

VOL. IV. No. 43.

THE MARINE OBSERVER.

JULY 1927.

## TABLE OF PRINCIPAL CONTENTS.

	PAGE	
Wireless Weather Signals ... ..	125	XXXV. Weather Chart evening of May 19th, 1920, W. North Atlantic.
Special Weather Observations required at times of Lunar Eclipse	126	XXXVI to XXXVIII. Weather Charts August 5th, 6th and 7th, 1922, E. North Atlantic.
The Marine Observer's Log (with illustrations) ... ..	126	XXXIX. Weather Chart, morning of May 19th, 1922, E. North Atlantic.
Commander F. M. C. Sergeant, R.D., R.N.R. ... ..	129	XL and XLI. Weather Charts mornings of August 8th and 9th, 1923, E. North Atlantic.
Wireless and Weather an Aid to Navigation :—		XLII and XLIII. Weather Charts mornings of July 10th and 11th, 1926, E. North Atlantic.
Chapter VII. Temperature and Fog or clear Weather ...	131	Charts of Fog and Mist over the North Atlantic, 30°–60° N., compiled from observations for the years 1921–1925, July, August, September.
Hurricanes of the West Indies and N. Atlantic ... ..	135	Chart showing Mean Sea Surface Temperatures, South Atlantic, for month of July from observations of British Ships during the years 1855–1899 and 1855–1878.
Sargasso Sea ... ..	137	
Weather Signals. French Indo-China, China, Hong Kong, Japan, Philippine Islands :—		
II. Wireless Weather Signals Bulletins ... ..	138	
Wireless Storm Warnings ... ..	141	
III. Wireless Time Signals ... ..	142	
IV. Visual Storm Warnings ... ..	142	
Lithographic Illustrations after page 146.		
Charts XXXIV to XLIII. "Wireless and Weather" :—		
XXXIV. Weather Chart morning of May 19th, 1920, W. North Atlantic.		

## WIRELESS WEATHER SIGNALS.

WE have been asked by the Director of the Royal Observatory at Hong Kong to draw attention to the addition to the Hong Kong Weather Bulletin which was made on July 1st, 1926. From that date coded reports of observations made at stations on the coasts of the China Sea have been broadcast through Cape d'Aguiar (VPS) Wireless station so that data for the land is available to ships within range of Cape d'Aguiar with which to make their own weather charts.

In "Work of the Year" in the June Number mention was made of the good use which this message had been put to by a ship on our list of regular observers, and in this number a description with details of it will be found along with other Weather Signals for the Far East.

We are asked also to point to the need of Hong Kong Observatory for reports by wireless through Cape d'Aguiar of weather conditions observed by ships at sea.

The Meteorological Offices in India, South Africa, and Australia

the Harbour Master at Suva, Fiji, and other institutions in different parts of the British Empire have made similar appeals to Mariners for ships' wireless weather reports.

The form of message given in Chapter I of "Wireless and Weather an aid to Navigation" and in "Ships' Wireless Weather Signals" which will be found in the January 1927 Number of this journal provides essential information to both the Captains of ships at sea and to Directors of Observatories.

In the general interests of shipping and seamen and all that marine meteorology serves, the invitation to the Commanders of ships on our list which have mercurial barometers to report observations made at the same time as those of the nearest coast daily as a matter of routine to "All ships" cannot be too often brought to notice. As was shown in "Work of the Year" the number of selected ships now performing this useful service is steadily increasing.

If when within range of such stations as Cape d'Aguilar as are detailed in different parts of the world to receive ships' weather reports, the messages are made to these stations as well as and at the same time as to "All ships," then two purposes will be accomplished by one message and traffic may be reduced to the advantage of all concerned. Success in this method should be the more easily accomplished within range of Cape d'Aguilar for here definite times are allotted to the reception of ships' reports and that station listens for these reports during the intervals indicated in "Weather Signals," so that all ships may know just when to expect ships to make their reports. Marine observers will do well to make careful note of what is stated in the description of the Hong Kong Weather Bulletin regarding non-synchronisation of observation and that the barometer readings given in the message may not be the actual observations for 0600 G.M.T. and 2200 G.M.T., but deductions made from observations taken up to as much as three hours before these times. Especially when a deep depression is passing near a station, the reading given thus should be accepted with caution.

When the four equi-distant times of observation for all Longitudes recently laid down by International Agreement are adopted these discrepancies will disappear.

When the principle of issuing observed conditions at coast stations by Great Britain for the information of mariners along with forecasts

for coastal waters was being considered, the users of the information were consulted, and not only were the views of a great many commanders obtained, but the Chamber of Shipping of the United Kingdom appointed a committee of seamen of high standing to go into this and other matters.

As a result it was decided that only the most essential elements of actual weather at coast stations should be broadcast for shipping by Wireless Telegraphy and therefore the coded report in the British Wireless "Weather Shipping" Bulletin gives:—

The indicating number of stations, barometer tendency, present weather, visibility, barometric pressure, wind direction and force.

These elements at the coast are the most essential to seamen in our latitudes; in the Tropics where fog is more seldom experienced and Tropical Revolving Storms occur, the departure from the normal of the barometer for the time of day becomes of great importance and may well replace visibility. In making this earnest appeal to the Captains of ships to comply with the requests of Directors of British Dominion and Colonial Meteorological Offices and Observatories to send them reports of weather conditions at sea by wireless telegraphy, we would bring to the notice of those concerned the plea of so many British seamen for uniformity of code and arrangement so far as is possible in Weather Bulletins issued by wireless for shipping.

MARINE SUPERINTENDENT.

### SPECIAL WEATHER OBSERVATIONS REQUIRED AT TIMES OF LUNAR ECLIPSE.

HARVARD College Observatory have asked for information as to the weather, cloud and sky conditions at sunset or sunrise on the days of the total eclipses of the moon at the positions indicated below.

**June 15th, 1927.** Lat. 32° 42' N., Long. 174° 42' W. (Pacific Ocean) at the time of sunset. Also Lat. 17° 36' N., Long. 69° 06' W. (Caribbean Sea) at the time of sunrise.

**December 8th, 1927.** Lat. 25° 42' S., Long. 41° 36' E. (Mozambique Channel) at the time of sunset. Lat. 51° 18' S., Long. 51° 00' E. (South of the Crozets) at sunset. Lat. 22° 00' S., Long. 164° 24' E. (South-west of New Caledonia) at sunrise. Lat.

3° 30' S. Long. 157° 00' E. (North-east of Bougainville Island) at sunrise. The circumstances of these eclipses are such that it is considered that the amounts of obscuration of the moon and other features may depend on the state of the sky at the places mentioned.

The Commanders of ships which may happen to be in favourable position for observation (within, say, 100 miles of positions given) are requested to note in their Meteorological Logs and Forms 911 all particulars of weather and phenomena observed.

The data received will be forwarded to Harvard College Observatory.

### 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.

### THREE SHIP OBSERVATION OF THE AGULHAS CURRENT.

THE following report from H.M.S. *Birmingham*, Captain R. H. L. BEVAN, D.S.O., M.V.O., R.N., observer, Commander G. P. BOWEN, O.B.E., R.N., has been received from the Hydrographer of the Navy:—

"On 18th July, 1926, by stationing *Lowestoft* and *Verbena* 5 miles on either beam of *Birmingham* and ordering all ships to maintain revolutions for 10 knots, an endeavour was made to ascertain whether there is anything to be gained by keeping an offing of 20 miles or more on passage southwards from Durban.

"At 1000 *Birmingham* was in Latitude 32° 13'·5 S.  
Longitude 29° 23'·8' E.

course 223°. *Verbena* was 5' on starboard beam and *Lowestoft* 5' on port beam.

"By 1110 *Verbena* had drawn 7° ahead and *Lowestoft* 8° astern of bearing: at 1515 *Verbena* was 29° ahead and *Lowestoft* 32° astern of bearing.

"Over a period of 6 hours, *Verbena*, whose course took her 1 to 2 miles outside the 100 fathom line and 12 miles off shore, averaged 0·62 knot faster than *Birmingham* and 1·27 knots faster than *Lowestoft*.

"It appears likely that the maximum strength of the Agulhas current will be found just outside the 100 fathom line."

### PHOSPHORESCENCE.

#### South Atlantic.—Cape of Good Hope Route.

THE following is an extract from the Meteorological Report of s.s. *Clan Morrison*, Captain W. M. PORTERFIELD, Las Palmas to Cape Town, observer, Mr. L. C. HIGGINS, 3rd officer.

"On July 5th, 1926, at 2315 G.M.T. while in Latitude 8° 10' S., Longitude 2° 42' W., observed numerous patches of dull phosphorescence of about 6 to 24 ins. in diameter. At 2355 we commenced to pass through five broad bands of phosphorescence which stretched from N.E. by E. to S.W. by W. as far as the eye could see. The bands were not solid but seemed to be composed of numerous patches similar to the previous ones, some of which were lighter than others. The phosphorescence seemed to make the sea thick and sluggish. It took ten minutes steaming to pass through the five bands a distance of about 2 miles. Weather at the time:—Barometer 30·14 ins. Temperature 75°. Wind S.E. force 4. Sea S.E. 2. Swell S.S.E. 4, overcast, St."

## BAROMETER TENDENCY, COURSE AND SPEED.

THE following note appears amongst the Additional Remarks in the log of the Cable Ship *Colonia*, Commander G. F. CARLTON, O.B.E., R.N.R., principal observing officer, Lieutenant W. E. ALLEN, R.N.R., which is of interest in view of the stress laid upon the importance of this observation in Chapter I of "Wireless and Weather an Aid to Navigation." Volume IV, No. 37.

"As a practical example showing the necessity of giving the ship's course and speed when broadcasting weather wireless messages, the *Colonia's* experience on the 21st and 22nd February, 1927, may be cited as a typical case. When running on a 72° course, speed 9 knots, the barometer was falling with a strong N.W. gale blowing; on 'Heaving to' the barometer immediately commenced to rise very slowly. When the wind moderated and the ship was again put on her course 67° speed 7 knots the barometer again commenced to fall but the conditions generally improved."

## WHIRLWIND OF HOT AIR AND SAND.

## Persian Gulf.

THE following is an extract from the Meteorological Report of s.s. *Barpeta*, Captain L. A. F. BEYTAGH, Bombay to Basra, observer Mr. J. W. KNIGHT, 3rd officer.

"July 9th, 1926, 8 p.m. A.T.S. 3.48 G.M.T. Barometer 29.386 in. Air Temperature 88.1°. Sea Temperature 88.0°. Wind E.S.E. force 4. Sea E.S.E. 2. Swell S.E. 2. Visibility 7. Cloud Ci/Ci-St/Ci-Cu/Cu/St-Cu. Latitude 23° 58' N. Longitude 59° 00' E. Course N. 48° E., True, at 10.4 knots.

"The wind gradually freshened after 8 p.m. and hauled and backed round the compass, scarcely remaining in any direction for more than a few minutes until 11 p.m. when it steadied slightly to South force 4. 11 p.m. Barometer 29.318 in. Air Temperature 90°.6. Clouds of all types passed over the sky and heavy Nimbus came up from the N.E. and a few drops of rain were noticed.

"11.50 p.m. The sky was covered with Cu/Cu-Nb/Nb, the latter appearing in long black rolls. Barometer 29.308 in. Air Temperature 92°.0.

"11.55 p.m. The wind suddenly dropped to almost a calm and then blew from E.N.E. force 5 to 6; it seemed like the blast from a furnace and the air was heavily laden with sand. I thought at first the ship was afire as a moment previous the air had been moderately cool, but after making certain that that was not the case, I went to the barometer and thermometer and saw that the temperature had risen to 99°.2—i.e., 7°.2 since coming from the charthouse a matter of three minutes previous.

"11.55 Readings. Barometer 29.304 in. Air Temperature 99°.2. The wind increased rapidly in force to 7 and quickly backed, being at West at midnight.

"12 midnight. Barometer 29.300 in. Air temperature 99°.2. Wind West force 7.

"July 10th.—

0015.	Barometer	29.314.	Air Temperature	91°.0.	Wind	South.	Force	6.
0030.	"	29.332.	"	89°.0.	"	N.E. by E.	"	5.
0100.	"	29.363.	"	88°.0.	"	N.E.	"	5.
0130.	"	29.370.	"	88°.0.	"	E.S.E.	"	4.
0200.	"	29.373.	"	88°.0.	"	E.S.E.	"	4.
0300.	"	29.383.	"	88°.0.	"	E.S.E.	"	4.
0400.	"	29.393.	"	88°.0.	"	E.S.E.	"	3-4.

"The actual whirlwind of hot air and sand lasted from 1155 p.m. to 0015 a.m.—twenty minutes—the air cooling then suddenly to 91°.0.

"At daybreak I noticed the vessel was covered with a fine red sand, probably collected from the deserts behind the Makran Coast and carried out to sea, a distance of 80 miles when it reached the vessel. The column seemed to be travelling in a S.W'y direction. It is impossible to state its probable diameter, but it certainly was not less than 5 miles—the distance the vessel ran while in it.

"From the changing of the wind I conclude the whirlwind had a fast anti-clockwise movement.

"Heavy clouds covered the sky during the whole of the 12 midnight to 4 p.m. watch, after which they gradually dispersed, leaving Cirrus and St-Cu. I am given to understand that these sand whirlwinds are uncommon—my Commander, who has been in this part of the world

for the greater part of his career, tells me that he has only known of two others of a similar nature, both occurring some years ago. One of these occurred during the daytime and he said it had the appearance of a waterspout, a huge column of sand-laden air rising from the sea to the heavy clouds above; it was distinct and regular in shape. On this occasion the ship passed about 5 miles from it, whereas last night the vessel must have passed right through its centre.

"What I noticed most of all was the sudden changing of temperature—there was no gradual heating and cooling; from the cool air on the outskirts of the whirlwind one suddenly felt the hot blast, a line could have been drawn almost separating the air of 92°.0 from the air of 99°.2.

"The approximate position of whirlwind was: Latitude 24° 26' N. Longitude 59° 34' E."

NOTE.—This is a very interesting and valuable account, the time of occurrence of the hot whirlwind, midnight, being especially noteworthy. The prevailing wind in the outer part of the Gulf of Oman during the month of July is south-easterly, force 2 or 3, with frequent but short-lived calms.

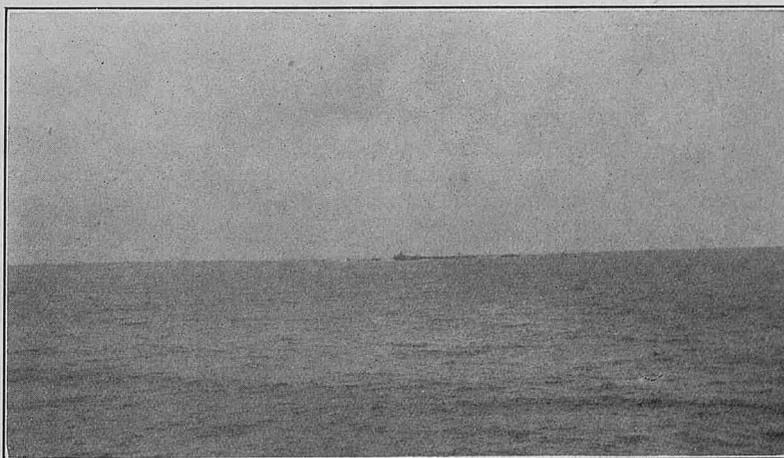
## SQUALLS IN NORTH ATLANTIC DOLDRUMS.

THE following is an extract from the Meteorological Log of S.S. *Windsor Castle*, Captain H. STRONG, Cape Town to Southampton, Observer, Mr. T. O. WILBRAHAM, 4th Officer.

"10th July, 1926, 4.30 p.m. Line squall approaching, 4.38 p.m., dry 79°.8, wet 74°.8, barometer reading 1016.2 mb. 5.40 p.m. W.S.W. (T) force 5 then west force 5, dry 77°.8, wet 75°.0, barometer 1016.7 mb. 5.48 p.m., squall passing to eastward, dry 76°.0, wet 75°.0, rain commenced. 5.50 p.m., lull, heavy rain on starboard bow. Dry 77°, wet 75°, passing under line of heavy Nimbus clouds, variable choppy sea. 5.53 p.m. wind W.N.W., barometer 1016 mb. 5.55 p.m. Passing under second line of heavy Nimbus thick misty rain, very heavy rain to starboard. 5.56 p.m., hard squall. Horizon seen ahead and to port (straight smudged line), intermittent rain until 6.30 p.m., when rain ceased. Position at Noon 10th July, Latitude 6° 19' N. Longitude 14° 15' W. Course N. 35° W. Speed 15½ knots.

## PHOTOGRAPH OF ST. PAUL ROCKS.

THE accompanying photograph of St. Paul Rocks, Latitude 0° 55' N., Longitude 29° 23' W., taken when half a mile off, has been received from s.s. *Holbein*, Captain W. A. GOUGH.



## BORA.

THE following extract from the Remark Book of H.M.S. *Sandhurst*, Captain H. H. ROGERS, M.V.O., O.B.E., R.N., observer Lieutenant F. A. SLOCUM, R.N., has been received from the Hydrographer of the Navy:—

"22nd July, 1926, at Lussin Piccolo (Latitude 44° 23' N., Longitude 14° 25' E.). The barometer had been falling slowly since

noon of previous day, and on the morning of 22nd stood at 1009 mb. No unusual phenomenon was apparent during the forenoon beyond high white detached clouds over land to N.E. with light breeze from N.E. By noon, however, clouds had increased and were much lower while wind had veered to S.W. During afternoon wind fell away to fitful puffs, sky rapidly became overcast to N.E. At about 1600 a squall of intense violence struck the ship from N.E. by N. Barometer shot up to 1011 and wind settled down to force 8 with violent squalls of force 9 every five minutes or so. At 1630 wind began to abate and by 1700 had died away to light airs accompanied by light rain with detached clouds. Barometer remained steady at 1011 for a few hours and then began to rise, finally standing at 1019 at noon of the following day. The inhabitants did not appear to regard the approaching bora with very much misgiving, the boatmen merely standing to shelter under the weather shore. A few boats were caught unawares and swamped or driven ashore."

The following extract from the Remark Book of H.M.S. *Assistance* has also been received from the Hydrographer of the Navy:—

"On the afternoon of 22nd July, 1926, the ship was anchored off Brioni Island in position 353°, 8.5 cables from Saluga Point Beacon (Latitude 44° 53' N., Longitude 13° 45' E.).

"There was very little wind, and the air felt hot and oppressive.

"At about 1445 a bank of heavy black clouds was observed to the north-westward. It was surmounted by white clouds which appeared to be rising. The whole had the appearance of a snow-capped range of mountains on a misty day.

"At about 1510 the first gusts of a north-westerly wind were felt, and by 1515 it had risen to force 7-8.

"The ship was headed south-west and so was caught broadside on. While swinging she dragged about 150 yards to the south-east.

"By 1530 the ship was head to wind and a second anchor was let go and the ship ceased to drag.

"The wind veered rapidly and after 1600 began to decrease. By 1700 it was E. by S., force 3, and the weather was fine."

Time.	Zone 1.	Wind.	Barometer.	Dry Bulb.	Wet Bulb.
0400		0	1008.9	71°	64°
0800		0	1007.7	76	65
1200		W. 1	1007.5	80	71
1600		N.E. 6-8	1008.1	70	64
1800		E. by S. 3	1008.8	69	61
2000		E. by S. 2	1010.5	69	60
2400		N. 2	1014.2	65	60

### AURORA.

#### North Atlantic.

The following is an extract from the Meteorological Report of S.S. *Northwestern Miller*, Captain E. L. NUTTALL, London to Philadelphia; Observer, Mr. N. MACDONALD, 2nd Officer:—

"July 28th, 1926, from 5.15 to 5.40 G.M.T. about 50 miles east of *Nantucket Light Vessel* observed brilliant display of Aurora Borealis, some beams shooting as high as Pole Star, and numerous short ones. About 10° up from horizon a whitish haze flickered at a terrific rate. The whole subsided rapidly. A bright moonlight cloudless sky at the time."

### REFRACTION.

#### Approaching English Channel.

The following is an extract from the Meteorological Log of S.S. *Port Sydney*, Captain W. G. HIGGS, Montreal to London; Observer, Mr. G. L. H. DEAN, 2nd Officer:—

"July 28th, 1926. When making the channel on this date excessive refraction was observed as follows: latitude by Mer. Alt. Sun (Captain HIGGS and two officers all agreeing upon altitude) was found to be 49° 42' N. Shortly afterwards the Bishop Rock Lighthouse was sighted and a definite fix off this at 2.30 p.m. worked back

to noon gave the latitude as 49° 36' N., i.e., six miles to the southward, this large discrepancy being obviously due to refraction. Wind N.W. by W., force 2. Barometer 1030 mb. Dry bulb 59°. Wet Bulb 59°. Weather oe.

### PECULIAR APPEARANCE OF SETTING SUN.

#### North Atlantic.

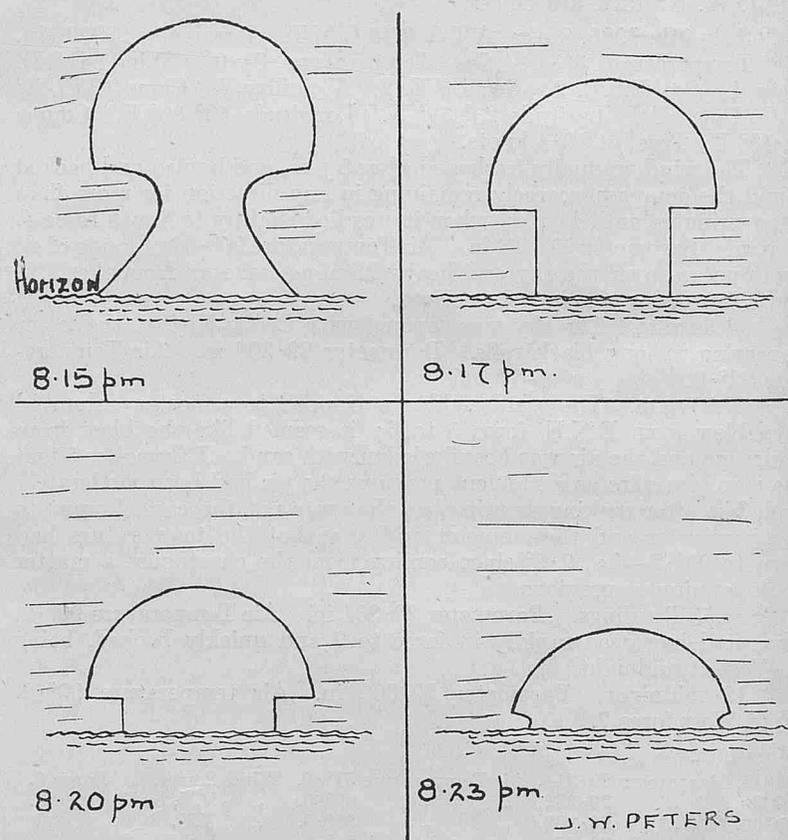
The following is an extract from the Meteorological Report of S.S. *Celtic*, Captain G. BERRY, Boston to Liverpool; Observer, Mr. J. W. PETERS, 4th Officer:—

"The accompanying diagram represents the peculiar appearance of the setting sun noted on the 4th July, 1926, just after our departure from *Boston Lightship*.

"The shape and colour of the sun were most striking, and resembled nothing more closely than a gigantic red hot rivet slowly sinking in the ocean.

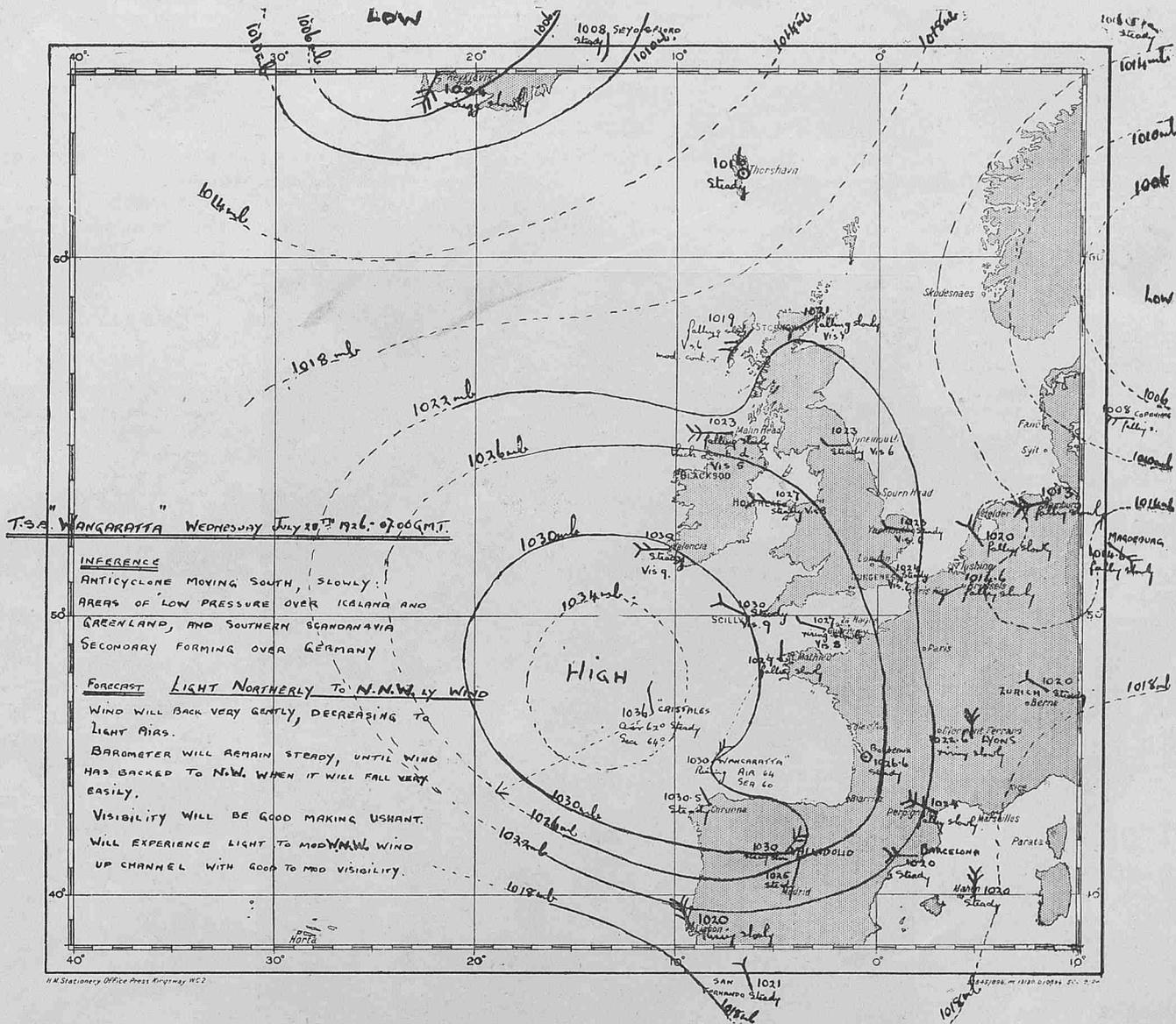
"Wind S.E., force 2. Sky partly overcast with Cirrus. Sea smooth. Barometer 1012.9 mb. steady. Dry bulb 61. Wet bulb 55°. Sea 59°."

Effect of Refraction on the appearance of the setting sun 4th July 1926. 15 miles N. of C. Cod.



WEATHER CHART MADE AT SEA.

Weather Chart (one of a series) made on board S.S. "Wangaratta," Captain W. Scutt, by Mr. S. R. Millard, 2nd Officer, July 28th, 1926.



According to the Meteorological Log of S.S. Wangaratta the wind backed to N.N.W. during the 28th July, barometer remaining steady until 8 p.m. when it commenced to fall slowly.

COMMANDER F. M. C. SERGEANT, R.D., R.N.R.

It can easily be realized how well known Commander SERGEANT, who retired last year, was to the officer personnel of the Mercantile Marine from the fact that during his career as an examiner of Masters and Mates, more than 25,000 Officers passed through his hands for the various Certificates of Competency issued by the Board of Trade.

Born at Liverpool on the 14th February, 1861, he was the youngest son of the late RICHARD SERGEANT, well known in the Corn Trade. During his education at the Merchant Taylors School, Great Crosby, he gained several competitive scholarships and other distinctions.

In 1876 he joined as a Midshipman the BRITISH SHIPOWNERS COMPANY (Messrs. Gracie, Beazley & Co.) who controlled the famous fleet of sailing ships belonging to Liverpool; his first ship being the *British Ambassador*, of 2,000 tons register. After completing his time he served in the various grades as an Officer in sail, and in 1885 obtained command of the ship *Assyrian*, when in Calcutta, taking her to New York and finally to Cork, where she was sold. In 1886 he passed for Extra Master, and was subsequently in command of several

sailing vessels belonging to the late T. B. WALMSLEY, engaged in the trade to the West Coast of South America.

In 1894 he was appointed Lieutenant R.N.R., and for several years remained in the Royal Navy, serving in the following of His Majesty's Ships—*Prince George*, *Anson*, *Camperdown*, *Endymion* and *Indefatigable*; part of this service being during the blockade of Crete.

He also served for several years in Messrs. ALFRED HOLT & Co., and the WHITE STAR LINE, in the different grades; then in 1898 he joined the Marine Department of the Board of Trade, in which service he remained for 28 years, having been for 21 years Chief Examiner and Secretary to the Local Marine Board; also Senior Examiner in Navigation and Seamanship to the Training Ships *Conway* and *Indefatigable*.

Two years before entering the service of the Board of Trade he married the younger daughter of the late Admiral SIR JOHN H. HEFFERNAN, K.C.B., and has four children, three of whom are in the medical profession.



COMMANDER F. M. C. SERGEANT, R.D., R.N.R.  
Senior Examiner of Masters and Mates, Liverpool  
1905-1926.

---

From 1909 until 1921 Commander SERGEANT acted as Marine Agent to the Meteorological Office, and his efforts in interesting the Commanders and Officers of Liverpool ships were much appreciated, and when his Agency was terminated he received the special thanks of the Meteorological Committee, for his good work.

In his well-earned retirement last year, upon reaching the age limit, he carries the cordial good wishes of a very large number of members of the Nautical profession, for many years of health and happiness.

M. C.

## WIRELESS AND WEATHER, AN AID TO NAVIGATION.

### CHAPTER VII.

#### TEMPERATURE AND FOG OR CLEAR WEATHER.

In middle and high latitudes it is frequently found that the slow passage of air from a region of warmer sea surface to one of cool sea surface is associated with fog at the latter. Also that air passing from colder sea surface to warmer sea surface is frequently associated with good visibility.

With reports from distant ships, if they include the elements suggested in Chapter I, not only may charts be made which give the pressure distribution and therefore wind circulation, but the changes of temperature which the air is suffering in its passage to a region may be ascertained, which knowledge may give an idea of the conditions of visibility which may be expected.

It is not the purpose of this chapter to explain in detail the process of fog formation, but to continue as tersely as possible to show how application of Wireless and Charting may give the fore-knowledge desired.

There is probably no region on the trade routes of the world where fog is more prevalent than on the Grand Banks, and where the conditions causing fog are more pronounced. We therefore cannot do better than use experience gained in that region as a preliminary.

#### General Conditions in the Vicinity of the Grand Banks.

The Labrador Current brings cold water from the Arctic by way of Smith Sound, Baffin Bay, and Davis Straits, which expands over the northern part of the Grand Banks, spreading eastward and dividing. One branch setting S.W. flows past Cape Race; the other flows south along the eastern edge of the Grand Banks until it meets the northern edge of the Gulf Stream forming the Cold Wall.

The Gulf Stream brings warm water from the tropical Atlantic and the Gulf of Mexico north of the Antilles and by way of the Strait of Florida, following the coast of the United States to Cape Hatteras, expanding and inclining eastward.

Thus, over the Grand Banks, the sea surface temperature is cold, while to the southward it is warm, there being a steep Sea Isothermal gradient running from west to east to the southward of the Grand Banks. The Charts of Mean Sea Temperatures of the North Atlantic illustrate this.

