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ICE ON THE TRADE ROUTES OF THE SOUTHERN OCEAN.

LAST month in "The Marine Observer's Log" there appeared the report of a collision with an Iceberg by *Mamari*, on August 5th, 1927, in Latitude 49° 21' S., Longitude 53° 38' W., that ship sustaining considerable damage to her bow was escorted to Puerto Belgrano by *Matakana* who happened to be within Wireless range shortly after the collision occurred. In this Number further interesting reports of ice on the Trade Routes of the Southern Ocean are produced and many have been received showing that 1927 was an unusually heavy season.

On February 6th, 1927, an iceberg was reported by *Mongolian Prince* in as far North as Latitude 35° 41' S., Longitude 53° 54' W., which even for this region where the Cape Horn and Falkland currents carry icebergs from the Antarctic, is an unusually low Latitude. On January 29th, 1928, *Tymeric* reported ice in the Australian Bight in Latitude 35° 05' S., Longitude 129° 55' E., which is a long way north of the limits charted up to the present. The head of the Argentine Meteorological Service and the Australian Commonwealth Meteorologist have both asked for information of ice reported in the Southern Hemisphere in connection with its possible effect on weather and climate in South America and Australia.

In view of the large number of ice reports received in the Marine Division, it is proposed not only to revise the Southern Ocean

Ice Charts in next year's MARINE OBSERVER, but also to publish monthly lists of reports received in continuation of those given up to 1916 on the old monthly issues of the Meteorological Charts of the Indian Seas so that all concerned may have full information of ice in the Southern Ocean since collection was commenced. Such information only tells the Mariner where ice has been encountered and therefore where it may be encountered again; it does not give him information of ice existing and a danger to navigation.

In the Western North Atlantic the great volume of shipping necessitates and justifies the maintenance of an Ice Patrol and Ice Warning Service which is paid for by the Maritime Nations of the World in proportion to their tonnage. In the Southern Ocean where shipping is not of sufficient volume to justify the maintenance of an ice patrol, Mariners may do much to aid each other in the matter of information of ice seen.

How "Selected Ships" may give further valuable service.

It is a fairly well-known custom that ships sighting ice should make it known to others which are in Wireless Communication, but more may be done; therefore it is advocated that "Selected Ships" in Southern Waters should add to their routine Weather reports made to "All Ships," information of ice, with time and position, seen or reported within the last 24 hours. By this means

as the distribution of "Selected Ships" is improved the information of ice in the South which constitutes a danger to navigation along the trade routes may be more effectively circulated and without undue congestion of Wireless Communication.

Here then is another reason for improving the distribution of "Selected Ships" and for a greater proportion of "Selected Ships" using the trade routes in the great Southern Ocean. It is hoped that according to total tonnage each Maritime Nation will in future maintain a proportionate number of 1,000 "Selected Ships" so that there may always be at sea in positions to report in all oceans some 350 selected ships.

Experience with British "Selected Ships" shows that 35 per cent. is the proportion which are in favourable positions to report in all oceans on any day, and 350 "Selected Ships" well distributed at sea in all oceans may provide a fairly complete network of reported observations.

British "Selected Ships" have done yeoman service. They have proved that Ships' Wireless Weather Telegraphy is best conducted upon purely voluntary lines and that pride of service is the best incentive to **The Work** at sea.

MARINE SUPERINTENDENT.

THE MARINE OBSERVER'S LOG.

It is hoped that these pages will be filled each month with a selection of the contributions of Mariners in manuscript, or remarks from the Logs and Reports of regular Marine Observers.
Responsibility for statements rests with the Contributor.

ICE IN THE SOUTH ATLANTIC.

THE following is an extract from the Meteorological Log of S.S. *Port Melbourne*, Captain A. H. BROWN, Wellington to Monte Video. Observer, Mr. N. H. B. BLOYE, 3rd Officer:—

"5.20 p.m., A.T.S., September 15th, 1927.

Latitude 48° 13' S. Course 000°. Longitude 56° 49' W. Speed 12 Knots.

"Ice had been reported by the ship *Parma* in Latitude 51° 51' S., Longitude 52° 52' W., on September 13th, when she passed four icebergs, but nothing was seen by us until 5.20 p.m., on September 15th, when at the termination of a heavy squall of snow (wind W.S.W. force 5) two icebergs were seen on our port side, and later at 6.15 p.m. a third berg was sighted and passed at 7.0 p.m. The bergs were to windward and the temperature of the air fell 3 degrees from 39° to 36° while passing them, the water remaining unchanged at 39°.

Approximate position of bergs:—

1st Berg.

2nd Berg.

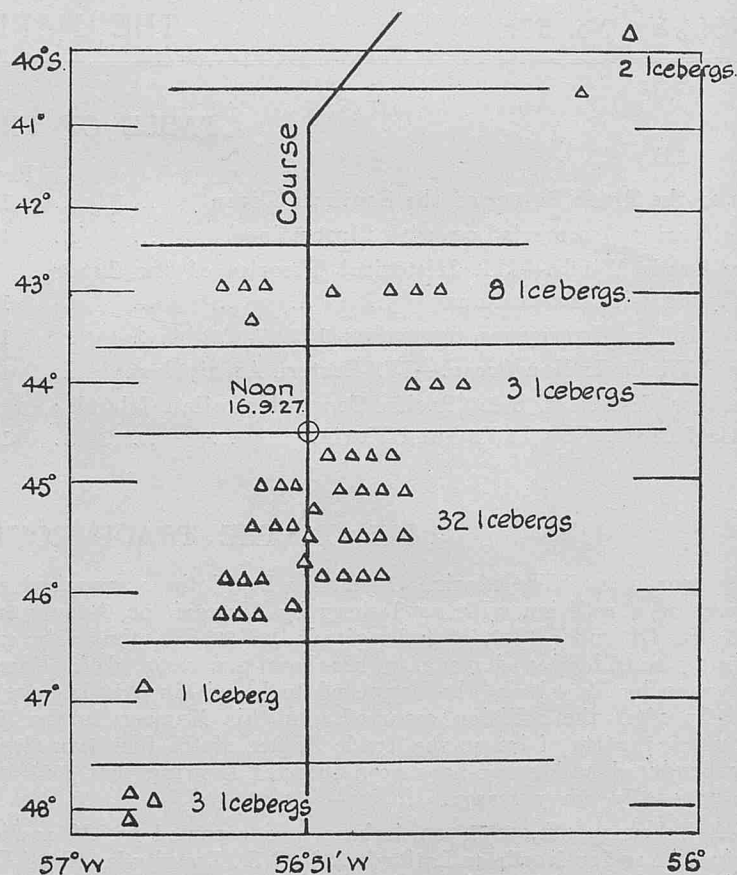
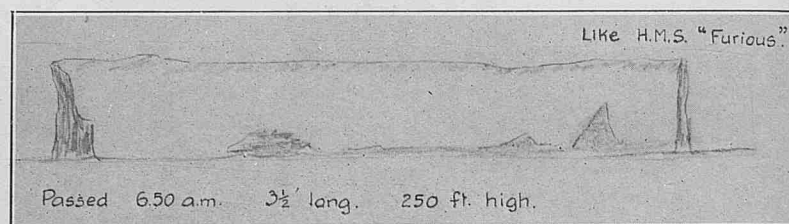
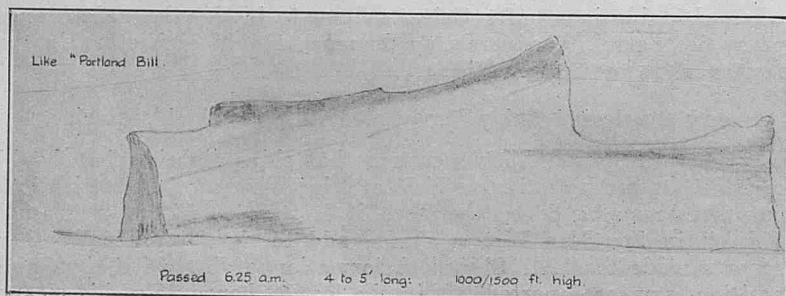
5.20 p.m., Latitude 48° 03' S. 6.25 p.m., Latitude 47° 49' S.
15 miles. Longitude 56° 55' W. 12 miles. Longitude 56° 59' W.

3rd Berg.

7.00 p.m., Latitude 47° 40' S.
15 miles. Longitude 56° 59' W.

"September 16th.—One iceberg was sighted at 2.30 a.m., dist. about 15 miles to the westward in Latitude 46° 27' S., Longitude 57° 00' W., but as in the case of last evening it was too dark to make out their formation or shape.

"At 6.20 a.m. A.T.S. the main portion of the ice was encountered, when 11 icebergs were observed close in on either bow and right ahead. The first was passed at 6.30 a.m., and from then up to 8.0 a.m., 22 icebergs were passed at various distances on either side from 1½ to 12 miles distant, and at one time, 7.00 a.m., the ship was surrounded by 19 icebergs, the nearest being 1½ miles distant, the others 2 to 5 and up to 12 miles distant, and made a very imposing sight, as the first few bergs passed this day proved to be (with one exception) the largest bergs to be seen. Of these the largest was 4 to 5 miles long and 1,500 ft. high, and several were up to 1,000 ft. in height.

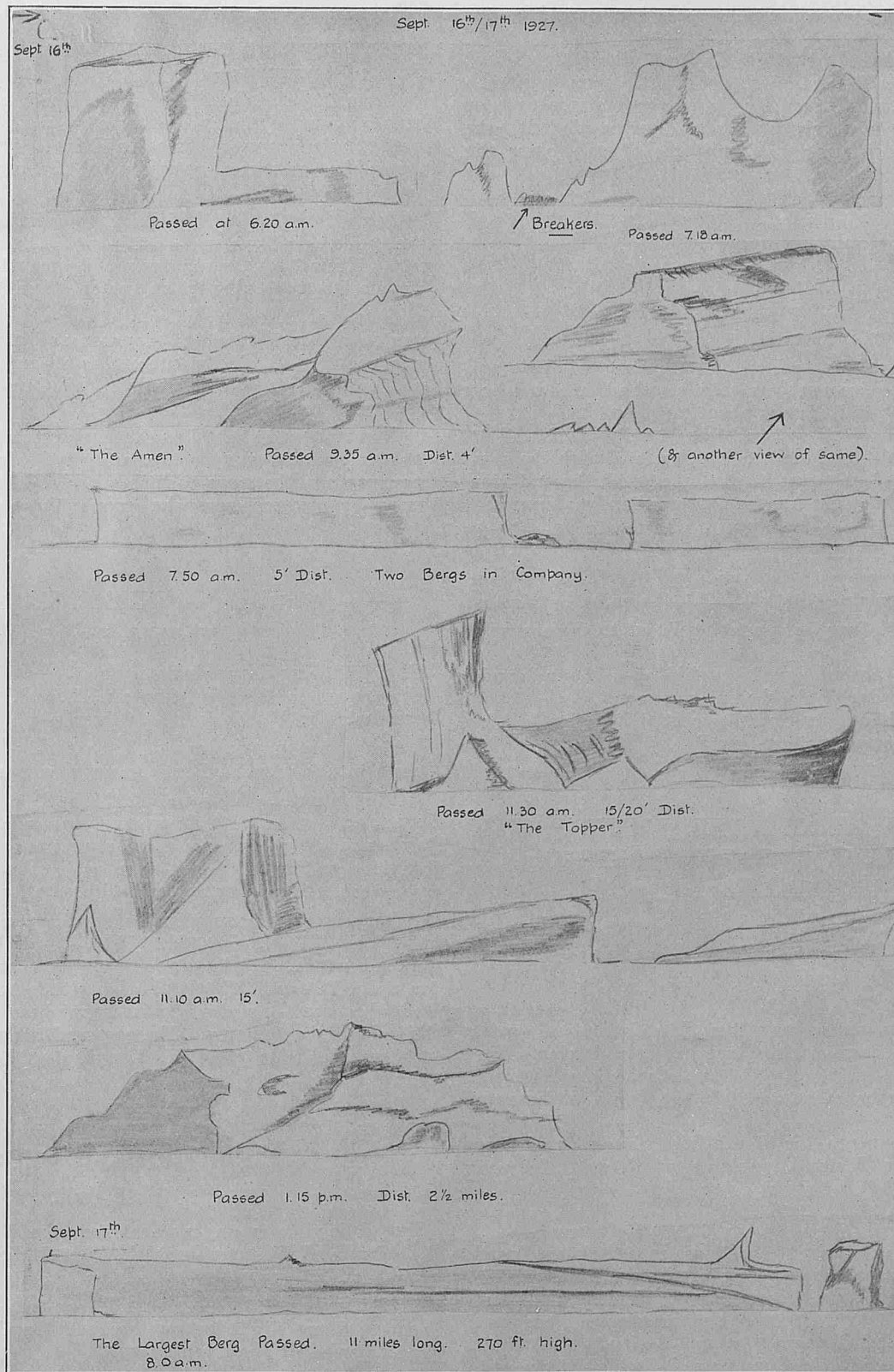


"From 8.0 a.m. up to Noon, another 10 icebergs were passed, and at 8.30 a.m. a quantity of pan and drift ice was passed very close to the ship, but that was the only small and broken ice seen.

"September 16th, Noon Position, Latitude 44° 31' S., Longitude 56° 51' W. Course 000°. Speed 12 knots.

"The icebergs passed this morning were of two distinct types, the largest being of the high glacial formation.

"Parts of these high bergs (where they had not been broken off) in the upper surfaces, were very smooth, but the sides were very rough with (in most) at least two distinct pressure ridges running through them in lines, and also looking as though there were two



or three layers of ice in their composition. Towards their base they become smoother in general, but with deep crevices and bays cut in them by the continual action of the water, and with very rough corners where pieces had broken off.

"From a distance they appeared dazzlingly white in the sun, but when observed closer, most were rather dull, more a dirty white colour, but three of the later ones before noon were of a much purer white at the tops, and at the centre were a distinct blue, and some of the ridges appearing a deep blue.

