

VOL. VIII. No. 92.

THE MARINE OBSERVER.

AUGUST, 1931.

TABLE OF PRINCIPAL CONTENTS.

	PAGE.		PAGE.
The Visibility which Exists Ahead Beyond Sight of the Navigator	163	Canada, U.S.A. (Atlantic Coast) and West Indies	178
The Marine Observer's Log (with illustrations)	164	Sweden (Amendment)	183
Northern and Southern Lights	170	Lithographic Illustrations after page 184:—	
Wind, Fog, Mist and Weather in the Region off the coast of Portugal	173	Chart IX.—Ships' Wireless Weather Signals.	
Weather Signals:—		Fog frequency in the South Atlantic—August.	
Wireless Stations detailed to receive Routine Coded Weather Reports from "A Selected Ships"	174	Wind, Fog, Mist and Weather for the Region off the Coast of Portugal—August.	
Wireless Stations detailed to receive Routine Coded Weather Reports from "B Selected Ships"	176	Typhoons in the Far East during the years 1882 to 1926 (3 charts)—August.	

THE VISIBILITY WHICH EXISTS AHEAD BEYOND SIGHT OF THE NAVIGATOR.

Information of whether it is clear or not ahead and beyond sight, particularly in middle and high latitudes, is of course such a natural desire for any navigator to have, that it would scarcely seem necessary to mention it if it were not for the need of precaution against the improper use of such information.

"Selected Ships" report their estimates of the visibility in their coded routine reports; this information being given by the third figure of the fourth or last universal Group, and is for the time of observation only. In the British Weather Shipping Bulletin information is given of observed visibility to seaward from the ten British coast stations, for which coded observations are given, by the fifth figure in the first group of each station, at the time of observation.

As visibility may be changing, time is all important. We use the words "estimates of visibility" when referring to Selected Ships' reports and "observed visibility to seaward" when referring to coast stations with reason.

In a ship at sea usually it is not possible to obtain measurements of the range of vision from objects present. As every experienced seaman knows, an estimate of visibility may be found to be in error, and over confidence in the accuracy of such estimates has led to accidents. The observed visibility to seaward of coast stations is usually obtained by seeing objects, the distance of which is known by the observer, but of course there may not be suitable objects on

desirable bearings to seaward. Telegraphic errors may occur, afloat or ashore, and all information of visibility received in a ship beyond her own range of vision should be used with caution. Caution is necessary in using one's own estimates of visibility, that is the distance that one may judge that one can see at sea because experience has proved, and often with reason for regret, that the most experienced observer may be a great deal out in his estimate of the visibility.

If due caution is exercised then information of the state of visibility received in ships under weigh, from positions ahead of them, particularly if they be in regions of traffic or places of landfall, is most helpful.

Commanders of "Selected Ships" who make these reports are asked to have great care exercised in observation, record, coding, and communication, and all who use the information are advised to bear in mind the possibility of error.

The attention of all concerned is invited to the fog and visibility scale (Specification for use at sea) and the remarks accompanying it on pages 61 and 62 of the MARINE OBSERVER'S HANDBOOK, 5th edition. It may be useful to many ships bound up the English

Channel to have information of visibility ahead not only at the coast but in mid channel, but it is not desirable to increase W/T traffic in this congested area.

Now the Southern Railway's cross channel mail packet, running between Newhaven and Dieppe, usually reports the conditions of wind, weather, and visibility, with time and position, observed in mid channel to the Southern Railway's W/T station at Newhaven, GNV, in the Ships' International Wireless Weather code on 700 metres wave length spark. This is acknowledged by the station on the same wave length I.C.W.

Neither the time of observation nor the time of sending the message are fixed but these ships are usually near mid channel at about 0100 G.M.T. on the homeward passage and at about 1200 G.M.T. on the outward passage. The message may be picked up by all ships who wish to have the information. This by the courtesy of the Southern Railway. The message is telegraphed to Weather London, and contributes to the forecasts given in the British Weather Shipping Bulletin.

MARINE SUPERINTENDENT.

1st May, 1931.

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.

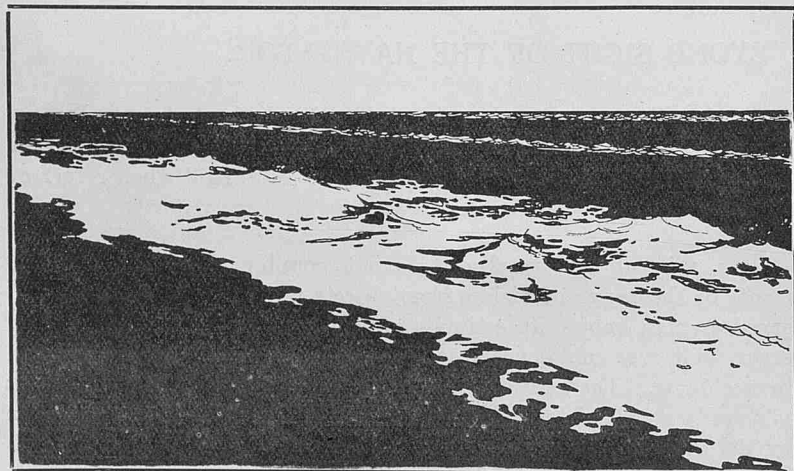
Responsibility for statements rests with the Contributor.

CURRENT RIPS.

China Sea.

THE following is an extract from the Meteorological Record of S.S. *Kashgar*, Commander F. SUDALL, R.D., R.N.R., Singapore to Hong Kong. Observer, Mr. R. P. EDDY, sketch by Mr. A. J. NOBBS.

"26th August, 1930, at 10.00 a.m. observed line of current rips, direction E.N.E. to W.S.W. Water in these rips was proceeding violently to the southward. Ship's head deflected $1\frac{1}{2}$ points in that direction. Width of line about 150 yards, length of line about 4 miles (very approximate). Position of ship Latitude $14^{\circ}31'N$. Longitude $110^{\circ}16'E$. Wind S.S.E. force 4, fair and clear, sea temperature $82^{\circ}F$., current experienced in 24 hours N.N.E. $\frac{1}{2}$ knot."



STEAMSHIP ROUTE, COLOMBO AND THE FAR EAST TO PERIM DURING THE S.W. MONSOON.

THE following is an extract from the Meteorological Record of S.S. *Knight Companion*, Captain A. L. DAVIES.

S.S. *Knight Companion*, Tonnage Gross 7375.

This is an eleven-knot steamer at her best. We left Colombo at 5 p.m., August 9th, 1930, making direct for $1\frac{1}{2}^{\circ}$ Channel, thence passing through the following positions:—

Noon	12th	$1^{\circ}50'N$	$69^{\circ}55'E$				
„	13th	$2^{\circ}26'N$	$65^{\circ}21'E$	Run 276 Miles	Current	N. 27° W. 14	
„	14th	$3^{\circ}14'N$	$61^{\circ}22'E$	„ 244 „	„	N. 49° E. 37	
„	15th	$4^{\circ}17'N$	$57^{\circ}28'E$	„ 245 „	„	S. 41° E. 11	
„	16th	$6^{\circ}38'N$	$54^{\circ}45'E$	„ 214 „	„	N. 66° E. 52	
„	17th	$9^{\circ}14'N$	$51^{\circ}39'E$	„ 262 „	„	N. 47° W. 26	

I hauled up for Ras Hafun at 4.00 a.m. on the 17th in $7^{\circ}45'N$. $52^{\circ}10'E$. Sighted Ras Rafun on a N.N.W. bearing distance 15 miles about 4.30 p.m. and from noon to a position 5 miles east of the lighthouse experienced a N.E'ly set of 2 knots, which was considerably stronger when within a distance of 10 miles of the Cape. Between Ras Hafun and Guardafui we experienced no current at all with us and if anything I should say it was slightly adverse. We had light S.E. winds and moderate S.E. swell, as far as $62^{\circ}E$., with fine weather, then the wind hauled to the S.W. and freshened, but at no time reached above force 5 except between 4.00 a.m. and noon on the 17th when it was force 6. Up to noon on the 18th we averaged a speed of 10.4 knots, which I think is better than we should have done had we taken the more Northerly Route and we probably made the passage in as good, if not better time, even taking into consideration the added distance and of course with less wear and tear.

RAPID FALL OF SEA SURFACE TEMPERATURE.

Off Perim.

THE following is an extract from the Meteorological Record of S.S. *British Dominion*, Captain R. J. TAYLOR, Suez to Abadan. Observer, Mr. A. JAMES, 2nd Officer.

On August 29th, 1930, at 1055 G.M.T. in Latitude 12° 42' N., Longitude 40° 20' E., observed sea surface temperature 90°, air 92° F., ship approaching Perim from Red Sea. On nearing Balfe Pt., a "Strong Tide Rip" extended from Balfe Pt. in a N.E. to S.W. direction for exactly one mile with a clear-cut regular line on its western boundary, terminating in a sharp point, with a slight sweep inshore as if to form a V on its eastern side, then curved towards the S.E. with a weakening line of demarcation. The ship crossed the extreme point of the "Tide Rip" at 1115 G.M.T., at which moment a surface temperature of 70° F. was obtained, a fall of 20° F. At this time the wind was E.S.E., force 3. Sky cloudless and the air temperature had fallen slowly to 88° F. and continued to fall until 1140 G.M.T., when it remained at 85° F. Continuous surface temperatures were taken until 1800 G.M.T., but after 1305 G.M.T. sea surface temperature rose to 82° F. The following observations were carefully taken:—

1115	G.M.T.	Balfe Pt.	050°	dist. 1 ml.	Sea 70° F.
1123	"	"	000°	" 1¼ mls.	" 71° F.
1131	"	Pirie Pt.	048°	" 1 ml.	" 74° F.
1140	"	High Lt.	013°	" 2½ mls.	" 76° F.
1155	"	"	327°	" 3½ mls.	" 80° F.
1210	"	"	307°	" 6 mls.	" 84° F.
1231	"	"	298°	" 10 mls.	" 80° F.
1250	G.M.T.	Latitude 12° 34' N.	Longitude 43° 39' E.	"	77° F.
1305	"	" 12° 33' N.	" 43° 43' E.	"	79° F.

and from latter position to Latitude 12° 37' N., Longitude 44° 44' E., at 1800 G.M.T. a very steady rise to 82° F. was observed. Note the rise and fall of these temperatures, which is most interesting. The Master states he had noticed this cold patch of water in this vicinity on former occasions, especially during S.W. Monsoon period.

NOTE.—In the Meteorological Chart of the Red Sea, it is stated that considerable changes of sea temperature are observed in the neighbourhood of the Strait of Bab-el-Mandeb during the months of June and October and that these may be very great in the period July to September.

PHOSPHORESCENCE.

Arabian Sea.

THE following is an extract from the Meteorological Record of S.S. *Narkunda*, Commander J. J. W. PARKER, R.D., R.N.R., Brisbane to London via Suez. Observers, Messrs. C. H. MOULTON, 2nd Officer, and A. W. FRANKLIN, Cadet.

Monday, August 18th, 1930, at 1738 G.M.T., observed apparent clearing and brightening of sky to the south-westward. At 1808 hours observed sea impregnated with phosphorescence. At 1818 hours ship encountered phosphorescent sea, and in a few minutes the whole sea all round, to the limits of visibility, was phosphorescent, giving a peculiar effect, somewhat like a moderately moonlight night, with a calm sea in shallow water. Breaking waves showed up as temporary dark patches. There was a very definite line of demarcation where the phosphorescence began, and it appeared to be travelling in a N.E.'ly direction. At 1938 hours the phosphorescence began to ease off—by 2008 hours it was much less, and by 2038 hours on the moon rising it was no longer discernible to the naked eye.

From 1853 to 1923 we passed some hundreds of what appeared to be dead snakes, varying in length from 2 to 5 feet. They were floating on the surface, motionless, many passing very close to the ship's side, being plainly visible in the light thrown from the ship's decks, and showing up black in the phosphorescence. Some were more or less straight, others in sinuous forms and apparently tangled. On a wave breaking over them, there was no sign of movement or life.

At 1800 G.M.T., Latitude 15° 30' N., Longitude 58° 10' E., Barometer 29.63 in., Temperature, Air 76° F., Sea 77° F. Sea Temperature at 1900 hrs. 74° F., Wind S.S.W. force 6/5, Sea S.W. 5, Swell S.W. 7, Cloud Fr.-Cu., A.-Cu.

THE following is an extract from the Meteorological Record of S.S. *Atreus*, Captain J. H. WILLCOX, Suez to Padang, E. Indies. Observer, Mr. E. A. H. GEPP, 3rd officer.

In view of various reports, which have from time to time been published in THE MARINE OBSERVER, concerning "White Water" in and near the Gulf of Aden, it is interesting to note that exactly the same conditions and appearance were observed on the night of 20th August, 1930, from S.S. *Atreus*.

The milky appearance of the sea was first observed at 7.30 p.m. (A.T.S.), one hour and twenty minutes after sunset, in Latitude 12° 38' N., Longitude 55° 19' E., ship then steering 105° at 13 knots. The general appearance of the sea was a whitish, milky liquid, entirely lacking in the bright sparkle usually associated with phosphorescence, and giving to an observer the impression of sources of light at some considerable depth below the surface.

Although the sky was practically cloudless, and the visibility good, as observed by the lights of another vessel proceeding in the same direction some miles distant, it appeared as though there was a thick haze or mist over the sea, which at times rendered the horizon totally indiscernible. Until 11.30 p.m. (A.T.S.) this "white water" was encountered in large patches, some stretching as far as the eye could see, the patches being interspersed with small darkish patches and irregularly shaped belts of normal sea water. Over these latter patches there was no appearance as of haze or mist, though this was readily discernible above the "milky" patches.

After 1.20 a.m. (A.T.S.) in Latitude 12° 20' N., Longitude 56° 27' E., the ship apparently ran out of the "white water," as no more "milky" patches were seen.

Upon first entering the above area, the wind, sea, and swell, which had been heavy from the S.W., began to moderate. Temperature of air was 79° 3 F and sea 78° 0 F during this period.

THE following is an extract from the Meteorological Record of S.S. *Trojan Star*, Captain G. A. GRIFFIN, United Kingdom to the East. Observer, Mr. L. S. HASSELL, 2nd officer.

On August 28th, 1930, at about 11 p.m. A.T.S., north of Socotra, the vessel ran suddenly into a line of milky luminescence stretching from horizon to horizon in a north and south line, in about Latitude 13° 14' N., Longitude 52° 57' E.

This appearance gave a perfectly radiant glow, making the heavens appear an inky black. All the stars were showing, and the sea after steaming for about an hour in an easterly direction had the appearance of a field of snow, being illuminated from underneath, in fact the phenomenon was almost indescribable.

Several samples of the water were taken in a bucket, and when examined in the dark seemed to contain thousands of very thin lines of light, some apparently about half an inch in length, others much shorter, but when the water was examined in the light in the chartroom, very little could be seen. A bottle of this water has been retained.

There was absolutely no sparkle in the water as in ordinary luminescence, and the waves broke seemingly of a black colour. The discharge from the condenser also appeared black. The sea was rough.

Just before steaming out of this patch, the appearance seemed to increase in brilliancy, and I can only describe the effect as a vessel steaming through a field of pure white, illuminated snow. We steamed out of this at 2.50 a.m. A.T.S. as suddenly as we entered it, in Latitude $13^{\circ} 47' N.$, Longitude $53^{\circ} 32' E.$, and after getting into normal water a brilliant glow was visible from north to south astern the ship.

EXPERIENCES IN THE VICINITY OF A WEST INDIAN HURRICANE.

THE following report has been received from S.S. *Cherry Branch*, Captain C. E. ELLIOTT, Panama to Liverpool via St. Thomas, W.I.

Cristobal was cleared at 6 p.m. on the 19th August, and bearing in mind I was to pass through the region of tropical storms at their busiest period, I gave instructions that weather conditions had to be recorded in all their phases.

Wireless weather reports were taken in daily transmitted from Arlington, San Juan and Almirante, and daily charts were made on board. On the 21st our charts showed a disturbance forming S.E. of Hatteras and on the 22nd this storm had taken definite form and was moving N.N.W. I considered our observations had so far been rewarded.

On the 23rd the sky was cloudless and I particularly noted the extreme visibility. At 8 a.m. wind was east force 4, easing off, slight E'ly. swell, at noon wind had dropped to light variable airs. Having received the 1200 G.M.T. weather report from San Juan, my chart was made for the West Indies area. I noted that barometer readings at the various stations registered below normal and my chart showed a depression east of St. Martins, which appeared to be forcing a wedge of low pressure westward to St. Martins along to St. Thomas and back to Roseau. My suspicions were now aroused that a storm was in the making to the eastward.

Ship's barometer (aneroid) uncorrected, showed normal reading for the latitude; this I knew to be wrong, for on my outward voyage I had been in company with "Selected Ships" in this area and found my readings approximately .12 ins. too high.

At noon wind was variable and light, 3 p.m. wind came away N.N.W. force 2 and at 4 p.m. backed to N.W. same force, slight E'ly. swell continued. Barometer showed no appreciable change other than the diurnal range.

6.30 p.m. while waiting to get observations a single cumulus cloud was seen bearing E. by N., top to horizon 8 degrees, 3 degrees at base, and moved south, the horizon to the north appeared hazy and we were unable to obtain sights. The atmosphere was very warm throughout the day, but I would not call it oppressive.

Midnight, wind veered to N.N.W., this shift was probably due to vessel being under lee of the land.

On the 24th at 5 a.m. I was off St. Thomas and alongside coaling wharf; at 6 a.m. I questioned the pilot about the weather conditions, he was somewhat dubious as to what was taking place, he was inclined to think that the storm off the American coast was affecting the barometers in their area, I did not fall in with these views. Two small sailing craft left port at 7 a.m., having delayed their departure since last night fearing some disturbance was developing in the vicinity; before leaving they had obtained an all clear message from Harbour Master's office.

At 1200 G.M.T. when the reading of the St. Thomas barometer is taken I noted reading of ship's barometer.

Steamer left port at 11.15 a.m., at about noon I received San Juan's weather report, also that of the *Lobos* for 1200 G.M.T. which proved very valuable to me. I compared the barometer reading of St. Thomas 29.86 in. with my reading while in port 30.00 in. which gave me an error of .14 to subtract; my chart was now drawn up.

At noon I was clear of the land, wind N.W. force 2, heavy N.E. swell, sky cumulus clouds from the north $3/10$, visibility very good, still my barometer had shown no inclination to fall, I realised now it was reading below normal.

My chart showed definitely that the storm was formed and travelling to the North of N.W. As the weather did not look threatening I had no hesitation making my course to the N.E.; I was almost certain the storm would pass ahead of me during the night, as considering the time of the year I did not anticipate a recurve in these low latitudes.

Similar weather conditions prevailed until 8 p.m. when the sky became perfectly clear, no clouds visible. The 2200 G.M.T. weather report was plotted on a chart and the progress of the storm noted, I had the 1800 G.M.T. report of the *Lobos* before me, but did not enter it on the chart as the times differed.

11 p.m. dense nimbus clouds appeared over the horizon from the N.N.E. moving S.S.W., between 11.30 and 11.50 p.m. very heavy rain fell, the noise of the rain striking the sea could be heard some considerable distance away. Midnight wind dropped to calm, light rain, 12.15 a.m. sky cleared with only one tenth cumulus N.N.E., smooth sea, heavy N.E. swell.

On the 25th August at 5 a.m. wind came away from the S.W. force 1 increasing to force 3 at 8 a.m., swell was now N.N.E. moderate, cumulus clouds from the S.W. $4/10$ ths.

About one dozen small land birds are to be seen flying around the decks this morning.

Weather chart was made on receipt of San Juan's report also those of *Lobos* and *Ruahine* which showed the storm had passed ahead of me travelling N.N.W.

2 p.m. wind was S.W. by S. force 4, sea S.W. 3, Moderate N'ly. swell, clouds cumulus from the S.W. $4/10$ ths and Ci-St. from S.S.E. $2/10$ ths.

NOTE:—*Cherry Branch* was not a regular observing ship at that time and this is the first evidence received of ships not of the regular observing fleet using the reports made by "Selected Ships" since those reports were made in the Ship's International Wireless Weather Code which came into use for British ships on May 1st, 1930. Since then many shipowners have had the Decode placed on board their ships.

ABNORMAL REFRACTION.

North Pacific Ocean.

THE following is an extract from the Meteorological Log of S.S. *Niagara*, Captain J. F. S. BROWN, Honolulu to Suva. Observer, Mr. L. P. BOURKE, 3rd Officer.

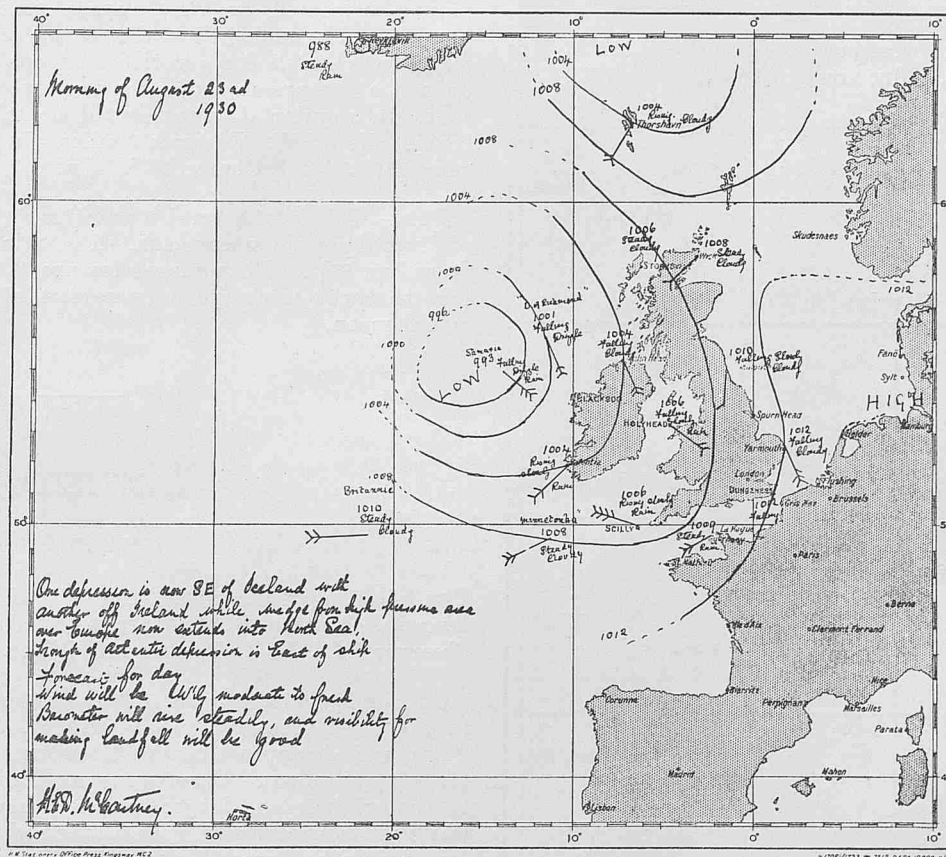
31st August, 1920 at 2030 A.T.S. observed the lights of R.M.S. *Aorangi* bearing 170° , estimated distance of 13 miles. The lights were then easily apparent to the naked eye. At 2033 the lights completely disappeared and three observers, with powerful glasses failed to see the ship again until 2047, when her lights became dimly visible, as through a haze, at short intervals until 2053.

From 2053 till 2100, when the *Aorangi* was abeam distant 4 miles, the conditions appeared quite normal and remained so until 2130 when the vessels were 16 miles apart. R.M.S. *Aorangi* reported that she observed R.M.S. *Niagara* at 2028 A.T.S. and that the *Niagara* was clearly visible throughout. From this it would appear that the *Aorangi* must have passed through a locality of atmospheric distortion, Ship's position Latitude $0^{\circ} S.$, Longitude $171^{\circ} W.$ Wind east, force 3. Temperature Air $83^{\circ} F.$, Sea Surface $84^{\circ} F.$, Sky cloudless. Occasional dull lightning to eastward.

WEATHER CHARTS MADE AT SEA.

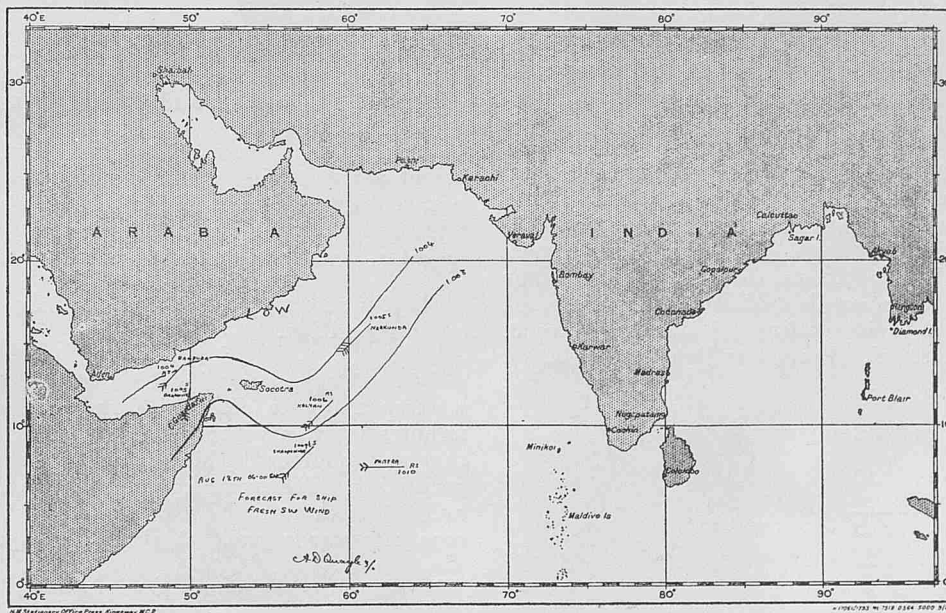
Eastern North Atlantic.

Weather Chart made at sea on board S.S. *Minnetonka*, Captain T. F. GATES, C.B.E., New York to London, by Mr. H. E. D. McCARTNEY from a selection of reports received from "Selected Ships" on the Roll Call for the day and from coast station reports given in the British Weather Shipping Bulletin.



Arabian Sea.

Weather Chart made at sea on board M.V. *Shropshire*, Captain G. L. ENGLISH, Colombo to Port Sudan, by Mr. A. D. QUAYLE, 3rd Officer.



REFRACTION.

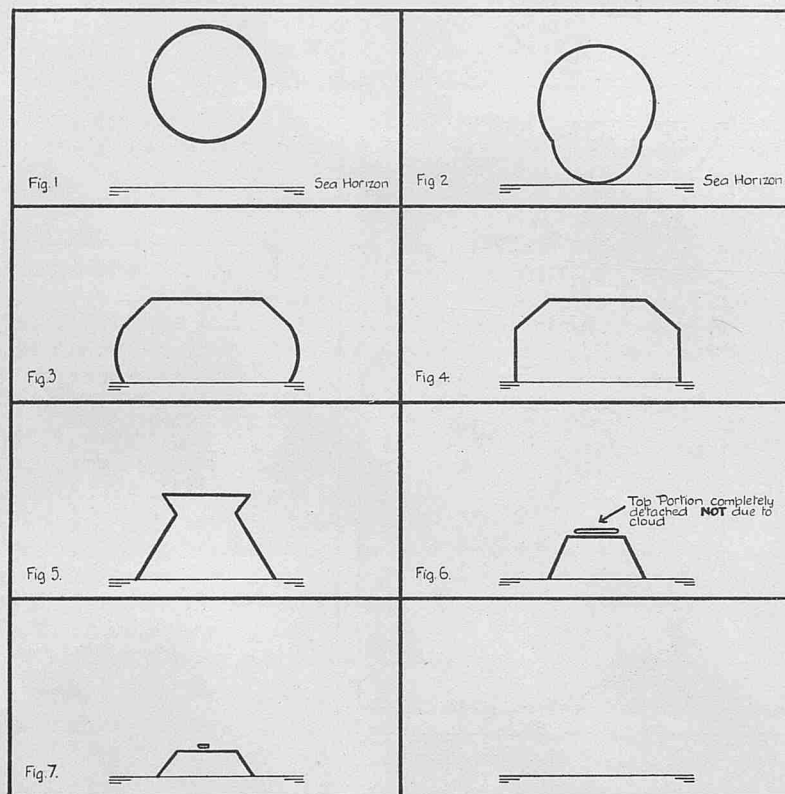
Off West Coast of Greece.