Now, if the barometer is high at the Azores and low at Halifax with an even and shallow gradient, it follows by Buys Ballot's Law that the wind will be light from the southward over the region of the Banks and the drift of air will be coming across the warm waters of the Gulf Stream where it will pick up moisture. On reaching the Cold Wall, the air at the surface will be rapidly chilled, if it contains sufficient moisture this will condense as fog. The lower layers of the air, having been chilled, rapidly become colder than those above them, so that convective currents fail to take the moisture aloft, and it remains as fog at the surface.

It is interesting to note that the frequency of gales in the winter in this region is very high, the mean path of depressions passing hereabouts.

#### A Typical Case of Fog on the Grand Banks.

CHART XXXIV. On the morning of May 19th, 1920, the central part of the North Atlantic was dominated by an extensive anti-cyclone, causing light to moderate winds and fine weather. There was a shallow depression centred south of Nova Scotia in which *Adriatic* experienced light and variable winds, and rain in Latitude  $40^{\circ} 29' N.$  Longitude  $56^{\circ} 30' W.$

No fog was reported though it is probable that it was present on the eastern side of the depression between the Newfoundland coast and Latitude  $42^{\circ} N.$ , caused by the warm moist southerly and south-easterly winds which would be expected with the pressure distribution shown in this area, coming in contact with the cold water of the Labrador current.

CHART XXXV. On the evening of May 19th, 1920, the depression

had become a little deeper and moved a little eastward, and the anti-cyclone had spread to the south-east, the general pressure distribution remaining the same.

The development of fog between the Meridians of  $40^{\circ}$  and  $50^{\circ}$  West is now clearly shown, and the influence of air and sea temperature can be traced.

At 8 a.m., CHART XXXIV., *Finland* and *Mississippi*, both homeward bound, were in the Gulf Stream, both having sea temperature  $67^{\circ}$ —*Finland*  $66^{\circ}$  air, and *Mississippi*  $68^{\circ}$  air.

At 8 p.m. *Finland* got into cold water, sea temperature  $46^{\circ}$  and had fog. *Mississippi*, 160 miles ahead, was still within the boundary of the Gulf Stream, with sea temperature  $66^{\circ}$  and air  $65^{\circ}$ , recorded exceptional visibility.

The warm southerly wind, chilled considerably in its passage, had extended its influence northward to *Minnedosa* and produced fog; *Melita*, in Latitude  $49^{\circ} 53' N.$ , Longitude  $44^{\circ} 34' W.$ , experienced fog from similar cause.

From a study of the general conditions of currents with mean sea temperature, together with the pressure distribution existing on the evening of May 19th, 1920, it may be inferred that fog probably existed over the stippled area on CHART XXXV. Of course, it will be realised that the limits of the currents and cold and warm water vary considerably at short intervals.

In all probability fog was prevalent on the Grand Banks in the south-east quadrant of this depression until it moved East or filled in.

#### Prediction of Fog or Clear Weather in the Eastern North Atlantic.

For this purpose a number of standardised reports over a considerable area are necessary for success. On several occasions within the last few years, when a large number of ships forwarded copies of Wireless Weather Reports, made and sent during exceptional weather conditions, it was apparent that better results had not been obtained owing to insufficient range, traffic interference, observations not synchronising, and uncorrected barometers. On the other hand since the 1st edition was published there have been many occasions when ships have been so fortunate as to receive a number of reports direct, made by selected ships to "All Ships" and they have made charts and successful forecasts not only of wind but of fog or visibility. In short, experience shows that popular organisation is required if Wireless and Weather is to prove the aid to navigation hoped for. The following examples give an idea of what is aimed at, and are based on the supposition that a limited number of ships broadcast standard reports of observations taken at the standard times laid down, by long range Wireless Telegraphy, at arranged times for transmission, thus tending to reduce the traffic difficulty but increasing the value of information, and providing synchronised data over a great area to all ships who can intercept it.

#### Visibility.

On the morning of August 5th, 1922, S.S. *Catalina*, Captain R. COLLINS, from St. Domingo to Havre, distant some 480 miles from Scilly, her point of land fall, would like to know if she may expect clear weather along her route, and particularly when approaching the land.

CHART XXXVI shows that there are anticyclones to the north-westward of Ireland and south-westward of the Azores, and between them lies a very large area of low and intermediate pressure in which are two depressions, one centred in about Latitude  $53^{\circ} N.$ , Longitude  $30^{\circ} W.$ , the other in about Latitude  $47^{\circ} N.$ , Longitude  $13^{\circ} W.$

*Catalina* steering east-north-east at 10 knots throughout August 4th, had light easterly winds which backed through N.E. to N.N.W. which indicated that the depression now east-south-east some 200 miles from her position, had overhauled and passed to the southward of her.

As her barometer is rising slowly, this depression is probably continuing in an easterly direction at greater speed than her own, but the slow-rising barometer at Corunna and St. Mathieu, Brest, do not as yet confirm an easterly movement, though further east at Bordeaux the mercury is falling.

*Losada*, steaming S. 48° W., 11 knots, across the front of this depression, has had a falling barometer, and *Aba* on a nearly opposite course, N. 27° E., 13 knots, also across the front of the depression, has had a falling barometer, while *Matheran*, steaming S. 19° W., 11 knots, not far to the north-west of Corunna, has a steady barometer.

We must remember that though the expressions rising or falling are used, the reports really give us what the barometer has done in an interval, and during that interval the ship was changing her position.

The tendencies observed by *Catalina*, and reported by *Losada*, *Aba* and *Matheran*, allowing for courses and speeds, give a very good indication that the depression is moving to the eastward.

*Catalina* is, however, more concerned with the depression to the north-west which, with the distribution of pressure existing, is most likely to follow in the wake of the last, though it should be noted that the barometer is falling slowly at Malin Head and Wick, while it is steady, or rising slowly, at Valentia, Holyhead, Dungeness and Spurn Head.

Now *Vellavia* in rear of this depression steering N. 88° E., 11 knots, has barometer steady, an indication that the depression may be moving eastward at about her own speed.

*Alpine Range* to the southward of the depression steering N. 67° E., 10 knots, has barometer falling slowly, and *Menominee* to the south-east of depression, has barometer falling slowly when steering N. 78° E., 16 knots; and *Melita* steering N. 78° W., 18 knots, still under influence of eastern depression and approaching the position of the westerly Low, has barometer steady.

From all these tendencies, allowing for the effect of course and speed upon each, it is indicated that the western depression is moving in a direction to the southward of east.

*Catalina* may therefore expect, steering N. 70° E., 10 knots, to maintain a position between the two depressions where she may expect light winds from the northward or southward according to which depression the wind circulation is due, and the weather is likely to remain clear in the rear of the eastern Low.

If the western depression overhauls her, it is probable from the wind circulation and temperatures reported by *Vellavia* and *Alpine Range*, that the visibility will remain good because the air will have come from over cold water to warmer water, and so have been gradually warmed in its passage. The sky is likely to be cloudy or overcast.

It must be clearly understood that the passage of air from cold to warmer water under all circumstances will not produce good visibility, indeed there are conditions when this process may actually produce fog, but, generally speaking, when associated with the rear of a depression, such a circulation and temperatures may often bring clear weather, while the passage of air from warm to colder water is often associated with fog.

According to the log, *Catalina* was in Latitude 48° 10' N., Longitude 18° 15' W., at noon on August 5th, and there were light and variable airs with sky  $\frac{8}{10}$ ths covered with Strato-Cumulus; the barometer fell very slowly.

At 4 p.m. light N.E. airs, clouds practically stationary. In the first watch Cumulus and Strato-Cumulus moved slowly from west. Light airs and calms, with overcast sky, continue until 4 a.m., when the wind is south, force 2, and the barometer has fallen to 1010 mb. (29.83 in.); the ship is now under the influence of the westerly depression.

On the morning of August 6th, CHART XXXVII, which, when compared with that of the previous day, will be of more value. It will be seen that the eastern depression travelled E. by N.  $\frac{1}{2}$  N. some 400 miles, and is now centred between Brest and Jersey. The western depression has moved about 250 miles east-south-east.

*Catalina* is shown by the Chart to be in front of the western depression, which is advancing at greater speed than her own. With exceptional visibility reported by *Kroonland*, 140 miles N.W. by W., and temperatures with wind favourable to good visibility reported by *Melita*, *Alpine Range* and *Aquitania*, the prospects of the weather remaining clear, though there will probably be showers, as the right semi-circle of the depression passes over her, are excellent, and clear weather is forecasted for the following morning in the vicinity of the Bishops.

According to the log the weather remained fine until 8 a.m. on August 7th, when for an hour there were passing showers of light rain. The visibility was 8 or 9 by scale throughout.

CHART XXXVIII is made in the forenoon of August 7th; the western depression has travelled east-south-east, 350 miles, and spread, and is dominating the weather from the western coasts of the British Isles to 30° W. and as far south as Latitude 40° N. The barometer tendency of stations from Brest, northward, indicate that the depression is still moving eastward.

The report of visibility at St. Mary's, Scilly at 7 a.m. G.M.T., indicated 7 by scale, *i.e.*, good, or about 10 miles; at this time there was rain at the station.

At 10.30 a.m. the Bishop Lighthouse was sighted bearing N. 53° E., distant 20 miles.

#### Fog, when will it lift ?

On the morning of August 6th, 1922, R.M.S. *Ormonde*, Commander H. G. STAUNTON, C.B.E., R.N.R., from Gibraltar to Plymouth, was in fog off the Portuguese Coast and would like to know when it will lift, and if, when it has cleared, it will remain so, along her route ?

All who have navigated the West Coast of Portugal are familiar with fog in patches during the summer months, when the ship may be enveloped in a dense fog bank at one moment, and in the next there may be extreme visibility, conditions which are most dangerous for collision.

A glance at the Charts of the N. Atlantic of mean sea surface temperature for every two degrees of Latitude and Longitude, will give an indication of a frequent cause.

Close in to the coast the water is colder than to seaward under average conditions, and on occasions this is even more marked.

Now if the drift of the air is from the west over warm water gradually becoming cooler, it will become saturated, so that on reaching the coastal region, where the fall in sea temperature is steep, not only will condensation take place, but the air near the surface will be so quickly cooled, that convective currents will fail to take the moisture aloft, and it will remain in fog banks at the surface.

*Ormonde* arrived at Gibraltar at 6.12 a.m. and left again at 9.48 a.m. August 5th. Supposing that she had been able to intercept the reports, and had made CHART XXXVI, although there are no observations off the West Coast of Portugal, she would have known from the general pressure distribution shown that light airs and calms might be expected, with conditions favourable for the formation of fog.

In the middle watch there was extreme visibility, and Cape Roca Light was sighted, distant 47 miles. At 6.22 a.m., when Cape Roca was abeam, dense fog set in.

From the reports on the morning of August 6th, CHART XXXVII it will be noted that S.W. of St. Vincent, *Deseado* reports exceptional visibility, light S.W. airs, air temperature 72°, and sea 65°. *Matheran*, some 60 miles North of *Ormonde*, has fog, light S.W. airs, air temperature 66°, and sea 65°. All over the region off this Coast very similar conditions are probable, while the wind reported by *Losada*, and the Azores indicates that the air supply is coming from the westward.

It has been shown that the westerly depression is moving east-south-east, and as it advances the wind will freshen from the westward off the North-West Coast of Spain, and there any fog which may exist will be dispersed. *Ormonde* may therefore expect fog as far north as Cape Finisterre, thence to the Channel the visibility is likely to be good.

According to the log, *Ormonde* had fog in patches throughout the forenoon of August 6th, and clear weather from Latitude 40° N., when there was a light N.N.W. breeze which backed to W.S.W. after passing Cape Finisterre, when the shore lights were visible outside their range. Ushant Light was sighted at 11.30 p.m. on August 7th, visibility very good, there being a gentle S.W. breeze with blue sky and cloudy.

#### Fog, associated with Mixing of Cold and Warm Winds, or Light Airs.

Fog may frequently occur near the boundary between contrary winds, and this is sometimes seen in the North Sea when a depression over England causing southerly winds in its front is accompanied by a secondary, bringing light and relatively cold northerly airs in rear; the mixing of these winds often taking place at the coast, where they produce a fog of short duration.

A Col frequently produces conditions which cause fog. The fog which prevailed from May 18th to 20th, 1922, when R.M.S. *Egypt* was sunk in collision with the S.S. *Seine*, off Ushant, originated in the

air circulations meeting in a Col off the coast of Portugal, lying between two anticyclones.

CHART XXXIX, MORNING OF MAY 19TH, 1922, shows the conditions. From this it will be seen that air drawn from the eastward of the Azores was blowing from warm to cooler water round a High, and meeting air coming over from Spain, and Southern France, to the south-east of another High in the Col where *Hororata* and *Desna* were in fog. The mist and fog further northward are probably more due to the usual cause of sea fog.

Local Fogs.

CHART XL, MORNING OF AUGUST 8TH, 1923, shows that there was a large shallow depression centred to the northward of Latitude 57° N. near the 28th meridian of West Longitude. A Wedge of High pressure extended northward of Madeira to latitude 45° N. and there was an Anticyclone over France, with a Col over the Bay.

The tendencies of the barometer at British stations, and those of ships to the westward, allowing for their courses and speeds indicate that the depression is probably moving to the N.E. or filling up, while those reported at Portuguese stations, and by ships in the vicinity of the Wedge, indicate that it (the wedge) is probably spreading north and intensifying.

Fog is reported at Corunna, in the Col, probably due to radiation during the night.

*Clan Sinclair*, off Lisbon, with a light westerly air, has mist, and *Bosworth*, to the westward of Scilly, with a fresh S. by E. breeze, haze; there is fog at Holyhead; no other reports indicate the presence of obscurity other than that caused by rain.

The conditions are such from Madeira to the Channel, that fog may occur if the wind comes light from the southward, and morning fog may spread in the vicinity of Corunna should light airs off the land continue. Let us continue our deductions from the point of view of an individual ship. S.S. *Woodarra*, Captain J. V. REILLY, from Las Palmas to Dublin, provides an example. She had a light N.N.E. air in the Col, with sea temperature one degree higher than air. *Bosworth*, some 260 miles ahead, and to the westward of Scilly, in haze, with a fresh S. by E. breeze, reports air temperature 62° and sea 61°. Here, if the wind falls light, it is highly probable that fog will form. Now with the depression moving to the N.E., or filling in, and the Wedge spreading northward, pressure is generally rising over the Eastern North Atlantic; a shallower barometric gradient may be expected near Scilly, and the isobars may be expected to trend more east and west which will result in the wind falling light and coming more from the westward; thus, the air at Scilly to-morrow morning will probably have come a considerable distance over a sea surface in which the isothermal gradient may be expected to lie more or less athwart its course. The air will become saturated with moisture followed by condensation. According to *Woodarra's* log, the wind became southerly at noon, a light air, at 4 p.m. it was S.S.W. force 3, at midnight S.W. by S. force 3, and at 1.20 a.m. they ran into thick fog; at 2.30 a.m. a light drizzle commenced which ceased at 3 a.m., when the visibility slightly improved, and at 4.5 the fog thickened again.

CHART XLI, for morning of August 9th, 1923, indicates that there is low pressure to the northward of the Trans-North Atlantic tracks; the Wedge has spread to the northward and depressions appear to the N.W. and S.E. of it. The fog experienced by *Woodarra*, with the conditions shown, we should expect not to cover an extensive area, and it will be noted that good visibility is reported at St. Mathieu, Brest, and at Jersey.

For the prediction of wind and general weather conditions, southern trading vessels look for reports from ships to the westward along the Trans-North Atlantic routes. By this example it will be seen that reports of these vessels will be of considerable value to Western Ocean ships.

When we were collecting views for framing the "Weather Shipping Bulletin" so that it might fulfil as many purposes as possible, the Commodores of two great Atlantic services pointed to the need for visibility reports at the Scillies and Channel Islands. For, said they, when bound for Cherbourg, we could shape a course to make a landfall at the Bishops or Casquets, according to what visibility there was on either side of the Channel.

*Oriana*, off Vigo, has fog with a light N.E. breeze, but ships further off the land, and to the southward, are reporting clear weather, there being fresh north-easterly winds along this part of the Madeira route.

The observations of *Manchester Corporation*, *Metagama*, and *Mont-*

*rose*, all on the Tory Island route, afford a good example for tracing the passage of air, and in this case it is passing from cold to warmer water; there is cloud but no fog. Further south, the passage of air cannot be so well traced, and it will be evident how this is complicated by the movement of weather systems.

At 9.30 a.m. *Woodarra* was N.W. of Scilly, the wind veered more to the westward, and the fog lifted; it appears to have been quite local.

S.S. *Traveller*, Captain E. W. JONES, from Liverpool to Kingston, Jamaica, reported heavy rains, calms and variable airs, accompanied by waterspouts and violent whirlwinds in the morning watch, on August 9th, 1923. At this time *Traveller* was in the centre of the depression, indicated close to the eastward of her on CHART XLI. Here, convective currents would be strong, and the conditions would be unfavourable for fog formation.

It will often be found that though conditions which might be expected to produce fog at a place or over an area are present, fog is not present. Enough has been said in this Chapter to show how desirable observations of humidity are for fog prediction.

The humidity of the air is found by calculation from the difference between the temperature observed by the dry bulb and wet bulb thermometers, for which purpose tables are given below. A small error in reading, or a false temperature, even though slight, may result in an entirely erroneous humidity.

Fog and the Utility of Humidity Observation.

Since the 1st Edition was published Portable screens have been finding their place in an increasing number of ships and better observations of air temperature are now made. To include the depression of the Wet Bulb thermometer in Wireless Weather reports to "All ships" is not advocated, at any rate for the present, because the elements recommended make the messages quite long enough and brevity is so essential for regulating wireless traffic. But each individual ship making a chart may be able to gain something from her own humidity observations. Here are the tables necessary to find the relative humidity and the dew point, and the following example will give some indication of the utility of them.

Table for Finding the Relative Humidity (per cent.).

Dry Bulb. °F.	Depression of Wet Bulb.												
	0°	1°	2°	3°	4°	5°	6°	7°	8°	9°	10°	11°	12°
90	100	96	92	88	84	81	77	74	70	67	63	60	57
88	100	96	92	88	84	80	77	73	69	66	63	59	56
86	100	96	92	88	84	80	76	72	69	65	62	58	55
84	100	96	92	87	83	79	76	72	68	64	61	57	54
82	100	96	91	87	83	79	75	71	67	64	60	57	53
80	100	96	91	87	83	79	74	70	66	63	59	55	52
78	100	95	91	86	82	78	74	70	66	62	58	54	50
76	100	95	91	86	82	78	73	69	65	61	57	53	49
74	100	95	90	86	81	77	72	68	64	60	56	52	48
72	100	95	90	85	80	76	71	67	63	58	54	50	46
70	100	95	90	85	80	75	71	66	62	57	53	49	44
68	100	95	90	84	79	75	70	65	60	56	51	47	43
66	100	95	89	84	79	74	69	64	59	54	50	45	41
64	100	94	89	83	78	73	68	63	58	53	48	43	39
62	100	94	88	83	77	72	67	61	56	51	46	41	37
60	100	94	88	82	77	71	65	60	55	50	44	39	34
58	100	94	88	82	76	70	64	59	53	48	42	37	31
56	100	94	87	81	75	69	63	57	51	46	40	35	29
54	100	93	87	80	74	68	61	55	49	43	38	32	26
52	100	93	86	79	73	66	60	54	47	41	35	29	23
50	100	93	86	79	72	65	59	52	45	38	32	26	20
48	100	92	85	77	70	63	56	49	42	36	29	22	16
46	100	92	84	77	69	62	54	47	40	33	26	19	—
44	100	92	84	75	68	60	52	45	37	29	22	—	—
42	100	91	83	74	66	58	50	42	34	26	18	16	—
40	100	91	82	73	65	56	47	39	30	27	—	—	—
38	100	91	81	72	63	54	44	39	31	22	—	—	—
36	100	90	80	70	60	54	44	35	26	18	—	—	—
34	100	90	79	70	60	50	41	31	21	—	—	—	—
32	100	89	79	68	57	47	36	27	17	—	—	—	—
30	100	88	76	65	53	43	33	22	—	—	—	—	—

Table for Finding the Dew Point (°F.).

Dry Bulb. °F.	Depression of Wet Bulb.												
	0°	1°	2°	3°	4°	5°	6°	7°	8°	9°	10°	11°	12°
90	90	89	87	86	85	83	82	80	79	77	76	74	73
88	88	87	85	84	83	81	80	78	77	75	74	72	70
86	86	85	83	82	80	79	78	76	75	73	71	70	68
84	84	83	81	80	78	77	75	74	72	71	69	67	66
82	82	81	79	78	76	75	73	72	70	68	67	65	63
80	80	79	77	76	74	73	71	69	68	66	64	62	61
78	78	77	75	74	72	71	69	67	66	64	62	60	58
76	76	75	73	72	70	68	67	65	63	61	60	58	55
74	74	72	71	69	68	66	64	63	61	59	57	55	53
72	72	71	69	67	66	64	62	61	59	57	55	52	50
70	70	69	67	65	63	62	60	58	56	54	52	50	47
68	68	66	65	63	61	60	58	56	54	52	49	47	45
66	66	64	63	61	59	57	56	53	51	49	47	44	42
64	64	62	61	59	57	55	53	51	49	47	44	41	38
62	62	60	59	57	55	53	51	49	46	44	41	38	35
60	60	58	56	55	53	51	48	46	44	41	38	35	32
58	58	56	54	52	50	48	46	43	41	38	35	32	28
56	56	54	52	50	48	46	43	41	38	35	32	29	25
54	54	52	50	48	46	43	41	38	35	32	29	25	20
52	52	50	48	46	43	41	38	36	32	29	25	20	16
50	50	48	46	43	41	39	36	33	29	25	21	16	10
48	48	46	44	41	39	36	33	30	26	22	17	12	4
46	46	44	42	39	36	34	30	27	23	19	13	6	—
44	44	42	39	37	34	31	28	23	19	15	8	—	—
42	42	40	37	34	32	28	25	20	16	9	—	—	—
40	40	38	35	32	29	26	22	17	11	8	—	—	—
38	38	35	33	30	26	22	18	15	10	3	—	—	—
36	36	33	30	27	23	21	16	11	5	—	—	—	—
34	34	31	28	25	22	17	13	7	—	—	—	—	—
32	32	29	26	22	19	14	8	—	—	—	—	—	—
30	30	27	23	20	15	10	4	—	—	—	—	—	—

Suppose that R.M.S. *Kenilworth Castle*, Captain STANLEY OWEN, from Cape Town to Southampton on July 10th, 1926, at 0700 G.M.T. made CHART XLIII with the observations given in the British Wireless "Weather Shipping" Bulletin and observations reported by selected ships invited to report to "All ships." They note their own observation of the depression of the wet bulb on their chart.

This chart indicates a depression centred far to the N.N.W. and probably moving northward and a small anticyclone centred not very far to the westward of the ship apparently nearly stationary.

The wind circulation is such that the air which *Kenilworth Castle* will come across on her course at a speed of 15 knots next morning in a position now distant some 360 miles to the N.N.E. will have come from a position about a third of the way between the present positions of *Hobson's Bay* and *Intaba* during the interval and probably from nearer *Intaba* earlier; force 3 gives a velocity of 9 knots.

The temperatures of air and sea reported by those ships indicate

that air following this course will be passing from warm to cooler sea and will therefore be humid. At present *Kenilworth Castle* has a fresh breeze from north air 64° depression of the wet bulb below that temperature 3° and sea the same temperature as the air.

By inspection, the table for relative humidity shows this to be here, 83 per cent. and the air is not very humid, while the dew point table indicates that with this amount of invisible water vapour in the air the temperature would have to fall to 59° for fog to form.

Now disregarding the daily range of temperature, with the wind circulation shown by the chart we should expect that the change of temperature due to change of latitude would be about compensated by the source from which the air came as the ship proceeded northward. That is to say as the ship steams across the N.E. end of the anticyclone the wind will back by way of West to S.W. so that the wind will be coming from a warmer region with consequent greater evaporation.

Supposing that the temperature now reported by *Hobson's Bay* will be about the same with the wind from the same direction on the morning of July 11th, if the humidity increased to 100 per cent. the air still being 64°, fog will form.

CHART XLIII shows that on the morning of July 11th, 1926, *Kenilworth Castle* had a light S.W. breeze but was still with good visibility, *Sylvafield*, 100 miles to the N.W. and *Intaba*, 340 miles to the westward both have fog. Now at 8 a.m. on July 11th, 1926, *Kenilworth Castle* logged air 64° but the wet bulb was 63° giving relative humidity 94 per cent. and dew point 62° so that though we were right in our expectation of temperature we over-estimated the amount of moisture which would be brought from the S.W. Thick fog set in with *Kenilworth Castle* at 10.55 a.m., no temperature observations were recorded at that moment but at noon the air was 66°, wet bulb 64°, with visibility 3 by scale, i.e., half a mile, the fog was evidently reducing, for these observations give relative humidity 89 per cent. and dew point 63°, the sea temperature at 8 a.m. was 63° and remained the same at noon so that the air in contact with the sea had evidently been brought to that temperature when the fog commenced at 10.55 a.m.

Occurrence of Low Visibility when Current sets towards the Land.

On several coasts it has been observed that when the prevailing wind drops the current changes; for example, in the July number, in his article accompanying the "Current Charts for the Direct Cape Route," Mr. DURST proved by worked up observations, that off the West Coast of Cape Colony the current normally sets N.W., while the prevailing wind in summer is S.E. Observations throughout all months of the year showed that when the wind fell light or was from the westward, the current frequently sets more towards the land.

Now whereabouts the sea surface temperature is cold, while it is warmer to seaward, so that a surface set towards the land may possibly often be concurrent with fog; thus, just as the navigator is deprived of means of fixing his position by terrestrial bearings, his ship may be being set into danger.

It will be noted that current arrows are plotted in CHARTS XXXVI, XXXVII and XXXVIII; in a future chapter we hope to be able to show some advantage in charting current reports with weather.

(To be continued.)

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

## HURRICANES OF THE WEST INDIES AND NORTH ATLANTIC.

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

INVESTIGATION into the nature and characteristics of the Hurricanes which frequent the West Indies and adjacent waters of the North Atlantic has occupied the attention of scientists for the past century. In 1831 REDFIELD of America showed these storms to be of circular motion revolving in an anti-clockwise direction and having a progressive movement following a parabolic track. He also theoretically proved that in the Southern Hemisphere the winds in such disturbances would revolve in a contrary direction to those of Northern Latitudes.

A few years later Colonel REID, Governor of Barbados, by actual investigation proved REDFIELD'S theories to be correct and drew up the first practical rules for the management of ships encountering these storms.

Since then GARRIOTT and FASSIG of the United States Weather Bureau and VINES of the Habana Observatory have issued comprehensive works dealing with storms occurring between 1876 and 1911. In addition MITCHELL of the United States Weather Bureau published in 1924 the result of his investigations in tracing the tracks of all recorded storms during the years 1887 to 1923, reaching many important conclusions regarding their place of origin and the conditions which govern their subsequent path. It is from the above mentioned works that the following information has been obtained.

**Intensity and Extent of Storms.**

The term hurricane, by which the tropical revolving storms of the West Indies and North Atlantic are known, is used to distinguish them from the cyclones or depressions which occur in the temperate regions of the North Atlantic.

Hurricanes of the West Indies have the same general characteristics as the Cyclones of the Indian Ocean and the Typhoons of the North Pacific and China Seas. They consist of immense whirls of air revolving in an anti-clockwise direction round a calm or relatively calm centre and at the same time having a general progressive movement. The wind blows in a more or less spiral movement towards the centre, the indraught decreasing as the centre is approached. The indraught is greater in some quadrants than in others. In the storms of the West Indies it is generally greatest in the right hand rear quadrant of the storm field and least in the left hand front quadrant.

The intensity of a storm is shown by the amount the barometer at the centre falls taking as the standard reference the normal height of the barometer for the time of year. In severe storms the barometer in the storm centre may fall to below 948 mb. (28 in.).

The storm field of a hurricane may be divided into three areas—

(1) The outer storm area containing winds up to gale force in which the barometer falls slowly and in which the diurnal range is still marked.

(2) The inner storm area in which winds of storm and hurricane force prevail where the barometer falls rapidly masking the diurnal range.

(3) The "Eye" of the Storm sometimes as little as 7 and rarely exceeding 20 miles in diameter which is an area of absolute or relative calm.

The extent of the storm field varies greatly but is as a rule not over 400 miles in diameter while the inner storm area rarely exceeds 100 miles in diameter.

**Season and Frequency of Storms.**

The Hurricanes of the West Indies, in common with Tropical revolving storms of other parts of the world, are confined mainly to the warmer months of the year when conditions are most favourable for their formation. The season may be regarded as beginning in June and ending in October, the frequency of storms increasing as the season advances.

The following table by MITCHELL shows the monthly frequency of storms recorded during the years 1887-1923. The storms are divided into 3 Groups :—

- Group 1—Storms of known hurricane intensity.
- Group 2—Storms of doubtful intensity.
- Group 3—Storms not of hurricane intensity.

Month.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
Group 1 -	0	6	10	32	46	26	2	0	122
Group 2 -	0	5	3	3	15	23	6	2	57
Group 3 -	1	5	4	4	17	22	7	0	60
Total -	1	16	17	39	78	71	15	2	239
Percentage -	0	7	7	16	33	30	6	1	—

From the above table it is seen that out of the 239 storms recorded 188 or 78 per cent. occurred in the three months August to October and 149 or 62 per cent. occurred in the two months September and October.

**Region of Origin and Track of Storms.**

Hurricanes do not form over or near the Equator. There is no record of a storm developing south of the 9th parallel and the greater number generate north of Latitude 10° North.

REDFIELD when investigating a severe hurricane that occurred in August 1853 found that it generated in the vicinity of the Cape Verde Islands. Later, in 1874, Captain TOYNBEE in his remarks accompanying "Monthly Charts of Meteorological Data in the area between the Equator and Latitude 10° North, Longitudes 20° to 30° West," states "The strong south-westerly gales experienced between 9° and 10° North, considered in connection with the strong north-east winds between 16° and 20° North in August seem to indicate that the breeding place of the West Indian hurricanes lies between them." MITCHELL when replottting the tracks of all recorded storms in the years 1887-1923 proved Captain TOYNBEE'S assumption to be correct, finding the two chief places of origin of tropical hurricanes to be in the immediate vicinity of the Cape Verde Islands and in the Caribbean Sea West of Longitude 78° West. No storm was found to have originated in the central or Eastern portions of the Caribbean Sea.

The Doldrums of the North Atlantic lying between the N.E. and S.E. trade winds is an area of high temperature and humidity. The Doldrum belt moves north with the sun in declination and in the months of August and September are situated in the vicinity of the Cape Verde Islands. At this time the S.E. trade winds blowing on their southern side acted on by the Earth's rotation are deflected to the S.W. The humidity within the belt is then also highest, thus with the N.E. trades blowing on the northern side conditions favouring the formation of revolving storms exist. At the commencement and towards the end of the hurricane season a belt of Doldrums exist on the western side of the Caribbean Sea, making this region as favourable a breeding ground for cyclonic storms as that of the Cape Verde Islands.

The tracks of West Indian Hurricanes are determined by the existing pressure distribution and chiefly by the position of the Azores anti-cyclone at the time. At first moving in a west or north-westerly direction they seek to turn north at the first opportunity, recurving into any existing trough of relatively low pressure, keeping the area of high barometer to the right of their path. An extension of the Azores anti-cyclone to the coast of the United States will prevent a storm from recurving. They then continue in a west or north-westerly direction across the Caribbean Sea and Gulf of Mexico, dissipating inland over the Southern States. An anti-cyclone extending from the United States seawards in an east or south-easterly direction will also prevent a hurricane to the southward from recurving to the north and north-east.

Some hurricanes when impeded by the presence of an area of high pressure describe loops in their track. When this happens the loop is always described to the left and occurs when the storm is south of the 35th parallel. MITCHELL explains this as follows :—

"If a cyclone is travelling towards the north or north-east in a southerly or south-westerly current aloft and its progress is blocked

by an anti-cyclone one of the two following things will happen.