"The other type of berg met with seemed to be of the glacier ice tongue formation, and were on the whole rather longer than the others but were not so high in structure and very much more even.

"One of 4 miles length and several 2 to 3 miles and 200 to 250 feet high, with flat slightly undulating tops.

"All this type were more inclined to be grey than white, and their vertical cliff-like sides were very much broken up with the action of the water, as waves could be seen breaking on them at intervals.

"All the bergs were affected by the current, the smaller ones more noticeably, as they were continually swinging round, so one got a view of both sides of them, and the larger body of the bergs (at 7.00) appeared to be drifting in a north-easterly direction. This was ascertained when the ship was stopped during a heavy squall of snow, and they crossed our track, being observed more to the eastward up to 4 p.m. when they then seemed to be recrossing it to the N.W. again.

"From Noon to 4 p.m., three more bergs were passed well out to the eastward, the largest being 180 ft. high, and from 4 p.m. to

8 p.m. another eight were passed, which were then passed to the westward of us.

"Many whales were about the whole day and large patches of kelp were passed and it is important to note that although in such close proximity to the icebergs, no change in the temperature for the less was noticed whatsoever, and when surrounded by the 19 bergs, the water had gradually risen three degrees since the previous midnight.

8 p.m. of 15th, water 39 degrees F.

Midnight of 15th, water 40½ degrees F.

4 a.m. of 16th, water 40 degrees F.

8 a.m. of 16th, water 42 degrees F.

Noon of 16th, water 43 degrees F.

4 p.m. of 16th, water 44 degrees F.

8 p.m. of 16th, water 43½ degrees F.

"Sept. 17th.—Speed had been reduced throughout the night and at 7.45 a.m. an enormous iceberg was seen on the starboard bow bearing from 085° to 108° and distant about 20 miles.

"This was the largest berg passed and was 11 miles long and an even though slightly undulating height of 270 feet and with the same cliff sides as the others. Course was altered and from the end view when passed, it appeared very much more narrow than was supposed.

Position on passing at 8.30 a.m., Latitude 40° 33' S., Longitude 55° 58' W.

Sept. 17th, Noon Position, Latitude 40° 01' S., Longitude 55° 51' W. Course 000° and 018°. Speed 12 knots.

"At 6.45 p.m. the last iceberg was passed well out to the eastward and distant about 20 miles.

"Two bergs had been reported to us by a ship ahead bound south, but as it was just getting dark only the one was seen.

"The sketches included are some of the most distinctive looking bergs but of course the names are our own."

THE TRADE ROUTE ACROSS THE SOUTH PACIFIC BETWEEN PANAMA AND THE PORTS OF AUSTRALASIA.

THE following are further replies to the Marine Superintendent's Note published in Volume V, No. 51 under this heading:—

Captain J. L. B. Hunter, S.S. "Rotorua."

"Owing to the fact that having to call at Pitcairn Island on the Outward and Homeward passages, the track to New Zealand from the Panama Canal remains practically the same throughout the year.

"The current likely to be encountered is the deciding factor of the track to be steered.

"The winds experienced are the South-East Trades, and from about 30° South to New Zealand, variable winds with frequent strong southerlies.

"Outward Passage.

"On leaving Panama a course is steered close into the coast (north side, Gulf of Panama) to take advantage of the south-westerly set that is usually experienced there, passing Cape Mala at a distance of about ten miles, thence to a position ten miles to the eastward of Hood Island in the Galapagos Group, Latitude 1° 30' S., Longitude 89° 30' W. Hood Island is passed closely in order to avoid as much as possible the west-north-west set of the Peruvian Current. Midway between the Galapagos Isles, and the mainland this current is running at its strongest rate. On leaving this position a direct course is steered to Pitcairn Island, and thence to New Zealand.

"Homeward Passage.

"A direct course is steered for Pitcairn Island, thence to a position on the Equator in 85° West Longitude.

"The Galapagos are passed at a distance of about 100 miles to the south-east, to take advantage of the westerly, and northerly set of the Peruvian Current.

"Cape Mala is made at a distance of about 15 to 20 miles.

"The ship is kept well off the land in order to avoid the south-westerly set on the northern side of the Gulf."

Captain A. W. McKellar, R.D., R.N.R., S.S. "Ruapehu."

"The following tracks which I have used for some years appear to give the best results:—

"From Cape Mala steer to pass Hood Island at a safe distance, bearing in mind the frequency of a strong W.N.W. set, thence a Great Circle course to Pitcairn Island. The currents are usually favourable, sometimes markedly so, nearing Pitcairn a S.E. set is frequently found.

"From Pitcairn to New Zealand ports as near the Great Circle as possible, giving a wide berth to the doubtful position shoals en route. From 30° S. strong westerlies may be expected and currents variable but generally in an easterly and northerly direction.

"Homeward from New Zealand ports and not calling at Pitcairn, steer on a Great Circle to Equator and 83° W., altering to northward about 2° S., if the current is abeam or slack, thence to eastward of Malpelo Island, and well off Cape Mala to avoid strength of current inshore.

"Homeward to about Longitude of Pitcairn, the westerlies appear less steady than further south, and northerly and southerly gales are frequent. On the more eastern track the Trade Winds are fresh to strong, but decrease somewhat sooner than to the westward."

CURRENT.

North Indian Ocean.

THE following is an extract from the Meteorological Report of M.S. *Javanese Prince*, Captain E. NAYLOR, Penang to Suez. Observer, Mr. W. Venn, 3rd Officer:—

"Below are particulars of a southerly set experienced between Pulo Wei and Dondra Head on passage from Penang to Suez.

"The 'Monthly Meteorological Chart of East Indian Seas' for September and our previous experience show a strong easterly set. In the chart for October a southerly set is shown, but it is not shown to extend so far to the eastward as is shown by our position. The strong easterly set was not met with at all on this passage.

"Our observed noon position for September 25th, was, Latitude 5° 52' N., Longitude 89° 58' E. Course and distance to noon September 26th, 267° (S. 87° W.) 314 miles, making the D.R. position for noon, Latitude 5° 35½' N., Longitude 84° 43' E. Wind between W.S.W., force 4-5, and west with heavy head sea and increasing swell throughout the 24 hours. The observed noon position for September 26th, was Latitude 5° 11½' N., Longitude 84° 47' E., making a set and drift of S. 9° E. 24'."

EARTHQUAKE SHOCKS.

West Indies.

THE following is an extract from the Meteorological Report of C.S. *Henry Holmes*, cable work, West Indies.

"In the port of St. Thomas, Virgin Isles, U.S.A. West Indies, 26th September, 1927 (0740 G.M.T.) or 3.40 a.m. L.M.T. earthquake tremor. Short slight but subterranean rumbling, heavy, and lasted over a period of one minute.

"28th September, 1927 (0945 G.M.T.) 5.45 a.m. L.M.T., slight earthquake tremor."

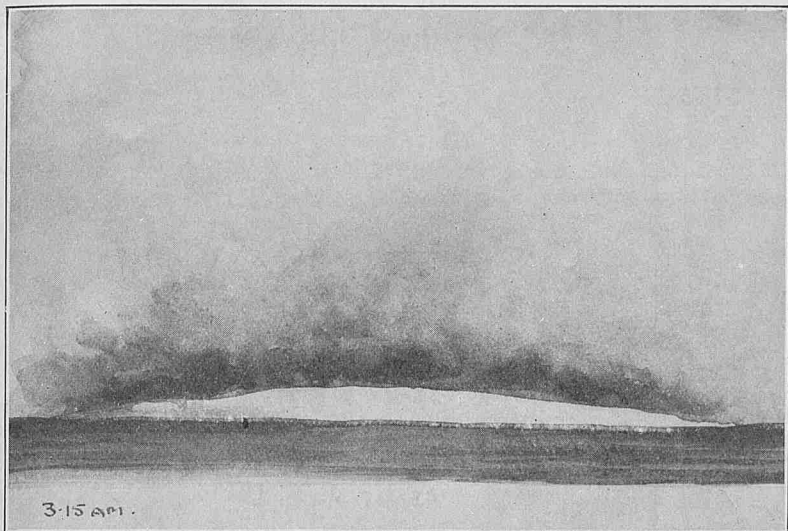
DOLDRUM SQUALL.

North Atlantic.

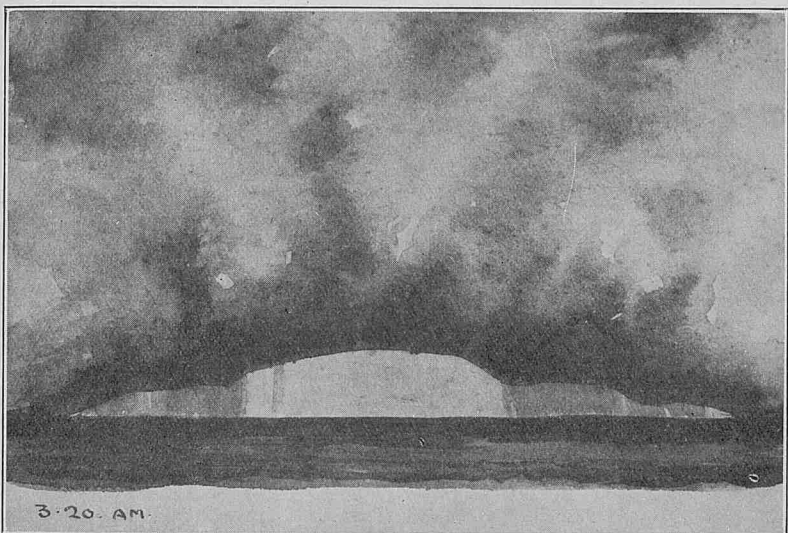
THE following is an extract from the Meteorological Log of S.S. *Llandoverly Castle*, Captain G. OWENS, London to Cape Town. Observer, Lieutenant C. H. WILLIAMS, R.N.R., 2nd Officer:—

"Sunday, 4th September, 1927, in Latitude 3° 55' N., Longitude 16° 10' W., ship steaming S. 9° E. (True) at 14 knots.

"3.10 a.m.—Clear sky. Stars very bright and twinkling. Wind S.W. force 2. Dark bank of cloud appeared along southern horizon.



"3.15 a.m.—Line cloud in low, well-defined arch, extending from about S.E. to S.W. points of horizon. Temperatures in screen, dry 76°, wet 74°.



"3.20 a.m.—Arch of cloud rising rapidly, clear in centre, but rain falling in places. Appearance of wind squall. Light Stratus overhead flying rapidly from south.

"3.24 a.m.—Line cloud overhead, few drops of rain fell. Only slight increase of wind to S.S.W. force 3.

"3.38 a.m.—Sky overcast with Stratus. Light rain commenced, temperatures, dry 75°, wet 73°.

"3.50 a.m.—Rain ceased. Wind S.S.E. force 3-4. Commencement of S.E. Trade Wind."

SQUALL IN THE TRADES.

South Pacific Ocean.

THE following is an extract from the Meteorological Log of S.S. *Rimutaka*, Captain F. A. HEMMING, Wellington to Balboa. Observer, Mr. G. C. SAUL, 3rd Officer:—

"Friday, 23rd September, 1927, 5.05 p.m., observed on starboard bow what appeared to be a very heavy rain squall approaching rapidly from the S.E. The wind, which had previously been from E.S.E., force 6, freshened quickly to force 8 at 5.10 p.m., when the squall reached the vessel and remained at force 8 until the squall passed over at 5.16 p.m. During this 6 minutes, although to the eye it appeared to be raining a very fine rain, the decks were not wetted at all and it was only after holding the back of the hand to the wind for a minute or so that moisture could be felt. The temperature of the sea remained unchanged at 71°.4 but the hygrometer readings showed dry 68°.S,

wet 68°.5 as against 69°.5 and 66°.3 at 4 p.m. Barometer corrected, 1020.5 mb. i.e., 1.1 mb. higher than reading at 4 p.m. Wind direction, steady E.S.E., throughout.

"At 5.16 the squall passed over and away to N.W., and the wind at ship eased to force 6 as before. The squall was now on the port quarter between ship and sun and had the effect of looking through darkened glass at the sun and surrounding clouds. Assuming the speed of the squall to be 40 miles per hour and that of ship 11.5 miles per hour and angle between ship's track and path of squall 60°, the time occupied in passing over (6 mins.) gives a rough estimate of 4.7 miles as the diameter of the squall. A faint rainbow was visible on starboard bow when squall was first seen at 5.05 p.m.

"Position of ship at 4 p.m. Latitude 17° 13' S., Longitude 103° 05' W. Course N 52° E., speed 11½ knots."

SQUALL.

Indian Ocean.

THE following is an extract from the Meteorological Report of S.S. *Maloja*, Captain G. MANLEY, Australia to London via Ports. Observer Mr. A. D. DENNIS, 3rd Officer:—

"September 11th, 1927, at 5.0 p.m. Latitude 4° 40' S., Longitude 89° 20' E., observed line-squall stretching across horizon ahead. 15 minutes later it had increased so as to start on the port beam distance 15 miles (approx.) and ended 2 points (22°) forward of the starboard beam, distance 5 to 6 miles. The formation of the cloud was peculiar in that it appeared to be made up of numerous small clouds, fitting together so as to represent a spiral (from a distance it looked like the 'lay' of a rope). The squall travelled towards the S.S.E. and lay in a W.S.W.-E.N.E.'ly position."

TRADE WIND SQUALL.

North Atlantic.

THE following is an extract from the Meteorological Log of S.S. *Aba*, Captain T. E. WILLIAMS, Las Palmas to Sierra Leone. Observer, Mr. S. J. BRISTOW, 2nd Officer:—

"September 20th, 1927, at 6.25 p.m., A.T.S., Latitude 24° 50' N., Longitude 16° 21' W. Line-squall of perfect formation extending S.S.E./N.N.W. (true) direction, decrease in temperature 8° F., barometer falling 2.6 millibars. Wind increasing to force 8, and almost total darkness during passing of squall. Visibility 4. A secondary line-squall followed 10 minutes later, parallel direction, but of less force. Squall lasted 30 minutes in all, the wind veered E.N.E. The black band of cloud had outriders greatly disturbed. Weather previous to squall being moderate Trades. No rain fell, conditions of a turbid nature, dust deposited on ship. A line-squall in these latitudes seems very unusual."

