700 the next morning shows the depression to be causing a complete cyclonic circulation over the British Isles, and is now centred in the Channel just south of Portland. During the past 24 hours the depression moved in an easterly direction at about 17 knots, becoming much shallower, the strongest wind being that of a fresh breeze recorded at Dungeness.

WEATHER SIGNALS.

WIRELESS WEATHER SIGNALS.

II.—WIRELESS WEATHER BULLETINS.

UNITED STATES OF AMERICA (ATLANTIC COAST, C.W. ISSUES.

Washington.—Arlington W/T Station, approximate Latitude 38° 52′ N., Longitude 77° 05′ W., call sign **NAA,** broadcasts weather bulletins at 0330 and 1530 G.M.T. on a wave length of 2,677 metres (C.W.).

The bulletins are divided into **two parts** and begin with the words "Weather Bureau Bulletin."

First Part.

Part I of the 0330 and 1530 G.M.T. bulletins contains observations taken at 0100 and 1300 G.M.T., respectively, from the stations in the list below. Upper air observations are also included in this part from those stations marked with a dagger (†) if received in time, and also weather reports from ships at sea.

Indicator Letters.	Station.	Position (Approx.). Lat.	Long.
*J	St. Johns, N.F. ...	47°34′N.	52°42′W.
*S	Sydney, N.S. ...	46°10′N.	60°10′W.
*CK	Cochrane, Ont. ...	49°20′N.	81°00′W.
*FP	Father Point, Que.	48°31′N.	68°19′W.
*ML	Montreal, Que. ...	45°30′N.	73°35′W.
E	Eastport, Me. ...	44°53′N.	67°02′W.
N	Northfield, Vt. ...	44°08′N.	72°42′W.
T	Nantucket, Mass.	41°17′N.	70°05′W.
NY	†New York, N.Y.	40°28′N.	74°00′W.
AC	†Atlantic City, N.J.	39°21′N.	74°26′W.
WA	†Washington, D.C.	38°52′N.	77°03′W.
NF	†Norfolk, Va. ...	36°50′N.	76°18′W.
LB	Lynchburg, Va....	37°18′N.	79°01′W.
AV	Asheville, N.C. ...	35°32′N.	82°28′W.
H	Hatteras, N.C. ...	35°14′N.	75°32′W.
C	†Charleston, S.C.	32°43′N.	79°52′W.
*B	Bermuda... ...	32°17′N.	64°46′W.
CO	†Columbia, S.C. ...	34°02′N.	80°57′W.
JA	Jacksonville, Fla.	30°19′N.	81°51′W.
K	†Key West, Fla.	24°33′N.	81°48′W.
KC	Kansas City, Mo.	39°07′N.	94°38′W.
O	†Omaha, Nb. ...	41°23′N.	96°01′W.
OK	Oklahoma City, Okla.	35°32′N.	97°28′W.
DA	Dallas, Tex. ...	32°46′N.	96°31′W.
EP	El Paso, Tex. ...	31°50′N.	106°30′W.
SE	Seattle, Wash. ...	47°38′N.	122°25′W.
RO	Roseburg, Oreg....	43°11′N.	123°10′W.
SF	San Francisco, Calif.	37°50′N.	122°30′W.
DI	San Diego, Calif.	32°42′N.	117°15′W.
BS	Boise, Idaho ...	43°40′N.	116°00′W.
LD	Lander, Wyo ...	41°40′N.	108°40′W.
DV	Denver, Colo. ...	39°48′N.	105°05′W.
*ED	Edmonton, Alberta	53°32′N.	113°05′W.
*SC	Swift Current, Sask.	50°30′N.	107°45′W.
BK	Bismarck, N. Dak.	—	—
*HT	Horta, Azores ...	38°32′N.	28°38′W

* Cloud reports not included.

The stations are indicated by the key letters given above and are followed by two or more groups of five figures in each group. The first two groups contain surface observations. The remaining groups contain observations of clouds and upper air data.

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

An X will be substituted for any missing data.

Code used: Special (United States Meteorological).

Explanation of first and second Groups.

First Group.—1st three figures give the barometer reading

* Cloud reports not included.

corrected in inches and hundredths, the initial 2 or 3 being omitted. (To convert to millibars, see Table XLI).

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

5th figure gives the wind force by Beaufort scale; the letters W (whole gale) S (storm) H (hurricane) will be sent for forces 10, 11 and 12 respectively.

Second Group.—1st figure gives the present weather (state of weather at surface, Table XXXVIII).

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

3rd figure gives the past weather during the preceding 12 hours (Table XL).

4th and 5th figures give the air temperature in whole degrees Fahrenheit. When the temperature is zero or 100°, the 4th and 5th figures will be 00; when between 2° and 8°, inclusive, the 4th figure will be 0 and the 5th figure the temperature; when below zero, the correct temperature can be obtained by subtracting the code figures sent from 100°. The initial figure 1 is omitted for temperatures of 100° or more. No confusion should arise in decoding temperatures below zero or above 100°, if the season of the year and the position of the reporting stations are considered, for example :—

Duluth	DU 74	= 74° in summer and −26° in winter.
Kansas City	KC 04	= 104° in summer and 4° in winter.
Chicago	CH 00	= 100° in summer and zero in winter.

Ship Reports.—Weather reports from ships in the Atlantic Ocean, and during the hurricane season additional reports from ships in the Gulf of Mexico and Caribbean Sea, follow the land stations' reports as follows :—

0330 G.M.T. bulletin contains Noon G.M.T. observations which were received too late for inclusion in the 1530 G.M.T. bulletin and 0000 G.M.T. observations.

1530 G.M.T. bulletin contains 0000 G.M.T. observations received too late for inclusion in the 0330 G.M.T. bulletin and Noon G.M.T. observations.

NOTE.—Ship reports of previous observations are only included when conditions are unusual.

The reports from ships are given in two five-figure groups for each ship preceded by the call sign of the ship.

First Group.—1st two figures give the latitude (north) to the nearest degree.

3rd, 4th and 5th figures give the longitude (west) to the nearest degree.

Second Group.—1st three figures give the barometric pressure in inches and hundredths, the initial 2 or 3 being omitted. (To convert to mbs, *see* Table XLI.)

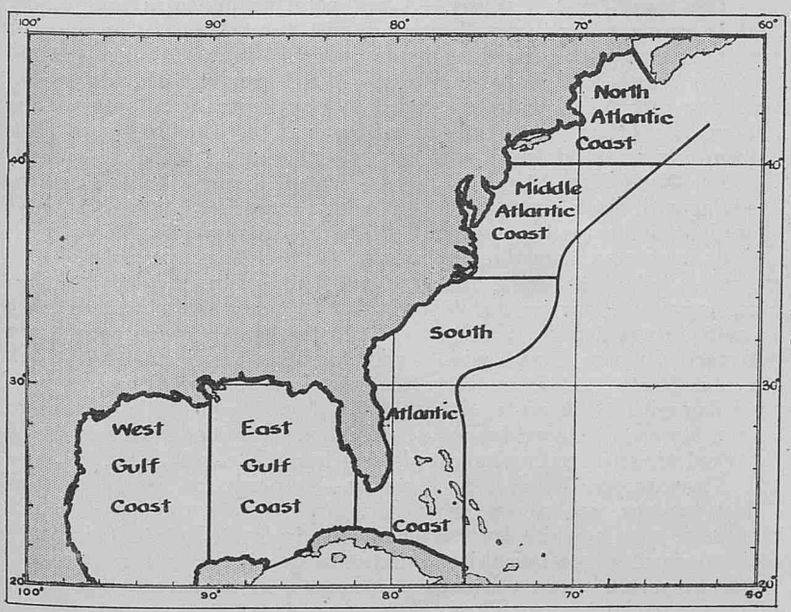
4th figure gives the wind direction (Table XXXVII).

5th figure gives the wind force by Beaufort Scale.

Second Part.

Part II of the bulletin is in plain language, and consists of a synopsis of general pressure distribution, including the location of high and low areas, and the barometer readings at their centres; wind and weather forecasts for the areas shown on the CHARTLET below.

CHARTLET OF U.S. MARINE FORECAST AREAS.



Storm and hurricane warnings are also broadcast for these areas, and flying weather forecasts for each of six aviation zones.

Weather Information for the benefit of Shipping approaching New York Harbour.

The W/T stations shown below broadcast weather conditions at Sandy Hook from observations made one hour previous to the times of transmission. The information will include barometric pressure, temperature, wind direction and force, state of sky, state of sea, and visibility.

W/T Station.	Call Sign.	Position (approx.)		Time G.M.T.	Wave length. Metres.
		Latitude.	Longitude.		
Tuckerton, N.J. -	**WSC**	39° 33′ N.	74° 23′ W.	1400, 2200.	650 (I.C.W.).
Chatham Marion,	**WCC**	41° 43′ N.	70° 46′ W.	1400, 2200	2,200 (C.W.).

BERMUDA ISLANDS.

Spark Issues.

The W/T Station at Bermuda Dockyard, approximate Latitude 32° 19′ N., Longitude 64° 50′ W., broadcasts weather conditions prevailing at Bermuda at 0015 and 1215 G.M.T. on a wave length of 1,600 metres, spark, and at 0020 and 1220 G.M.T. on a wave length of 600 metres, spark.

SPECIAL WEATHER TELEGRAPHY TABLES, NOT NEW INTERNATIONAL CODE.

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

Table XXXVII.—Wind Direction True.

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

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

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

Table XXXIX.—Barometric Change during two hours preceding Observation.

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

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

Table XL.—Past Weather.

Information concerning occurrence of thunderstorms, high winds, and precipitation during the preceding 12 hours.

Code Figure.

1 = Thunderstorm without high winds and less than ·06 inch precipitation.

2 = Thunderstorm without high winds and with ·06 inch or more precipitation.

3 = Thunderstorm with high winds and less than ·06 inch precipitation.

4 = Thunderstorm with high winds and ·06 inch or more precipitation.

5 = Precipitation less than ·06 inch.

6 = Precipitation from ·06 to ·16 inch inclusive.

7 = Precipitation more than ·16 inch.
8 = High winds without thunderstorm and without precipitation in excess of ·06 inch.
9 = High winds without thunderstorm and with precipitation in excess of ·06 inch.
0 = No precipitation or high winds.

Table XLI.

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		

WIRELESS STORM WARNINGS.

UNITED STATES OF AMERICA (ATLANTIC COAST).

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

W/T Station.	Call Sign.	Position. (Approx.) Latitude, Longitude.	Time. G.M.T.	Wave length. (Metres.)
Jupiter, Fla.	**NAQ**	26° 57′ N. 80° 05′ W.	1630, 2300	2,271 (C.W.).
St. Augustine, Fla.	**NAP**	29° 53′ N. 81° 17′ W.	1630	2,342 (Spark)
Savannah, Ga.	**NEV**	32° 05′ N. 81° 07′ W.	1600, 2300	2,271 (C.W.).
Charleston, S.C.	**NAO**	32° 51′ N. 79° 58′ W.	1530, 2300	2,776 (C.W.).
Norfolk, Va.	**NAM**	36° 50′ N. 76° 18′ W.	0100, 1545, 2100.	2,271 (C.W.).
Washington (Arlington)	**NAA**	38° 52′ N. 77° 05′ W.	0330, 1530	2,677 (C.W.).
Philadelphia	**NAI**	39° 52′ N. 75° 11′ W.	1545, 2200	2,828 (C.W.).
New York	**NAH**	40° 28′ N. 74° 00′ W.	1530, 2200	2,776 (C.W.).
Boston, Mass.	**NAD**	42° 21′ N. 70° 57′ W.	2200	2,939 (C.W.).

Hurricane warnings are broadcast when necessary and repeated at 2-hour intervals by :—

Jupiter W/T Station, NAQ, until 0500 G.M.T.
St. Augustine W/T Station, NAP, until 2300 G.M.T.
Savannah W/T Station, NEV, until 0500 G.M.T.
Charleston W/T Station, NAO, for 24 hours.
Norfolk W/T Station, NAM, until 0500 G.M.T.

The areas to which the warnings refer are given in the the text of the messages.

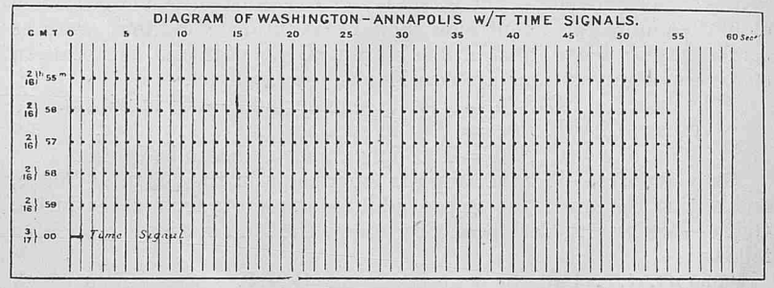
III.—WIRELESS TIME SIGNALS.

UNITED STATES OF AMERICA (ATLANTIC COAST).

All American Time Signals are sent according to the American Code, (See **Diagram of Washington-Annapolis W/T Time Signals.**)

Station.	Call sign.	Wave length.	G.M.T. of Time Signal.	——
Washington (Annapolis). Lat, 38° 59′ 00″ N. Long. 76° 27′ 00″ W.	NSS	17,130 C.W.	0255–0300 1655–1700	Signals sent daily. The "lag" of the Annapolis T.S. is 0.08 second (constant).
Washington (Arlington). Lat. 38° 52′ 05″ N. Long. 77° 04′ 47″ W.	NAA	2,677 C.W.	0255–0300 1655–1700	Daily, Controlled by Naval Observatory, Washington. The "lag" of the Arlington T.S. is 0.09 second (constant). Error generally less than 0.1 second.
Charleston (S.C.) ...	NAO	2,776 C.W.	1655–1700	These stations transmit only when Washington (Arlington) (NAA) is out of action (Sundays and Holidays excepted).
Norfolk (Va.) ...	NAM	2,883 C.W.	do.	
New York ...	NAH	2,776 C.W.	do.	
Newport (R.I.) ...	NAF	2,607 C.W.	do.	

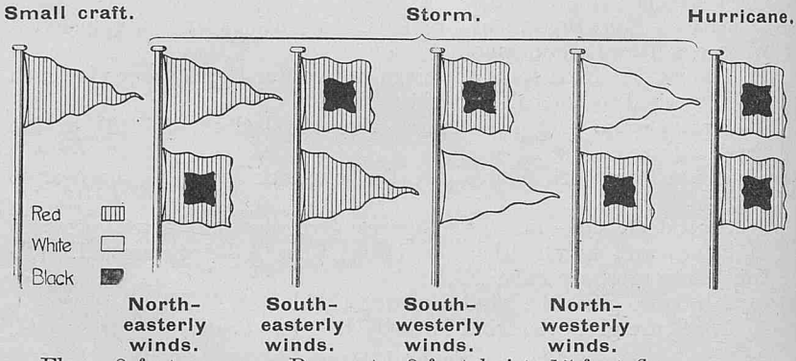
NOTE.—Sharp tuning to the individual wave lengths of the American Stations is required, in order to receive satisfactorily.



IV.—VISUAL STORM WARNINGS.

UNITED STATES OF AMERICA.

Visual, Small-Craft, Storm and Hurricane Warnings.



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

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

Explanation of Warnings.