THE following report has been received from H.M.S. *Eagle*, Captain H. E. DANNREUTHER, D.S.O., R.N.

The accompanying sketches represent the setting of the sun on 8th August, 1930. Time of sunset 1930 (Zone 2). The total time of the phenomenon was about two minutes.

Position of ship Latitude $36^{\circ} 30' N.$ Longitude $21^{\circ} 55' E.$

Wind W. by N. force 5 to 6. Temperature Dry Bulb $80^{\circ} F$, Wet Bulb $78^{\circ} F$, Sea $80^{\circ} F$. Cloud, a fine trace of Ci-St.



LUNAR HALO AND CORONA.

South Pacific Ocean.

THE following is an extract from the Meteorological Record of S.S. *Middlesex*, Captain P. B. CLARKE, Curacao to Auckland, N.Z. Observer, Mr. R. STEPHENS, 3rd officer.

On August 4th, 1930 at 0600 G.M.T. observed a lunar halo and corona simultaneously. Diameter of the halo was 20° and of the corona 8° . The colours in the halo were bluish-white, red, reddish-yellow, and green, the red being brightest. The corona was bluish-white and reddish-yellow. Upper clouds Ci and Ci-St., lower clouds St-Cu and Ci-St., were in bands radiating from a point bearing N.N.E. Barometer 29.74 in. falling. Wind N., force 3. Temperature, Dry $69^{\circ} F$, Wet $68^{\circ} F$. There was light precipitation at the time.

Ship's position Latitude $24^{\circ} 54' S.$, Longitude $130^{\circ} 21' W.$

LUNAR HALO WITH MOCK MOONS.

China Sea.

THE following is an extract from the Meteorological Record of S.S. *Aeneas*, Captain W. K. WALLACE, Hong Kong to Singapore. Observer, Mr. A. McL. PILCHER, 3rd Officer.

August 6th, 1930, 1.00 a.m. (A.T.S.). A luminous halo encircling the moon was observed. Bearing of moon S. $50^{\circ} W.$ Two very luminous spots or points of the halo, one exactly opposite the other, were observed to bear S. $25^{\circ} W.$ and S. $75^{\circ} W.$ These two points appeared to be approximately 5° above the moon one on one side and below the moon on the other. The phenomenon was visible for a period of about 45 minutes. Unfortunately owing to the presence of a large number of fishing junks no altitudes or angular distances could be taken. Waglan Island light bearing N. $75^{\circ} W.$ Distance 2 miles. In Latitude $22^{\circ} 10\frac{1}{2}' N.$ Longitude $114^{\circ} 20' E.$ Course 198° . Speed 14.0 knots.

NOTE.—This is of special interest as an example of the observation of irregular halo phenomena. The halo seen was the common one of radius $22\frac{1}{2}^{\circ}$. The unusual feature of the observation lies in the fact that the mock moons were not of the same altitude as the actual moon.

METEOR.

Persian Gulf.

THE following is an extract from the Meteorological Record of S.S. *Barpeta*, Captain H. PARTRIDGE, Bombay to Persian Gulf Ports. Observer, Mr. J. H. DAVIES, 3rd Officer.

On Sunday, 31st August, 1930, at 8.30 p.m. M.T.S., a large meteor in flight was observed to the N.N.W. The meteor appeared near Aries and disappeared near Cassiopeia, the sky being clear and visibility excellent. Duration of its flight was about one second and it was brighter and larger than any planet such as Venus. It was white in its appearance, with a long red tail, which remained visible for about a half second after the disappearance of the meteor.

Ship's position: Latitude $27^{\circ} 57' N.$, Longitude $50^{\circ} 53' E.$

WATERSPOUT.

Red Sea.

THE following is an extract from the Meteorological Log of S.S. *Oronsay*, Captain W. S. SHELFORD, Colombo to Suez. Observers, Messrs. E. M. MACKAY and O. C. DAVIES.

August 13th, 1930, at 10.45 a.m. Observed a waterspout of great height about 4 miles distant on starboard beam, apparently travelling south-westwards. Though clouds were travelling fairly fast the stem of this spout remained practically perpendicular for the ten minutes it was visible before it disappeared in a rain squall.

Shortly afterwards, two other spouts were observed forming in a similar position.

At 11.45 a.m., the wind having just shifted to N.E. force 3, two waterspouts were observed forming close to the ship. About five minutes later, another waterspout was observed in the distance off the port quarter. This spout was observed to break up rather peculiarly. The outer column broke off just below the cloud line, and fell back into the sea, leaving a thin central stem, which very soon afterwards broke at about three-quarter height.

In all, six waterspouts were observed in just over half-an-hour.

Position of ship, Latitude 16° N. Longitude 41° E. approx. Weather overcast. Upper clouds Ci-St 10. Lower heavy masses of Cu-Nb and Nb, clouds (fairly high) travelling to westward, wind west force 3. Previous weather; thunderstorms. Ship steering 330° ; 15 knots.

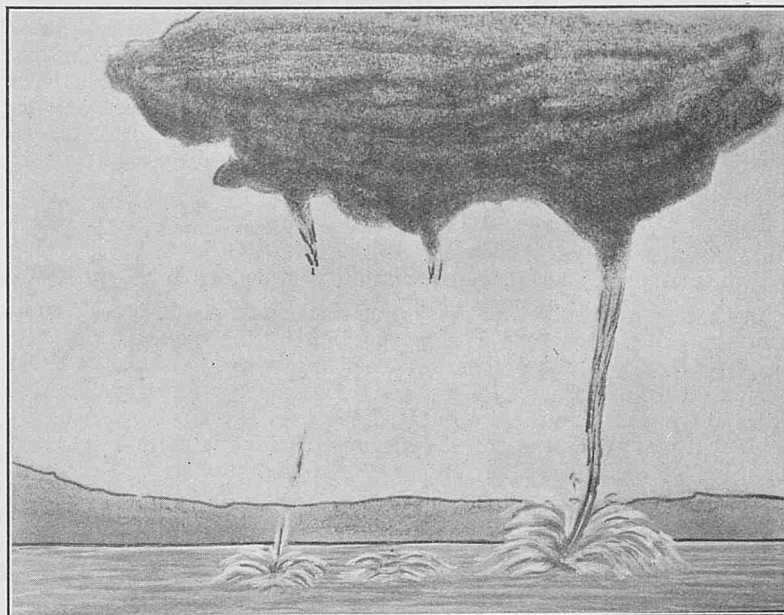
REMARKS BY MR. O. C. DAVIES, OFFICER-OF-WATCH.

Being on watch during the time of the forming of the distant waterspouts already mentioned, it was very interesting to suddenly find one in its early stages quite close ahead on the starboard bow. Our attention was attracted to what at first glance would appear to be the usual commotion of a shoal of small fish disporting themselves close to the surface. No rain was falling, though thunderclouds were four thousand feet, or more, overhead. Approaching nearer, we realised its quite rapid approach to us, and as it swept by, only two hundred feet on our starboard side travelling in a southerly direction, we were quite able to notice the following phases of it. The apparent commotion was caused by wind rushing round in a small area, the wavelets thus caused falling inward towards the centre. We felt the violent gusts blowing towards it as we passed, and the whole evidently had a clockwise motion.

A fine spray was starting to form, like a cloud of steam, above it to the height of a few feet.

When a few miles astern, this became much more dense, and the sea it encircled, much more disturbed.

Within ten minutes or so of its passing us, a spout was observed coming from the clouds, and a few minutes later the whole joined, making another enormous waterspout.



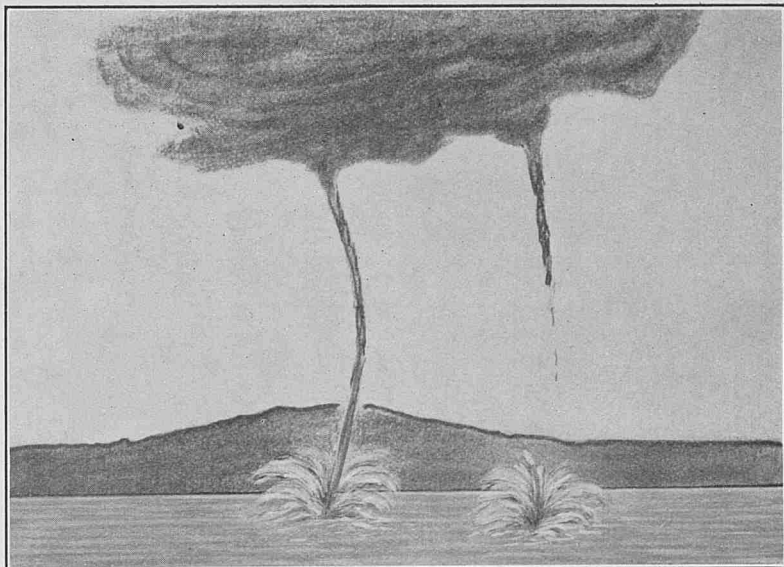
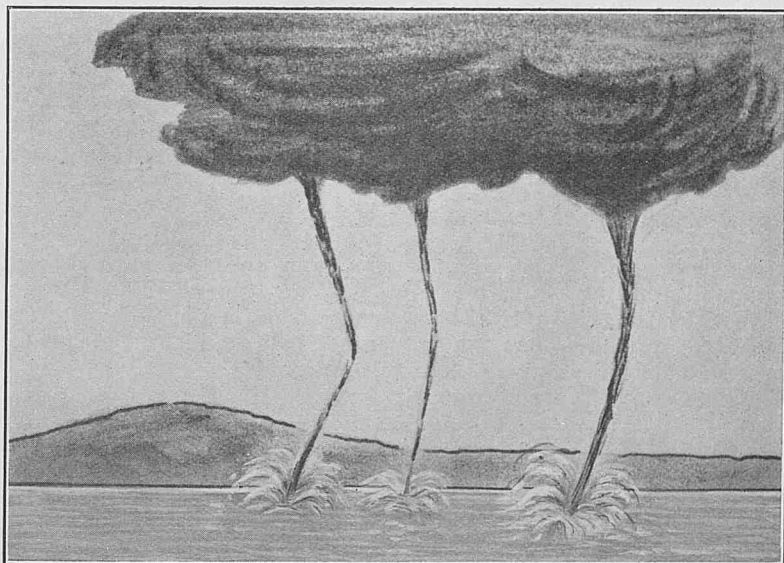
WATERSPOUTS.

West Indies.

THE following is an extract from the Meteorological Log of M.V. *Rangitane*, Captain A. W. MCKELLAR, R.D., R.N.R., Colon to Southampton. Observers, Messrs. A. W. MARSHALL, 3rd Officer, and A. BROWN, 4th Officer.

August 8th, 1930, 5.20 p.m. A.T.S. A moderate rain shower having passed near and to the eastward of vessel, observed small spiral cloud extending from mass of Nb and Cu-Nb following main body of rain cloud and bearing about N.E. by E. Two minutes later and about 8° to the northward a second small spiral formed. After a few minutes they commenced to extend downwards gathering speed as they neared the sea; meanwhile, two whirlpools had formed on the sea surface whirling the spray round at a great speed and giving it an upward movement until finally two complete waterspouts had formed. In the same manner a third water-spout was formed, so that now three perfect examples of water-spouts were observed at the same time within a mile of the vessel and within 200 yards of each other. At 5.35 p.m. the two last formed waterspouts were seen to break, when in a very short time they disappeared into the cloud. The first formed spout now began to increase in size, causing a cloud of spray on the sea surface, which whirled 50 feet into the air. The spout was now perfect in shape with smooth edges. At 5.40 the centre of the spout appeared to throw off wisps of cloud, which revolved round the main body and upwards at a terrific rate. At 5.45 the formation gradually decreased, passing away astern to intermingle with the main rain cloud. A peculiarity of the phenomenon observed was that the motion of the spiral leaving the cloud was clockwise, and that on the completion of the formation of the waterspout the motion was anti-clockwise.

Position of Ship Cape Dame Marie bearing 115° distant 20 miles (Haiti Island). Latitude $18^{\circ} 45' N.$, Longitude $74^{\circ} 46' W.$



NORTHERN AND SOUTHERN LIGHTS.

PREPARED IN THE MARINE DIVISION BY J. L. THOMAS, CLERICAL ASSISTANT.

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

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

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

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

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

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

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

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

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



Figure 1.

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

Reproduced by permission of the Royal Society.

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

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

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

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

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

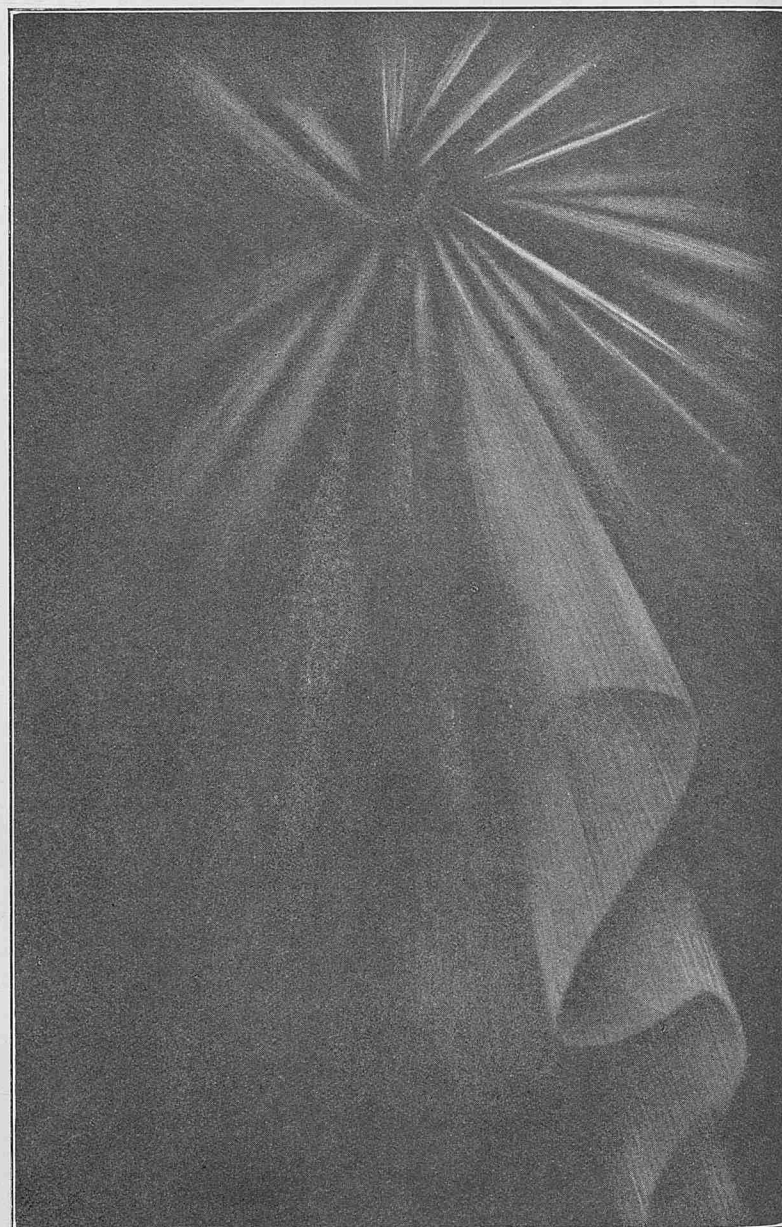


Figure 2.

Corona, April 8th, 1903, 2 a.m. (British Antarctic Expedition, 1901-4).

Reproduced by permission of the Royal Society.

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

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

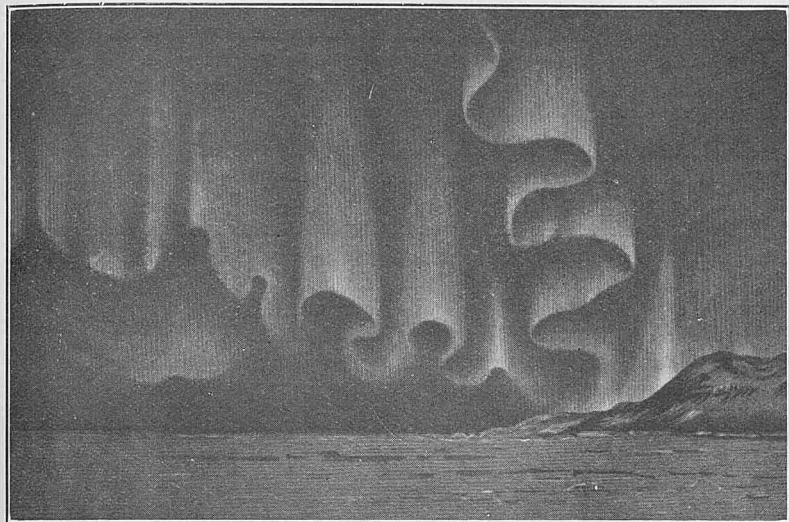


Figure 3.

Auroral Curtain, July 5th, 1902, 1 a.m. to 2 a.m., seen in N.

(British Antarctic Expedition, 1901-4).

Reproduced by permission of the Royal Society.

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

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

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

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

Intensity of Auroral Light.—The intensity of the light is ordinarily very faint, even in the most brilliant aurora. Observers in the regions where the aurora is generally brightest, have agreed that the total illumination of the most beautiful aurora is less than that of the full moon, and even seldom surpasses that of the moon in its first quarter. An indirect proof of this fact can be traced in the comparison of the

periods of appearance of aurora with the age of the moon at the times of observation. The frequency of aurora diminishes always with the period of full moon, which shows that the general lighting of the sky by the full moon masks a great number of auroras and hinders their observation. This influence of the age of the moon on the apparent frequency of aurora had been noted by the French scientist MAIRAN. He observed at least three times more auroras visible in the period between the beginning of the last quarter and the end of the first quarter, than in the period between the beginning of the first quarter and the end of the last quarter. Auroras during full moon are exceptional.

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

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

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

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

If the lowest height of aurora is about 50 statute miles (*see below*), it is quite permissible to assume that the observations made by those observers, who claim to have heard the sound, have been faulty. Dr. C. CHREE pointed out the possibility that aurora occasionally occurs simultaneously with the form of electrical discharge known as St. Elmo's Fire.

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

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

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

Several observers have claimed that they have seen aurora at much lower heights, and some say that aurora has appeared between them and distant mountains. The results of the Norwegians throw doubt on these claims.

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

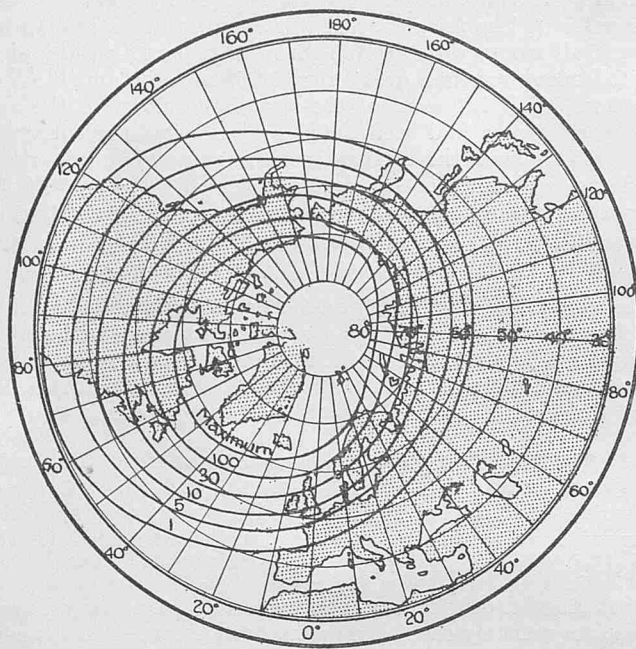


Figure 4.

Showing yearly frequency of Aurora Borealis.

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

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

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

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

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

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

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

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

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

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

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

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

WIND, FOG, MIST AND WEATHER FOR THE REGION OFF THE COAST OF PORTUGAL.

The following notes are obtained from the chartlets published monthly in the current numbers of THE MARINE OBSERVER covering the area between Latitude 35° and 45° North and Longitude 5° and 15° West which includes the West Coasts of Spain and Portugal.

The chartlets show the monthly average of Wind, Fog, Mist and Weather compiled from observations contained in the Meteorological Logs of the British Voluntary Observing Fleet during the years 1921 to 1928.

From October to April, the winds off the West Coasts of Spain and Portugal alternate from South through West to East, those with a Northerly component preponderating when South of the 40th parallel.

From May to September the prevailing winds over the whole region blow from the N.W. and N.E. quadrants. Calms and variables are infrequent throughout the year.

Gales of force 8 or above may be encountered from any point of the compass during the winter months from October to April especially in that region North of the 40th parallel. During the summer months of May, June, and September, they are rarely experienced and are not recorded during the months of July and August.

Squalls are frequently recorded during the winter months, especially in that area North of the 40th parallel. South of this Latitude and east of Longitude 10° W. they are comparatively rare.

When lightning is observed within this region, it is infrequently accompanied by reports of thunder.

Fog and mist is far more frequent during the summer than in the winter months there being nearly twice as much fog and mist recorded during the months of May to September than during the months of October to April. Fog and mist is also more prevalent between Longitude 10° West and the Coast line than further to seaward. The water in the Portuguese current flowing off the coast is colder than that to seaward, the difference in temperature being more marked during the summer months. This streak of cold water is chiefly accountable for the summer sea fogs which generally occur in patches, and may or may not extend right in to the land.

It should be remembered that the observations shown on the chartlets are taken on board ships passing some distance off the coast; they may themselves be in clear weather while the coast line is enshrouded in fog or mist which does not extend far seaward. It would be expected that this purely coastal fog would be more prevalent in winter than in summer so that the frequency of fog shown on the chartlets during the winter months may be less than that actually prevailing close in to the coast.

Haze is reported chiefly in the region between Longitude 10° W. and the coast line and is more prevalent during the summer than the winter months. Rain and drizzle is far more frequent during the winter than in the summer months and is more prevalent in the area north of Latitude 40° N. during both seasons.

SOUTHERN ICE REPORTS.

During the Years 1929 and 1930.

August.

No reports of Ice, sighted in the Southern Ocean during the month of August, in the years 1929

and 1930, have been received at the Meteorological Office.

WEATHER SIGNALS.

I.—SHIPS' WIRELESS WEATHER SIGNALS.

Urgent Meteorological reports should be made at any time. Any ship at any time encountering a tropical revolving storm should report to all ships and the appropriate station, continuing to report at intervals of three hours so long as the ship remains under the influence of the storm.

Ships experiencing gales in which the wind reaches Force 10 or above in the Beaufort Scale should inform all ships within range.

Ships encountering Ice or other navigational dangers should report immediately to all ships and the appropriate station; see instructions for Danger to Navigation Signals for all ships, pages 31 and 32, Vol. VIII, No. 85.

For full particulars of "Selected Ships" Routine Meteorological Reports with Schedule for Communication, see pages 16 to 19, Vol. VIII, No. 85.

See List of W/T Stations detailed to receive reports from **A Selected Ships** with particulars up to date below, also on Chart IX.

In parts of the world where such stations and particulars are not given, British **A Selected Ships** should make their reports to **CQ**

on 2100 metres (143 kc/s) as stated on page 18 Vol. VIII, No. 85 (January, 1931, MARINE OBSERVER).

B Selected Ships broadcast their report to C.Q. on 600 m. spark, and these may be intercepted by the stations ringed in on Chart IX. In making these reports to C.Q. "B Selected Ships" should make special endeavour to ensure that the report is received at these shore stations. With a view to assisting Meteorological Services who have provided information and to ensuring that routine reports from all "Selected Ships" within range of certain coast stations may be received by those services a list of stations specially detailed to receive reports from "B Selected Ships" is also given on pages 176 and 177. The procedure given on pages 16 to 19, Vol. VIII, No. 85, should be adhered to as far as possible.

According to agreement reached by the International Meteorological Conference, 1929, all arrangements for the co-operation of shipping in Voluntary Marine Meteorological work are to be made through the Meteorological Services of the different countries in which the ships are registered, in accordance with the agreed upon International plan for all parts of the World, following the International Convention for Safety of Life at Sea, 1929.

WIRELESS STATIONS DETAILED TO RECEIVE ROUTINE CODED WEATHER REPORTS FROM "A SELECTED SHIPS."

Request for Information.

THE ATTENTION OF METEOROLOGICAL SERVICES IS INVITED TO THE INVITATION GIVEN ON PAGE 16 OF VOL. VIII, No. 85, JANUARY
MARINE OBSERVER.

Ocean.	Station.	Position.	Call Sign.	Frequency and Wave Length.		Area and limits covered by Station.	Telegraphic address of Meteorological Centre.	Information required—Limit of Groups.	Notes.
				For Station to call up "Selected Ships."	For "Selected Ships" to report to Station.				
North Atlantic and North Sea.	Portishead.	Lat. 51° 28' 41" N. Long. 2° 47' 30" W.	GKU.	149 kc/s. (2013 metres).	143 kc/s. (2100 metres).	North Sea and Eastern North Atlantic East of Longitude 40° W. and North of Latitude 38° N., but not within 300 miles of station. (see Chart IX.)	Weather London.	Weather only, up to seven groups, preferably No. 3 Supplementary Groups.	Control system. "Selected Ships" chosen to report in given order notified by station daily at 2230, 0330, and 1030 G.M.T. Roll call thus—Weather begins—Call signs of chosen "Selected Ships"—Weather ends.
	Chatham Mass. Sayville N.Y. or West Palm Beach, Fla.	Lat. 41° 42' N. Long. 70° 00' W. Lat. 40° 42' N. Long. 73° 06' W. Lat. 26° 42' N. Long. 80° 02' W.	WCC. WSL. WMR.	}	142.9 kc/s. (2098 metres).	North Atlantic West of Longitude 40° W.	Observer Washington.	Weather only. First four groups of observations taken at 0000 and 1200 G.M.T. only required.	No control. All British "A Selected Ships" within area to address their 0000 and 1200 G.M.T. observations to Observer Washington and their 1800 G.M.T. observations to CQ in accordance with schedule.
	Horta, Azores.	Lat. 38° 32' N. Long. 28° 38' W.	CTH.		125 kc/s. (2400 metres).	North Atlantic South of Latitude 38° N. and East of Longitude 40° W.	Radio Horta.	Weather only, up to seven groups, preferably No. 3 Supplementary Groups.	No control—all British "A Selected Ships" within area should report in accordance with Schedule.

(Continued.)

[illegible]

**WIRELESS STATIONS DETAILED TO RECEIVE ROUTINE CODED WEATHER REPORTS FROM
"B SELECTED SHIPS."**

Ocean.	Station.	Position.	Call Sign.	Telegraphic address of Meteoro- logical Centre desiring information.	Information desired.	Notes.
North Atlantic.	Horta, Azores.	Lat. 38° 32' N. Long. 28° 38' W.	CTH.	Radio Horta	Weather only, up to 7 groups, preferably No. 3 Supplementary Groups.	
Indian Ocean.	Calcutta.	Lat. 22° 33' 31" N. Long. 88° 20' 16" E.	VWC.	Weather.	Weather only up to 6 groups, No. 6 Supplement- ary Groups preferred.	
	Rangoon.	Lat. 16° 45' 57" N. Long. 96° 11' 51" E.	VTR.			
	Madras.	Lat. 12° 59' 17" N. Long. 80° 10' 56" E.	VWM.			
	Bombay.	Lat. 19° 04' 55" N. Long. 72° 49' 54" E.	VWB.			
	Karachi.	Lat. 24° 51' 05" N. Long. 67° 02' 32" E.	VWK.			
	Matara.	Lat. 6° 01' 07" N. Long. 80° 35' 39" E.	GZP.			
	Mauritius.	Lat. 20° 23' S. Long. 57° 35' E.	VRS.	Observatory Mauritius.	Weather 4 universal groups and first of No. 6 Supplementary Groups.	