WATERSPOUT.

North Atlantic.

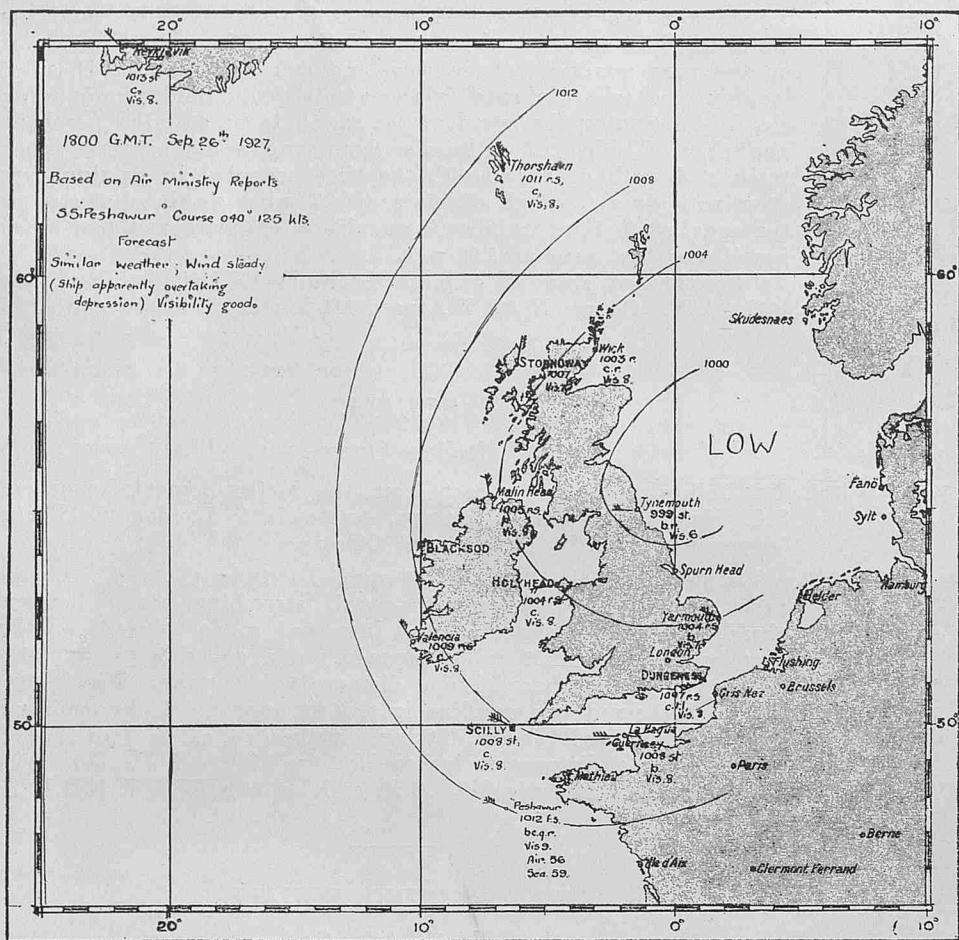
THE following is an extract from the Meteorological Report of S.S. *Highland Prince*, Captain R. H. ROBINSON, London to River Plate:—

"September 24th, 1927, 8.15 a.m. G.M.T., ship bound S.W., off Ushant, in Longitude 5° 25' W., observed half formed waterspout bearing S. and apparently stationary. First observed to resemble a pencil point protruding from ragged edge of heavy Nimbus cloud. Descending rapidly until approximately half way between lower edge of cloud and sea, it then appeared to split, as a distinct high patch was observed passing down centre. Shortly after, the spout disappeared, withdrawing rapidly into cloud again. Duration of time visible 10 minutes.

"Wind S.W., force 4, barometer 29.12 in. Temperature 57°. Clouds Ci-St., Ci-Cu., A-St., Cu-Nb., Nb., amount 8."

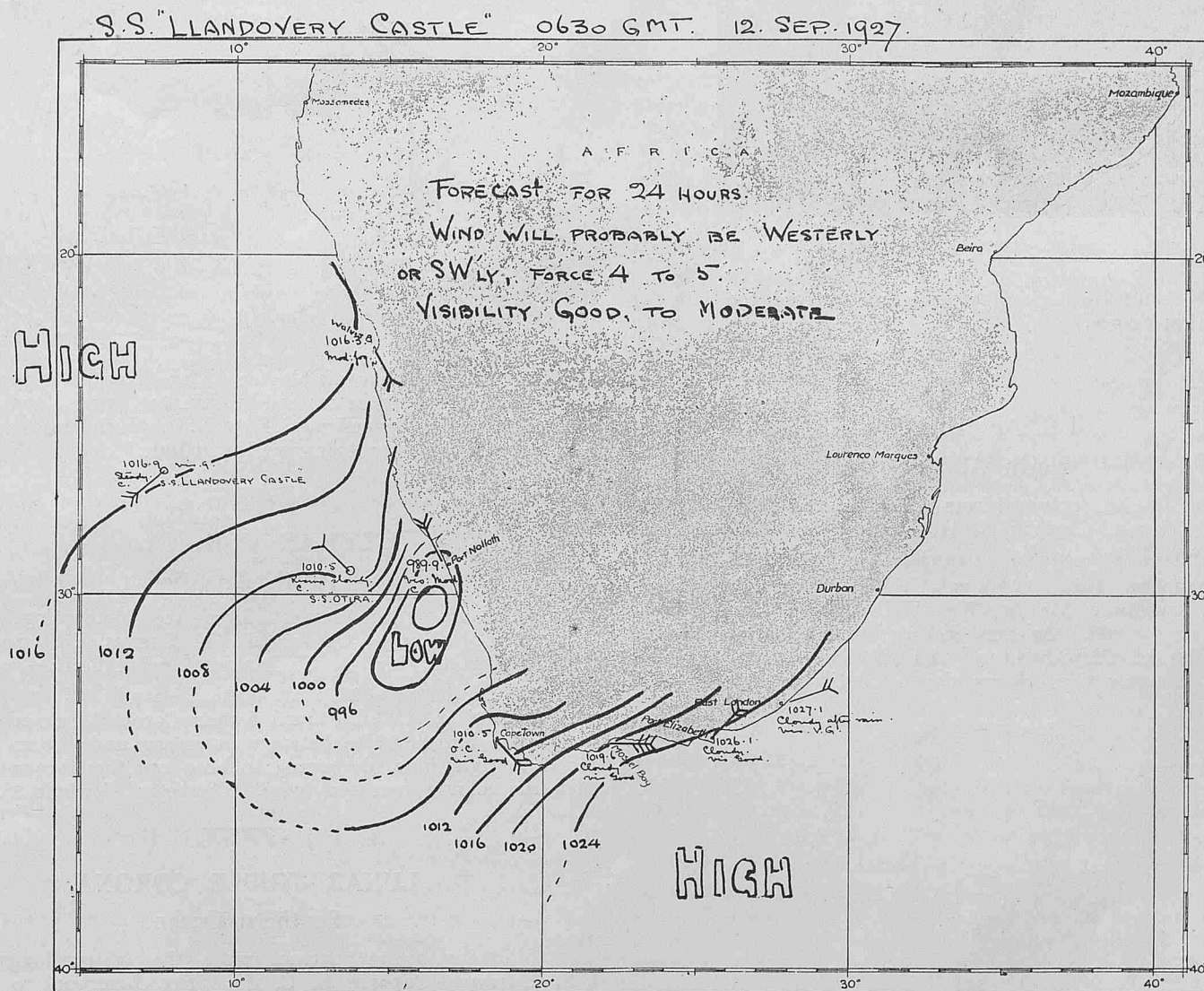
WEATHER CHARTS MADE AT SEA.

Eastern North Atlantic.



South African Waters (continued).

Weather Chart (one of a series) made on board S.S. *Llandoverly Castle*, Captain G. OWENS, London to Cape Town, by Lieutenant C. H. WILLIAMS, R.N.R., 2nd Officer.



According to *Llandoverly Castle's* Meteorological Log, the wind veered to N.W. force 4 at 10.30 a.m., and had backed to S.W. force 5 by 4 p.m., remaining from that quarter throughout the day.

CLOUD PHOTOGRAPHS.

Off East Coast of Australia.

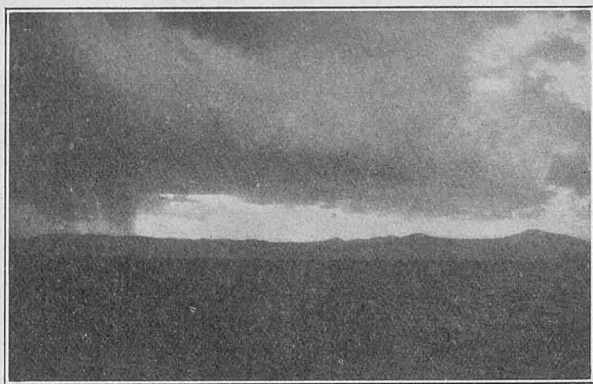
THE accompanying photographs from H.M.A.S. *Moresby*, Captain J. A. EDGELL, O.B.E., R.N., surveying east coast of Australia, were taken by Lieutenant W. H. MARTIN, R.A.N.:—

"16th September, 1926, at Border Island, Latitude 20° 09' S., Longitude 149° 03' E. At 1745, Zone Time (-10). Just before sunset. Low Cumulo-Nimbus and Nimbus from S.E. The clouds were passing low over the land to the westward at a height of about 2,000 feet.

"At intervals it appeared as though a waterspout might be forming, but on each occasion no sooner had the funnel commenced to show below the edge of the Nimbus cloud than it disintegrated in a rain squall.

"The rain squalls could be seen quite distinctly (see photographs) and were of short duration.





Wind S.E. by S., force 5. Temperatures, dry 73° F., wet 66° F., sea 73° F."

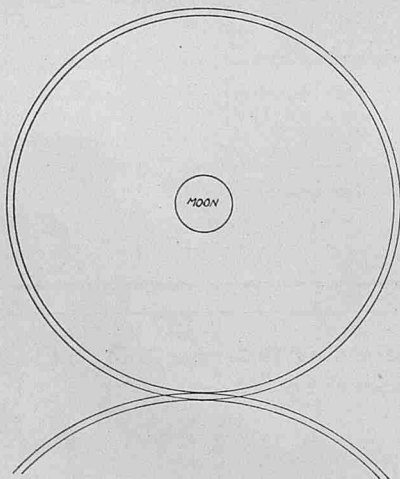
NOTE.—These photographs and notes were received too late for the 1927 MARINE OBSERVER.

LUNAR HALO.

North Atlantic.

THE following is an extract from the Meteorological Log of S.S. *City of Chester*, Captain F. W. LETTON, Port Said to New York. Observer, Mr. A. J. BARNETT, 2nd Officer:—

"14th September, 1927, 4.0 a.m. G.M.T., 6h.30m. Latitude 38° 10' N., Longitude 35° 00' W. Well defined Lunar Halo. Diameter of whole 23°. As per sketch. Moon at time covered with light film of Cirro-Stratus. Arc of lower contact visible for about 10 minutes. No colours visible. Altitude of moon 36°."



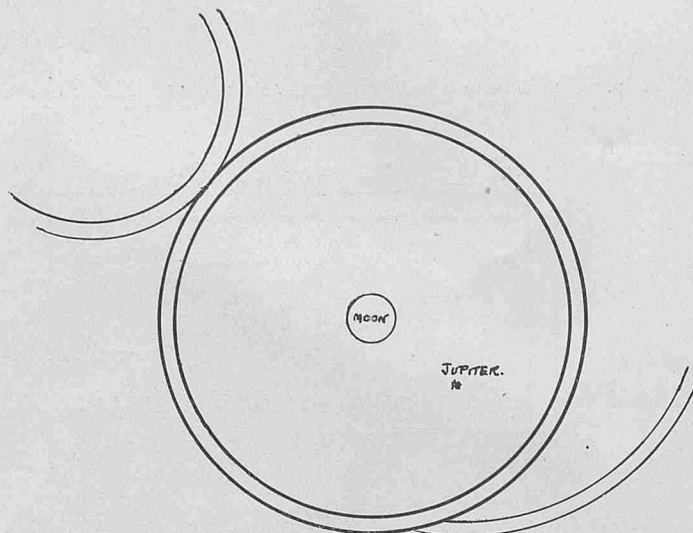
NOTE.—The halo commonly seen round the sun or moon has a radius of nearly 22°. Whatever halo it is associated with an arc of lower contact is a very rarely observed phenomenon. Arcs of upper contact are comparatively frequent.

South Pacific.

THE following is an extract from the Meteorological Log of S.S. *Rimutaka*, Captain F. A. HEMMING, Wellington to Balboa. Observer, Mr. G. C. SAUL, 3rd Officer:—

"Rough sketch of remarkably fine lunar halo of 21½° radius with two arcs of contact as seen at 11.40 p.m., local time on September 10th, 1927 (equals 1027 G.M.T., September 11th) in D.R. position, Latitude 41° 45' S., Longitude 162° 43' W. Colour sequence from inside of halo—bright red paling to orange yellow and white on outside. Arcs of contact near *Jupiter* and on far side of moon from *Jupiter* both fairly well defined but fainter than the halo itself.

"Weather at time of observation:—Wind S'ly, force 2. Barometer, 1018.3 mb. Air 47° 5. Sea 51.0°.



"The halo was only visible for a few minutes and at the time of observation moon was covered by thin low flying cloud of peculiar Stratus formation travelling S.E. to N.W. which presently thickened and covered whole sky bringing fine drizzle."

LUNAR CORONA.

North Atlantic.