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

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

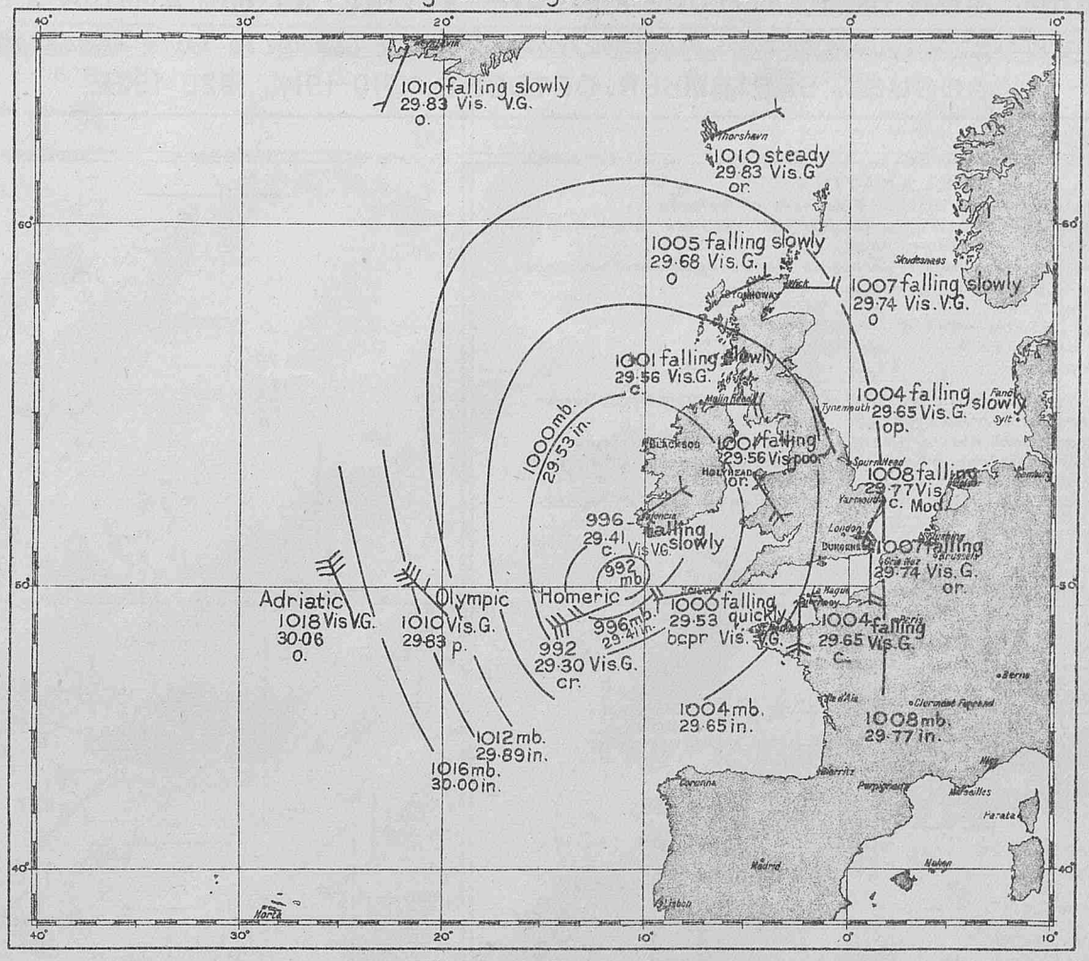
The South-East Storm Warning.—A red pennant *below* a square red flag with black centre displayed by day, or one red lantern displayed by night, indicates the approach of a storm of marked violence, with winds beginning from the *South-East.*

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

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

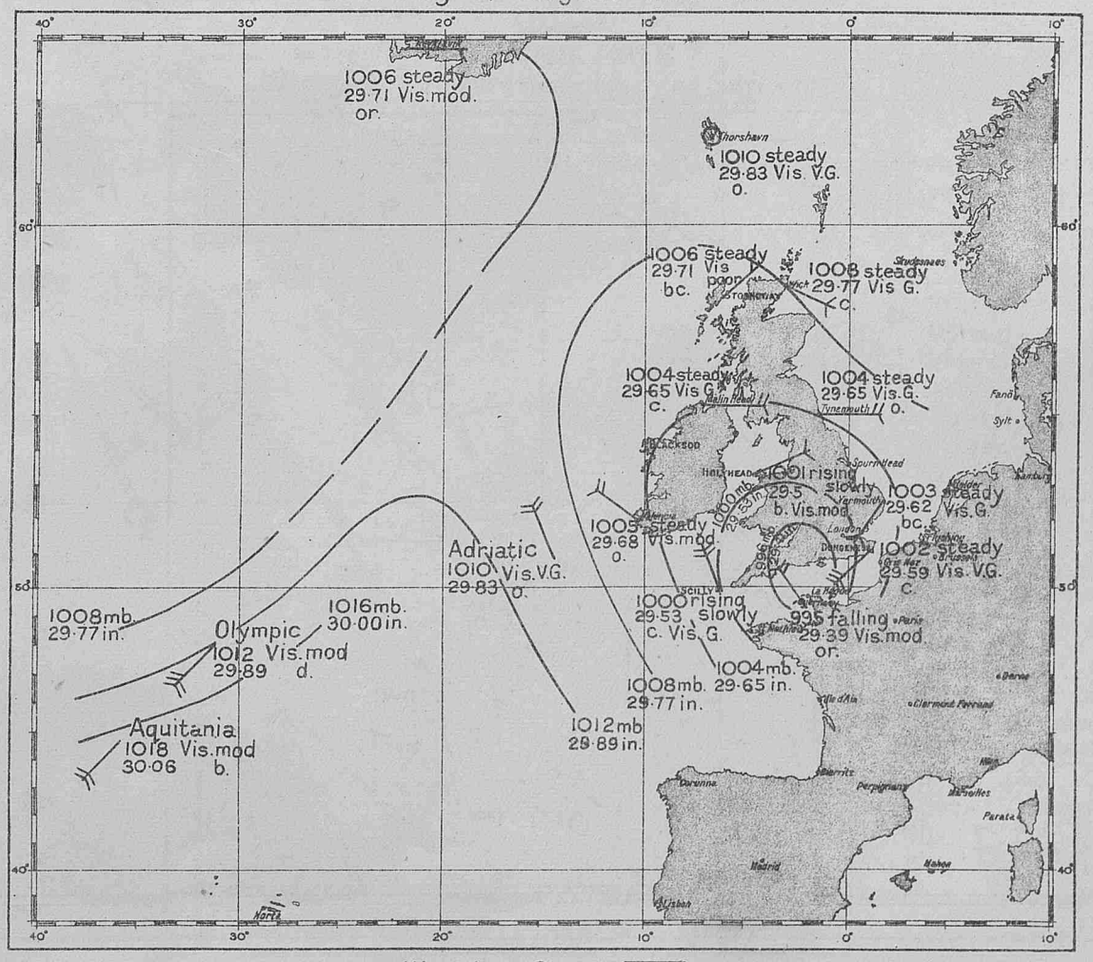
Hurricane or Whole-Gale Warning.—Two square flags, red with black centres, one above the other, displayed by day, or two red lanterns, with a white lantern between, displayed by night, indicate the approach of a tropical hurricane or of one of the extremely severe and dangerous storms which occasionally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

Morning of August 21st 1925.



Weather Chart XVII.

Morning of August 22nd 1925.

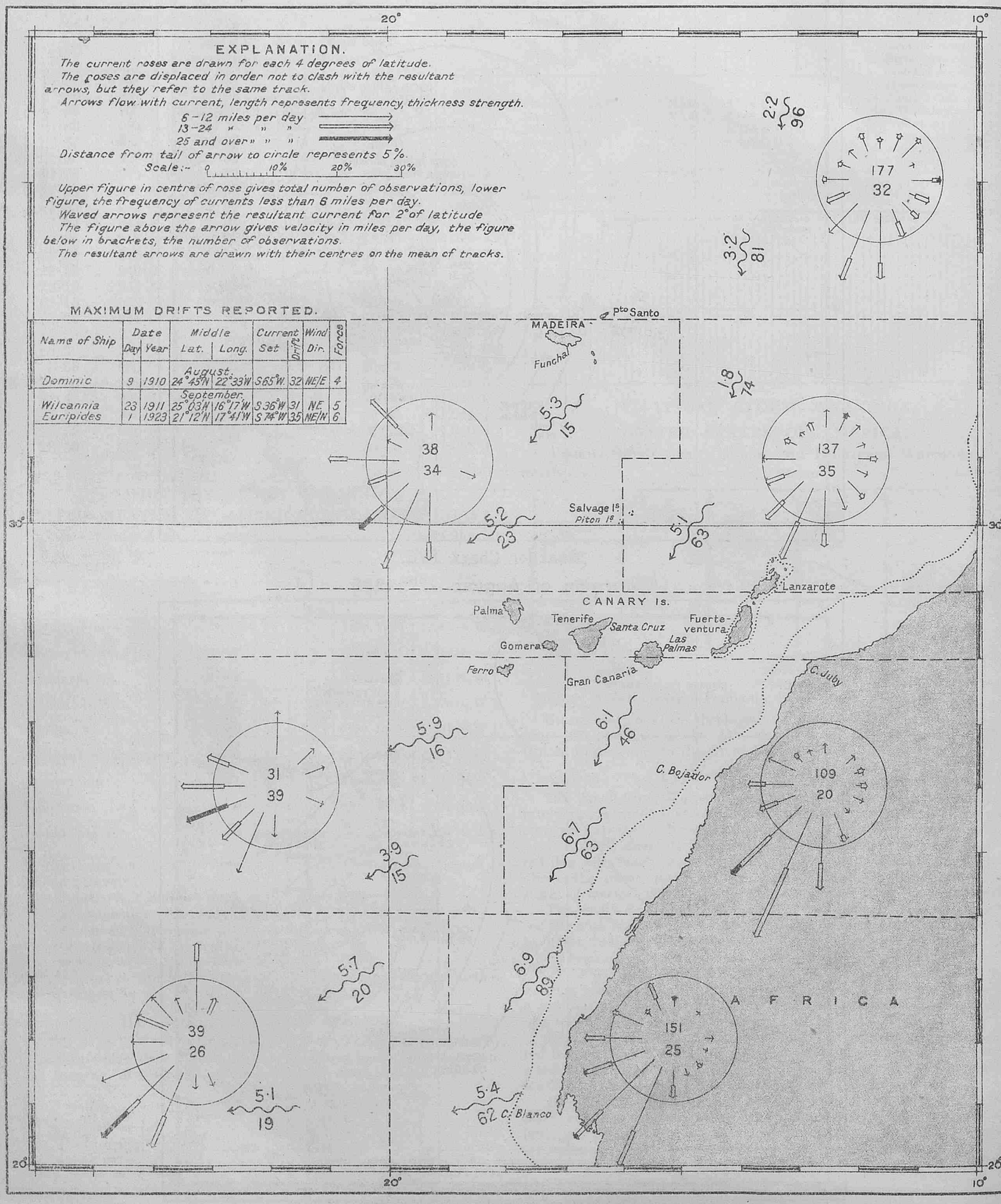


Weather Chart XVIII.

CURRENTS on the routes from LATITUDE OF CAPE St VINCENT to LATITUDE OF CAPE BLANCO.

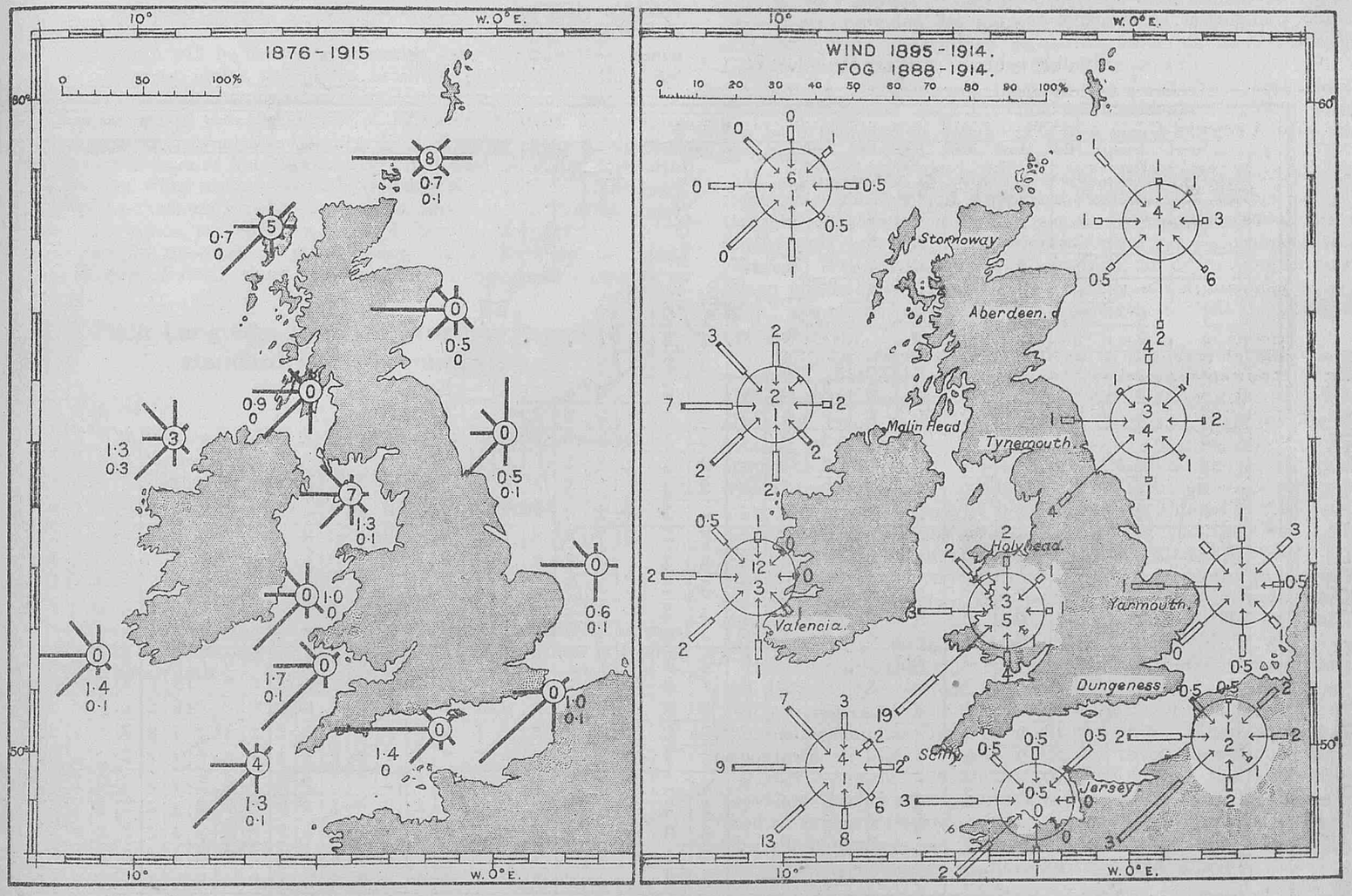
Compiled from observations made by ships using the routes from the Channel to South Africa and South America.

AUGUST, SEPTEMBER, OCTOBER, 1910-1914, 1920-1924.



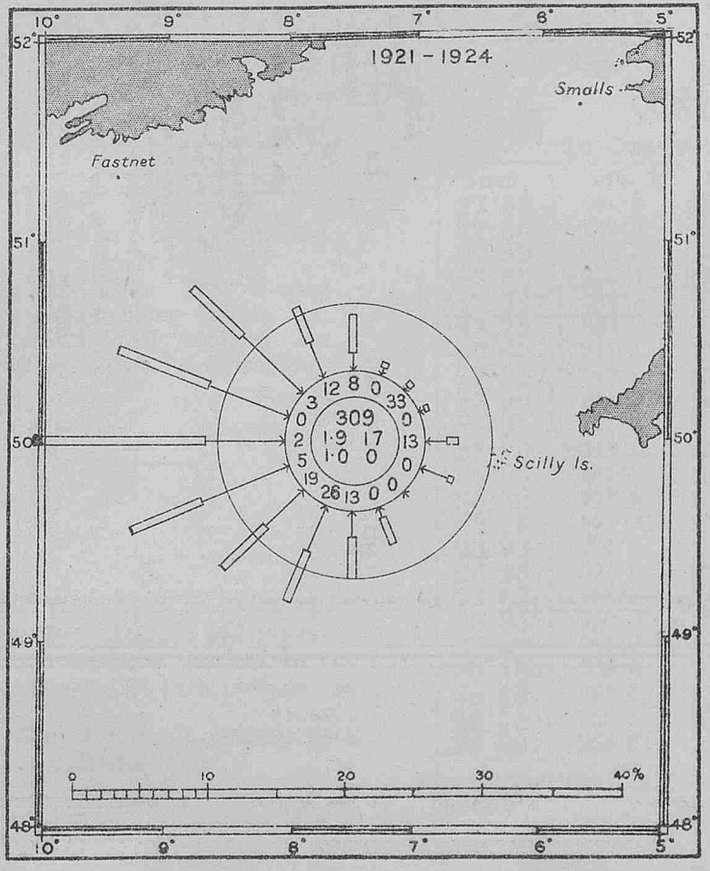
AUGUST.

WIND AND FOG AT COAST STATIONS. GREAT BRITAIN AND IRELAND



WIND, FOG AND MIST.

S.W. APPROACHES TO GREAT BRITAIN AND IRELAND.



Frequency of fog per thousand observations for each 2 points of compass 1921-1924.
Latitude 48°-52°N.
Longitude 5°-10°W.

Direction.	Frequency.
N	3
NNE	0
NE	3
ENE	0
E	3
ESE	0
SE	0
SSE	0
S	7
SSW	19
SW	16
WSW	7
W	3
WNW	0
NW	3
NNW	7
Calm	3
Var.	0
Total	74

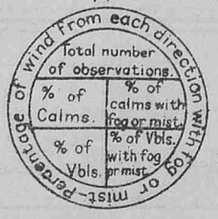
Percentage frequency of fog and mist for area = 7%.

Mean and Maximum number of days with fog during the month at the different stations.

Station.	Mean.	Max.
Stornoway	0·6	4
Malin Head	2·1	8
Valencia	0·8	3
Holyhead	4·8	11
Scilly	4·5	10
Jersey	1·4	6
Dungeness	2·4	6
Yarmouth	1·1	5
Tynemouth	2·5	7
Aberdeen	2·1	8

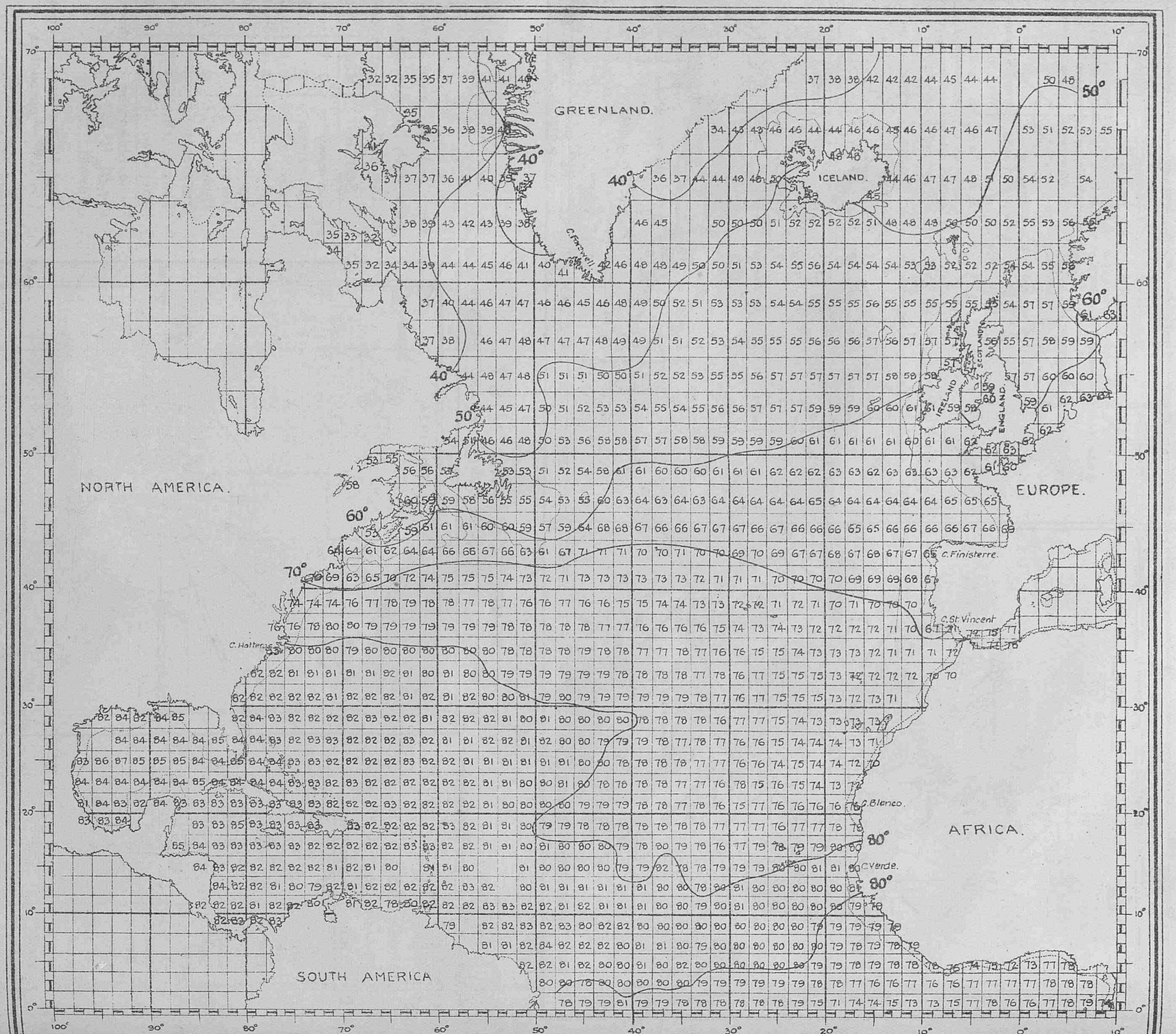
For explanation of charts see Vol. III. N°25, page 10, of this Journal.