WIRELESS STATIONS DETAILED TO RECEIVE ROUTINE CODED WEATHER REPORTS FROM
"B SELECTED SHIPS."

(Continued.)

Ocean.	Station.	Position.	Call Sign.	Telegraphic address of Meteorological Centre desiring information.	Information desired.	Notes.
North Pacific and China Sea.	Cape d'Aguilar, Hong Kong.	Lat. 22° 12' 39" N. Long. 114° 15' 19" E.	VPS.	Royal Observatory.	Weather only, preferably No. 6 Supplementary Groups.	
South Pacific.	Auckland.	Lat. 36° 50' 36" S. Long. 174° 46' 08" E.	ZLD.	Weather Wellington.	Weather only, up to 7 groups.	Apia, Rarotonga and Chatham Island relay to New Zealand. Rarotonga keeps watch 0630 to 1330 G.M.T. Chatham Island 0430 to 1230 G.M.T. Remainder cover schedule. Reports desired through nearest station when "B Selected Ships" are within 1,000 miles of New Zealand.
	Wellington.	Lat. 41° 16' 26" S. Long. 174° 01' 00" E.	ZLW.			
	Awarua.	Lat. 46° 30' 27" S. Long. 168° 22' 21" E.	ZLB.			
	Chatham Island.	Lat. 43° 57' 02" S. Long. 176° 31' 04" W.	ZLC.			
	Rarotonga.	Lat. 21° 11' 54" S. Long. 159° 48' 51" W.	ZKR.			
	Apia.	Lat. 13° 15' 17" S. Long. 170° 49' 42" W.	ZMA.			

II.—WIRELESS WEATHER SIGNALS. WIRELESS WEATHER BULLETINS.

Canada, Nova Scotia, Newfoundland and Labrador, etc.

(I.C.W. and Spark Issues.)

THE following stations broadcast weather bulletins, giving forecasts,** on 600 metres spark, unless otherwise indicated. Where the times of transmission are omitted, forecasts are sent on request. Stations marked with an asterisk (*) are open during the season of navigation only.

Country.	W/T Station.	Call Sign.	Position (approx.).		Time, G.M.T.
			Lat. N.	Long. W.	
Canada (Nova Scotia).	†Lurcher Lt. Vsl. ...	VDR	43° 49'	66° 32'	—
	†Yarmouth ...	VAU	43° 46'	66° 07'	0430, 1630
	†Chebucto Head ...	VAV	44° 30'	63° 31'	0440, 1640
	North Sydney ...	VCO	46° 13'	60° 15'	—
	Sable Island ...	VCT	43° 56'	60° 02'	—
Canada ...	§Louisburg ...	VAS	46° 09'	59° 57'	0400, 1600
	Grindstone Island ...	VCN	47° 23'	61° 54'	—
	*Fame Point, Que. ...	VCG	49° 07'	64° 36'	0430, 1630
	*Clarke City, Que. ...	VCK	50° 11'	66° 37'	—
	†Father Point, Que. ...	VCF	48° 31'	68° 28'	0420, 1620
	†Quebec ...	VCC	46° 48'	71° 12'	0410, 1610
	†Montreal ...	VCA	45° 34'	73° 38'	0400, 1600
	*Heath Point Lt. Vsl. (Anticosti I.) ...	VGI	49° 03'	61° 30'	—
	†St. John ...	VCE	45° 14'	66° 03'	0400, 1600
	†Belle Isle ...	VCM	51° 53'	55° 22'	0440, 1640
Newfoundland and Labrador.	Cape Race ...	VCE	46° 39'	53° 04'	0420, 1620
	Point Amour ...	VCL	51° 27'	56° 50'	—
St. Pierre and Miquelon Is.	St. Pierre ...	FQN	46° 47'	56° 11'	0100, 1300
Hudson Bay and Strait.	*†Port Churchill ...	VAP	58° 47'	94° 09'	1600
	*†Cape Hopes ...	VAY	61° 05'	69° 33'	—
	Advance				
	*†Nottingham Is. ...	VCB	63° 06'	77° 56'	—
	*†Resolution Is. ...	VAW	61° 20'	64° 50'	1620

† The station keeps watch for the first half of every odd hour from 1200 to 0000, and from 0300 to 0330, G.M.T.

‡ Wavelength, 600 metres (I.C.W.).

§ Wavelength, 2,804 metres (I.C.W.).

Wireless Telephony R/T Issues.

THE following stations broadcast weather forecasts,** issued by the Canadian meteorological service, by word of mouth.

Country.	Station.	Call Sign.	Position (approx.).		Time G.M.T.	Wave-length R/T.
			Lat. N.	Long. W.		
Canada (New Brunswick).	St. John... ..	CFBO	45° 14'	66° 03'	1000, 1200	337 m.
Canada (Nova Scotia).	Sambro Outer Bank Lt.-V.	VGX	44° 22'	63° 26'	1200 1730	435 m.
	Louisburg ...	VAS	46° 09'	59° 57'	0800, 1700	435 m.

** Details of areas, periods and elements not available.

United States of America (Atlantic Coast).

C.W. Issues.

Washington.—Arlington W/T Station, approximate Latitude 38° 52' N., Longitude 77° 05' W., call sign **NAA**, broadcasts weather bulletins at 0300 and 1500 G.M.T., on wavelengths of 2653 metres (C.W.) and 4409 metres (C.W.) simultaneously.

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

First Part.

Part I of the 0300 and 1500 G.M.T. bulletins contains observations taken at 0100 and 1300 G.M.T., respectively, from the stations in the following list, followed by weather reports from ships at sea.

Key letters	Name of station	Latitude north	Longitude west
TP	The Pas. Man ...	53° 35'	101° 12'
WG	Winnipeg, Man ...	49° 55'	97° 10'
BK	Bismarck, N. Dak ...	46° 49'	100° 49'
O	Omaha, Nebr. ...	41° 16'	95° 58'
KC	Kansas City Mo. ...	39° 05'	94° 35'
OK	Oklahoma City, Okla ...	35° 29'	97° 31'
DA	Dallas, Tex. ...	32° 45'	96° 48'
GV	Galveston, Tex. ...	29° 19'	94° 50'
DU	Duluth, Minn. ...	46° 49'	92° 09'
M	Marquette, Mich. ...	46° 33'	87° 26'
LC	La Crosse, Wis. ...	43° 50'	91° 12'
CH	Chicago, Ill ...	41° 50'	87° 40'
SL	St. Louis, Mo. ...	38° 39'	90° 13'
CN	Cincinnati, Ohio ...	39° 07'	84° 30'
NV	Nashville, Tenn. ...	36° 11'	86° 50'
LR	Little Rock, Ark. ...	34° 41'	92° 15'
VK	Vicksburg, Miss ...	32° 17'	90° 50'
NO	New Orleans, La. ...	30° 00'	90° 05'
P	Pensacola, Fla. ...	30° 25'	87° 12'
L	Alpena, Mich. ...	45° 05'	83° 25'
D	Detroit, Mich. ...	42° 21'	83° 03'
F	Buffalo, N.Y. ...	42° 53'	78° 50'
PB	Pittsburgh, Pa. ...	40° 26'	79° 57'
LB	Lynchburg, Va. ...	37° 27'	79° 08'
CT	Charlotte, N.C. ...	35° 17'	89° 39'
AT	Atlanta, Ga. ...	33° 45'	84° 21'
TA	Tampa, Fla. ...	27° 59'	82° 29'
K	Key West, Fla. ...	24° 40'	81° 48'
MI	Miami, Fla. ...	25° 46'	80° 12'
NU	Nassau, Bahamas ...	25° 05'	77° 23'
TI	Turks Island, W.I. ...	21° 20'	71° 10'
SJ	San Juan, P.R. ...	18° 29'	66° 06'
JA	Jacksonville, Fla. ...	30° 21'	81° 40'
C	Charleston, S.C. ...	32° 50'	79° 58'
WL	Wilmington, N.C. ...	34° 18'	77° 59'
H	Cape Hatteras, N.C. ...	35° 14'	75° 32'
NF	Norfolk, Va. ...	36° 51'	76° 18'
BAL	Baltimore, Md. ...	39° 18'	76° 38'
AC	Atlantic City, N.J. ...	39° 22'	74° 27'
NY	New York, N.Y. ...	40° 43'	74° 01'
T	Nantucket, Mass. ...	41° 15'	70° 00'
BN	Boston, Mass. ...	42° 22'	71° 02'
N	Northfield, Vt. ...	44° 08'	72° 40'
E	Eastport, Me. ...	44° 54'	67° 00'
CK	Cochrane, Ont. ...	49° 04'	80° 58'
DC	Doucet, Que. ...	48° 17'	76° 40'
PN	Parry Sound Ont. ...	45° 20'	80° 01'
ML	Montreal, Que. ...	45° 31'	73° 34'
FP	Father Point, Que. ...	48° 30'	68° 30'
BC	Port Aux Basques, N.F. ...	47° 33'	59° 10'
CR	Cape Race, N.F. ...	46° 40'	53° 04'
SAB	Sable Island, N.S. ...	43° 56'	60° 00'
HX	Halifax, N.S. ...	44° 38'	63° 35'
B	Bermuda ...	32° 18'	64° 42'
HT	Horta, Azores ...	38° 32'	28° 29'

The stations are indicated by the letters given above and are followed by two groups of five figures.*

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

0300 G.M.T. bulletin contains 0000 G.M.T. observations; also Noon G.M.T. observations which were received too late for inclusion in the 1500 G.M.T. bulletin.

1500 G.M.T. bulletin contains Noon G.M.T. observations; also 0000 G.M.T. observations received too late for inclusion in the 0300 G.M.T. bulletin.

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

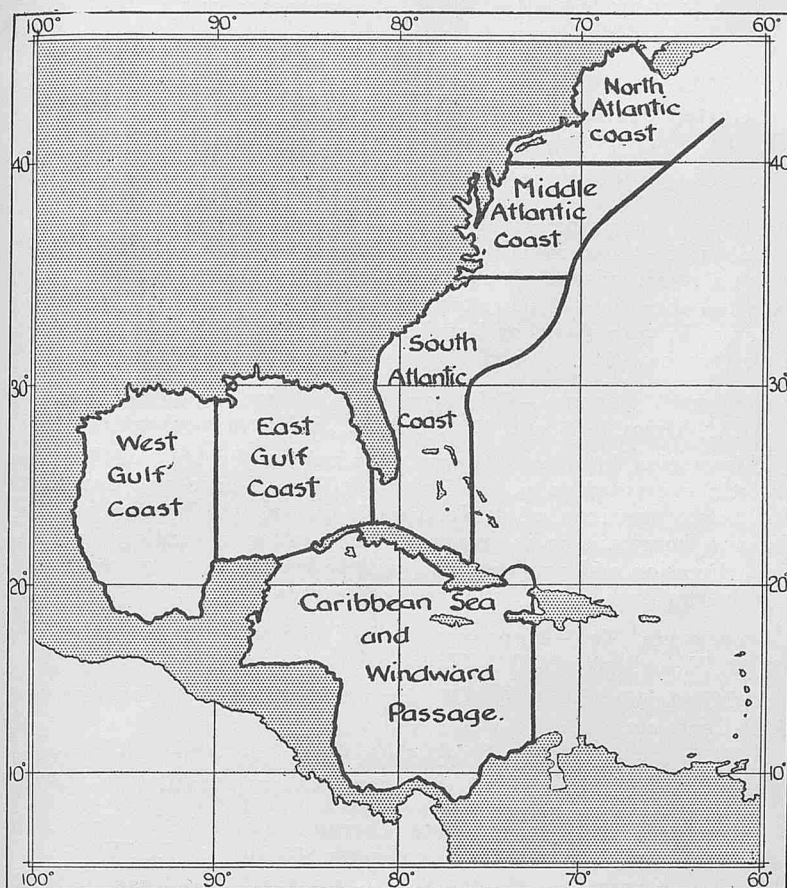
The reports from ships are given in two five-figure groups* for each ship preceded by the call sign of the ship.

* The code used is not the International Ships' Wireless Weather Code referred to in "Wireless Weather Signals from the Shore," page 36, Vol. VIII, No. 86, February Marine Observer.

Second Part.

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

Storm warnings are also broadcast for these areas.



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

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

W/T Station.	Call Sign.	Position (approx.).		Time, G.M.T.	Wave-length. Metres.
		Latitude.	Longitude		
Tuckerton, N.J....	WSC	39° 33' N.	74° 23' W.	1400, 2200	650 (I.C.W.).
Chatham (Marion), Mass.	WCC	41° 43' N.	70° 46' W.	1400, 2200	2,200 (C.W.).

United States of America, Caribbean Sea, Gulf Coast and West Indian Islands.

Weather bulletins are broadcast from the under-mentioned W/T stations. They are of the same general character. They are based upon observations taken in the U.S.A. at 0100 and 1300 G.M.T. and one hour earlier at stations in the Gulf of Mexico and Caribbean Sea. The bulletins are divided into two parts.

Part I contains observations from stations in the following lists given in a five-figure group* for each station preceded by the indicator letter or letters of the station. If observations from any station cannot be supplied, the indicator letters and code figures will be omitted altogether. If only a portion of the observations are missing the letter "X" will be sent in lieu.

Part II.—Sent in plain language, consists of wind and weather forecasts, storm and hurricane warnings for the various areas shown on the CHARTLET.

For particulars of storm and hurricane warnings, see p. 180.

W/T Stations from which the Bulletins are Broadcast. (C.W. and Spark Issues.)

Almirante-Panama—by arrangement with the United Fruit Co. (owners of the W/T station).

Approximate Latitude 9° 20' N., Longitude 82° 17' W.

Call Sign RXA Wavelength, 4,075 metres (C.W.).

Times of broadcast, 0445 and 1730 G.M.T.

Part I is broadcast only from the following stations in the 1730 G.M.T. bulletin and *only during the hurricane season, June to November inclusive.* **Part II** is broadcast daily throughout the year at both times.

Observation Stations in Part I. of Bulletin.				Part II. of Bulletin.
Indicator Letters.	Station.	Position (approx.).		(Storm and Hurricane Warnings. Wind and Weather forecasts for West Gulf of Mexico. Wind and Weather forecasts for East Gulf of Mexico. Wind and Weather forecasts for Caribbean Sea and Windward Passage. See Chartlet.
		Lat.	Long.	
CG	Cape Gracias, Nic.	15° 00' N.	83° 13' W.	
BZ	Belize, Honduras	18° 00' N.	88° 20' W.	
BFD	Bluefields, Nic.	12° 00' N.	83° 45' W.	
W	Willemstadt, Curaçao.	12° 10' N.	69° 00' W.	
SJ	San Juan, P.R.	18° 28' N.	66° 06' W.	
PP	Port au Prince, Haiti.	18° 37' N.	72° 17' W.	
CFG	Cienfuegos, Cuba	22° 11' N.	80° 33' W.	
GUE	Guane, Cuba	-	-	
KN	Kingston, Jamaica	18° 10' N.	76° 48' W.	
TI	Turks I., Bahamas	21° 31' N.	71° 08' W.	

At 0445 G.M.T., **Part II** only of bulletin, broadcast daily throughout the year.

NOTE.—The above bulletins are sent by W/T to **Almirante W/T** station from the **Tropical Radio Telegraph Station at New Orleans La.**, call sign WNU at 0430 and 1630 G.M.T. on a wavelength of 3331 metres (C.W.) and ships are invited to intercept them.

Key West, Fla.—Approximate Latitude 24° 33' N., Longitude 81° 48' W.

Call sign NAR. Wavelength, 2,653 metres (C.W.).

Time of broadcast, 0400 G.M.T.

Observation Stations in Part I. of Bulletin.				Part II. of Bulletin.
Indicator Letters.	Station.	Position (approx.).		(Wind and Weather forecasts for South Atlantic Coast. Wind and Weather forecasts for East Gulf of Mexico. Wind and Weather forecasts for West Gulf of Mexico. Wind and Weather forecasts for Caribbean Sea and Windward Passage. Storm and Hurricane Warnings. See Chartlet.
		Lat.	Long.	
H	Hatteras, N.C.	35° 14' N.	75° 32' W.	
C	Charleston, S.C.	32° 43' N.	79° 52' W.	
JA	Jacksonville, Fla.	30° 19' N.	81° 51' W.	
MI	Miami, Fla.	39° 35' N.	84° 13' W.	
K	Key West, Fla.	24° 33' N.	81° 48' W.	
P	Pensacola, Fla.	30° 21' N.	87° 19' W.	
GV	Galveston, Tex.	29° 19' N.	94° 48' W.	
BV	Brownsville, Tex.	25° 53' N.	97° 26' W.	
FW	Fortworth, Tex.	32° 30' N.	97° 40' W.	
KN	Kingston, Jam.	18° 01' N.	76° 48' W.	
TI	Turks Island	21° 31' N.	71° 08' W.	
HA	Havana, Cuba	23° 10' N.	82° 22' W.	
GO	Guantanamo Bay (Cuba).	19° 54' N.	75° 12' W.	
CG	Cape Gracias, Nic.	15° 00' N.	83° 13' W.	
SJ	San Juan, P.R.	18° 28' N.	66° 06' W.	

Key West W/T Station also broadcasts wind and weather forecasts, storm and hurricane warnings for the Florida, South Atlantic and east Gulf of Mexico Coasts at 1800 G.M.T. on a wavelength of 2,653 metres (C.W.).

San Juan P.R. (July 1 to November 15, inclusive).—Approximate Latitude 18° 28' N., Longitude 66° 06' W.

Call sign, NAU.

Time of broadcast, 0200 G.M.T.

Wavelength, 2,653 metres (C.W.).

* The code used is not the International Ships' Wireless Weather Code referred to in "Wireless Weather Signals from the Shore," page 36, Vol. VIII, No. 86, February Marine Observer.

Observation Stations in Part I. of Bulletin.			Part II. of Bulletin.	
Indi- cator Letters.	Station.	Position (approx.). Lat. Long.	Hurricane Warnings.	
SJ	San Juan, P.R. - -	18° 28' N. 66° 06' W.		
ST	St. Thomas, Virgin Is.	18° 23' N. 64° 55' W.		
BT	Basseterre, St. Kitts	17° 18' N. 62° 43' W.		
RS	Roseau, Dominica -	15° 17' N. 61° 24' W.		
BB	Bridgetown, Bar- bados.	13° 09' N. 59° 35' W.		
SD	Santo Domingo, D.R.	18° 28' N. 69° 53' W.		
PL	Puerto Plata, D.R.	19° 49' N. 70° 42' W.		
LU	Castries, St. Lucia -	14° 01' N. 61° 00' W.		
W	Willemstadt, Cura- cao.	12° 10' N. 69° 00' W.		
PS	Port of Spain, Trinidad.	10° 40' N. 61° 30' W.		
SM	St. Martins, D.W.I. -	18° 02' N. 63° 04' W.		

Repetition of "Arlington" bulletin.

San Juan W/T Station re-broadcasts Part I and portions of Part II of the 0300 and 1500 G.M.T., Washington-Arlington (NAA) bulletins, previously explained on pp. 178-179, at 0400 and 1600 G.M.T., respectively, on a wavelength of 6,653 metres (C.W.). This re-broadcast is **not** made when conditions do not permit the reception of the Arlington bulletins at San Juan.

Repetition of "San Juan" bulletin.

Guantanamo, Cuba, approximate Latitude 19° 55' N., Longitude 75° 09' W.
Call sign, **NAW**.
Time of broadcast, 0115 G.M.T.
Wavelength, 2,653 metres (C.W.).
During the hurricane season, July 1 to November 15, inclusive, this W/T station repeats the 0045 G.M.T. bulletin broadcast by San Juan, explained above, at 0115 G.M.T.

Barbados.

Bridgetown W/T station, approximate position latitude 13° 06' N, longitude 59° 37' W, call sign **VPO**, broadcasts the following weather information, received from the Meteorological Station, Codrington (latitude 13° 07½' N., longitude 59° 36' W.), when unsettled weather conditions prevail or indications of stormy weather are observed:—
Barometric pressure, barometric tendency, wind direction and force (or velocity in miles per hour), weather at time of observation, and G.M.T. of the observation.
If possible the approximate position of the centre of a tropical cyclonic disturbance will be broadcast.

WIRELESS STORM WARNINGS.

United States of America (Atlantic Coast).

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

W/T Station.	Call Sign.	Position. (Approx.) Latitude, Longitude.	Time. G.M.T.	Wavelength. (Metres.)
Jupiter, Fla. ...	NAQ	26° 57' N. 80° 05' W.	1630, 2300	1,621 (I.C.W.).
St. Augustine, Fla. ...	NAP	29° 53' N. 81° 17' W.	1700	1,621 (C.W.).
Savannah, Ga. ...	NEV	32° 05' N. 81° 06' W.	1600, 2330	1,621 (I.C.W.).
Charleston, S.C. ...	NAO	32° 52' N. 79° 58' W.	1530, 2300	2,458 (C.W.).
Norfolk, Va. ...	NAM	36° 50' N. 76° 18' W.	0130, 0900, 1330, 1600, 2100	2,459 (I.C.W.).
Washington (Arlington)	NAA	38° 52' N. 77° 05' W.	0300* 1500*	2,653, 4,409 C.W. simultaneously.
Philadelphia ...	NAI	39° 53' N. 75° 11' W.	1548, 2200	2,883 (C.W.).
New York ...	NAH	40° 28' N. 74° 00' W.	1530, 2130	2,939 (C.W.).
Boston, Mass. ...	NAD	42° 21' N. 70° 57' W.	1600, 2200	2,939 (C.W.).

* In Part II of the Weather Bulletin.

Hurricane warnings are broadcast when necessary on 600 metres (I.C.W.) and repeated at intervals as stated, by:—

- Jupiter W/T Station, **NAQ**, hourly for 12 hours.
- St. Augustine W/T Station, **NAP**, every two hours until 2300 G.M.T.
- Savannah W/T Station, **NEV**, every two hours until 0100 G.M.T.
- Charleston W/T Station, **NAO**, every two hours for 24 hours.
- Norfolk W/T Station, **NAM**, at hourly intervals.

United States of America (Caribbean Sea, Gulf Coast) and West Indian Islands.

(C.W. and Spark Issues.)

STORM and hurricane warnings are broadcast by the following W/T Stations for the various areas etc. shown on the CHARTLET, p. 179. When a storm exists that is likely to affect an area, the location and expected direction of movement of the storm centre will be given, followed by any storm or hurricane warnings and advices to shipping that have been issued.

Almirante, Panama.—Call sign **RXA**. Wavelength 4,075 metres (C.W.). Times, 0445 and 1730, G.M.T., *daily, throughout the year*.
This station broadcasts storm warnings in Part II of Weather bulletin explained on p. 179 for the Gulf of Mexico and Caribbean Sea, also warnings of "Northers" during the winter months. When a hurricane is in progress, information regarding its location, direction and progress, etc., will be broadcast every two hours, at the even hour, after issue by the Weather Bureau.

Brownsville, Tex.—Approximate Latitude 25° 52' N., Longitude 97° 26' W., call sign **NAY**. Wavelength 2,885 metres (C.W.):—
At Midnight and 1700 G.M.T., broadcasts storm warnings for west Gulf Coast etc.
Hurricane warnings also broadcast, when issued by local weather bureau. These are repeated at 2 hour intervals until 0500 G.M.T.
Galveston, Tex.—Approximate Latitude 29° 19' N., Longitude 94° 47' W., call sign **WGV**. Wavelength 830 metres (I.C.W.):—
At 1630 G.M.T. (except Sundays and holidays) and 2300 G.M.T., broadcasts storm warnings for west Gulf Coast etc.
Hurricane warnings also broadcast, same routine as Brownsville.

New Orleans, La.—Approximate Latitude 29° 57' N., Longitude 90° 02' W., call sign **NAT**. Wavelength 2,885 metres (C.W.):—
At 1600 G.M.T., broadcasts storm and hurricane warnings for south Atlantic and Gulf Coasts.

Key West Fla., call sign **NAR**:—
At 0400 G.M.T. on a wavelength of 2,653 metres (C.W.), broadcasts storm warnings for south Atlantic Coast (Hatteras to Key West) and for east and west Gulf Coasts (Key West to Brownsville) and all hurricane warnings. At 1800 G.M.T., on a wavelength of 2,653 metres (C.W.), broadcasts storm and hurricane warnings for the Florida, south Atlantic and east Gulf of Mexico Coasts. Storm and hurricane warnings are also broadcast on 600 metres.

San Juan P.R., call sign **NAU**. At 0400 and 1600 G.M.T., on 2,653 metres (C.W.) broadcasts hurricane warnings. Hurricane warnings and information relating thereto are also broadcast whenever issued by the Weather Bureaux at Washington D.C. and San Juan on 600 metres and 8,870 metres (C.W.) and repeated at the even hour for 12 hours if not previously cancelled.

- Guantanamo (Cuba)—**NAW**—600 (I.C.W.) repeated hourly.
- Port au Prince (Haiti) **NSC**—600 (C.W.) repeated hourly.
- St. Thomas { Virgin Islands } **NBB**—600 (spk.) repeated hourly.
- Santo Domingo—**HIA**—600 (spk.) repeated every 4 hours.
- Ensenada (Porto Rico)—**WPR**—600 (spk.) repeated every 4 hours.

These W/T stations broadcast hurricane warnings when issued by the Weather Bureaux at Washington D.C. and San Juan, and repeat them at the intervals as stated, if not previously cancelled.

Barbados.

See Weather Bulletins issued as necessary during the hurricane season, page 180.

No information of a regular Wireless Storm Warning Service has yet come to hand, but these messages will go some way in supplying warnings for shipping.

In addition to which Bridgetown W/T station re-broadcasts urgent weather reports from ships in or near hurricanes.

Marine Observers visiting Barbados are advised to consult the Harbour Master at Bridgetown and to give him every assistance in working up this service.

WIRELESS ICE WARNINGS.

Canada, Nova Scotia, Newfoundland and Labrador, etc.

(Spark I.C.W. and C.W. Issues.)

The following W/T stations broadcast ice warnings. Stations marked with an asterisk (*) are open during the season of navigation only.

W/T Station.	Latitude N. (approximate.)	Longitude W. (approximate.)	Call Sign.	Wave length (Metres).	G.M.T. of issue.
†Lurcher Lt.-V....	43° 49'	66° 32'	VDR	600 (Spk.)	On request.
Chebucto Head ..	44° 30'	63° 31'	VAV	600 (I.C.W.)	On request.
Sable Island ...	43° 56'	60° 02'	VCT	600 (Spk.)	On request.
North Sydney ...	46° 13'	60° 15'	VCO	600 (Spk.)	On request.
†Louisburg ...	46° 09'	59° 57'	VAS	2804 (C.W.)	0400, 1600.
†Grindstone Island	47° 24'	61° 51'	VCN	600 (Spk.)	On request.
*Fame Point ...	49° 07'	64° 36'	VCG	600 (I.C.W.)	0430, 1630
Father Point ...	48° 31'	68° 28'	VCF	600 (I.C.W.)	0420, 1620
*Clarke City ...	50° 11'	66° 37'	VCK	600 (Spk.)	On request.
*Heath Pt. Lt.-V.	49° 03'	61° 30'	VCI	600 (Spk.)	On request.
Cape Race ...	46° 39'	53° 04'	VCE	600 (Spk.)	0420, 1620
Pt. Amour ...	51° 27'	56° 52'	VCL	600 (Spk.)	On request.
Belle Isle ...	51° 53'	55° 22'	VCM	600 (I.C.W.)	0440, 1640

† The station keeps watch for the first half of every even hour from 1200 to 0030, and from 0300 to 0330, G.M.T.

† Broadcasts Gulf of St. Lawrence Ice Patrol report giving ice conditions between C. Race and Quebec and recommended route to be followed.