"(1) The north-east or east winds out of the anti-cyclone will cause the cyclone to turn to the west or the south-west, after which its course is dependent upon the further behaviour of the anti-cyclone. If it moves to the eastward the cyclone will soon turn to the north-west and later resume its interrupted north-eastward advance in the south-westerly wind aloft, west of the anti-cyclone. If the latter remains stationary for some time the cyclone will be driven farther to the south-west and may then enter a region of westerly or south-westerly winds aloft, when far enough away from the influence of the anti-cyclone. When the latter finally moves off the cyclone will move north-eastward, its track having described a loop to the left. If the anti-cyclone persists long enough the cyclone will gradually fill up.

"(2) If the anti-cyclone is extensive and lies to the north and north-west of the cyclone rather than to the north-east and north, the winds aloft are likely to be from a point west of north consequently deflecting the cyclone to the east instead of to the west and causing it to move in a direction south of east until it gets away from the influence of the anti-cyclone of the type described—a slow moving one. Later on the cyclone moves north-eastward as in the case of the hurricane of late October, 1921, after it left the Florida peninsula. In order to cause a cyclone to complete a loop to the right after being deflected to the south-east it would be necessary for the anti-cyclone to outrun the cyclone and to move south-eastward and southward after reaching a position north-east of the cyclone's centre thus causing the general drift aloft in the vicinity of the latter to change from the north-west through north, north-east and south-east to south. However, this it is thought can never occur south of about Latitude 30° North, inasmuch as the anti-cyclone that originally causes the deflection to the south-east is a slow moving one, making it impossible for it to move in the manner indicated as necessary to cause a right-hand loop in the track of the cyclone."

The place of origin and average tracks of storms recorded in the different months of the hurricane season are as follows:—

**June.**—The majority of the storms in this month originate over the Caribbean Sea and Gulf of Mexico, West of the 80th meridian and are mostly of moderate intensity. Moving at first in a north-westerly direction they later recurve to the N.E. and dissipate south of the 45th parallel. A few storms continue into the Eastern North Atlantic as extra tropical cyclones.

**July.**—A few storms in this month originate in the western Caribbean Sea and in the Gulf of Mexico, but the majority enter the Caribbean from the eastward and may be of moderate or violent intensity. Their tracks are similar to the storms of June.

**August.**—Storms are over twice as frequent in August as in the two preceding months, the larger number are storms of great intensity. A few generate in the Gulf of Mexico, the majority originate east of the Lesser Antilles and in the vicinity of the Cape Verde Islands. Some of the storms moving in a direction north of west pass either north or south of Cuba and cross the mainland before recurving. Others recurve in about 28° North between the 50th and 80th meridians and continuing in a north-easterly direction traverse the North Atlantic, passing between Iceland and the British Isles.

**September.**—Hurricanes attain their maximum frequency this month and are twice as numerous as the storms in August. The majority occur in the first half of the month and are far less frequent both in number and intensity during the latter half of September. They mostly originate east of the Lesser Antilles and in the vicinity of the Cape Verde Islands. A few generate in the Western Caribbean Sea and Gulf of Mexico, especially during the latter half of the month.

While some of the storms of this month do not recurve but continue in a north-westerly direction to the west coast of the Gulf of Mexico, the larger number recurve to the north-east in about Latitude 28° North. Many continue into high Latitudes before dissipating.

**October.**—The total number of storms recorded during this month are only a little less than in September, and like the storms of that month are most frequent in the first two weeks when more than five times as many occur than in the last fortnight of the month and nearly twice as many as in the second half of September. The storms

of the first part of the month are generally of a more severe nature than those of the second part. The majority originate east of the Lesser Antilles, and in the Western Caribbean Sea, very few storms in this month originate in the Gulf of Mexico. At first progressing in a north-westerly direction, they recurve to the north-east, many continuing into high latitudes before dissipating. Anti-cyclonic areas moving eastward across the United States, extending further south in this month, influence the path of tropical storms causing them to become irregular, some storms describing loops in their paths.

**November.**—During this month storms are few in number and generally of small intensity. The two recorded storms known to have attained violent intensity were both confined to the Western Caribbean Sea.

#### Rate of Progression.

The Rate of Progression of Tropical revolving storms depends upon the general drift of the atmosphere in which the storms form and advance. The velocity therefore varies considerably in different storms, also for the same storm at different periods of its existence. The average velocity of West Indian hurricanes is approximately 300 miles per day.

When fully formed hurricanes moving along the first branch of their path progress at about eleven miles per hour, there being little variation throughout the season. During recurvature, if the parabola of the path is an open one, the rate of progression does not decrease sensibly, but if the parabola is narrow the storm will become almost stationary. When obstructed by an area of high pressure, storms have been observed to remain stationary for two or three days. On the second branch of their path their velocity increases to about 14 miles per hour from May to August, and to about 18 miles per hour in September and October. If the storm continues into the temperate regions the velocity increases to that of a cyclone of the middle latitudes, which is from 20 to 30 miles per hour.

The life of a hurricane while below the 30th parallel may be anything between one and nineteen days, but is on the average of six days duration.

#### Precursory Signs of an Approaching Hurricane.

The first indication of the existence of a hurricane is often given by the appearance of Cirrus cloud. In many cases when the storm centre is far distant and before the barometer commences to fall or the least sign of bad weather is noticed, isolated Cirrus may be observed appearing in feathery streaks converging to a point, the direction of which approximately indicates the bearing of the storm centre.

After twenty-three years' careful observation the late Father VINES, when Director of Habana Observatory, made the following statement:—

"In the West Indian Cyclones the rotation and the cyclonic circulation take place in such a manner that the inferior currents as a rule converge more or less toward the vortex; at a certain altitude the currents follow a nearly circular course, and higher still their course is divergent. It is particularly to be noticed that this divergence is all the greater as the currents occupy higher altitudes until a point is reached where the highest Cirrus clouds are seen to move in a completely divergent radial direction. Thus, if the vortex lies due south the wind will blow more or less from east-north-east, the lowest cloud will move from east, the Alto-Cumulus from east-south-east, the dense Cirro-Stratus from south-east, the Cirro-Cumulus from south-south-east and the light Cirrus from south."

The appearance of Cirrus cloud does not always indicate the existence of a hurricane, but should they converge and the point of convergence be well defined and persistent it is probable that they are issuing from a cyclonic vortex.

Another indication of the existence of a hurricane at a distance may be observed from the appearance of a heavy swell not caused by the then prevailing wind. The distance from the centre that swell may be propagated depends greatly upon the position of the nearest coast or upon the intervention of islands which will turn it from its original direction, but with a clear reach the cyclonic swell can generally be observed when distant 600 miles from the storm's centre.

When the storm's centre is still at a considerable distance from the observer a huge mass of black cloud which forms about the centre, termed the "Bar of the Storm," may sometimes be observed low down on the horizon. At a distance the cloud bank retains its shape and position for hours and its direction will give an approximate bearing

of the centre, while any change in bearing will give an indication of the direction of the storm's movement.

By carefully watching the movement of the barometer and comparing it with the normal pressure, as shown on meteorological charts, timely warning of the existence of a hurricane may be obtained. Within the Tropics pressure is generally very regular and any departure from the normal should be viewed with suspicion, but before comparisons are made it must be borne in mind that the barometer readings must be reduced to Absolute pressure and allowance made for Diurnal Range.

In his investigation of the paths taken by hurricanes, MITCHELL states:—"As this study of tropical storms progressed, it became more and more apparent that any tropical storm will recurve into a

trough of relatively low pressure that may exist when the tropical storm arrives in the same region irrespective of the Longitude or the time of the year."

This being the case, it is obvious that the most reliable information a navigator can get of the probable development and path of a storm known to be in his vicinity, will be obtained from a weather chart made on board from the synchronized observations obtained from ships and those of the nearest coast. Such a chart will give him a graphic illustration of the existing pressure distribution from which he can draw his own conclusions. This subject was fully explained and examples given in Chapters IV and V of "Wireless and Weather an Aid to Navigation" published in the April and May Numbers of this Journal.

## SARGASSO SEA.

PREPARED IN THE MARINE DIVISION BY H. T. SMITH, CLERICAL ASSISTANT.

THE central portion of the North Atlantic Ocean has probably remained the subject of myth and legend for a longer period than any other part of the ocean. Its name, the Sargasso Sea, is derived from the name given to it by the early Portuguese navigators, "Sargaçao," so called from the fact that the berries borne by the sea weed, for the abundance of which the sea is famous, resemble grapes (sarga). It was traversed by COLUMBUS as he voyaged westwards and the islands and fields of weeds hampering the progress of his ship, giving the impression that the sea itself was becoming a material force to impede navigation, nearly caused a mutiny among his crew. For centuries it remained comparatively unknown, forming the theme of innumerable tales of ships becoming enmeshed in the sea-weed and being sucked gradually to the centre of this mighty whirl, there to disappear for ever.

After increased knowledge of the oceans had banished most of the myths, many theories were advanced from time to time to account for its existence. Major RENNELL observed "That the waters of the Atlantic have a greater tendency toward the middle of the Ocean than otherwise and this seems to indicate a reduced level forming a kind of hollow space or depressed surface." Another theory according to FINDLAY was that it "Is the vortex of an immense eddy or whirl formed by the inclination of the water to the westward caused by the influence of the Trade Winds and Gulf Stream" while others maintain that it is a raised surface kept in position by the mighty stream currents by which it is surrounded.

The investigation of the conditions in the Sargasso Sea was one of the tasks of the *Challenger* Expedition in 1873 and the results of that expedition contributed very largely to our knowledge of life and conditions there.

The Sargasso Sea is oval in shape extending according to KRUMMEL from about Latitude 25° N. to Latitude 30° N. and Longitude 40° W. to Longitude 73° W. although isolated patches of weed are frequently met with outside these limits and the whole area is thought to fluctuate with the sun's movement north and south of the Equator. It is coincident with the area of permanently high barometric pressure over the North Atlantic and is at the centre of the oceanic circulation. As will be seen from the charts of currents the Sargasso Sea is a region of weak and variable currents. It is bounded on the south by the North Equatorial Current, the west and north by the Gulf Stream and its extensions, and on the East by the North African Current. Its chief characteristic is of course the abundance of floating sea-weed with which whole stretches of the sea are covered.

The temperature of the sea-water is high while the decrease in temperature with depth is small compared with other parts of the Ocean. It is also a region of high surface salinity reaching 36 to 37 per thousand parts. This may be partly due to the presence of the weed causing increased evaporation.

Consequently the warm saline waters of the Sargasso Sea are the happy hunting ground of the naturalist for they teem with animal life of all descriptions down to great depths. As far as is known the Sargasso Sea is the only breeding ground of the common freshwater eel, which after spending years of its life in the backwaters of a river, migrates through thousands of miles of ocean to spawn in these depths.

The Sargasso Weed or Gulf Weed as it is more commonly known to seamen, is not native to the Sargasso Sea although for many years it was thought to be so; it being assumed that it grew on the bottom, and then, becoming detached, floated to the surface. When met with in the open ocean the weeds are not complete plants but must be looked on as FINDLAY puts it as "Cut-flowers." Gulf Weed grows as all common algæ do, with its roots attached to a rock or some such solid base. Its sources of origin are the coasts of Central America and the rocks and shoals of the Caribbean. Here it grows in profusion, the gas-filled bladder-like berries forming with great rapidity. Broken off by the scouring action of the waves and made buoyant by the profusion of berries, it is carried by the Gulf Stream away up the Straits of Florida into the open Atlantic. Here the prevalent S. W'ly wind tends to set up a surface drift across the Gulf Stream and this, combined with the effect of the rotation of the earth, causes much of the Gulf Weed to be thrown off to the right of the Gulf Stream into the comparative calm of the Sargasso Sea or else if it is carried right along in the Gulf Stream, it enters the Sargasso Sea when the current recurves near the Azores. KRUMMEL has calculated that it would take a piece of weed six months to travel from the Straits of Florida to the west of the Azores. Although broken off from its roots, the Gulf Weed continues for some considerable period to grow vegetatively, but as long as it is detached it is destitute of organs of reproduction. After drifting for a period at the instance of wind and current it eventually decomposes and with the perishing of its bladder-like berries loses its buoyancy and sinks.

Sargasso Weed is generally found floating in little islands or bunches, not matted but with branches loosely intertwined, varying in size from one or two feet to two or three yards in diameter. When a moderate wind is prevalent, it is frequently formed into long lanes. The general colour is olive, the younger branches being more of a golden olive, while the decaying portions become covered with a parasitic growth of a vivid white colour.

These Gulf Weed islands afford protection to swarms of minute animals, crabs and fishes, peculiar to themselves and consisting of forms not usually found in the open ocean—an added proof of the littoral origin of the weed itself. Sir WYVILLE THOMSON, writing in the "Voyage of the *Challenger*," says: "These floating islands have inhabitants peculiar to them, and I know of no more perfect example of protective resemblance than that which is shown by the Gulf Weed fauna. Animals drifting about on the surface of the sea with such scanty cover as the single broken layer of the sea weed, must be exposed to exceptional danger from the sharp eyed sea birds hovering above them, and from the hungry fishes searching for prey beneath; but one and all of these creatures imitate in such an extraordinary way, both in form and colouring, their floating habitat and consequently one another, that we can well imagine their deceiving both the birds and the fishes."

In the process of decay the Gulf Weed eventually becomes *detritus* or dust and according to Sir JOHN MURRAY constitutes the nourishment of many of the animal forms inhabiting deeper waters, which is perhaps an additional cause of the prolific animal life abounding in the Sargasso Sea.

There are other areas where weed is very prevalent—in the South

Atlantic and North and South Pacific Oceans and probably these areas are the result of similar causes, a comparatively calm area into which is flung the weed drifting in a strong current, but none of them are comparable in extent or in the possession of such distinctive

and peculiar biological features as the Sargasso Sea.

The following books have been used in compiling the above:—

FINDLAY'S "Sailing Direction of the North Atlantic."

"Depths of the Ocean," by Sir JOHN MURRAY and Dr. J. HJORT.

"The Voyage of the *Challenger*," by Sir WYVILLE THOMSON.

## WEATHER SIGNALS.

### II.—WIRELESS WEATHER BULLETINS.

#### FRENCH INDO-CHINA.

Mitho W/T Station, approximate Latitude  $10^{\circ} 21' N.$ , Longitude  $106^{\circ} 21' E.$ , call sign HVM, broadcasts weather bulletins at 0300 and 1330 G.M.T. on a wavelength of 600 metres as follows:—

##### 0300 G.M.T. Bulletin.

This bulletin commences with the words "Obs. 6 heures" and contains 2300 G.M.T. observations taken at the following stations:—

Fu Lien	...	Latitude $20^{\circ} 49' N.$	Longitude $106^{\circ} 47' E.$	(approx.)
Tourane	...	" $16^{\circ} 07' N.$	" $108^{\circ} 13' E.$	"
Cape St. James	...	" $10^{\circ} 20' N.$	" $107^{\circ} 05' E.$	"
Fort Bayard	...	" $21^{\circ} 13' N.$	" $114^{\circ} 16' E.$	"

**Form of message.** One seven-figure group for each station is broadcast in the order given above. The group for Fort Bayard has six figures only.

**Code used.** Mostly New International, expressed by symbols, BBBVFFM.

BBB = Barometric pressure in millimetres and tenths, initial figure 7 omitted. (To convert to mbs and ins. see Table XV, p. 57, Vol. IV, No. 39 of this Journal).

VV = Wind direction, from Table III, p. 19, Vol. IV, No. 37 of this Journal.

F = Wind force, Beaufort scale.

M = State of sea, according to the following scale:—

0 = Calm.	5 = Rather rough.
1 = Very smooth.	6 = Rough.
2 = Smooth.	7 = High.
3 = Slight.	8 = Very high.
4 = Moderate.	9 = Phenomenal.

The figure representing State of Sea is not broadcast for Fort Bayard.

##### 1330 G.M.T. Bulletin.

This bulletin is broadcast *en clair* and gives a summary of 0900 G.M.T. observations taken at Indo-China stations and 0600 G.M.T. weather conditions at Hong Kong. The observations of each station are broadcast in the following order:—

Barometric pressure, barometric tendency during the preceding 24 hours, wind direction and force (Beaufort), state of the sky, temperature and state of the sea.

The barometric tendency is given according to the following table:—

Barometer (millimetres).	
± 0 to 1 = Hausse (rise) or baisse (fall)	Légère (slight).
± 1 to 2 = " " " "	Faible (small).
± 2 to 3 = " " " "	Moderée (moderate).
± 3 to 4 = " " " "	Assez forte (rather quickly).
± 4 to 6 = " " " "	Forte (quickly).
± 6 to 8 = " " " "	Très forte (very quickly).

#### Important.

NOTE.—It has been said that there is a "Zone of silence" along the Anam Coast, between Padaran and Varella Point which renders the reception of W/T signals from Mitho W/T Station difficult. See p. 5 of Vol. IV, No. 37 of this Journal.

#### CHINA.

##### Spark and C.W. Issues.

Pratas Island W/T Station, approximate Latitude  $20^{\circ} 42' N.$ , Longitude  $116^{\circ} 43' E.$ , call sign XPI, broadcasts a daily weather report and forecasts based upon observations from about 90 stations in the Far East at:—

0600 G.M.T. (based upon 2200 G.M.T. observations) wavelength 600m. (spk).

1100 G.M.T. ( " " 0600 " " ) wavelength 600m. (spk).

Repeated at 0610 and 1110 G.M.T. respectively, on a wavelength of 1450m. (C.W.).

The weather report and forecasts are broadcast *en clair* in English and are preceded by QST QST QST de XPI XPI XPI. The message is broadcast twice and contains the following information:—

**Part I.** Synopsis of general atmospheric pressure distribution including the location of high and low pressure areas.

**Part II.** Location and expected direction of movement of depression, or typhoon, affecting the China Sea, Eastern Sea, Yellow Sea, Japan Sea (including the Pacific Ocean to the eastward) or S.E. of the Philippine Islands extending northward from Guam and adjacent islands to Northern Japan.

**Part III.** Wind and weather forecast for Formosa Channel, China Sea and neighbouring areas.

**Part IV.** Wind direction and force, and state of the weather at Pratas Island.

Weather reports are also transmitted on request free of charge.

#### HONG KONG.

##### Spark and C.W. Issues.

Cape d'Aguilar (Tailong head) W/T Station approximate Latitude  $22^{\circ} 13' N.$ , Longitude  $114^{\circ} 16' E.$ , call sign VPS broadcasts weather bulletins containing observations from various stations in the Far East at:—

0400 and 1200 G.M.T. Wavelength 600 metres (spk), repeated at 0500 and 1300 G.M.T. respectively. Wavelength 2,800 metres (C.W.).

The names of the observing stations included in these broadcasts, together with the hours at which the observations are taken are given in the lists below.

As it has been found impossible to secure complete synchronisation, the barometer readings broadcast at 0400 G.M.T. will be reduced approximately to 2200 G.M.T. and those broadcast at 1200 G.M.T. to 0600 G.M.T.

##### 0400 G.M.T. Bulletin.

No.	Station.	Position (approximate).		Time of observation (G.M.T.).
		Latitude.	Longitude.	
1.	Nagasaki - - -	$32^{\circ} 45' N.$	$129^{\circ} 53' E.$	2100
2.	Oshima - - -	—	—	2100
3.	Naha - - -	$26^{\circ} 13' N.$	$127^{\circ} 41' E.$	2100
4.	Ishigakijima - - -	$24^{\circ} 20' N.$	$124^{\circ} 10' E.$	2100
5.	Ichang - - -	$30^{\circ} 42' N.$	$111^{\circ} 16' E.$	2200
6.	Hankow - - -	$30^{\circ} 35' N.$	$114^{\circ} 18' E.$	2200
7.	Changsha - - -	$28^{\circ} 22' N.$	$112^{\circ} 50' E.$	2200
8.	Shanghai - - -	$31^{\circ} 15' N.$	$121^{\circ} 30' E.$	2200
9.	Sharp Peak - - -	$25^{\circ} 59' N.$	$119^{\circ} 27' E.$	2300
10.	Amoy - - -	$24^{\circ} 27' N.$	$118^{\circ} 04' E.$	2200
11.	Swatow - - -	$23^{\circ} 23' N.$	$116^{\circ} 42' E.$	2200
12.	Taihoku - - -	$25^{\circ} 02' N.$	$121^{\circ} 31' E.$	2100
13.	Koshun - - -	—	—	2100
14.	Pescadores - - -	$23^{\circ} 30' N.$	$119^{\circ} 30' E.$	2100
15.	Hong Kong - - -	$22^{\circ} 18' N.$	$114^{\circ} 10' E.$	2200
16.	Pratas Island - - -	$20^{\circ} 42' N.$	$116^{\circ} 43' E.$	2200
17.	Fu Lien - - -	$20^{\circ} 49' N.$	$106^{\circ} 47' E.$	2300
18.	Tourane - - -	$16^{\circ} 07' N.$	$108^{\circ} 13' E.$	2300
19.	Cape St. James - - -	$10^{\circ} 20' N.$	$107^{\circ} 05' E.$	2300
20.	Basco - - -	$20^{\circ} 26' N.$	$121^{\circ} 58' E.$	2200
21.	Aparri - - -	$18^{\circ} 31' N.$	$122^{\circ} 07' E.$	2200

No.	Station.	Position (approximate).		Time of observation (G.M.T.).
		Latitude.	Longitude.	
22.	Manila - - -	14° 35' N.	120° 59' E.	2200
23.	Legaspi - - -	13° 10' N.	123° 45' E.	2200
24.	Tacloban - - -	11° 15' N.	125° 00' E.	2200
25.	Iloilo - - -	10° 42' N.	122° 34' E.	2200
26.	Surigao - - -	9° 48' N.	125° 29' E.	2200

**Form of message.** One group containing 12 figures is broadcast for each of the stations given in the list.

1st, 2nd, 3rd and 4th figures in each group give the corrected barometer reading.

5th and 6th figures in each group give the dry bulb temperature of the air.

7th and 8th figures in each group give the wet bulb temperature of the air.

9th and 10th figures in each group give the wind direction (00 = N.; 04 = E.; 08 = S.; 12 = W., etc.)

11th figure in each group gives the wind force by Beaufort scale, forces of 9 and above being sent as 9.

12th figure in each group gives the weather according to the following table:—

- 1 = fine; blue sky or detached clouds.
- 2 = cloudy or overcast.
- 3 = rain.
- 4 = fog.
- 5 = thunderstorm.
- Z = No observation.

A weather report and forecast based upon observations taken at 2200 G.M.T. follow the stations' reports.

**1200 G.M.T. Bulletin.**

No.	Station.	Position (approximate).		Time of observation (G.M.T.).
		Latitude.	Longitude.	
1.	Shanghai - - -	31° 15' N.	121° 30' E.	0600
2.	Sharp Peak - - -	25° 59' N.	119° 27' E.	0600
3.	Amoy - - -	24° 27' N.	118° 04' E.	0600
4.	Swatow - - -	23° 23' N.	116° 42' E.	0600
5.	Taihoku - - -	25° 02' N.	121° 31' E.	0300
6.	Koshun - - -	—	—	0300
7.	Pescadores - - -	23° 30' N.	119° 30' E.	0300
8.	Hong Kong - - -	22° 13' N.	114° 16' E.	0600
9.	Pratas Island - - -	20° 42' N.	116° 43' E.	0600
10.	Fu Lien - - -	20° 49' N.	106° 47' E.	0700
11.	Tourane - - -	16° 07' N.	108° 13' E.	0700
12.	Cape St. James - - -	10° 20' N.	107° 05' E.	0700
13.	Basco - - -	20° 26' N.	121° 58' E.	0600
14.	Aparri - - -	18° 31' N.	122° 07' E.	0600
15.	Manila - - -	14° 35' N.	120° 59' E.	0600
16.	Legaspi - - -	13° 10' N.	123° 45' E.	0600
17.	Tacloban - - -	11° 15' N.	125° 00' E.	0600
18.	Iloilo - - -	10° 42' N.	122° 34' E.	0600
19.	Surigao - - -	9° 48' N.	125° 29' E.	0600

**Form of message.** Same form as 0400 G.M.T. Bulletin.

A weather report and forecast based upon observations taken at 0600 G.M.T. follow the stations' reports.

**NOTE.**—Ships within W/T range of Cape d'Aguiar are invited to transmit weather reports to CQ and VPS containing observations made at 0300, 0600, 0900 and 2200 G.M.T. For sample message see page 17, Vol. IV, No. 37 of this Journal.

This station looks out specially for ships' weather reports at 0315 to 0345, 0615 to 0645, 0915 to 0945, and 2215 to 2245 G.M.T. Thus all ships may know when to expect selected ships to be making their reports to CQ and VPS and may more easily be able to receive the reports.

**Important.**

It has been said that there is a "zone of silence" in the centre of Formosa Strait up to the Foochow coast which renders the reception of W/T Signals from Hong Kong W/T Station difficult. See p. 5 of Vol. IV, No. 37 of this Journal.

**SHANGHAI.**

**Spark Issues.**

Shanghai-Zi-ka-wei W/T Station, approximate Latitude 31° 12' N.,

Longitude 121° 26' E., call sign **FFZ**, broadcasts weather bulletins at:—

0300 G.M.T., after Time Signal, containing observations made at 0100 G.M.T.

0900 G.M.T., after Time Signal, containing observations made at 0700 G.M.T.

1400 and 1800 G.M.T., containing observations made at 1200 G.M.T.

Wavelength 750 metres (spark).

The bulletins consist of weather messages, sent *en clair*, in French and English, for China and the China seas.

Typhoon and gale warnings are also broadcast by this W/T station, after the weather bulletins, for particulars see p. 141.

**Important.**

Owing to the alleged existence of "zones of silence" along the China Coast which apparently make reception of W/T messages difficult from Shanghai W/T station, weather bulletins and storm warnings will also be broadcast on a short wavelength of 34 metres at 1130 G.M.T. preceded by the general call and the call sign of Shanghai W/T Station **FFZ**.

These zones are said to be as follows:—

In the centre of Formosa Strait up to the Foochow Coast.

In the Gulf of Pechili behind Shantung Promontory, and

In the Yangtse-kiang river between Nanking and Chingkiang.

The range of the Shanghai W/T station short wave set has been ascertained to be approximately 2,000 miles.

See p. 5, Vol. IV, No. 37 of this Journal.

**JAPAN.**

**C.W. Issues.**

**The Central Meteorological Observatory Tokyo, W/T Station,** approximate Latitude 35° 39' N., Longitude 139° 45' E., call sign **JFRA**, broadcasts weather bulletins as follows:—

(1) **Synoptic data** messages giving a synopsis of the weather situation over Japan and the neighbouring seas by means of data, in code (Japanese Meteorological) for twenty (or less) selected stations.

(2) **Storm warnings**, for particulars see p. 141.

**Synoptic data messages** are broadcast as follows:—

At 0010 G.M.T. containing observations taken at 2100 G.M.T. (previous day).

„ 0600 G.M.T. „ „ „ „ 0300 „

„ 1110 „ „ „ „ 0900 „

Wavelength: at 0010 and 0600 G.M.T. 4,000 metres (C.W.) repeated on 600 metres (I.C.W.).

at 1110 G.M.T., 4,000 metres (C.W.) repeated on 750 metres (I.C.W.).

**Method of transmission** at all times is as follows:—

- (1) Commencing signal: - - - - - transmitted once.
- (2) QST „ thrice.
- (3) "de": - - - - - „ once.
- (4) Call sign **JFRA** „ once.
- (5) Message „ twice.
- (6) End of message - - - - - „ once.

**List of Selected Meteorological Stations.**

The synoptic data messages give the barometric reading, direction and force of the wind and the state of the weather in code at the following twenty stations:—

Index Letter.	Name of Station.	Province.	Position (approx.).	
			Latitude.	Longitude.
A	Ishigakijima - - -	Loochoo	24° 20' N.	124° 10' E.
B	Nafa - - -	„	26° 13' N.	127° 41' E.
C	Nase - - -	„	28° 23' N.	129° 31' E.
W	Kagoshima - - -	Japan Proper	31° 34' N.	130° 33' E.
I	Murotozaki - - -	„	33° 15' N.	134° 11' E.
F	Tomie - - -	„	32° 37' N.	128° 46' E.

Index Letter.	Name of Station.	Province.	Position (approx.).	
			Latitude.	Longitude.
G	Sakai - - - -	Japan Proper	35° 33' N.	133° 14' E.
V	Hamamatsu - - -	"	34° 43' N.	137° 43' E.
H	Mera - - - -	"	34° 55' N.	139° 50' E.
J	Bonin Is. - - - -	"	27° 05' N.	142° 11' E.
K	Minatsuki - - - -	"	37° 22' N.	136° 45' E.
L	Ishinomaki - - -	"	38° 26' N.	141° 19' E.
M	Hakodate - - - -	Hokkaido	41° 47' N.	140° 43' E.
N	Shana - - - -	"	45° 14' N.	147° 53' E.
O	Mokpo - - - -	Chosen (Korea)	34° 47' N.	126° 20' E.
S	Gensan (Wensan) -	"	39° 11' N.	127° 26' E.
P	Yūki - - - -	"	42° 20' N.	130° 24' E.
Q	Dairen (Talien) -	Manchuria	38° 54' N.	121° 36' E.
R	Changehun - - -	"	43° 55' N.	125° 18' E.
T	Shanghai - - - -	China	31° 15' N.	121° 30' E.

When the information from one or more stations is lacking, data from the auxiliary stations in the following table will be broadcast in lieu.

List of Auxiliary Stations.

Index Letter.	Name of Station.	Province.	Position (approx.).	
			Latitude.	Longitude.
U	Taihoku - - - -	Formosa	25° 02' N.	121° 31' E.
D	Miyazaki - - - -	Kiushiu	31° 55' N.	131° 26' E.
Z	Nemuro - - - -	Hokkaido	43° 20' N.	145° 35' E.
X	Joshin - - - -	N. Chosen	40° 30' N.	129° 11' E.
Y	Mukden - - - -	S. Manchuria	41° 48' N.	123° 23' E.

Form of Messages.

The synoptic data messages are broadcast in a collection of letters forming 20 groups (or less), each group consists of five letters.

1st letter in each group is the index letter of the observation station.

2nd and 3rd letters in each group give the corrected barometer reading in mm., Table XXXII. (To convert to mbs. and ins. see Table XV, p. 57, Vol. IV, No. 39, of this Journal.)

4th letter in each group gives the wind force by Beaufort Scale and the state of the weather, Table XXXIII.

5th and last letter in each group gives the wind direction, Table XXXIV.

SPECIAL WEATHER TELEGRAPHY TABLES,

NOT NEW INTERNATIONAL CODE.

Japanese Meteorological Code.

Table XXXII—Barometric Pressure.