Key to numbers in rose, S.W. Approaches.



MEAN SEA SURFACE TEMPERATURES FOR MONTH OF AUGUST COMPUTED FROM ALL AVAILABLE SOURCES DURING THE PERIOD 1855 TO 1917.

NORTH ATLANTIC.



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

2210/1313. W6 59 A. D.L. 1300. 6/26.

Wireless and Weather an Aid to Navigation.

Advance in any subject or movement can only be truly attained from within, and therefore advancement of meteorology as a branch of seamanship will be the surer if seamen take the initiative, hence in the chapters under the above heading, published in the 1924 numbers, we made suggestions based upon experience at sea for the promotion of the application of Wireless Weather Telegraphy to seamanship, and in the January, 1926, Number, page 2, all ships in the list of regular Marine Observers indicated as having mercurial barometers were invited to make routine reports to "All Ships" giving observations synchronising with those of the nearest coast. For these times, *see* chart on page 14, No. 25, Vol. III.

A sample message is given below to which may be added information of swell, cloud type, or other predominant elements as necessary.

Plain Language Wireless Weather Report in standard form recommended.

To C.Q.

Weather 4757 *N* 1908 *W Barometer corrected* 2994 *NNW* 2 *Overcast* 0700 *G.M.T. Fifth Course N* 70 *E* 10 *rising slowly Current S* 59 *E quarter knot from* 47 *N* 24 *W to* 48 *N* 20 *W Air* 59 *Sea* 61 *Catalina.*

NOTE.—The date appears in the middle of this message, the most important elements appearing before it. If abbreviation is desired omit all after date.

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.

ICE REPORTS.

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

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

CURRENT OBSERVATION.

It is very desirable that good current data should be recorded. Spaces are provided for current experienced throughout the day and for current determined at shorter intervals in Meteorological Logs, while Form 911 provides for either or both.

Generally the difference between the *Dead Reckoning Position* at noon, reckoned from previous noon, and the *observed position* has been accepted as attributable to a single current for the whole 24 hours.

It is necessary to make careful distinction between *Dead Reckoning Position* and *Estimated Position*, the former being the position as reckoned from the last fix by courses steered and distances run, corrected for all known errors and disturbances *except* current. When a fix cannot be obtained, an estimation for current (when one is known generally to exist) is sometimes applied to the D.R.; the result may then be conveniently termed the *Estimated Position.*

If this estimated position is given in the Meteorological Log or Form 911, *it should be clearly stated*, otherwise it may be misleading.

Currents of varying velocity and direction may be experienced along the track made in 24 hours; therefore, when reliable fixes such as by Stellar observations at twilight are obtained, the current should be determined for the intervals, and all should be checked with the noon to noon result. Each of these currents determined at shorter intervals than 24 hours should be entered in the Meteorological Log in the appropriate column, and the time and latitude and longitude of each observation position should be given in the latitude and longitude columns. The times given on Form 911 indicate the interval. The period of short interval currents should usually not be less than, say, six hours. The best interval is probably from twilight to twilight.

It is desirable that whenever possible two methods of ascertaining the distance run through the water should be used, as recent investigation goes to show that with one means of measuring the speed the inclination has been to credit the ship. When possible it is recommended that both patent log and revolutions should be used.

For working out the set and drift of current the position *from* as well as the position *to* must always be *fixes*. Some observers have used an *estimated* position *from*, which makes the set and drift false. The same remarks apply to course allowances for set; the latter are naturally necessary to make an *estimated* course.

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.

(A) *See* Cunard S.S. Company's letter on this Chart.

(F) From 16th May to Opening of Belle Isle route, and to 30th November when not using the Belle Isle route. 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 opening of Belle Isle route 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.

ROUTE NOTICES.

For latest information *re* Tracks *see* Cunard S.S. Co.'s letter on this Chart, also Board of Trade "Notices to Mariners," 1st June, 1926. pp. 145 and 258.

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.

Steamers keep {10'N of this track Westbound / 10'S of this track Eastbound}

Steamers keep {10'N of this track Westbound / 10'S of this track Eastbound}

Steamers keep {10'N of this track Westbound / 10'S of this track Eastbound}

Steamers keep {10'N of this track Westbound / 10'S of this track Eastbound}

Steamers keep {10'N of this track Westbound / 10'S of this track Eastbound}

Limit of Ice reported to Meteorological Office 1901-1925

Clarke City VCK
Anticosti VCI
Heath Pt. Lt. V.
Fame Pt. VCG
Father Pt. VCF
Grosse I.
Quebec VCD
Montreal
GULF OF ST. LAWRENCE
NEWFOUNDLAND
Magdalen Is.
Grindstone I. VCN
St. Paul
Prince Edward Is.
Cape Breton Is.
VCO Sydney
St. Pierre HYS
St. John VAR
NOVA SCOTIA
VAV
VAU
Lurcher Lt.V. VDR
C. Sable
VCT Sable Is.
Boston NAD
New York NAH
Nantucket Lt.V.
VCM
VCL
C. Race
C. Norman
C. Amour
Virgin Rocks
VCE

LATEST ICE REPORT FROM CANADA.

The following cablegram, dated 12th June, 1926, was received from the Superintendent, Canadian Signal Service, Quebec :—

"Belle Isle Strait, heavy open ice everywhere; numerous bergs and growlers off Belle Isle. Cape Race, no ice in sight. Other points no ice."

PHENOMENAL DRIFTS OF ICE.

Date.	Ship or Source of Report.	Position. Lat.	Position. Long.	Remarks.
Aug. 12, 1903	S.S. Saxon Prince ...	37°52'N.	71°30'W.	Piece 3 ft. high, 40 ft. long.
,, 7, 1908	S.S. Caronia	50°31'N.	18°55'W.	2 pieces 10 ft. square and 15 ft. square.
,, 2, 1909	S.S. Shimosa ...	37°16'N.	42°06'W.	Piece 18 ft. by 5 ft., 2 ft. out of water.
,, 14, 1912	S.S. Ulstermore ...	43°55'N.	39°16'W.	Piece.
,, 27, 1912	S.S. Lux	42°30'N.	15°26'W.	50 ft. sq., 4 ft. out of water.
,, 10, 1915	S.S. St. Louis ...	41°02'N.	48°00'W.	Berg.
,, 16, 1915	S.S. St. Leonards ...	41°09'N.	50°43'W.	—
,, 21, 1915	S.S. Strathgarry ...	40°46'N.	68°20'W.	Growler.
,, 1915	Do.	39°00'N.	46°20'W.	Piece 20 ft. long, 4 ft. high.
,, 20 1920	U.S. Hyd. Bulletin	40°30'N.	47°52'W.	Berg.

Reports of Ice sighted between June 1st and June 30th, 1926, which have been received by the Meteorological Office, are shown by the Symbols plotted in the position reported, the figures indicating the day of the month.

IMPORTANT.

The following letter dated 2nd June, 1926, was received from the Cunard S.S. Co., Liverpool:—

"NORTH ATLANTIC TRACKS."

"We are this morning in receipt of telegraphic advice from New York to the effect that a large iceberg was reported on the 28th May in Latitude 41°48' North Longitude 48°28' West. This information prompted us to take immediate action in conformance with the Track Regulations, and after consultation between our Marine Advisers and those of the White Star Line it was decided to advise all Lines party to the North Atlantic Track Agreement to immediately operate on Track "A" Eastbound (bringing same into force to-day) and Track "A" Westbound on June 9th.

"Furthermore, during the period necessary to clear Track "A" Westbound of Eastbound vessels already on the high seas and on Track "B" Eastbound, it was decided to bring Westbound steamers further South, and, therefore, from June 2nd to June 8th inclusive steamers operating on Track "B" Westbound have been instructed to make the corner in Latitude 41° North and Longitude 47° West."

2210/1313 Wt. 53A D11. 1100. 6/26.

AUGUST M.O., 1926. H.M.S.O. Press, Kingsway, W.C.2.

NOTICES.

MARINE METEOROLOGY.

Co-operation of Shipowners, Masters and Mates.

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

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

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

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

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

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

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

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

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

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

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

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

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

Marine Observers who wish to assist in developing the rapid interchange of Meteorological information and Weather Forecasting at sea can do so by using the standard form, **not** in code, of W/T Weather Report suggested in "Weather Signals," given in Vol. III, No. 25, pages 14 and 15. For this purpose a mercurial barometer of which the index error has been ascertained is essential.

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

Marine Agencies and Port Meteorological Officers.

LIVERPOOL ..	(Port Meteorological Office), Lieut.-Commander M. Cresswell, R.N.R., Dock Office. *Telephone No.: Bank 8959.*
CARDIFF	Captain T. Johnston, Technical College.
CLYDE	Captain M. C. Corrance, Board of Trade Surveyor's Office, 73, Robertson Street, Glasgow.
DUBLIN	Captain M. H. Clarke, Chief Surveyor, Department of Industry and Commerce, Marine Branch, 27, Eden Quay.
HULL	Captain Geo. B. Sturdy, c/o Mr. W. Hakes, Commercial Road.
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.
TYNE	Captain J. J. McEwan, Marine School, South Shields.
HONG KONG ..	Lieut.-Commander O. C. G. Leveson-Gower, R.N., Superintendent, Admiralty Chart and Chronometer Depôt.
VANCOUVER ..	T. S. H. Shearman, Esq., Room 40, Post Office Building.
AUSTRALIA ..	The Commonwealth Meteorologist.

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

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

LATE PRESS.

DERELICTS AND FLOATING WRECKAGE.

Date.	Position. Latitude.	Position. Longitude.	Description.
	NORTH SEA.		
7.6.26	54°58′N.	1°13′W.	Derelict fishing vessel, capsized.
12.6.26	1 m. E. of N. Goodwin Lt. Vsl.		Heavy wreckage.
	ENGLISH CHANNEL.		
4.6.26	49°09′N.	3°56′W.	Derelict sailing trawler, dismasted, bowsprit standiing.
13.6.26	Beachy Hd. bearing N.E. 4 m.		Small boat, empty, marked *Mimosa, St. Vaast.*
21.6.26	49°48′N.	3°37′W.	Red spherical buoy.
	NORTH ATLANTIC.		
1.6.26	49°48′N.	10°47′W.	Red buoy with superstructure marked *Company 40X.*
1.6.26	42°47′N.	17°24′W.	Red nun buoy, lower section, covered with green marine growth.
2.6.26	38°54′N.	73°43′W.	Damaged lifeboat full of water.
2.6.26	41°54′N.	62°52′W.	Log 15 ft. long, 18 ins. in diameter, covered with barnacles.
3.6.26	47°04′N.	6°52′W.	Fisherman's small dory, red inside and bright varnished outside, name on bow thought to be *Silvanne.*
3.6.26	46°38′N.	7°48′W.	Drifting can buoy, no marks, covered with marine growth.
3.6.26	40°11′N.	71°26′W.	Log about 25 ft. long and 2 ft. in diameter.
4.6.26	25°28′N.	74°02′ W.	Large tree stump projecting 6 ft. out of water and several roots under water.
5.6.26	36°44′N.	52°30′W.	Apparently part of schooner, 40 feet long.
5.6.26	40°16′N.	56°24′W.	Buoy with framework.
6.6.26	32°14′N.	58°40′W.	Red conical whistle buoy, marked *LS* over *D.*
6.6.26	41°58′N.	43°41′W.	Heavy spar, 40 ft. long, covered with marine growth.
7.6.26	45°12′N.	7°51′W.	Floating conical buoy, thickly covered with barnacles.
8.6.26	34°17′N.	31°12′W.	Wreckage, 60 ft. long and 40 ft. wide, apparently the bottom of a wooden vessel.
9.6.26	48°—′N.	5°45′W.	Large spherical buoy, black and white vertical, lamp on top.
9.6.26	49°38′N.	12°41′W.	Red bell buoy, overgrown, drifting.
9.6.26	43°29′N.	5°32′W.	Conical buoy.
9.6.26	34°10′N.	74°—′W.	Upright spar, projecting 6 ft. out of water and apparently attached to submerged wreckage.
9.6.26	41°16′N.	56°52′W.	Buoy with staff supporting four targets and a pennant.
9.6.26	38°14′N.	64°33′W.	Large drifting red conical buoy, with eye plate on top, very rusty and with heavy marine growth on the water line.
11.6.26	49°31′N.	8°03′W.	Large spherical buoy with superstructure.
11.6.26	37°05′N.	74°55′W.	Vertical spar projecting 5 ft. out of water, apparently attached to submerged wreckage.
12.6.26	26°28′N.	79°44′W.	Burning wooden vessel: current setting N. true at 3 knots, wind E., force 3.
13.6.26	27°21′N.	79°43′W.	Visible wreckage, dangerous to navigation.
13.6.26	39°20′N.	73°00′W.	Damaged boat, about 18 ft. long, painted lead colour, no name visible.
16.6.26	49°08′N.	11°08′W.	Large black gas buoy adrift, dangerous to navigation.
18.6.26	49°34′N.	10°45′W.	Drifting red buoy.
20.6.26	49°40′N.	7°50′W.	Red spherical iron buoy, apparently adrift, dangerous to navigation.
22.6.26	46°57′N.	6°50′W.	Red drifting buoy.
27.6.26	48°31′N.	7°17′W.	Buoy adrift, painted red and black marked *B.*
27.6.26	48°50′N.	10°39′W.	Whistle buoy adrift.
	NORTH PACIFIC.		
12.6.26	46°01′N.	124°55′W.	Spar projecting about 6 ft. out of water, apparently attached to wreckage.

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.

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

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

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

No. = Keeps Ship's Meteorological Report Form 911 with ship's instruments. Letter M after No. indicates ship's barometer Mercurial; A. ship's barometer Aneroid.