THE following is an extract from the Meteorological Log of S.S. *City of Chester*, Captain F. W. LETTON, Port Said to New York. Observer, Mr. A. J. BARNETT, 2nd Officer:—

"11th September, 1927, 3.0 a.m., Latitude 37° 00' N., Longitude 19° 10' W. Well defined Lunar Corona observed. Sequence of colour, bluish white between luminary and brown ring, then violet to light blue, deepening to blue and then brown again and then the colours repeated twice. Diameter of whole 8°."

LUNAR TRIPLE CORONA.

Southern Ocean.

THE following is an extract from the Meteorological Log of S.S. *Hurumui*, Captain E. C. S. UPTON, Liverpool to Fremantle, via Cape of Good Hope. Observer, Mr. G. R. HOGG, 3rd Officer:—

"September 14th, 1927, 2.50 a.m. observed Corona Bluish white inner field—brownish-red inner ring. Purple, green, orange, brownish-red, purple-green outer ring merging into orange occasionally another, i.e., third brownish-red ring visible.

"All colours of exceptional brilliance and fairly well defined.

"Position of ship at midnight, Latitude 38° 18' S., Longitude 70° 28' E. Course N. 81° E., Speed 11 knots."

LUNAR RAINBOW.

North Atlantic.

THE following is an extract from the Meteorological Report of S.S. *Socrates*, Captain F. C. TAYLOR, Victoria, Brazil to New York. Observer, Mr. W. E. JORDAN, 2nd Officer:—

"September 10th, 1927, at 3.22 a.m., A.T.S., Latitude 27° 40' N., Longitude 58° 22' W. Barometer 29.98 in. rising slowly. Air temperature 79°. Wind N.W., force 1-2. No sea. Slight confused swell. Light Cumulus clouds from north, amount 3. Visibility 8. A solitary patch of Nimbus cloud, carrying with it a light shower, was observed travelling from N. to S. on the starboard side of vessel. The moon westerling, on the port side, when the shower appeared diametrically opposite the moon, viz.:—shower bearing N.E. (true) and moon bearing S.W. (true) with the ship in between, a beautiful rainbow was seen to form in the shower. It

was very distinct, the colours being perfectly recognisable, being composed of silver, blue and green. It was the most perfect formation that it has ever been my luck to witness, the arc being perfect from sea to sea. The true altitude of the moon was $13^{\circ} 44'$ and that of the topmost section of the rainbow's arc, $27^{\circ} 40'$. The whole phenomenon lasted but two minutes, disappearing at 3.24 a.m. A.T.S. as the shower passed astern."

METEOR.

Off South Africa.

THE following is an extract from the Meteorological Log of S.S. *Ascanius*, Captain J. AGNEW, Durban to Cape Town. Observer, Mr. C. HOUGHTON, 2nd Officer:—

"September 5th, 1927, 2.15 a.m., Latitude $34^{\circ} 57'$ S., Longitude $19^{\circ} 47'$ E., observed brilliant meteor commencing in the vicinity of *Fomalhaut* and travelling in a northerly direction, disappearing to the northward of *Pegasus*. Time of flight about 2 seconds. Meteor was of great magnitude (similar to that of *Venus*) and illuminated the whole heavens.

"Sky cloudless, visibility 9."

West Indies.

THE following is an extract from the Meteorological Log of S.S. *Ruapehu*, Captain A. W. MCKELLAR, R.D., R.N.R., Southampton to Colon. Observer, Mr. W. J. GLASSBOROW, 3rd Officer:—

"September 21st, 1927, at 9.48 p.m., A.T.S. (0204 G.M.T.), approaching Borinquen Point, Porto Rico, observed passage of brilliant meteor, which fell rapidly from an altitude of about 75° bearing N.E.—close to *Lyrae*. Three small parts detached themselves from the main body during flight which became invisible at an altitude of 15° . An indication of the remarkable brilliancy of this phenomenon lies in the fact that the vessel was well illuminated even when the body passed behind a heavy Cu-Nb cloud."

NORTHERN LIGHTS.

North Atlantic.

THE following is an extract from the Meteorological Report of S.S. *Maresfield*, Captain T. E. JONES, South Shields to Montreal. Observer, Mr. T. CONOLLY, 3rd Officer:—

"Six consecutive auroral displays were seen between the limits of Latitude $57^{\circ} 21'$ N., Longitude $23^{\circ} 27'$ W., and Latitude $51^{\circ} 51'$ N., Longitude $55^{\circ} 18'$ W., at the time of the Autumnal Equinox 1927, between September 24th and 29th inclusive. It was also visible in the Pentland Firth prior to this, and in the River St. Lawrence a day later.

"The light varied extremely, and was mainly visible about ninety minutes after sunset until past midnight. Appearing on the northern horizon it stretched from N.W. to E.N.E., magnetic. The phenomena resembled effects given by the sun and moon; the light of dawn for example when it illuminates the edges of large clouds, the moon trying to force its beams through cloud banks, or as a bright river flowing through them, or sudden streaks rather similar to lightning. If the sky were clear it gave a faint milky glare of diffused illumination which reflected into the sea, or searchlight columns of vividness, and long arcs. Its own characteristics were the almost instantaneous change in form and brightness, searchlight movements and length of ray, one measuring 30° . When amongst the clouds, vivid auroral patches through which no stars could be discerned, seemed to be mutually attracted. The main regions of play measured from $6\frac{1}{2}^{\circ}$ to 16° above the horizon.

"Auroral form on the night of September 29th merits special description. At about 7.45 p.m. A.T.S. a convex arc appeared from N.W. to E.N.E. Rapid little bumps of illumination moved through the arc, giving it a continual wave. At moments the light did, however, remain uniform and steady; only to be disturbed and invigorated suddenly; on this latter occasion becoming quite vivid. At either end a pale filament extended into the sky. At the centre, lower part was 13° high, whilst its breadth would have been from 2° to 3° . When the wavy motion took place the colouration was beautiful, underneath a blood-red, reddy-brown, pink and purple showing. The centre changed from white like phosphorus, to a pale yellow, whilst the upper limb was distinctly green. A small Cirrus cloud on its surface looked quite black, the whole night lighted. This display continued for some thirty minutes when aurora dispersed, and in rapid darting flares it approached and receded from the zenith, similar to huge massed searchlights, whilst patches were seen here and there. Gradually dying down, the arc quickly reformed a little E'ly. of its former position.

"Our deviation remained ordinary, but a fresh gale blew during the passage; practically every cloud form in view; nighttime not affected by the light of moon, as this satellite had waned in its last quarter, and barely reached first. Even when in this latter phase, it was only above the horizon for a short time at twilight."

THE TRADE WINDS.

III.—Historical Theories of the Trade Winds.

IN the fourth article of this series we shall give an account of the general circulation of the atmosphere, with special reference to that in and over the Trade Wind regions. In the present article we shall briefly trace the historical development of the subject. In giving an account of the circulation as we know it at the present time it will be necessary to deal in broad outline with the atmospheric circulation as a whole in order that the part the Trade Winds play may be shown in proper perspective. The historical account will, however, be confined to theories which refer directly to the Trade Wind circulation, either at the surface or in the upper air. It must be understood that in these older theories there was no distinction between a description of the upper air circulation and a general theory of the cause of the circulation, since direct observation of the winds of the upper air was almost entirely lacking, being confined to very scanty observations of cloud motion and of the wind on mountain peaks. In other words the force and direction of the winds of the upper air were almost as much a matter of theory as the attempted explanations of the cause of the winds. It should be stated that the historical part of the present article is supplementary to that in the first article, where we considered only historical descriptions of the Trade Winds as actually experienced by ships.

In order to understand the earlier of the quotations which follow it must be remembered that ARISTOTLE (384-322 B.C.) in his "Meteorologica" had attributed all winds to the result of a gradual accumulation of the vapours emanating from the ground, and that this idea of emanations or exhalations persisted for some 2,000 years until the middle or near the end of the 17th century, broadly speaking until about the time of the invention of the barometer by TORRICELLI (1643).

What is probably the earliest attempt at a theory of the Trade Winds is referred to, with comments, in J. DE ACOSTA'S "Historia natural y moral de la Indias" published at Seville in 1590. Chapter 6 of book 3 of this work has the (translated) title "Why do ships always find an east wind in the Torrid Zone?" and the conclusion is as follows:—"Father ALONSO SANCHEZ, a Religious of our Society who went to the West and the East Indies and was a very practical and clever man, said that the reason there was such continuous settled weather below the line or near the line appeared to him to be that the same air moved by the Sky bore the ships along with it and that this was not a wind proper nor an exhalation but the actual portion of the air moved by the diurnal course of the sky.

... If this were not air moved by the sky it would sometimes

drop and sometimes become contrary and sometimes also become stormy. Although this is a learned statement, it cannot be denied that there is also a wind, which arises on account of the vapours and exhalations from the sea; and we have frequently noticed that this same breeze blows at times more strongly and at times more gently, whilst at times it is impossible to carry full sail. It is therefore clearly established that the air in motion carries along with it the vapours it encounters by the way because it has considerable force and encounters no resistance; and therefore the wind blowing from east to west is continuous and almost uniform near the line and throughout almost the whole of the Torrid zone which is the path followed by the Sun between the two tropics of Cancer and Capricorn."

We now know that the idea that the air rotates independently of the Earth is erroneous. It will also be noticed that the above quotation is written on the assumption that the Earth stood still and the sun and stars revolved round it once daily. The next reference to the Trade Winds appears in a work of the famous English philosopher and scientist FRANCIS BACON, first published in Latin in 1622. "That this breeze blows excellently between the Tropics, is a certain fact but its cause is doubtful. It may be that the atmosphere, like the sky, moves, but almost imperceptibly outside the Tropics because of the smaller circuits which it has to perform, and very noticeably within the Tropics because of these circuits being greater. It may be, on the other hand, that the heat dilates the whole atmosphere, which can no longer be contained in its former place, but the dilation of the air gives an impulse to the surrounding air which causes this breeze according as the sun advances. But this is more noticeable in the Tropics where the sun is hotter; outside them it is almost imperceptible. We may apply a crucial instance by inquiring whether the breeze blows at night or not. For during the night the rotation of the atmosphere continues while the heat of the sun does not.

"It is, however, certain that the breeze does not blow at night but at dawn and even in broad daylight. Nevertheless, this instance does not settle the question. For particularly in those parts where night and day are distinguished not so much by their difference in duration as by their difference in heat and cold, there the nocturnal condensing of the atmosphere might slow down and neutralise the natural movement of the atmosphere—which is very gentle."

The statement above that the Trade Winds do not blow at night is now well-known to be incorrect. The famous Italian physicist and astronomer GALILEO GALILEI in his well-known work, published in 1632, "*Dialogo di Galileo Galilei . . . sopra i due massimi sistemi del mondo Tolemaico, e Copernicano*" (Dialogue of Galileo Galilei . . . concerning the two great systems of the world, Ptolemaic and Copernican), writes as follows:—"We said then and I now repeat that the air being a light and fluid body and not closely attached to the earth does not necessarily obey the earth's motion except in so far as the roughness of the earth's surface carries along that part of the air adjacent to it which does not overtop by much the highest points of the mountains. The more this portion of the air is filled with vapours, fumes and exhalations, all substances partaking of terrestrial qualities and hence destined by their nature to follow the same movements, the less it resists the revolution of the earth. But where the reason for this motion is absent, i.e., in parts of the world where there are big flat spaces and where there are fewer mixtures of terrestrial vapours, the reason for the surrounding air obeying the earth's revolution partly ceases to exist, since in these parts whilst the earth revolves towards the East, there is a wind blowing from the east to the west and this wind is stronger where the speed of rotation of the earth is greater; this occurs at places farthest from the Poles and nearest the great circle of diurnal revolution.

"In effect experience endorses this philosophic discourse because in the big oceans and in the parts of them far from land, and within the Torrid zone and therefore between the Tropics, where there is no terrestrial evaporation, there is a perpetual exhalation moving from the east and so constant in character that ships, thanks to this, travel easily towards the West Indies. The same ships once free of the Mexican shores sail with the same ease across the Pacific Ocean to what we know as the East Indies, but which are in a Westerly direction from them."

In a geographical work first published in Latin in 1650 BERNARD VARENIUS discarded the original theory of the slip of the air rela-

tively to the Earth and developed the theory of the expansion of the air by the sun's heat in the equatorial regions given above in the quotation from FRANCIS BACON. Speaking of the Trade Winds he says:—"The general and most important cause is the sun. The first part of the atmosphere to be rarefied and attenuated by its heat is that on which the sun's rays fall perpendicularly, i.e., the part over which the sun is directly placed. When the air is made to expand, it requires much more room (its volume increases considerably). The result of this is that the air is driven out by the sun and pushes out the adjoining air with great force. Since the sun is rotating from East to West the main current of the air lies towards the West. An indication of this fact may be seen in the prevalence of East winds in many parts of the Torrid zone and all over the sea. In fact the sun pushes the air from East to West and does not allow it to go outside the Torrid zone. It is true that the air, when it is rarefied is forced out in every direction towards every point of the compass, North, South, East and West and towards all the intermediate points. It is not, however, allowed to expand in every direction and accordingly its impulse towards the West is made the more pronounced by the motion of the sun in that direction. As a result, the wind in the Torrid zone has almost continually a tendency towards the West, while in our zone this is frequently so on many days, in the early hours before and after daybreak when the other winds usually fall."

In 1663 ISAAC VOSS in his work "*De motu marium et ventorum liber*" (Of the movement of the seas and the free winds), after mentioning the tropical east winds gives an explanation which covers the Equatorial Current as well as the Trade Winds. He says:—"Although the heat of the sun sucks up the water and distends its more volatile parts yet it does not lower the level nor lessen the depth of the sea. On the contrary, its tendency is to dilate it and raise it up. Whenever the sun is shining down perpendicularly, there the sea is forced to expand. Again, when the sun recedes from the perpendicular, then the sea subsides. In some cases it falls even below its former level. Since, accordingly, those parts of the sea which are receiving or have just received, the direct vertical rays of the sun are raised above the level of the adjoining waters which stretch out towards the West and which have not yet received the direct rays, it follows of necessity that the waves flow from the higher surface to the lower. This is the only force which drives the sea towards the West. The same process is to be understood in the movement of the Winds. For the atmosphere is subject to the same influences as the sea over which it lies."