Tenths	0	1	2	3	4	5	6	7	8	9
Millimetres.	Code Letters.									
less than 711	AA	—	—	—	—	—	—	—	—	—
711 - -	AB	—	AC	—	AD	—	AE	—	AF	—
2 - -	AG	—	AH	—	AI	—	AJ	—	AK	—
3 - -	AL	—	AM	—	AN	—	AO	—	AP	—
4 - -	AQ	—	AR	—	AS	—	AT	—	AU	—
5 - -	AV	—	AW	—	AX	—	AY	—	AZ	—
6 - -	BA	—	BB	—	BC	—	BD	—	BE	—
7 - -	BF	—	BG	—	BH	—	BI	—	BJ	—
8 - -	BK	—	BL	—	BM	—	BN	—	BO	—
9 - -	BP	—	BQ	—	BR	—	BS	—	BT	—
720 - -	BU	BV	BW	BX	BY	BZ	CA	CB	CC	CD
1 - -	CE	CF	CG	CH	CI	CJ	CK	CL	CM	CN
2 - -	CO	CP	CQ	CR	CS	CT	CU	CV	CW	CX
3 - -	CY	CZ	DA	DB	DC	DD	DE	DF	DG	DH
4 - -	DI	DJ	DK	DL	DM	DN	DO	DP	DQ	DR

Table XXXII—Barometric Pressure—(continued)

Tenths.	0	1	2	3	4	5	6	7	8	9
Millimetres.	Code Letters.									
725 - -	DS	DT	DU	DV	DW	DX	DY	DZ	EA	EB
6 - -	EC	ED	EE	EF	EG	EH	EI	EJ	EK	EL
7 - -	EM	EN	EO	EP	EQ	ER	ES	ET	EU	EV
8 - -	EW	EX	EY	EZ	FA	FB	FC	FD	FE	FF
9 - -	FG	FH	FI	FJ	FK	FL	FM	FN	FO	FP
730 - -	FQ	FR	FS	FT	FU	FV	FW	FX	FY	FZ
1 - -	GA	GB	GC	GD	GE	GF	GG	GH	GI	GJ
2 - -	GK	GL	GM	GN	GO	GP	GQ	GR	GS	GT
3 - -	GU	GV	GW	GX	GY	GZ	HA	HB	HC	HD
4 - -	HE	HF	HG	HH	HI	HJ	HK	HL	HM	HN
5 - -	HO	HP	HQ	HR	HS	HT	HU	HV	HW	HX
6 - -	HY	HZ	IA	IB	IC	ID	IE	IF	IG	IH
7 - -	II	IJ	IK	IL	IM	IN	IO	IP	IQ	IR
8 - -	IS	IT	IU	IV	IW	IX	IY	IZ	JA	JB
9 - -	JC	JD	JE	JF	JG	JH	JI	JJ	JK	JL
740 - -	JM	JN	JO	JP	JQ	JR	JS	JT	JU	JV
1 - -	JW	JX	JY	JZ	KA	KB	KC	KD	KE	KF
2 - -	KG	KH	KI	KJ	KK	KL	KM	KN	KO	KP
3 - -	KQ	KR	KS	KT	KU	KV	KW	KX	KY	KZ
4 - -	LA	LB	LC	LD	LE	LF	LG	LH	LI	LJ
5 - -	LK	LL	LM	LN	LO	LP	LQ	LR	LS	LT
6 - -	LU	LV	LW	LX	LY	LZ	MA	MB	MC	MD
7 - -	ME	MF	MG	MH	MI	MJ	MK	ML	MM	MN
8 - -	MO	MP	MQ	MR	MS	MT	MU	MV	MW	MX
9 - -	MY	MZ	OA	OB	OC	OD	OE	OF	OG	OH
750 - -	OI	OJ	OK	OL	OM	ON	OP	OQ	OR	OS
1 - -	OT	OU	OV	OW	OX	OY	OZ	PA	PB	PC
2 - -	PD	PE	PF	PG	PH	PI	PJ	PK	PL	PM
3 - -	PN	PO	PP	PQ	PR	PS	PT	PU	PV	PW
4 - -	PX	PY	PZ	QA	QB	QC	QD	QE	QF	QG
5 - -	QH	QI	QJ	QK	QL	QM	QN	QO	QP	QQ
6 - -	QR	QS	QT	QU	QV	QW	QX	QY	QZ	RA
7 - -	RB	RC	RD	RE	RF	RG	RH	RI	RJ	RK
8 - -	RL	RM	RN	RO	RP	RQ	RR	RS	RT	RU
9 - -	RV	RW	RX	RY	RZ	SA	SB	SC	SD	SE
760 - -	SF	SG	SH	SI	SJ	SK	SL	SM	SN	SO
1 - -	SP	SQ	SR	SS	ST	SU	SV	SW	SX	SY
2 - -	SZ	TA	TB	TC	TD	TE	TF	TG	TH	TI
3 - -	TJ	TK	TL	TM	TN	TO	TP	TQ	TR	TS
4 - -	TT	TU	TV	TW	TX	TY	TZ	UA	UB	UC
5 - -	UD	UE	UF	UG	UH	UI	UJ	UK	UL	UM
6 - -	UN	UO	UP	UQ	UR	US	UT	UU	UV	UW
7 - -	UX	UY	UZ	VA	VB	VC	VD	VE	VF	VG
8 - -	VH	VI	VJ	VK	VL	VM	VN	VO	VP	VQ
9 - -	VR	VS	VT	VU	VV	VW	VX	VY	VZ	WA
770 - -	WB	WC	WD	WE	WF	WG	WH	WI	WJ	WK
1 - -	WL	WM	WN	WO	WP	WQ	WR	WS	WT	WU
2 - -	WV	WW	WX	WY	WZ	XA	XB	XC	XD	XE
3 - -	XF	XG	XH	XI	XJ	XK	XL	XM	XN	XO
4 - -	XP	XQ	XR	XS	XT	XU	XV	XW	XX	XY
5 - -	XZ	YA	YB	YC	YD	YE	YF	YG	YH	YI
6 - -	YJ	YK	YL	YM	YN	YO	YP	YQ	YR	YS
7 - -	YT	YU	YV	YW	YX	YY	YZ	ZA	ZB	ZC
8 - -	ZD	ZE	ZF	ZG	ZH	ZI	ZJ	ZK	ZL	ZM
9 - -	ZN	ZO	ZP	ZQ	ZR	ZS	ZT	ZU	ZV	ZW
780 - -	ZX	ZY	—	—	—	—	—	—	—	—
more than 780.1	ZZ	—	—	—	—	—	—	—	—	—

Table XXXIII—Force of the Wind and State of the Weather.

Wind Force	0-1	2-3	4-6	6-7	8-9	10 and over.
Weather.	Code Letters.					
Fair - - -	A	A	B	C	D	E
Cloudy - - -	F	F	G	H	I	J
Rain - - -	K	K	L	M	N	P
Snow - - -	Q	Q	R	S	T	U
Fog - - -	V	V	W	X	Y	Z

Note.—Although the same signals are given for "Calms" and "Light Winds," the former is always meant when the direction of the wind is omitted.

Table XXXIV.—Direction of the Wind.

Direction.	N.	NNE.	NE.	ENE.	E.	ESE.	SE.	SSE.	S.	SSW.	SW.	WSW.	W.	WNW.	NW.	NNW.	Calm.
Code Letter.	N	O	P	Q	E	F	G	H	S	T	U	V	W	X	Y	Z	C

**WIRELESS STORM WARNINGS.  
FRENCH INDO-CHINA.**

**Spark Issues.**

**Kien an W/T Station**, approximate Latitude, 20° 48' N., Longitude, 106° 37' E., call sign **HVB**, broadcasts typhoon or storm warnings in code, immediately after the weather bulletins at 0300 and 1330 G.M.T. and at other times, as necessary, on a wavelength of 600 metres spark.

**Form of message :—**

“Typhoon” **LLLD<sub>1</sub>D<sub>1</sub>K** or “Coup de Vent” **DDQ**, followed by a check figure equal to the sum of the figures of the preceding group.

**Code :—**

**LL** = Latitude (given in whole degrees) of the centre of the typhoon.

**ll** = Longitude ditto.

**DD** = Forecast of the direction the typhoon (or storm) is likely to travel. (See Table III, p. 19, Vol. IV, No. 37 of this Journal), with the following additions :—

- 51—In formation.
- 52—Two centres.
- 53—Direction unknown.
- 54—Stationary, or very slow.
- 56—Turning.
- 58—Filling up.

**K** = Radius and force.

- 1—± 120 miles; intensity unknown.
- 2—± 120 miles; intensity violent.
- 3—± 60 miles; intensity unknown.
- 4—± 60 miles; intensity violent.
- 5—Increasing.
- 6—± 30 miles; intensity unknown.
- 7—± 30 miles; intensity violent.
- 8—Exceptional velocity.
- 9—Continental depression.
- 0—Position unknown.

**Q** = Area threatened.

- 1—Coasts of Anam.
- 2—Gulf of Tongking and Swatow.
- 3—Formosa channel.
- 4—Formosa to Yangtse.
- 5—Yangtse to Shantung.
- 6—Gulf of Pechili to Gulf of Yalu.
- 7—Sea of Japan.
- 8—North of Hokkaido.
- 9—East coast of Japan.
- 0—South of Kyushu.

These warnings are also broadcast when necessary by the following W/T stations in French Indo-China.

W/T Station.	Position (approx.).		Call Sign.	Wavelength. Metres.
	Latitude.	Longitude.		
Fort Bayard	21° 13' N.	110° 23' E.	<b>HVH</b>	600
Tourane	16° 07' N.	108° 13' E.	<b>HVI</b>	600
Mitho	10° 21' N.	106° 21' E.	<b>HVM</b>	600

**CHINA.**

**Pratas Island W/T Station**, call sign **XPI**, broadcasts typhoon warnings for the China Sea when necessary. The warnings are broadcast *en clair* in English and are preceded by the Danger Signal **TTT** (— — —). They are issued as frequently as changes are observed, or at such intervals as may be deemed most expedient.

**HONG KONG.**

**Spark Issues.**

**Cape d'Aguiar (Tailong Head), W/T Station**, call sign **VPS**, broadcasts storm warnings at 0400 G.M.T. and repeats them every two hours until 1600 G.M.T. or until the next warning is issued, on a wavelength of 600 metres (spark).

**Important.**

**NOTE.**—It has been said that there is a “zone of silence” in the centre of Formosa Strait up to the Foochow coast which renders the reception of W/T Signals from Hong Kong W/T Station difficult. See p. 5 of Vol. IV, No. 37, of this Journal.

**SHANGHAI.**

**Spark Issues.**

**Shanghai-Zi-ka-wei W/T Station**, call sign **FFZ**, broadcasts typhoon and gale warnings, when necessary after the weather bulletins described on p. 139 at 0300 (after Time Signal), 0900 (after Time Signal), 1400 and 1800 G.M.T. The warnings are broadcast *en clair* and give information concerning the position of the centres of typhoons or continental depressions, for China and the China Seas.

Wavelength 750 metres (spark).

**Important.**

**Typhoon Warnings Broadcast on Short Wavelength and also on request by Shanghai W/T. FFZ.**

For the benefit of ships who experience difficulty in the reception of W/T messages from **Shanghai W/T Station, FFZ**, owing to the alleged existence of “Zones of silence” along certain portions of the China coast these warnings will, if necessary, be broadcast on a short wavelength of 34 metres at 1130 G.M.T.

Ships are invited in case of difficulty, to ask Shanghai W/T station, **FFZ**, for special typhoon warnings which will be transmitted free of charge.

Particulars of these “zones” are given on p. 139.

**JAPAN.**

**C.W. Issues.**

**The Central Meteorological Observatory, Tokyo, W/T Station**, call sign, **JFRA**, broadcasts storm warnings, when necessary, *en clair*, in English after the weather bulletins explained on p. 139. The warnings contain the following information :— approximate position of typhoon (or cyclone), the direction in which it is moving, or expected movement, or information concerning severe gales, or duration of monsoon, over Japan and the neighbouring seas.

Time 0010 G.M.T. { Wavelength 4,000 metres (C.W.) repeated on  
 ,, 0600 G.M.T. { 600 metres (I.C.W.).  
 ,, 1110 G.M.T. { Wavelength 4,000 metres (C.W.) repeated on  
 750 metres (I.C.W.).

III.—WIRELESS TIME SIGNALS.

Country and W/T Station.	Call Sign.	Wave Length. (Metres.)	G.M.T.			System.
<b>Hong Kong.</b> Stonecutters Latitude 22° 19' 18" N. Longitude 114° 08' 31" E.	BXY	2,000 (I.C.W.)	h. m. s.	h. m. s.		Preliminary signals sent between 0153 and 0155 G.M.T. and between 1253 and 1254 G.M.T. before transmission of Time Signal proper, "CQ de BXY HK TIME WAIT." The Time Signals are dots (of about 0.2 second duration) sent at each second. The dots are <i>omitted</i> at the 28th, 29th, 54th, 55th, 56th, 57th, 58th and 59th second of each minute for the purpose of identifying the signals. NOTE.—Signals controlled from Hong Kong Observatory.
			01 55 00—02 00 00	12 55 00—13 00 00		
<b>China.</b> Shanghai Latitude 31° 13' 14" N. Longitude 121° 27' 48" E.	FFZ	600 (spark)	02 54 00—02 54 50	02 55 00		Time Signal preceded by "general call" (CQ de FFZ). - - - - - etc. ▪ (Time Signal). - - - - - etc. ▪ (Time Signal). - - - - - etc. ▪ (Time Signal). (As above). NOTE.—Signals controlled from Zi-ka-wei Observatory.
			02 56 00—02 56 50	02 57 00		
			02 58 00—02 58 50	02 59 00		
			0854—0859			

IV.—VISUAL STORM WARNINGS.

Hong Kong.

Local Storm Signals.

In addition to the China seas storm signals, symbols from which are displayed when necessary at Blackhead Hill, Kowloon, the following system of local storm signals is in force at Hong Kong.

Signal.	Symbol.	Signification.
1		A typhoon exists which may possibly cause a gale at Hong Kong within 24 hours.
2		Gale expected from the North (N.W. to N.E.).
3		Gale expected from the South (S.E. to S.W.).
4		Gale expected from the East (N.E. to S.E.).
5		Gale expected from the West (N.W. to S.W.).
6		Gale expected to increase
7		Wind of typhoon force expected (any direction).

The symbol for Signal No. 1 is coloured *red*, the remaining symbols are *black*.

Signal No. 7 will be accompanied by three explosive bombs, fired at intervals of 10 seconds at the Water police station, and repeated

at the Harbour Office.

The signals will be lowered when it is considered that all danger is over.

Day signals displayed at Harbour Office, H.M.S. *Tamar*, W/T mast Royal Observatory, Green Island signal mast, a flagstaff on the premises of the Hong Kong and Kowloon Wharf and Godown Coy. at Kowloon, the Standard Oil Coy.'s flagstaff at Lai chi Kok, and a flagstaff near the field officers' quarters at Lye Mun.

Night Signals (Lights).

Signal No.	1	2	3	4	5	6	7
	WHITE	WHITE	GREEN	GREEN	WHITE	GREEN	RED
	WHITE	GREEN	WHITE	GREEN	WHITE	GREEN	GREEN
	WHITE	GREEN	WHITE	WHITE	GREEN	GREEN	RED

Night signals displayed, at sunset, on the tower of the railway station, W/T mast Royal Observatory, H.M.S. *Tamar*, and on the Harbour Office flagstaff. They have the same signification as the day signals.

Signal No. 7 will be accompanied by explosive bombs, as above, in the event of the information conveyed by this signal being first published at night.

Supplementary Warnings.

When signals are displayed in the harbour a cone will be exhibited at the following stations:—

Gap rock	Sau ki wan
Waglan	Sai kung
Stanley	Sha tau kok
Aberdeen	Tai Po

to notify the fact to native craft and passing ocean vessels.

Further details can always be given to ocean vessels on demand, by signal from lighthouses.

The object of the system is to give at least 24 hours' warning of a gale (force 8 Beaufort scale) and also warnings of expected changes in the direction and force of the wind. Owing, however, to the uncertain movements of typhoons and to insufficient telegraphic observations it will occasionally happen that Signals 2 to 5 may be

displayed without a gale occurring at Hong Kong, or even Gap rock, but the reverse is not likely to happen, except in the case of typhoons forming in the vicinity and travelling rapidly towards Hong Kong, or of a located typhoon increasing its rate of progression abnormally. Signal No. 1 is intended as a warning to "Stand by" and watch for the next signal.

NOTE.—The China seas storm signal system necessitates a mast-head symbol which should not be mistaken for a black signal of the local system.

**PHILIPPINE ISLANDS.**

**Typhoon Warning Signals.**

TYPHOON warning signals are displayed upon receipt of information from the Weather Bureau at Manila, as follows:—

**Day Signals.**—Black cylinder, 1½ feet in diameter, 2 feet high. Black cone, base 1½ feet in diameter, 2 feet high. Black sphere, 2 feet in diameter. Flag, 3 or 4 feet square, of any convenient colour.

**Night Signals.**—Red and White lights shown vertically or horizontally.

Signal No.	By Day.	By Night.	Meaning.
1			<p><b>Indicates</b> (a) A distant typhoon the direction of whose movements is still unknown. The signal will be changed in case the typhoon approaches.</p> <p>(b) The direction of the distant typhoon is at present such that the storm may pass off without seriously affecting the archipelago.</p> <p>(c) A general warning, viz., when the weather indications are dangerous but such as are not covered by any one of the other signals in use; for instance, when the typhoon recurves east of the archipelago. In such cases see the daily weather note posted at all the meteorological and telegraph stations and Custom houses.</p> <p><b>Precautions.</b>—Vessels should prepare to strengthen their moorings and to get up steam. Small vessels, especially open launches, should not risk going far from port.</p>
2			<p><b>Indicates</b> that the centre of the typhoon will pass (or is passing) to the northward at a considerable distance. Winds from west to south are to be expected, which may acquire considerable force and continue for several days.</p> <p><b>Precautions.</b>—Vessels should strengthen their moorings. It is considered advisable that vessels should send down light yards and masts. Steam vessels should be ready to use their engines at short notice. Dangerous for small vessels to be in Manila bay.</p>
3			<p><b>Indicates</b> that the centre of the typhoon will pass (or is passing) to the southward at a considerable distance. Winds from east to south are to be expected. These are generally less violent than those referred to in signal No. 2.</p> <p><b>Precautions.</b>—As for signal No. 2.</p>

Signal No.	By Day.	By Night.	Meaning.
4			<p><b>Indicates</b> that the location of the typhoon is dangerous for the place where the signal is hoisted, though the danger is not imminent. Look out for the next signal.</p> <p><b>Precautions.</b>—Vessels should strengthen their moorings. Steam vessels must be ready to use their engines in case of sudden emergency. Small vessels must remain at their moorings.</p>
5			<p><b>Indicates</b> that the centre of the typhoon will pass (or is passing) to the northward at a short distance. Strong winds from north, through west, to south are to be expected, which may become very violent.</p> <p><b>Precautions.</b>—Vessels should strengthen their moorings as much as possible. Lower and secure all gear. Use steam to help anchors. Vessels outside Manila harbour may find it necessary to seek refuge in Kavite. No vessels should be under way while this signal is hoisted.</p>
6			<p><b>Indicates</b> that the centre of the typhoon will pass (or is passing) to the southward at a short distance. Strong winds from north, through east, to south are to be expected, which may become very violent, though usually they are less severe than those referred to in signal No. 5.</p> <p><b>Precautions.</b>—As for signal No. 5.</p>
7			<p><b>Indicates</b> that the centre of the typhoon will pass over the place where the signal is hoisted.</p> <p><b>Precautions.</b>—As for signal No. 5. It must be noted, however, that after the absolute or relative lull, due to the actual passing of the centre, the wind will suddenly change to a direction opposite to the one from which it came before the lull; also that it may often be more violent than before.</p>
8			<p><b>Indicates</b> very high tides, and floods.</p> <p><b>Precautions.</b>—Vessels of any description must not attempt to enter or leave a harbour or river, nor to move about inland waters while this signal is hoisted. The flag in this signal is of any convenient colour.</p>

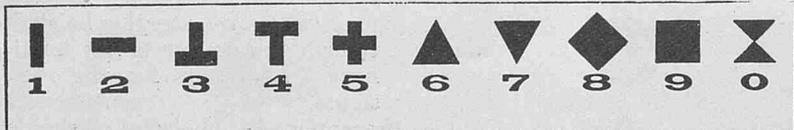
**CHINA SEAS STORM SIGNAL SYSTEM.**

**Typhoon and Storm Signals.**

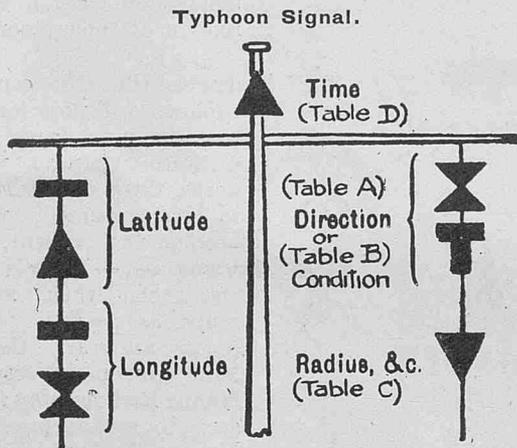
THE China seas storm signal system which has been drawn up by joint agreement between the observatories at Zi-ka-wei and Hanoi and the Chinese Maritime Customs, is now definitely adopted along the whole China coast, including Hong Kong and the Indo-China ports.

**General Explanation.**

The signals are made by means of certain symbols, each corresponding, for certain purposes, to a number:—



The symbols are hoisted at the yardarms and masthead of the storm-signal mast and have the general characteristics as shown below.

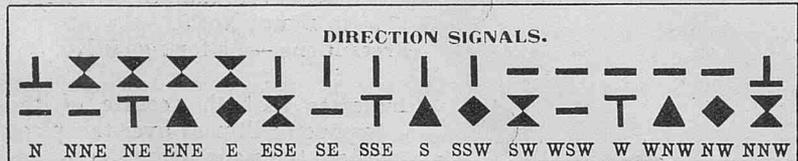


*Meaning.*—A severe typhoon within 30 miles of Lat. 26° N., Long. 120° E., travelling N.E. Warning issued this morning.

The two upper symbols, on one yardarm indicate latitude, 26°, the lower two figures longitude, the 100 being omitted, i.e., 20 indicates longitude 120°.

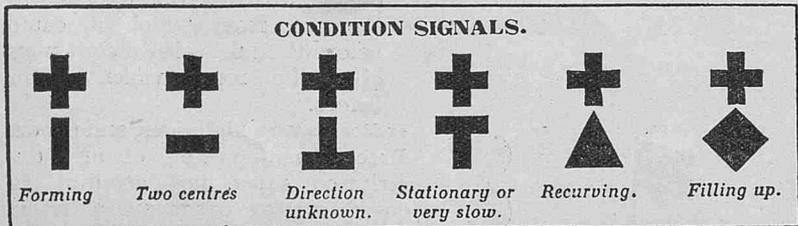
The two upper symbols on the opposite yardarm indicate the direction in which a typhoon is travelling, see Table A.

TABLE A.



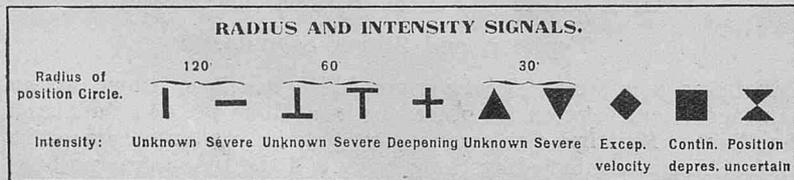
(Note.—The numbers corresponding to the symbols indicate the number of points from North or alternatively certain conditions of the typhoon, see Table B.)

TABLE B.



The lower symbol on this side indicates the radius of the circle whose centre is shown by the latitude and longitude. This symbol may also indicate degree of intensity. In the case of a continental depression it indicates that it is such, and the corresponding latitude and longitude is the centre of an indefinite area affected. See Table C.

TABLE C.



*Note.*—It should be clearly understood that the position indicated is not necessarily the centre of the typhoon, but merely indicates the centre of a circle of a specified radius within which the centre of the typhoon is believed to lie.

The signal at the masthead indicates the time the warning was issued by the Observatory. See Table D.

TABLE D.



It is important that seamen should realise that the position of the centre of the typhoon as signalled is the position according to the data possessed by the Observatory at the time of the issue of the warning. That data may be as much as 12 hours old. Thus, if the time signal indicates that the warning was issued "This morning," it may be that the position corresponds to data concerning yesterday afternoon.

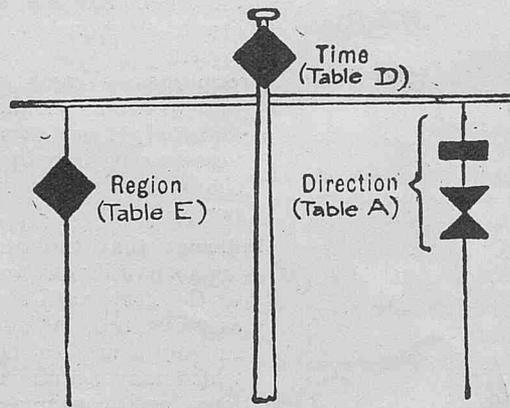
If the signal "Deepening" is made, it indicates that there is reason to believe that the barometric gradient and, consequently, the intensity of the typhoon are increasing.

If the signal "Exceptional velocity" is made, it indicates that there is reason to believe that the rate of progression is 25 per cent. or more greater than the average rate.

If the signal "Position uncertain" is made, it indicates that the data possessed is unreliable and that the position signalled is a mere probability.

The several tracks which a typhoon may follow in the several months are very varied, and the velocity of progression is liable to be erratic. It is not safe to count on a typhoon maintaining a velocity indicated by previous position of its centre. The velocity is liable to increase very suddenly. Seamen are recommended to study from available sources the tracks and average velocities for the month and locality concerned. The table on p. 145, taken from "Typhoons of the North Pacific and China Seas," Vol. II, No. 20, of this Journal may be useful.

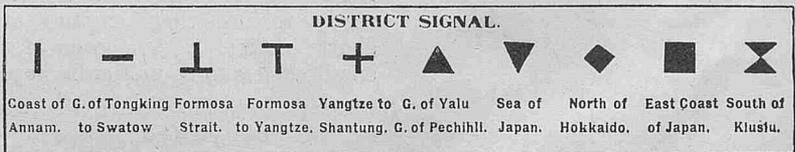
**GALE SIGNALS.**



*Meaning.*—The north coast of Hokkaido threatened by a gale from S.W. Warning issued yesterday afternoon.

The one symbol at one end of the yardarm shows the region threatened. See Table E.

TABLE E.



The two symbols at the other yardarm show the direction from which the gale is expected to blow. See Table A.

The symbol at the masthead shows the time the warning was issued by the Observatory. See Table D.

*Note.*—In addition to the above general signals, local storm signals are displayed at Hong Kong. See p. 142.



The rate of progression is shown by changing the relative positions of the direction symbols to the yardarm. See Table G.

TABLE G.—Rate of Progression.

	Direction symbols separated by the normal distance.	Velocity not known.
	Direction symbols separated by twice normal distance.	10 to 20 miles per hour.
	Twice normal distance between yardarm and upper symbol.	20 to 30 miles per hour.
	Twice normal distance between yardarm and upper symbol. Also twice normal distance between the two symbols.	About 30 miles per hour.

(In Table G the symbols represent an easterly movement of the typhoon.)

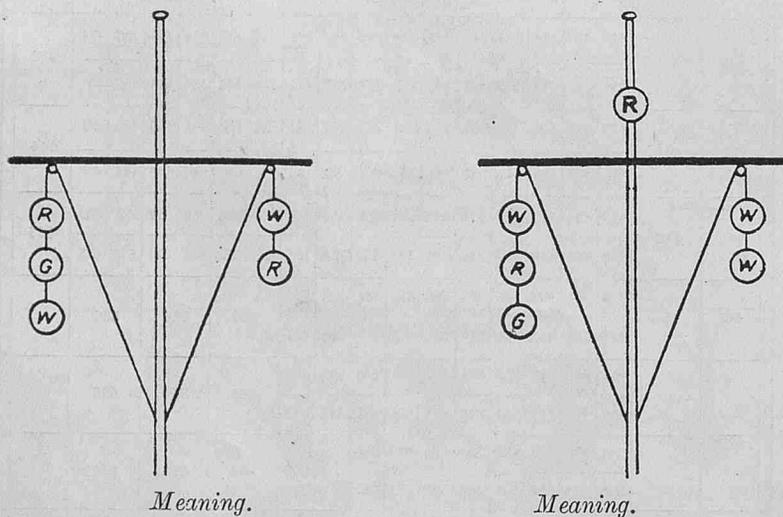
One symbol at the masthead shows the time at which the centre was located, and the intensity (force) of the typhoon. See Table H.

TABLE H.—Time and Force.

	Time	This Morning	This Afternoon	Last Night
Force.		6 am.	2 pm.	10 pm.
Not indicated.		●	⊗	◆
Violent.		▼	▲	■

2. Night Signals.

Examples of Night Signals.



Meaning.

Meaning.

A cyclone or typhoon over Korea (Chosen), moving towards the north-east. A cyclone over Hokushu, moving towards the east.

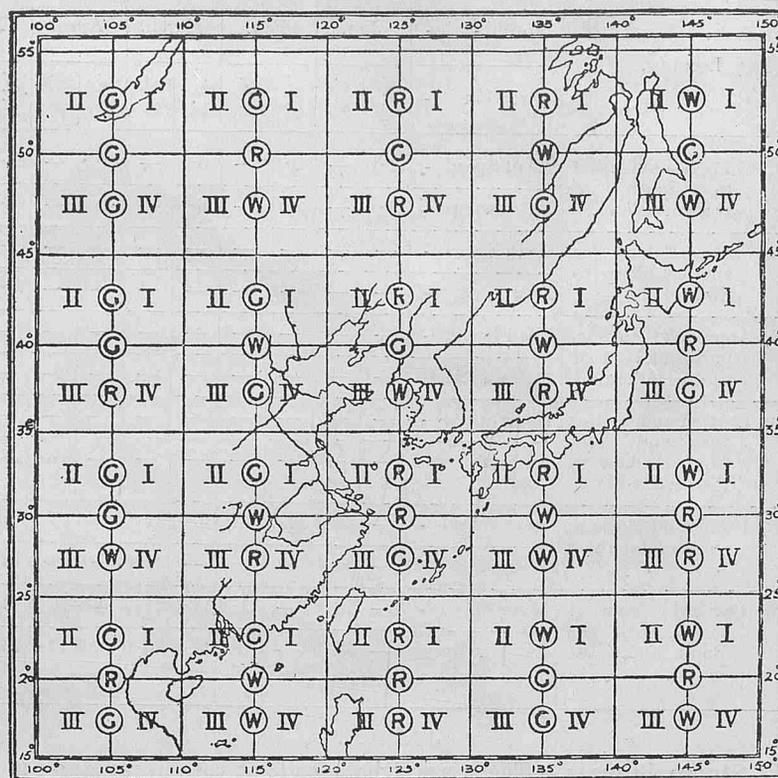
Three lights, vertical, at one yardarm indicate the district in which the typhoon or cyclone is situated. See POSITION LIGHT CHARTLET.

One light at the masthead shows the subdivision of the district in which the centre is situated. See Table I. and POSITION LIGHT CHARTLET.

TABLE I.—Subdivision Light.

⊙	⊙	⊙	None
1 <sup>st</sup> Quadrant.	2 <sup>nd</sup> Quadrant.	3 <sup>rd</sup> Quadrant.	4 <sup>th</sup> Quadrant.

Position Light Chartlet.



The letters W,R,G, denote White, Red, and Green, respectively.

Two lights, vertical, at the other yardarm show the direction of the motion of the centre. See Table J.

TABLE J.—Direction of Motion Lights.

⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
⊙	⊙	⊙	⊙	⊙	⊙	⊙	⊙
N.	NE.	E.	SE.	S.	SW.	W.	NW.

The letters W.R.G. in Tables I. and J. denote white, red, and green, respectively.

Local Storm Signals.

These signals are made by day with either a red ball, a red cylinder, or a red cone; and by night by coloured lights, which have the following significance:—

Day Signals.	Night Signals.	Signification.
A red ball -	A red light -	Strong winds or gales expected.
A red cylinder -	A green light -	Rain or snow storm.
A red cone -	A red light over a green light.	Approach of a cyclonic storm of dangerous intensity.

Special Notices regarding Personnel.

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

Captain F. E. Beadnell, R.N.R.

Captain F. E. BEADNELL, Commander of the R.M.S. *Adriatic*, has voluntarily retired after nearly 32 years' service with the WHITE STAR LINE in order to facilitate the promotion of younger officers.

Captain BEADNELL served his apprenticeship with the HUDSON BAY COMPANY, and after ten years' service at sea joined the WHITE STAR LINE as a Junior Officer in 1895. Obtaining his first command in 1904 he has since commanded many of the big ships of the White Star Fleet.

Captain BEADNELL has been a regular member of the Voluntary Corps of Marine Observers since 1905, and Marine Observers will join with the Marine Division in wishing him long life and happiness in his well-earned retirement.