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

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

Name of Vessel.	Captain.	Observing Officers.	Official Meteorological Equipment.	Line.	Last Log, Register, or Report Contributed. Received up to 18.6.26.	Date Received.
Aba	Hughes, J. ...	R. A. Roberts, R. A. Downes, L. B. Silvester, S. J. Bristowe.	M.L.	Elder Dempster ...	Met. Log. 11.11.25 to 11.4.26...	23.4.26.
Abinsi	Wright, J. B. ...	R. R. Watson	No. A.	„ „ ...	Form 911 31.3.26 to 9.5.26 ...	13.5.26.
Achilles	Hill, R.	D. MacTavish	„ A.	A. Holt	„ 8.10.25 to 19.10.25...	18.11.25.
Actor	Haylett, E. ...	A. Frew, J. McKay, G. Penston.	M.L.	Harrison	Met. Log. 28.1.26 to 4.4.26 ...	12.4.26.
Adda	Toft, J. T.	E. C. Davis	No. M.	Elder Dempster ...	„ 17.3.26 to 24.4.26 ...	30.4.26.
50 *Adriatic* ...	Beadnell, F. E., Capt., R.N.R.	A. C. I. Anson, R. G. Roberts, J. Allingham.	W.T.	White Star	W.T. Reg. 3.5.26 to 22.5.26 ...	28.5.26.
					Form 911 2.5.26 to 22.5.26 ...	28.5.26.
Aeneas	Wallace, W. K. ...	J. M. Anderson	No. A.	A. Holt	„ 21.3.26 to 9.4.26 ...	17.5.26.
Agapenor ...	Ramsay, J. ...	S. G. Ellams	„ A.	„	„ 28.4.26 to 8.5.26 ...	17.5.26.
Alban	Whayman, W. ...	C. D. Lane, A. T. Douglas ...	„ A.	Booth	„ 6.12.25 to 22.12.25...	4.1.26.
Albania	Gronow, S.	L. Harper	„ A.	Cunard	„ 29.8.25 to 22.9.25 ...	24.9.26.
Alipore	Harrison, R., D.S.O., R.D., Commr., R.N.R.	D. N. Stafford	„ M.	P. and O.	„ 2.3.26 to 11.5.26 ...	1.6.26.
Almanzora ...	Mackenzie, G. A. ...	J. Clark	„ A.	R.M.S.P.	„ 2.4.26 to 15.5.26 ...	19.5.26.
Alondra ...	Prendergast, J. J. ...	H. Peters	„ A.	Yeoward	„ 22.5.26 to 12.6.26 ...	15.6.26.
Ampetco ...	Vandenkerckhove, A.	A. Aspeslagh	„ A.	American Petroleum...	„ 28.4.26 to 12.5.26 ...	7.6.26.
Antilochus ...	Wilkinson, H. ...	E. T. Bayes	„ A.	A. Holt	„ 10.11.25 to 31.3.26...	6.4.26.
Aorangi	Crawford, R. ...	A. Lansey, J. W. Bray, G. H. Kime, H. A. Titchfield.	M.L.	Canadian-Australasian	Met. Log. 13.1.26 to 29.4.26 ...	29.5.26.
Appam	Yardley, H. A., D.S.C.	Prendergast, Dutton, W. Page	„	Elder Dempster ...	„ 23.12.25 to 23.5.26...	5.6.26.
30 *Aquitania* ...	Charles, Sir J. T. W., K.B.E., C.B., R.D., Commodore, R.N.R.	J. L. Croasdaile, R. G. Thelwell, J. Locke, R. V. Youd.	W.T.	Cunard	W.T. Reg. 16.5.26 to 31.5.26 ...	3.6.26.
Arabic	Davies, J.	R. Walker, H. G. Morgan, W. Clements.	No.	White Star	„ 21.4.26 to 13.5.26 ...	17.5.26.
					Form 911 20.4.26 to 14.5.26 ...	17.5.26.
Arafura	Gordon, A. S. ...	J. T. Heddle, G. C. Smith, O. B. Godfrey, F. O. Colvin.	M.L.	Eastern and Australian	Met. Log. 6.1.26 to 4.4.26 ...	14.5.26.
Archimedes ...	Taylor, F. C. ...	F. W. Johnson	No. A.	Lamport & Holt ...	Form 911 7.6.25 to 8.7.25 ...	9.7.25.
Ariguani ...	Scudamore, J. H. H., D.S.C., R.D. Commr. R.N.R.	G. Dobson	M.L.	Elders & Fyffes ...	„ 28.2.26 to 3.4.26 ...	8.4.26.
Armadale Castle...	Millard, L. A., Knight, A.	... ...	M.L.	Union Castle ...	Met. Log. 9.8.25 to 4.4.26 ...	19.4.26.
Arracan	Willis, M.	R. McInnes, M. S. Stuart, C. C. Weir.	„	P. Henderson ...	„ 4.1.26 to 11.4.26 ...	26.4.26.
Arundel	Short, H.	Mr. Hill	C.C.	Southern Rly. ...	Telegraphic Report 18.6.26 ...	18.6.26.
Arundel Castle ...	Hague, J. W., Commr., R.N.R.	G. Blaiklock, C. Lloyd, H. S Colbourne, T. A. Rainey, F. O. Wilbraham.	M.L.	Union Castle ...	Met. Log. 24.10.25 to 15.2.26...	23.2.26.
Assyria	Donald, D. R. ...	A. Middleton	No. A.	Anchor	Form 911 16.8.25 to 7.9.25 ...	9.9.25.
Astronomer ...	Booth, W. M. ...	J. Rae, H. Thomas, E. Shatton.	M.L.	Harrison	Met. Log. 29.8.25 to 12.1.26 ...	14.1.26.
Athenic	Davies, E.	W. Hill	No. A.	White Star	Form 911 3.5.26 to 17.5.26 ...	19.5.26.
Atreus	Salter, G. H. ...	J. C. Podmore	„ A.	A Holt	„ 1.4.26 to 18.4.26 ...	17.5.26.
Atsuta Maru ...	Saito, B.	K. Murazumi	„ A.	Nippon Yusen Kaisha	„ 23.2.26 to 8.3.26 ...	15.3.26.
Auditor	Owen, W. T. ...	T. E. Steel	„ M.	Harrison	„ 11.3.26 to 25.4.26 ...	10.5.26.
Ausonia	Gibbons, G., R.D., Commr. R.N.R.	L. T. Sampson	„ A.	Cunard	„ 5.3.26 to 28.3.26 ...	6.4.26.
Author	Kinloch, R ...	... ...	„ M.	Harrison	... ...	...
Avon	Adam, C., R.D., Commr., R.N.R.	E. S. Munch	„ M.	R.M.S.P.	Form 911 27.1.26 to 12.3.26 ...	17.3.26.

Name of Vessel.	Captain.	Observing Officers.	Official Meteorological Equipment.	Line.	Last Log, Register, or Report Contributed. Received up to 18.6.26.	Date Received.
Balfour	Rothwell, A. ...	S. W. Keay	No. A.	Canadian Pacific ...	Form 911 6.3.26 to 4.5.26 ...	26.5.26.
51 *Baltic*	White, E. R., Commr. R.N.R.	H. R. Wilkinson, R. Conway, D. K. Crawford.	W.T.	White Star ...	W.T. Reg 17.5.26 to 5.6.26 ...	11.6.26.
					Form 911 21.3.26 to 11.4.26 ...	14.4.26.
Bambra ...	Turner, J. E. ...	H. W. Norris, J. E. Turner, F. Humble.	M.L.	State Service, Australia	Met. Log. 25.11.25 to 3.5.26 ...	15.6.26.
Bampton Castle ...	Hutchings, A. H. ...	J. W. S. Brooks	No.	Union Castle ...	,, 3.10.25 to 11.2.26 ...	15.2.26.
Banbury Castle ...	Singeisen, E. A., D.S.C., R.D., Capt., R.N.R.	... ...	,,	,, ...	... ...	...
Banffshire ...	Wynne, R. H. ...	J. M. Bowie	No. A.	Turnbull Martin ...	Form 911 23.3.26 to 27.4.26 ...	6.5.26.
Barpeta ...	Denne, G. A. ...	J. W. Knight	,, M.	British India ...	,, 24.3.26 to 22.4.26 ...	10.5.26.
Baychimo ...	Cornwall, S. A. ...	S. Jackson	,, A.	Hudson's Bay Co. ...	,, 18.11.25 to 9.1.26 ...	13.1.26.
Beaufort ...	Rice, W. V., D.S.O., D.S.C., Commr., R.N.	J. Taylor	M.L.	His Majesty's Ship ...	Met. Log. 14.8.25 to 13.11.25...	11.1.26.
59 *Belgenland* ...	Howell, T.	C. J. Murray, J. M. Appleby, F. Clitty.	W.T.	Red Star	W.T. Reg. 17.5.26 to 5.6.26 ...	8.6.26.
					Form 911 16.5.26 to 5.6.26 ...	8.6.26.
Benalder ...	Cole, J. H., D.S.C....	T. S. Rawlingson	No. A.	Ben Line	,, 26.5.26 to 7.6.26 ...	17.6.26.
Bendigo ...	Nicholl, R. N. C. ...	C. E. Arundel	,, M.	P. & O. Branch ...	,, 7.1.26 to 25.1.26 ...	15.3.26.
Bengloe ...	McCorquodale, A. ...	G. M. Duff	,, A.	Ben Line	,, 12.8.25 to 29.8.25 ...	30.9.25.
31 *Berengaria* ...	Diggle, E. G., R.D., Capt., R.N.R.	J. A. Myles, W. C. A. Robson	W.T.	Cunard ...	W.T. Reg. 2.5.26 to 7.6.26 ...	10.6.26.
Berrima ...	Townshend, W. P.	T. Ferguson	No. M.	P. & O. Branch ...	Form 911 13.2.26 to 30.3.26 ...	11.5.26.
Bintang ...	Morzer Bruyns, M. F.	A. A. H. Blankestyn ...	,, M.	Nederland ...	,, 27.3.26 to 8.4.26 ...	10.5.26.
Bogota ...	Dunn, R. E., O.B.E.	T. R. Thomas	,, A.	R.M.S.P. Co. ...	,, 8.10.25 to 28.10.25...	5.11.25.
Bolingbroke ...	Jones, D. C. ... Dott, J. F.	C. A. Mott	M.L.	Canadian Pacific ...	Met. Log. 30.6.25 to 16.1.26 ...	20.1.26.
Borda	Holland R. ...	... ...	No. M.	P. & O. Branch ...	Form 911 25.7.25 to 1.9.25 ...	15.2.26.
Bothwell ...	Jones, D. J. C. ...	G. Mowatt	,, A.	Canadian Pacific ...	,, 13.4.26 to 20.5.26 ...	26.5.26.
Brandon ...	Henderson, W. ...	T. Beck	,, A.	,, ,, ...	,, 15.2.26 to 17.3.26 ...	20.3.26.
Brecon ...	McCombie, G. ...	F. E. Bevis	,, A.	,, ,, ...	,, 16.3.26 to 19.4.26 ...	28.4.26.
Brenda ...	Lamont, A. ...	F. R. Ness	,, A.	Scottish Fishery Board	Form 911 1.5.26 to 31.5.26 ...	7.6.26.
Brighton ...	Hill, A.	Mr. Munton	C.C.	Southern Railway ...	Telegraphic Report 17.6.26 ...	17.6.26.
British Advocate	Taylor, R. J. ...	G. H. Wylie	No. M.	British Tankers ...	Form 911 20.4.26 to 9.6.26 ...	14.6.26.
British Engineer...	Joures, T. W. ...	E. L. W. Evans	,, M.	,, ,, ...	,, 26.1.26 to 9.3.26 ...	12.4.26.
British Soldier ...	Putt, R. O.	H. J. Crangle	,, A.	,, ,, ...	,, 1.4.26 to 23.5.26 ...	7.6.26.
Bronte	Crapper, J. S. ...	... ...	No.	Lamport & Holt ...	... ...	...
Browning ...	Connorton, W. A. ...	A. B. Murray	No. A.	,, ,, ...	Form 911 16.11.25 to 13.2.26...	16.2.26.
Bruyere ...	Denson, W. ...	R. Mowbray	,, A.	,, ,, ...	,, 20.1.26 to 12.2.26 ...	22.3.26.
Cambria C.S. ...	Sherwood, C. A. ... D.S.C.	H. Selby, A. J. English, B. C. Farrow.	M.L.	Eastern Tel. Co. ...	Met. Log. 14.7.25 to 21.11.25 ..	26.1.26.
Cambria ...	Telfer, J.E. ...	V. S. Phillips	C.C.	L.M. & S. Rly. ...	Telegraphic Report 16.6.26 ...	16.6.26.
Cameronia ...	Smart, R. W. ...	C. Paton	No. A.	Anchor	Form 911 9.5.26 to 30.5.26 ...	7.6.26.
Camito	Forrester, W. T., O.B.E.	W. T. Broome, H. J. Perratt, P. C. Congdon, F. Dudgeon.	M.L.	Elders & Fyffes ...	Met. Log. 25.1.26 to 14.6.26 ...	16.6.26.
Canada ...	Jones, T. ...	G. T. Kavanagh	No. M.	White Star-Dominion	Form 911 24.4.26 to 17.5.26 ...	19.5.26.
Canadian Importer	Wallace, C. ...	C. W. Gilding	,, A.	Canadian Govt. Mercantile Marine.	,, 1.6.25 to 7.7.25 ...	24.7.25.
Canadian Inventor	Boulton, F. W. ...	T. Edgar	,, A.	,, ,, ,,	,, 21.11.25 to 9.12.25...	1.2.26.
Canadian Miller	McConechy, W. T.	B. D. Ranns	,,	,, ,, ,,	... ...	...
Canadian Scottish	Wallace, C.	P. D. Angus	,, A.	,, ,, ,,	Form 911 14.2.26 to 19.3.26 ...	28.5.26.
Canadian Skirmisher.	Millar, W. H. ...	R. J. Watson	,, A.	,, ,, ,,	,, 3.3.26 to 15.4.26 ...	5.5.26.
Canadian Winner	Hocking, N. P. ...	R. Girling	,, M.	Union Castle ...	,, 15.3.26 to 28.4.26 ...	4.5.26.
35 *Carmania* ...	Brown, F. G., R.D., Capt., R.N.R.	M. Boston, L. R. Simpson, D. E. Sibson.	W.T.	Cunard	W.T. Reg. 26.4.26 to 14.5.26 ...	20.5.26.
					Form 911 8.5.26 to 15.5.26 ...	20.5.26.
34 *Caronia* ...	Hossack, W. H., R.D., Capt., R.N.R.	R. F. Bovey, T. Ashcroft, D. Butler.	,,	,, ...	W.T. Reg. 17.5.26 to 4.6.26 ...	10.6.26.
					Form 911 19.4.26 to 9.5.26 ...	17.5.26.
52 *Cedric* ...	Hickson, V. W., Lt.-Commr. R.N.R.	E. A. Crowley, A. Thompson, D. K. Crawford.	,,	White Star	W.T. Reg. 12.4.26 to 2.5.26 ...	13.5.26.
					Form 911 11.4.26 to 2.5.26 ...	13.5.26.
53 *Celtic* ...	Berry, G. ...	J. W. Peters, F. E. Patchett, L. Thompson.	,,	,, ,, ...	W.T. Reg. 26.4.26 to 14.6.26 ...	16.6.26.
					Form 911 23.5.26 to 14.6.26 ...	16.6.26.
Centaur ...	Rose, A. F. ...	L. Johnstone	No. M.	A. Holt & Co. ...	,, 6.2.26 to 26.3.26 ...	3.5.26.
Ceramic ...	Roberts, J., C.B.E. D.S.O.,R.D.,Capt., R.N.R.	D. W. Chamberlain ...	,, A.	White Star	,, 20.4.26 to 24.5.26 ...	26.5.26.
Changte ...	Gambrill, F. C. ...	J. Thomas, Tyer, J. A. Allan	M.L.	Yuill & Co.... ...	Met. Log. 30.9.25 to 28.1.26 ...	24.3.26.
China	Cossey, W. F. ...	E. R. Chaffin	No. M.	P. & O.	Form 911 31.3.26 to 19.4.26 ...	21.4.26.
Chindwara ...	Brisley, P. L. ...	W. Welch	,, M.	British India ...	,, 29.8.25 to 17.12.25...	11.1.26.
City of Baroda ...	Houghton, W. ...	A. Beaton, J. Cook, W. H. Dalton.	M.L.	Ellerman	Met. Log. 19.9.25 to 31.5.26 ...	4.6.26.
City of Benares ...	Spencer, H. ...	C. G. Inglis	No. A.	,, ...	Form 911 27.3.26 to 13.4.26 ...	22.4.26.
City of Brisbane...	Seaborne, F. O., D.S.C.	R. W. Watkin	,, A.	,, ...	,, 24.5.26 to 4.6.26 ...	18.6.26.
City of Canterbury	Bremner, D. M. ...	E. Garner	,, A.	,, ...	,, 20.3.26 to 13.6.26 ...	15.6.26.
City of Chester ...	Letton, F. W. ...	F. C. Wilson, H. Asher, W. Speakman.	M.L.	,, ...	Met. Log. 15.11.25 to 3.3.26 ...	8.3.26.
City of Edinburgh	Spencer, H. ...	J. D. MacDonald	No. M.	,, ...	Form 911 4.6.25 to 2.7.25 ...	18.8.25.
City of Hong Kong	Walton, H. L., O.B.E., R.D., Commr. R.N.R.	Westlake	,, A.	,, ...	... ...	...
City of London ...	Martin, D.	J. J. McTigue	,, A.	,, ...	Form 911 8.3.26 to 2.4.26 ...	12.4.26.
City of Marseilles	Brown, G.	W. A. MacAdams, G. F. L. Coates.	,, A.	,, ...	,, 25.2.26 to 18.3.26 ...	22.3.26.
City of Rangoon...	Dunning, T. W. J....	A. Gibb, V. S. Turner, A. H. Cosker, E. J. Sawyer, G. Lawrey.	M.L.	,, ...	Met. Log. 16·6·25 to 17·11·25...	9.12.25.
City of Yokohama	McDonald, W. D. ...	R. A. Fulton	No. A.	,, ...	Form 911 12.2.26 to 5.4.26 ...	26.5.26.
Clan Lamont ...	McCornish, A. B. ...	C. W. Banbury, A. F. Martin	,, A.	Clan	,, 31.1.26 to 8.3.26 ...	6.4.26.
Clan Lindsay ...	Willits, J., R.D., Commr. R.N.R.	J. C. Carter	,, A.	,, ...	,, 9.4.26 to 28.4.26 ...	3.5.26.
Clan Macbeth ...	Young, A. H., R.D., Lieut.- Commdr., R.N.R.	W. Hurst	,, A.	,, ...	,, 18.4.26 to 11.5.26 ...	10.6.26.
Clan Macfadyen	Stenson, F. J., R.D., Capt., R.N.R.	J. W. Charles	,, A.	,, ...	,, 14.3.26 to 10.5.26 ...	14.6.26.
Clan Macgillivray	West, W. F. ...	P. G. de Gruchy	,, A.	,, ...	,, 18.12.25 to 17.1.26...	11.2.26.
Clan Macindoe ...	Law, A. ...	J. G. Baillie	,, A.	,, ...	,, 22.10.25 to 20.1.26...	8.2.26.
Clan Mackellar ...	Scotland, A. ...	D. McAllister	,, A.	,, ...	,, 30.4.26 to 19.5.26 ...	7.6.26.
Clan Mackinnon	McLean, J. G. ...	W. F. Isaac, S. Y. Strange, J. E. Clayton,	M.L.	,, ...	Met. Log. 5.11.25 to 16.2.26 ...	22.3.26.