The work of BOHUN (1671) referred to in the first article of this series also contains an explanation of the Trade Winds based on the solar heat at the Equator. In 1684 Dr. MARTIN LISTER read a paper before the Royal Society in which he regarded the Trade Winds as the "constant breath" of the sargasso weed "because the matter of that *Wind*, coming (as we suppose) from the breath of only one *Plant* it must needs make it constant and uniform. Whereas the great variety of *Plants* and *Trees* at land must needs furnish a confused matter of *Winds*." In this crude idea we see probably the last influence of ARISTOTLE's emanation theory. In the following year Dr. GARDEN of Aberdeen also wrote a paper on the Trade Winds.

In the Philosophical Transactions for 1686 appeared the celebrated paper of EDMUND HALLEY, "An historical account of trade-winds and monsoons observable in the seas between and near the tropics with an attempt to assign the physical cause of the said winds." This paper contained a map of the winds of the Atlantic and Indian Oceans between the parallels of 30° N. and S. which therefore appeared 13 years before the charts of DAMPIER reproduced in the first article of this series. HALLEY's theory of the Trade Winds is important, as already stated, since it formed the basis of a theory which still persists to some extent at the present time. It is simple, depending on the sun's greater heating power in equatorial regions whereby the warm air rises by convection, and the cooler air from regions both north and south of the Equator flows in to take its place. HALLEY added to this an explanation of the easterly of the Trade Winds. The sun exerts its greatest heating power when in the meridian, hence by the same principle of convection the air at a place where the sun is in the meridian would rise and other air would flow in laterally to take its place. As the sun is

(apparently) moving westward throughout the day, the air at places further to the westward would successively receive the maximum heating, so that the lateral flow of air would come only from the east and not equally from east and west as it would if the relative positions of the sun and earth were fixed. The combination of the northerly and the easterly current give the north-east Trades and that of the southerly and the easterly current the south-east Trades. In 1735 GEORGE HADLEY wrote a paper "Concerning the Cause of the General Trade Winds", which he began by saying "I think the Causes of the general Trade-Winds have not been fully explained by any of those who have wrote on that subject, for want of more particularly and distinctly considering the Share the diurnal Motion of the Earth has in the Production of them: for although this has been mentioned by some amongst the Causes of those Winds, yet they have not proceeded to show how it contributes to their Production; or else have applied it to the Explication of these Phaenomena, upon such Principles as will appear upon examination not to be sufficient." HADLEY in this paper then proceeds to show how a current of air which starts in the northern hemisphere with a direction from due N., as in HALLEY's convectional theory, will actually be blowing from a N.E. direction on account of the Earth's rotation and similarly for the S.E. Trade. The effect of this rotation is most easily visualised if it be remembered that the air above any part of the Earth's surface, whatever the actual force or direction of the wind, is being carried round by the Earth's rotation at exactly the same speed as the Earth's surface beneath it, and that the Earth's surface in successively lower latitudes rotates more and more rapidly. In modern meteorology the wind component introduced by the rotation of the Earth is called the geostrophic component; it is of course equally introduced in the case of any fluid body, as we have seen in the case of ocean currents in THE MARINE OBSERVER articles. HADLEY thus presented a very real contribution towards the study of atmospheric motion. What is therefore usually referred to rather loosely in modern books as HALLEY's theory of the Trade Winds is really the joint theory of HALLEY's N. and S. components and HADLEY's E. component, though HALLEY also attempted an explanation of the E. component.

The theory of the Counter-Trades also originated with HALLEY. He says "But as the cool and dense air, by reason of its greater gravity, presses on the hot and rarefied, it is demonstrable, that this latter must ascend in a continued stream, as fast as it rarefies, and that being ascended, it must disperse itself to preserve the equilibrium; that is by a contrary current, the upper air must move from those parts where the heat is greatest: so by a kind of circulation, the north-east trade wind below will be attended with a south-westerly above, and the south-easterly with a north-west wind above." HADLEY in the paper mentioned above also developed this theory of the Counter-Trades. He showed that the outflowing air from the upper equatorial region, moving to the north and to the south, would also maintain much of its original maximum velocity of rotation and hence arriving in higher latitudes would have a greater velocity of diurnal rotation than the earth's surface at that point. Hence there would be a component of motion in the upper air from west to east, which combined with the original northward movement (north of the Equator) and southward movement (south of the Equator) would give the N.W. and S.W. counter-trades respectively. HADLEY, however, took the matter a step further. He supposed that this upper air was gradually cooling during its movement away from the Equator and consequently would gradually descend towards the surface north and south of the Trade Wind zones, thus providing the westerly winds of temperate latitudes.

For more than a century after the appearance of HADLEY's paper there was very little advance in the general theories of atmospheric circulation. DALTON wrote his "Meteorological Observations and Essays" in 1793, in which he, without knowledge of the existence of HADLEY's theory of the effect of the Earth's rotation, independently produced the same theory. He discovered HADLEY's paper just in time to note the fact in the preface of his book. During the early part of the nineteenth century a good deal of work was being done on the minor processes of atmospheric circulation, cyclones and revolving storms, etc., by REDFIELD, CAPPER and others, but it was not until just after the middle of the century that new theories of the

general circulation came into being. Of these, the first was that of MAURY, set forth in his "Physical Geography of the Sea" in 1855, which is shown diagrammatically in FIGURE 3. It must be understood that the dotted lines and arrows outside the disc representing the earth are intended to show, on an exaggerated scale, the vertical section of the atmosphere along a meridian. It follows that only the north and south components of the circulation can be so shown.

The Atmospheric Circulation according to Maury, 1855.

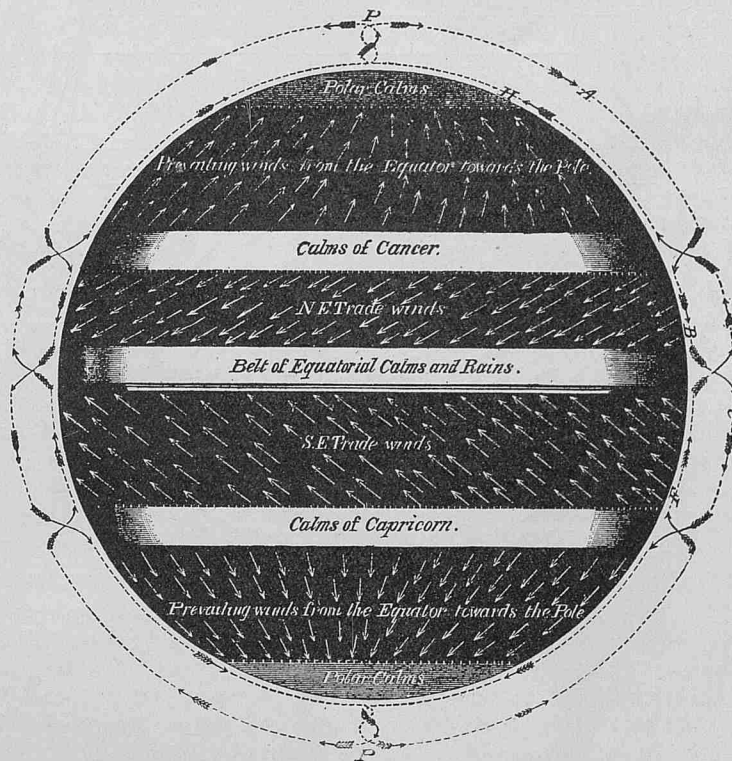


Figure 3.

The essential element of MAURY's theory is that the Counter-Trade descends to the surface in the regions of the "Calms of Cancer" and thence passes as a surface wind to the neighbourhood of the Pole. Here they rise and return as an upper wind, descending in the same region as the Counter-Trades do and thence passing southward as the N.E. trade wind. A similar procedure takes place in the Southern Hemisphere with a crossing at the "Calms of Capricorn." A further essential part of the theory is that the N.E. trade rises

The Atmospheric Circulation according to Ferrel, 1856.

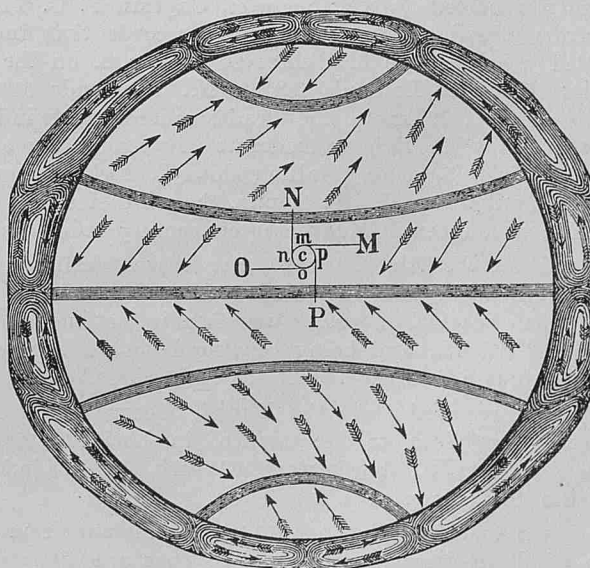


Figure 4.

The Atmospheric Circulation according to Thomson, 1857.

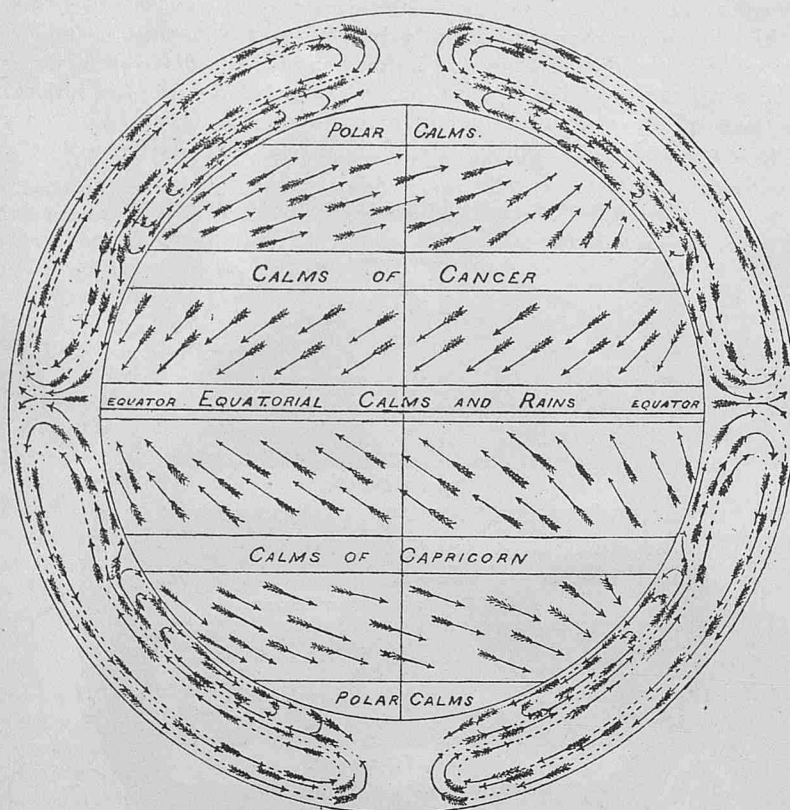


Figure 5.

(To be continued.)

at the Equator and continues as the Counter-Trade of the Southern Hemisphere, while the S.E. trade rises at the Equator and continues as the Counter-Trade of the Northern Hemisphere. There is thus a third crossing of the winds at the Equator. The theory was largely built up as an explanation of how the air over the great rainy regions of the continents received its moisture, but it was supported in other ways. For example, MAURY stated, on the authority of Professor EHRENBURG, that South American infusoria had been found by means of the microscope "to be prevalent in the blood-rains and sea-dust of the Cape Verde Islands, Lyons, Genoa and other places."

In the following year, 1856, quite a new theory was put forward by FERREL in a paper on "The Winds and Currents of the Ocean." In this theory, which was supported by mathematical reasoning, the vertical section of the atmosphere between Equator and Pole contained three complete circulations, one over the Trade Wind region, one over middle latitudes and one over the polar region (see FIGURE 4). In 1857, THOMSON, having rejected MAURY's and FERREL's theories, published a new theory of atmospheric circulation (see FIGURE 5). In this the original great circulation of HALLEY from Equator to Pole and back again was restored, but was modified by a subsidiary circulation extending over the region of the temperate westerlies to high polar latitudes. This circulation was northerly at the surface, the return being southerly at a moderate height, above which the main southerly return current of HALLEY's theory was found. In 1860, FERREL published his second theory in which his three circulations remained only in the lower part of the atmosphere, a general northward current from Equator to Pole lying above them. In his well-known work "A Popular Treatise of the Winds," published in 1889, he gave a third and final theory which was essentially similar to that of THOMSON.

WEST INDIAN HURRICANES, SEPTEMBER, 1927.

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

HURRICANES of the West Indies and North Atlantic reach their maximum frequency during the month of September and in 1927 the normal average for the month was attained, three storms of known hurricane intensity being recorded.

Insufficient observations were received to enable the first storm of the month to be tracked, but from reports received it appears to have been of a violent nature and of short duration.

It was first reported by S.S. *Socrates*, Captain F. C. TAYLOR, on passage from Brazil to New York, who records that indications of unsettled weather were first observed at 8 p.m. on the evening of the 6th. When in Latitude $18^{\circ} 53' N.$, Longitude $51^{\circ} 11' W.$, steering $N 37^{\circ} W.$, 10 knots, the Trades ceased, the wind coming fitfully from N. by W., light to moderate in strength, the barometer was then 1011 mb. (29.86 in.), falling slowly, which is about 5 mb. (0.15 in.) below the normal. At 11 p.m. the wind steadied at N.W., force 4, and a long swell was observed coming from east.