WEATHER CHART, MORNING OF MAY 19TH. 1920.

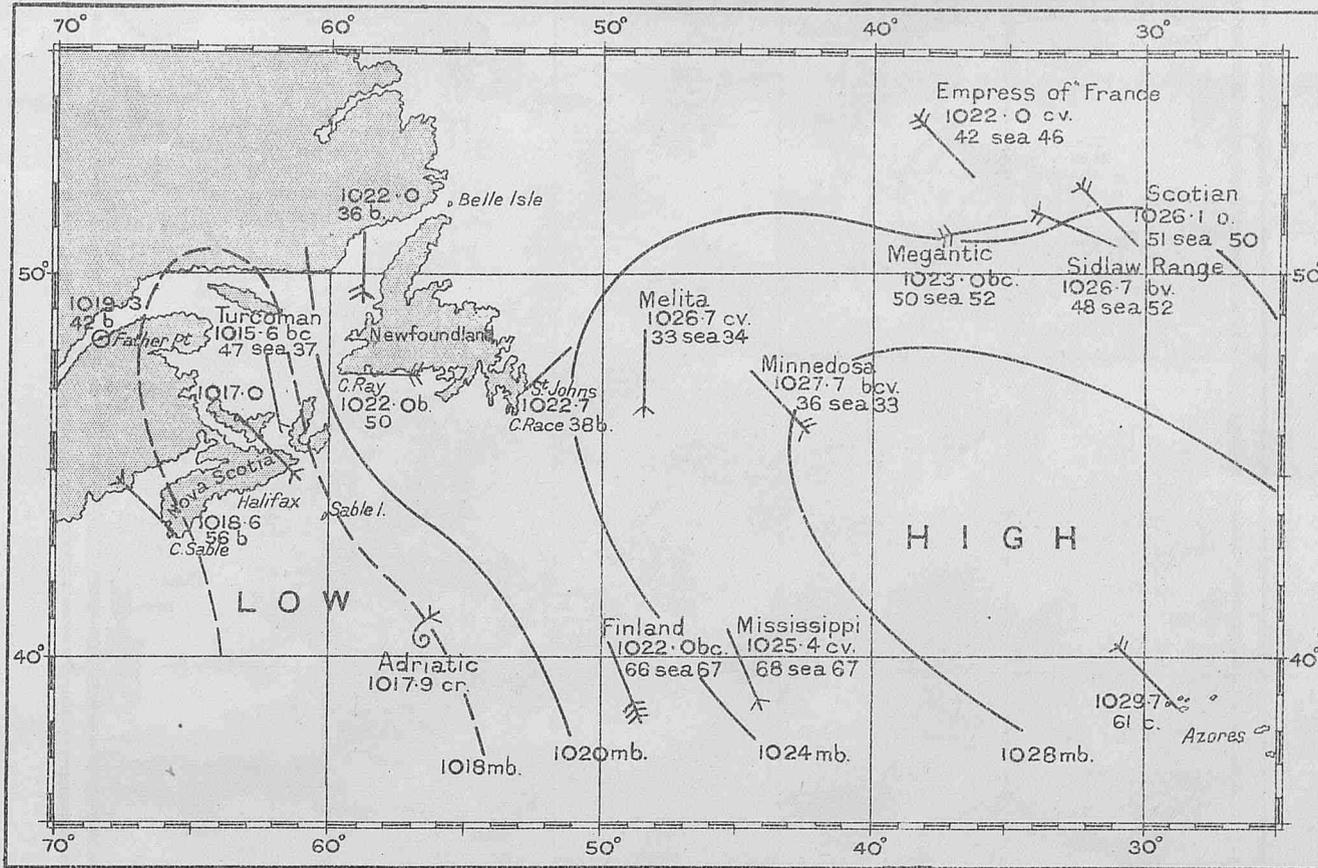


Chart XXXIV. —“Wireless and Weather.”

WEATHER CHART, EVENING OF MAY 19TH. 1920.

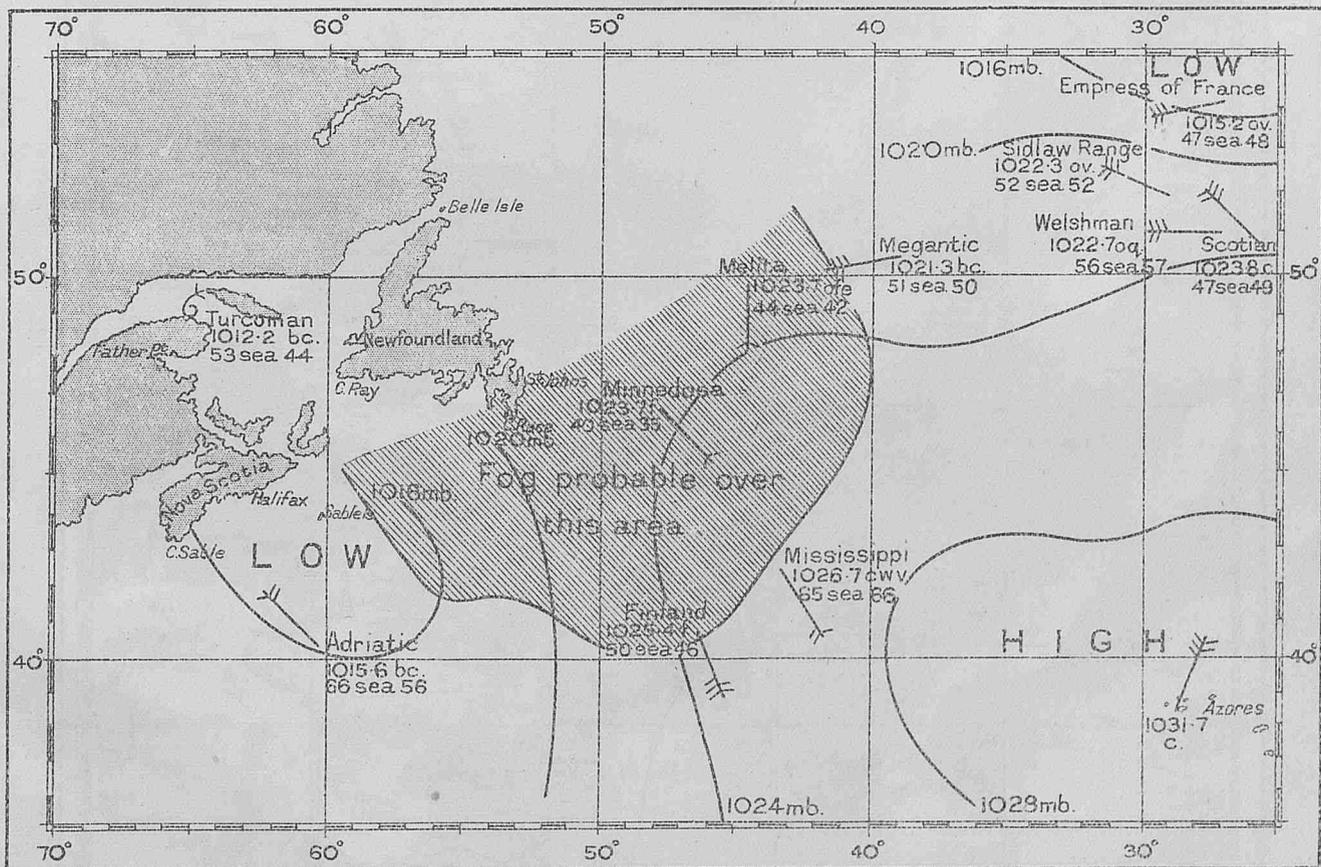


Chart XXXV. —“Wireless and Weather.”



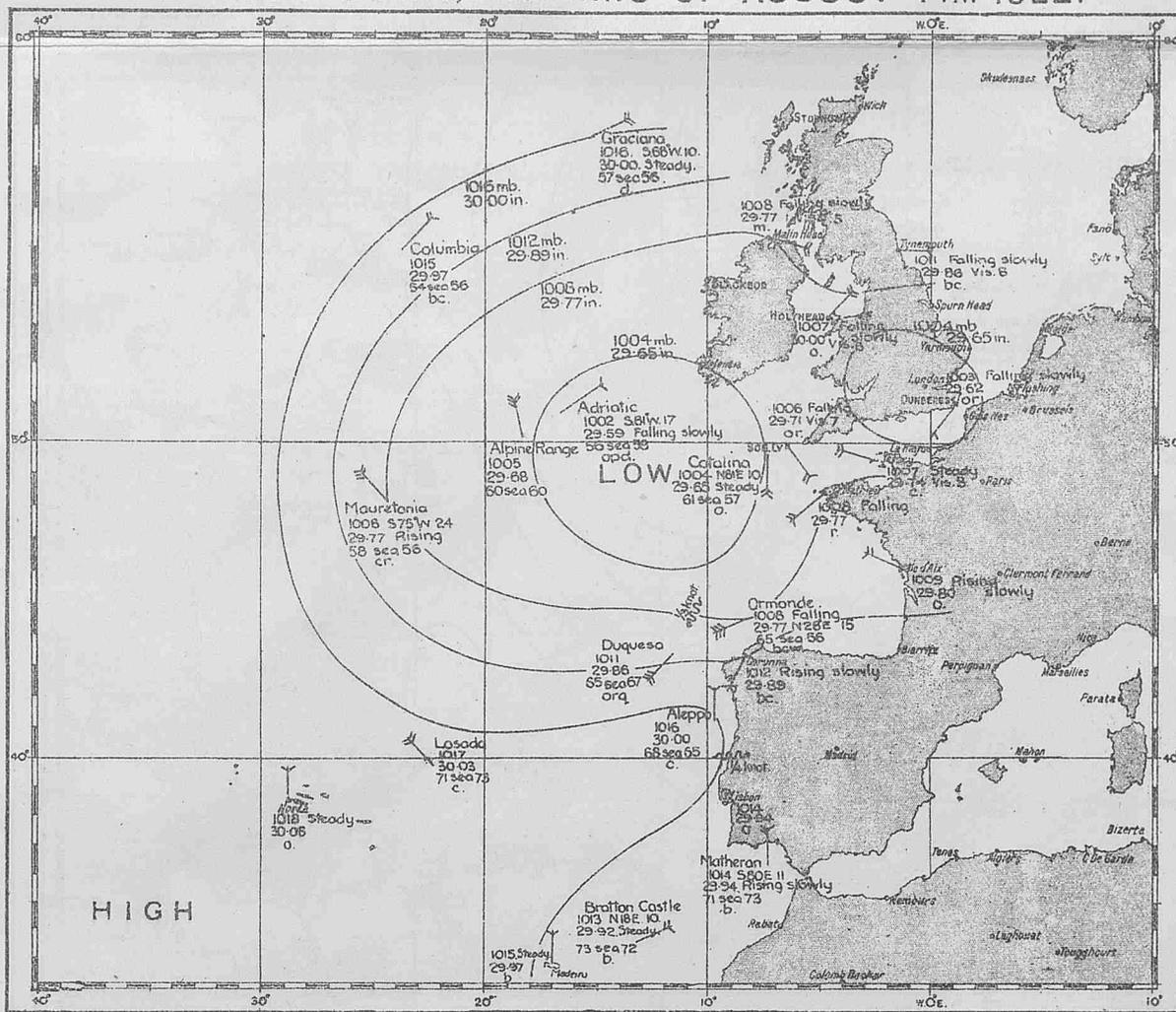


Chart XXXVIII.—Wireless and Weather.

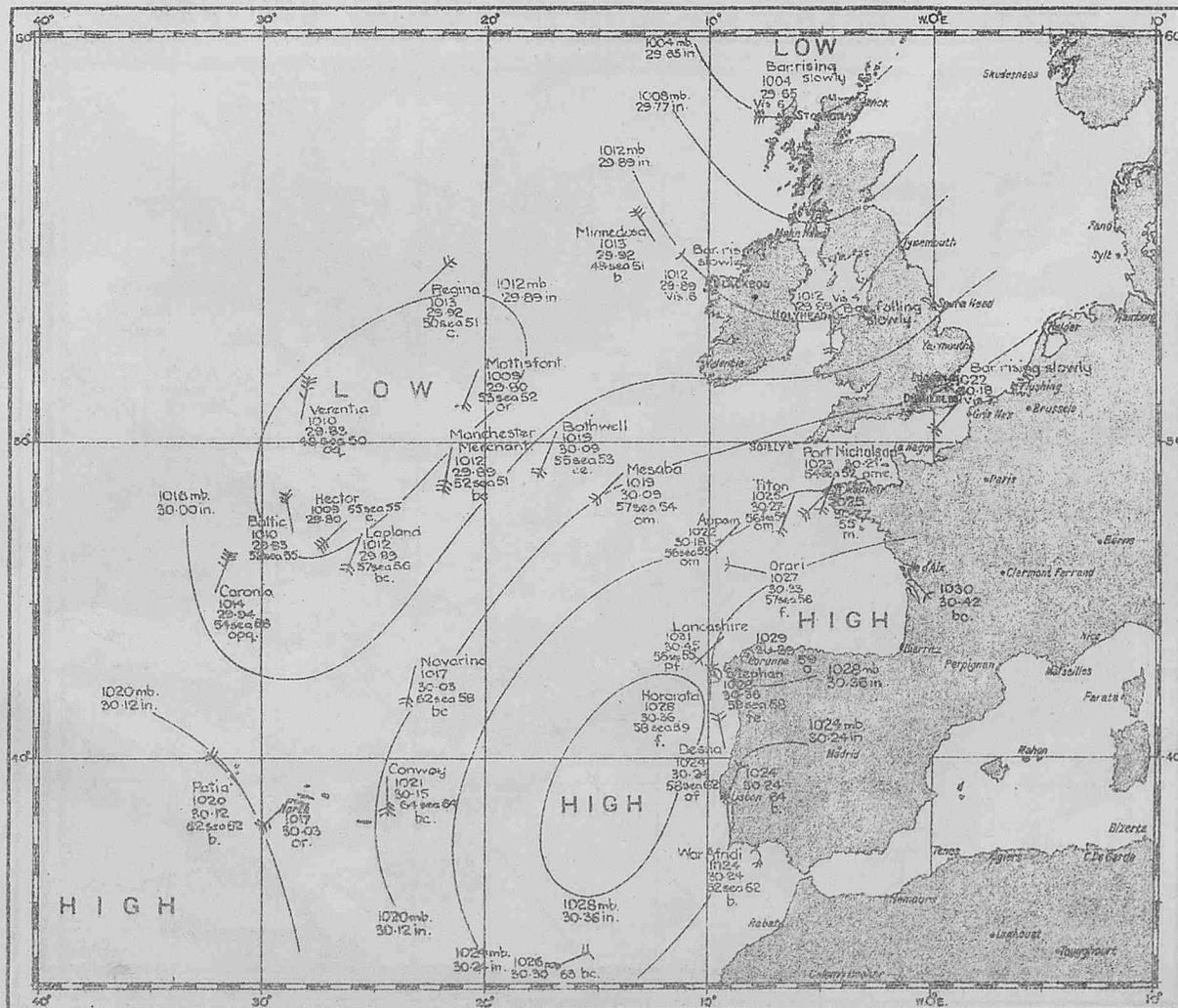


Chart XXXIX.—Wireless and Weather.



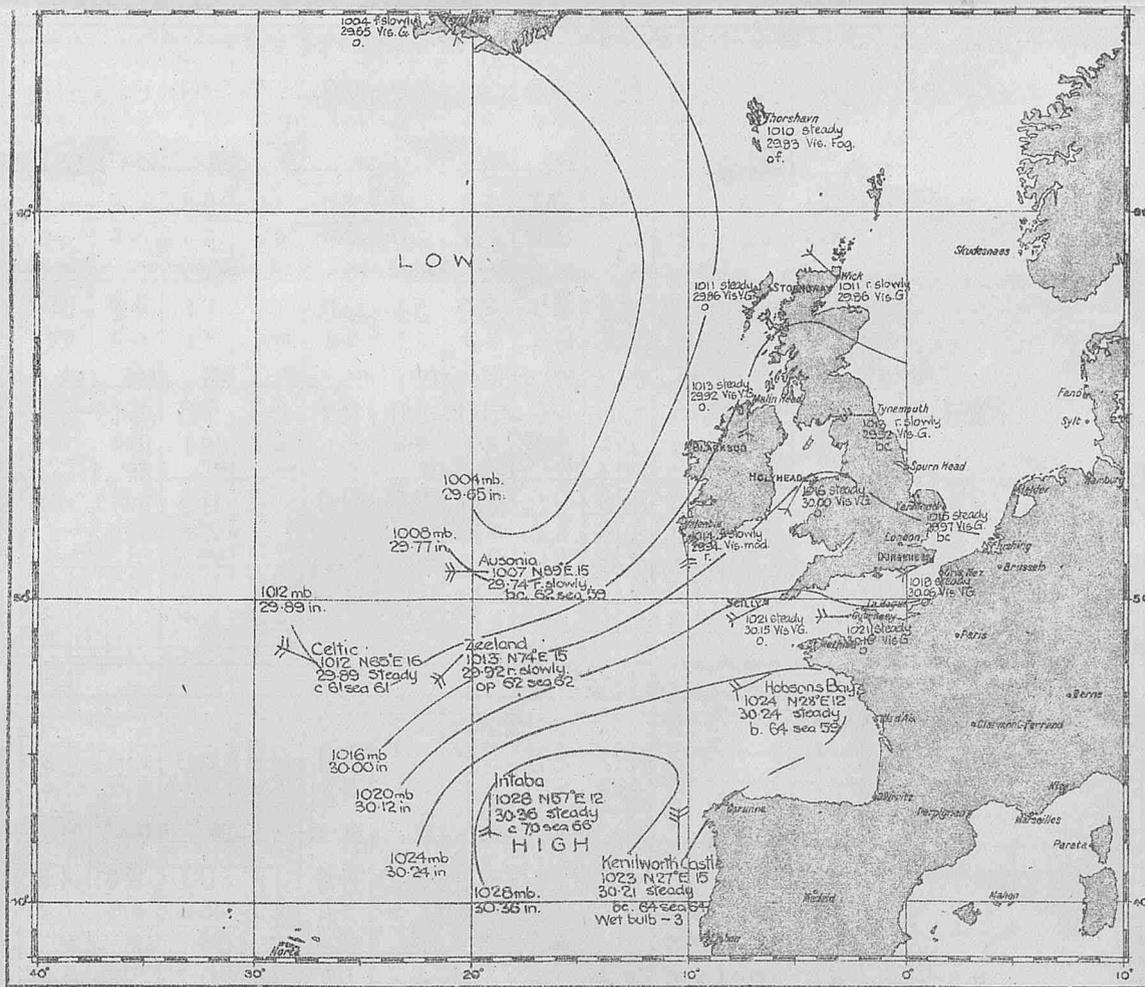


Chart XLII.—"Wireless and Weather."

WEATHER CHART, MORNING OF JULY 11 TH, 1926.

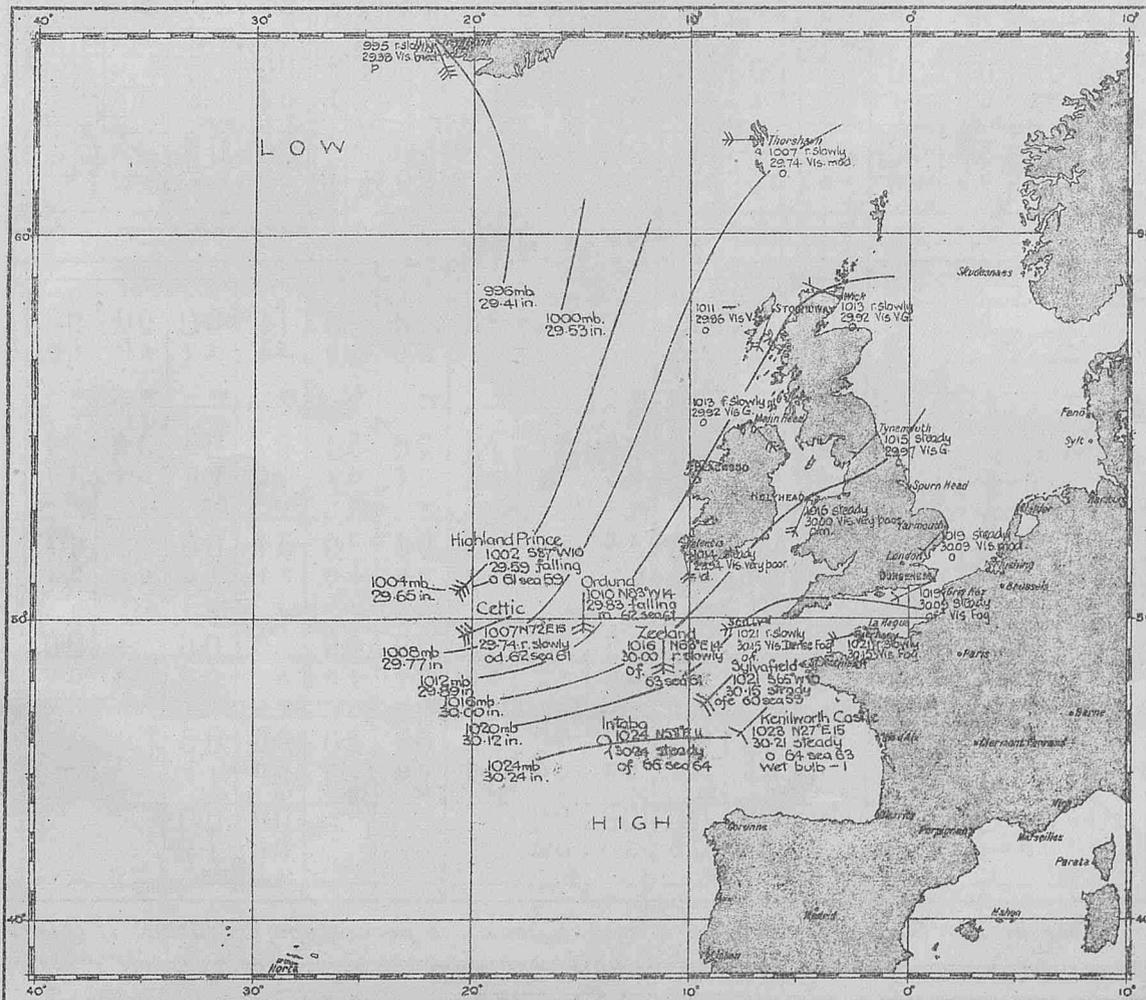
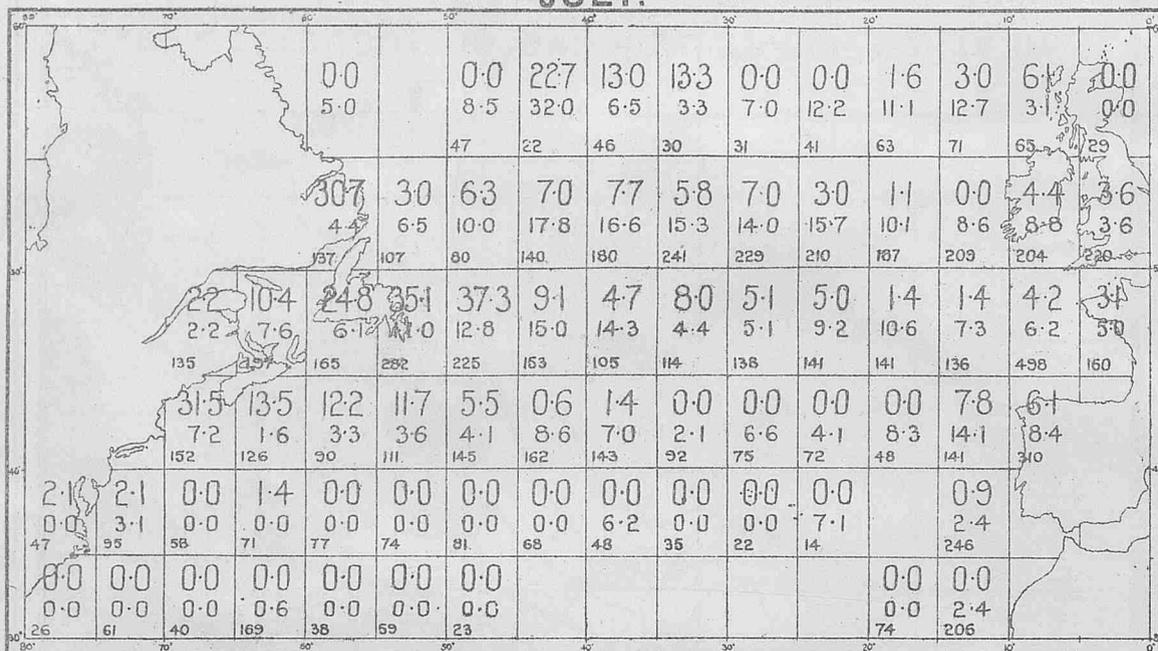


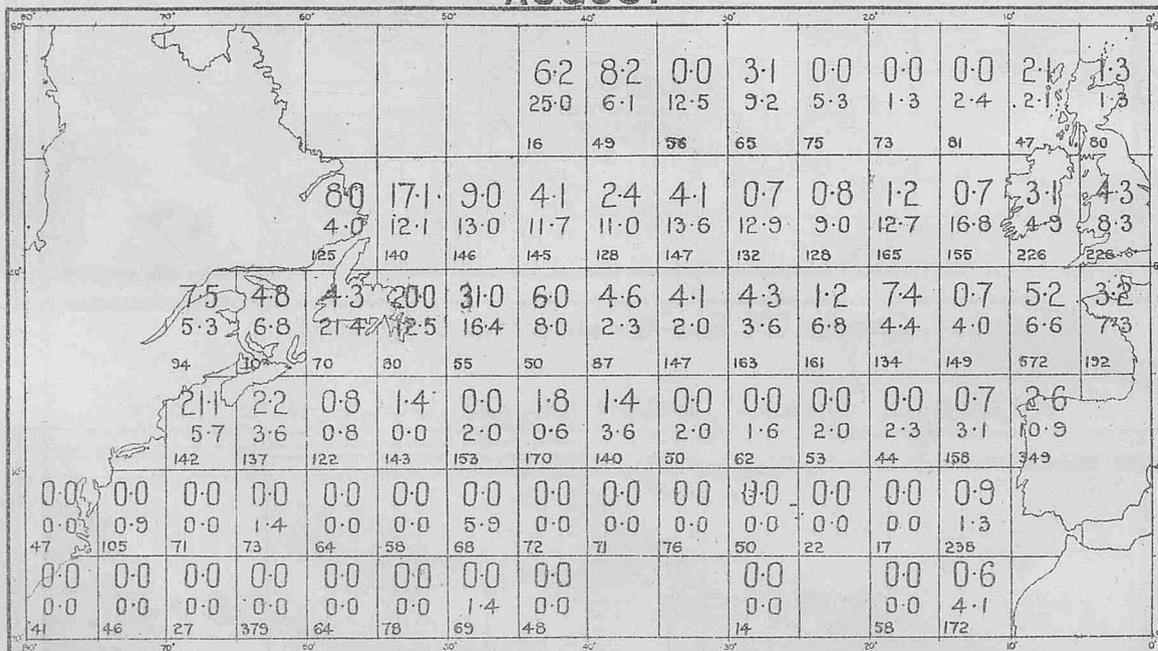
Chart XLIII.—"Wireless and Weather."

COMPILED FROM OBSERVATIONS FOR THE YEARS 1921-1925.

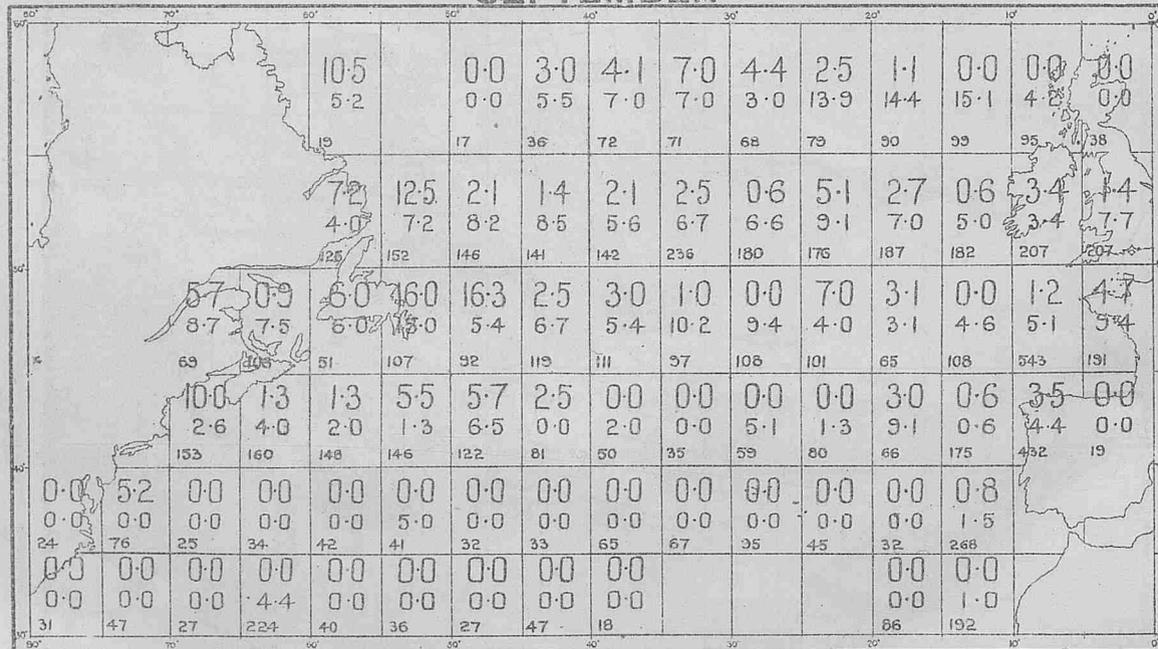
JULY.



AUGUST

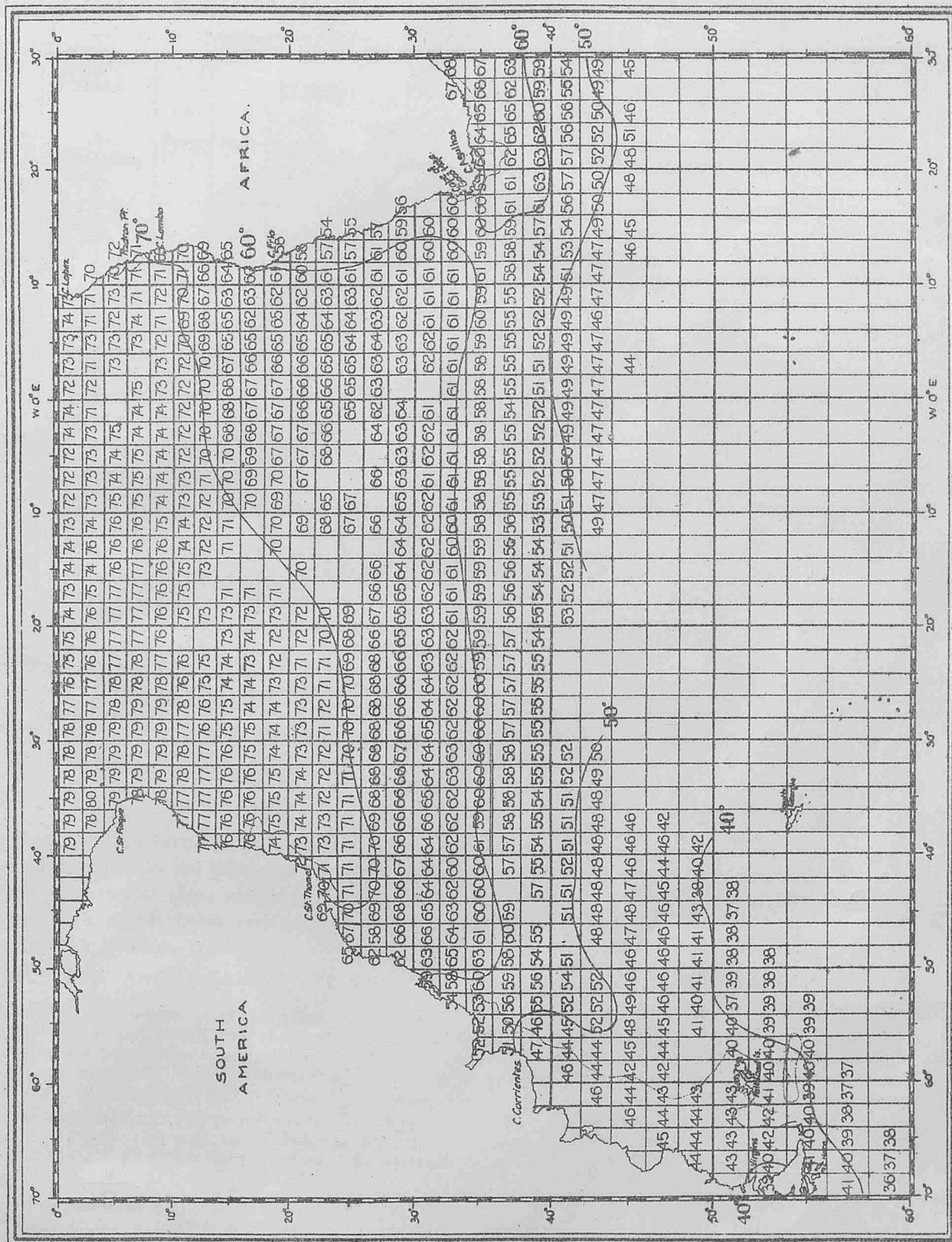


SEPTEMBER



The upper (large) numbers in the centre of each 5° square show the percentage frequency of observations of fog. The lower (medium sized) numbers in the centre of each 5° square show the percentage frequency of observations of mist. The small number in the lower left hand corner of each 5° square is the number of observations on which the percentage frequency is based.