III. WIRELESS TIME SIGNALS.

Canada (Nova Scotia).

Spark Issue.

Chebucto Head D/F Station, Latitude 44° 30' 01" N., Longitude 63° 31' 20" W., call sign VAV broadcasts a time signal daily (Sundays excepted) at 14h. 00m. 00s., G.M.T., on a wavelength of 600 metres (spark).

The procedure is as follows:—

G.M.T.	Signal.
h. m. s. h. m. s.	
13 58 00 to 13 58 57	A dot (●) is transmitted at each second.
13 59 00	(●) Time signal.
13 59 03 to 13 59 50	A dot (●) is transmitted at each second.
14 00 00	(●) Time signal.

For the purpose of these signals the observatory at St. John (New Brunswick) is connected by land telegraph to Chebucto Head D/F Station.

United States of America (Atlantic Coast).

(C.W. and I.C.W. Issues.)

Time Signals are broadcast according to the United States System (See Diagram of Washington—Annapolis W/T Time Signals below), from the following W/T Stations:—

Washington—Arlington, Latitude 38° 52' 05" N., Longitude 77° 04' 47" W., call sign NAA on wavelengths* of 435 R/T and 2,653 metres (I.C.W.) on high power, at 3h. 00m. 00s., and 17h. 00m. 00s., G.M.T. and on 2653 metres (I.C.W.) at 08h. 00m. 00s.

The time signals are broadcast daily and are controlled by the Naval Observatory, Washington. They are broadcast simultaneously on the above-mentioned wavelengths.

The transmission of each time signal will be followed by the letters VA. In case of error or failure the words "No Time" will be sent together with the time when the next correct time signal will be made.

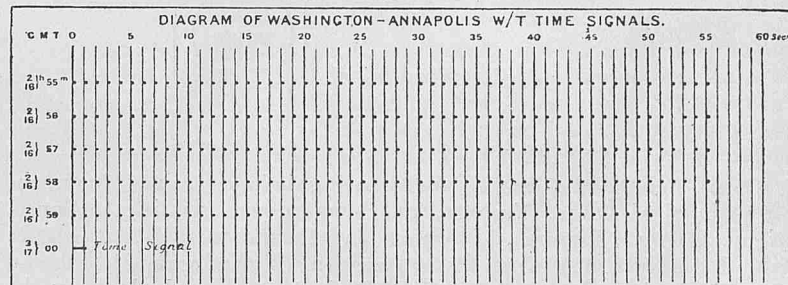
The error of the time signal is generally less than 0.1 second.

Washington—Annapolis, Latitude 38° 59' 00" N., Longitude 76° 27' 00" W., call sign NSS, on a wavelength of 17,040 metres (C.W.) at 3h. 00m. 00s., 8h. 00m. 00s., and 17h. 00m. 00s. G.M.T.

The time signals are relayed from the U.S. Naval Observatory and are broadcast on high power.

See Washington—Arlington for alternative broadcast times in case of failure.

The error of the time signal is generally less than 0.1 second.



The following W/T Stations broadcast a time signal at 17h. 00m. 00s., G.M.T., only when Washington—Arlington is out of action (Sundays and holidays excepted):—

	Latitude.	Longitude.	Call Sign.	Wavelength. Metres.
New York ...	40° 48' 00" N.	73° 50' 00" W.	NAH	2,939 (C.W.)
Norfolk ...	36° 49' 33" N.	76° 17' 46" W.	NAM	2,453 (I.C.W.)
Charleston ...	32° 51' 36" N.	79° 57' 49" W.	NAO	2,453 (I.C.W.)

* Sharp tuning to the transmitting wavelengths is necessary in order to receive satisfactorily.

Panama.

(C.W. Issues.)

W/T Stations.	Call Sign.	Wavelength metres.	Time of Signal being made G.M.T.	—
Colon - - -	NAX	2,271 (I.C.W.)	h. m. s. h. m. s. 3 55 00- 4 00 00	Sent daily.
Lat. 9° 22' 09" N. Long. 79° 54' 07" W.			17 55 00-18 00 00	

United States of America, Gulf Coast.

(C.W. Issues.)

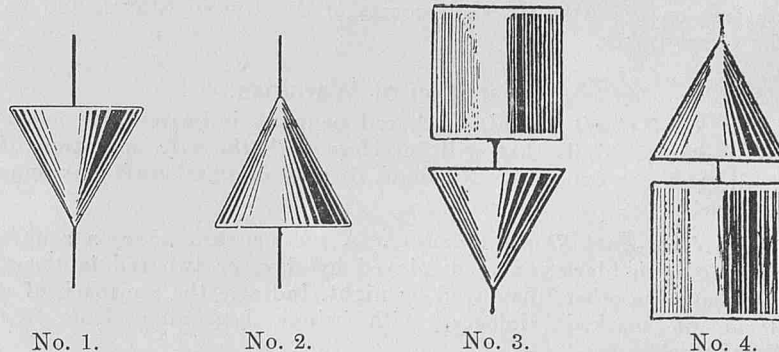
			h. m. s. h. m. s.	
New Orleans -	NAT	2,883 (C.W.)	16 55 00-17 00 00	Sent daily.
Lat. 29° 56' 50" N. Long. 90° 02' 18" W.				
Key West -	NAR	2,828 (C.W.)	16 55 00-17 00 00	"Lag" of Key West time signal is 0.5 second or more.
Lat. 24° 33' 22" N. Long. 81° 48' 21" W.				

NOTE.—The Key West time signals are operated by long distance telegraphic control lines from Washington D.C.

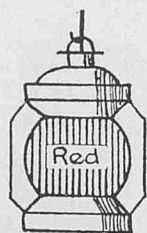
IV. VISUAL STORM WARNINGS.

Canada.

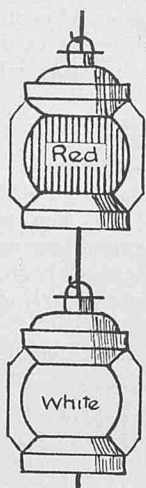
By Day.



By Night.



Nos. 1 or 3.



Nos. 2 or 4.

Storm signals are hoisted on warning being received from the Meteorological Office, Toronto, at Camperdown (Halifax), Canso, Digby, Halifax, Liscomb, Liverpool, and Yarmouth, Westport (Brier Island) in Nova Scotia; at Point Lepreau, St. Andrews, St. John in New Brunswick; Eastport (State of Maine), at several places on the coasts of Cape Breton island, New Brunswick, Prince Edward Islands, Quebec, Newfoundland and British Columbia.

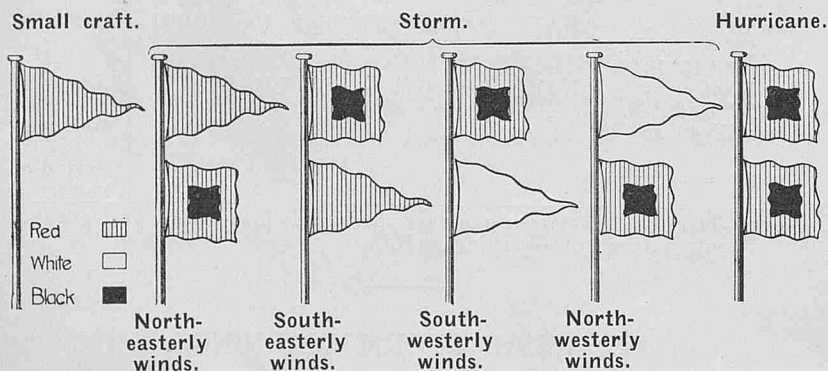
Signification: Day or Night Signals.

- No. 1, hoisted to indicate the probability of a gale; at first, from an easterly direction.
- No. 2, hoisted to indicate the probability of a gale; at first, from a westerly direction.
- No. 3, hoisted to indicate the probability of a *heavy* gale; at first, from an easterly direction.
- No. 4, hoisted to indicate the probability of a *heavy* gale; at first, from a westerly direction.

It must be borne in mind that the storm signals do not necessarily mean that a storm will occur at the place where the signal is displayed, but that one is expected either there or within such a distance that vessels leaving port would be liable to be caught in it.

UNITED STATES OF AMERICA.

Visual, Small-Craft, Storm and Hurricane Warnings.



Flags, 8 feet square. Pennants, 8-foot hoist, 12-foot fly.

Storm warnings are displayed at some 228 U.S. Weather Bureau stations on the Atlantic, Gulf coasts of the United States, and on the Great Lakes.

Explanation of Warnings.

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

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

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

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

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

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

These warnings are also displayed at the following places in the West Indies: Basseterre, St. Kitts, Aguadilla Central, Aguirre Central, Arecibo, Arroyo, Culebra, Fajardo Playa, Guanica Central, Humacao Playa, Ponce, San Cristobal, and Vieques Island, Porto Rico; Kingston, Jamaica; Puerto Plata, and Santo Domingo, S. D., Roseau, Dominica; St. Thomas, Virgin Islands of the U.S.A.; Grand Turk Island, Turks Islands; and Habana, Cuba.

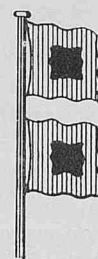
NOTE.—The Weather Bureau stations at Cape Henry, Virginia, and the Philadelphia Maritime Exchange Station at Delaware Breakwater are equipped for day and night communication with passing vessels. The International Code is used by day and the Morse Code, flashlight, by night. Messages to or from vessels will be forwarded to destination.

Barbados.

Storm signals are hoisted at the following places on the island to give warning of the approach of a hurricane:—

- Mount Standfast, St. James.
- South Point Lighthouse.
- Harrison's Point Lighthouse.
- Commercial Hall.
- Crane Hotel, Saint Philip.
- Beaumont Hotel, Bathsheba.
- Highgate Signal Station.
- Districts B, C, D, E and F Police Stations.

By Day:—



By Night:—Three rockets fired in rapid succession from the Harbour Police Station and two red lights, one above the other, displayed from the flagstaffs of the stations above.

AMENDMENT. WIRELESS WEATHER BULLETIN. SWEDEN.

Page 71, Volume VIII, No. 87, March MARINE OBSERVER.

Part I, in code.

The Key and Code now used is exactly the same as that used for the British "Weather Shipping" Bulletin given on page 51, Volume VIII, No. 86, February MARINE OBSERVER and in the Pamphlet, M.O. 329.

To list of Stations add:—

Index No.	Station	Position (Approx.)	
		Latitude N.	Longitude E.
1	Kalmar	56° 39'	16° 22'

Part IV.

Add Area 1.

WIRELESS STORM WARNINGS. SWEDEN.

Page 72, Volume VIII, No. 87, March MARINE OBSERVER.

Add to Areas:—

Eastern Part of North Sea (East of Longitude 5° E.).

Special Notices Regarding Personnel.

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

OBITUARY.

The death of Captain H. ASHLEY, a member of our Voluntary Corps of Marine Observers, which took place on board his ship the *Harmodius*, at Hull, is noted with regret.

CAPTAIN SIR ARTHUR H. ROSTRON, K.B.E., R.D., R.N.R.

SIR ARTHUR ROSTRON, commander of R.M.S. *Berengaria* and commodore of the CUNARD FLEET, has retired after 36 years' service with the CUNARD S.S. Co.

Sir Arthur commenced his career as a cadet in the School Ship *Conway* leaving her to complete his apprenticeship in the Ship *Cedric the Saxon*, in which ship he later sailed as Mate.

In 1895 he joined the CUNARD S.S. Co. as a 4th Officer and rising through the intermediate grades, obtained his first command in August, 1907, when he was appointed Master of the *Brescia*, engaged

in the company's Mediterranean trade. Since then he has commanded many of the CUNARD FLEET, including *Alaunia*, *Andania*, *Ivernia*, *Saxonia*, *Carpathia*, *Carmania*, *Mauretania* and *Berengaria*.

In 1912 when in command of *Carpathia* he successfully rescued many lives from the ill-fated *Titanic*, for which service he was presented by PRESIDENT TAFT with the Congressional Medal of Honour the highest honour the United States could confer. Further honours awarded him for this service were the "American Cross of Honour", the gold medal of the Shipwreck Society of New York, and the Liverpool Shipwreck and Humane Society Medal.

In 1926, HIS MAJESTY THE KING created him a Knight Commander of the Order of the British Empire, and at the same time the Freedom of New York was awarded him "for his splendid services to humanity, to the city of New York, and to the people of the United States over many years". In March, 1929, he was invested by the Admiral in Command at Cherbourg with the Legion of Honour. A member of the Voluntary Corps of Marine Observers since 1914, Marine Observers join with the Marine Division in wishing Sir Arthur long life and happiness in his retirement.

CAPTAIN E. G. DIGGLE, R.D., R.N.R.

Captain E. G. DIGGLE, R.D., R.N.R., commander of R.M.S. *Acquitania*, has been appointed Commodore of the Cunard Fleet in succession to Captain Sir A. H. ROSTRON, K.B.E., R.D., R.N.R., who recently retired.

CAPTAIN J. T. TOFT.

Captain J. T. TOFT commander of the R.M.S. *Accra* and Commodore of the Elder Dempster Fleet, has retired after 49 years' service afloat.

He commenced his sea career in 1882, serving his time in the Cambrian Line sailing ships *Willian Leavitt* and *Cambrian Monarch*. He later sailed as 2nd mate of the *Eastern Light*.

Transferring to steam in 1888 he joined the African Steam Ship Company as third officer, obtaining his first command six years later, when he was appointed Master of the *Winnebago*.

Since then he has commanded many ships of the Elder Dempster Fleet including the *Ebani*, *Mandingo*, *Akassa*, *Sangara*, *Nyanga*, *Nigeria*, *Muraja*, *Prahsu*, *Sierra Leone*, *Aburi*, *Sobo*, *Avo Mendi*, *Falaba*, *Abinsi*, *Apapa*, *Abosso*, *Akabo*, *Appam*, *Adda* and *Accra*, all of which were engaged in the West African trade.

Captain TOFT has been a member of our corps since 1921, who join with the Marine Division in wishing him long life and happiness in his retirement.

THE UNITED STATES OF AMERICA
DEPARTMENT OF THE ARMY
OFFICE OF THE CHIEF OF STAFF
WASHINGTON, D. C.

MEMORANDUM FOR THE CHIEF OF STAFF
SUBJECT: [Illegible]

1. [Illegible]

2. [Illegible]

3. [Illegible]

4. [Illegible]

5. [Illegible]

6. [Illegible]

7. [Illegible]

8. [Illegible]

9. [Illegible]

10. [Illegible]

11. [Illegible]

12. [Illegible]

13. [Illegible]

14. [Illegible]

15. [Illegible]

16. [Illegible]

17. [Illegible]

18. [Illegible]

19. [Illegible]

20. [Illegible]

21. [Illegible]

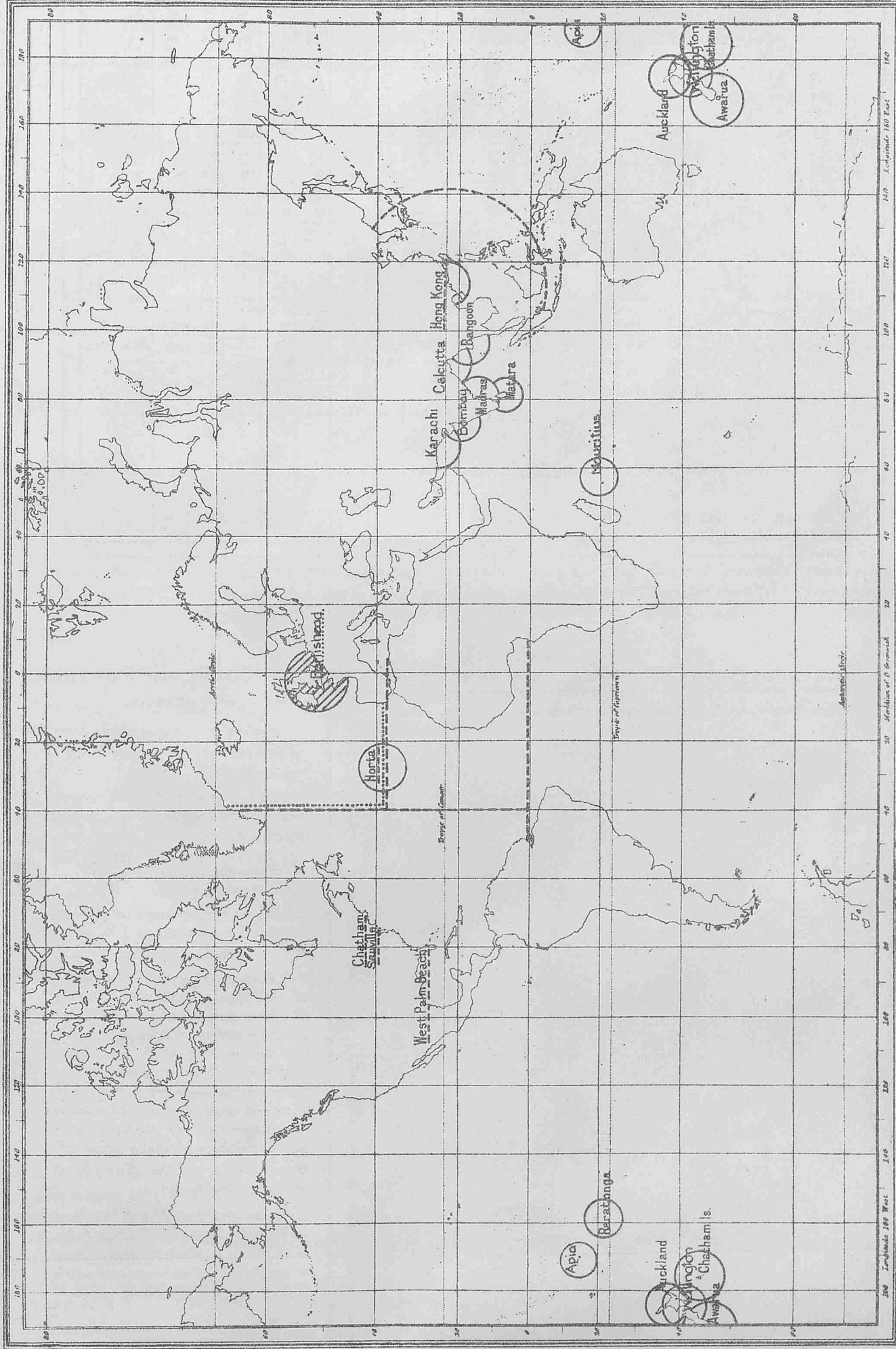
22. [Illegible]

23. [Illegible]

24. [Illegible]

Chart IX.— SHIPS' WIRELESS WEATHER SIGNALS.

Stations for Reception of Routine Wireless Weather Reports from "Selected Ships."



The dotted line indicates the area in which British "A Selected Ships" report under control to Portishead. The small shaded circle indicates the area from which reports are prohibited to Portishead.



A pecked line indicates the reporting area round stations in other countries to which British "A Selected Ships" should report. The names of such stations being also underlined with a pecked line.

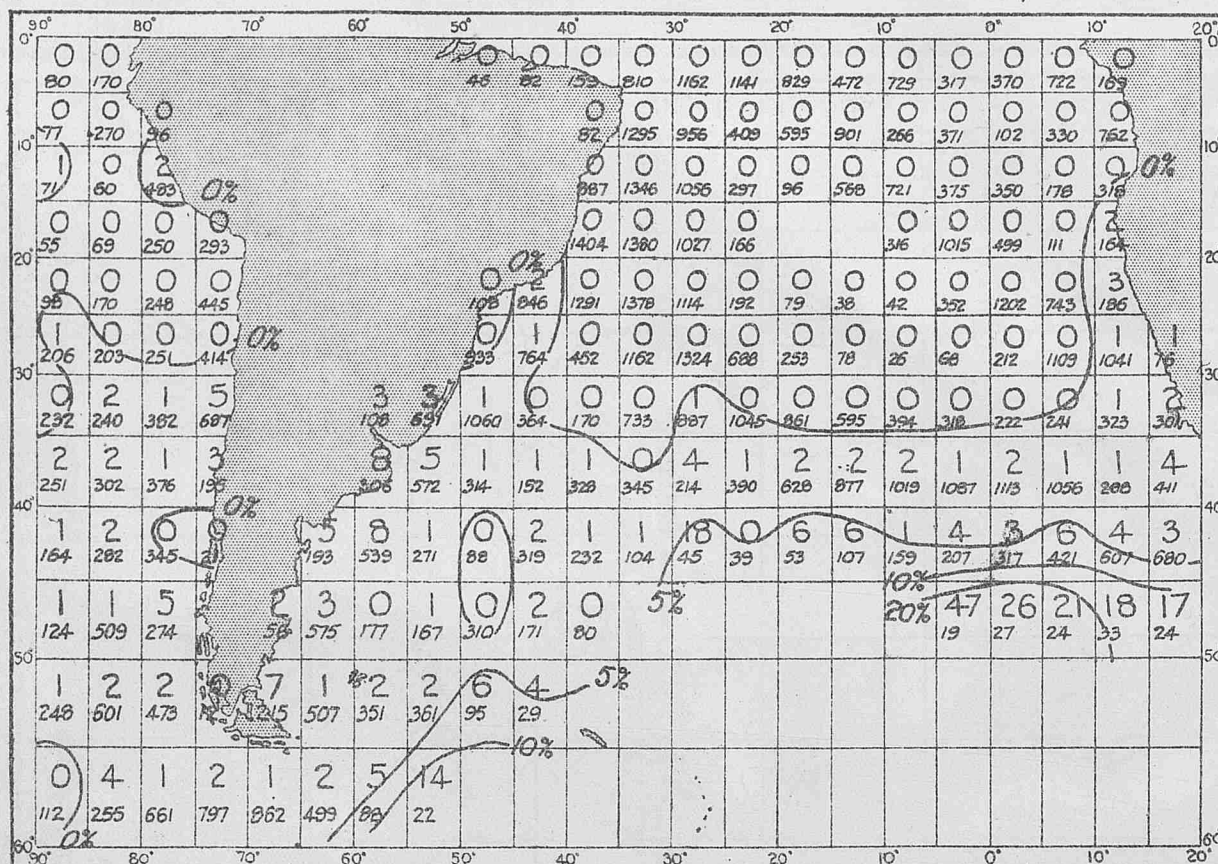


The full-line circles indicate the areas round islands and coast stations which could receive spark "Selected Ships" reports to C.Q.



AUGUST

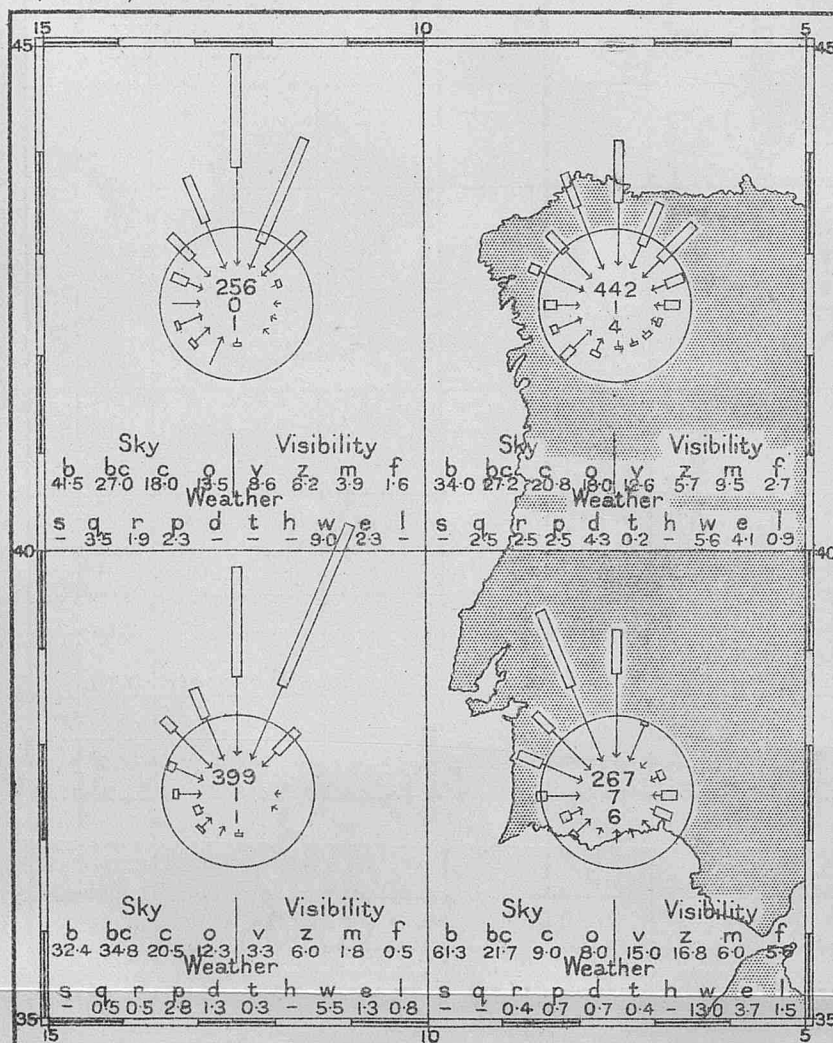
FOG IN THE SOUTH ATLANTIC AND VICINITY OF WEST COAST OF SOUTH AMERICA, PERCENTAGE FREQUENCY.



The upper figures in the 5° squares give the percentage frequency of occasions upon which fog was logged, the lower figures the total number of observations. Lines are drawn for 0, 5, 10 and 20%. The chart is compiled from observations from British Ships for the period 1855 to 1899.

AUGUST

WIND, FOG, MIST AND WEATHER FOR THE REGION OFF THE COAST OF PORTUGAL.



EXPLANATION.

The Wind roses are drawn from Sea observations within the 5° squares.

Arrows fly with the wind, length represents frequency, thickness strength.

Gales. Moderate. Light.
8-12 4-7 1-3

Distance from head of arrow to circle represents 5%, 20%
Scale: 0 10 20

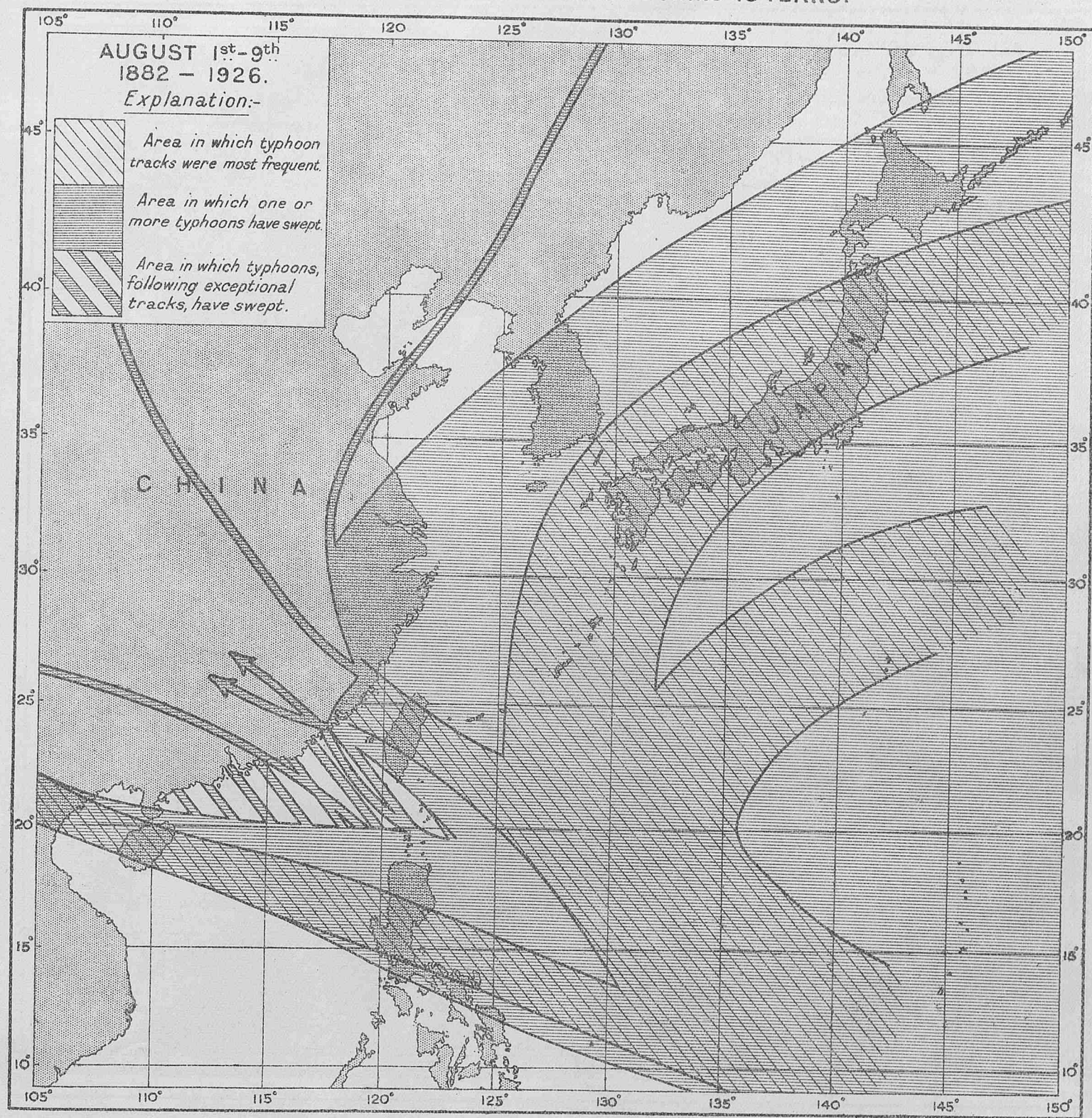
The upper figure in the centre of the rose gives total number of observations, the middle figure the percentage frequency of calms and the lower figure the percentage frequency of variable winds.