Name of Vessel.	Captain.	Observing Officers.	Official Meteoro-logical Equipment.	Line.	Last Log, Register, or Report Contributed. Received up to 18.6.26.	Date Received.
Clan Macphee ...	Gourlay, J. B. ...	D. S. Rae, A. W. Jones, J. J. Millar.	M.L.	Clan	Met. Log. 28.12.24 to 24.7.25...	4.8.25.
Clan Macnaughton	Thomson, W. ...	A. J. Storkey, D. MacDiarmid	No. A.	,, ...	Form 911 24.12.25 to 13.1.26...	22.2.26.
Clan Mactaggart...	Gray, J. N. ...	W. J. Henderson	,, A.	,, ...	,, 19.4.26 to 23.5.26 ...	26.5.26.
Clan MacTavish	Higgins, C. J. ...	... ...	,, A.	,, ...	... ...	...
Clan Macvicar ...	Phillips, G. P. ...	L. S. Murrin	,, A.	,, ...	Form 911 14.7.25 to 2.8.25 ...	24.8.25.
Clan Macwhirter	Waterhouse, J. ...	R. W. Roberts	,, A.	,, ...	,, 4.6.26 to 12.6.26 ...	17.6.26.
Clan Macwilliam	Williamson, A. ...	... ...	,, A.	,, ...	... ...	...
Clan Malcolm ...	Neill, G. A. ...	S. M. Werrey Easterbrook, N. MacLeod.	M.L.	,, ...	Met. Log. 18.10.25 to 5.4.26 ...	13.4.26.
Clan Morrison ...	Porterfield, W. M....	G. Morren	No. A.	,, ...	Form 911 30.3.26 to 6.5.26 ...	13.5.26.
Clan Murdoch ...	Miller, W. ...	P. McMillan	,, A.	,, ...	,, 24.3.26 to 14.4.26 ...	17.5.26.
Clan Ranald ...	Openshaw, L. G. ...	T. E. Woodall	,, A.	,, ...	,, 22.1.26 to 23.2.26 ...	25.2.26.
Clan Ross ...	Jones, R. C. ...	G. Short	,, A.	,, ...	,, 28.4.26 to 19.5.26 ...	25.5.26.
Clan Sinclair ...	Neill G. A. ...	J. Brittain	,, A.	,, ...	,, 10.3.25 to 29.7.25 ...	5 8.25.
Clan Urquhart ...	Gibb, A. F. W. ...	T. G. Mitchell	,, A.	,, ...	,, 29.3.26 to 4.4.26 ...	10.5.26.
Colonia, C.S. ...	Campos, V., O.B.E., Lt. - Commr. R.N.R.	S. A. Garnham, C. A. Bullock, L. J. Hegarty, W. R. Matthews, W. Anderson.	M.L.	Telegraph Construction & Maintenance.	Met. Log. 16.1.26 to 29.4.26 ...	25.5.26.
Colonian ...	Gittins. R. P. ...	T. A. Schofield-Miller ...	No. A.	Leyland	Form 911 7.1.26 to 31.1.26 ...	8.2.26.
Comorin ...	Borland, J. Mc. I., C.B., D.S.O., R.D., Capt. R.N.R.	... ...	No.	P. & O.	... ...	...
Concordia ...	Morris, J. ... / Telfer, J. H. ...	T. Philip, J. McIntosh, J. Davies, H. A. Hartley.	M.L.	Anchor Donaldson ...	Met. Log. 7.8.25 to 8.2.26 ...	19.2.26.
Copenhagen ...	Kerr, J. J. ...	... ...	,,	Glen & Co. ...	... ...	...
Corinthic ...	Hart, F.	F. Kean, M. Bennett, F. G. Rogers.	M.L.	White Star ...	Met. Log. 4.4.25 to 18.7.25 ...	27.7.25.
Cornish City ...	James, D. P. ...	... ...	No. A.	Reardon Smith ...	... ...	...
Cornwall ...	Haines, F. P. ...	T. Hains	,, A.	Federal	Form 911 10.4.26 to 25.5.26 ...	28.5.26.
Crawford Castle ...	Morgan, A. O., R.D., Commr. R.N.R.	J. E. R. Wilford	,, A.	Union Castle ...	,, 26.3.26 to 1.5.26 ...	26.5.26.
Cristales ...	Isaacson, J. M. ...	... ...	M.L.	Elders & Fyffes ...	... ...	...
Culebra ...	Mackay, A. S., R.D., Commr. R.N.R.	P. Cooper, J. W. Duncan, C. A. Payne.	,,	R.M.S.P. Co. ...	Met. Log. 4.5.25 to 15.12.25 ...	1.1.26.
Cumberland ...	Deith, G. T. ...	... ...	No.	Federal	... ...	...
Cuthbert ...	Barlow, F. P. ...	S. E. Adam	No. A.	Booth	Form 911 10.1 26 to 24.2.26 ...	15.3.26.
Cyclops ...	Cosker, W. ...	H. L. Cole	,, A.	A. Holt	,, 4.3.26 to 16.3.26 ...	8.4.26.
Dardanus ...	Williams, D. T. ...	C. F. Morgan	,, M.	,, ...	,, 29.4.26 to 13.5.26 ...	14.6.26.
Darian... ...	Masters, W. ...	A. S. Holland	,, A.	Leyland	,, 17.1.26 to 8.3.26 ...	10.3.26.
Darro	Matthews, G. P. ...	R. S. Holland, A. Barff ...	,, M.	R.M.S.P. Co. ...	,, 4.4.26 to 29.5.26 ...	1.6.26.
Demerara ...	Willan, F. C. L. ...	J. J. C. Blake	,, M.	R.M.S.P. Co. ...	,, 21.3.26 to 14.5.26 ...	20.5.26.
Demosthenes ...	Orriss, F. A. ...	J. F. Cruickshank ...	,, M.	Aberdeen	,, 12.4.26 to 1.5.26 ...	26.5.26.
Deseado ...	Hannam, F. S. ...	C. C. Dingle, L. D. Jennings	,, M.	R.M.S.P. Co. ...	,, 19.4.26 to 13.6.26 ...	17.6.26.
Desna	Huff, G. F. ...	J. W. Smith	,, M.	,, ...	,, 20.2.26 to 17.4.26 ...	21.4.26.
Deucalion ...	Findlay, J. ...	L. E. Brown	,, A.	A. Holt	,, 16.1.26 to 5.4.26 ...	12.4.26.
Dieppe... ...	Marmery, S. ...	Mr. Parsons	C.C.	Southern Railway ...	Telegraphic Report 14.6.26 ...	14.6.26.
Dimboola ...	Roy, C. M. ...	G. A. Molyneux	No. A.	Melbourne S.S. Co. ...	Form 911 16.4.26 to 11.5.26 ...	14.6.26.
Discoverer ...	Ling, J. T. ...	H. Hall	,, M.	Harrison	,, 19.12.25 to 5.2.26 ...	25.3.26.
Discovery, R.R S	Stenhouse, J. R., D.S.O., D.S.C., O.B.E., R.D., Commr. R.N.R.	T. W. Goodchild	M.L.	Discovery Expedition	Met. Log. 24.7.25 to 7.1.26 ...	19.2.26.
Domala, M.V. ...	Buswell, W. ...	C. E. Merchant	No. M.	British India ...	Form 911 20.2.26 to 21.4.26 ...	6.5.26.
Doric ...	S.Bolton,D.S.C.,R.D., Commr., R.N.R.	W. F. Dennison, W. Nicoll, E. N. Lloyd.	No.	White Star {	W.T. Reg. 18.4.26 to 11.5.26 ... / Form 911 16.4.26 to 12.5.26 ...	17.5.26. / 17.5.26.
Doric Star ...	Thomas, R. T. ...	L. McDermott	No. M.	Blue Star ...	,, 11.4.26 to 21.4.26 ...	3.5.26.
Dorington Court...	Isaacs, W. A. ...	E. D. A. Gibbs	,, A.	Haldin & Co. ...	,, 12.9.25 to 6.11.25 ...	20.11.25.
Dorset ...	Kettlewell, C. R. ...	E. Smith, H. S. Rogers, S. T. Woodhouse.	M.L.	New Zealand S.S. Co.	Met. Log. 13.6.25 to 29.12.25...	6.1.26.
Dromore Castle ...	Vincent, E. S., R.D., Commr. R.N.R.	D. H. McDougall	No. A.	Union Castle ...	Form 911 11.4.26 to 17.5.26 ...	31.5.26.
Dryden ...	Major, T. W. ...	A. Hewitt	,, M.	Lamport & Holt ...	,, 1.9.25 to 17.9.25 ...	7.10.25.
Duendes ...	Cox, F. D. ...	H. Jones...	,, M.	P.S.N. Co. ...	,, 15.2.26 to 3.3.26 ...	8.3.26.
Dundrum Castle	Weller, H. E. ...	W. S. Byles	,, A.	Union Castle ...	,, 9.2.26 to 9.3.26 ...	10.3.26.
Dunrobin ...	Ramsay, J. D. ...	M. M. Ramsay	,, A.	Glen & Co.	,, 20.4.26 to 18.5.26 ...	31.5.26.
Duquesa ...	Ellis, F., D.S.C. ...	W. Myerscough	,, M.	Furness Withy ...	,, 6.2.26 to 2.4.26 ...	12.4.26.
Durenda ...	Wilson, W. ...	K. G. Pullman	,, M.	British India ...	,, 1.1.26 to 9.1.26 ...	1.2.26.
Edinburgh Castle	Wilford, T. H. ...	... ...	No.	Union Castle ...	Met. Log. 8.1.26 to 24.1.26 ...	29.5.26.
El Cordobes ...	Noton, F. G. ...	S. C. N. Burridge	No. A.	British & Argentine S.N. Co.	Form 911 15.4.26 to 14.5.26 ...	25.5.26.
Elmina ...	Millson, H. E. ... / Allen, E. E. ...	H. Readman, J. M. Stuart, D. S. Mackenzie, J. A. McGough.	M.L.	Elder Dempster ...	Met. Log. 2.12.25 to 19.4.26 ...	25.5.26.
El Paraguayo ...	Smith, F. C. ...	J. Allerton	No. M.	Houlder Bros. ...	Form 911 4.2.26 to 28.3.26	6.4.26.
Elpenor ...	T. W. Hannay ...	M. Robertson	M.L.	A. Holt	Met. Log. 1.11.25 to 1.3.26 ...	4.3.26
Empress of Asia...	Douglas, L. D., R.D., Lt. - Commr., R.N.R.	R. H. Foley, M. Kissack, L. Johnston, L. C. Hogg, T. M. W. Golby.	,,	Canadian Pacific ...	,, 17.9.25 to 29.1.26 ...	2.3.26.
Empress of Australia.	Hailey, A. J. ..	R. Leicester, J. Downes ...	,,	,, ,, ...	,, 21.3.25 to 17.12.25...	12.1.26.
Empress of Canada	Robinson, S., C.B.E., R.D., Commr., R.N.R.	W. S. Halliday, L. C. Barry, J. W. Thomas.	,,	,, ,, ...	,, 1.10.25 to 8.2 26 ...	29 5.26.
Empress of France	Griffiths, E. ...	E. Roberts, F. Chodzko, W Ewens.	,,	,, ,, ...	,, 27.1.26 to 13.4.26 ...	19.4.26.
Empress of Russia	Hosken, A. J. ...	G. R. Newell, H. B. Metcalfe, J. S. Clark, J. H. Reid.	,,	,, ,, ...	,, 17.10.25 to 22.2.26	29.3 26.
Empress of Scotland	Latta, R. G. ...	B. Grant, W. Bacon, F. G. Hutchings.	,,	,, ,, ...	,, 14.11.25 to 20.4.26...	26.4.26.
Endeavour ...	Commr. S. A. Geary-Hill, D.S.O., R.N.	G.S. Norrington, E.V.B. Baker, E. H. B. Baker, J. Torlesse.	,,	His Majesty's Ship ...	,, 7.11.25 to 2.3.26 ...	23.3.26.
Essequibo ...	Duncan, E. E. ...	A. Lyall	No. M.	R.M.S.P. Co. ...	Form 911 25.3.26 to 10.5.26 ...	20.5.26.
Eumaeus ...	Read, J. W. ...	W. J. Ryan	,, A.	A. Holt	,, 28.4.26 to 12.5.26 ...	14.6.26.
Euripides ...	Roberts, T. V. ...	H. S. Cox. G. R. Fisher, G. Perry.	M.L.	Aberdeen	Met. Log. 17.7.25 to 16.4.26 ...	23 4.26
Eurybates ...	Carnon, C. G. ...	C. Napier	No. A.	A. Holt	Form 911 9.4.26 to 28.4.26 ...	31.5.26.
Explorer ...	Lamont, A. ...	Scientific Staff	M.L.	Scottish Fishery Board	Met. Log. 2.3.25 to 17.10.25 ...	29.12.25.
Ferndale ...	Daniel, F.	D. Jones	No. M.	Commonwealth Govt.	Form 911 7.3.26 to 7.4.26 ...	11.5.26.