# SOUTH ATLANTIC. MEAN SEA SURFACE TEMPERATURES FOR MONTH OF JULY.



Computed from observations of British ships during the years 1855 to 1899 except to the Southward and Eastward of Latitude 30° South and Longitude 10° East where the observations are for the years 1855 to 1878.

No.	Name	Amount
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		
21		
22		
23		
24		
25		
26		
27		
28		
29		
30		
31		
32		
33		
34		
35		
36		
37		
38		
39		
40		
41		
42		
43		
44		
45		
46		
47		
48		
49		
50		
51		
52		
53		
54		
55		
56		
57		
58		
59		
60		
61		
62		
63		
64		
65		
66		
67		
68		
69		
70		
71		
72		
73		
74		
75		
76		
77		
78		
79		
80		
81		
82		
83		
84		
85		
86		
87		
88		
89		
90		
91		
92		
93		
94		
95		
96		
97		
98		
99		
100		

STATE OF NEW YORK

# NOTICE.

## REPORTS ON TROPICAL CYCLONES, HURRICANES AND TYPHOONS.

It will be of great assistance, if, in all cases in the vicinity of cyclones, observers will note the period and length of swell.  
Form 905.

REPORT ON CYCLONE EXPERIENCED BY S.S. \_\_\_\_\_ Captain \_\_\_\_\_  
Owners \_\_\_\_\_ from \_\_\_\_\_ to \_\_\_\_\_

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

Date. 192...	Time of Observation.	Position.		True Course.	Dis- tance.	Barometer Uncorrected.	Attd. Ther- mometer.	Wind.		Weather by Beaufort Notation.	Sea.		Swell.		Clouds.			Remarks.	
		Lat.	Long.			Height above sea.....ft.		True Direction.	Force by Beaufort Scale.		True Direction.	Amount 0 to 9.	True Direction.	Amount Characteristic.	Types.		Amount 0-10.		
															Upper, and direction from which they move.	Lower, and direction from which they move.			
	4 a.m.																		
	8 a.m.																		
	Noon.																		
	4 p.m.																		
	8 p.m.																		
	Midt.																		

Copies of W/T. weather messages received or sent, from or to other ships or the shore, are specially desired.

It is specially desired that it should be stated if the Barometer is Mercurial or Aneroid.

The accompanying blue postcard should be completed in accordance with instructions thereon in order that the error of the barometer may be known.

If the position by observation at noon is given when obtained, and by D.R. at noon when sights are not obtained, so long as the courses (True) and distances between each set of weather observations are given with time, it will enable the computers to ascertain the position of the ship when each set of observations is recorded, which is very important. Hourly observations are desirable near the storm centre.

Please state at each Noon how much ship's time differs from G.M.T.; also state if ship's time is used.

If in addition to the observations required by the above form a narrative of the experiences in cyclones is given it will be greatly appreciated.

This report will give great assistance in investigating cyclones.

Address to which acknowledgment may be sent \_\_\_\_\_

### IMPORTANT.

Members of the Regular Corps of Voluntary Marine Observers are requested to pass on the following to Commanders, Officers and Wireless Operators of ships which are not on our list so that the voluntary work of our Corps may be of the greatest possible benefit to the Sea Services.

#### WIRELESS AND WEATHER TELEGRAPHY.

The advantages which may be derived from the Weather Reports addressed to "All ships" containing observations made at the same time as those of the telegraphic reports of the nearest coast by certain selected ships co-operating in the voluntary system of the Marine Division of the Meteorological Office is brought to notice.

These reports are made on 600 metres spark and 2,400 metres C.W., wave lengths, regularly, once or twice daily as soon as convenient after observation time, of which the following is an example:—

To CQ.

*Weather 3045N 6146W Barometer corrected 3009 ENE3  
Cloudy CiStr 8 1300 G.M.T. Twenty Eight May Course  
N49E 13 Steady Current WSW 3/4 Knot From 28N 65W to  
30N 61W Air 73 Sea 74. Cristales.*

NOTE.—The message may be abbreviated in which case the elements after the date are omitted.

The names of the ships making these reports along the trade routes in all oceans are indicated in the fleet list of "The Marine Observer." Only ships which have reliable mercurial barometers are selected.

These reports can be used to the greatest advantage in conjunction with the coast observations broadcast in code in the Weather Shipping Bulletins of many countries.

For the guidance of mariners in this practical application of marine meteorology "Wireless and Weather an Aid to Navigation" is being published in serial chapters in the 1927 numbers of "The Marine Observer."

The "Marine Observer" is the monthly review of the Marine Division in co-operation with Voluntary Marine Observers published by the authority of the Meteorological Committee and may be obtained from H.M. Stationery Office through any bookseller.

In it is also given concise descriptions of Weather Signals for all coasts of the World and information of Weather, Currents, Ice and other matters connected with Marine Meteorology.

#### TROPICAL REVOLVING STORMS.

##### OBSERVATIONS.

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

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

#### POSITIONS IN METEOROLOGICAL LOG.

Marine Observers can do much to facilitate data extraction and research work in the Marine Division by carefully following the instructions for keeping the Original Note Book and Meteorological Log.

Usually it is customary to enter the D.R. and observed positions at noon and at such times as the set and drift of current is determined between positions fixed by stellar observations.

For many purposes in the Marine Division we have to work out the exact position from these with the course and distance run of the position at the end of each watch when the weather is logged.

As the position is often worked out for the purpose of navigating the ship at these times it would be of great assistance if the D.R. position were entered in columns 4 and 6 when the weather observations are entered at 4 a.m., 8 a.m., 4 p.m., 8 p.m. and midnight, particularly 8 a.m.

# ICE CHART. WESTERN NORTH ATLANTIC.

## LETTERS OF TRANSATLANTIC TRACKS INDICATE

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

- (S) From 1st March to 31st August, inclusive.
- (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 the opening of the Straits of Belle Isle to 14th November.

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

### ROUTE NOTICES.

For latest information re Tracks see pages 78-9, Vol. IV. No. 40, of this Journal.

### SYMBOLS USED ON THE CHART.

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

### PHENOMENAL DRIFTS OF ICE.

Date.	Ship or Source of Report.	Position.	Remarks.
		Lat. Long.	
July, —, 1890	S.S. Slavonia	48°53' N. 24°11' W.	Last remnants of berg.
" —, 1902	2 reports by Fishermen	56°30' N. 69°30' W.	40 to 50 ft. long, 15 ft. wide.
" 31, 1909	S.S. Shimosa	36°50' N. 30°01' W.	2 ft. 6 in. out of water.
" 10, 1913	S.S. Lothian	37°27' N. 36°48' W.	25 ft. long, 3 to 8 ft. wide.
" 18, 1916	U.S. Hydrographic Bulletin.	32°09' N. 54°26' W.	Piece of berg 3 or 4 ft. out of water.
" 23, 1916	S.S. San Giorgio	42°09' N. 63°24' W.	Berg 60 ft. long.
" 23, 1918	U.S. Hyd. Bulletin	44°25' N. 35°01' W.	Large berg.
" 18, 1921	Do.	44°30' N. 36°23' W.	Small berg about 15 ft. sq.
" 21, 1921	Do.	39°59' N. 40°39' W.	Berg.
" 31, 1921	Do.	37°37' N. 47°28' W.	Berg.
" 10, 1926	S.S. Chelatos	42°42' N. 36°45' W.	2 pieces of ice.

Reports of Ice sighted between May 1st and May 31st, 1927, which have been received by the Meteorological Office, are shown in the position reported, the figures indicating the day of the month.

### LATEST ICE REPORT FROM CANADA.

The following cablegram dated 12th May, 1927, was received from the Superintendent, Canadian Signal Service, Quebec :—

" Belle Isle Strait, heavy close packed ice everywhere. St. Pauls Island and Cape Breton Coast, heavy open ice. Gut of Canso, Northumberland Strait and Magdalen Islands, no ice in sight. Cape Ray to Quebec, no ice in sight."

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)

May 12  
Large number of bergs and ice fields in area, especially concentrated vicinity 47.30-1 50.40

Limit of Ice reported to Meteorological Office July 1901-1926

**MARINE METEOROLOGY.**

**Co-operation of Shipowners, Masters and Mates.**

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

For sample weather report message see pages 15 and 17 of Vol. IV. No. 37

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

**LATE PRESS.**

**DERELICTS AND FLOATING WRECKAGE.**

Date.	Position.		Description.
	Latitude.	Longitude.	
<b>ENGLISH CHANNEL.</b>			
10.5.27	50°09'N.	1°48'W.	Large spar, floating vertically.
<b>NORTH SEA.</b>			
12.5.27	5 miles E. of Ter-schilling Bank Lt. V.		Drifting cutter, dangerous to navigation.
<b>BALTIC.</b>			
4.5.27	56°53'N.	11°19'E.	Drifting wreckage.
<b>NORTH ATLANTIC.</b>			
1.5.27	48°39'N.	19°26'W.	Red conical light buoy.
2.5.27	49°39½'N	7°18½'W.	Spar projecting 2 or 3 feet out of water, apparently attached to some obstruction.
2.5.27	41°10'N.	9°57'W.	Light buoy painted red, dangerous to navigation
2.5.27	41°56'N.	63°13'W.	Bell buoy.
5.5.27	50°55'N.	8°40'W.	50 feet spar, dangerous to navigation.
5.5.27	37°30'N.	74°43'W.	Large reel with edges showing 5 feet out of water.
5.5.27	43°08'N.	64°31'W.	Red whistle buoy.
8.5.27	42°37'N.	63°31'W.	Large black buoy.
11.5.27	48°15'N.	19°00'W.	Red painted whistle buoy marked with black S. A very slight sound was noticeable.
11.5.27	39°52'N.	37°12'W.	Wreck of floating schooner <i>Annabel Cameron</i> , of Pictou, loaded with timber, dangerous to navigation.
15.5.27	47°10'N.	6°38'W.	Drifting spar buoy about 10 feet high with light on top, dangerous to navigation.
15.5.27	48°28'N.	7°15'W.	Floating cylindrical buoy.
<b>NORTH PACIFIC.</b>			
4.5.27	29°19'N.	117°26'W.	Large log.

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

**LONDON ...** ... Captain L. A. BROOKE SMITH, R.D., R.N.R.,  
Marine Superintendent.  
Commander J. Hennessy, R.D., R.N.R., Senior  
Nautical Assistant.  
Room 319, Adastral House, Kingsway, W.C.2.  
(Telephone No.: *Holborn 3434 Extension 421*).  
Nearest station Temple, District Railway.  
Mr. W. T. GRIEVES, Visiting Officer for the Port  
of London.

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

**Agents.**

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

**CARDIFF ...** ... Captain T. JOHNSTON, Technical College, Cathays  
Park.

**CLYDE ...** ... Captain M. C. CORRANCE, Board of Trade Sur-  
veyor's Office, 73, Robertson Street, Glasgow.

**Agents (contd.).**

**FREMANTLE,**  
W. Australia. Captain J. J. AIREY, Deputy Director of Naviga-  
tion, Dalgety's Buildings.

**HONG KONG,**  
China. Lieut. Commander O. C. G. LEVESON-GOWER,  
R.N., Superintendent, Admiralty Chart and  
Chronometer Depot, H.M. Dockyard.

**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.

**SYDNEY,**  
New South Wales. Commander G. D. WILLIAMS, D.S.O., R.D., R.N.R.,  
Deputy Director of Navigation, Customs House.

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

**VANCOUVER,**  
British Columbia. Mr. T. S. H. SHEARMAN, Room 40, Post Office  
Building.

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 13.5.27.	Date Received.
<i>Aba</i> ...	Hughes, J. ...	S. J. Bristowe, O. E. Jones, C. Spark.	M.L.	Elder Dempster ...	Met. Log. 13.10.26 to 12.3.27...	17.3.27.
<i>Abinsi</i> ...	Millson, H. E. ...	E. W. Bascombe ...	No. A.	A. Holt ...	Form 911 29.12.26 to 23.2.27...	3.3.27.
<i>Achilles</i> ...	Wilson, C. A. ...	...	M.L.	Harrison ...	Met. Log 9.1.27 to 7.4.27 ...	21.4.27.
<i>Actor</i> ...	Haylett, E. ...	A. Frew, J. McKay, G. Morrice.	"	...	...	...
<i>Adda</i> ...	Toft, J. T. ...	...	No. M.	Elder Dempster ...	Form 911 27.10.26 to 3.12.26...	7.12.26.
<i>50 Adriatic</i> ...	Beadnell, F. E., Capt., R.N.R.	R. G. Roberts, O. V. Lucas ...	W.T.	White Star ...	W.T. Reg. 3.4.27 to 23.4.27 ...	26.4.27.
<i>Aeneas</i> ...	Wallace, W. K. ...	J. M. Anderson ...	No. A.	A. Holt ...	Form 911 18.10.26 to 6.11.26...	9.11.26.
<i>Agapenor</i> ...	Ramsay, J. ...	...	" A.	...	27.3.27 to 4.4.27 ...	19.4.27.
<i>Aidan</i> ...	Pym, J. ...	J. Whayman ...	" A.	Booth ...	" 12.12.26 to 4.3.27 ...	11.3.27.
<i>Alban</i> ...	Whayman, W. R. ...	S. E. Adams ...	" A.	...	" 10.3.27 to 22.3.27 ...	4.5.27.
<i>Albania</i> ...	Gronow, S. ...	L. Harper ...	" A.	Cunard ...	" 9.3.27 to 26.4.27 ...	11.5.27.
<i>Alpore</i> ...	Harrison, R., D.S.O., R.D., Captain, R.N.R.	D. A. C. Butler ...	" M.	P. and O. ...	" 29.8.26 to 22.9.26 ...	24.9.26.
<i>Almanzora</i> ...	Wakeman, E. C. ...	D. O. Llewellyn ...	" A.	R.M.S.P. ...	" 19.3.27 to 3.5.27 ...	4.5.27.
<i>Albertic</i> ...	Parker, W. H., C.B.E., R.D., Capt. R.N.R.	...	No.	White Star ...	...	...
<i>Alondra</i> ...	Prendergast, J. J. ...	H. Peters ...	No. A.	Yeoward ...	Form 911 10.4.27 to 30.4.27 ...	4.5.27.
<i>Ampetco</i> ...	Vandenkerckhove, A. ...	...	" A.	American Petroleum ...	" 18.2.27 to 2.3.27 ...	4.4.27.
<i>Andalucia</i> ...	Thomas, R. J. ...	...	" M.	Blue Star ...	...	...
<i>Anchises</i> ...	Woodgett, R. J. ...	...	" A.	A. Holt ...	Form 911 27.3.27 to 15.4.27 ...	9.5.27.
<i>Andes</i> ...	Parker, W. H., C.B.E., R.D., R.N.R.	T. J. Horan ...	" M.	R.M.S.P. Co. ...	" 29.1.27 to 15.3.27 ...	21.3.27.
<i>Antiochus</i> ...	Dunlop, S. K. ...	R. W. Trethewey ...	" A.	A. Holt ...	" 16.3.27 to 6.4.27 ...	19.4.27.
<i>Aorangi</i> ...	Crawford, R. ...	G. H. Kime, H. A. Titchfield, Showman, A. C. ...	M.L.	Canadian-Australasian ...	Met. Log. 25.8.26 to 9.12.26 ...	11.1.27.
<i>30 Aquitania</i> ...	Charles, Sir J. T. W., K.B.E., C.B., R.D., Commr., R.N.R.	J. L. Crossdaile, J. Locke, D. MacLean.	W.T.	Cunard ...	W.T. Reg. 10.4.27 to 25.4.27 ...	28.4.27.
<i>62 Arabic</i> ...	Harvey, H. ...	W. F. Jackman, J. M. Appleby, W. Jenkins.	"	White Star ...	" 4.4.27 to 23.4.27 ...	26.4.27.
<i>Arafura</i> ...	Gordon, A. S. ...	G. C. Smith, R. Lloyd Harry, C. G. Knight, B. W. Dun.	M.L.	Eastern and Australian ...	Met. Log. 29.10.26 to 26.1.27...	25.3.27.
<i>Arawa</i> ...	Summers, W. G. ...	...	"	Shaw, Savill and Albion ...	...	...
<i>Archimedes</i> ...	Downs, E. B. ...	E. R. Hartley ...	No. A.	Lampart & Holt ...	Form 911 14.4.27 to 24.4.27 ...	7.5.27.
<i>Argyllshire</i> ...	Wallace, J. ...	J. M. Crone ...	" M.	Federal ...	" 17.3.27 to 21.3.27 ...	27.4.27.
<i>Ariguani</i> ...	Seadamore, J. H. H., D.S.C., R.D., Commr., R.N.R.	S. A. Sapworth, G. McKee, W. E. Butcher, J. W. Kendall.	M.L.	Elders & Fyffes ...	Met. Log. 14.8.26 to 12.12.26	18.12.26.
<i>Armadale Castle</i> ...	Owen, S. H., Implah, C. B.	...	"	Union Castle ...	" 31.10.26 to 24.4.27...	9.5.27.
<i>Arracan</i> ...	Willis, M. ...	R. McInnes, G. B. Christie, C. C. Weir.	"	P. Henderson ...	" 22.5.26 to 3.12.26 ...	4.4.27.
<i>Arundel</i> ...	Short, H. ...	Mr. Hill ...	C.C.	Southern Rly. ...	Telegraphic Report 20.4.27 ...	20.4.27.
<i>Arundel Castle</i> ...	George, J., O.B.E. ...	R. May ...	No. A.	Union Castle ...	Form 911 22.4.27 to 8.5.27 ...	11.5.27.
<i>Astronomer</i> ...	Richards, J. ...	A. Brown, J. Glen, Thompson.	M.L.	Harrison ...	Met. Log. 15.8.26 to 25.12.26	1.1.27.
<i>Ascanius</i> ...	Agnew, J. ...	W. Hill ...	No. A.	A. Holt ...	Form 911 29.1.27 to 7.3.27 ...	11.3.27.
<i>Athenic</i> ...	Davies, E. ...	F. A. Brown ...	" A.	White Star ...	" 8.2.27 to 6.3.27 ...	4.5.27.
<i>Atrous</i> ...	Salter, G. H. ...	K. Murazumi ...	" A.	A. Holt ...	" 11.12.26 to 12.1.27...	19.1.27.
<i>Atsuta Maru</i> ...	Shibutani, S. ...	T. E. Steel ...	" M.	Nippon Yusen Kaisha ...	" 7.4.27 to 9.5.27 ...	12.5.27.
<i>Auditor</i> ...	Owen, W. T. ...	E. R. B. Freeman ...	" A.	Harrison ...	" 19.2.27 to 28.2.27 ...	3.3.27.
<i>Avsonia</i> ...	Stafford, W., D.S.C., R.D., Lt.-Commr., R.N.R.	...	"	Cunard ...	...	...

Name of Vessel.	Captain.	Observing Officers.	Official Meteorological Equipment.	Line.	Last Log, Register, or Report Contributed. Received up to 13.5.27.	Date Received.
Avon ... ..	Hannam, F. S. ...	E. S. Dunch ... ..	No. M.	R.M.S.P. ... ..	Form 911 10.11.26 to 20.1.27...	8.2.27.
Balfour ... ..	McQueen, D. S. ...	W. P. Phillips ... ..	" A.	Canadian Pacific	10.1.27 to 14.2.27 ...	18.2.27.
Balranald ... ..	Townshend, W. P., Commr., R.N.R.	C. Hannan, F. Ward, — Cowell, — Davis.	M.L.	P. & O. Branch	Met. Log. 25.12.26 to 1.5.27 ...	7.5.27.
51 Baltic ... ..	White, E. R., Commr. R.N.R.	J. W. Paine, D. K. Crawford, J. Law.	W.T.	White Star ... ..	W.T. Reg. 18.4.27 to 6.5.27 ...	10.5.27.
Bampton Castle ... ..	Hutchings, A. H. ...	...	No. A.	Union Castle	Form 911 24.1.27 to 12.3.27 ...	15.3.27.
Banbury Castle ... ..	Singelsen, E. A., D.S.O., R.D., Capt., R.N.R.	C. G. Cuthbertson ... ..	" A.	"	" 22.2.27 to 13.4.27 ...	9.5.27.
Banffshire ... ..	Wynne, R. H. ...	W. F. Lockhead ... ..	" A.	Turnbull Martin	" 8.3.27 to 19.3.27 ...	25.4.27.
Baradine ... ..	Rollo, W. ...	...	M.L.	P. & O. Branch	"	"
Baron Murray ... ..	Edgar, J. E. ...	W. P. G. Arthur, H. Thompson	No. A.	Hogarth & Sons	Form 911 8.5.26 to 10.6.26 ...	21.9.26.
Barpeta ... ..	Strachan, J. ...	W. P. Page ... ..	" M.	British India	" 9.3.27 to 7.4.27 ...	25.4.27.
Barraool ... ..	Rhodes, H. R. ...	F. S. Bowman ... ..	" M.	P. & O. Branch	" 12.2.27 to 1.3.27 ...	19.4.27.
Baychimo ... ..	Cornwall, S. A. ...	E. J. Hankin ... ..	" A.	Hudson's Bay Co.	" 17.10.26 to 1.12.26 ...	8.12.26.
Baymaud ... ..	Foellmer, G. ...	...	" M.	"	"	"
59 Belgeland ... ..	Howell, T. ...	C. Murray, J. Cross ... ..	W.T.	Red Star ... ..	Met. Log. 29.11.26 to 7.5.27 ...	10.5.27.
Beltana ... ..	Allin, C. H. C. ...	F. Ardern ... ..	No. M.	P. & O. Branch	Form 911 6.4.27 to 21.4.27 ...	9.5.27.
Benaviter ... ..	Cole, J. H., D.S.O.	L. H. Smith ... ..	" A.	Ben Line ... ..	" 21.4.27 to 28.4.27 ...	11.5.27.
Bendigo ... ..	Nicholl, R. N. C. ...	J. Young ... ..	" M.	P. & O. Branch	" 4.2.27 to 18.3.27 ...	24.3.27.
Benefactor ... ..	O'Connor, T. ...	A. Watson ... ..	" M.	Harrison ... ..	"	"
31 Berengaria ... ..	Roston, Sir A. H., K.B.E., R.D., Capt., R.N.R.	J. A. Myles, W. C. A. Robson, S. A. T. Bullock.	W.T.	Cunard ... ..	W.T. Reg. 28.3.27 to 10.4.27 ...	19.4.27.
Berrima ... ..	Short, C. E. ...	T. Ferguson ... ..	No. M.	P. & O. Branch	Form 911 4.8.26 to 5.12.26 ...	7.12.26.
Berwyn ... ..	McCombie, G. ...	D. Dunn ... ..	" A.	Canadian Pacific	" 23.1.27 to 19.3.27 ...	24.3.27.
Bintang ... ..	Morzer Bruyns, M. F.	M. C. Altins ... ..	" M.	Nederland ... ..	" 26.2.27 to 25.3.27 ...	29.3.27.
Bogota ... ..	Barkley, E. ...	...	" A.	R.M.S.P. Co.	" 15.2.27 to 2.3.27 ...	22.3.27.
Bolingbroke ... ..	Dotz, J. F. ...	C. A. Mott ... ..	M.L.	Canadian Pacific	Met. Log. 23.1.26 to 31.8.26 ...	8.9.26.
Borda ... ..	Holland, R. ...	...	No. M.	P. & O. Branch	Form 911 1.1.27 to 23.1.27 ...	1.2.27.
Bothwell ... ..	Rothwell, A. J. ...	— Biggs ... ..	" A.	Canadian Pacific	" 6.3.27 to 14.4.27 ...	20.4.27.
Brandon ... ..	Sargent, A. H., R.D., Lt.-Commr., R.N.R.	T. Beck ... ..	" A.	"	" 25.7.26 to 25.8.26 ...	27.8.26.
Brecon ... ..	Prantice, W. ...	...	" A.	"	" 22.12.26 to 22.1.27 ...	25.1.27.
Brenda ... ..	Lamont, A. ...	M. MacInnes ... ..	" A.	Scottish Fishery Board	" 4.4.27 to 29.4.27 ...	7.5.27.
Brighton ... ..	Hill, A. ...	Mt. Munton ... ..	C.C.	Southern Railway	Telegraphic Report 12.5.27 ...	12.5.27.
British Advocate ... ..	Taylor, R. J. ...	E. Williams ... ..	No. M.	British Tankers	Form 911 15.2.27 to 1.4.27 ...	8.4.27.
British Soldier ... ..	Putt, R. O. ...	H. J. Crangle ... ..	" A.	"	" 17.11.26 to 10.12.26 ...	3.1.27.
Bronte ... ..	Crappier, J. S. ...	W. Jones, C. E. Legg ... ..	" A.	Lamport & Holt	" 15.1.27 to 10.2.27 ...	15.2.27.
Browning ... ..	Comorton, W. A. ...	A. B. Murray ... ..	" A.	"	" 29.3.26 to 1.7.26 ...	5.7.26.
Burma ... ..	Reid, R. B. ...	J. Henderson ... ..	" A.	Henderson ... ..	" 24.7.26 to 10.10.26 ...	29.10.26.
Cambria C.S. ... ..	Sherwood, C. A., D.S.O.	A. J. English, B. C. Farrow, C. F. St. John.	No.	Eastern Tel. Co.	Met. Log. 9.9.26 to 25.1.27 ...	23.2.27.
Cambria ... ..	Telfer, J. E., O.B.E.	V. S. Phillips ... ..	C.C.	L.M. & S. Rly.	Telegraphic Report 7.5.27 ...	7.5.27.
Cameronia ... ..	Gemmell, W. ...	...	No. A.	Anchor ... ..	Form 911 27.3.27 to 14.4.27 ...	27.4.27.
Camito ... ..	Forrester, W. T., O.B.E.	W. T. Broome, P. C. Congdon, F. Dudgeon.	M.L.	Elders & Fyffes	Met. Log. 20.11.26 to 21.3.27 ...	26.3.27.
Canadian Importer ... ..	McCulloch ... ..	C. R. Randle ... ..	No. A.	Canadian Govt. Mer- cantile Marine.	Form 911 18.11.26 to 4.1.27 ...	10.1.27.
Canadian Inventor ... ..	Boulton, F. W. ...	D. Grey ... ..	" A.	"	" 5.9.26 to 14.12.26 ...	21.2.27.
Canadian Miller ... ..	McConechy, W. T. ...	C. E. Moore, H. Ruegg ... ..	" A.	"	" 14.3.26 to 23.6.26 ...	15.7.26.
Canadian Scottish ... ..	Wallace, C. ...	J. T. White, E. A. Mullock ... ..	" A.	"	" 11.12.26 to 20.1.27 ...	14.2.27.
Canadian Skirmisher ... ..	Millar, W. H. ...	...	" A.	"	" 19.11.26 to 5.1.27 ...	11.1.27.
Canadian Winner ... ..	Bisset, C. R. ...	R. Girling, J. Cochrane ... ..	" M.	"	" 16.11.26 to 21.12.26 ...	9.2.27.
35 Carmania ... ..	Brown, F. G. R.D., Capt., R.N.R.	L. R. Simpson, W. M. Stewart, P. L. Williams, D. E. Sibson.	W.T.	Cunard ... ..	W.T. Reg. 20.3.27 to 10.4.27 ...	13.4.27.
Carnarvon Castle ... ..	Hague, J. W., Commr., R.N.R.	S. Colbourne, H. A. Causton, G. Goringe, H. Iddes.	M.L.	Union Castle	Met. Log. 24.12.26 to 17.4.27 ...	9.5.27.
34 Caronia ... ..	Hossack, W. H., R.D., Capt., R.N.R.	M. Boston, H. G. Hayward, D. Macmillan.	W.T.	Cunard ... ..	W.T. Reg. 11.4.27 to 30.4.27 ...	9.5.27.
Casanare ... ..	Steidelmann, H. ...	...	No. A.	Elders & Fyffes	Form 911 11.4.27 to 30.4.27 ...	9.5.27.
Cavina ... ..	Riseley, A. D. ...	H. Cruickshank ... ..	" A.	"	" 24.2.27 to 25.3.27 ...	31.3.27.
52 Cedric ... ..	Hickson, V. W., Lt.- Commr., R.N.R.	S. S. Fieldwood, D. Cham- berlin.	W.T.	White Star ... ..	W.T. Reg. 28.3.27 to 1.5.27 ...	7.5.27.
53 Celtic ... ..	Berry, G. ...	F. Pratt, A. Thompson, J. Peters.	"	"	Form 911 27.3.27 to 17.4.27 ...	20.4.27.
Centaur ... ..	Rose, A. F. ...	L. Johnstone ... ..	No. M.	A. Holt & Co.	W.T. Reg. 10.4.27 to 1.5.27 ...	4.5.27.
Ceramic ... ..	Roberts, J., C.B.E., D.S.O., R.D., Capt., R.N.R.	J. A. Bayer ... ..	" A.	White Star ... ..	Form 911 10.4.27 to 1.5.27 ...	4.5.27.
Changte ... ..	Gambrill, F. C. ...	J. Thomas, D. D. Tyer, J. A. Allan, — Johnson.	M.L.	Yuill & Co. ... ..	" 22.12.26 to 2.2.27 ...	14.3.27.
China ... ..	Furlong, G. H. S., R.D., Capt., R.N.R.	M. K. Stone ... ..	No. M.	P. & O. ... ..	Met. Log. 18.8.26 to 10.12.26 ...	27.1.27.
Chindwara ... ..	Brooks, E. G. ...	J. J. Smith ... ..	" M.	British India	Form 911 8.10.26 to 27.10.26 ...	15.11.26.
Chindwin ... ..	Esslemont, C. ...	W. D. Tulloch ... ..	" A.	Henderson ... ..	" 20.11.26 to 28.11.26 ...	29.12.26.
City of Baroda ... ..	McMillan, J. ...	A. Beaton, E. H. Routledge, H. C. Snow.	M.L.	Ellerman ... ..	Met. Log. 22.1.27 to 8.4.27 ...	13.4.27.
City of Benares ... ..	Anderson, W. W. ...	C. G. Inglis ... ..	No. A.	"	" 22.7.26 to 2.1.27 ...	4.3.27.
City of Brisbane ... ..	Seaborne, F. O., D.S.O.	R. M. Redhead ... ..	" A.	"	Form 911 14.12.26 to 9.1.27 ...	24.1.27.
City of Canterbury ... ..	Bremner, D. M. ...	W. F. Munro ... ..	" A.	"	" 11.3.27 to 8.5.27 ...	11.5.27.
City of Carlisle ... ..	Mordue, J. A. ...	...	" A.	"	" 4.2.27 to 5.3.27 ...	23.3.27.
City of Chester ... ..	Letton, F. W. ...	H. Asher, W. Speakman, H. A. Hazell.	M.L.	"	" 9.4.27 to 29.4.27 ...	9.5.27.
City of Edinburgh ... ..	Wyper, J. ...	N. G. Fraser ... ..	No. M.	"	Met. Log. 21.9.26 to 5.2.27 ...	23.2.27.
City of Hong Kong ... ..	Walton, H. L., O.B.E., R.D., Comr., R.N.R.	...	" A.	"	Form 911 17.2.27 to 9.4.27 ...	13.4.27.
City of London ... ..	Parker, F. W., R.D., Commr., R.N.R.	K. M. Nicholson ... ..	" A.	"	" 17.3.27 to 6.4.27 ...	4.5.27.
City of Rangoon ... ..	Jones, P. ...	A. Gibb ... ..	M.L.	"	" 24.10.26 to 15.1.27 ...	20.1.27.
City of Venice ... ..	Lee, A. ...	...	No. A.	"	Met. Log. 4.9.26 to 4.12.26 ...	15.12.26.
City of Yokohama ... ..	McDonald, W. D. ...	W. N. M. Faichney ... ..	" A.	"	Form 911 2.3.27 to 17.3.27 ...	4.5.27.
Clan Alpine ... ..	Lennox, W. J. ...	G. Short ... ..	" A.	Clan ... ..	" 17.2.27 to 17.3.27 ...	4.5.27.
Clan Lamont ... ..	Urquhart, P., D.S.O.	P. de Gruchy ... ..	" A.	"	" 27.1.27 to 21.3.27 ...	6.4.27.
					" 10.12.26 to 5.1.27 ...	13.1.27.