At 9 a.m., on the 7th, the barometer ceased falling, 1008 mb. (29.77 in.), the wind had increased to force 6 and the easterly swell was much heavier. *Socrates* was then in Latitude $20^{\circ} 45' N.$, Longitude $52^{\circ} 35' W.$, and being convinced that a hurricane was in being sent out a weather report to "All Ships."

A reply was received from the Danish Motor Vessel, *Nordpol*, bound from New York to Montevideo, in Latitude $21^{\circ} 40' N.$, Longitude $51^{\circ} 00' W.$, barometer 1006 mb. (29.71 in.) falling slowly, wind S.E., hurricane force, sea heavy.

Nordpol was therefore $N 62^{\circ} E$ 116 miles distant from *Socrates* and with winds in directly opposite directions and little difference in their barometric pressure shows the centre of storm to lie on

the line of bearing between the ships, but probably nearer *Nordpol* than *Socrates* considering the velocity of the wind reported by the former ship.

At 10 a.m. *Nordpol* steering north, reported wind veering to S.S.E. maintaining hurricane force, barometer steady 1006 mb. (29.71 in.). The shift of wind indicating a movement of the storm to the N.W., *Socrates* altered course from $N 37^{\circ} W$ to the S.E. when the barometer commenced to rise slowly and the wind gradually backed to west.

At noon, *Nordpol*, in Latitude $22^{\circ} 09' N.$, Longitude $51^{\circ} 14' W.$, reported wind south, force 8, barometer 1010 (29.83 in.) rising rapidly. As *Nordpol* was making way to the northward the changes in barometric pressure and wind direction experienced by her show that the storm was progressing in a NW'ly direction and that the area containing winds of hurricane force was small in extent.

Socrates, in Latitude $20^{\circ} 37' N.$, Longitude $52^{\circ} 26' W.$, at noon, with barometer 1009 mb. (29.80 in.) rising slowly, experienced a shift of wind to S.S.W., force 5, and assuming ship to have crossed the trough into the right hand rear quadrant of the storm hauled up to east keeping wind on starboard quarter. In the afternoon watch the wind continued to back and increased to force 8 and at 4 p.m., ship was hove to in Latitude $20^{\circ} 35' N.$, Longitude $51^{\circ} 48' W.$, barometer 1011 mb. (29.86 in.), wind south, force 8. At 8 p.m., the wind fell light and backed to S.E., barometer 1015 mb. (29.97 in.), when ship resumed original course and speed. At this time, *Nordpol*, in Latitude $22^{\circ} 50' N.$, Longitude $50^{\circ} 45' W.$, reported barometer 1017 mb. (30.03 in.) rising, wind S.S.E., force 6, decreasing.

At 10 a.m. on the next day the S.S. *Litiopa* in Latitude 25° 41' N., Longitude 54° 34' W., reported wind SE by E, force 10, with violent squalls, while other ships reported disturbed conditions prevailing between the 25th and 28th parallels and the 54th and 57th meridians.

From the above it will be seen that the synchronised weather reports exchanged between *Socrates* and *Nordpol* enabled the former ship to take the correct seamanlike action.

The second storm of the month was first indicated when S.S. *Newby Hall*, Captain J. K. STOREY, from New York to Walvis Bay, throughout the 23rd experienced an increasing NE'ly wind and gradually falling barometer. At 8 a.m. on this day, in Latitude 15° 27' N., Longitude 39° 17' W., barometric pressure was 1010 mb. (29.83 in.) which is about 6 mb. (0.17 in.) below normal and her wind N.E. force 6, see WEATHER CHART XIII for the morning of September 23rd. Maintaining course and speed S 54° E 9 knots, the wind veered at midnight to E by S, force 6, with ugly banks of Nimbus cloud to the south, probably the bar of the storm moving from east to west. At 3 a.m., on the 24th, the wind veered suddenly to south and decreased in strength to force 3, after which the weather commenced to improve. *Newby Hall* must have crossed on the 23rd to the north of the storm's centre which was travelling N.W.

WEATHER CHART XIV, for the morning of September 24th, shows the centre to be situated in about Latitude 25° 30' N., Longitude 54° W. S.S. *Tamaroa*, Captain W. HARTMAN, from Wellington to Southampton, steering N 45° E 11 knots, crossed the storm field in front of centre experiencing a strong gale from N.N.E. veering gradually to E.S.E.

WEATHER CHART XV, for the morning of September 25th, shows the centre to be situated in about Latitude 28° N., Longitude 60° W., having progressed during the past 24 hours in an approximate W.N.W. direction at 15 knots.

WEATHER CHART XVI, for the morning of September 26th. The centre continued to move in a N W'ly direction and was situated in about Latitude 31° N., Longitude 61° W.

At 7 a.m. on this day, the Dutch S.S. *Mijdrecht* from Seville to New Orleans, in Latitude 31° 08' N., Longitude 61° 00' W., recorded barometer 984 mb. (29.06 in.), wind north, force 12. S.S. *Hororata*, Captain E. HOLLAND, was then about S 65° W 100 miles from *Mijdrecht*, recording barometer 1009 mb. (29.80 in.), wind N.W., force 7. *Hororata* steaming N 48° E 10 knots throughout the day experienced wind backing but gradually decreasing in force, so that the ring of winds of hurricane force was small in extent.

WEATHER CHART XVII, for the morning of September 27th. During the past 24 hours, the centre passing east of Bermuda appears to have recurved and was situated in approximately Latitude 35° N., Longitude 60° W., moving to the N.E. At 10 a.m. on this day the Dutch S.S. *Spaarndam*, from Antwerp to Habana in Latitude 37° 37' N., Longitude 60° 43' W., recorded barometer 994 mb. (29.35 in.), wind north, force 10.

WEATHER CHART XVIII, for the morning of September 28th, shows the centre to be situated in about Latitude 38° 30' N., Longitude 52° W., having progressed in an approximate E.N.E. direction at 18 knots. At 6 a.m. on this day, the S.S. *Bolivian*, from London to New York, in Latitude 42° 44' N., Longitude 52° 48' W., barometer

981 mb. (28.97 in.), experienced the wind backing from N.E., force 7, to N.N.W., force 12 as the storm advanced.

A secondary disturbance is shown on the chart for this day, centred in about Latitude 27° N., Longitude 46° W. S.S. *Trematon*, Captain B. EVANS, steering S 64° W, 10 knots at 3 a.m. on this day experienced a shift of wind from S.E. to east increasing in force when the barometer commenced to fall. Throughout the morning watch there was torrential rain and at 8 a.m., the wind had increased to force 9, barometer 999 mb. (29.50 in.). At 9 a.m. wind veered to S.S.W. increasing to hurricane force, ship was hove to. At 10 a.m., lowest pressure was recorded, 969.4 mb. (28.63 in.), wind S.S.W., force 12, the sea was pyramidal causing much damage to deck fittings. Fifteen minutes later the wind suddenly dropped to force 4, but remained steady in direction, the lull lasted for half an hour when the wind again increased to hurricane force with terrific squalls. The barometer now commenced to rise and at noon was 996 mb. (29.41 in.), the wind steady from S.S.W. maintaining hurricane force. During the afternoon watch the wind gradually moderated to force 7 and at 4 p.m. the sky cleared to the N.W. At midnight, barometer 1013.9 mb. (29.94 in.), the wind had dropped to force 4, fine clear weather.

At 8 a.m. on the 28th S.S. *Pacuare*, Captain S. A. SAPSWORTH, in Latitude 28° 14' N., Longitude 49° 46' W., was only 140 miles S 75° W from *Trematon*, barometer 1013 mb. (29.92 in.), wind N.N.W., force 4. Steering S. 59° W., 10 knots throughout the day she experienced nothing worse than a heavy E.S.E. swell, the wind gradually backing to W.S.W., but decreasing in strength from force 4 to force 2. The experience of the two ships shows that the storm was of small extent, but of great intensity.

WEATHER CHART XIX for the morning of September 29th. The main disturbance moved during the past 24 hours in a N.N.E. direction at 12 knots and is now centred in approximately Latitude 43° N., Longitude 54° W. S.S. *Port Sydney*, Captain W. G. HIGGS from Barry to Philadelphia crossed the storm field in front of centre on the 28th and 29th. At noon on the 28th, steering S 80° W 12 knots, in Latitude 43° 05' N., Longitude 50° 09' W., the barometer commenced to fall, 1013 mb. (29.92 in.), and the wind from E.N.E. freshened to a moderate gale. Throughout the rest of the day the barometer continued to fall and at midnight was 980 mb. (28.94 in.). On the 29th the barometer continued to fall during the middle watch, wind back to N.E. and increased to hurricane force. At 3.30 a.m. lowest barometer was recorded, 970 mb. (28.65 in.), ship was hove to.

With the first rise of the glass, the wind steady in direction from N.E., increased in force, Captain HIGGS in his log remarking that from 3 a.m. to 8 a.m. the wind force was stupendous and unparalleled in his experience. At 9.30 a.m. wind backed to N by W, easing to force 11. Similar conditions prevailed to 3.30 p.m. when with the sky clearing from north the wind commenced to decrease in strength. Ship was put on her course. At midnight, barometer had risen to 1013 mb. (29.92 in.), and the wind had decreased to force 9.

Insufficient observations do not permit the secondary storm's centre to be shown on this day's chart, but *Trematon's* and *Pacuare's* winds indicate it to be situated north of *Trematon*.

WEATHER CHART XX for the morning of September 30th. The storm's centre continues to move N.E., and is now situated east of Newfoundland. Gales of storm force were reported on this day over the Atlantic tracks west of the 30th meridian.

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

LOCAL WINDS—INDIAN OCEAN.

IV.—Eastern Archipelago.

The greater portion of the Eastern Archipelago lying south of the Equator is within the range of the North-West and South-East monsoons; but the normal monsoon winds are considerably modified by the presence of high islands, the direction of the coast line, narrow channels, and the occurrence of land and sea breezes.

That portion of the Archipelago lying north of the Equator comes under the influence of the North-East and South-West monsoons of the China Sea, and these are also subject to interruption owing to the same causes.

The general season of the South-East and South-West monsoons is from April to October, and the North-West and North-East monsoons from November to March, with variations according to locality.

Java Sea.—In the Java Sea the South-East monsoon sets in in April, and blows strongest from June to August, ending in October or November. In the western part of the sea, its direction is from E.S.E., in the centre from east, and over the eastern portion from E.S.E. to S.E. In the Sunda Strait the monsoon blows from S.S.E. to S.E., but is only constant during August and September. Thunderstorms are more frequent here at this season than in any other part of the Archipelago.

The North-West monsoon blows in the Java Sea from December to March, its direction being from W.N.W. to west. It is stronger in force than the South-East monsoon, and is accompanied by squalls and heavy showers. In the Sunda Strait this monsoon blows from between S.W. and W.N.W., with frequent heavy rain. It lasts from November to April, and is stronger and more regular than the South-East monsoon.

Near the north coast of Java, land and sea breezes prevail, extending for about 15 miles off shore. The sea breeze sets in about 10 a.m. from N.E. (during the South-East monsoon season), remaining from this direction until about 6 p.m., the land wind coming off about 8 or 9 p.m. During the North-West monsoon, the sea breeze comes from the N.W., while the land breeze is not apparent.

On the south coast of Java during the South-East monsoon, the winds blow unsteadily from between east and south, veering to S.S.W. during November and December. They blow generally from S.W. during the North-West monsoon, only in January and February coming from north of west. At the changes of the monsoon, land and sea breezes occur regularly.

In the Banka, Gaspar and Carimata Straits, the monsoons prevail as in the Java Sea; but the times of the changes of the monsoons and their direction are somewhat irregular, and the South-East monsoon is much interrupted by calms.

Off the S.E. coast of Sumatra, land and sea breezes are sometimes experienced up to 30 miles off shore. In the Banka Strait, the winds follow the direction of the coast, with slight variation from the influence of the land and sea breezes.

In Gaspar and Carimata Straits, the settled weather of the South-East monsoon can be counted upon as a rule from about the end of May; the wind then blows strongly from between S.E. and S.S.E. until the beginning of October. The character of the weather then changes, light southerly or south-easterly winds being felt up to mid-day, followed by land breezes from across the west coast of Borneo. In November the North-West monsoon is ushered in by thunderstorms, rain and violent squalls from the westward, alternating with days of calm fair weather. The North-West monsoon season extends from November to March, and during that period, North to N.W. winds predominate, sometimes reaching gale force, with squalls (especially at night) heavy rains and thunderstorms.

The Lesser Sunda Islands.—On the coasts of the islands east of Java as far as Timor the character of the monsoons is similar to that of the Java Sea. The South-East monsoon sets in in May, with winds between east and E.S.E., which reach their maximum force

in June and July. During this monsoon the weather is fine, while during the North-West monsoon, November to March, rain, thunderstorms and squalls occur. In April the wind is variable.

In the Bali Strait the wind often blows very strongly, while in the Sapi Strait variable land and sea breezes are usually experienced. Generally speaking the wind here is usually southerly in the morning and northerly after 2 p.m., with periods of calm between the two winds.

On the N.W. coast of Timor, the North-West monsoon blows from October to March, reaching its maximum force towards the end of November or beginning of December; thence, until February strong winds from between north and west prevail. During April or early May the wind veers to the east or south; and during the South-East monsoon season, land and sea breezes are well-developed on the Timor coasts.

Arafura Sea and Coasts of New Guinea.—In the area between Timor and New Guinea the South-East monsoon commences in April and blows until the beginning of October; then, after a few weeks of variable winds, the North-West monsoon sets in and prevails until March.

In the southern portion of the Eastern Archipelago, generally speaking the North-West monsoon brings the rainy season, with thunderstorms and squalls, whereas the South-East monsoon is accompanied by fine weather. The S.W. coast of New Guinea however, and the islands between this and the east coast of Celebes have quite different weather conditions, for here during the South-East monsoon period squalls with heavy rain are experienced while the rest of the year is fine.