The percentage frequency of types of weather are shown in the lower half of each 5° square by the figures beneath each of the letters of the Beaufort weather notation.

For example, in the 5° square Latitude 35° to 40° N. Longitude 5° to 10° W, a was logged 8 times in every 100 observations while w was logged 13 times.

Compiled from observations of British Ships received since the adoption of the Hollerith system of extraction, covering the years 1921-1928.

TYPHOONS IN THE FAR EAST DURING 45 YEARS.

AUGUST — Three charts: *Total observations of Typhoons for month - 130.*Chart I—August 1st to 9th

The coast of China is almost free of typhoons in the vicinity of Shantung and curiously enough in the neighbourhood of Hong Kong. The coast of Annam and the South of the South China Sea are also almost completely free.

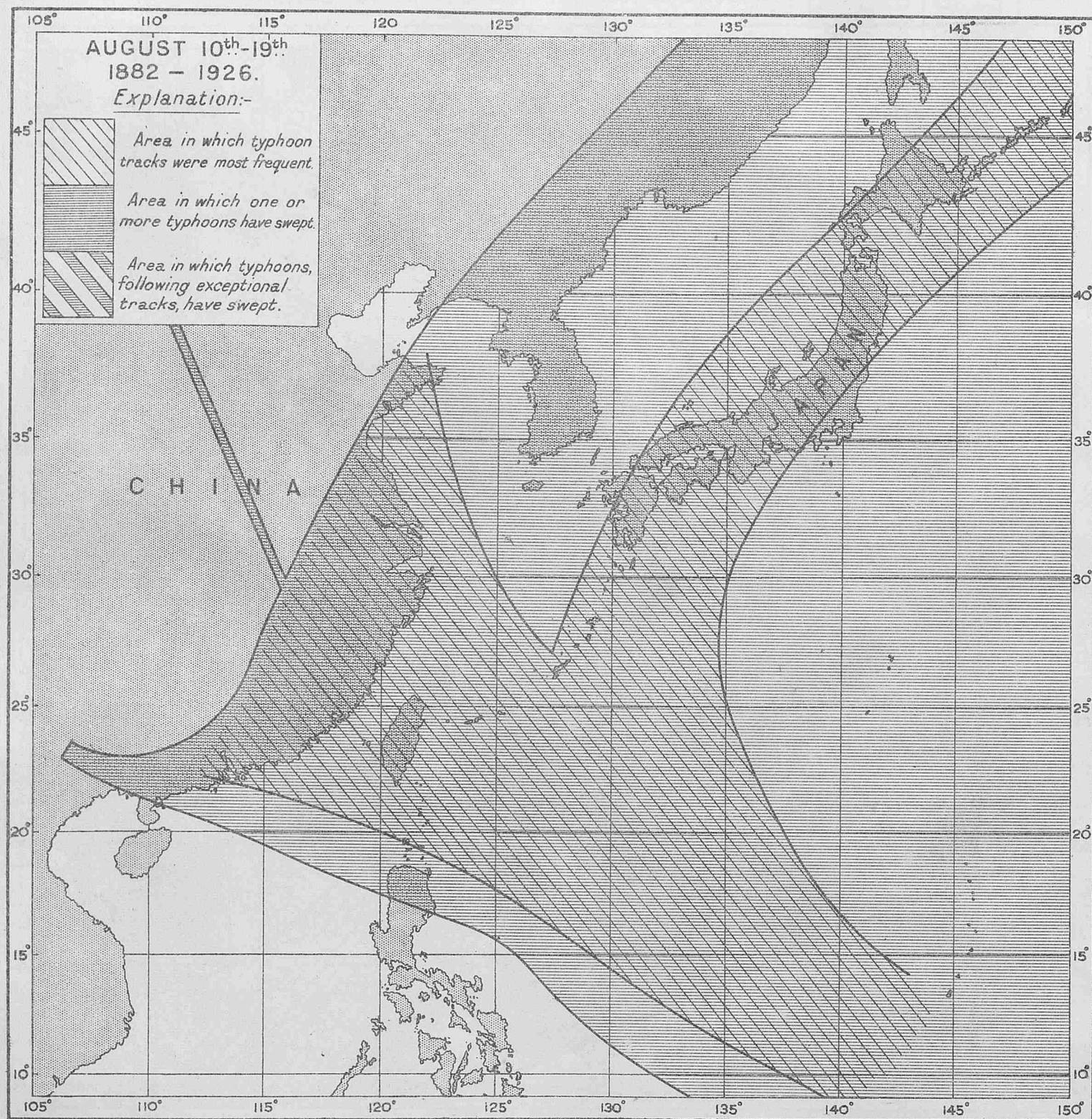
Four tracks, of which two principal ones. The first over Formosa coming from the Pacific. The other over the Straits of Korea and Japan.

The two lesser tracks are: one across the centre of Luzon to the N.W. over Hainan and Hongkong; the other turning N.E. at Lat. 25°N. Long. 135°E. towards the Bonin Islands. A few W.S.W. tracks over the Sea of China.

Starting point: from Guam and Yap and also North of Guam at Lat. 25°N.

(From "Atlas of the Typhoons of the China Seas 1882 to 1926," by the Rev. P.E. Gherzi S.J., Director Zi-ka-wei Observatory, near Shanghai China.)
Published by The Hydrographic Institute of the Royal Marine Genoa.

TYPHOONS IN THE FAR EAST DURING 45 YEARS.

AUGUST — Three charts: *Total observations of Typhoons for month - 130.*Chart II— August 10th to 19th

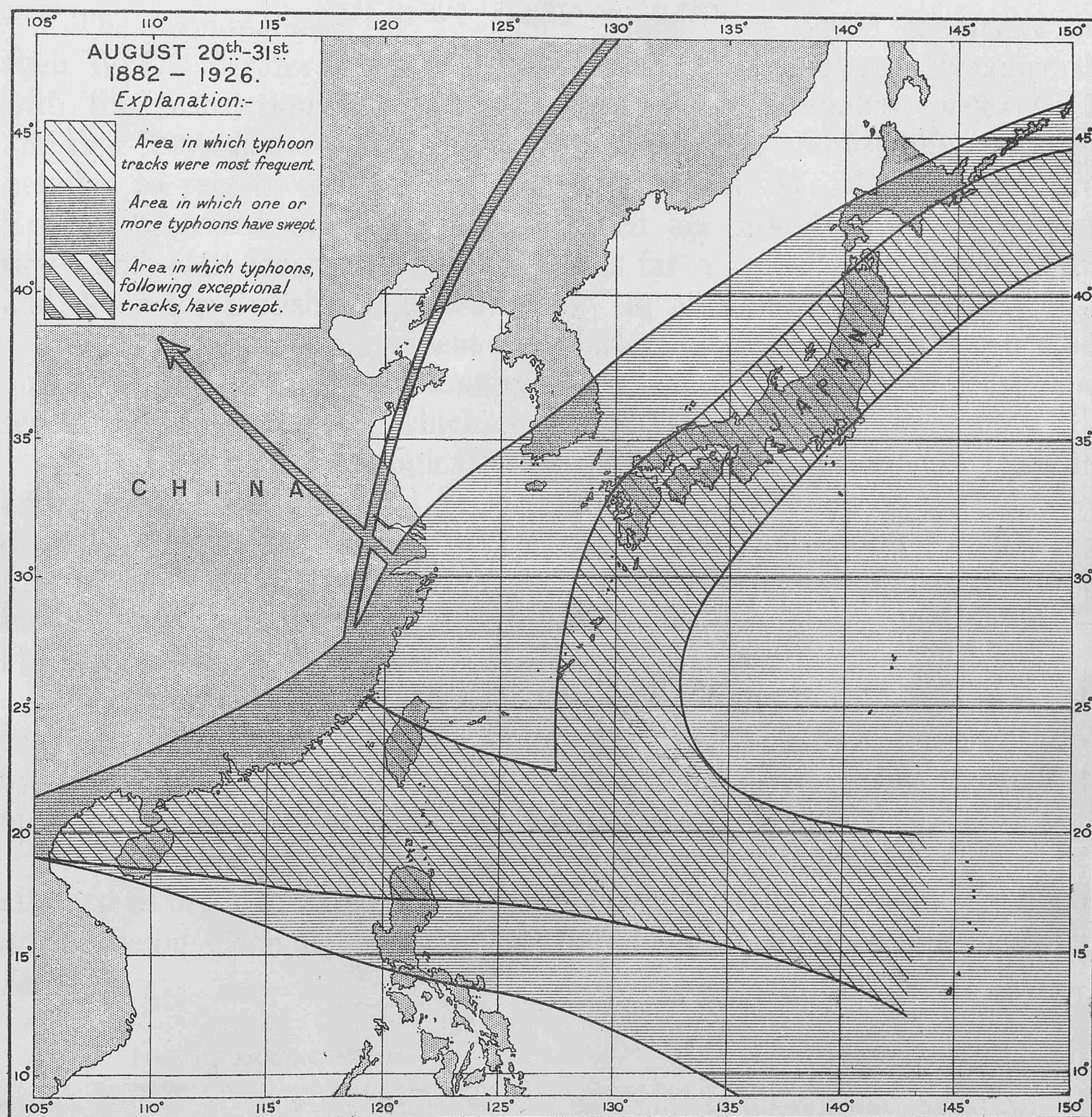
The coast of Annam remains free, as also the Chinese Coast North of the Yangtse river. The South of Luzon and the Vizayas (Calamianes) Islands are also free.

Two principal tracks. One very wide, Southern one, which coming from the Pacific covers the Balintang Channel, Bashee Channel, Formosa, the East China Sea and Coast of China from Macao to Shantung. This is the period of greatest danger along the whole of this long section. The second track passes over the Riu-Kiu Islands and the whole of Japan turning N.E. at approximately Lat. 30°N. and Long. 130°E.

Starting point: round Guam and Yap.

*(From "Atlas of the Typhoons of the China Seas 1882 to 1926" by the Rev. P.E. Gherzi S.J., Director Zi-ka-wei Observatory, near Shanghai China.)
(Published by The Hydrographic Institute of the Royal Marine Genoa.)*

TYPHOONS IN THE FAR EAST DURING 45 YEARS.



AUGUST - Three charts: *Total observations of Typhoons for month - 130.*

Chart III - August 20th to 31st

Two principal tracks as in the preceding period. But the Southern track descends towards the South and especially covers the centre and South of Formosa with the Straits, the North of the South China Sea and the Chinese Coast from South of Foochow to South of Haifong in Tonking and the Island of Hainan. The Northern track turns slightly East and Annam and the Vizayas (Calamianes) Islands are immune.

Starting point: Especially round Guam. S.W. tracks become less rare.

(From "Atlas of the Typhoons of the China Seas 1882 to 1926" by the Rev. P.E. Gherzi S.J., Director, Zi-ka-wei Observatory, near Shanghai China.)
Published by The Hydrographic Institute of the Royal Marine Genoa.

VERY IMPORTANT.

The Commanders of "Selected Ships" are asked to ensure that their W/T. Operators as well as their observing officers are fully conversant with the instructions given in the January 1931 number, pages 16-19, and that they see monthly the Chart of the World and lists giving Stations detailed to receive or intercept Routine Wireless Weather Reports from British "Selected Ships." All concerned are asked to use the correct times and wave lengths and to adhere as far as possible to the procedure laid down for British "Selected Ships" in all parts of the world.

By International agreement the Masters of Ships are to receive advice and instructions in this voluntary work only from the Meteorological service of the country in which the ships are registered.

The British Meteorological Office, has therefore invited all Dominion and Foreign Meteorological Services to send particulars of W/T. stations detailed in accordance with Article 35 of the Convention for Safety of Life at Sea, 1929, to receive reports from "Selected Ships"; and the information when received, is included in the lists given monthly in The Marine Observer.

The Commanders of British "Selected Ships" will best serve the cause of International Marine Meteorology, and their own national service, by carrying out the advice and instructions given them through the medium of The Marine Observer.

This procedure was adopted after international agreement had been attained in order to avoid the confusion which arose through conflicting advice being given to shipping by the different national meteorological services.

POSTAL ARRANGEMENTS.

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

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

S.S..... Captain.....

Port of Call.....

Date of Homeward Departure.....

Postal Address.....

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

ICE REPORTS.

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

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

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

ICE CHART.

WESTERN NORTH ATLANTIC.

LETTERS OF TRANSATLANTIC TRACKS INDICATE.

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

- (C) From 1st July to 10th April, 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 87-88 of Vol. VIII, No. 88, April, 1931, Number, and Notice of Changes on the Ice Chart in May, 1931 number.

SYMBOLS USED ON THE CHART

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

PHENOMENAL POSITIONS OF ICE.

Date.	Ship or Source of Report.	Position. Lat. Long.	Remarks.
Aug. 12, 1903	S.S. Saxon Prince ...	37°52'N. 71°30'W.	Piece 3 ft. high, 40 ft. long.
" 7, 1908	S.S. Caronia ...	50°31'N. 18°55'W.	2 pieces 10 ft. square and 15 ft. square.
" 2, 1909	S.S. Shimosa ...	37°16'N. 42°06'W.	Piece 18 ft. by 5 ft., 2 ft. out of water.
" 14, 1912	S.S. Ulstermore ...	43°55'N. 39°16'W.	Piece.
" 27, 1912	S.S. Lux ...	42°30'N. 15°26'W.	50 ft. sq., 4 ft. out of water.
" 10, 1915	S.S. St. Louis ...	41°02'N. 48°00'W.	Berg.
" 16, 1915	S.S. St. Leonards ...	41°09'N. 50°43'W.	—
" 21, 1915	S.S. Strathgarry ...	40°46'N. 68°20'W.	Growler.
" 1915	Do.	39°40'N. 40°20'W.	Piece 20 ft. long, 4 ft. high.
" 29, 1920	U.S. Hyd. Bulletin	40°30'N. 47°52'W.	Berg.

Reports of Ice sighted between June 1st and June 30th, 1931, which have been received by the Meteorological Office, are shown by the Symbols plotted in the position reported, the figures indicating the day of the month.

LATEST ICE REPORT FROM CANADA.

The following cablegram, dated 12th June, 1931, was received from the Canadian Signal Service, Quebec:—

Bergs and growlers in Belle Isle Strait: other points no ice in sight.

ICE IN GREENLAND WATERS.

INFORMATION RECEIVED BY CABLEGRAM FROM DANISH METEOROLOGICAL INSTITUTE, COPENHAGEN.

18th June..... "Ice edge 20 miles off Cape Farewell, Julianehaab bay free of ice."

MARINE METEOROLOGY.

CO-OPERATION OF SHIPOWNERS, MASTERS AND MATES.

Captains and officers who wish to co-operate regularly with the Meteorological Office should apply to the appropriate Port Meteorological Officers or Agents, a list of these gentlemen with addresses is given below. A general description of Marine Meteorological Work, including the particulars desired from intending Marine Observers, is given in Chapter I of *THE MARINE OBSERVER'S HANDBOOK*, 5TH EDITION, which may be obtained from H.M. Stationery Office direct, or through any booksellers, price 2s. 6d.

The names of vessels regularly observing for the Meteorological Office, London, together with their Commanders and Observing Officers, are given monthly in *THE MARINE OBSERVER*, which may be obtained from H.M. Stationery Office, price 2s., 2s. 2d. post free.

The Captains and Officers of regular observing ships constitute the Corps of Voluntary Marine Observers. For certain branches of this work tested instruments are lent to the Captains of British ships registered at ports in Great Britain. A certain number of Regular Observing ships are detailed as "Selected Ships" for the purpose of the World Wide Scheme of Routine Ships' Wireless Weather Telegraphy Reporting. These "Selected Ships" are indicated monthly in the "Fleet List" in *THE MARINE OBSERVER* by a number.

To decode "Selected Ships" reports the pamphlet M.O. 329, price 3d. may be obtained from H.M. Stationery Office.

Only ships registered at Ports in Great Britain will, in future, be included in the Meteorological Office, London, "Fleet List."

Marine Observers are asked to send in their Meteorological Log through the appropriate Port Meteorological Officer or Agent (accompanied by Form 138 in the case of "Selected Ships") at intervals of not more than six months. The Meteorological Record Form 911 (accompanied by Form 138 in the case of "Selected Ships") should be posted direct to the Meteorological Office, London, at the end of each voyage.

When sending in the Meteorological Log or Record, Regular Observing ships will render great assistance if they will notify the Port Meteorological Officer or Agent of their requirements.

The Port Meteorological Officers and Agents inspect official instruments at regular intervals, replacing those which are defective.

Where ships' instruments are found by comparison to be reliable they may be used for the work of "Selected Ships." A reliable mercurial barometer is essential as part of the equipment of a "Selected Ship."

A copy of *THE MARINE OBSERVER* is sent monthly to the Captain of every observing ship for the information and guidance of the officers doing this work. He is also supplied with *THE MARINE OBSERVER'S HANDBOOK* and such charts and atlases as are considered necessary as Meteorological equipment for *The Work* of a Regular Observing ship in a particular trade.

WIRELESS AND WEATHER AN AID TO NAVIGATION, published by H.M. Stationery Office, which affords information and guidance for the practical application of Marine Meteorology to Navigation, may be purchased through any bookseller, price 5s.

Returns made by Regular Observing ships are acknowledged monthly in *THE MARINE OBSERVER*, and a list of those Commanders and Officers who have performed specially fine work is published yearly in *THE MARINE OBSERVER* and Excellent Awards are made to them.

The work done by Regular Observing Ships in making written returns, and by "Selected Ships" in broadcasting routine information by W/T, together with "Weather Shipping" Bulletins broadcast from the shore, conforming with the recommendations of the International Convention of Safety of Life at Sea, 1929, provide the necessary information for the use of all shipping. Thus by shipowners encouraging the specialist work in those of their ships whose names appear in *THE MARINE OBSERVER*, this Voluntary Work under the supervision of the Meteorological Office provides a service to all shipping at minimum cost to the National funds.

Shipowners are asked to facilitate the forwarding of postal matter from the Air Ministry addressed to the Captains of their ships.

LATE PRESS.

DERELICTS AND FLOATING WRECKAGE.

Date.	Position.		Description.
	Latitude.	Longitude.	
NORTH SEA.			
7.6.31	52°06'N.	2°05'E.	Spar attached to wreckage.
8.6.31	2 m. N.E. of outer Dowsing.		Bridge grating and about 6 ft. deck plank.
13.6.31	54°57'N.	0°12'E.	Broken spar about 4 ft. above water, apparently attached to submerged wreckage.
13.6.31	51°44'N.	2°43'E.	Abandoned steamer <i>Urania</i> .
ENGLISH CHANNEL.			
9.6.31	50°26'N.	0°19'W.	Heavy log about 30 ft. long, overgrown with marine growth: apparently attached to some submerged object. Dangerous to navigation.
16.6.31	49°02'N.	4°05'W.	Ship's boat.
17.6.31	49°53'N.	5°08'W.	Heavy log covered with marine growth: dangerous to navigation.
18.6.31	48°38'N.	4°45'W.	Drifting buoy with globe as topmark, light extinguished, painted black.
20.6.31	50°02'N.	1°03'W.	Rusty torpedo shaped cylinder about 5 feet long.
22.6.31	48°56'N.	4°16'W.	<i>Re Blanche</i> buoy.
IRISH SEA.			
12.6.31	54°39'N.	5°18'W.	Submerged wreck, mast projecting.
BAY OF BISCAY.			
3.6.31	45°09'N.	5°25'W.	Tree trunk with branches adrift: dangerous to navigation.
7.6.31	45°28'N.	7°32'W.	Floating iron object of large dimensions: dangerous to navigation.
15.6.31	48°11'N.	5°27'W.	Six red conical buoys, one with white band, drifting: dangerous to navigation.
NORTH ATLANTIC.			
5.6.31	23°34'N.	69°04'W.	Derelict, about 75 ft. long, awash.
5.6.31	41°01'N.	53°36'W.	Red buoy with <i>Telegraph No. 3</i> in white letters.
7.6.31	36°03'N.	13°— W.	Large spherical steel buoy.
8.6.31	48°47'N.	19°25'W.	Large log 25 ft. by 4 ft. by 4 ft., covered with marine growth.
8.6.31	49°55'N.	17°22'W.	Round buoy, painted white and red with letters <i>W.U. Telegraph</i> and with a blue flag on pole.
10.6.31	46°27'N.	34°34'W.	Floating log, 20 ft. long.
15.6.31	49°16'N.	13°59'W.	Trunk, 25 ft. long, 6 ft. in diameter, covered with growth: dangerous to navigation.
19.6.31	48°21'N.	5°18'W.	Drifting black can buoy with staff and diamond cage top mark.

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.
THAMES ...	Lieut. C. H. WILLIAMS, R.N.R., Port Meteorological Officer, P.L.A. Building, King George V Dock (south side), London, E.16. (Telephone No.: Albert Docks 2659. Telegraphic Address: Barometric Aldock, London).
MERSEY ...	Lieut. Commander M. CRESSWELL, R.N.R., Port Meteorological Officer, Dock Office, Liverpool. (Telephone No.: Bank 8959. Telegraphic Address: Meteorite, Liverpool).

Agents.

BELFAST ...	Captain J. MCINTYRE, Harbour Master, Harbour Office. (Telephone No.: Belfast 4090).
BRISTOL CHANNEL	Captain T. JOHNSTON, Technical College, Cathays Park, Cardiff. (Telephone No.: Cardiff 6813).
CLYDE ...	Mr. ROBERT CLEARY, Master Mariner, The Clutha Stevedoring Co., Ltd., Princes Dock, Glasgow. (Telephone No.: 513 Ibrox).
FREMANTLE ... W. Australia.	Captain J. J. AIREY, Deputy Director of Navigation, Customs House. (Telephone No.: B 1391).

Agents (contd.).

HONG KONG, China.	Lieut. Commander G.B.R. RUDYERD-HELPMAN, R.N., Superintendent, Admiralty Chart and Chronometer Depot, H.M. Dockyard. (Telephone No.: 108 Dockyard).
HUMBER ...	Captain A. M. BROWN, Ellerman Wilson Line Office, Hull. (Telephone No.: Central 2130).
FORTH ...	Captains C. G. BONNER, V.C., D.S.C., and D. AITCHISON, Leith Salvage and Towage Co., Ltd., 2, Commercial Street, Leith.
SOUTHAMPTON	Mr. R. I. T. MCEWAN, Master Mariner, Gilchrist Navigation School, 5, Union Bank Chambers, 1, Bernard Street. (Telephone No. Southampton 4277).
SYDNEY, New South Wales.	Commander G. D. WILLIAMS, D.S.O., R.D., R.N.R., Deputy Director of Navigation. Captain C. LINDBERGH. Customs House. (Telephone No.: B 6421).
TYNE ...	Captain J. J. MCEWAN, Marine School, South Shields.
VANCOUVER, British Columbia.	Mr. T. S. H. SHEARMAN, 61, Leigh Spencer Building, 553, Granville Street. (Telephone No.: Seymour 3309).

LIST OF VOLUNTARY OBSERVING SHIPS

i

FLEET LIST.

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 records received, are given with the date and description of last log, register or record 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 records within a reasonable period will automatically be removed from the list and the free issue of THE MARINE OBSERVER discontinued; it is, therefore, earnestly requested that changes of service, probable periods of lay up or transfer of Commanders may be notified whenever possible.

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

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

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

Explanation of Abbreviations.

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

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

W.T. = Equipped wholly or partly with tested Instruments lent by the Meteorological Office for reporting in code by W/T in the International Selected Ship system.

No. = No Meteorological Office instrumental equipment on board.

M = Ship's barometer *mercurial*.

A = Ship's barometer *aneroid*.

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

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

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

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

** = Short range transmission and reception.

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

Selected Ships.

Those ships in this list which have a number and symbols indicating W/T apparatus before their names are "Selected Ships" invited to make by W/T, reports of observations taken at arranged G.M. Times to "All Ships."