LIST OF VOLUNTARY OBSERVING SHIPS

Name of Vessel.	Captain.	Observing Officers.	Official Meteorological Equipment.	Line.	Last Log, Register, or Report Contributed. Received up to 13.5.27.	Date Received.
<i>Clan Lindsay</i> ...	Worthington, J. H.	E. P. Smith ...	No. A.	Clan ...	Form 911 5.3.27 to 21.3.27 ...	31.3.27.
<i>Clan Macbeth</i> ...	Young, A. H., R.D., Lieut. - Commr. R.N.R.	... ..	" A.	" ...	" 1.3.27 to 6.4.27 ...	27.4.27.
<i>Clan Macfadyen</i> ...	Stenson, F. J., R.D., Capt., R.N.R.	H. M. Wavell ...	" A.	" ...	" 25.3.27 to 23.4.27 ...	27.4.27.
<i>Clan Macgillivray</i> ...	West, W. F. ...	J. H. Johnson ...	" A.	" ...	" 26.1.27 to 12.3.27 ...	22.3.27.
<i>Clan Macindoe</i> ...	Low, A. ...	... ..	" A.	" ...	" 11.2.27 to 30.3.27 ...	4.4.27.
<i>Clan Mackellar</i> ...	Smith, W. P. ...	J. K. Thomas ...	" A.	" ...	" 23.2.27 to 5.3.27 ...	29.3.27.
<i>Clan MacKinnon</i> ...	McComish, A. B. ...	W. F. Isaac, S. Y. Strange, J. W. Innes.	M.L.	" ...	Met. Log. 21.8.26 to 27.11.26...	2.12.26.
<i>Clan Macphee</i> ...	Gourlay, J. B. ...	D. S. Rae, J. O. Woodall, J. J. Millar.	"	" ...	" 6.9.25 to 14.5.26 ...	24.6.26.
<i>Clan Macnaughton</i> ...	Simpson, A. W. ...	F. Cossar ...	No. A.	" ...	Form 911 21.2.27 to 14.3.27 ...	23.3.27.
<i>Clan Macnagart</i> ...	Mee, F. T. ...	S. A. Carter ...	" A.	" ...	" 17.2.27 to 8.3.27 ...	19.4.27.
<i>Clan Macwhirter</i> ...	Waterhouse, J. ...	R. W. Roberts ...	M.L.	" ...	" 26.11.26 to 12.12.26	17.12.26.
<i>Clan Macwilliam</i> ...	Williamson, A. ...	T. B. Cranwill ...	No. A.	" ...	" 28.8.26 to 9.10.26 ...	30.10.26.
<i>Clan Malcolm</i> ...	Neill, G. A. ...	J. T. Bell, H. V. Wightman, A. R. McDonald.	M.L.	" ...	Met. Log. 23.9.26 to 3.3.27 ...	30.3.27.
<i>Clan Morrison</i> ...	Porterfield, W. M. ...	L. C. Higgins ...	No. A.	" ...	Form 911 18.2.27 to 19.3.27 ...	4.5.27.
<i>Clan Murdoch</i> ...	Miller, W. ...	H. F. M. Preston ...	" A.	" ...	" 30.1.27 to 10.3.27 ...	5.4.27.
<i>Clan Ranald</i> ...	Laird, C. ...	J. B. Templeman ...	" A.	" ...	" 23.2.27 to 21.3.27 ...	21.4.27.
<i>Clan Ross</i> ...	Smith, W. P. ...	D. B. Edgar ...	" A.	" ...	" 8.12.26 to 21.12.26 ...	13.1.27.
<i>Clan Sinclair</i> ...	George, L. S. ...	N. Macleod ...	" A.	" ...	" 24.1.27 to 10.2.27 ...	5.3.27.
<i>Clan Urquhart</i> ...	Baker, E. W. ...	E. A. Hewson ...	" A.	" ...	" 8.2.27 to 8.5.27 ...	12.5.27.
<i>Colonia, C.S.</i> ...	Carlton, G. F., O.B.E., Commr., R.N.R.	W. E. Allen, W. F. Anderson, F. B. Bolingbroke.	M.L.	Telegraph Construction & Maintenance.	Met. Log. 4.12.26 to 25.2.27 ...	8.3.27.
<i>Colonian</i> ...	Gittins, R. P. ...	... ..	No. A.	Leyland ...	Form 911 10.4.27 to 9.5.27 ...	12.5.27.
<i>Comorin</i> ...	Borland, J. Mc. I., C.B., D.S.O., R.D., Capt., R.N.R.	C. L. Hayward ...	" M.	P. & O. ...	" 6.11.26 to 15.1.27 ...	7.2.27.
<i>Concordia</i> ...	Telfer, J. H. ...	T. Philip, J. McIntosh, S. R. McNie.	M.L.	Anchor Donaldson ...	Met. Log. 3.9.26 to 14.1.27 ...	24.1.27.
<i>Corinthic</i> ...	Hart, F. ...	E. Burt, J. Warltire, M. Bennet.	"	White Star ...	" 3.12.26 to 19.3.27 ...	11.4.27.
<i>Cornwall</i> ...	Haines, F. P. ...	H. S. White ...	No. A.	Federal ...	Form 911 26.1.27 to 28.2.27 ...	12.4.27.
<i>Craftsman</i> ...	Gibbins, W. ...	J. Williams ...	" A.	Harrison ...	" 23.12.26 to 10.3.27 ...	14.3.27.
<i>Crawford Castle</i> ...	Morgan, A. O., R.D., Commr., R.N.R.	J. A. Wilson ...	" A.	Union Castle ...	" 19.2.27 to 28.3.27 ...	19.4.27.
<i>Culebra</i> ...	Mackay, A. S., R.D., Commr., R.N.R.	P. Cooper, F. B. Collinson, J. W. Smith.	M.L.	R.M.S.P. Co. ...	Met. Log. 27.12.26 to 23.3.27...	12.4.27.
<i>Cumberland</i> ...	Deith, G. T. ...	J. D. Marks ...	No. A.	Federal ...	Form 911 7.8.26 to 8.1.27 ...	9.2.27.
<i>Cuthbert</i> ...	Lee, O. J. P. ...	C. C. Beal ...	" A.	Booth ...	" 20.10.26 to 3.11.26...	10.11.26.
<i>Cyclops</i> ...	Cosker, W. ...	J. R. C. Evans ...	" A.	A. Holt ...	" 12.3.27 to 1.4.27 ...	19.4.27.
<i>Dardanus</i> ...	Williams, D. T. ...	C. F. Morgan ...	" M.	" ...	" 9.12.26 to 14.2.27 ...	26.2.27.
<i>Durian</i> ...	Masters, W. ...	A. S. Holland ...	" A.	Leyland ...	" 3.3.27 to 23.3.27 ...	12.4.27.
<i>Darro</i> ...	Matthews, G. P. ...	... ..	" M.	R.M.S.P. Co. ...	" 19.3.27 to 12.4.27 ...	4.5.27.
<i>Demerara</i> ...	Willan, F. C. L. ...	J. R. Baty ...	" M.	" ...	" 8.3.27 to 28.4.27 ...	4.5.27.
<i>Demosthenes</i> ...	Orriss, F. A. ...	J. Cruickshank ...	" M.	Aberdeen ...	" 5.2.27 to 17.3.27 ...	23.3.27.
<i>Desado</i> ...	Shillitoe, B., R.D., Commr., R.N.R.	L. D. Jennings ...	" M.	R.M.S.P. Co. ...	" 26.2.27 to 18.3.27 ...	29.3.27.
<i>Desna</i> ...	Green, J. ...	A. F. Walker ...	" M.	" ...	" 3.12.26 to 19.1.27 ...	31.1.27.
<i>Deucalion</i> ...	Findlay, J. ...	R. Wilson ...	" A.	A. Holt ...	" 3.3.27 to 9.4.27 ...	12.4.27.
<i>Dieppe</i> ...	Marmery, S. ...	Mr. Parsons ...	C.C.	Southern Railway ...	Telegraphic Report 13.5.27 ...	13.5.27.
<i>Dimboola</i> ...	Roy, C. M. ...	... ..	No. A.	Melbourne S.S. Co. ...	Form 911 18.2.27 to 18.3.27 ...	25.4.27.
<i>Discoverer</i> ...	Ling, J. T. ...	C. C. Heaton ...	" M.	Harrison ...	" 16.10.26 to 20.3.27...	23.3.27.
<i>Discovery, R.R.S.</i> ...	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. 8.5.26 to 11.7.26 ...	30.9.26.
<i>Domala, M.V.</i> ...	Kitson, A. G. ...	J. G. Wallace ...	No. M.	British India ...	Form 911 1.12.26 to 3.2.27 ...	16.3.27.
<i>Dominia, C.S.</i> ...	Campos, V., O.B.E., Lt.-Commr., R.N.R.	S. A. Garnham, C. Bullock, L. J. Hegarty, R. Johnson.	M.L.	Telegraph Construction & Maintenance.	Met. Log. 11.9.26 to 4.2.27 ...	25.2.27.
<i>Doric</i> ...	Bolton, S., D.S.C., R.D., R.N.R.	G. Kavanagh, J. A. Heenan, J. Clarke.	No.	White Star ...	Form 911 17.4.27 to 7.5.27 ...	11.5.27.
<i>Doric Star</i> ...	Thomas, R. T. ...	L. McDermott ...	No. A.	Blue Star ...	W.T. Reg. 20.3.27 to 5.4.27 ...	8.4.27.
<i>Dorington Court</i> ...	Clarke, E. J. ...	E. W. Blomberg ...	" A.	Haldin & Co. ...	Form 911 22.11.26 to 20.12.26	10.1.27.
<i>Dromore Castle</i> ...	Vincent, E. S., R.D., Commr., R.N.R.	D. H. McDougall ...	" A.	Union Castle ...	" 11.2.27 to 1.5.27 ...	9.5.27.
<i>Dryden</i> ...	Major, T. W. ...	... ..	" M.	Lanport & Holt ...	" 27.2.27 to 18.3.27 ...	4.5.27.
<i>Duendes</i> ...	Pape, E. R. ...	W. Billington ...	" M.	P.S.N. Co. ...	" 3.3.27 to 24.3.27 ...	19.4.27.
<i>Dunaff Head</i> ...	Butt, H. L., R.D., Commr., R.N.R.	F. S. Napier ...	" A.	Ulster S.S. Co. ...	" 4.12.26 to 13.1.27 ...	25.1.27.
<i>Dundrum Castle</i> ...	Weller, H. E. ...	... ..	" A.	Union Castle ...	" 27.1.27 to 24.2.27 ...	14.3.27.
<i>Dunrobin</i> ...	Ramsay, J. D. ...	C. H. Kendall ...	" A.	Glen & Co. ...	" 20.2.27 to 10.3.27 ...	19.4.27.
<i>Duquesa</i> ...	Ellis, F., D.S.C. ...	E. W. Denman ...	" M.	Furness Withy ...	" 8.1.27 to 3.3.27 ...	11.3.27.
<i>Edinburgh Castle</i> ...	Knight, A. ...	... ..	No. A.	Union Castle ...	" 1.4.27 to 17.4.27 ...	11.5.27.
<i>Egyptian Prince</i> ...	Ord, T. ...	... ..	"	Prince ...	" 13.1.27 to 7.3.27 ...	31.3.27.
<i>Elmina</i> ...	Williams, T. E. ...	E. Anders, C. G. S. Short, E. S. James.	M.L.	Elder Dempster ...	Met. Log. 3.11.26 to 21.3.27 ...	26.3.27.
<i>El Paraguayo</i> ...	Smith, F. C. ...	G. Fletcher ...	No. M.	Houlder Bros. ...	Form 911 12.3.27 to 4.5.27 ...	11.5.27.
<i>Elpenor</i> ...	Gordon, A. L. ...	M. Robertson, C. Kavanagh	M.L.	A. Holt ...	Met. Log. 11.10.26 to 7.2.27 ...	10.2.27.
<i>Elysia</i> ...	Duncan, A. R. ...	A. Laidlaw, H. C. Fry, J. A. Leitch.	"	Anchor ...	" 4.2.27 to 10.4.27 ...	22.4.27.
<i>Empress of Asia</i> ...	Lovegrove, A. V. R., D.S.O., R.D., Capt., R.N.R.	R. H. Foley, L. Johnston, L. C. Hogg, W. T. Miller.	"	Canadian Pacific ...	" 16.9.26 to 23.1.27 ...	2.3.27.
<i>Empress of Canada</i> ...	Robinson, S., C.B.E., R.D., Commr., R.N.R.	... ..	"	" ...	" 1.10.26 to 12.2.27 ...	22.3.27.
<i>Empress of France</i> ...	Griffiths, E. ...	E. Roberts, W. Ewens, W. Pickersgill.	"	" ...	" 29.1.27 to 15.4.27 ...	1.5.27.
<i>Empress of Russia</i> ...	Hosken, A. J. ...	J. H. Reid ...	"	" ...	" 19.8.26 to 29.11.26...	21.2.27.
<i>Empress of Scotland</i> ...	Latta, R. G. ...	P. Powys Smith, T. Sargent, E. Aikman.	"	" ...	" 14.11.26 to 22.4.27...	3.5.27.

Name of Vessel.	Captain.	Observing Officers.	Official Meteorological Equipment.	Line.	Last Log, Register, or Report Contributed. Received up to 13.5.27.	Date Received.
<i>Endeavour</i> ...	Commr. S. A. Geary-Hill, D.S.O., R.N.	C. S. E. Lansdown ...	M.L.	His Majesty's Ship ...	Form 911 14.11.26 to 13.3.27...	28.3.27.
<i>Essequibo</i> ...	Kite, E. ...	H. E. Hughes ...	No. M.	R.M.S.P. Co. ...	" 24.2.27 to 22.4.27 ...	26.4.27.
<i>Eumaeus</i> ...	Read, J. W. ...	J. L. Millar ...	" A.	A. Holt ...	" 19.2.27 to 5.3.27 ...	28.3.27.
<i>Euripides</i> ...	Collins, P. J., O.B.E.	H. S. Cox, K. D. Fisher, P. Longdon.	M.L.	Aberdeen ...	Met. Log. 18.7.26 to 22.11.26...	29.11.26.
<i>Euryades</i> ...	Stewart, J. R. ...	... ..	No. A.	A. Holt ...	Form 911 22.2.27 to 3.4.27 ...	6.4.27.
<i>Explorer</i> ...	Allan, J. ...	... ..	" A.	Scottish Fishery Board	" 15.4.27 to 29.4.27 ...	4.5.27.
<i>Ferndale</i> ...	Daniel, F. ...	E. F. Pember ...	" M.	Commonwealth Govt.	" 21.4.27 to 29.4.27 ...	9.5.27.
<i>Flandria</i> ...	Maars, L. ...	T. Doornbosch ...	" M.	Holland Lloyd ...	" 11.2.27 to 31.3.27 ...	4.4.27.
<i>Francisco</i> ...	Scales, H. ...	J. C. Nettleship ...	" A.	Ellerman Wilson ...	" 22.1.27 to 4.3.27 ...	17.3.27.
<i>Freya</i> ...	Angus W. ...	W. Pirrie ...	" A.	Scottish Fishery Board	" 1.4.27 to 30.4.27 ...	7.5.27.
<i>Gaika</i> ...	Whitfield, G. J. ...	R. E. H. Partington ...	" A.	Union Castle ...	" 26.1.27 to 21.4.27 ...	4.5.27.
<i>Galtymore</i> ...	Southerland, E. ...	R. B. Gurner ...	" M.	Furness Withy ...	" 12.3.27 to 23.3.27 ...	29.3.27.
<i>Garret</i> ...	Visser, C. W. ...	C. J. Vandenboom ...	" M.	Rotterdam Lloyd ...	" 1.4.27 to 14.4.27 ...	4.5.27.
<i>Garth Castle</i> ...	Jackson, C. R. ...	W. S. J. Aldous ...	" A.	Union Castle ...	" 1.2.27 to 11.3.27 ...	15.3.27.
<i>Getria</i> ...	Veldkamp, G. J. ...	T. van der Mast ...	" M.	Holland Lloyd ...	" 19.2.27 to 10.3.27 ...	14.3.27.
<i>Geranium</i> ...	Bennett, H. T., D.S.O., Commr. R.A.N.	... ..	M.L.	His Majesty's Australian Ship	... ..	...
<i>Glenamou, M.V.</i> ...	Homan, C. E. ...	R. H. Bishop ...	No. A.	Glen Line ...	Form 911 28.2.27 to 9.5.27 ...	12.5.27.
<i>Glengarry</i> ...	Angier, J. ...	... ..	No.	" ...	... ..	...
<i>Glenluce</i> ...	Kennett, W. H. ...	... ..	No. A.	" ...	Form 911 21.2.27 to 12.3.27 ...	4.5.27.
<i>Glenshane</i> ...	Beer, E. ...	D. C. Evans ...	" A.	" ...	" 4.2.27 to 21.4.27 ...	4.5.27.
<i>Gloucestershire</i> ...	Robin, E. ...	... ..	" A.	Bibby ...	" 4.12.26 to 12.2.27 ...	17.2.27.
<i>Gorgon</i> ...	Hughes, J. W. ...	A. E. Bowit, E. W. Powell, J. M. T. Edward.	M.L.	A. Holt & Co. ...	" 29.10.26 to 7.4.27 ...	9.5.27.
<i>Halesius</i> ...	... ..	... ..	No. A.	R. P. Houston ...	... ..	...
<i>Haliartius</i> ...	Marsh, L. V. ...	... ..	" A.	R. P. Houston ...	Form 911 24.2.27 to 20.3.27 ...	4.5.27.
<i>Harmonides</i> ...	Hughes, W. F. ...	S. S. Davidson ...	" A.	" ...	" 29.1.27 to 19.2.27 ...	17.3.27.
<i>Harmony, Auxy.</i> ...	Jackson, J. C. ...	A. W. Bush ...	" A.	Moravian Mission ...	" 25.12.26 to 6.1.27 ...	19.1.27.
<i>Hatarana</i> ...	Denne, G. H. A. ...	F. Wells, C. Parkes, W. T. Beedle, T. S. Barnes.	M.L.	British India ...	" 12.6.25 to 27.2.26 ...	29.3.26.
<i>Hatimura</i> ...	Lane, S. R., R.D., Capt. R.N.R.	... ..	No. M.	British India ...	... ..	...
<i>Hawraki, M.V.</i> ...	Frew, J. D. ...	... ..	M.L.	Union S.S. Co., N.Z. ...	Form 911 22.6.26 to 11.7.26 ...	20.9.26.
<i>Henry Holmes, C.S.</i> ...	Bicker Caarten, A. ...	M. A. Green ...	No. M.	W. I. & Panama Telegraph Co.	" 22.12.26 to 10.1.27...	15.2.27.
<i>Herald</i> ...	Silk, H. V., Lieut-Commr., R.N.	D. G. V. Williams ...	M.L.	His Majesty's Ship ...	Met. Log. 4.9.26 to 30.11.26 ...	27.1.27.
<i>Herefordshire</i> ...	Mann, R. P. ...	H. R. Mackay ...	No. A.	Bibby ...	Form 911 21.8.26 to 29.1.27 ...	7.2.27.
<i>Hermivius</i> ...	Roberts, T. V. ...	G. P. McCraith ...	" A.	Shaw, Savill & Albion	" 25.9.26 to 11.10.26...	22.11.26.
<i>Herschel</i> ...	Watson, W. W. ...	J. F. Maurey ...	" A.	Lamport & Holt ...	" 21.3.27 to 4.4.27 ...	25.4.27.
<i>Hertford</i> ...	Urquhart, D. ...	A. Robertson ...	" A.	Federal ...	" 1.2.27 to 21.2.27 ...	4.4.27.
<i>Hibernia</i> ...	Tanner, E. B., O.B.E.	R. Woodall ...	" C.C.	L.M. & S. Rly. ...	Telegraphic Report, 12.5.27 ...	12.5.27.
<i>Highland Heather</i> ...	Rowell, G. A. ...	J. H. Pitton, J. Hardy ...	No. A.	Nelson ...	Form 911 13.12.25 to 24.6.26 ...	14.7.26.
" <i>Laddie</i> ...	Alford, C. ...	E. F. Smart ...	" A.	" ...	" 23.11.26 to 14.1.27 ...	24.1.27.
" <i>Piper</i> ...	Collings, D. ...	J. S. Collins, S. E. Jackson, W. T. Breen.	M.L.	" ...	Met. Log. 25.4.26 to 16.9.26 ...	23.9.26.
" <i>Pride</i> ...	Robinson, R. H. ...	... ..	No. A.	" ...	Form 911 21.2.27 to 14.3.27 ...	28.3.27.
" <i>Prince</i> ...	Brown, J. B. ...	S. A. Wheaton ...	" A.	Prince ...	" 23.2.27 to 28.2.27 ...	4.4.27.
" <i>Rover</i> ...	Ashby Graves, F. ...	C. C. Legg ...	" A.	Nelson ...	" 1.2.27 to 24.3.27 ...	4.4.27.
<i>Hildebrand</i> ...	Maddrell, J. ...	... ..	" A.	Booth ...	" 16.3.27 to 28.4.27 ...	4.5.27.
<i>Hobsons Bay</i> ...	Kydd, O. J. ...	R. Pearce, A. Badman, T. Morrison, H. Hendy.	M.L.	Commonwealth Govt.	Met. Log. 3.8.26 to 17.12.26 ...	23.12.26.
<i>Holbein</i> ...	Gough, W. A. ...	H. L. Budd ...	No. A.	Lamport & Holt ...	Form 911 9.1.27 to 18.3.27 ...	23.3.27.
<i>54 Homeric</i> ...	Holme, A. ...	A. S. Dyer, H. G. Morgan, S. B. Morfee.	W.T.	White Star ...	W.T. Reg. 31.3.27 to 14.4.27 ...	22.4.27.
<i>Honorata</i> ...	Holland, E. ...	E. R. Kemp, F. Malcouronne	No. A.	New Zealand S.S. Co.	Form 911 1.9.26 to 3.1.27 ...	5.1.27.
<i>Hubert</i> ...	Byans, L. ...	S. G. Edwards ...	" A.	Booth ...	" 11.1.27 to 10.3.27 ...	4.4.27.
<i>Huntingdon</i> ...	Ashworth, W. ...	R. Cox ...	" A.	Federal ...	" 25.1.27 to 2.3.27 ...	5.3.27.
<i>Huruma</i> ...	Burton Davies, J. ...	J. Oxnard, L. C. Hill, L. Cann, K. Goldsworthy.	M.L.	New Zealand S.S. Co.	Met. Log. 10.10.26 to 18.11.26 ...	26.11.26.
<i>Ingoma</i> ...	Barrow, R. K. ...	C. R. Davenport ...	No. M.	Harrison ...	Form 911 19.2.27 to 3.4.27 ...	7.4.27.
<i>Inkum</i> ...	Meetham, J. T. ...	... ..	" A.	J. H. Welsford ...	... ..	...
<i>Iris, C.S.</i> ...	Hughes, H. R. ...	W. Oliver, D. Bruce, D. MacDonald, T. Vickers.	M.L.	Pacific Cable Board ...	Met. Log. 23.1.26 to 25.4.26 ...	5.10.26.
<i>Iroquois</i> ...	Jackson, A. L., Commr., R.N.	H. L. Jenkins ...	"	His Majesty's Ship ...	" 24.8.26 to 3.12.26 ...	15.2.27.
<i>Izion</i> ...	Reed, G. C. ...	C. W. R. Murphy ...	No. A.	A. Holt ...	Form 911 10.1.27 to 10.3.27 ...	19.4.27.
<i>Japanese Prince</i> ...	Naylor, E. ...	W. Venn ...	" A.	Prince ...	" 17.2.27 to 20.3.27 ...	7.5.27.
<i>Jervis Bay</i> ...	Chaplin, W. R. ...	R. W. Laycock ...	" M.	Commonwealth Govt.	" 30.3.27 to 18.4.27 ...	9.5.27.
<i>John Pender, C.S.</i> ...	Smythe, T. W. ...	H. W. Milne ...	" A.	Eastern Tel. Co. ...	" 8.9.26 to 25.9.26 ...	25.10.26.
<i>Justin</i> ...	Lee, O. J. P., R.D., Commr., R.N.R.	R. C. Holmes ...	" A.	Booth ...	" 29.3.27 to 10.4.27 ...	25.4.27.
<i>Kaiser-i-Hind</i> ...	Manley, G. ...	A. H. Cole ...	" M.	P. & O. ...	" 26.3.27 to 12.4.27 ...	19.4.27.
<i>Kalyan</i> ...	Cotching, A. ...	... ..	" M.	P. & O. ...	... ..	...
<i>Kamo Maru</i> ...	Shiratori, S. ...	... ..	" A.	Nippon Yusen Kaisha	Form 911 15.1.27 to 15.2.27 ...	6.4.27.
<i>Kangaroo</i> ...	Norris, H. C. ...	V. J. Denton, H. W. Norris, E. Hutchinson, H. Griffiths.	M.L.	State Service Australia	Met. Log. 25.7.26 to 13.11.26...	21.12.26.
<i>Karapara</i> ...	Miller, A. C. ...	J. W. Knight ...	No. M.	British India ...	Form 911 24.11.26 to 7.1.27 ...	24.1.27.
<i>Kashmir</i> ...	Stringer, R. H., O.B.E., R.D., Commr., R.N.R.	J. H. Anderson ...	" M.	P. & O. ...	" 28.1.27 to 27.2.27 ...	1.3.27.
<i>Kenilworth Castle</i> ...	Chave, Sir B., K.B.E.	... ..	M.L.	Union Castle ...	Met. Log. 8.8.26 to 30.1.27 ...	5.4.27.
<i>Kent</i> ...	Downton, M. M. ...	F. M. Knight ...	No. A.	New Zealand S.S. Co.	Form 911 28.7.26 to 31.8.26 ...	8.9.26.
<i>Khiva</i> ...	Cooper, C. P. ...	G. W. Wood ...	M.L.	P. & O. ...	Met. Log. 17.10.26 to 31.1.27 ...	3.2.27.
<i>Khyber</i> ...	Hester, C. W., R.D., Commr., R.N.R.	C. B. Roche, E. J. Parry, H. D. Case, G. S. B. Collard.	"	P. & O. ...	Form 911 27.8.26 to 8.12.26 ...	13.12.26.
<i>Kia Ora</i> ...	McIntosh, A. ...	E. A. Hickling, J. Laurensen	"	Shaw Savill & Albion	Met. Log. 21.6.26 to 15.12.26...	30.12.26.
<i>Knight Communion</i> ...	Cox, B. T. ...	... ..	No. M.	A. Holt ...	Form 911 3.3.27 to 15.3.27 ...	23.3.27.
<i>Koolinda, M. V.</i> ...	Buckeridge, G. ...	J. S. Airey ...	" M.	State Service, Australia	" 14.3.27 to 29.3.27 ...	4.5.27.
<i>Kovno</i> ...	Dossor, W. A. ...	H. Redfern, A. Snowdon, A. Hebblewhite.	M.L.	Ellerman Wilson ...	Met. Log. 12.6.26 to 26.11.26 ...	27.11.26.
<i>Kyogle</i> ...	Coalstad, C. ...	E. W. Hughes, C. B. Odman	No. A.	Commonwealth Light-house Service.	Form 911 26.11.26 to 19.12.26 ...	7.2.27.
<i>37 Laconia</i> ...	Britten, E. T. ...	T. Parry, J. Ashcroft, J. W. Caunce.	W.T.	Cunard ...	W.T. Reg. 4.4.27 to 10.4.27 ...	19.4.27.
					Form 911. 3.4.27 to 10.4.27 ...	19.4.27.