At the height of the respective monsoons the wind direction in the Arafura Sea is E.S.E. or W.N.W. In both cases the wind veers or backs to south or S.W., towards the end of the monsoon periods.

On the New Guinea coasts the South-East monsoon blows from May to October, with a great deal of rain from June to September; and from the end of October until April the North-West monsoon prevails, its direction in January varying from N.N.W. to N.E.

Over the sea between New Guinea and Australia the prevailing direction of the wind at the beginning of the North-West monsoon season is from N.E. to north, sometimes backing to west. Shortly before this monsoon is established, a five to six day period of westerly winds, known as the "Syzygy" is frequently experienced. The average direction of the wind during the monsoon is from N.N.W.

Over this area, the South-East monsoon blows with great regularity, the direction during the middle of the period being from between E.S.E. and S.E., while at the beginning and end of the season its direction is east.

Banda Sea and The Moluccas.—In the Banda Sea the South-East monsoon sets in during April, when S.E. winds begin to prevail; they become settled and strong in May, continuing with undiminished force until August, and then gradually decrease in strength during September and October. In November, S.E. winds still prevail, but west and N.W. winds are at times experienced. The North-West monsoon begins in December, reaches its height in January and February, and continues with great regularity until March.

On the north coast of Ceram during the South-East monsoon, the weather is fine, with regular land and sea breezes.

In the Molucca Sea the monsoons are well marked and blow from N.N.W. and S.S.E., April and November being transition months. The South-East monsoon usually sets in during the latter half of April, and gradually increases in steadiness and force until July and August. In October it decreases in strength and becomes much less regular. The North-West monsoon, which sets in during December and attains its greatest frequency and force in January and February, is not so strong or steady as the South-East monsoon.

Blowing through the Molucca Passage crossing the Equator, the South-East monsoon veers towards the south and S.W. and gradually merges into the South-West monsoon of the China Sea; while during the northerly monsoon the wind direction similarly veers from N.N.W. to N.E.

Borneo and Celebes.—The islands of Borneo and Celebes, the largest and fourth largest respectively in the Archipelago, are divided into two parts by the Equator.

On the south coast of Celebes the South-East monsoon is established from May to October, the dry season; and during the same period the South-West monsoon is blowing on that part of the island which is north of the Equator. The North-West monsoon replaces the South-East during October, and blows strongly until April; while during the same period the North-East monsoon prevails northward of the Equator.

Owing to the peculiar shape of the island, the direction of the prevailing winds varies considerably on the different coasts, and land and sea breezes are general.

On the west coast of Celebes from November to April, the winds vary between W.S.W. and W.N.W., though light southerly winds are sometimes experienced between November and February. In April the winds blow from N.E. to S.E., but calms and N.W. winds are also met with. In June the winds begin to blow with some regularity from S.E., occasionally veering to S.W. From May to October, land and sea breezes blow regularly near the coast, the former between 7 p.m. and 7 a.m., and the latter between 10 a.m. and 5 p.m.

On the north coast, strong southerly winds, called "Selatan" occasionally blow for some days during the South-East monsoon season, without being overcome by the sea breeze. During the North-West monsoon, especially from December to February, westerly winds sometimes prevail with great force, lasting for some days, and accompanied by heavy squalls. A dark lead coloured sky to seaward is an almost certain indication of the approach of these squalls.

In the Gulf of Tomini, on the east coast of Celebes, the monsoons are weak, with a large proportion of variable winds. The northerly monsoon lasts from December to April, and the southerly from May to October. Strong winds are seldom experienced, and heavy squalls or thunderstorms are rare.

In the Tomori Gulf, further south, the monsoons blow much more steadily, especially the South-East, which begins at the end of April, and blows strongly until October; its direction is from E.S.E. by day, and, under the influence of the land breeze, from E.N.E. by night. The North-West monsoon commences in December, from W.N.W., and is at its height in January with heavy squalls. In February and March unsteady winds from between S.W. and north prevail.

On the north-east coast of Borneo the North-East monsoon season extends from about the middle of October to the middle of April. The wind blows steadily from between north and east, with moderate force, from about 11 a.m., becoming stronger towards evening, and dying away in the early morning, when it may be replaced by a gentle land breeze. During December and January the wind sometimes reaches the force of a moderate gale, lasting from 3 to 9 days. On this coast the South-West monsoon lasts from the middle of April to the middle of October, but is not so strong as the northerly monsoon. Land breezes are more marked, and during the afternoon and evening, squalls lasting an hour or two are frequently experienced, sometimes reaching the force of a fresh gale.

On the east coast of Borneo, in Macassar Strait, the monsoons are not so well marked. From July to October, southerly winds prevail, and from December to May northerly winds. In October

and November, also in May and June, light variable winds and calms are frequent. The northerly monsoon is considered the wet season, and the southerly monsoon the dry season, although rains are abundant at all times, and sudden squalls are frequent.

On the south and south-west coasts of Borneo, the winds are similar to those previously described for the Java Sea and Carimata Strait.

On the north-west coast of Borneo the general North-East and South-West monsoons of the China Sea are experienced. From November to April, northerly winds predominate, blowing strongly and with great regularity in January and February from North to N.N.W. In March, northerly winds are more frequent, but N.E., E.N.E. and even east winds occur. The southerly monsoon begins early in May, with easterly and south-easterly winds. It is strongest from June to September, when the wind comes from between S.E. and S.W. In October the winds become variable in direction, and there are frequent calms.

Land and sea breezes are general at all times of the year, and modify the direction of the monsoon winds, both northerly and southerly winds tending to become westerly by day and easterly by night.

Palawan.—The monsoons on the coast of Palawan are so much subject to interruption that it is difficult to say at what period either sets in fairly. From January to April, moderate N.E. to East winds prevail, and land and sea breezes are experienced with considerable regularity. May and the early part of June appear to be the finest period of the year on the west coast, with regular land and sea breezes, the former coming from south and S.E. in the morning, and the latter from north and N.W. in the afternoon.

Towards the end of June and throughout July, unsettled weather may be expected, while in August it is generally fine, with moderate S.W. or west winds. In September and October the wind generally blows strongly from W.S.W., with cloudy weather; and off the south west end of Palawan, frequent squalls occur, veering to W.N.W. and N.W. In November and December, the weather is variable, N.E. and east winds, changing at times to S.E., frequently prevailing.

Philippines.—Amongst these islands the two regular monsoons of the China Sea prevail, but are much affected by local conditions, notably by land and sea breezes; and also by the occurrence of typhoons; principally between May and November.

The North-East monsoon commences about October and continues until April, with fresh winds varying from north to N.E., sometimes backing to N.W. and blowing hard. Occasionally northerly gales, called "Nortadas" occur, which last from one to three days, and usually indicate the passing of a typhoon not very far off. This season is the fine season except on coasts directly exposed to the monsoon, where heavy rainfall is experienced especially in south-east Luzon and Mindanao. The wind dies away to a calm in the evening, and is followed by a land breeze during the night. The high land of the Philippines interrupts the regular monsoons, and under the high land close inshore, there may be frequently calms or westerly winds while farther seaward the wind is N.E.

The South-West monsoon sometimes commences in May, but is not generally established until June, and continues until September or October. Its direction near the coast is influenced by land and sea breezes to a greater extent than during the North-East monsoon. This season is characterised by the occurrence of south-westerly or westerly winds, called "Collas", which are accompanied by violent squalls and much rain, and often last for several days. They are usually connected with atmospheric depressions or typhoons to the north or north-east of Luzon.

(To be continued.)

WEATHER SIGNALS.

II.—WIRELESS WEATHER SIGNALS.

WIRELESS WEATHER BULLETINS.

The Key and Decode Tables of the International Weather Telegraphy Code will be found on pages 20 to 23 of Volume V No. 49. (The January, 1928, Number.)

The method of decoding station weather reports made in code was described in the British "Weather Shipping" Bulletin, on pages 37 and 38 of Volume V No. 50. (The February, 1928, Number.)

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

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

UNITED STATES OF AMERICA (PACIFIC COAST).

(C.W. Issues.)

San Francisco, California, W/T Station, approximate Latitude 38° 06' N., Longitude 122° 17' W., call sign **NPG**, broadcasts weather bulletins as follows:—

At 0330 G.M.T., on wavelengths of 7,005 and 35.9 metres (C.W.), simultaneously, and at 1530 G.M.T., also on wavelengths of 7,005 and 35.9 metres (C.W.), simultaneously.

The bulletins commence with the letters USWB (U.S. Weather Bureau) and are divided into two parts.

Part I is broadcast in special code (United States Meteorological) and contains observations from the stations in the list below, taken at 0100 G.M.T. for the 0330 G.M.T., bulletin and at 1300 G.M.T., for the 1530 G.M.T., bulletin, except as follows, where the observations do not synchronise:—

Kodiak and Dutch Harbour, Alaska, observations are taken at Midnight and Noon G.M.T. Observations at remaining Alaskan stations are taken at 1700 and 0500 G.M.T.

Honolulu observations taken at 0630 and 1830 G.M.T.

Guam, Manila, China and Japan observations taken at 2200 G.M.T.

Midway observations taken at 1830 Midway local time of the preceding day.

First Part.

Indicator Letters and Stations.

Indicator Letters.	Station.	Position (approx.).	
		Latitude.	Longitude.
<i>Alaska.</i>			
*NM	- Nome - - - - -	64° 50' N.	167° 20' W.
*SPI	- St. Paul - - - - -	57° 02' N.	170° 30' W.
*DH	- Dutch Harbour - - - - -	53° 53' N.	166° 32' W.
*TN	- Tanana - - - - -	65° 00' N.	151° 40' W.
*EA	- Eagle - - - - -	64° 50' N.	140° 50' W.
*KD	- Kodiak - - - - -	57° 40' N.	152° 30' W.
*CV	- Cordova - - - - -	60° 35' N.	145° 40' W.
*JU	- Juneau - - - - -	58° 18' N.	134° 25' W.
*SK	- Sitka - - - - -	57° 03' N.	135° 20' W.
<i>Canada.</i>			
*ED	- Edmonton, Alberta - - - - -	53° 32' N.	113° 05' W.
*KA	- Kamloops, B.C. - - - - -	50° 48' N.	120° 03' W.
*CY	- Calgary, Alberta - - - - -	51° 00' N.	114° 00' W.
*SC	- Swift Current, Sask. - - - - -	50° 30' N.	107° 45' W.
*PR	- Prince Rupert, B.C. - - - - -	54° 15' N.	130° 21' W.
<i>United States, etc.</i>			
TAT	- Tatoosh I, Wash. - - - - -	48° 23' N.	124° 44' W.
†SE	- Seattle, Wash. - - - - -	47° 38' N.	122° 25' W.
NH	- North Head, Wash. - - - - -	46° 18' N.	124° 05' W.
PD	- Portland, Oreg. - - - - -	45° 31' N.	122° 31' W.
RO	- Roseburg, Oreg. - - - - -	43° 11' N.	123° 10' W.
EUR	- Eureka, Calif. - - - - -	40° 42' N.	124° 16' W.
RB	- Red Bluff, Calif. - - - - -	40° 10' N.	122° 10' W.
SM	- Sacramento, Calif. - - - - -	38° 32' N.	121° 30' W.
†SF	- San Francisco, Calif. - - - - -	37° 50' N.	122° 30' W.
FN	- Fresno, Calif. - - - - -	36° 10' N.	119° 50' W.

* Cloud reports not included.

† Upper air observations from these stations included in bulletins.

Indicator Letters and Stations—cont.

Indicator Letters.	Station.	Position (approx.).	
		Latitude.	Longitude.
<i>United States, etc.—cont.</i>			
SLO	- San Luis Obispo, Calif. - - - - -	35° 08' N.	120° 43' W.
*PAR	- Point Arguello, Calif. - - - - -	34° 35' N.	120° 38' W.
†LA	- Los Angeles, Calif. - - - - -	33° 40' N.	118° 15' W.
†DI	- San Diego, Calif. - - - - -	32° 42' N.	117° 15' W.
†SPO	- Spokane, Wash. - - - - -	47° 40' N.	116° 41' W.
*WW	- Walla Walla, Wash. - - - - -	46° 08' N.	118° 50' W.
BA	- Baker, Oreg. - - - - -	45° 00' N.	117° 30' W.
HL	- Helena, Mont. - - - - -	46° 10' N.	111° 50' W.
†BS	- Boise, Idaho - - - - -	43° 40' N.	116° 00' W.
LD	- Lander, Wyo. - - - - -	41° 40' N.	108° 40' W.
WM	- Winnemucca, Nev. - - - - -	40° 50' N.	118° 10' W.
†R	- Reno, Nev. - - - - -	39° 20' N.	119° 50' W.
†SLC	- Salt Lake City, Utah - - - - -	40° 45' N.	111° 40' W.
†MD	- Modena, Utah - - - - -	37° 30' N.	113° 50' W.
*DV	- Denver, Colo. - - - - -	39° 48' N.	105° 05' W.
GJ	- Grand Junction, Colo. - - - - -	39° 10' N.	108° 20' W.
SA	- Santa Fe, N. Mex. - - - - -	35° 39' N.	106° 02' W.
*PH	- Phoenix, Ariz. - - - - -	33° 00' N.	112° 00' W.
YU	- Yuma, Ariz. - - - - -	32° 46' N.	114° 38' W.
*HO	- Honolulu, Hawaii - - - - -	21° 18' N.	157° 52' W.
*MDI	- Midway Island - - - - -	28° 15' N.	177° 22' W.
*FMA	- Manila P.I. - - - - -	14° 35' N.	120° 52' E.
*FGM	- Guam. - - - - -	13° 32' N.	144° 53' E.

China and Japan, etc.