Name of Vessel.	Captain.	Observing Officers.	Official Meteoro-logical Equipment.	Line.	Last Log, Register, or Report Contributed. Received up to 18.6.26.	Date Received.
Fitzroy ...	Silk, H. V., Lt.-Commr, R.N.	M. E. Welby	M.L.	His Majesty's Ship ...	Met. Log. 25.8.25 to 16.11.25...	21.11.25.
Flandria ...	Veldkamp, G. J. ...	T. Doornbosch	No. M.	Holland Lloyd ...	Form 911 12.3.26 to 29.4.26 ...	3.5.26.
Flinders ...	Henderson, D A., Lt.-Commr., R.N	H. E. Turner	M.L.	His Majesty's Ship ...	Met. Log. 23.8.25 to 20.11.25...	2.12.25.
Francisco ...	Collins, F. ...	C. Walker	No. A.	Ellerman Wilson ...	Form 911 23.1.26 to 5.2.26 ...	15.2.26.
Freya	Angus, W. ..	A. S. Currie	,, A.	Scottish Fishery Board	,, 1.5.26 to 30.5.26 ...	7.6.26.
Garoet	Visser, C. W ...	C. J. Vandenboom	,, M.	Rotterdam Lloyd ...	,, 20.1.26 to 20.2.26 ...	12.4.26.
Gascoyne ...	Rutt, W. N. ...	R. Simpson	,, A.	Dalgety & Co. ...	,, 19.1.26 to 24.2.26 ...	30.3.26.
Gelria	Bakker, T. J. ...	K. H. Schilp	,, M.	Holland Lloyd ...	,, 26.3.26 to 13.5.26 ...	17.5.26.
Glenamoy, M.V. ...	Angier, J. ...	R. H. Bishop	,, A.	Glen Line	,, 7.5.26 to 20.5.26 ...	28.5.26.
Glenapp, M.V. ...	Roberts, W. E. ...	S. W. Bell	,, A.	,, ...	,, 14.11.25 to 27.12.25	4.1.26.
Glenshane ...	Beer, E. ...	R. A. Dale	,, A.	,, ...	,, 21.2.26 to 11.3.26 ...	6.4.26.
Gloucestershire ...	Robin, E. ...	M. W. Simmons	,, A.	Bibby	,, 30.1.26 to 9.4.26 ...	12.4.26.
Gorgon... ...	Hughes, J. W. ...	E. W. Powell	,, A.	A. Holt & Co. ...	,, 11.4.26 to 26.4.26 ...	31.5.26.
Gourko... ...	Aspinall, A. E. ...	G. B. Bray, S. N. Stokes, J. D. Birch.	No.	Ellerman Wilson ...	Met. Log. 16.5.25 to 1.11.25 ...	10.12.25.
Haliartus ...	Marsh, L. V. ...	W. H. Upton	No. A.	R. P. Houston ...	Form 911 11.4.26 to 8.5.26 ...	7.6.26.
Harmony, Auxy.	Jackson, J. C. ...	A. W. Bush	,, A.	Moravian Mission ...	,, 1.12.25 to 18.12.25...	29.12.25.
Hatarana ...	Denne, G. H. A. ... Beedle, T. S.	F. Wells, C. Parkes, W. T. Barnes.	M.L.	British India ...	,, 12.6.25 to 27.2.26 ...	29.3.26.
Hauraki, M.V. ...	Davey, A. H. ...	J. A. Pearson	No. M.	Union S.S. Co. N.Z....	,, 12.1.26 to 17.3.26 ...	29.4.26.
Henry Holmes, C.S.	Bicker Caarten, A.	R J. M. Pearce	,, M.	W. I. & Panama Telegraph Co.	,, 7.7.25 to 5.9.25 ...	23.9.25.
Herald	Harvey, J. R., O.B.E., Commr., R.N.	W. C. Jenks	M.L.	His Majesty's Ship ...	Met. Log. 25.9.25 to 25.12.25	24.2.26.
Herefordshire ...	Mann, R. P. ...	J. E. Cullen, G. Whitworth, P. S. Cooper.	No.	Bibby	,, 11.10.25 to 17.12.25	14.1.26.
Herschel ...	Davies, G. W. ...	J. M. Edgar	No. A.	Lamport & Holt ...	Form 911 14.10.25 to 15.12.25	29.12.25.
Hertford ...	Urquhart, D. ...	A. Robertson	No. A.	Federal	... ...	...
Hibernia ...	Tanner, E. B. ...	R. Woodall	C.C.	L.M. & S. Rly. ...	Telegraphic Report, 22.5.26 ...	22.5.26.
Highland Enterprise	Pond, R. H. ...	J. H. Titton	No. A.	Nelson	Form 911 12.12.25 to 11.2.26...	10.3.26.
,, *Glen* ...	Jones, T. J. ...	W. Jealous	,, A.	,, ...	,, 29.3.26 to 26.5.26 ...	31.5.26.
,, *Heather*	Powell, G. A. ...	J. H. Cables, F. Jeyes ...	No.	,, ...	... ...	...
,, *Laddie*...	Alford, C. ...	E. F. Smart	No. A.	,, ...	Form 911 15.3.26 to 8.5.26 ...	19.5.26.
,, *Piper* ...	Collings, D. ...	A. S. Jones, J. S. Collins W. T. Breen, E. F. Smart.	M.L.	,, ...	Met. Log. 20.6.25 to 3.11.25 ...	18.11.25.
,, *Pride* ...	Davies, G. A. ...	F. Falconer, R. R. Soanes, G. E. Leech.	No.	,, ...	,, 5.12.25 to 31.1.26 ...	4.2.26.
,, *Rover* ...	Ashby Graves. F. ...	G. J. Evans	No. A.	,, ...	Form 911 1.3.26 to 24.4.26 ...	17.5.26.
,, *Warrior*	Robinson, R. H. ...	J. O. Simons	,, M.	,, ...	,, 25.3.26 to 19.5.26 ...	26.5.26.
Hildebrand ...	Maddrell, J. ...	A. Allan	,, A.	Booth	,, 17.3.26 to 29.4.26 ...	5.5.26.
Hobsons Bay ...	Kydd, O. J. ...	Morrison, Hendy, Grantham, M. P. Pearce.	M.L.	Commonwealth Govt.	Met. Log. 24.11.25 to 12.3.26...	18.3.26.
Holbein ...	Gough, W. A. ...	H. L. Rudd	No. A.	Lamport & Holt ...	Form 911 13.2.26 to 28.4.26 ...	5.5.26.
54 *Homeric* ...	Holme, A. ...	A. E. Dyer, A. Griffiths, J. W. Best.	W.T.	White Star	W.T. Reg. 13.5.26 to 28.5.26 ...	1.6.26.
Honorius ...	Samuels, C. ...	J. E. Martin, W. G. Iddes ...	No. A.	R. P. Houston ...	Form 911 27.7.25 to 27.8.25 ...	31.8.25.
Hororata ...	Holland, E. ...	H. J. Wilde	,, A.	New Zealand S.S. Co.	,, 16.7.25 to 27.1.26 ...	2.2.26.
Hubert... ...	Pym, J. H. ...	S. G. Edwards	,, A.	Booth	,, 14.1.26 to 12.3.26 ...	6.4.26.
Hurunui ...	Burton Davies, J....	J. C. Tuckett, C. D. Watt, F. Pover, G. R. Hogg.	M.L.	New Zealand S.S. Co.	Met. Log. 20.11.24 to 17.5.25...	9.6.25.
Ikala	Meetham, J. T. ...	E. Lightfoot, C. W. Smithurst	No. A.	J. H. Welsford & Co.	Form 911 22.5.25 to 5.6.25 ...	16.7.25.
Ingoma ...	Barrow, R. K. ...	O. Stanhope	,, M.	Harrison	,, 10.4.26 to 20.5.26 ...	26.5.26.
Intaba	Gibbings, W. A. ...	A. M. Hughes	,, A.	,, ...	,, 11.3.26 to 25.4.26 ...	30.4.26.
Iris, C.S. ...	Hughes, H. R. ...	... ...	M.L.	Pacific Cable Board ...	... ...	...
Iroquois ...	Jackson, A. L., Commr.. R.N.	A. K. Baxendell	,,	His Majesty's Ship ...	Met. Log. 17.8.25 to 30.11.25...	27.1.26.
Ixion	Williams, R. J. ...	A. S. Brotherton	No. A.	A. Holt	Form 911 21.3.26 to 22.5.26 ...	7.6.26.
Javanese Prince...	Naylor, E. ...	F. Armstrong	,, A.	Prince	... ...	...
Jervis Bay ...	Chaplin, W. R. ...	R. W. Laycock	,, M.	Commonwealth Govt.	Form 911 31.3.26 to 13.4.26 ...	7.6.26.
John Pender, C.S.	Gibson, L.	A. E. Everall	,, A.	Eastern Tel. Co. ...	,, 31.10.25 to 19.11.25	9.12.25.
Justin	Evans, L. ...	A. R. Fasting	,, A.	Booth	... ...	...
Kaikoura ...	McNish, R. ...	H. E. Reilly, H. Neagle, D. Glegg, S. Toyne.	M.L.	New Zealand S.S. Co.	Met. Log. 26.1.25 to 8.8.25 ...	26.8.25.
Kaisar-i-Hind ...	Manley G. ...	G. R. Baker	No. M.	P. & O.	Form 911 10.4.26 to 27.4.26 ...	13.5.26.
Kamo Maru ...	Shiratori, S. ...	—. Heyesaki	,, A.	Nippon Yusen Kaisha	,, 21.3.26 to 11.4.26 ...	10.5.26.
Kangaroo ...	Norris, H. C. ...	R. J. Sinclair, V. J. Denton, J. Egglestone.	M.L.	State Service Australia	Met. Log. 21.9.25 to 27.2.26 ...	14.6.26.
Kashmir ...	Stringer, R.H., O.B.E., Commr., R.N.R.	H. Aubrey	No. M.	P. & O.	Form 911 10.4.26 to 18.4.26 ...	20.4.26.
Kathlamba ...	Mordue, J. A. ...	... ...	,, A.	Ellerman Bucknall ...	,, 9.3.26 to 27.3.26 ...	26.4.26.
Kellett	Maxwell, P. S. E., Commr., R.N.	D. G. V. Williams... ...	M.L.	His Majesty's Ship ...	Met. Log. 29.7.25 to 16.11.25...	18.11.25.
Kenilworth Castle	Chave, Sir B., K.B.E.	J. W. Beckh, A. C. Grove Price, L. G. May, H. L. Iddas.	,,	Union Castle ...	,, 8.2.25 to 26.8.25 ...	12.1.26.
Kent	Downton, M. ...	... ...	No. A.	New Zealand, S.S. Co.	... ...	...
Khiva	Randall, H.W., R.D., Capt., R.N.R.	J. H. Anderson	M.L.	P. & O.	,, 18.1.26 to 23.4.26 ...	4.5.26.
Khyber... ...	Browning, J. B. R.D., Commr., R.N.R.	C. B. Roche	No. M.	,, ...	Form 911 16.4.26 to 4.5.26 ...	31.5.26.
Kia Ora ...	McIntosh, A. ...	E. A. Hickling	M.L.	Shaw Savill & Albion	,, 27.2.26 to 9.4.26 ...	13.4.26.
Kildonan Castle...	Imlah, C. B. ...	G. H. Pickering	,, A.	Union Castle ...	,, 2.1.26 to 21.2.26 ...	1.3.26.
Kitano Maru ...	Gotoh, M.	M. Hara	,, A.	Nippon Yusen Kaisha	,, 12.9.25 to 6.10.25 ...	13.11.25
Knight Companion	Reed, G. C. ...	J. J. Daniel	,, M.	A. Holt	,, 29.4.26 to 15.5.26 ...	26.5.26.
Kovno	Dossor, W. A. ...	J. J. Collier, H. Redfern. S. Duckells, A. Snowdon, J.C. Nettleship, C. Williams.	M.L.	Ellerman Wilson ...	Met. Log. 7.11.25 to 4.4.26 ...	3.6.26.
Kweiyang ...	Byers, G. ...	... ...	,,	China Nav. Co. ...	... ...	...
Kyogle	Coalstad, C. ...	C. B. Odman, E. W. Hughes	No. A.	Commonwealth Lighthouse Service.	Form 911 17.8.25 to 9.11.25 ...	14.12.25.
Lady Denison Pender, C.S.	West, G. W. ...	F. Lawrence	,, A.	Eastern Tel. Co. ...	,, 22.3.26 to 10.4.26 ...	10.5.26.
Laguna ...	Pape, E. R. ...	W. P. Boon	,, A.	Pacific S.N. Co. ...	,, 29.3.26 to 7.5.26 ...	13.5.26.
Lahore ...	Gordon, L. M., R.D., Commr. R.N.R.	A. D. Dennis	,, M.	P. & O.	,, 26.2.26 to 27.4.26 ...	17.5.26.
Lalande ...	Hamill, H.	R. S. Hagley	,, A.	Lamport & Holt ...	,, 30.3.26 to 12.4.26 ...	15.6.26.
Lancashire ...	Beckett. F W. ...	W. M. S. Higginson ...	,, A.	Bibby	,, 27.2.26 to 6.5.26 ...	26.5.26.
36 *Lancastria* ...	Malin, R. G., Lt.-Commr., R.N.R.	P. J. Robinson, R. P. Campbell, L. R. Sharp.	W.T.	Cunard ...	W.T. Reg. 23.5.26 to 13.6.26 ... Form 911 23.5.26 to 13.6.26 ...	18.6.26. 18.6.26.
Laomedon ...	Beswick, W. ...	H. Howe...	No. A.	A. Holt	,, 11.12.25 to 15.1.26...	15.3.26.
La Paz, M.V. ...	Dunn, R. E. ...	F. T. Gale	,, ,,	Pacific S.N. Co. ...	,, 13.2.26 to 4.3.26 ...	25.3.26.

Name of Vessel.	Captain.	Observing Officers.	Official Meteorological Equipment.	Line.	Last Log, Register, or Report Contributed. Received up to 18.6.26.	Date Received.
Laplace ...	Shaw, W. ...	R. B. Langley	No. A.	Lamport & Holt ...	Form 911 6.5.26 to 31.5.26 ...	10.6.26.
					Met. Log. 1.1.26 to 8.5.26 ...	17.5.26.
55 *Lapland* ...	Howell, T. ...	E. Cornellie, F. Good, Flett ...	W.T.	Red Star	W.T. Reg. 15.4.26 to 7.5.26 ...	17.5.26.
					Form 911 17.10.25 to 7.11.25...	9.11.25.
Lassell, M.V. ...	Hickman, V. T. ...	F. J. Durrant	No. A.	Lamport & Holt ...	,, 20.2.26 to 9.3.26 ...	29.3.26.
Leicestershire ...	English, G. L. ...	J. Cullen, P. H. Potter, D. Y. Sharrock, J. Tradewell.	M.L.	Bibby	Met. Log. 2.1.26 to 12.3.26 ...	18.3.26.
Leighton, M.V. ...	Lindesay J. M. ...	H. A. Bolding	No. A.	Lamport & Holt ...	Form 911 2.3.26 to 3.4.26 ...	19.4.26.
Leitrim ...	Robertson, A. ...	H. G. Letts	,, A.	Dowie, J., & Co. ...	,, 14.3.26 to 22.4.26 ...	31.5.26.
Loch Katrine ...	Shillitoe, B. ...	K. Whitaker	,, M.	R.M.S.P. Co. ...	,, 9.3.26 to 30.5.26 ...	7.6.26.
London Commerce	Young, H. J., D.S.C.	H. P. Longland	,, A.	Furness Withy ...	,, 13.3.26 to 16.4.26 ...	22.4.26.
London Importer ..	Williamson, J. M. ...	J. S. Williams, A. B. Gloyne	M.L.	,, ,, ...	Met. Log. 8.2.26 to 26.4.26 ...	28.5.26.
Loriga, M.V. ...	Barkley, E. ...	W. N. Anders	No. A.	Pacific S.N. Co. ...	Form 911 22.5.25 to 6.8.25 ...	25.8.25.
Losada, M.V. ...	Meldrum, G. W. ...	E. Baxter	,, M	,, ,, ...	,, 23.11.25 to 15.2.26	18.2.26.
Macedonia ...	Potter, H. W., R.D., Commr., R.N.R.	E. R. Bodley	,, M.	P. & O.	,, 1.5.26 to 22.5.26 ...	31.5.26.
Macharda ...	Richardson, T. ...	D. M. Fulton	,, M.	Brocklebank ...	,, 23.5.26 to 2.6.26 ...	10.6.26.
Mahana ...	Kershaw, W. A. R.	F. M. Smith, J. C. K. Rogers	M.L.	Shaw, Savill & Albion	,, 13.1.26 to 20.2.26 ...	1.3.26.
Maharaja ...	Elliott, G. F. ...	T. E. Turner	No. M.	Asiatic S.N. Co. ...	,, 18.4.26 to 25.5.26 ...	14.6.26.
Maihar ...	Rowe, J. P. ...	C. Shaw, H. T. Scoins, G. Henshaw, A. C. Hocking.	M.L.	Brocklebank ...	Met. Log. 17.12.25 to 17.2.26...	8.3.26.
Maimyo ...	Richardson, T. ...	P. Yates	No. A.	,, ...	Form 911 23.7.25 to 13.10.25...	3.11.25.
Maiwara ...	Brown, T. M. ...	... ...	M.L.	Burns Philp ...	... ...	...
58 *Majestic* ...	Metcalfe, G. R. ...	W. Pearson, J. Paine, A. Young, W. T. Fitzgerald.	W.T.	White Star... ...	W.T. Reg. 7.5.26 to 10.6.26 ...	14.6.26.
Makambo ...	Brown, T. M. ... McLean, J.	A. Blair. F. C. Vogelmann, T. R. Lang.	M.L.	Burns Philp ...	Met. Log. 8.8.25 to 19.2.26 ...	7.4.26.
Makura ...	Worrall, L. C. H. ...	O. C. Bray, J. M. Hood, A. Foster.	,,	Canadian-Australasian	,, 11.3.25 to 19.2.26 ...	4.5.26.
Malakuta ...	Adamson, F. L. ...	J. H. Round	No. M.	Brocklebank ...	Form 911 28.2.26 to 12.4.26 ...	26.4.26.
Malancha ...	Whitham, F. ...	E. A. Randall	,, M.	,, ...	,, 30.3.26 to 13.4.26 ...	3.5.26.
Malda	Gray, T. N. ...	J. P. Brown	,, M.	British India ...	,, 28.3.26 to 1.5.26 ...	26.5.26.
Manchester Brigade	Stott, C. H. ...	... ...	,, A.	Manchester Liners ...	... ...	...
Manchester Corporation.	Everest, J. E. ...	W. L. Lavers	,, A.	,, ,, ...	,, 17.5.26 to 28.5.26 ...	11.6.26.
Manchester Hero	Riley, J. E. ...	... ...	M.L.	,, ,, ...	... ...	...
Manchester Merchant.	Hudson, J. H. ...	R. A. Walker	No. A.	,, ,, ...	Form 911 14.3.26 to 28.3.26 ...	6.4.26.
Manchester Shipper	Dormer, A. E ...	... ...	M.L.	,, ,, ...	Met. Log. 19.9.25 to 8.5.26 ...	31.5.26.
Manipur ...	Cochran, G. N. ...	R. Penston	No. M.	Brocklebank ...	Form 911 2.3.26 to 16.5.26 ...	17.6.26.
Mantua	Randell, G. G. ...	J. Paice	,, M.	P. & O.	,, 5.5.26 to 19.5.26 ...	14.6.26.
Manzanares ...	Maxwell Brown, W.E.	G. S. Gracie	,, A.	Elders & Fyffes ...	,, 10.11.25 to 25.11.25	4.1.26.
Marburn ...	Stewart, A.... ...	R. H. W. Jackson ...	No. M.	Canadian Pacific ...	Form 911 24.4.26 to 17.5.26 ...	20.5.26.
Marella ...	Mortimer S. ...	J. A. Street	M.L.	Burns Philp ...	Met. Log. 2.4.25 to 25.8.25 ...	1.12.25.
Marengo ...	Collins, T. ... ... Brown, A. M. ...	F. Eglin, J. E. Stott, J. Donovan, B. Bryon, J. Ford	,,	Ellerman Wilson ...	,, 19.9.25 to 8.3.26 ...	16.3.26.
Margha ...	Milne, R. A., R.D., Commr. R.N.R.	J. Strachan, P. Wright, J. Ball.	,,	British India ...	,, 21.2.26 to 2.5.26 ...	4.6.26.
Matakana ...	Thurston, H. P. ...	A. Chrystal	M.L.	Shaw, Savill & Albion	,, 26.7.25 to 3.1.26 ...	8.1.26.
Mataram ...	Hillman, E. J. ...	K. L. Thompson	No. A.	Burns Philp & Co. ...	Form 911 18.6.25 to 18.7.25 ...	31.8.25.
Matheran ...	Columbine, F. F. ...	J. A. Embley, R. E. Gartside, G. T. Hogg, D. Newton.	M.L.	Brocklebank ...	Met. Log. 14.7.25 to 13.10.25...	2.11.25.
Mathura ...	Bacon, A. E. ...	H. H. Armstrong	No. M.	,, ...	Form 911 1.2.26 to 3.3.26 ...	8.3.26.
Matiana ...	Langlands, D. H. ...	G. Earl	,, M.	British India ...	,, 29.4.26 to 27.5.26 ...	31.5.26.
Maunganui ...	Worrall, L. C. H. ...	A. R. Noble	,, M.	Union S.S. Co. of N.Z.	,, 8.8.25 to 3.9.25 ...	28.9.25.
32 *Mauretania* ...	Rostron, A. H., C.B.E., R.D., Capt. R.N.R.	E. R. Taylor, A. Mackellar, L. L. Harper.	W.T.	Cunard	W.T. Reg. 18.4.26 to 14.6.26 ...	16.6.26.
Media	Mallett, R. ...	S. C. Cramb	No. A.	T. & J. Brocklebank...	Form 911 20.10.25 to 20.11.25...	14.12.25.
56 *Megantic* ...	Trant, E. L., Commr. R.N.R.	F. A. Billiald, J. Clarke, N. E. Banks.	W.T.	White Star ...	W.T. Reg. 10.5.26 to 29.5.26 ...	1.6.26.
22 *Melita*	Notley, A. H. ...	D. Dunn, J. Shearer, H. Lewis	,,	Canadian Pacific ...	,, 8.5.26 to 26.5.26 ...	31.5.26.
					Form 911 30.11.25 to 17.12.25	21.12.25.
Memnon ...	Evans, D. L. ...	L. S. Evans	No. A.	A. Holt	,, 16.11.25 to 3.3.26 ...	13.3.26.
Menominee ...	Pollard, W. F., D.S.O., R.D., Capt. R.N.R.	R. Day	,, A.	Atlantic Transport ...	,, 15.10.25 to 21.11.25...	25.11.25.
Mercian ...	Gardner, J. ...	R. Hughes	,, A.	Leyland ...	,, 12.9.25 to 20.9.25 ...	23.9.25.
21 *Metagama* ...	Freer, A. Commr. R.N.R.	R. Walker, A. Mansey ...	W.T.	Canadian Pacific ...	W.T. Reg. 9.5.26 to 28.5.26 ...	3.6.26.
Miami... ...	Makepeace, S. ...	A. F. Woodhouse, J. W. Kendall.	No. A.	Elders & Fyffes ...	Form 911 20.10.25 to 21.11.25	24.11.25.
Minderoo ...	Richardson, E. ...	B. J. Bennie, W. J. McPhedron, J. H. Oxton.	M.L.	West Australia Nav. Co.	Met. Log. 31.5.25 to 9.11.25 ...	12.1.26.
Mirna ...	Mackenzie, G. G. ...	J. H. Hennessey	No. A.	Scottish Fishery Board	Form 911 2.4.26 to 1.5.26 ...	10.5.26.
23 *Minnedosa* ...	Griffiths, J. N. ...	L. Hammersley, F. W. Roberts, W. F. MacGowan.	W.T.	Canadian Pacific ...	W.T. Reg. 23.5.26 to 9.6.26 ...	11.6.26.
Minnetonka ...	Gates, T. F., C.B.E.	H. E. McCartney	No. M.	Atlantic Transport ...	,, 11.4.26 to 1.5.26 ...	4.5.26.
Minnewaska ...	Claret, F. H., C.B.E., Commr., R.N.R.	J. W. Grier	,, M.	,, ,, ...	,, 27.2.26 to 6.3.26	13.3.26.
Mirror, C.S. ...	Gibson, L. ...	A. G. Watts	,, M.	Eastern Tel. Co. ...	,, 21.4.26 to 24.4.26 ...	7.5.26.
Moldavia ...	Burleigh, C. W., D.S.O., R.D., Capt., R.N.R.	G. E. Owen	,, M.	P. & O.	,, 7.4.26 to 23.5.26 ...	10.6.26.
Mongolian Prince	Durrant, G. D. ...	M. Gibson	,, A.	Prince	,, 13.9.25 to 15.10.25...	26.10.25.
Monkbarns, Ship	Davies, W. ...	R. Baise	,, A.	J. Stewart & Co. ...	,, 23.10.25 to 16.11.25	29.12.25.
24 *Montcalm* ...	Hamilton, G. ...	H. McFadyen	W.T.	Canadian Pacific ...	W.T. Reg. 22.5.26 to 10.6.26 ...	14.6.26.
					,, 25.4.26 to 14.5.26 ...	18.5.26.
25 *Montclare* ...	Webster, G. S., R.D., Lt.-Commr., R.N.R.	R. Fegan, H. S. Knight, A. Harrison.	,,	,, ,, ...	,, 2.5.26 to 20.5.26 ...	26.5.26.
					Form 911 2.5.26 to 21.5.26 ...	26.5.26.
Montferland ...	Van Noppen, C. D.	Van der Mast	No. M.	Holland Lloyd ...	,, 30.11.25 to 26.2.26...	2.3.26.
27 *Montnairn* ...	Turnbull, J., C.B.E., R.D., Capt., R.N.R.	F. E. Williams, T. H. Carter, T. Jones.	W.T.	Canadian Pacific ...	W.T. Reg. 23.5.26 to 10.6.26 ...	14.6.26.
Montoro ...	Donaldson, A. ...	K. Morris	No. A.	Burns, Philp & Co. ...	Form 911 2.9.25 to 19.10.25 ...	14.12.25.
26 *Montrose* ...	Landy, E. ...	A. Watt, R. Woods, J. Patrick.	W.T.	Canadian Pacific ...	W.T. Reg. 21.3.26 to 4.6.26 ...	17.6.26.