Name of Vessel.	Captain.	Observing Officers.	Meteoro-logical Equipment.	Line.	Last Log, Register, or Record Contributed. Received up to 12.6.31.	Date Received.
233 †† <i>Aba</i> , M.V. ...	Lawson, J. H. ...	G. L. Donald, R. A. Cherry	W.T.	Elder Dempster ...	Forms 911 & 138 26.3.31 to 28.4.31	30.4.31
121 †† <i>Abinsi</i> ...	Sola, P. ...	J. J. Smith, G. Baker ...	"	" " ...	" " 15.4.31 to 22.5.31	27.5.31
122 †† <i>Accra</i> , M.V. ...	Toft, J. T. ...	R. B. Ellis ...	W.T.-M.	" " ...	" " 6.5.31 to 8.6.31	10.6.31
155 †† <i>Achilles</i> ...	Cosker, W. ...	C. Broad, R. E. Agar, J. S. Stratford.	M.L.	A. Holt " ...	Form 915 4.10.30 to 13.2.31 ...	19.2.31
055 †† <i>Actor</i> ...	Whyte, D. L. ...	G. Penston, E. Pearce, P. Harrow.	No. M.	Harrison ...	Forms 911 & 138 26.2.31 to 1.5.31	21.5.31
123 †† <i>Adda</i> , M.V. ...	Shooter, J. C. ...	J. Boyd, F. C. Langton ...	W.T.-M.	Elder Dempster ...	" " 23.4.31 to 25.5.31	28.5.31
050 †† <i>Adriatic</i> ...	Binks, J. ...	G. T. Kavanagh, R. S. Walker, O. V. Lucas.	W.T.	White Star ...	" " 4.5.31 to 22.5.31	26.5.31
<i>Aeneas</i> ...	Wallace, W. K. ...	A. McL. Pilcher ...	No. A.	A. Holt ...	Form 911 14.3.31 to 25.3.31 ...	11.5.31
166 †† <i>Agamemnon</i> ...	Beswick, W., D.S.C., Commr., R.N.R.	W. K. Hale ...	W.T.	" ...	" 7.4.31 to 22.4.31 ...	18.5.31
<i>Aidan</i> ...	Jackson, T. H. ...	A. A. Gerrard ...	No. A.	Booth ...	2.4.31 to 31.5.31 ...	10.6.31
<i>Alaunia</i> ...	Prothero, M. ...	T. O. Ellis ...	" A.	Gunard ...	" 16.11.30 to 6.12.30 ...	8.12.30
<i>Alban</i> ...	Evans, L. ...	J. G. Tippet ...	" A.	Booth ...	" 16.8.30 to 7.10.30 ...	27.10.30
<i>Albion Star</i> ...	Phillips, C. W. ...	T. Gilchrist ...	" M.	Blue Star ...	" ...	"
310 †† <i>Alcantara</i> , M.V. ...	Wakeman, E. C. ...	R. H. Tepper ...	W.T.	R.M.S.P. ...	Form 911 21.2.31 to 8.4.31 ...	14.4.31
178 †† <i>Alipore</i> ...	Lyndon, E. P. ...	J. P. McArthur ...	No. M.	P. & O. ...	" 9.4.31 to 19.4.31 ...	18.5.31
175 †† <i>Almanzora</i> ...	Hannam, F. S. ...	W. W. Dovell ...	W.T.	R.M.S.P. ...	" 11.4.31 to 26.5.31 ...	28.5.31
012 †† <i>Almeda Star</i> ...	Turner Russell, W. ...	E. K. Watkins, H. Metcalf, E. Russell, C. Williams.	No. M.	Blue Star ...	Forms 911 & 138 4.4.31 to 19.5.31	27.5.31
<i>Alondra</i> ...	Scott, L. S. ...	G. Hamilton, E. W. Thomas	" A.	Yeoward ...	Form 911 10.5.31 to 30.5.31 ...	3.6.31
<i>Alynbank</i> ...	Robertson, J. ...	G. E. Beaton, R. McKellar ...	" A.	A. Weir & Co. ...	" 17.4.31 to 28.4.31 ...	26.5.31
103 †† <i>Andalucia Star</i> ...	Vernon, R. ...	W. Cumming, G. Clarke, J. Bradshaw.	" M.	Blue Star ...	Forms 911 & 138 22.2.31 to 5.4.31	13.4.31
<i>Antilochus</i> ...	Dougall, W. T. ...	C. F. Lock ...	" A.	A. Holt ...	25.4.31 to 5.5.31 ...	14.5.31
209 †† <i>Aorangi</i> , M.V. ...	Martin, W. ...	J. Watling, D. H. Richards, J. Billingham, H. Weston.	M.L.	Canadian- Australasian	Form 915 21.8.30 to 13.1.31 ...	18.4.31
120 †† <i>Apapa</i> , M.V. ...	Crawford, R. ...	J. R. Sergiades, V. Feeney.	W.T.-M.	Elder Dempster ...	Forms 911 & 138 9.4.31 to 10.5.31 ...	14.5.31
129 †† <i>Appam</i> ...	Beith, A. ...	W. M. M. Hutchings, C. V. Evans, H. O. Forster.	W.T.	" " ...	" " 18.3.31 to 24.4.31	27.4.31
<i>Araby</i> ...	Draper, J. M. ...	W. M. M. Hutchings, C. V. Evans, H. O. Forster.	"	" " ...	" " 18.3.31 to 24.4.31	"
115 †† <i>Arandora Star</i> ...	Lee, J., D.S.C. ...	H. Haigh ...	No. A.	MacIver ...	Form 911 15.3.31 to 30.5.31 ...	4.6.31
<i>Architect</i> ...	Moulton, E. W. ...	C. O. Worth, R. T. Hales, F. Graham, H. F. Partridge.	" M.	Blue Star ...	Forms 911 & 138 23.4.31 to 8.6.31	9.6.31
278 †† <i>Architect</i> ...	Mowat, I. ...	A. C. Banister ...	" M.	Harrison ...	Forms 911 & 138 1.1.31 to 18.3.31	25.2.31
293 †† <i>Ariguani</i> ...	Scudamore, J. H. H., D.S.C., R.D., Commr., R.N.R.	G. McKee, J. S. Bell, M. F. Moss, J. Hillman, A. Crone, G. Binks.	M.L.	Elders & Fyffes ...	Form 915 28.12.30 to 28.4.30 ...	1.5.31
<i>Ariosto</i> ...	Biggins, R. L. ...	N. F. Hewetson, R. W. Holdsworth.	No. A.	Ellerman Wilson ...	Form 911 25.2.31 to 30.5.31 ...	9.6.31
144 †† <i>Arlanza</i> ...	Clarke, E., R.D., Commr., R.N.R.	S. A. Gammon, H. V. Todd, F. T. Brett.	W.T.	R.M.S.P. ...	Forms 911 & 138 14.3.31 to 27.4.31	29.4.31
091 †† <i>Armada de Castle</i> ...	Whitfield, G. J. ...	W. Pace, C. Lloyd, A. H. Parry, L. G. May.	M.L.	Union Castle ...	Form 915 6.12.30 to 26.4.31 ...	29.4.31
296 †† <i>Arracan</i> ...	Thomson, S. ...	K. Currie, G. Davidson, H. H. Brown.	"	P. Henderson ...	Form 915 14.11.30 to 15.4.31 ...	18.4.31
<i>Arundel</i> ...	Shaw, B. ...	E. Hill ...	C.C.	Southern Rly. ...	Telegraphic Report 11.6.31 ...	11.6.31
095 †† <i>Arundel Castle</i> ...	Morton Betts, W. ...	G. L. Clarke, O. Pitts, H. Baty.	M.L.	Union Castle ...	Form 915 10.1.31 to 3.5.31 ...	14.5.31
156 †† <i>Ascanius</i> ...	Wilson, C. A. ...	R. Robinson, E. Radford, R. Holdstock.	"	A. Holt ...	" 14.9.30 to 15.1.31 ...	23.1.31
280 †† <i>Astronomer</i> ...	Richards, J. ...	T. R. Hill ...	No. M.	Harrison ...	Forms 911 & 138 4.11.30 to 30.11.30	4.12.30

LIST OF VOLUNTARY OBSERVING SHIPS

iii

Name of Vessel.	Captain.	Observing Officers.	Meteoro- logical Equipment.	Line.	Last Log. Register, or Record Contributed. Received up to 12.6.31.	Date Received.
272 *† City of Singapore City of Yokohama Clan Alpine	Kendall, J. W. ... Singleton, J. G. ... Young, A. H., R.D., Commr., R.N.R.	F. Wrigley ... J. Kinley, N. Dawson, H. Nish R. R. Baxter ...	No. M. " A. " A.	Ellerman ... " ... Clan ...	Forms 911 & 138 15.4.31 to 10.5.31 Form 911 29.10.30 to 20.11.30 " 30.3.31 to 18.4.31	20.5.31 25.11.30 11.5.31
Clan Kenneth Clan Macalister	... Stenson, F. J., A.D.C., R.D., Capt., R.N.R.	T. A. Pearson ... T. M. Rees Davis ...	" A. " A.	" ... " ...	" 17.12.30 to 22.1.31 " 21.3.31 to 11.4.31	2.2.31 5.5.31
Clan MacBean Clan Macbeth	Boag, J. ... Worthington, C. D. ...	L. Thomson ... W. R. Woodruffe, I. Cape Scott, L. W. Gibbins.	" A. " A.	" ... " ...	" 21.2.31 to 20.5.31 " 22.12.30 to 21.3.31	28.5.31 27.3.31
Clan Macfadyen Clan Macfarlane	Laird, C. ... Redford, L. F., Lieut- Commr. R.N.R.	W. C. Dazell ... W. H. Simpson, W. Wright, H. F. Town, J. R. Moss.	" A. " A.	" ... " ...	" 25.2.31 to 9.4.31 " 20.12.30 to 5.4.31	22.4.31 14.4.31
Clan Macgillivray Clan Macindoe Clan Mackellar	Mackinlay, A. ... Scott-Smith, H. E. G. Lyall, A. B. ...	S. R. J. Woods ... J. C. Dunphy, B. H. Magill. A. V. Howard ...	" A. " A. M.L.	" ... " ... " ...	" 1.4.31 to 13.5.31... " 8.4.31 to 11.5.31... " 23.1.31 to 7.2.31	12.6.31 16.5.31 7.3.31
001 *† Clan Macphee	Gourlay, J. B. ...	E. H. Stone, G. Drake, A. Pollock.	" ... W.T.	" ... " ...	Form 915 19.12.30 to 30.3.31	4.5.31
004 *† Clan MacNair	Holman, W. G. ...	F. H. Petheridge, A. Wood- row, J. Napier.	W.T.	" ... " ...	Forms 911 & 138 15.3.31 to 5.4.31	4.5.31
Clan Macquarrie 002 *† Clan Macwhirter	West, W. F. ... Low, A. ...	J. H. Thorpe ... M. J. Lewis, H. Whitehead, C. Rodger	No. A. M.L.	" ... " ...	" 4.1.31 to 17.4.31 Form 915 31.1.31 to 12.5.31	21.4.31 1.6.31
003 *† Clan Malcolm	George, L. S. ...	A. Lynch, J. W. Innes, B. Hind, R. F. Carter.	" ... No. A.	" ... " ...	" 19.12.30 to 21.3.31 Form 911 1.4.31 to 26.4.31	10.4.31 11.5.31
Clan Morrison Clan Murdoch Clan Ranald Clan Ross Clan Sinclair	Porterfield, W. M. Lt- Commr., R.N.R. Wynne, R. H. ... Hawley, F. J. ... Calderwood, W. ... Cater, H. ...	R. J. Brittain ... P. S. Evans ... R. J. Elliott, C. F. Cooke. G. B. Owen ... D. Mc Allister ...	No. A. " A. " A. " A. " A.	" ... " ... " ... " ... " ...	" 5.1.31 to 7.2.31 ... " 15.1.31 to 7.5.31... " 8.3.31 to 5.6.31 ... " 3.4.31 to 20.4.31 ...	25.2.31 18.5.31 9.3.31 18.5.31
017 *† Colonial 298 *† Comedian 185 † Comorin 198 *† Contractor 049 *† Coptic, M.V.	Baird, W. ... Cadogan, A. ... Cartright, C. W., D.S.C. Harraden, ... Williams, G. ...	W. Moore ... F. M. Eales ... R. E. Tucker ... L. Seddon ... R. E. Nicholson, T. H. Davies, W. Burt.	" M. " M. " M. " M. W.T.	Harrison ... " ... P. & O. ... Harrison ... Shaw, Savill & Albion	" 28.3.31 to 27.4.31... Forms 911 & 138 28.3.31 to 27.4.31... Forms 911 & 138 4.3.31 to 6.4.31...	19.5.31 19.5.31 9.4.31
040 † Corinthia Cornwall 006 † Coronado	Bowan, H. ... Almond, J. G. ... Legge, A. W. ...	R. Orangle, W. Nicholl, E. Burt W. H. G. Timberlake... A. Orchard, A. Magill, G. Binks.	" A. No. A. W.T.	White Star ... New Zealand S.S. Elders & Fyffes	" 9.11.30 to 24.2.31 Form 911 17.4.31 to 21.5.31 Forms 911 & 138 29.4.31 to 30.5.31...	26.2.31 25.5.31 3.6.31
214 *† Counsellor 301 *† Culebra 285 *† Custodian Cyclops	Jackson, J. ... Rathkings, E. C., Commr., R.N.R. O'Connor, T. ... Glossop, S. ...	G. C. Heaton ... H. D. Hooper, T. Powell, R. J. Finch. J. Johnson, W. Rennie, W. F. O'Neill. R. A. Hanney ...	No. M. M.L. No. M. " A.	Harrison ... R.M.S.P. Co. ... Harrison ... A. Holt ...	Form 915 14.2.31 to 28.4.31 Forms 911 & 138 25.11.30 to 4.3.31 Form 911 8.12.30 to 5.2.31	5.5.31 11.3.31 13.2.31
Dakotian Dardanus Darian 302 † Darro Davianian 303 † Demerara	Atkinson, W. H. ... Christie, W. ... Hannafor, W. ... Green, J. ... Trickey, J. ... Matthews, G. P. ...	R. J. S. Pope ... J. S. Ogilvie ... A. S. Holland ... J. M. Phillip ... P. M. Ralston ... H. H. Treweek, E. N. Gillet, F. Crankshaw.	" A. " A. " A. W.T.-M. No. A. W.T.-M.	Leyland ... A. Holt ... Leyland ... R.M.S.P. Co. ... Leyland ... R.M.S.P. Co. ...	" 10.11.30 to 17.12.30 ... " 26.4.31 to 5.5.31 ... " 27.9.30 to 8.10.30 ... Forms 911 & 138 4.2.31 to 25.3.31... Form 911 29.8.30 to 22.10.30 ... Forms 911 & 138 27.10.30 to 17.12.30	24.12.30 20.5.31 14.10.30 18.4.31 28.10.30 22.12.30
008 *† Denis 304 † Desado 117 † Desna 252 *† Devon	Harris, F. C. P. ... Buret, J. ... Huff, G. ... Russell, A. ...	A. W. Hanchett, J. H. Stoker. H. Fraser, F. Collinson ... G. L. Elliott, H. Lang... G. Chaplin, J. D. Marks, M. Willinott.	M.L. W.T.-M. " ... No. M.	Booth ... R.M.S.P. Co. ... " ... Federal ...	" 6.5.31 to 21.5.31 " 14.2.31 to 9.4.31 " 2.3.31 to 23.4.31 " 22.3.31 to 5.4.31	29.5.31 13.4.31 14.5.31 25.4.31
Dieppe 284 *† Director	Lidbetter, W. ... Worthington, B. ...	E. A. Biles ... M. G. O'Brien, A. M. Hughes, A. E. Rogers.	C.C. No. M.	Southern Railway ... Harrison ...	Telegraphic Report 1.6.31 Forms 911 & 138 20.10.30 to 12.3.31	1.6.31 25.4.31
080 *† Discovery, Auxy. Barque. Dominia, C.S.	MacKenzie, K. N. ... Campos, V., O.B.E., Lt.-Commr., R.N.R.	W. R. Colbeck ... W. E. Allen, A. S. Muir, W. F. Anderson.	M.L. " ... " ...	Douglas Mawson Expedition. Telegraph Construc- tion & Maintenance.	" ... Form 915 5.9.30 to 24.11.30	... 6.12.30
Dominic Dorelian 251 † Doric	Griffith, W. ... Hugan, C. ... Jackson, W. J. ...	F. W. Boden ... J. A. Kendall ... F. Pratt, A. Chamberlain, A. Fisher.	No. A. " A. W.T.	Booth ... Leyland ... White Star ...	Form 911 14.2.31 to 10.3.31 " 20.3.31 to 25.5.31 Forms 911 & 138 10.5.31 to 31.5.31	13.3.31 1.3.31 2.6.31
307 *† Doric Star 275 *† Dramatist Dromore Castle 142 † Duchess of Atholl	Mills, D. H. ... Meek, A. J. ... Heanly, T. W. ... McQueen, D. S. ...	— Anderson ... I. W. Page, ... P. Swan ... G. Mowatt, C. D. West, E. Glennie.	No. M. " M. " A. W.T.-M.	Blue Star ... Harrison ... Union Castle ... Canadian Pacific	Form 911 1.5.31 to 24.5.31 " 18.1.30 to 3.7.30 Forms 911 & 138 16.5.31 to 5.6.31...	3.6.31 9.9.30 8.6.31
152 † Duchess of Bedford 151 † Duchess of Richmond. 143 † Duchess of York	Sibbons, H. ... Freer, A., R.N.R. ... Stuart, R. N., V.C., D.S.O., Commr., R.N.R.	A. Mawsey, J. H. Tudor, J. Stewart. F. H. Stell ... N. Scallan, D. Parsons ...	" ... " ... " ...	" ... " ... " ...	" 26.4.31 to 15.5.31... " 10.5.31 to 29.5.31... " 14.3.31 to 22.5.31...	20.5.31 1.6.31 28.5.31
098 † Dunbar Castle, M.V. Dunluce Castle Dunrobin Dunster Grange	Vincent, E. S., R.D., Commr., R.N.R. Hutchings, A. H. ... Ramsay, J. D. ... Wilson, G. F. ...	J. Daziel, G. D. Pennick, P. G. MacIver, A. C. M. Black ... W. R. Holt, J. R. Butt ... J. Allerton ...	W.T. No. A. " A. " M.	Union Castle ... " ... Glen & Co. ... Houlder ...	" 10.3.31 to 29.3.31 Form 911 5.9.30 to 13.11.30 " 10.3.31 to 19.3.31 ...	31.3.31 19.11.30 22.4.31
102 *† Duquesa 215 *† Durenda, M.V.	Williams, W. E. ... Parkes, C. E. ...	F. D. Jones ... W. T. T. Barnes, C. F. Okill...	" M. " M.	Furness Withy British India ...	Forms 911 & 138 3.11.30 to 7.1.31 " 3.4.31 to 18.4.31	12.1.31 18.5.31
077 † Edinburgh Castle Egori 107 *† El Argentino, M.V.	Gilbert, E. F. ... Nelson, J. A. ... Ellis, F., D.S.C.	C. Harvey, R. Longman, E. F. Day. J. T. Townson, R. A. Cherry W. Findlay, J. Burch, C. G. Adlard.	W.T. No. A. " M.	Union Castle ... Elder Dempster ... Houlder ...	Form 911 24.2.31 to 11.4.31 " 16.9.30 to 3.10.30 Forms 911 & 138 2.3.31 to 22.4.31	14.4.31 6.10.30 12.5.31
090 *† Eldon Park 009 *† Elmworth, M.V. 158 *† Elpenor	Burns, R. ... Wilson, T. P. ... Wilson, R. J. ...	J. Macrae, W. Walker, H. L. Roberts. J. M. Whyte ... E. Roberts, H. Skinnis, J. F. Browning.	" M. " M. M.L.	Denholme S.S. Co. ... R. S. Dalgleish ... A. Holt ...	Forms 911 & 138 10.10.30 to 25.12.30 " 26.2.31 to 23.3.31... Form 915 1.5.30 to 6.2.31	13.2.31 8.4.31 13.2.31
108 *† Elstree Grange 109 *† El Paraguayo 110 *† El Uruguayo	Williams, W. E. ... Frost, C. R. ... McNamara, T. ...	P. A. Hawkesworth ... G. Fletcher, F. J. G. Rice, R. L. Aldridge. F. E. Hailstone ...	No. M. " M. " M.	Houlder ... " ... " ...	Forms 911 & 138 2.2.31 to 27.4.31 " 24.2.31 to 1.5.31 ... " 11.1.31 to 12.3.31	30.4.31 5.5.31 24.3.31

Name of Vessel.	Captain.	Observing Officers.	Meteoro-logical Equipment.	Line.	Last Log, Register, or Record Contributed. Received up to 12.6.31.	Date Received.
027 *† <i>Elysia</i> ...	Henderson, F. M. ...	C. Mitchell, J. Herbert, W. A. Beveridge.	M.L.	Anchor ...	Form 915 13.9.30 to 4.1.31 ...	26.1.31
088 *† <i>Empire Star</i> ...	Owen, G., R.D., Lieut.-Commr., R.N.R.	... ..	"	Blue Star ...	... ..	...
086 †† <i>Empress of Australia</i>	Griffiths, E., Lieut.-Commr., R.N.R.	A. Tippet, M. Williams, O. F. Pennington.	W.T.	Canadian Pacific ...	Forms 911 & 138 21.5.31 to 6.6.31	9.6.31
154 †† <i>Empress of Canada</i>	Hailey, A. J., Lieut.-Commr., R.N.R.	C. W. G. Patterson, G. M. Fawcett, A. M. Barff, G. O. Baugh.	M.L.	" "	Form 915 27.11.30 to 20.3.31	18.4.31
061 †† <i>Empress of France</i>	Turnbull, J., C.B.E., R.D., Capt., R.N.R.	E. Roberts, R. Newson ...	W.T.	" "	Forms 911 & 138 26.5.31 to 30.5.31	2.6.31
153 †† <i>Empress of Japan</i>	Robinson, S., C.B.E., R.N.R.	R. Goss, R. Wolfenden, A. Le Maistre.	M.L.	" "	Form 915 7.8.30 to 13.1.31	16.2.31
<i>Eumaeus</i> ...	Hodgson, R. N. ...	W. G. Coxshall ...	No. A.	A. Holt ...	Form 911 17.2.31 to 8.5.31	14.5.31
<i>Euryades</i> ...	Ewan, W. B. ...	D. S. Bruce ...	" A.	" ...	" 21.1.31 to 26.1.31	17.2.31
<i>Explorer</i> ...	Allan, J. ...	A. Stout ...	" A.	Scottish Fishery Brd.	" 9.5.31 to 28.5.31	4.6.31
067 *† <i>Ferndale</i> ...	Beighton, J. N. ...	L. J. Hopkins, H. C. Hone ...	" M.	Aberdeen Common-wealth.	Forms 911 & 138 18.2.31 to 1.6.31	6.6.31
074 *† <i>Fordsdale</i> ...	Thompson, W. J. ...	M. Harries ...	" M.	Aberdeen Common-wealth.	" " 26.3.31 to 28.4.31	5.5.31
030 †† <i>Franconia</i> ...	Irving, R. B. ...	W. M. Stewart, J. H. Kenworthy, R. Pollitt.	W.T.	Cunard ...	" " 31.5.31 to 6.6.31	9.6.31
<i>Freya</i> ...	Lamont, A. ...	W. Pirrie ...	No. A.	Scottish Fishery Brd.	Form 911 3.3.31 to 31.3.31	7.4.31
159 ** <i>Gascoyne</i> ...	Johnson, L. ...	J. S. Macbryde, C. O. Melson, W. Uttley.	M.L.	A. Holt & Co. ...	Form 915 2.5.30 to 22.9.30	13.1.31
125 *† <i>Glenamoy, M.V.</i> ...	Ings, W. J. ...	F. Laycock, L. Eccles, A. C. Radley.	"	Glen Line ...	" 2.2.31 to 8.5.31	16.5.31
<i>Glenbeg, M.V.</i> ...	Newing, L. ...	G. A. C. Barnard ...	No. A.	" ...	Form 911 20.1.31 to 1.3.31	7.4.31
126 *† <i>Glenagarry, M.V.</i> ...	Angier, J. ...	J. Tyler, J. W. Leslie, S. W. Bell.	" M.	" ...	Forms 911 & 138 29.3.31 to 10.4.31	14.4.31
<i>Gleniffer</i> ...	Baker, W. H. ...	A. H. D. Shaw ...	" A.	" ...	Form 911 16.4.31 to 1.5.31	8.6.31
<i>Glenluce, M.V.</i> ...	Kennett, W. H. ...	J. A. Evans ...	" A.	" ...	" 31.8.30 to 24.12.30	30.12.30
<i>Glenishane</i> ...	Martin, V. F. ...	S. Merrick ...	" A.	" ...	" 27.10.30 to 17.2.31	24.2.31
<i>Glenworth</i> ...	Aitchison, D. M. ...	A. Bone ...	" A.	R. S. Dalglish ...	" 16.5.31 to 28.5.31	4.6.31
<i>Gloucester Castle</i> ...	MacMahon, J., R.D., Commr., R.N.R.	C. Black ...	" A.	Union Castle ...	" 26.2.31 to 3.5.31	20.5.31
085 *† <i>Governor</i> ...	Windsor, G. R. ...	... ..	" M.	Harrison ...	... ..	...
<i>Guildford Castle</i> ...	Schalefield, H. L. ...	E. Hamlyn ...	" A.	Union Castle ...	Form 911 22.4.30 to 10.5.30	10.6.30
<i>Halesius</i> ...	Steel, R. ...	— Browne, A. S. P. May ...	" A.	R. P. Houston ...	" 21.4.31 to 17.5.31	8.6.31
111 *† <i>Hardwicke Grange</i>	Fowler, W. H. ...	W. L. Baker, A. D. Seybold, W. E. Ellis.	" M.	Houlder ...	Forms 911 & 138 15.2.31 to 7.4.31	14.4.31
<i>Harmonides</i> ...	Elwell, F. R. ...	L. Pogson, J. Craig-Robertson, E. McLachlan.	" A.	R. P. Houston ...	Form 911 27.3.31 to 25.4.31	29.4.31
262 ** <i>Hauraki, M.V.</i> ...	Norton, A. T. ...	D. McLeish, A. W. Rabbitts, R. Kendall.	M.L.	Union S.S. Co., N.Z. ...	Form 915 15.8.29 to 31.10.30	8.1.31
<i>Herminitus</i> ...	Roberts, T. V., R.D., Lieut.-Commr., R.N.R.	F. W. Gilroy ...	No. A.	Aberdeen Common-wealth.	Form 911 6.3.31 to 12.4.31	18.4.31
<i>Herschel</i> ...	Watson, W. W. ...	S. Ranson ...	" A.	Lampert & Holt ...	" 9.1.31 to 18.3.31	20.3.31
253 *† <i>Hertford</i> ...	Burton Davies, J. ...	W. Redwood, G. D. Baldwin, E. Hopkins, P. Shakespeare P. Block.	M.L.	Federal ...	Form 915 16.8.30 to 27.12.30	31.12.30
<i>Hibernia</i> ...	Williams, E. R. ...	C. A. Marsh ...	C.C.	L.M. & S. Railway ...	Telegraphic Report 15.5.31	15.5.31
182 †† <i>Highland Brigade</i>	Lloyd, H. ...	W. Stephen, N. Hersee, C. Morgan.	No. M.	Nelson ...	Forms 911 & 138 22.3.31 to 13.5.31	18.5.31
116 †† <i>Highland Chieftain, M.V.</i>	Robinson, R. H. ...	W. J. Presland, W. Irving ...	" M.	" ...	" 25.2.31 to 12.4.31	18.4.31
099 †† <i>Highland Monarch, M.V.</i>	Ashby Graves, F. ...	R. Polden ...	" M.	" ...	" 9.2.31 to 1.4.31	7.4.31
250 †† <i>Highland Princess, M.V.</i>	Collins, D. ...	I. Shearer ...	" M.	" ...	... ..	...
079 *† <i>Hildebrand</i> ...	Buck, R. H., R.D., Capt., R.N.R.	W. H. Cross ...	W.T.	Booth ...	Forms 911 & 138 21.3.31 to 26.4.31	5.5.31
075 *† <i>Hobson's Bay</i> ...	Kydd, O. J. ...	J. Worrall, B. F. Moffatt, C. Carroll, C. Campbell, C. C. Good.	M.L.	Aberdeen Common-wealth.	Form 915 28.5.30 to 9.1.31	5.2.31
<i>Holbetn</i> ...	Gough, W. A. ...	F. Delaney ...	No. A.	Lampert & Holt ...	Form 911 9.12.30 to 8.1.31	7.1.31
054 †† <i>Homerle</i> ...	Bulman, J. B. ...	H. G. Morgan, M. Bennett, W. Poustie.	W.T.	White Star ...	Forms 911 & 138 14.5.31 to 29.5.31	1.6.31
<i>Hubert</i> ...	Briscoe, W. ...	T. E. Williams ...	M.L.	Booth ...	Form 911 4.2.31 to 1.4.31	14.4.31
261 *† <i>Huntingdon</i> ...	Field, H. G. B. ...	M. J. Broadhead, P. S. Calcutt, J. H. Strand Jones, H. F. Wilkinson.	W.T.	Federal ...	" & 138 17.11.30 to 3.3.31	14.3.31
200 *† <i>Huntsman</i> ...	Russell, H. ...	H. Wells ...	No. M.	Harrison ...	... ..	...
289 *† <i>Inanda</i> ...	Gibbins, W. H. ...	... ..	" M.	" ...	... ..	...
*† <i>Ingoma</i> ...	Gibbins, W. ...	S. M. Smith, D. Douglas Kerr, R. Sutcliffe.	" M.	" ...	Forms 911 & 138 27.3.31 to 6.5.31	11.5.31
160 *† <i>Ixon</i> ...	Stewart, J. A. ...	G. L. Oldrich, W. H. Deans, F. G. Brown.	M.L.	A. Holt ...	Form 915 9.10.30 to 18.3.31	29.5.31
<i>Jamaica Merchant</i>	Bach, L. G., R.D., Lieut.-Commr., R.N.R.	B. W. Smith, D. T. Sharrock, S. G. Scrutton, R. C. Viguris.	"	Jamaica Direct Fruit	" 15.1.31 to 30.5.31	6.6.31
072 ** <i>Jamaica Planter</i> ...	Towell, W. C. ...	C. P. Winand ...	W.T.	" "	Forms 911 & 138 9.4.31 to 3.5.31	15.5.31
<i>Jamaica Producer</i>	Allen, P. D. ...	H. C. Braine ...	No. A.	" "	Form 911 7.5.31 to 2.6.31	12.6.31
<i>Javanese Prince, M.V.</i>	Smith, J. ...	C. E. Edney ...	" A.	Prince ...	" 16.3.31 to 19.5.31	28.5.31
187 *† <i>Jeyapore</i> ...	Harris, W. L. ...	A. G. Edwards ...	" M.	P. & O. ...	Forms 911 & 138 29.11.30 to 23.2.31	2.3.31
188 †† <i>Katsar-i-Hind</i> ...	Headlam, P. C., R.D., Commr., R.N.R.	T. T. Ferguson, H. Flint, S. Hopkins.	" M.	" ...	" 12.4.31 to 19.5.31	30.5.31
189 *† <i>Kalyan</i> ...	Cooper, C. P., O.B.E., R.D., Capt., R.N.R.	M. G. Morris ...	" M.	" ...	" 9.12.30 to 25.1.31	27.1.31
041 *† <i>Karama, M.V.</i> ...	McIntosh, A. ...	K. D. Fisher, N. S. Milne, C. Sendall, A. S. White.	M.L.	Shaw, Savill & Albion	Form 915 15.10.30 to 8.2.31	17.2.31
217 *† <i>Karapara</i> ...	Maclean, A. ...	J. B. Walker, G. Gittings ...	No. M.	British India ...	Forms 911 & 138 4.4.31 to 27.4.31	26.5.31
<i>Karmala</i> ...	McBride, — ...	A. Storr ...	" M.	P. & O. ...	" ...	...
190 *† <i>Kashgar</i> ...	Sudell, F., R.D., Commr., R.N.R.	R. P. Eddy, C. H. Long ...	" M.	" ...	Forms 911 & 138 14.12.30 to 8.3.31	24.3.31
191 *† <i>Kashmir</i> ...	Mallalae, R., Lt.-Commr., R.N.R.	H. M. Webb, F. C. Fairburne	" M.	" ...	Forms 911 & 138 19.12.30 to 22.2.31	26.2.31
114 †† <i>Kenya</i> ...	Grant, W. E. ...	W. H. Brown, R. Lord, A. Ralph.	" M.	British India ...	" 13.3.31 to 23.4.31	26.5.31
218 *† <i>Khandalla</i> ...	Baird, S. K. ...	W. Gordon Jones ...	" M.	" ...	" 27.2.31 to 10.4.31	4.5.31
186 *† <i>Kidderpore</i> ...	Woodroffe, S. Y. ...	R. H. Hand, G. S. B. Coleard	" M.	P. & O. ...	Forms 911 & 138 18.12.30 to 25.2.31	16.3.31
169 ** <i>Kwangchow</i> ...	Stringer, C. B. L. ...	O. Fox ...	M.L.	China Nav. Co. ...	Form 915 1.5.30 to 1.11.30	6.1.31