LIST OF VOLUNTARY OBSERVING SHIPS

Name of Vessel.	Captain.	Observing Officers.	Official Meteorological Equipment.	Line.	Last Log, Register, or Report Contributed. Received up to 13.5.27.	Date Received
<i>Lady Denison</i> ...	West, G. W. ...	F. Lawrence ...	No. A.	Eastern Tel. Co. ...	Form 911 9.5.26 to 7.7.26 ...	7.8.26.
<i>Logan</i> ...	Pattison, G. H. ...	E. A. Owen ...	" A.	Pacific S.N. Co. ...	" 9.3.27 to 27.3.27 ...	19.4.27.
<i>Lohore</i> ...	Kirkwood, J. H. ...	W. G. Stevenson ...	" M.	P. & O. ...	Met. Log. 27.11.26 to 31.12.26 ...	5.1.27.
<i>Lalande</i> ...	Dawson, E. N. ...	A. E. Warburton ...	" A.	Lampart & Holt ...	Form 911 21.11.26 to 12.3.27 ...	29.3.27.
<i>Lancashire</i> ...	Hamill, H. ...	de Legh, P. ...	" A.	Bibby ...	" 1.1.27 to 13.3.27 ...	16.3.27.
<i>36 Lancastrius</i> ...	Malin, R. G., Lt-Commr., R.N.R. ...	R. P. Campbell, L. R. Sharp, F. G. Russell ...	" W.T.	Cunard ...	W.T. Reg. 2.4.27 to 30.4.27 ...	4.5.27.
<i>Laomedon</i> ...	Commr., R.N.R. ...	A. Yarwood ...	No. A.	A. Holt ...	Form 911 31.3.27 to 1.5.27 ...	4.5.27.
<i>La Paz, M.V.</i> ...	Beswick, W., D.S.C., Lt-Commr., R.N.R. ...	D. L. Jones ...	" M.	Pacific S.N. Co. ...	" 9.12.26 to 3.3.27 ...	11.3.27.
<i>Laplace</i> ...	Benson, C. W. ...	A. L. Murray, R. D. Cottam ...	" A.	Lampart & Holt ...	" 26.1.27 to 11.3.27 ...	22.3.27.
<i>55 Lapland</i> ...	Shaw, W. ...	E. Cornelle, J. C. Flett ...	" W.T.	Red Star ...	Form 911 18.11.26 to 31.3.27 ...	13.4.27.
<i>Lautaro, M.V.</i> ...	Morehouse, W. M. ...	J. Cullen, P. Hawkins, J. K. Gemmell, H. S. Vickers. ...	No. M.L.	Pacific S.N. Co. ...	Form 911 12.4.27 to 1.5.27 ...	4.5.27.
<i>Leicestershire</i> ...	Dunn, R. E. ...	J. T. A. Thomson ...	" M.L.	Bibby ...	Met. Log. 13.2.27 to 15.4.27 ...	27.4.27.
<i>Leighton, M.V.</i> ...	Lindesay, J. M. ...	... ..	No. A.	Lampart & Holt ...	Form 911 21.2.27 to 12.3.27 ...	4.4.27.
<i>Leitrim</i> ...	Robertson, A. ...	... ..	" A.	Dowie, J., & Co. ...	" 22.2.27 to 9.4.27 ...	19.4.27.
<i>Landaff Castle</i> ...	Morton Betts, W. ...	... ..	" No.	Union Castle ...	" ... ..	" ... ..
<i>Landoverly Castle</i> ...	Owens, G. ...	... ..	" M.L.	" ... ..	" ... ..	" ... ..
<i>Loch Katrine</i> ...	Buret, T. J. C. ...	R. J. Finch ...	No. M.	R.M.S.P. Co. ...	Form 911 5.2.27 to 2.5.27 ...	12.5.27.
<i>London Commerce</i> ...	Young, H. J., D.S.C. ...	... ..	" A.	Furness Withy ...	" 2.3.27 to 6.4.27 ...	12.4.27.
<i>London Importer</i> ...	Fowler, W. H. ...	J. S. Williams, W. Stanley ...	" M.L.	" ... ..	Met. Log. 23.1.27 to 15.4.27 ...	1.5.27.
<i>Lord Antrim</i> ...	Jarvis, F. E. ...	L. G. Kirwan ...	No. A.	Ulster S.S. Co. ...	Form 911 1.4.27 to 15.4.27 ...	27.4.27.
<i>Loriga, M.V.</i> ...	Clapham, E. C. ...	R. W. Gill ...	" A.	Pacific S.N. Co. ...	" 28.1.27 to 12.4.27 ...	19.4.27.
<i>Losada, M.V.</i> ...	Ross, J. ...	E. Baxter ...	" M.	" ... ..	" 1.2.27 to 20.2.27 ...	20.4.27.
<i>Macedonia</i> ...	Potter, H. W., R.D., Commr., R.N.R. ...	E. Lee ...	" M.	P. & O. ...	" 4.3.27 to 4.5.27 ...	7.5.27.
<i>Macharda</i> ...	Tyers, W. O. ...	D. M. Fulton ...	" M.	Brocklebank ...	" 3.3.27 to 4.4.27 ...	7.4.27.
<i>Mahana</i> ...	Kershaw, W. A. R. ...	F. M. Smith, H. C. Smith, J. C. K. Rogers. ...	" A.	Shaw, Savill & Albion ...	Met. Log. 15.4.26 to 10.8.26 ...	30.8.26.
<i>Maharaja</i> ...	Hinton, J. C. ...	H. A. Hartley ...	" M.	Asiatic S.N. Co. ...	Form 911 30.11.26 to 14.12.26 ...	15.2.27.
<i>Mahia</i> ...	Williams, G. ...	R. Naef ...	" No.	Shaw, Savill & Albion ...	" ... ..	" ... ..
<i>Maihar</i> ...	Rowe, J. P. ...	C. Shaw, C. Cadwallader, S. S. Slade. ...	" M.L.	Brocklebank ...	Met. Log. 24.7.26 to 1.5.27 ...	10.5.27.
<i>Maimyo</i> ...	Smith, G. C. ...	H. M. Drummond ...	No. A.	" ... ..	Form 911 27.12.26 to 18.3.27 ...	21.4.27.
<i>Maiwara</i> ...	Brown, T. M. ...	... ..	" M.L.	Burns Philp ...	" ... ..	" ... ..
<i>58 Majestic</i> ...	Metcalfe, G. R. ...	W. W. Pearson, L. Thompson ...	" W.T.	White Star ...	W.T. Reg. 14.4.27 to 28.4.27 ...	3.5.27.
<i>Makambo</i> ...	McLean, J. ...	F. C. Vogelmann, T. R. Lang, W. O. L. Wilding. ...	" M.L.	Burns Philp ...	Met. Log. 26.6.26 to 6.10.26 ...	29.12.26.
<i>Makura</i> ...	Brown, T. M. ...	O. C. Bray, W. J. Weber, L. P. Bourke. ...	"	Canadian-Australasian ...	" 9.9.26 to 20.1.27 ...	7.2.27.
<i>Malabar</i> ...	Davey, A. H. ...	... ..	"	" ... ..	" ... ..	" ... ..
<i>Malakuta</i> ...	Mawson, J. ...	R. Morris ...	" M.	Burns, Philp & Co. ...	" 6.7.26 to 15.12.26 ...	23.3.27.
<i>Malancha</i> ...	Hillman, E. J. ...	N. Grayson ...	No. M.	Brocklebank ...	Form 911 9.2.27 to 24.3.27 ...	19.4.27.
<i>Valda</i> ...	Adamson, F. L. ...	R. Humble ...	" M.	" ... ..	" 5.2.27 to 24.2.27 ...	4.5.27.
<i>Maloja</i> ...	Sharpe, G. ...	W. S. Donald, A. A. Parker ...	" M.	British India ...	" 20.1.27 to 24.2.27 ...	5.3.27.
<i>Mamari</i> ...	Gray, T. N. ...	Warner, S. C. ...	" M.	P. & O. ...	" ... ..	" ... ..
<i>Manchester Brigade</i> ...	Falconer, H. ...	P. Campbell ...	" A.	Shaw, Savill & Albion ...	Form 911 23.12.26 to 6.2.27 ...	17.2.27.
<i>Manchester Corporation</i> ...	Stott, C. H. ...	J. Shaw ...	" A.	Manchester Liners ...	" 29.1.27 to 4.3.27 ...	11.3.27.
<i>Manchester Hero</i> ...	Everest, J. E. ...	... ..	" A.	" ... ..	" 7.2.27 to 23.3.27 ...	27.4.27.
<i>Manchester Merchant</i> ...	Riley, J. E. ...	J. H. Emmitt, H. Anderton, B. M. Brown. ...	" M.L.	" ... ..	Met. Log. 31.7.26 to 10.2.27 ...	9.3.27.
<i>Manchester Regiment</i> ...	Struss, F. D. ...	E. W. Jeffries ...	No. A.	" ... ..	Form 911 26.6.26 to 11.8.26 ...	20.8.26.
<i>Manchester Shipper</i> ...	Foale, J. R. ...	J. F. Fisher ...	" A.	" ... ..	" 13.2.27 to 17.3.27 ...	24.3.27.
<i>Manipur</i> ...	Dormer, A. E. ...	H. Swindells ...	" M.L.	" ... ..	Met. Log. 24.7.26 to 16.11.26 ...	29.11.26.
<i>Mantua</i> ...	Cochran, G. N. ...	R. Penston, K. Leadbetter ...	No. M.	Brocklebank ...	Form 911 6.1.27 to 4.2.27 ...	8.3.27.
<i>Marella</i> ...	Randell, G. G. ...	... ..	" M.	P. & O. ...	" 25.2.27 to 6.4.27 ...	19.4.27.
<i>Marengo</i> ...	Mortimer, S. ...	... ..	" M.L.	Burns Philp ...	Met. Log. 3.10.25 to 7.11.26 ...	5.4.27.
<i>Margha</i> ...	Williams, J. C., R.D., Commr., R.N.R. ...	F. Barnard, H. Bryon, J. Ford ...	"	Ellerman Wilson ...	" 14.1.27 to 21.2.27 ...	16.3.27.
<i>Marsina</i> ...	Milne, R. A., R.D., Commr., R.N.R. ...	P. Wright, H. E. Evans, R. M. Wyatt, E. H. Rabey. ...	"	British India ...	" 24.10.26 to 21.1.27 ...	26.1.27.
<i>Masirah</i> ...	Rothery, S. ...	H. C. Tarrington ...	No. A.	Burns, Philp & Co. ...	Form 911 15.9.26 to 6.10.26 ...	15.11.26.
<i>Matakana</i> ...	Mallett, R. ...	A. E. Evans ...	" M.	Brocklebank ...	" 12.9.26 to 13.10.26 ...	16.11.26.
<i>Mataroa</i> ...	Thurston, H. P. ...	J. Hart, J. Dickson, G. E. Lindsay. ...	" M.L.	Shaw, Savill & Albion ...	Met. Log. 1.2.27 to 13.3.27 ...	18.3.27.
<i>Matheran</i> ...	Voy, W. ...	V. V. Edmonds ...	No. A.	Burns Philp & Co. ...	Form 911 26.12.26 to 20.1.27 ...	28.2.27.
<i>Matiana</i> ...	Kershaw, W. A. R. ...	T. T. Oliver, J. J. Nicoll, J. C. K. Rogers. ...	" M.L.	Shaw, Savill & Albion ...	Met. Log. 6.11.26 to 20.2.27 ...	9.3.27.
<i>Maunganui</i> ...	Hanna, R. G. ...	H. H. Armstrong, H. Willington, J. Richardson. ...	"	Brocklebank ...	" 5.9.26 to 31.12.26 ...	5.1.27.
<i>32 Mauretania</i> ...	Green, F. V. ...	R. M. Morrison ...	No. M.	British India ...	Form 911 18.3.27 to 3.4.27 ...	25.4.27.
<i>Media</i> ...	Davey, A. H. ...	C. G. Eustace ...	" M.	Union S.S. Co. of N.Z. ...	" 4.6.26 to 9.7.26 ...	23.8.26.
<i>Medic</i> ...	Diggle, E. G., R.D., Capt., R.N.R. ...	E. R. Taylor, J. A. Quarrie, G. Duguid. ...	" W.T.	Cunard ...	W.T. Reg. 3.4.27 to 18.4.27 ...	20.4.27.
<i>Megantic</i> ...	Mallett, R. ...	S. C. Cramb ...	No. A.	T. & J. Brocklebank ...	Form 911 24.4.27 to 9.5.27 ...	11.5.27.
<i>22 Melita</i> ...	Jones, W. H. ...	W. Nicoll ...	" A.	White Star ...	Form 911 2.5.26 to 28.6.26 ...	7.7.26.
<i>Memnon</i> ...	Trant, E. L., R.D., Commr., R.N.R. ...	H. A. Billiard, R. Conway, J. C. Boyce. ...	" A.	" ... ..	W.T. Reg. 10.3.27 to 18.4.27 ...	21.4.27.
<i>21 Metagama</i> ...	Notley, A. H., R.D., Commr., R.N.R. ...	J. Shearer, N. J. P. Roberts ...	" W.T.	Canadian Pacific ...	" 18.3.27 to 7.4.27 ...	19.4.27.
<i>Middlesex</i> ...	Melling, C. F. ...	L. S. Evans ...	No. A.	A. Holt ...	Form 911 17.4.27 to 5.5.27 ...	9.5.27.
<i>Minderoo</i> ...	Freer, A. Commr., R.N.R. ...	R. Walker, J. H. Lewis ...	" W.T.	Canadian Pacific ...	W.T. Reg. 5.11.26 to 19.12.26 ...	6.1.27.
<i>Minna</i> ...	Macrae, A. B. ...	A. V. Pearce ...	No. M.	Federal ...	Form 911 2.3.27 to 23.3.27 ...	27.4.27.
<i>23 Minnedosa</i> ...	Richardson, E. ...	B. J. Bennie, W. J. McPhedran, J. H. Oxtan. ...	" A.	West Australia Nav. Co. ...	Met. Log. 2.5.26 to 4.10.26 ...	1.12.26.
<i>Minnesota</i> ...	Mackenzie, G. G. ...	J. H. Hennessey ...	" A.	Scottish Fishery Board ...	Form 911 26.3.27 to 16.4.27 ...	19.4.27.
<i>Minnetonka</i> ...	Griffiths, J. N. ...	J. P. Dobson, G. Mowatt ...	" W.T.	Canadian Pacific ...	W.T. Reg. 2.4.27 to 22.4.27 ...	27.4.27.
<i>Mirror, C.S.</i> ...	Pollard, W. F., D.S.O., Capt., R.N.R. ...	... ..	" No. M.	H.M. Transport ...	Form 911 5.2.27 to 31.3.27 ...	12.4.27.
<i>Minnewaska</i> ...	Gates, T. F., C.B.E. ...	H. E. McCartney ...	" M.	Atlantic Transport ...	" 13.4.27 to 1.5.27 ...	4.5.27.
<i>Mirror, C.S.</i> ...	Claret, F. H., C.B.E., Commr., R.N.R. ...	F. Mummery ...	" M.	" ... ..	" 28.3.27 to 16.4.27 ...	20.4.27.
<i>Mirror, C.S.</i> ...	Gibson, L. ...	A. G. Watts ...	" M.	Eastern Tel. Co. ...	" 8.3.27 to 17.3.27 ...	8.4.27.

Name of Vessel.	Captain.	Observing Officers.	Official Meteorological Equipment.	Line.	Last Log, Register, or Report Contributed. Received up to 13.5.27.	Date Received.
Mississippi	Wylie, J. T. J.	...	No. A.	Atlantic Transport	Form 911 10.3.27 to 18.4.27	21.4.27.
Moldavia	Burleigh, C. W., D.S.O., R.D., Capt., R.N.R.	R. H. Maskell	" M.	P. & O.	" 5.12.26 to 23.12.26	19.1.27.
Mongolian Prince	Edwards, W.	V. E. Palmer	" A.	Prince	21.3.27 to 4.4.27	4.5.27.
24 Montcalm	Hamilton, G.	H. McFadyen	" W.T.	Canadian Pacific	W.T. Reg. 27.3.27 to 15.4.27	20.4.27.
25 Montclare	Webster, G. S., R.D., Lt.-Commr., R.N.R.	E. Shergold, A. Mansey, R. W. Jackson.	"	"	10.4.27 to 29.4.27	3.5.27.
Montferland	Van Noppen, C. D.	W. Slooten	No. M.	Holland Lloyd	Form 911 16.10.26 to 4.11.26	9.11.26.
27 Montnairn	Turnbull, J., A.d.C., C.B.E., R.D., Capt., R.N.R.	L. Hammersley, N. A. Goater.	" W.T.	Canadian Pacific	W.T. Reg. 5.8.26 to 6.11.26	17.11.26.
26 Montrose	Landy, E.	A. Watt, F. Hutchings	"	"	20.3.27 to 8.4.27	20.4.27.
20 Montroyal	Sibbons, H.	R. Antrobus	"	"	16.4.27 to 6.5.27	9.5.27.
Moresby	Edgell, J. A., O.B.E., Capt., R.N.	W. H. Martin	" M.L.	His Majesty's Australian Ship.	Met. Log. 18.4.27 to 4.5.27	7.5.27.
Morvada	Mills, T. L., O.B.E., R.D., Commr., R.N.R.	A. J. Norris	No. M.	British India	Form 911 7.11.26 to 27.1.27	1.2.27.
Mulbera	Steadman, W. R.	E. H. Spriggs	" M.	"	" 16.4.27 to 20.4.27	25.4.27.
Nagara	Foster, E.	E. Hewitt	" M.	R.M.S.P. Co.	" 9.12.26 to 28.12.26	3.1.27.
Nagoya	Davis, H. C., D.S.C., R.D., Commr., R.N.R.	L. Porter	" M.	P. & O.	" 28.1.27 to 3.5.27	12.5.27.
Naldera	Coldwell, G. J.	W. F. Laughland	" M.	"	"	"
Nardana	Moth, F. L.	J. N. McMillan	" M.	"	"	"
Nellore	Hignett, A. H., R.D., Lt. - Commr., R.N.R.	S. H. Baldwin	" M.	"	Form 911 27.3.27 to 15.4.27	27.4.27.
Nerbudda	Williams, B. N.	J. W. B. Archibald	" M.	British India	" 27.2.27 to 18.3.27	12.4.27.
Nestor	Houghton, G. K.	D. W. Stroud, O. C. Williams, N. Anderson.	" M.L.	A. Holt	Met. Log. 15.8.26 to 18.12.26	29.12.26.
Newby Hall	Butler, J.	E. M. Robertson, A. W. Wise, R. Y. Smith.	"	Ellerman	" 26.11.26 to 6.3.27	28.3.27.
Newfoundland	Westgarth, W. A., D.S.C.	R. F. Handley, E. Sainty, S. Moore.	"	Furness Withy	" 19.8.26 to 3.12.26	14.12.26.
Niagara	Showman, A. C.	A. P. Cousin, D. McKenzie, T. Haulton, J. M. Hood.	"	Canadian-Australian	" 22.9.26 to 30.1.27	5.4.27.
Ningchow	Christie, W.	...	No. A.	A. Holt	Form 911 13.10.26 to 30.12.26	10.1.27.
Norfolk	Mead, G. F.	J. W. Pring	" A.	Federal	" 27.2.27 to 29.3.27	9.5.27.
Norna	Wright, J. W.	T. R. Ness	" A.	Scottish Fishery Board	" 1.4.27 to 24.4.27	4.5.27.
Norseman, C.S.	Barter, H. O., R.N., Commr., R.N.R.	R. W. Greenfield	" M.	Western Tel. Co.	" 1.4.27 to 13.4.27	4.5.27.
Northwestern Miller	Nuttall, E. L.	...	" A.	Furness Withy	" 20.11.26 to 23.12.26	29.12.26.
Nova Scotia	Furneaux, S.	W. P. Paterson	" M.	"	" 8.9.26 to 4.10.26	18.10.26.
Nowshera	Rowe, S. N.	W. D. L. Reeves	" M.	British India	" 9.1.27 to 1.3.27	25.4.27.
Nubian	Watmough, T. M.	...	" A.	Leyland	" 28.2.27 to 14.3.27	22.3.27.
Oaklands Grange	St. Clair, C., D.S.C.	E. J. Longheed	" A.	Houlder Bros.	" 17.3.27 to 11.4.27	7.5.27.
57 Olympic	Marshall, W., C.B., D.S.O., A.d.C., R.D., Capt., R.N.R.	A. Fisher, H. J. C. Day	" W.T.	White Star	W.T. Reg. 7.4.27 to 21.4.27	25.4.27.
Orama	Shelford, W. S., Lieut. - Commr., R.N.R.	T. Fox Russell, C. K. Blake, H. Tanner.	" M.L.	Orient	Form 911 6.4.27 to 21.4.27	27.4.27.
Oranian	Hoskins, W.	W. Lawton	No. A.	Leyland	Form 911 11.9.26 to 13.11.26	26.11.26.
Orbita	...	...	No.	R.M.S.P. Co.	"	"
Oreoma	Dominy, E. H., C.B.E., Commr., R.N.R.	T. Naylor, G. Gerety, T. Mitchell.	" M.L.	Pacific S.N. Co.	Met. Log. 18.11.26 to 4.2.27	22.2.27.
Orduna	Daniel, T.	E. Hicks	No. M.	R.M.S.P. Co.	Form 911 13.1.27 to 22.3.27	28.3.27.
Orestes	Hanney, T. W.	F. T. Berry	" A.	A. Holt	" 14.2.27 to 17.3.27	28.3.27.
Orita	Splatt, W. A.	C. C. N. Gibson, D. W. Hutchinson, G. R. Bubb, J. L. Jones.	" M.L.	Pacific S.N. Co.	Met. Log. 22.6.26 to 29.11.26	20.12.26.
Ormonde	Wyatt, A. G. N., Lieut. Commr., R.N.	A. M. Hughes	"	His Majesty's Ship	" 7.9.26 to 17.11.26	1.12.26.
Ormonde	James, L.V., D.S.C.	...	No. M.	Orient	Form 911 18.4.27 to 27.4.27	4.5.27.
Oronsay	Owens, A. L., R.D., Lt.-Commr., R.N.R.	J. C. K. Dowding, E. Hatch, R. Galpin, R. S. Hawker.	" M.L.	"	Met. Log. 11.9.26 to 19.1.27	24.1.27.
Oroya	Duncan, E. E.	...	No. M.	Pacific S.N. Co.	Form 911 9.2.27 to 19.4.27	4.5.27.
Orsova	Cameron, E. P., R.D., Commr., R.N.R.	L. E. Fordham, L. J. Vesty, W. Elliott, J. P. Castle-Bartley.	" M.L.	Orient	Met. Log. 12.12.26 to 16.3.27	26.3.27.
Ortega	Barkley, E.	G. M. Rice	No. M.	Pacific S.N. Co.	Form 911 29.9.26 to 15.11.26	24.11.26.
Orvieto	Thorne, G. G., R.D., Commr., R.N.R.	I. E. G. Goldsworthy, G. L. Carter, J. L. Skilling, T. L. Shurrock.	" M.L.	Orient	Met. Log. 25.12.26 to 31.3.27	4.4.27.
Osterley	Hayes, I. J.	S. Burnnand	No. A.	"	Form 911 1.11.26 to 3.2.27	8.2.27.
Otaki	McNish, R.	C. R. Brown	" A.	New Zealand S.S. Co.	" 24.12.26 to 7.2.27	10.2.27.
Otira	Wood, C.	D. N. MacGregor	" M.	Shaw, Savill & Albion	" 15.12.26 to 29.1.27	2.2.27.
Otranto	Stanton, H. G., C.B.E., R.D.	...	" M.	Orient	" 20.1.27 to 1.4.27	19.4.27.
Oxfordshire	Crumplin, W. E.	T. W. Coyne	" A.	Bibby Bros.	" 18.12.26 to 24.2.27	2.3.27.
Pacific Shipper, M.V.	Newman, G. W. A.	G. Davis	" A.	Furness Withy	" 22.2.27 to 25.3.27	29.3.27.
Pacure	Sapsworth, S.	V. R. Watkins	" A.	Elders & Fyffes	" 4.4.27 to 7.5.27	12.5.27.
Pakeha	W. P. Clifton Mogg	E. T. Baker, R. E. Nicholson, A. J. Tillot.	" M.L.	Shaw, Savill & Albion	Met. Log. 21.12.26 to 29.4.27	7.5.27.
Parsora	Evans, J. O.	N. Turner	No. A.	Hain S.S. Co.	Form 911 25.10.26 to 7.11.26	9.11.26.
Paris	Cook, C. L.	Mr. Biles	" C.C.	Southern Ry.	Telegraphic Report. 15.10.26	15.10.26.
Patia	Makepeace, S.	J. Kinsley	No. A.	Elders & Fyffes	Form 911 27.12.26 to 28.1.27	14.2.27.
Patrician	Pugh, R. H.	H. W. Stanley	" M.	Harrison	" 11.6.26 to 28.9.26	23.11.26.
Patrol, C.S.	Welsh, T. K.	J. S. Browne	" No.	Eastern Extension (A. & C.) Telegraph Co.	Met. Log. 18.10.26 to 15.11.26	9.2.27.
Paisander	Slater, H. N.	...	No.	A. Holt	"	"
Peshawur	Wilding, H. G.	J. C. Melonie, J. K. Crone, R. G. Wood.	" M.L.	P. & O.	Met. Log. 30.10.26 to 6.3.27	18.3.27.
Piako	Kettlewell, C. R.	...	"	New Zealand S.S. Co.	"	"
Polycarp	Evans, T. G.	C. W. Smethurst	No. A.	Booth	Form 911 30.1.27 to 13.2.27	26.2.27.



Name of Vessel.	Captain.	Observing Officers.	Official Meteorological Equipment.	Line.	Last Log, Register, or Report Contributed. Received up to 13.5.27.	Date Received.
<i>Telamon</i> ...	Clark, D. ...	F. Wardrobe ...	No. A.	A. Holt ...	Form 911 19.2.27 to 7.3.27 ...	29.3.27.
<i>Teucer</i> ...	Hodgson, R. N. ...	D. T. Thorne ...	" A.	" ...	" 18.3.27 to 26.3.27 ...	4.5.27.
<i>Themistocles</i> ...	Jermyn, W. M. ...	H. C. Howe ...	" M.	Aberdeen ...	" 13.2.27 to 4.3.27 ...	29.3.27.
<i>Theseus</i> ...	Jones, E. ...	W. A. Fyffe ...	" A.	A. Hoit ...	" 31.3.27 to 19.4.27 ...	4.5.27.
<i>Titan</i> ...	Wilkinson, T. G. ...	D. MacTavish, G. W. Best, C. G. Bailey.	M.L.	" ...	Met. Log. 27.8.26 to 12.2.27 ...	23.2.27.
<i>Tongariro</i> ...	White Parsons, V.C.	J. J. Youngs ...	No. M.	New Zealand S.S. Co.	Form 911 8.1.27 to 15.2.27 ...	21.2.27.
<i>Transylvania</i> ...	Bone, D. W. ...	P. Middleton ...	" A.	Anchor ...	" 10.4.27 to 1.5.27 ...	11.5.27.
<i>Traveller</i> ...	Worthington, B. ...	E. L. Stockley ...	" M.	T. & J. Harrison ...	" 2.2.27 to 12.4.27 ...	19.4.27.
<i>Trematon</i> ...	Evans, B. ...	R. Gregory, C. Warren, J. Toms.	M.L.	Hain S.S. Co. ...	Met. Log. 10.10.26 to 7.3.27 ...	25.4.27.
<i>Turakina</i> ...	Hamilton, E. S. ...	A. N. Marshall, G. S. Shepherd	No. M.	New Zealand S.S. Co.	Form 911 27.9.26 to 5.1.27 ...	28.1.27.
<i>Tuscama</i> ...	Smart, R. W. ...	J. Hamilton ...	" A.	Anchor ...	" 4.3.27 to 28.3.27 ...	19.4.27.
<i>Tyndareus</i> ...	Scott, J. R. ...	A. G. Phillips, F. Howe, A. R. McDavid.	M.L.	A. Holt ...	Met. Log. 1.7.26 to 22.11.26 ...	10.1.27.
<i>Ulimaroa</i> ...	Wylie, W. J. ...	" ...	No. M.	Huddart Parker, Ltd.	Form 911 4.3.27 to 28.3.27 ...	4.5.27.
<i>Ulysses</i> ...	McHutchon, W. ...	E. C. Radford ...	" A.	A. Holt ...	" 18.12.26 to 30.1.27 ...	3.2.27.
<i>Umwolosi</i> ...	Barnes, E. W. ...	R. L. B. Ryde ...	" A.	Bullard King ...	" 10.3.27 to 6.4.27 ...	4.5.27.
<i>Valacia</i> ...	Inch, F. ...	G. Meggitt ...	" M.	Cunard ...	" 12.1.27 to 10.4.27 ...	13.4.27.
<i>Vardulia</i> ...	Fear, E. T. C. ...	L. D. W. Rand ...	" A.	" ...	" 30.1.27 to 13.3.27 ...	4.4.27.
<i>Verbania</i> ...	Pooley, T. S. M. ...	A. F. Watts ...	" A.	" ...	" 8.2.27 to 26.3.27 ...	19.4.27.
<i>Vigilant</i> ...	Simpson, E. S. S. ...	J. Hunter ...	" A.	Scottish Fishery Board	" 17.4.26 to 23.12.26 ...	7.5.27.
<i>Waiotapu</i> ...	Harris, E. ...	J. W. McCaskill ...	" M.	Canadian-Australasian	" 5.3.27 to 4.4.27 ...	20.4.27.
<i>Wairuna</i> ...	Whyborn, H. S. ...	R. Howie, G. H. George, A. W. Rabbitts.	M.L.	Union S.S. Co. of N.Z.	Met. Log. 19.6.26 to 25.9.26 ...	29.12.26.
<i>Walmer Castle</i> ...	Chave, Sir B., K.B.E.	H. A. Deller ...	No. A.	Union Castle ...	Form 911 7.5.26 to 23.5.26 ...	7.6.26.
<i>Wanagaratta</i> ...	Scutt, W. ...	T. W. Worthingham, S. R. Millard, K. M. Morrison, A. G. Brooks.	M.L.	British India ...	Met. Log. 18.9.26 to 1.2.27 ...	7.2.27.
<i>Warfield</i> ...	Steel, R. ...	C. M. Quick ...	No. A.	" ...	Form 911 11.2.27 to 4.3.27 ...	11.3.27.
<i>War Nizam</i> ...	Moncrieff, T. ...	J. Row ...	" A.	British Tankers ...	" 24.2.27 to 2.4.27 ...	13.4.27.
<i>Welshman</i> ...	Rollerson, W. ...	J. Mendus ...	" M.	White Star-Dominion	" 22.10.26 to 14.11.26	26.11.26.
<i>William Scoresby, R.S.S.</i>	Mercer, G. M., D.S.C., Lt.-Commr., R.N.R.	A. Irving, M. C. Lester ...	M.L.	Falkland Islands Government.	Met. Log. 5.7.26 to 23.12.26 ...	4.4.27.
<i>Windsor Castle</i> ...	Strong, H., R.D., Commr., R.N.R.	F. Wilbraham, C. L. Lovegrove, J. Montgomery, F. Norfolk.	"	Union Castle ...	" 1.6.26 to 20.9.26 ...	2.10.26.
<i>Winifredian</i> ...	Harrocks, W. ...	A. Crone ...	No. M.	Leyland ...	Form 911 27.3.27 to 30.4.27 ...	11.5.27.
<i>Wonganelia</i> ...	Suffern, H. ...	G. F. Phillips ...	"	W. Crossby & Sons ...	" 4.3.27 to 27.3.27 ...	4.5.27.
<i>Woodarra</i> ...	Reilly, J. V. ...	L. D. Graham, H. Goater, B. W. Smith.	M.L.	British India ...	Met. Log. 23.10.27 to 18.4.27 ...	1.5.27.
<i>Yorkshire</i> ...	Millson, G. E. ...	W. M. C. Higginson ...	No. A.	Bibby ...	Form 911 15.1.27 to 26.3.27 ...	4.4.27.
<i>Conway H.M.S.</i>	Richardson, F. A., D.S.C., Commr., R.N.	The Senior Cadets ...	Cadets' M.L.	" ...	Cadets' Met. Log. 23.1.27 to 2.4.27	4.4.27.
<i>Pangbourne Nautical College.</i>	Tracy, A. F. G., Commr., R.N.	" ...	"	" ...	Cadets' Met. Log. 16.1.27 to 26.3.27	30.3.27.
<i>Worcester, H.M.S.</i>	Sayer, M. B., O.B.E., R.D., Capt., R.N.R.	" ...	"	" ...	Cadets' Met. Log. 21.1.27 to 13.4.27	19.4.27.
<i>Abaco</i> ...	" ...	The Keepers ...	Lighthouse Register.	" ...	Lighthouse Register 1.7.26 to 20.10.26	20.4.27.
<i>Cay Lobos</i> ...	" ...	" ...	"	" ...	Lighthouse Register 1.7.26 to 31.12.26	20.4.27.
<i>Double Headed Shot</i> ...	" ...	" ...	"	" ...	Lighthouse Register 1.7.26 to 31.12.26	20.4.27.
<i>Inagua</i> ...	" ...	" ...	"	" ...	Lighthouse Register 1.7.26 to 31.12.26	20.4.27.
<i>Sombrero</i> ...	" ...	" ...	"	" ...	Lighthouse Register 15.7.26 to 23.1.27	1.2.27.
<i>Watling Island</i> ...	" ...	" ...	"	" ...	Lighthouse Register 1.7.26 to 31.12.26	10.11.26.
<i>Cape Pembroke (Falkland Is.)</i>	" ...	" ...	"	" ...	Lighthouse Register 17.1.26 to 20.7.26	24.2.27.

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 30.4.27.	Date Received.
<i>Darro</i> ...	Matthews, G. P. ...	W. Halder-Campe ...	R.M.S.P. Co. ...	Water Samples ...	10.3.27.
<i>Desado</i> ...	Shillito, B. ...	F. P. Wheeler ...	" ...	" ...	13.1.27.
<i>Hildebrand</i> ...	Maddrell, J. ...	A. Allan ...	Booth ...	" ...	14.1.27.
<i>Manzanares</i> ...	Edwards H. ...	W. E. A. Duff ...	Elders & Fyffes ...	" ...	3.1.27.
<i>Reventazon</i> ...	Jack, D. A. ...	L. C. Bach ...	" ...	" ...	11.4.27.

July, M.O., 1927.