Name of Vessel.	Captain.	Observing Officers.	Official Meteoro-logical Equipment.	Line.	Last Log, Register, or Report Contributed. Received up to 18.6.26.	Date Received.
20 *Montroyal* ...	Sibbons, H. ...	J. H. Tudor, R. Hains, W. Biggs.	W.T.	Canadian Pacific ...	W.T. Reg. 18.1.26 to 5.4.26 ...	15.4.26.
Moresby ...	Edgell, J. A., O.B.E., Capt. R.N.	C. F. Mills	M.L.	His Majesty's Australian Ship.	Met. Log. 4.7.25 to 13.12.25 ...	10.2.26.
Morvada ...	Mills, T. L., O.B.E., R.D., Commr., R.N.R.	A. J. Norris	No. M.	British India ...	Form 911 14.3.26 to 4.6.26 ...	8.6.26.
Mulbera ...	Steadman W. R. ...	F. Broomhead	No. M.	,, ...	,, 1.5.26 to 13.5.26 ...	11.6.26.
Nagara ...	Buret, T. J. C. ...	F. A. C. Thacker	No. M.	R.M.S.P. Co. ...	,, 16.1.26 to 19.3.26 ...	26.3.26.
Nagoya	Davis, H. C. ...	P. Haworth	,, M.	P. & O.	,, 23.1.26 to 14.2.26 ...	8.3.26.
Nardana ...	Moth, F. L. ...	S. C. T. Smith	,, M.	British India ...	,, 15.9.25 to 25.10.25...	31.10.25.
Nellore	Hignett, A. H., R.D., Lt. - Commr. R.N.R.	F. Squire	,, M.	P. & O.	,, 10.1.26 to 7.2.26 ...	9.2.26.
Nestor	Owen, R. D., O.B.E.	D. Rees, F. J. Silva, D. W. Stroud.	M.L.	A. Holt	Met. Log. 24.1.26 to 30.5.26 ...	4.6.26.
Newby Hall ...	Edge T. P. ...	R. H. Stewart, G. E. M. Jenkins, R. M. Redhead, D. F. Galloway.	M.L.	Ellerman	Met. Log. 18.12.25 to 15.5.26...	10.6.26.
Niagara ...	Showman, A. C. ...	T. A. Macpherson, J. Dawson, A. P. Cousin. D. McKenzie	,,	Canadian-Australian...	,, 27.8.25 to 10.1.26 ...	2.3.26.
Ningchow ...	Wilson, C. A. ...	G. H. Oldridge	No. A.	A. Holt	Form 911 17.3.26 to 2.4.26 ...	31.5.26.
Norna	Wright, J. ...	T. Mather	,, A.	Scottish Fishery Board	,, 1.5.26 to 31.5.26 ...	7.6.26.
Norseman, C.S. ...	Barter, H. O., R.N., Commr., R.N.R.	... ...	M.L.	Western Tel. Co. ...	Met. Log. 19.10.25 to 29.4.26...	17.5.26.
Northwestern Miller	Nuttall, E. L. ...	... ...	No.	Furness Withy ...	... ...	...
Nubian ...	Watmough, T. M. ...	H. R. Gaskill	No. A.	Leyland	Form 911 23.12.25 to 24.1.26	28.1.26.
Oaklands Grange ...	Routledge, R. ...	E. J. Longheed	No. A.	Houlder Bros. ...	Form 911 15.4.26 to 15.5.26 ...	25.5.26.
42 *Ohio* ...	Parker, W.H., C.B.E., R.D., Capt. R.N.R.	D. R. Miller, H. Baylis, E. A. E. Littlewood.	W.T.	R.M.S.P. Co. ...	W.T. Reg. 3.5.26 to 22.5.26 ...	28.5.26.
					Form 911 1.5.26 to 24.5.26 ...	28.5.26.
57 *Olympic* ...	Marshall, W., C.B., D.S.O., R.D., Capt., R.N.R.	H. J. C. Day, A. Fisher, J. Law.	W.T.	White Star ...	W.T. Reg. 20.5.26 to 3.6.26 ...	8.6.26.
					Form 911 19.5.26 to 3.6.26 ...	8.6.26.
Orama	Staunton, H. G., C.B.E., R.D., Commr R.N.R.	L. J. Vesty, F. L. Hubbard, J. S. Metcalfe, A. S. Nicholls, T. Fox Russell.	M.L.	Orient	Met. Log. 15.11.25 to 16.2.26...	23.2.26.
Oranian ...	Hoskins, W. ...	R. H. Theaker	No. A.	Leyland	Form 911 16.8.25 to 3.9.25 ...	17.9.25.
Orari	Robinson, F. W. ...	F. Longheed, C. Wilkinson, W. Tarr.	M.L.	New Zealand S.S. Co.	Met. Log. 15.9.25 to 9.6.26 ...	17.6.26.
40 *Orbita* ...	Warner, G. E., R.D., Capt. R.N.R.	C. V. Fletcher, H. H. Treweeks.	W.T.	R.M.S.P. Co. ...	W.T. Reg. 22.5.26 to 9.6.26 ...	16.6.26.
					Form 911 17.10.25 to 10.11.25	12.11.25.
Orcoma ...	Dominy, R. H., C.B.E., Commr. R.N.R.	R. Griffiths, W. Billington ...	M.L.	Pacific S.N. Co. ...	Met. Log. 18.2.26 to 4.5.26 ...	14.5.26.
41 *Orduna* ...	Smith, W. E. D.S.O., R.D., Capt. R.N.R.	H. G. Whittle, S. Robbins, R. W. Sumpton.	W.T.	R.M.S.P. Co. ...	W.T. Reg. 16.5.26 to 6.6.26 ...	10.6.26.
					Form 911 15.5.26 to 6.6.26 ...	11.6.26.
Oriana	Ross, J.	W. Pearce, R. D. Eckford, T. H. McGill.	M.L.	Pacific S.N. Co. ...	Met. Log. 10.2.26 to 24.4.26 ...	3.5.26.
Orita	Splatt, W. A. ...	T. R. Scott, D. W. Hutchinson, R. W. Hanson, G. R. Bubb.	,,	,, ,, ...	,, 17.2.26 to 29 5.26 ...	9.6.26.
Ormonde ...	Knowles, C. H., D.S.O., Commr., R.N.	A. M. Hughes	,,	His Majesty's Ship ...	,, 4.9.25 to 4.12.25 ...	22.12.25.
Ormonde ...	Shelford, W. S., Lt.-Commr., R.N.R.	B. Winsor, H. Petit Dan, J. F. Thompson.	,,	Orient	,, 7.2.26 to 11.5.26 ...	17.5.26.
Ormuz ...	O'Sullivan, F. R. ...	E. Hatch, W. Wickham, W. Elliot.	,,	,, ...	,, 1.11.25 to 4.2.26 ...	10.2.26.
Oronsay ...	Owens, A. L., R.D., Lt. Commr., R.N.R.	— Hatch, — Rice, W. Elliot	,,	,, ...	,, 21.2.26 to 25.5.26 ...	31.5.26.
Oroya	Pearce, A. ...	S. Lewis	No. M.	Pacific S.N. Co. ...	Form 911 27.1.26 to 6.4.26 ...	13.4.26.
Orsova	Matheson, C. G., D.S.O., R.D., Capt., R.N.R.	G. E. Martin, A. J. Croft Cohen, H. Petit Dann.	M.L	Orient	Met. Log. 26.7.25 to 12.1.26 ...	20.1.26.
Orvieto	James, L. V., D.S.C.	L.E. Fordham, J. Goldsworthy, A. Hawker, A. H. Dyer.	M.L.	,, ...	,, 24.8.25 to 17.3.26 ...	23.3.26.
Osterley ...	Sarson, M. J. ...	H. Tanner, N. A. Whinfield, S. Burnnand.	No.	,, ...	,, 24.1.26 to 27.4.26 ...	20.5.26.
Otira	Elford H. E. ...	E. J. Riccard	No. M.	Shaw, Savill & Albion	Form 911 19.3.26 to 7.4.26 ...	7.5.26.
Otranto ...	Simner, G. L., R.D., Commr., R.N.R.	R. H. Rogerson	,, M.	Orient	,, 29.1.26 to 10.4.26 ...	15.4.26.
Ovid	Groom, A. C. B. ...	... ...	,, A.	Shakespear Shipping Co.	,, 10.5.26 to 19.5.26 ...	26.5.26.
Oxfordshire ...	Crumplin, W. E. ...	... ...	,, A.	Bibby Bros. ...	,, 25.3.26 to 23.4.26 ...	4.5.26.
Pacific Shipper, M.V.	Newman, G. W. A.	G. Davis	,, A.	Furness Withy ...	,, 14.12.25 to 17.3.26	22.3.26.
Pakeha ...	W. P. Clifton Mogg	E. T. Baker, A. Black, A. Lockhart	M.L.	Shaw, Savill & Albion	Met. Log. 26.9.25 to 28.2.26 ...	8.3.26.
Pareora ...	Evans, J. O. ...	R. F. Hillings	No. A.	Hain S.S. Co. ...	Form 911 28.12.25 to 6.2.26 ...	11.2.26.
Paris	Cook, C. L. ...	Mr. Biles...	C.C.	Southern Rly. ...	Telegraphic Report. 14.4.26 ...	14.4.26.
Patia	Bostock, R. J. ...	W. McIlwaine	No. A.	Elders & Fyffes ...	Form 911 4.7.25 to 8.8.25 ...	12.8.25.
Patrician ...	Pugh, — ...	... ...	No. M.	Harrison	... ...	...
Patrol C.S. ...	Welsh, T. K. ...	H. F. P. Albrecht	M.L.	Eastern Extension (A. & C.) Telegraph Co.	Met. Log. 8.7.25 to 3.2.26 ...	1.4.26.
Persic	Bulman, J. B. ...	R. Conway	No. A.	White Star ...	Form 911 27.9.25 to 4.11.25 ...	17.3.26.
Peshawur ...	Hester, C. W., R.D., Commr., R.N.R.	D. G. Baillie, E. J. R. North, R. D. Whyte-Mackay.	M.L.	P. & O.	Met. Log. 18.7.25 to 22.11.25...	24.11.25.
Pharos ...	Ewing, T. N. ...	A. McLachlan	No. A.	Northern Lighthouse Board.	Form 911 29.6.25 to 14.8.25 ...	18.8.25.
Philadelphian ...	Baker, J. A. ...	W. T. Godwin	,, A.	Leyland	,, 9.10.25 to 1.11.25 ...	16.11.25.
Polycarp ...	Evans, T. G. ...	C. W. Smethurst	,, A.	Booth	,, 21.4.26 to 7.5.26 ...	17.5.26.
Port Adelaide ...	Hayter S W. ...	E. Catchpole, G. Lovegrove, C. Hodson.	M.L.	Commonwealth & Dominion.	Met. Log. 21.8.25 to 28.12.25...	7.1.26.
Port Albany ...	Robinson, C. A. ...	E. A Leavett, A. G. Newbury, W. Eastoe, N. A. Crowe.	,,	,, ,,	,, 14.11.25 to 13.4.26...	21.4.26.