LIST OF VOLUNTARY OBSERVING SHIPS

V

Name of Vessel.	Captain.	Observing Officers.	Meteoro-logical Equipment.	Line.	Last Log. Register, or Record Contributed. Received up to 12.6.31.	Date Received.
147 †† <i>Laconia</i> ...	Townsend, J. C., R.D., Capt. R.N.R.	J. D. Archer, R. V. Youd, M. Boston.	W.T.	Cunard... ..	Forms 911 & 138 18.5.31 to 7.6.31	11.6.31
193 †† <i>Laguna</i> , M.V. ...	Dunn, R.E., O.B.E. ...	W. Billington	No. A.	Pacific S.N. Co. ...	Form 911 16.5.31 to 2.6.31 ...	5.6.31
193 †† <i>Lahore</i> ...	Hollow, T. H.	J. G. K. Gregory, F. Hull, S. R. Ewa.	„ M.	P & O.	Forms 911 & 138 21.9.30 to 11.2.31	17.2.31
036 †† <i>Lalande</i> ...	Symons, P.	C. Legg	„ A.	Lampport & Holt ...	Form 911 30.1.30 to 24.2.31 ...	4.3.31
036 †† <i>Lancastria</i> ...	Murchie, P. A., R.D., Capt. R.N.R.	J. S. Glendenning, S. Troo- man, N. Kingscote.	W.T.	Cunard	Forms 911 & 138 20.4.31 to 8.5.31	12.5.31
082 †† <i>Laomedon</i> ...	Watson, C. J.	A. E. Martin	No. A.	A. Holt	Form 911 31.1.31 to 23.3.31 ...	30.3.31
082 †† <i>La Paz</i> , M.V. ...	Morgan, D. R.	R. W. Hanson, J. Sutherland, G. Pattison.	„ M.	Pacific S.N. Co. ...	Forms 911 & 138 15.3.31 to 13.4.31	16.4.31
134 †† <i>Laplace</i> ...	Hickman, V. G.	N. R. Perons	„ A.	Lampport & Holt ...	Form 911 10.2.31 to 4.5.31 ...	11.5.31
134 †† <i>Lapland</i> ...	Harvey, H.	W. Jenkins, H. Patterson, R. Farmer.	W.T.	Red Star	Forms 911 & 138 2.5.31 to 23.5.31	26.5.31
076 †† <i>Largs Bay</i> ...	Jermyn, W. M.	F. B. Marsden	No. M.	Aberdeen Common- wealth.	„ „ 14.12.30 to 21.2.31	30.4.31
112 †† <i>La Rosarina</i> ...	Webb, C.	W. S. Hamblin	„ M.	Houlder	„ „ 23.3.31 to 14.5.31	22.5.31
112 †† <i>Lassell</i> ...	Lindsay, J.	P. Casey	„ A.	Lampport & Holt ...	Form 911 11.2.31 to 6.5.31 ...	14.5.31
064 †† <i>Laurentic</i> ...	Hume, R.	C. Cochrane, R. Crangle, R. Conway.	W.T.	White Star	Forms 911 & 138 25.4.31 to 16.5.31	18.5.31
083 †† <i>Lautaro</i> , M.V. ...	Leyne, R. W.	G. A. Thexton	No. M.	Pacific S.N. Co. ...	„ „ 4.11.30 to 22.2.31	2.3.31
254 †† <i>Limerick</i> ...	Molyneux, P. L.	A. M. Dowman, N. A. Thomas	„ M.	Federal	„ „ 22.2.31 to 3.4.31	8.4.31
093 †† <i>Llandaff Castle</i> ...	Attwood J.	T. E. R. Wilford	W.T.	Union Castle	Form 911 26.3.31 to 30.5.31 ...	3.6.31
097 †† <i>Llangibby Castle</i> , M.V.	Harvey, H. B.	H. S. Warren	„	„ „	Forms 911 & 138 31.1.31 to 3.4.31	15.4.31
094 †† <i>Llandoverly Castle</i>	Morgan, A. O., R.D., Commr. R.N.R.	L. H. Farrow, T. C. Goldstone, F. R. Pope.	M.L.	„ „	Form 915 20.9.30 to 24.11.30 ...	3.12.30
216 †† <i>Llanstephan Castle</i>	Bickford, C. N.	T. Campbell, H. Bunn, I. Duncan.	W.T.	„ „	Form 911 9.3.31 to 7.5.31 ...	14.5.31
084 †† <i>Lobos</i> , M.V. ...	Grant, F. H.	R. W. Gill	No. M.	Pacific S.N. Co. ...	Forms 911 & 138 27.12.30 to 16.2.31	21.2.31
084 †† <i>Lochgail</i> , M.V. ...	Scheonbusch, O. V. ...	P. Burrell	„ A.	„ „	„ „ 24.12.30 to 21.3.31 ...	27.3.31
084 †† <i>Loch Katrine</i> ...	Cocks, A.	J. E. Pardoe Matthews ...	„ A.	„ „	„ „ 26.1.31 to 24.4.31 ...	7.5.31
084 †† <i>Lochmonar</i> , M.V. ...	Purvis, A.	F. G. Dawson, A. Yeatman.	„ A.	„ „	„ „ 28.2.31 to 4.4.31 ...	7.4.31
084 †† <i>Logician</i> ...	Herschel, R. J.	T. Winstanley	„ M.	Harrison	„ „ 21.9.30 to 4.10.30 ...	7.10.30
084 †† <i>London Exchange</i>	Griffiths, J.	C. T. V. Rixham	„ A.	Furness Withy ...	„ „ 27.3.31 to 16.4.31 ...	1.5.31
084 †† <i>Lord Antrim</i> ...	Jarvis, F. E.	C. A. Milligan	„ A.	Ulster S.S. Co. ...	„ „ 27.3.31 to 16.4.31 ...	1.5.31
084 †† <i>Loriga</i> , M.V. ...	Grant, F. H.	J. D. Richards, W. Horsfall...	„ A.	Pacific S.N. Co. ...	„ „ 27.3.31 to 16.4.31 ...	1.5.31
008 †† <i>Losada</i> ...	Clapham, E. C.	D. W. Hutchinson	„ M.	„ „	„ „ 27.3.31 to 16.4.31 ...	1.5.31
194 †† <i>Macedonia</i> ...	Dickenson, C. C.	R. A. B. Kimpton	W.T.-M.	P. & O.	Forms 911 & 138 16.5.31 to 4.6.31	10.6.31
013 †† <i>Macharda</i> ...	Hanna, R. G.	C. Lindsay Miller, C. Parry, G. A. Jackson, R. J. Mayne.	No. M.	Brocklebank	„ „ 3.4.31 to 1.5.31	5.5.31
232 †† <i>Madura</i> ...	Parker, A. A.	A. Usher, D. S. Hutton, F. C. Conolly.	„ M.	British India	„ „ 9.1.31 to 14.3.31	17.3.31
078 †† <i>Magician</i> ...	Bury, E. R.	W. E. Shotton	„ M.	Harrison	„ „ 13.9.30 to 5.1.31 ...	8.1.31
048 †† <i>Mahana</i> ...	Cameron, J. M.	H. C. Smith, A. E. Masters, M. G. Stuart.	M.L.	Shaw, Savill & Albion	Form 915 13.9.30 to 5.1.31 ...	8.1.31
141 †† <i>Mahia</i> ...	Andrews, C. M.	G. Sangwin, M. P. Congdon, J. Jackson.	W.T.	„ „ „	Forms 911 & 138 17.9.30 to 18.1.31	26.1.31
140 †† <i>Mahratta</i> ...	Williams, E. R.	T. C. Eddy	No. M.	Brocklebank	„ „ 16.4.31 to 20.5.31 ...	5.6.31
014 †† <i>Mahrona</i> ...	Sharpe, G.	W. Le Brocq	„ M.	„ „	„ „ 10.12.30 to 10.3.31	20.4.31
015 †† <i>Mahsud</i> ...	Kershaw, R. W.	S. Richardson, E. Walker, J. R. Paisley.	„ M.	„ „	„ „ 26.2.31 to 8.5.31	12.5.31
016 †† <i>Maidan</i> ...	Ison, W. A.	F. Moore, F. L. Attwood, L. E. Jeans.	„ M.	„ „	Form 915 6.7.30 to 25.9.30 ...	4.11.30
016 †† <i>Maihar</i> ...	Charlton, W. L.	C. Cadwallar, H. Gillespie, A. D. Spring.	„ A.	„ „	„ „ 18.1.31 to 15.5.31 ...	19.5.31
042 †† <i>Maimoa</i> ...	Johnson, J. W.	A. Winton, E. Sainsbury, D. O. V. Pickersgill.	M.L.	Shaw, Savill & Albion	Form 911 5.3.31 to 21.4.31 ...	27.4.31
018 †† <i>Maimyo</i> ...	Smith, G. C.	J. L. Rodgers	No. A.	Brocklebank	Forms 911 & 138 4.1.31 to 1.4.31	7.4.31
018 †† <i>Makalla</i> ...	Maughan, J. W.	E. Williams	„ M.	Canadian- Australasian	Form 915 4.9.30 to 20.12.30 ...	19.2.31
225 †† <i>Makura</i> ...	MacDonald, D.	J. W. S. Madden, A. P. Cousin, S. H. Crawford, M. V. Langdale, R. B. Denniston.	M.L.	„ „	„ „ 26.11.30 to 4.3.31	1.4.31
019 †† <i>Malakuta</i> ...	Adamson, F. L.	H. Simpson	No. M.	Brocklebank	„ „ 10.1.31 to 10.4.31	15.4.31
020 †† <i>Malancha</i> ...	Whitham, F.	R. Humble, H. B. Kelly, M. Mackenzie.	„ M.	„ „	Form 138 25.10.30 to 15.1.31	29.1.31
219 †† <i>Malda</i> ...	Denne, G. H. A.	D. B. Latun, G. W. P. King, E. B. Cutlack.	„ M.	British India	Forms 911 & 138 9.3.31 to 15.4.31	1.6.31
195 †† <i>Maloja</i> ...	Browning, J. B., R.D., Commr. R.N.R.	R. E. Baldwin-Wiseman ...	„ M.	P. & O.	„ „ 1.1.31 to 2.4.31	8.4.31
196 †† <i>Malwa</i> ...	Britten, P. O.	P. J. Lawrence	„ M.	„ „	Forms 911 & 138 23.3.31 to 1.4.31	9.4.31
053 †† <i>Mamarr</i> ...	Thowless, E.	A. L. Harrop	„ M.	Brocklebank	Form 915 10.5.30 to 25.11.30 ...	5.12.30
053 †† <i>Manchester Brigade</i>	Stott, C. H.	J. H. Round, E. E. Bonnaud, J. Gregory.	M.L.	Manchester Liners ...	Form 911 11.11.30 to 16.12.30 ...	1.1.31
053 †† <i>Manchester Hero</i> ...	Mitchell, G. M.	R. O. Jones	„ A.	„ „	„ „ 16.30 to 3.7.30 ...	23.7.30
053 †† <i>Manchester Producer</i>	Struss, F. D.	T. J. Boyd	No. A.	„ „	Forms 911 & 138 17.11.30 to 6.2.31	14.3.31
028 †† <i>Mandala</i> ...	Whittingham, A. G., R.D., Capt. R.N.R.	W. E. F. Powell	„ M.	British India	„ „ 5.4.31 to 1.5.31	1.6.31
146 †† <i>Mandasor</i> ...	Richardson, T.	F. C. Madden, T. S. Cullen, J. Alexander.	„ M.	Brocklebank	„ „ 12.4.31 to 23.4.31	30.4.31
220 †† <i>Manela</i> ...	Maples, S. H.	T. M. Robertson, L. W. Kerton, F. C. Conolly.	„ M.	British India	„ „ 28.3.31 to 3.5.31	16.5.31
022 †† <i>Manipur</i> ...	Cochran, G. N.	L. F. Dodson, R. Penston, A. Hill.	„ M.	Brocklebank	„ „ 2.3.31 to 3.4.31	8.4.31
221 †† <i>Manora</i> ...	Hudson, H. T., R.D., Commr. R.N.R.	W. Brawn, A. Pyatt, S. A. Richards.	„ M.	British India	„ „ 11.3.31 to 8.5.31	18.5.31
177 †† <i>Mantola</i> ...	James, D. F.	M. Sharp	„ M.	P. & O.	Form 915 2.9.30 to 21.12.30 ...	19.2.31
197 †† <i>Mantua</i> ...	Hignett, R.D., Commr. R.N.R.	F. R. N. Greasley, C. Hay- ward, H. J. Cholerton.	W.T.-M.	Burns Philp	„ „ 21.10.30 to 16.3.31 ...	19.3.31
299 †† <i>Marcella</i> ...	Donaldson, A.	M. Pemberton, W. D. Col- quhoun, A. G. W. Thomas.	M.L.	Ellerman Wilson ...	„ „ 28.12.30 to 21.3.31 ...	26.3.31
222 †† <i>Marengo</i> ...	Aspinall, A. E.	H. Bryan, G. W. Revell, Bean, A.	„	„ „	Forms 911 & 138 9.3.31 to 7.5.31	16.5.31
104 †† <i>Marquesa</i> ...	Sibree, J. S.	W. L. Hepson, F. Brown, C. Newton, J. E. Dobson.	No. M.	British India	„ „ 3.1.31 to 12.4.31 ...	18.4.31
021 †† <i>Margha</i> ...	Hemmings, W. H.	P. Wright, H. Watkins ...	„ M.	Furness Houlder ...	„ „ 16.5.31 to 26.5.31 ...	29.5.31
021 †† <i>Marquesa</i> ...	Smiles, R. S.	J. Wetherall	„ M.	British India	„ „ 19.4.31 to 27.4.31 ...	6.5.31
021 †† <i>Masula</i> ...	Fitt, W. A.	E. B. Cutlack	„ A.	Shaw, Savill & Albion	„ „ 14.3.31 to 26.5.31 ...	29.5.31
044 †† <i>Matakana</i> ...	Gordon, H.	J. G. Allen	M.L.	„ „	„ „ 19.4.31 to 27.4.31 ...	6.5.31
044 †† <i>Mataroa</i> ...	Kershaw, W. A. R. ...	F. Eadon, H. A. Hill, F. C. Charnley, W. West, K. Owen.	„ A.	A. Holt	„ „ 19.4.31 to 27.4.31 ...	6.5.31
023 †† <i>Matheran</i> ...	Mulcahy, J. J.	S. S. Slade, J. F. Butter- worth, W. Cowrie.	No. M.	Brocklebank	Forms 911 & 138 4.5.31 to 4.6.31	8.6.31
223 †† <i>Mattana</i> ...	Green, F. V.	L. A. Burn, J. W. F. Daly ...	„ M.	British India	„ „ 10.5.31 to 21.5.31	28.5.31
024 †† <i>Matra</i> ...	Cornish, N. P.	C. Shaw, W. Robertson, O. Jones, J. Campbell.	„ M.	Brocklebank	„ „ 29.1.31 to 20.2.31	27.2.31
032 †† <i>Mauretania</i> ...	McNeil, S. G. S., R.D., Capt. R.N.R.	W. C. A. Robson, J. Wiseman, W. L. Cox.	W.T.	Cunard	„ „ 10.5.31 to 25.5.31	28.5.31
287 †† <i>Melita</i> ...	Stewart, A.	L. N. Outram, S. W. Keay ...	„ A.	Canadian Pacific ...	„ „ 16.5.31 to 6.6.31	9.6.31
287 †† <i>Mercian</i> ...	Manning, C. H.	F. P. Sheerbad	No. A.	Leyland	Form 911 14.3.31 to 26.5.31 ...	29.5.31
287 †† <i>Meriones</i> ...	Hanney, T. W.	J. G. Jones, G. H. Oldridge ...	„ A.	A. Holt	„ „ 19.4.31 to 27.4.31 ...	6.5.31

Name of Vessel.	Captain.	Observing Officers.	Meteoro- logical Equipment.	Line.	Last Log, Register, or Record Contributed Received up to 12.6.31.	Date Received.
255 *† Middlesex ...	Clarke, P. B. ...	J. Lunnon, J. Ricketts, R. Stephens, J. Halliday.	M.L.	Federal... ..	Forms 911 & 138 8.7.30 to 12.8.30	20.11.30
312 *† Minderoo ...	Macphedran W. J. ...	A. J. Perry ...	No. M.	Western Australian S.N. Co.	" " 12.3.31 to 19.4.31	2.6.31
Minna ...	Mackenzie, G. G. ...	A. M. Campbell ...	" A.	Scottish Fishery Brd.	Form 911 16.5.31 to 27.5.31	2.6.31
283 †† Minnedosa ...	Carr-Jones, D. T. ...	W.T.	" M.	Canadian Pacific ...	" " 20.4.31 to 30.4.31	14.5.31
068 †† Minnetonka ...	Gates, T. F., C.B.E. ...	H. E. D. McCartney, W. T. Harrison, T. Pullan.	No. M.	Atlantic Transport...	Forms 911 & 138 11.5.31 to 30.5.31	2.6.31
069 †† Minnewaska ...	Claret, F. H., C.B.E., Commr., R.N.R.	E. Pengelly, J. Grier, D. Davies.	W.T.-M.	" " ...	" " 27.4.31 to 16.5.31	19.5.31
Mississippi, M.V. ...	Finch, E. ...	A. C. Clay ...	No. A.	British India ...	Form 911 10.2.31 to 26.3.31	2.4.31
224 *† Modasa ...	Gilchrist, J. W. ...	W. Ascroft, H. C. Pearson.	" M.	" " ...	Forms 911 & 138 18.3.31 to 1.6.31	6.6.31
199 †† Mongolia ...	Rhodes, H. R. ...	H. Tee ...	" M.	Union S.S. of N.Z. ...	" " 20.4.31 to 30.4.31	14.5.31
Monowai ...	Toten, A. T. ...	" " ...	M.L.	Canadian Pacific ...	Forms 911 & 138 15.2.31 to 7.3.31	11.3.31
148 †† Montcalm ...	Rothwell, A. ...	T. L. Gillette, A. Mackie, A. Vaughan	W.T.-M.	" " ...	" " 3.5.31 to 22.5.31	1.6.31
149 †† Montclare ...	Carr-Jones, D. J. ...	A. Watt, J. Sharples, J. Soames, R. M. A. Stapleton.	"	" " ...	" " 4.4.31 to 23.4.31	27.4.31
150 †† Montrose ...	Dott, J. F. ...	K. Hutchings, J. M. Roche, E. A. Shergold, R. M. A. Stapleton.	W.T.	" " ...	Forms 911 & 138 7.2.31 to 14.5.31	19.5.31
164 †† Mooltan ...	Morton, A. J. ...	R. M. Richardson, J. C. Ablewhite, H. Fitz Marshall, J. L. Dunkley.	No. M.	P. & O. ...	Forms 911 & 138 29.3.31 to 30.4.31	5.5.31
226 †† Mulbera ...	Caffyn, F. ...	G. H. Springer ...	" M.	British India ...	" " ...	...
290 *† Musician ...	Bostock, O. ...	K. H. Davies ...	" M.	Harrison ...	" " ...	...
073 *† Nagara ...	Cocks, A. ...	R. L. Matheson... ..	" M.	R.M.S.P. Co ...	Form 915 13.12.30 to 18.3.31	26.3.31
201 †† Naldara ...	Harrison, R., D.S.O., R.D., Capt. R.N.R.	J. O. Divers, C. W. Mayne, M. F. Shute, H. J. Mann.	M.L.	P. & O. ...	" " 1.11.30 to 1.3.31	4.3.31
227 *† Nardana ...	Reilly, J. V. ...	H. Goater, H. Grace, A. Woodward, R. D. Macfadyen.	"	British India ...	Forms 911 & 138 3.1.31 to 26.3.31	2.4.31
118 ** Narenta ...	Falconer, A. C. ...	G. S. Grant, G. D. Bonner, M. A. Murch.	No. M.	R.M.S.P. Co. ...	" " 1.5.31 to 12.5.31	8.6.31
202 †† Narkunda ...	Biggs, J. H., R.D. Commr., R.N.R.	C. H. Moulton, J. C. Davies...	" M.	P. & O. ...	Forms 911 & 138 23.4.31 to 8.5.31	27.5.31
136 *† Navigator ...	Curphey, E. B. ...	T. R. Hill ...	W.T.	Harrison ...	" " 20.4.31 to 15.5.31	19.5.31
305 *† Nebraska ...	Bridges, E. A. ...	A. Frogbrook, W. S. Thomas, P. R. Cocks.	No. M.	R.M.S.P. Co. ...	Form 915 31.10.30 to 28.1.31	28.2.31
203 †† Nellore ...	Gordon, A. S. ...	L. J. Dixon, J. F. M. Heddle, H. E. Nuzum, J. Kavanagh.	M.L.	E. & A. S.S. Co. ...	" " 4.1.31 to 8.5.31	23.5.31
162 *† Nestor ...	Adcock, F. ...	W. T. Harris, P. Elder, W. Pearse.	"	A. Holt ...	Form 911 4.4.30 to 5.7.30	10.7.30
Nevisian ...	McCormick, J. ...	" " ...	No. A.	Leyland ...	Form 915 18.9.30 to 1.2.31	14.2.31
Newfoundland ...	Foxworthy, A. W. ...	R. F. Handley, E. Sainty, J. L. Macklin.	M.L.	Furness Withy ...	" " 13.11.30 to 23.2.31	30.4.31
210 ** Niagara ...	Hill, T. V. ...	G. H. Kime, D. A. Menlove, L. P. Bourke, J. W. T. Madden.	"	Canadian-Australasian	Form 911 5.1.31 to 16.1.31	23.1.31
Ningchow ...	Beale, H. E. ...	E. Butler ...	No. A.	A. Holt ...	Forms 911 & 138 17.6.30 to 6.7.30	29.7.30
229 *† Nirvana ...	Ayres, R. M. ...	S. H. Kinson, J. B. Hore, A. H. Baird.	" M.	British India ...	Form 915 1.12.30 to 22.3.31	25.3.31
256 *† Norfolk ...	Howell-Price, J., D.S.O., D.S.C.	G. C. Hocart, K. M. Lloyd Jones, L. Hanley.	M.L.	Federal ...	Form 911 1.5.31 to 3.5.31	3.6.31
270 *† Norman Star ...	Sinclair, J. ...	R. J. Wills ...	No. M.	Blue Star ...	Form 911 13.7.30 to 6.8.30	28.8.30
Norna ...	Angus, W. ...	T. R. Ness ...	" A.	Scottish Fishery Brd	Forms 911 & 138 9.11.30 to 16.12.30	22.4.31
100 *† Norseman, C.S. ...	Hammond, S. M. ...	R. Moss ...	" M.	Western Tel. Co. ...	" " 8.12.30 to 10.3.31	1.4.31
297 *† Northumberland ...	Upton, H. L., D.S.C., R.D., Commr., R.N.R.	R. S. Miller, H. Rogers, G. B. Cathie.	" M.	Federal... ..	Form 915 8.10.30 to 12.3.31	20.3.31
267 *† Novara ...	Dene, R. C. ...	N. W. Leach ...	" M.	P. & O. ...	Forms 911 & 138 18.1.31 to 29.1.31	11.5.31
Nova Scotia ...	Furieux, S. J. ...	J. E. Wilson, A. Hender, N. Forsythe, F. H. Jones.	M.L.	Furness Withy ...	" " 17.2.31 to 22.3.31	20.4.31
230 *† Nowshera ...	Longhurst, J. H. ...	R. Burch, B. H. Bentall.	No. M.	British India ...	" " ...	...
231 *† Nuddea ...	Beeching, P. H. ...	D. A. Jones, W. Monk, W. G. Pitcher.	" M.	" " ...	" " ...	...
Oaklands Grange ...	Phillips, A. G. M. ...	J. C. Thomas ...	" A.	Houlder Bros. ...	Form 911 30.5.30 to 18.9.30	4.10.30
243 *† Opawa ...	Robinson, F. W. ...	J. W. Pring ...	" M.	New Zealand S.S. Co.	Forms 911 & 138 2.2.31 to 5.5.31	8.5.31
170 †† Orama ...	Staunton, H. G., C. B. E., R. D., Commr., R.N.R.	W. Elliot, K. Morrison, R. W. Roberts.	W.T.	Orient ...	Form 911 26.11.30 to 17.1.31	29.1.31
Oranlian ...	Gittings, R. P. ...	H. O. Quinn ...	No. A.	Leyland ...	Forms 911 & 138 3.2.31 to 10.4.31	21.4.31
309 †† Orbita ...	Kite, E. ...	D. W. Hutchinson, L. J. Smith	W.T.-M.	Pacific S.N. Co. ...	" " 10.3.31 to 18.5.31	28.5.31
086 †† Orcoma ...	Benson, E. W. ...	W. J. Rutter, G. H. Pilling.	"	" " ...	" " 10.1.31 to 23.3.31	2.4.31
087 †† Orduña ...	Ridyard, A., O.B.E. ...	T. J. Naylor, R. F. A. Cox, E. B. James.	"	" " ...	Form 911 15.7.30 to 6.8.30	23.9.30
258 *† Oregon Star ...	Lewis, G. ...	E. T. Blaxland ...	No. M.	Blue Star ...	Telegraphic Report, 10.6.31	10.6.31
171 †† Orford ...	Owens, A. L., Commr. R.D., R.N.R.	B. W. Gorman, B. H. Jones, C. H. Denton.	" M.	Orient ...	Form 911 4.5.31 to 7.6.31	9.6.31
174 †† Ormonde ...	James, L. V., D.S.C.	T. L. Shurrock, N. Smith, C. Blake.	W.T.	" " ...	" " 3.2.31 to 23.4.31	12.5.31
172 †† Cronsay ...	Cameron, E. P., R.D., Commr., R.N.R.	E. M. Mackay, D. Madeley	"	" " ...	Forms 911 & 138 11.5.31 to 30.5.31	1.6.31
173 †† Orontes ...	O'Sullivan, F. R. ...	J. M. N. Swanson, S. Burnand, W. McKay.	No. M.	" " ...	Form 915 1.8.30 to 5.12.30	9.12.30
089 *† Oroya ...	Galloway, M. ...	J. M. Forsyth, J. Ayland, E. S. Jones.	" M.	Pacific S.N. Co. ...	" " ...	...
105 †† Orsova ...	Thorne, G. G., R.D. Commr., R.N.R.	R. B. Stannard ...	W.T.	Orient ...	" " ...	...
237 *† Otaki ...	Maltby, T. L. ...	A. V. Pearce, N. Baddeley, J. H. Underwood.	M.L.	New Zealand S.S. Co.	Form 915 31.8.30 to 6.2.31	17.2.31
Pacific Enterprise, M.V. ...	Newman, G. W. A. ...	" " ...	No. A.	Furness Withy ...	" " ...	...
279 *† Pacific Exporter ...	Holland, C. E., R.D., Commr., R.N.R.	A. L. Knapp ...	W.T.	" " ...	Forms 911 & 138 13.3.31 to 4.6.31	8.6.31
Pacific Shipper, M.V. ...	Goodwin, J. ...	S. Porter ...	No. A.	" " ...	Form 911 24.2.31 to 28.5.31	2.6.31
176 *† Pakeha ...	Elford, H. C. ...	A. J. Tillott ...	M.L.	Shaw, Savill & Albion	Forms 911 & 138 2.2.31 to 13.3.31	17.3.31
Pancras ...	Barlow, F. P. ...	L. A. Sayers, S. Adams ...	" A.	Booth ...	Form 915 13.12.30 to 2.2.31	13.2.31
Pareora ...	Evans, J. O. ...	C. Parry ...	No. A.	" P" Steamers, Ltd.	Form 911 15.7.30 to 6.8.30	23.9.30
Paris ...	Hill, A. ...	T. Mahoney ...	C.C.	Southern Rly. ...	Telegraphic Report, 10.6.31	10.6.31
Patia ...	Sapsworth, S. A. ...	R. O. Laycock, R. S. Howlett.	No. A.	Elders & Fyffes ...	Form 911 4.5.31 to 7.6.31	9.6.31
Peisander ...	Findlay, J. ...	C. T. Morgan ...	" A.	A. Holt ...	" " 3.2.31 to 23.4.31	12.5.31
058 †† Pennland ...	Making, V. L. ...	J. C. Flett ...	W.T.	Red Star ...	Forms 911 & 138 11.5.31 to 30.5.31	1.6.31
204 *† Peshawur ...	McBryde, A. M. ...	D. Meikle, J. T. Sheffield, T. E. Wrigley, M. P. Fyrtch, G. A. Nixon.	M.L.	P. & O. ...	Form 915 1.8.30 to 5.12.30	9.12.30
238 *† Piako ...	Aslin, E. P. C. ...	A. D. Wilson, A. W. Marshall, R. H. Carter.	No. M.	New Zealand S.S. Co.	Forms 911 & 138 9.3.31 to 22.4.31	1.6.31

LIST OF VOLUNTARY OBSERVING SHIPS

vii

Name of Vessel.	Captain.	Observing Officers.	Meteoro-logical Equipment.	Line.	Last Log. Register, or Record Contributed. Received up to 12.6.31.	Date Received.
039 *† <i>Planter</i>	Packe, M. G.	— Eustance	No. M.	Harrison	Form 911 16.2.31 to 26.3.31 ...	13.4.31
128 *† <i>Polycarp</i>	Furner, F. S.	A. S. Richardson	" A.	Booth	Form 915 14.1.31 to 16.5.31 ...	27.5.31
129 *† <i>Port Auckland</i>	Kippins, T.	R. Forrest, A. Brown, E. Mickleburgh.	M.L.	Commonwealth & Dominion.	Form 911 3.1.31 to 28.4.31 ...	5.5.31
129 *† <i>Bowen</i>	Brown, A. H.	F. R. Gorman	No. A.	" " "	Form 915 7.10.30 to 25.1.31 ...	31.1.31
136 *† <i>Campbell</i>	Gregory, S.	J. C. Goddard, N. M. Muzzell, C. Midwinter.	M.L.	" " "	" 16.12.30 to 23.4.31 ...	1.5.31
131 *† <i>Caroline</i>	Hearn, G. W.	V. G. Battle, E. W. R. Young, R. E. Garner.	"	" " "	" 19.10.30 to 22.3.31 ...	1.4.31
132 *† <i>Darwin</i>	Lewis, J. G.	K. D. Morgan, W. R. Johnson, A. J. Knell, L. C. Asser.	"	" " "	" 4.11.30 to 10.3.31 ...	1.4.31
132 *† <i>Denison</i>	Hall, G. S.	A. G. Newbury, R. A. Holloway, H. Duckling.	"	" " "	" 7.12.30 to 30.3.31 ...	9.4.31
133 *† <i>Dunedin, M.V.</i>	Mason, W. S., D.S.C.	H. M. Post, C. A. Hodson, R. W. Chamberlain.	"	" " "	Form 911 20.11.30 to 5.2.31 ...	12.3.31
" <i>Fairy</i>	Farmar, F.	J. Stannard, W. G. Jones, P. J. Howe.	No. A.	" " "	" 27.2.31 to 5.2.31 ...	18.4.31
" <i>Fremantle, M.V.</i>	Gilling, W.	L. J. Skailes	" A.	" " "	Form 915 7.10.30 to 29.1.31 ...	5.2.31
" <i>Gisborne, M.V.</i>	Hayter, S. W.	G. T. C. Harris, C. R. Townshend, W. M. Clough, P. A. Manday.	" A.	" " "	" 7.9.30 to 8.1.31 ...	15.1.31
135 *† <i>Hunter</i>	Higgs, W. G.	E. N. Rogerson, R. D. Elson, E. N. Howard, S. Ward.	M.L.	" " "	" 6.12.30 to 26.4.31 ...	11.5.31
137 *† <i>Nicholson</i>	Gregory, S. E. A.	G. W. Horton, H. E. Braine, R. C. H. Webb.	"	" " "	Form 911 24.10.30 to 12.2.31 ...	16.2.31
138 *† <i>Pirte</i>	Jack, J.	W. B. Hopkins	No. A.	" " "	Forms 911 & 138 19.4.31 to 7.5.31 ...	1.6.31
" <i>Wellington</i>	Jones, C. N.	E. Loughheed, O. S. Sheard ...	" M.	Houlder	Form 915 17.5.30 to 30.11.30 ...	2.2.31
106 *† <i>Princesa</i>	Friend, A. B.	J. Cooper, J. Holden, H. N. Hardie.	" M.	A. Holt	Form 911 17.4.31 to 18.5.31 ...	4.6.31
163 *† <i>Protesilaus</i>	Holden, W. R. F.	J. C. Podmore	M.L.	" " "	Forms 911 & 138 22.2.31 to 28.5.31 ...	8.6.31
<i>Pyrrhus</i>	Wilkinson, T. G.	G. A. Wild, D. Buckley, H. V. Williamson.	No. A.	" " "	" 30.4.31 to 3.6.31 ...	6.6.31
205 †† <i>Rajputana</i>	Jask, H. M.	G. Harvey, C. F. Minshall, A. L. Lewis.	" M.	P. & O.	" 15.2.31 to 22.4.31 ...	29.4.31
063 *† <i>Rancher</i>	McCullum, J.	T. A. Sergeant	" M.	Harrison	Form 915 13.2.31 to 28.5.31 ...	2.6.31
228 †† <i>Ranchi</i>	Brooks, C., D.S.O., R.D., Capt. R.N.R.	A. Brown, R. C. Aldridge, C. J. P. Guille.	M.L.	New Zealand S.S. Co.	Forms 911 & 138 17.1.31 to 29.4.31 ...	16.5.31
236 †† <i>Rangitane M.V.</i>	Holland, E.	J. Oxnard, D. Chadwick, S. Leggett.	W.T.-M.	" " "	" 22.11.30 to 3.3.31 ...	14.3.31
257 †† <i>Rangitika M.V.</i>	Hunter, J. L. B.	L. F. Maccouronne, H. K. Cockerill, C. Cruttenden.	"	" " "	" 28.2.31 to 9.4.31 ...	13.4.31
240 †† <i>Rangitiki M.V.</i>	Barnett, H.	J. Strike, R. A. Perry, D. S. Charks.	No. M.	P. & O.	Form 911 17.5.31 to 27.5.31 ...	3.6.31
207 †† <i>Ranpura</i>	Furlong, G. H. S.	H. J. M. Perry	" M.	" " "	Form 911 & 138 24.1.31 to 30.4.31 ...	8.5.31
071 †† <i>Rawalpindi</i>	Stringer, O. B. E., R.D., Commr. R.N.R.	G. Morrice	" M.	Harrison	Form 911 14.4.31 to 3.6.31 ...	11.6.31
247 *† <i>Recorder</i>	Egerton, J. J.	E. C. Hicks	" M.	Pacific S.N. Co. ...	Form 915 24.10.30 to 8.2.31 ...	14.2.31
306 *† <i>Reina del Pacifico, M.V.</i>	Roberts, E.	A. J. Angell, A. T. H. Weatherall, J. R. Vincent, H. N. Lawson.	M.L.	New Zealand S.S. Co.	Form 911 4.2.31 to 16.3.31 ...	19.3.31
239 *† <i>Remuera</i>	Holland, E. A.	C. Anderson	No. A.	A. Holt	" 17.10.30 to 1.2.31 ...	17.2.31
" <i>Rhexenor</i>	Stout, G. L.	H. S. Butler	" A.	Houlder Bros. ...	" 10.3.31 to 31.3.31 ...	8.4.31
" <i>Rhodesian Trans-</i>	Bowen, A. C.	J. A. Ferguson	" A.	Union Castle	" 21.3.31 to 11.4.31 ...	14.5.31
" <i>Ripley Castle</i>	Goodacre, R. W.	F. Wright	" A.	Goole Steam Shipping	Form 915 4.10.30 to 14.2.31 ...	19.2.31
" <i>Rother</i>	Woodhead, T. H.	G. C. Saul, L. W. Fulcher, H. Hill, A. I. Robertson.	M.L.	New Zealand S.S. Co.	Forms 911 & 138 16.12.30 to 10.3.31 ...	18.3.31
241 *† <i>Rotorua</i>	Lamb, C. B.	A. F. Day, J. Hoggins ...	No. M.	Blue Star	" 20.12.30 to 6.4.31 ...	9.4.31
062 *† <i>Royal Star</i>	Walsh, W.	A. Hocken, R. Warren, R. Hamilton.	W.T.	New Zealand S.S. Co.	Form 915 8.12.30 to 29.3.31 ...	29.5.31
246 *† <i>Ruahine</i>	Urquhart, D.	F. O. Colvin, C. Stratford, R. Millington.	M.L.	Eastern and Aus- tralian.	Telegraphic Report 11.6.31 ...	11.6.31
300 ** <i>St. Albans</i>	Diamond, S. L.	A. E. Ricketts, H. D. Freeman.	C.C.	G.W. Railway ...	" 6.6.31 ...	6.6.31
" <i>St. Helier</i>	Pitman, R.	F. E. Martin	"	" " "	10.9.30 ...	10.9.30
" <i>St. Julien</i>	Richardson, L.	A. MacKellar, F. G. Watts, J. A. Myles.	W.T.	Cunard	Forms 911 & 138 3.3.31 to 7.4.31 ...	14.4.31
038 †† <i>St. Patrick</i>	Malin, R. G., Lieut.-Commr. R.N.R.	M. L. Hodson, G. Thomson.	No. A.	Union Castle ...	Form 911 21.1.31 to 23.4.31 ...	14.5.31
" <i>Sandgate Castle</i>	Aylen, C. E. H.	H. P. Clegg, G. E. Harris ...	" A.	Prince	" 19.4.31 to 10.5.31 ...	1.6.31
" <i>Sardinian Prince</i>	Pearson, F. T.	A. H. D. Cambridge	" A.	Union Castle ...	" 10.4.31 to 1.6.31 ...	9.6.31
291 *† <i>Saxon</i>	Jackson, C. R.	J. Richardson, A. Robertson	" M.	Harrison	Forms 911 & 138 20.3.31 to 24.5.31 ...	2.6.31
" <i>Scholar</i>	Peterkin, A. G.	W. H. Hughes	C.C.	L.M. & S. Railway	Telegraphic Report 12.6.31 ...	12.6.31
033 †† <i>Scythia</i>	O'Neill, J.	F. P. Collins, A. Bridgewater, H. L. Pryse.	W.T.	Cunard	Forms 911 & 138 4.5.31 to 23.5.31 ...	27.5.31
" <i>Sea Victory</i>	Gibbons, G., R.D., R.N.R.	P. Curley	No. A.	Dover Navigation ...	Form 915 10.1.31 to 19.3.31 ...	21.3.31
211 *† <i>Shropshire, M.V.</i>	Gammon, G. H.	R. Cuming, C. F. Hicks, E. W. Jefferies, D. Hetherington.	M.L.	Bibby	Form 911 7.2.31 to 13.3.31 ...	8.4.31
" <i>Silksworth</i>	Blacklock, G.	F. J. Muttitt	No. A.	R. S. Dalgleish ...	Form 911 3.1.31 to 21.3.31 ...	27.3.31
" <i>Somali</i>	Kemp, T. H.	H. W. Vickers, A. Kirk ...	" A.	Ellerman Wilson ...	Form 915 17.10.30 to 12.12.30 ...	29.12.30
277 *† <i>Spero</i>	Montgomery, H.	J. Whayman, D. H. Daniels	M.L.	Booth	Form 915 24.11.30 to 7.4.31 ...	15.4.31
" <i>Stephen</i>	Jones, W. C. H., R.D., Commr. R.N.R.	R. Rees, D. J. Murray, — Lock, — MacRillican.	"	Federal	Form 911 26.12.30 to 23.4.31 ...	6.5.31
259 *† <i>Surrey</i>	Lettington, A. E.	J. R. Faulkner	No. A.	Houlder Bros. ...	" 4.4.31 to 8.5.31 ...	14.5.31
" <i>Sutherland Grange</i>	Matthews, S.	J. Johnson	" A.	Hunting & Son ...	Form 915 30.1.31 to 15.5.31 ...	23.5.31
" <i>Sylvanfield, M.V.</i>	MacDonald, W.	G. A. Harvey, E. Baker, A. G. Collins.	M.L.	Shaw, Savill & Albion	Forms 911 26.12.30 to 3.5.31 ...	8.6.31
045 †† <i>Tainui</i>	Clifton Mogg, W. P., Lieut.-Commr. R.N.R.	M. H. Vincent, T. G. Hardy, R. Potter, R. F. Weatherseed.	No. M.	British India ...	Forms 911 & 138 27.2.31 to 16.5.31 ...	10.6.31
081 *† <i>Tairoa</i>	Christie, D.	L. R. Bull, R. R. Roseman, F. Lutyen, T. Chapman.	W.T.-M.	Shaw, Savill & Albion	Form 915 5.12.30 to 25.2.31 ...	4.5.31
234 *† <i>Talma</i>	Harley, G. J.	V. C. Lette, R. Lloyd-Harry, B. M. Dun, G. Chadwick-Smith.	M.L.	E. & A. S.S. Co. ...	" 6.9.30 to 8.1.31 ...	16.1.31
046 †† <i>Tamaroa</i>	Hartman, W. H.	F. C. Oppen, R. M. Gray, W. J. Ryan.	"	A. Holt		
264 ** <i>Tanda</i>	Pilcher, E. T., Lieut.-Commr. R.N.R.					
165 *† <i>Tantalus, M.V.</i>	Dodds, R.					

Name of Vessel.	Captain.	Observing Officers.	Meteoro-logical Equipment.	Line.	Last Log. Register, or Record Contributed. Received up to 12.6.31.	Date Received.
047 *† <i>Taranaki</i> , M.V. ...	Wood, C., D.S.C. ...	G. Cope, R. Reed, K. A. Gordon, S. P. Wallis.	M.L.	Shaw, Savill & Albion	Form 915 10.1.31 to 19.3.31 ...	24.3.31
<i>Tarantia</i> ...	Caithness, J. B. ...	J. M. Cherry ...	No. A.	Anchor ...	Form 911 15.2.31 to 3.4.31 ...	9.4.31
<i>Tasmania</i> ...	Williams, J. V. ...	R. J. Coffey ...	" A.	New Zealand S.S. Co. ...	" 2.12.30 to 2.5.31 ...	8.5.31
<i>Teivestas</i> ...	Wilkinson, W. H. ...	F. Stott ...	" A.	A. Holt & Co. ...	" 18.3.31 to 6.6.31 ...	10.6.31
<i>Telamon</i> ...	Brown, R. ...	G. Edge ...	" A.	A. Holt ...	" 26.10.30 to 23.11.30 ...	10.12.30
<i>Tetela</i> ...	Brice, E. H. ...	F. P. Inch, G. Roberts, J. W. Jone.	" A.	Elders & Fyffes ...	" 31.3.31 to 3.5.31 ...	7.5.31
<i>Teucer</i> ...	Davies, J. ...	C. C. L'Estrange ...	" A.	A. Holt ...	" 15.3.31 to 7.4.31 ...	1.5.31
<i>Theseus</i> ...	Carnon, C. G. ...	D. S. Bruce ...	" A.	" ...	" 4.4.31 to 14.4.31 ...	22.4.31
007 *† <i>Thistle</i> ...	Whitfield, G.A., O.B.E.	S. B. Davis, H. B. Meek, G. L. Hetherington.	M.L.	Allan Black & Co. ...	Form 915 12.2.31 to 14.5.31 ...	18.5.31
235 *† <i>Tilawa</i> ...	Coleborn, E. ...	F. R. Kent Langdon, J. C. Haigh, J. W. Walker.	No. M.	British India ...	Form 911 28.2.31 to 8.4.31 ...	4.5.31
168 *† <i>Tinhow</i> ...	Chicken, W. E. ...	G. W. Seth, P. Aydon, E. Smith.	"	A. Weir & Co. ...	Forms 911 & 138 26.11.30 to 10.2.31	21.3.31
161 *† <i>Titan</i> ...	Elford, W. J. ...	F. B. Smith, A. K. Sanderson, J. Gould.	M.L.	A. Holt ...	Form 915 27.10.30 to 24.3.31 ...	2.4.31
244 *† <i>Tongariro</i> ...	Hamilton, F. S. ...	F. S. Cashmore, G. Dibley, W. Redwood, D. Baldwin, E. G. Williams.	"	New Zealand S.S. Co. ...	" 27.9.30 to 29.1.31 ...	5.2.31
025 †† <i>Transylvania</i> ...	Bone, D. W. ...	A. Middleton ...	W.T.	Anchor ...	Forms 911 & 138 26.4.31 to 17.5.31	19.5.31
288 *† <i>Traveller</i> ...	Barrow, W. T. C. ...	R. Ledger ...	No. M.	Harrison ...	" 15.2.30 to 11.5.31	18.5.31
<i>Trecarrell</i> ...	Old, E. G. ...	W. E. McEwan, G. A. Solly	" A.	Hain S.S. Co. ...	Form 911 26.3.31 to 29.4.31 ...	19.5.31
242 *† <i>Trematon</i> ...	Cundy, F. ...	J. Jenkyn, C. M. Quick, R. Stinson, W. B. Paul, T. M. Meakin, R. S. Davies.	M.L.	" ...	Met. Log. 16.9.29 to 8.3.30...	25.3.30
119 *† <i>Trojan Star</i> ...	Griffin, G. A. ...	A. Emerson, L. S. Hassell ...	No. M.	Blue Star ...	Forms 911 & 138 18.1.31 to 8.4.31...	4.5.31
245 *† <i>Turakina</i> ...	Laird, J. ...	A. E. Bainforth, H. Smith, J. Gould.	" M.	New Zealand S.S. Co. ...	" 12.10.30 to 7.2.31	12.2.31
276 †† <i>Tuscania</i> ...	Rome, W. B. ...	D. Blair, G. Noble, H. Campsie.	W.T.	Anchor ...	" 3.5.31 to 24.5.31	27.5.31
167 *† <i>Tyndareus</i> ...	Findlay, J. ...	J. R. C. Evans, M. J. Case, W. F. Lochead, E. B. Sandon.	M.L.	A. Holt ...	Form 915 24.6.30 to 2.12.30...	3.2.31
113 *† <i>Uffington Court</i> ...	Clarke, E. J. ...	T. Glover ...	No. A.	Haldin & Co. ...	Form 911 16.12.31 to 15.3.31 ...	13.4.31
<i>Upwey Grange</i> , M.V.	Goodrick, H. P. ...	P. J. Walker ...	" M.	Houlder ...	Forms 911 & 138 1.5.31 to 20.5.31	26.5.31
292 †† <i>Viceroy of India</i> ...	Thornton, E. J. R.D., Capt., R.N.R.	W. R. B. Neall, C. S. Cooke	" M.	P. & O. ...	" 17.5.31 to 1.6.31...	6.6.31
<i>Vigilant</i> ...	Simpson, E. S. S. ...	J. Wilson ...	" A.	Scottish Fishery Brd.	Form 911 3.5.31 to 26.5.31 ...	1.6.31
206 ** <i>Watotapu</i> ...	Hender, W. H. ...	J. E. Warwick, C. T. Robb, G. M. Coote.	" M.	Union S.S. Co. of N.Z.	" 16.11.30 to 10.12.30 ...	28.1.31
263 ** <i>Wairuna</i> ...	Stewart, A. R. ...	G. M. Coote.	M.L.	" ...	Form 915 4.7.30 to 6.10.30 ...	28.11.30
<i>Warfield</i> ...	Steele, R. ...	J. Gunning ...	No. A.	British Tankers ...	Form 911 23.2.31 to 7.3.31 ...	16.3.31
011 *† <i>War Nizam</i> ...	Penton, P. M. ...	D. P. E. Jones ...	" M.	Red Star ...	" ...	"
005 †† <i>Warwick Castle</i> ...	Owens, G. ...	Doughty, J. ...	W.T.	Red Star ...	Forms 911 & 138 26.4.31 to 16.5.31	18.5.31
060 †† <i>Westernland</i> ...	Reilly, H. E. ...	J. D. Marks, D. Clegg, J. Reeve.	M.L.	Federal ...	Form 915 21.9.30 to 30.1.31 ...	6.2.31
260 *† <i>Westmoreland</i> ...	Reilly, H. E. ...	J. D. Marks, D. Clegg, J. Reeve.	M.L.	Federal ...	Form 915 21.9.30 to 30.1.31 ...	6.2.31
<i>William Scoresby</i> , R.R.S.	Irving, J. J. C., Lieut. Commr., R.N.	W. A. Ellison, L. C. Hill, C. A. Millward.	"	Falkland Islands Government.	" 17.11.30 to 1.4.31 ...	8.6.31
208 †† <i>Winchester Castle</i> M.V.	Gardner, G. F., O.B.E., Lieut.-Commr., R.N.R.	G. F. Moon, A. G. Parey ...	W.T.	Union Castle ...	Forms 911 & 138 4.3.31 to 19.4.31	21.4.31
096 †† <i>Windsor Castle</i> ...	Chave, Sir B., K.B.E.	E. H. Dixey, J. L. Goatley, J. Trayner, D. P. H. Klaseen.	M.L.	" ...	Form 915 20.9.31 to 15.3.31 ...	30.3.31
<i>Worthing</i> ...	Marmery, S. ...	C. Munton, E. Balcombe ...	C.C.	Southern Railway ...	Telegraphic Report 11.6.31 ...	11.6.31
043 ** <i>Zealandic</i> , M.V. ...	Gaskell, J. H., R. D., Lieut. Commr., R.N.R.	P. Horwood, J. Thompson, B. Morris.	W.T.	Shaw, Savill & Albion	Forms 911 & 138 20.2.31 to 27.3.31	30.3.31
<i>Zent</i> ...	Bower, H. C. ...	W. A. Phillips, R. J. Holt Hobson.	No. A.	Elders & Fyffes ...	Form 911 7.1.31 to 9.2.31 ...	16.2.31
<i>Conway</i> , H.M.S. ...	Richardson, F. A., D.S.C., Commr., R.N.	The Senior Cadets ...	Cadets' M.L.	" ...	Cadets' Met. Log. 18.1.31 to 28.3.31	2.4.31
<i>Pangbourne Nautical College</i>	Tracy, A. F. G., Commr., R.N.	" ...	"	" ...	Cadets' Met. Log. 19.1.31 to 24.3.31	2.4.31
<i>Worcester</i> , H.M.S.	Steele, G. C., V.C., Lieut.-Commr., R.N.	" ...	"	" ...	Cadets' Met. Log. 23.1.31 to 15.4.31	20.4.31
<i>Abaco</i> ...	" ...	The Keepers ...	Lighthouse Register.	" ...	Lighthouse Register 1.7.30 to 31.12.30	22.5.31
<i>Cay Lobos</i> ...	" ...	" ...	"	" ...	Lighthouse Register 24.5.30 to 31.12.30	22.5.31
<i>Double Headed Shot</i> ...	" ...	" ...	"	" ...	Lighthouse Register 1.7.30 to 31.12.30	22.5.31
<i>Inagua</i> ...	" ...	" ...	"	" ...	Lighthouse Register 15.8.30 to 22.2.31	22.5.31
<i>Sombrero</i> ...	" ...	" ...	"	" ...	Lighthouse Register 1.7.30 to 31.12.30	28.1.31
<i>Watling Island</i> ...	" ...	" ...	"	" ...	Lighthouse Register 1.7.30 to 31.12.30	22.5.31
<i>Cape Pembroke</i> (Falkland Is.)	" ...	" ...	"	" ...	Lighthouse Register 1.7.30 to 31.12.30	19.2.31

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

Name of Vessel.	Captain.	Observing Officer.	Line.	Last Case of Water Samples, Reports, etc., received up to 31.5.31.	Date Received.
<i>Darian</i> ...	Hannaford, W. ...	D. G. Longmuir ...	Leyland ...	Water Samples ...	15.4.31
<i>Darro</i> ...	Green, J. ...	J. M. Phillips ...	R.M.S.P. Co. ...	" ...	7.4.31
<i>Davistan</i> ...	Trickey, J. ...	F. Steventon ...	Leyland ...	" ...	30.4.31
<i>Dorelian</i> ...	Hugan, C. ...	F. R. Hicken ...	" ...	" ...	16.3.31
<i>Hildebrand</i> ...	Buck, R. H., R.D., Capt. R.N.R.	W. H. Cross ...	Booth ...	" ...	5.5.31
<i>Mercian</i> ...	Hughan, C. ...	W. Parry ...	Leyland ...	" ...	7.10.30
<i>Nevisian</i> ...	McCormick, J. ...	T. J. Jones ...	" ...	Water Samples ...	24.4.31

August, M.O., 1931.