Name of Vessel.	Captain.	Observing Officers.	Official Meteorological Equipment.	Line.	Last Log, Register, or Report Contributed. Received up to 18.6.26.	Date Received.
Port Auckland ...	Durham, R. S. ...	R. B. Stannard	No. A.	Commonwealth & Dominion.	Form 911 25.11.25 to 5.1.26 ...	20.1.26.
,, *Bowen* ...	Gilling, W.	W. R. Johnston	,,	,, ,, ,,	... ...	...
,, *Caroline* ...	Renaut, F. A. ..	H. H. Smith, E. Fenton, C. Chamberlin, A. T. C. Cooper.	M.L.	,, ,, ,,	Met. Log. 3.10.25 to 11.4.26 ...	19.4.26.
,, *Chalmers* ...	Enright, W. J. ...	J. B. Bradley, A. E. Fishwick, E.N. Rogerson, N. H. Bloye.	,,	,, ,, ,,	,, 3.12.25 to 7.5.26 ...	29.5.26.
,, *Darwin* ...	Sawbridge, I. R. ...	E. T. N. Lawrey, G. F. Pannett.	No. A.	,, ,, ,,	Form 911 27.1.26 to 10.3.26 ...	22.4.26.
,, *Denison* ...	Ferris, J. ...	W. H. Sadler, J. C. Goddard	,, M.	,, ,, ,,	,, 15.6.25 to 14.8.25 ...	21.9.25.
,, *Dunedin* ...	Hutchinson ...	E. G. Jones	No. A.	,, ,, ,,	,, 7.1.26 to 1.5.26 ...	19.5.26.
,, *Hacking* ...	Hoad, A. C. ...	C. Newton	No. A.	,, ,, ,,	,, 18.11.25 to 2.1.26 ...	5.1.26.
,, *Hobart* ...	Craven, R.	L. Copeland	No.	,, ,, ,,	... ...	...
,, *Hunter* ...	Cottell, S. C. ...	A. Cooper, C. F. Post, J. T. Weldin.	M.L.	,, ,, ,,	Met. Log. 30.10.25 to 2.4.26 ...	14.4.26.
,, *Kembla* ...	Van den Bergh, C....	W. A. C. Sadler	No. A.	,, ,, ,,	... ...	...
,, *Melbourne* ...	Kearney, F. J. ...	D. G. H. Bradley, J. A. Fairbairn, A. G. Starkey.	M.L.	,, ,, ,,	Met. Log. 17.10.25 to 1.4.26 ...	7.4.26.
,, *Napier* ...	Jones, C. N. ...	M. E. Craven	No. A.	,, ,, ,,	Form 911 27.3.26 to 14.4.26 ...	4.5.26.
,, *Nicholson* ...	Jack, J. ...	... ...	,,	,, ,, ,,	... ...	...
,, *Pirie* ...	Higgs, W. G. ...	H. C. Jeffery, W. G. Jones, N. M. Muzzill, S. Hearn.	M.L.	,, ,, ,,	Met. Log. 26.8.25 to 27.2.26 ...	2.3.26.
,, *Sydney* ...	Lea, W. H. ...	G. L. H. Dean, K. D. Morgan, H. G. Boys Smith.	,,	,, ,, ,,	,, 8.5.26 to 8.6.26 ...	11.6.26.
,, *Victor* ...	Swan, L. H. ...	W. Howe, W. Renouf, W. J. Watson.	,,	,, ,, ,,	,, 6.9.25 to 2.6.26 ...	7.6.26.
,, *Wellington* ...	Farmer, F.	... ...	No	,, ,, ,,	... ...	...
President Jackson	Griffith, J ...	B. Christensen	No. A.	Pacific Mail S.S. Co....	Form 911 12.3.26 to 9.4.26 ...	17.5.26.
President Jefferson	Nichols, F. R. ...	C. H. Moen	,, A.	Admiral Oriental Line	,, 4.4.26 to 22.6.26 ...	11.6.26.
Protea, H.M.S.A.S.	Woodhouse, A. F. B., Lt.-Commr., R.N.	R. J. Whitley	,, A.	South African Naval Service.	,, 8.3.26 to 16.4.26 ...	18.5.26.
Pyrrhus ...	Elford, W. J. ...	J. L. Millar...	,, A.	A. Holt	,, 7.1.26 to 23.3.26 ...	6.4.26.
Ranpura ...	King, A. M., D.S.C.	R. H. Hand	No. M.	P. & O.	,, 20.3.26 to 13.5.26 ...	18.5.26.
Regina ...	Smith, R. G. ...	G. W. Couch, R. H. Shaw, C. Cochrane.	M.L.	White Star-Dominion	W.T. Reg. 5.4.26 to 20.4.26 ... / Form 911 5.4.26 to 20.4.26 ...	22.4.26. / 26.4.26.
Reindeer ...	Langdon, C. ...	... ...	C.C.	G.W. Railway ...	Telegraphic Report 15 5.26 ...	15.5.26.
Remuera	Cameron	P. McCullum	No.	New Zealand S.S. Co.	... ...	...
Rhodesian Transport.	Fowler, W. H. ...	W. Heritage	No. A.	Houlder Bros. ...	Form 911 14.11.25 to 12.3.26...	18.3.26.
Rimutaka ...	Henming, F. A. ...	F. Bishop	M.L	New Zealand S.S. Co.	Met. Log. 31.5 25 to 29 3.26 ...	1.4.26.
Risaldar ...	Park, G.	A. J. Cavallo, H. Hardwick, C. M. Knight.	,,	Asiatic S.N. Co. ...	,, 11.10.25 to 9.4.26 ...	11.5.26.
Romney ...	Syms, G.	H. Trodden	No. A.	Lamport & Holt ...	Form 911 9.10.25 to 21.10.25...	30.11.25.
Rotorua ...	Hunter, J. B. ...	D. F. Clegg, E. Lawrence, R. H. Cockerill.	M.L.	N.Z.S. Co. ...	Met. Log. 13.2.26 to 29.5.26 ...	8.6.26.
Royal Fusilier ...	Dawson, J. ...	J. Fraser	No. A.	London & Edinburgh S.S. Co.	Form 911 14.4.26 to 27.5.26 ...	31.5.26.
Royal Transport...	Dove, J.	R. Martin	,, A.	Houlder Bros. ...	,, 17.11.25 to 17.12.25	21.12.25.
Ruapehu ...	McKellar, A. W., R.D., Capt., R.N.R.	– Lettington, J. D. Tooms, A. J. Webb, E. Russel.	M.L.	New Zealand S.S. Co.	Met. Log. 20.11.25 to 22.3.26...	27.3.26.
St. Albans ...	Smith, G. L. ...	J.W. Kavanagh, J. F. Heddle, H. J. Jeans, W. McIntyre.	,,	Eastern and Australian	,, 5.8.25 to 2.12.25 ...	24.3 26.
St. Helier ...	Mulhall, W. ...	C. Bell	C.C.	G.W. Railway ...	Telegraphic Report 10.6.26 ...	10.6.26.
St. Julien ...	Langdon, C. H. ...	C. Joy	,,	,, ...	,, ,, 17.6.26 ...	17.6.26.
St. Patrick ...	Bearpark, E. W. ...	J. Hill	No. A.	Rankin Gilmour ...	Form 911 15.1.26 to 1.2.26	15.2.26.
Salaga	Sola, P., D.S.O. ...	G. E. Dutton	,, A.	Elder Dempster ...	,, 12.1.26 to 9.2.26 ...	15.2.26.
Samaria ...	McNeil, S. G. S. ...	H. L. Pryse	,, A.	Cunard	,, 1.5.26 to 24.5.26 ...	26.5.26.
Sandown Castle ...	Jackson, C. R. ...	P. G. Maciver	,, A.	Union Castle ...	,, 16.12.25 to 23.2.26...	26.2.26.
Saxoleine ...	Rodgers, C. S. ...	R. Johnsen	No. A.	Hunting & Son ...	,, 18.2.26 to 9.3.26 ...	29.3.26.
Saxon	Knight, A. ...	T. M. Lockwood	,, A.	Union Castle ...	,, 19.2.26 to 11.4.26 ...	13.4.26.
Scholar ...	McCullum, J. ...	J. D. Grieves	,, M.	Harrison	,, 1.4.25 to 20.6.25 ...	2.7.25.
Scindia ...	Matthews, W. ...	R. S. Paton	,, A.	Anchor	,, 28.11.25 to 1.3.26...	8.3.26.
Scotia	Prichard, S.D. ...	O. W. L. Jones	C.C.	L.M. & S. Rly. ...	Telegraphic Report 12.6.26 ...	12.6.26.
Scottish Bard ...	McDonnell S.	J. W. Lilley	No. A.	Tankers Ltd. ...	Form 911 31.1.26 to 15.2.26 ...	9.3.26.
33 *Scythia* ...	Prothero, W. ...	A. Nicholson, J. C. Munro, J. W. Caunce.	W.T.	Cunard	W.T. Reg. 9.5.26 to 29.5.26 ... / Form 911 9.5.26 to 29.5.26 ...	3.6.26. / 7.6.26.
Sheaf Mount ...	Groves, C. V. ...	C. A. Goold	No. A.	W. A. Souter ...	,, 22.1.26 to 26.2.26 ...	12.4.26.
Sheaf Spear ...	Whitfield G. A., O.B.E.	W. H. Grisewood, N. Thompson.	M.L.	,, ...	Met. Log. 22.7.25 to 5.3.26 ...	29.3.26.
Socrates ...	Taylor, F. C. ...	W. E. Jordan	No. A.	Lamport & Holt ...	Form 911 21.2.26 to 10.5.26 ...	28.5.26.
Soekaboemi ...	Z. W. Flach ...	C. van Reenen	,, M.	Rotterdam Lloyd ...	,, 19.12.26 to 28.3.26	19.4.26.
Somerset ...	Barnett, H. ...	J. J. Youngs	,, M.	N.Z.S. Co.	,, 15.12.25 to 21.1.26...	26.1.26.
Somersetshire ...	Leitch, R. C. ... / Griffiths, C. A.	P. Hawkins, R. C. Leitch, H. G. Walton.	M.L.	Bibby	Met. Log. 14.12.25 to 18.3.26	8.4.26.
Somme... ...	Miles, F. R., Commr., R.N.R.	H. Chamberlain, A. P. Portsmouth.	No	R.M.S.P. Co. ...	,, 22.11.24 to 29.8.25...	10.2.26.
Spectator ...	Harding, C. H. J. ...	D. Fraser, J. G. F. Betson ...	No. A.	,, ...	Form 911 20.11.25 to 20.2.26...	26.2.26.
Spero	Norton, W. J. ...	T. E. Fea, R. O. Otley ...	M.L.	Ellerman Wilson ...	Met. Log. 22.5.25 to 6.12.25 ...	10.12.25.
Stockwell ...	Thowless, E. ...	W. Gibson	No. A.	Brocklebank ...	Form 911 2.5.26 to 17.5.26 ...	14.6.26
Stuart Prince ...	Kemp, E. J. ...	W. Venn	,, A.	Prince	,, 18.2.26 to 6.3.26 ...	26.4.26.
Suwa Maru ...	Okuno, Y. ...	T. Nosaka	No. A.	Nippon Yusen Kaisha	,, 21.3.26 to 4.4.26 ...	5.5.26.
Tainui ...	Hartman, W. H. ...	P. S. Horwood	,, A.	Shaw, Savill & Albion	,, 17.3.26 to 22.4.26 ...	26.4.26.
Tairoa	Summers. W. G. ...	S. A. Bannister	,, A.	,, ,, ,,	,, 30.3.26 to 12.5.26 ...	17.5.26.
Tahiti ...	Aldwell, B. L. ...	W. Gould	,, A.	Union S.S. Co. of N.Z.	,, 25.2.26 to 16.4.26 ...	26.5.26.
Taiping ...	Hamilton, H. E. ...	... ...	M.L.	Yuill & Co. ...	... ...	...
Talthybius ...	Ireland, T. R. ...	P. Elder	No. A.	A. Holt	Form 911 19.9.25 to 26.10.25...	2.11.25.
Tanda	Pilcher, E. ... / Laing, J. D. ...	C. G. Holdaway, R. Lloyd Harry, B. Dun, H. Jeans.	M.L.	E. & A. S.S. Co. ...	Met. Log. 2.12.25 to 1.3.26 ...	7.4.26.
Tambora ...	Huisman, N. ...	H. Van Manen	No. M.	Rotterdam Lloyd ...	Form 911 15.2.26 to 31.3.26 ...	15.4.26.
Teiresias ...	Dodds, R. ...	W. H. Newby	No. A.	A. Holt & Co. ...	,, 13.12.25 to 14.1.26...	28.1.26.
Tekoa	Barnett, H. ...	... ...	No. M.	New Zealand S.S. Co.	,, 17.3.26 to 8.4.26 ...	13.5.26.

Name of Vessel.	Captain.	Observing Officers.	Official Meteorological Equipment.	Line.	Last Log, Register, or Report Contributed. Received up to 18.6.26.	Date Received.
Telamon ...	Duggan, C. ...	G. Bevan	No. A.	A. Holt	Form 911 30.3.26 to 16.4.26 ...	17.5.26.
Teucer ...	Hodgson, R. N. ...	A. Lightbody	,, A.	,, ...	,, 16.4.26 to 26.5.26 ...	7.6.26.
Themistocles ...	Jermyn, W. M. ...	R. J. Buckland	,, M.	Aberdeen	,, 18.4.26 to 7.5.26 ...	14.6.26.
Theseus ...	Jones, E.	W. A. Fyffe	,, A.	A. Holt	,, 20.3.26 to 30.3.26 ...	8.4.26.
Titan	Wilkinson, T. G. ...	S. C. Tinmouth, J. Morris, N. L. Thompson.	M.L.	,, ...	Met. Log. 20.10.25 to 11.3.26...	18.3.26.
Tongariro ...	White Parsons, V.C.	G. B. H. Jones	No. M.	New Zealand S.S. Co.	Form 911 2.4.26 to 9.5.26 ...	25.5.26.
Transylvania ...	Bone, D. W. ...	A. Middleton	No. A.	Anchor	,, 16.5.26 to 5.6.26 ...	10.6.26.
Traveller ...	Worthington, B. ...	... ...	No.	T. & J. Harrison ...	... ...	...
Trematon ...	Evans, B. ...	R. Gregory, J. Toms, J. Bell.	M.L.	Hain S.S. Co. ...	Met. Log. 2.9.25 to 8.2.26 ...	2.3.26.
Turakina ...	Hamilton, E. S. ...	A. N. Marshall, G. S. Shepherd	No. M.	New Zealand S.S. Co.	Form 911 9.2.26 to 4.5.26 ...	26.5.26.
Tuscana ...	Gemmell, W. J. ...	J. Hamilton	No. A.	Anchor	,, 2.5.26 to 22.5.26 ...	28.5.26.
Tyndareus ...	Slater, H. N. ...	C. Broad, A. C. H. Jones, S. A. Beith.	M.L.	A. Holt	Met. Log. 16.7.25 to 16.12.25...	12.1.26.
Ulimaroa ...	Wylie, W. J. ...	J. Gilbertson	No. M.	Huddart Parker, Ltd.	... ...	...
Ulysses ...	McHutcheon, W. ...	H. A Standfield	No. A.	A. Holt	Form 911 28.1.26 to 11.3.26 ...	16.3.26.
Umvolosi ...	Barnes, E. W. ...	R. L. B. Ryde	,, A.	Bullard King ...	,, 18.3.26 to 24.4.26 ...	17.5.26.
Valacia ...	Doyle, M. ...	N. Grayson	,, M.	Cunard	,, 8.1.26 to 19.5.26 ...	31.5.26.
Vardulia ...	Hughes, W. ...	A. Watts	,, A.	Cunard	,, 3.11.25 to 14.11.25...	8.2.26.
Vasconia ...	Inch, F.	G. Watts	,, A.	,, ...	,, 22.1.26 to 15.3.26 ...	26.3.26.
Verbania ...	Pooley, T. S. M. ...	W. Bradley	,, A.	Cunard	,, 4.4.26 to 7.5.26 ...	11.5.26.
Verentia ...	Wray, C. M. ...	F. H. Wood	,, A.	,, ...	,, 11.1.26 to 24.3.26 ...	6.4.26.
Vigilant ...	Simpson, E. S. S. ...	J. Hunter	,, A.	Scottish Fishery Board	,, 16.5.26 to 31.5.26 ...	7.6.26.
Waimana ...	Andrews, C. M. ...	... ...	,, A.	Shaw, Savill & Albion	,, 21.4.26 to 1.6.26 ...	8.6.26.
Waiotapu ...	Norton. A. ...	W. Johnson	,, A.	Canadian-Australasian	,, 19.3.26 to 16.4.26 ...	17.5.26.
Walmer Castle ...	Chave, Sir B., K.B.E.	H. A. Deller	,, A.	Union Castle ...	,, 7.5.26 to 23.5.26 ...	7.6.26.
Wangaratta ...	Scutt, W. ...	T. W. Wordingham, G. R. Millard, K. M. Morrison, N. A. Pope.	M.L.	British India ...	Met. Log. 30.8.25 to 19.1.26 ...	26.1.26.
Warfield ...	Steel, R.	H. Coffey	No. A.	,, ,, ...	Form 911 11.4.26 to 8.5.26 ...	7.6.26.
War Nizam ...	Moncrieff	... ...	No.	British Tankers ...	... ...	...
Welshman ...	Rollerson, W. ...	W. A. Fletcher	No. M.	White Star-Dominion	,, 29.4.26 to 25.5.26 ...	31.5.26.
Westmoreland ...	Upton, H. C. ...	R. G. Kers	M.L.	Federal	,, 18.9.25 to 3.4.26 ...	3.5.26.
White Heather, Ketch	Glenister, S. L. ...	F. R. Smith	No.	S. L. Glenister ...	... ...	...
Windsor Castle ...	Strong, H., R.D., Commr., R.N.R.	F. Wilbraham	M.L.	Union Castle ...	Form 911 26.3.26 to 16.5.26 ...	26.5.26.
Winifredian ...	Harrocks, W. ...	G. P. Boyle	No. M.	Leyland	,, 14.12.25 to 19.1.26...	30.1.26.
Woodarra ...	Reilly, J. V. ...	L. D. Graham, G. Hyland ... L. C. Comber, J. Wallace.	M.L.	British India ...	Met Log. 27.9.25 to 13.2.26 ...	22.2.26.
Yorkshire ...	Millson, G. C. ...	E. E. Jones	No. A.	Bibby	Form 911 11.12.25 to 17.2.26...	19.2.26.
Zeeland ...	Harvey, H. ...	W. N. Jenkins	,, M.	Red Star	,, 23.5.26 to 12.6.26 ...	14.6 26.
Conway H.M.S.	Broadbent, H. W., R.D. Capt., R.N.R.	The Senior Cadets... ...	Cadets' M.L.	... ...	Cadets' Met. Log. 24.1.26 to 3.4.26	12.4.26.
Pangbourne Nautical College.	Tracy, A. F. G., Commr., R.N.	,, ...	,,	... ...	Cadets' Met. Log. 18.1.26 to 26.3.26	1.4.26.
Worcester, H.M.S.	Sayer, M. B., O.B.E., R.D., Capt., R.N.R.	,, ...	,,	... ...	Cadets' Met. Log. 22.1.26 to 14.4.26	16.4.26.
Abaco	... ...	The Keepers	Lighthouse Register.	... ...	Lighthouse Register 20.7.25 to 31.12.25	9.3.26.
Cay Lobos ...	... ...	,, ...	,,	... ...	Lighthouse Register 1.7.25 to 31.12.25	8.3.26.
Double Headed Shot	... ...	,, ...	,,	... ...	Lighthouse Register 1.7.25 to 31.12.25	21.4.26.
Inagua... ...	... ...	,, ...	,,	... ...	Lighthouse Register 1.7.25 to 31.12.25	9.3.26.
Sombrero ...	... ...	,, ...	,,	... ...	Lighthouse Register 1.7.25 to 31.12.25	9.2.26.
Watling Island ...	... ...	,, ...	,,	... ...	Lighthouse Register 18.7.25 to 16.1.26	8.3.26.
Cape Pembroke (Falkland Is.).	... ...	,, ...	,,	... ...	Lighthouse Register 1.7.25 to 31.12.25	24.2.26.

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

Name of Vessel.	Captain.	Observing Officer.	Line.	Last Case of Water Samples, Reports, etc., Received up to 31.5.26.	Date Received.
Herschel	Carey, J. J.	T. Lester Guy	Lamport & Holt ...	Water Samples	26.3.26.
Hildebrand	Maddrell, J.	A. Allan	Booth	,, ,, ...	17.5.26.
Holbein	Gough, W. A.	H. L. Rudd	Lamport & Holt ...	,, ,, ...	19.5.26.
Manzanares	Edwards, H.	A. F. Moss	Elders & Fyffes ...	,, ,, ...	12.3.26.
Miami	Makepeace, S.	D. Smith	,, ,, ...	,, ,, ...	12.3.26.

August M.O., 1926.

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