*FHO	- Hong Kong, China - - - - -	22° 13' N.	114° 16' E.
*FSH	- Shanghai, China - - - - -	31° 15' N.	121° 30' E.
*FBI	- Bonin Island - - - - -	27° 05' N.	142° 11' E.
*FKO	- Koshun, Formosa - - - - -	25° 08' N.	121° 45' E.
*FNA	- Naha, Japan - - - - -	26° 13' N.	127° 41' E.
*FKA	- Kagoshima, Japan - - - - -	31° 34' N.	130° 33' E.
*FTO	- Tokio, Japan - - - - -	35° 39' N.	139° 45' E.
*FNE	- Nemuro, Japan - - - - -	43° 20' N.	145° 35' E.

The observations from land stations which are preceded by the indicator letters of the station are contained in two or more five-figure groups for each station. Groups one and two give surface observations, group three, cloud; and the remainder, upper air data.

The letter "X" will be substituted for any missing or unavailable data.

Explanation of groups one and two.

First Group.—1st three figures give the barometer reading corrected in inches and hundredths, the first figure (2 or 3) being omitted. (To convert to millibars, see Table L.)

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

5th figure gives the wind force by Beaufort Scale. The letters W (Whole gale), S (Storm), H (Hurricane), being used for forces 10, 11 and 12 respectively.

Second Group.—1st figures gives the present weather (State of weather at surface). (Table XLVII.)

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

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

4th and 5th figures give the air temperature in even degrees F.

Weather reports from ships in the North Pacific Ocean follow the reports from the land stations in Part I. Ship's observations taken at Midnight G.M.T. being broadcast in the 0330 G.M.T. bulletin and those taken at Noon G.M.T. being broadcast in the 1530 G.M.T. bulletin. They are broadcast in two five-figure groups for each ship, preceded by the W/T call sign of the reporting ship. The first group of numerals gives the ship's position to the nearest degree, the first two figures in this group giving the latitude (north), and the last three figures the longitude (west). The second group of numerals give the barometer reading in inches and hundredths (three figures, initial 2 or 3 not sent), wind direction (one figure) and wind force by Beaufort scale (one figure). To convert barometer reading to mbs. see Table L, and for wind direction figure see Table XLVI.

Part II of the bulletins is in plain language and consists of a summary of general pressure distribution; wind and weather forecasts for ocean zones (see CHARTLET below); storm warnings (for particulars see p. 194), and flying weather forecasts by zones (see CHARTLET below).

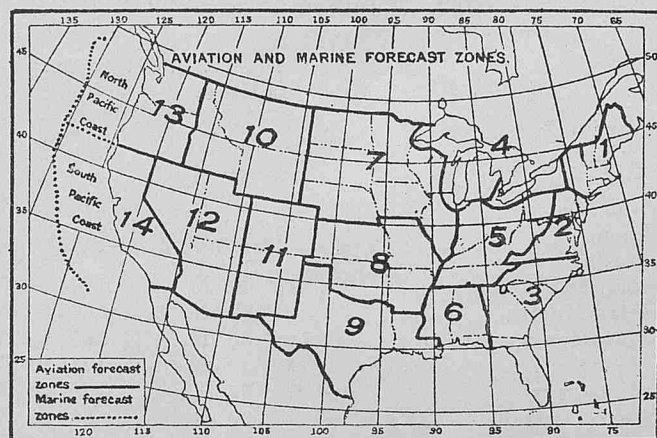
Periods covered by Forecasts.

In 0330 G.M.T. bulletins:

Wind and weather forecasts; 24 hours, beginning at 0800 G.M.T.
Flying weather forecasts; 12 hours, 0800 G.M.T., until 2000 G.M.T.

In 1530 G.M.T. bulletins:

Wind and weather forecasts; 24 hours beginning at 2000 G.M.T.
Flying weather forecasts; 12 hours, 2000 G.M.T., until 0800 G.M.T.



San Francisco W/T Station also transmits a report of the weather conditions in the Bonita Channel, every four hours, commencing with 0000 G.M.T. Wavelength, 2,776 metres (I.C.W.).

Hawaiian Islands.

Honolulu-Pearl Harbour W/T Station, approximate Latitude $21^{\circ} 12' N.$, Longitude $157^{\circ} 58' W.$, call sign **NPM**, broadcasts weather forecasts for the Hawaiian Islands and neighbouring ocean areas at 2230 G.M.T., on a wavelength of 5,552 metres (A.C.W.). The station also broadcasts the barometric reading, wind direction and force and state of weather at Honolulu at 0630, 1830 and 2230 G.M.T. on a wavelength of 5,552 metres (A.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 and can be similarly decoded. 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 is broadcast in special code (United States Meteorological) and contains observations from stations in the following lists.

The observations from these stations are 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.

Explanation of Group.

1st, 2nd and 3rd figures of group give the corrected barometer reading in inches and tenths, the first figure (2 or 3) being omitted. (See Table L for conversion of ins. to mbs.)

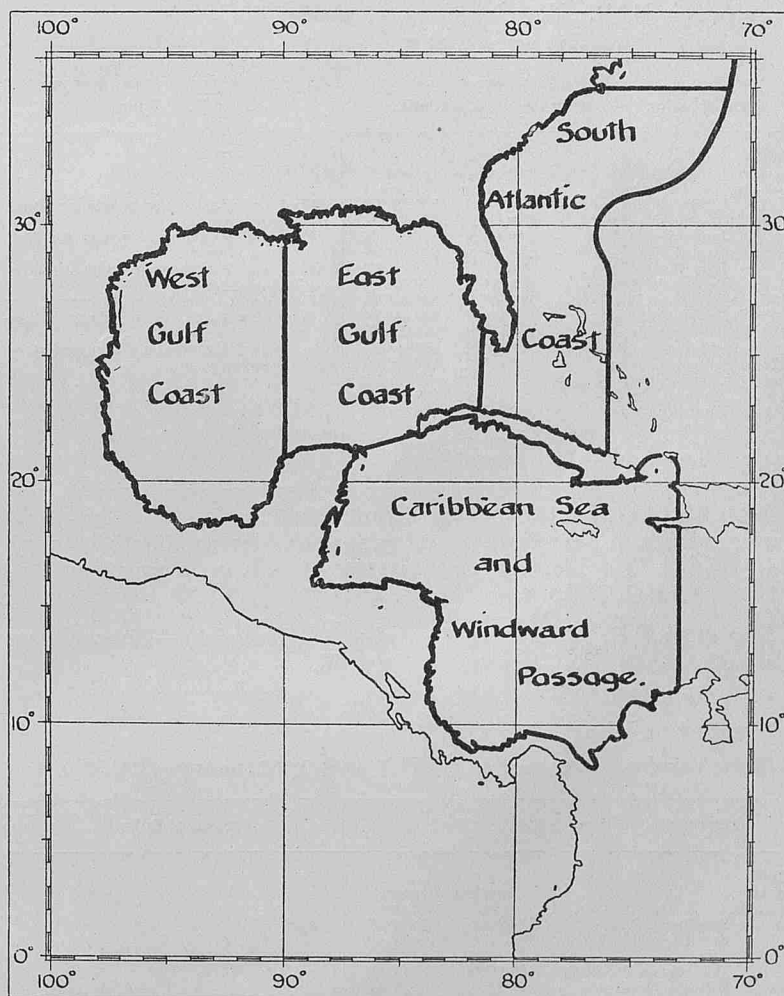
4th figure of group gives the wind direction true. (Table XLVI).

5th figure of group gives the wind force (Beaufort Scale). The letters W, S, or H will be used for forces 10, 11 and 12 respectively.

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

For particulars of storm and hurricane warnings, see p. 194.

Chartlet of U.S. Marine Forecast Areas.



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 $9^{\circ} 20' N.$, Longitude $82^{\circ} 17' W.$

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

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

At 1730 G.M.T. **Part I**, observations from following stations broadcast *only during the hurricane season*, June to November inclusive. **Part II** broadcast daily *throughout the year*.

Observation Stations in Part I. of Bulletin.			Part II. of Bulletin.
Indicator Letters.	Station.	Position (approx.). Lat. Long.	
CG	Cape Gracias, Nic.	15° 00' N. 83° 13' W.	{ 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, p. 191.
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 3,331 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 (I.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.). Lat. Long.	
H	Hatteras, N.C.	35° 14' N. 75° 32' W.	{ 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, p. 191.
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.	
BW	Burwood, La.	28° 57' N. 89° 23' W.	
GV	Galveston, Tex.	29° 19' N. 94° 48' W.	
BV	Brownsville, Tex.	28° 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 (I.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, 0045 G.M.T.
Wavelengths, 6,246 metres (C.W.) and 2,653 metres (I.C.W.).

Observation Stations in Part I. of Bulletin.			Part II. of Bulletin.
Indicator Letters.	Station.	Position (approx.). Lat. Long.	
SJ	San Juan, P.R.	18° 28' N. 66° 06' W.	{ Hurricane Warnings.
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, Barbados.	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, Curaçao.	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, which were explained in this Journal, Vol. V, No. 56 (the August, 1928, Number), at 0400 and 1600 G.M.T., respectively, on a wavelength of 6,246 metres (C.W.). This re-broadcast is **not** made when conditions do not permit the reception of the Arlington bulletin 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 (I.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.

MEXICO.

(Spark Issue.)

Chapultepec W/T station approximate Latitude 19° 25' N. Longitude 99° 11' W. call sign **XDA**, broadcasts a weather bulletin at 1900 G.M.T. after Time Signal on a wavelength of 2,000 metres (spark).

The bulletin is in two parts.
Part I., in special code, contains the observations of 1300 G.M.T. from the following stations:—

		Position approx.	
Station.		Latitude.	Longitude.
Acapulco	- - -	16° 52' N.	99° 50' W.
Chihuahua	- - -	28° 32' N.	106° 28' W.
Frontera	- - -	18° 35' N.	92° 38' W.
Guaymas	- - -	27° 58' N.	110° 48' W.
Leon	- - -	21° 01' N.	101° 15' W.
Lerdo	- - -	- - -	- - -
Manzanillo	- - -	19° 00' N.	104° 20' W.
Islas Marias	- - -	21° 40' N.	106° 30' W.
Matamoros	- - -	25° 53' N.	97° 33' W.
Mazatlan	- - -	23° 10' N.	106° 22' W.
Monterrey	- - -	25° 34' N.	100° 20' W.
Payo Obispo	- - -	18° 29' N.	88° 22' W.
La Paz	- - -	24° 10' N.	110° 18' W.
Progreso	- - -	21° 16' N.	89° 36' W.
Salina Cruz	- - -	16° 17' N.	95° 15' W.
Tacubaya	- - -	19° 24' N.	99° 12' W.
Tampico	- - -	22° 11' N.	97° 53' W.
Tapachula	- - -	15° 10' N.	92° 27' W.
Vera Cruz	- - -	19° 12' N.	96° 10' W.

Explanation of Part I.
Commencing with the word "Meteorologico," the name of the observation station is sent, followed by two groups of figures, there being five figures in each group.

First Group.—1st, 2nd and 3rd figures give the corrected barometric reading in millimetres and tenths, initial 7 omitted. To convert to mbs, or ins, see Table LI.

4th figure gives the wind direction (Table XLVI).
5th figure gives the wind force by Beaufort scale, 9 being used for forces 9 and above.

Second Group: 1st figure gives the state of the weather at the time of observation. (Table XLVII.)

2nd figure gives the barometric tendency in millimetres for the 2 hours previous to the time of observation. (Table LII.)

3rd figure gives the cloud amount. (Table LIII.)

4th figure gives the cloud form and speed. (Table LIV.)

5th figure gives the direction of movement of the clouds, from Table XLVI.

When both upper and lower clouds are observed, only the amount, kind, and direction of the lower clouds will be sent. In such cases the amount of the upper clouds, if any, can be determined, approximately, by taking the difference between the tenths of cloudiness interpreted from the figures showing "present weather" and "amount of clouds."

NOTE.—(1) Missing observations replaced by letter "X."

(2) When all the data for a station cannot be supplied, the name of the station will be omitted.

Part II. sent *en clair* (Spanish) gives information concerning the general weather situation, position of centres of High or Low pressure areas, and weather forecasts for 24 hours.

SPECIAL WEATHER TELEGRAPHY TABLES.

NOT NEW INTERNATIONAL CODE.

Table XLVI.—Wind Direction (True).

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

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

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

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

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

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

Table XLIX.—Past Weather.

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

Code Figure.
1 = Thunderstorm without high winds and less than .06 inch precipitation.
2 = Thunderstorm without high winds and with .06 inch or more precipitation.
3 = Thunderstorm with high winds and less than .06 inch precipitation.
4 = Thunderstorm with high winds and .06 inch or more precipitation.
5 = Precipitation less than .06 inch.
6 = Precipitation from .06 to .16 inch inclusive.
7 = Precipitation more than .16 inch.
8 = High winds without thunderstorm and without precipitation in excess of .06 inch.
9 = High winds without thunderstorm and with precipitation in excess of .06 inch.
0 = No precipitation or high winds.

Table L.

To convert Inches to Millibars.

Inch.	mb.	Inch.	mb.	Inch.	mb.
27.50	931.2	28.65	970.2	29.85	1,010.8
27.55	932.9	28.70	971.9	29.90	1,012.5
27.60	934.6	28.75	973.6	29.95	1,014.2
27.65	936.3	28.80	975.3	30.00	1,015.9
27.70	938.0	28.85	976.9	30.05	1,017.6
27.75	939.7	28.90	978.6	30.10	1,019.3
27.80	941.4	28.95	980.3	30.15	1,021.0
27.85	943.1	29.00	982.0	30.20	1,022.7
27.90	944.8	29.05	983.7	30.25	1,024.4
27.95	946.5	29.10	985.4	30.30	1,026.1
28.00	948.2	29.15	987.1	30.35	1,027.7
28.05	949.9	29.20	988.8	30.40	1,029.4
28.10	951.6	29.25	990.5	30.45	1,031.1
28.15	953.2	29.30	992.2	30.50	1,032.8
28.20	954.9	29.35	993.9	30.55	1,034.5
28.25	956.6	29.40	995.6	30.60	1,036.2
28.30	958.3	29.45	997.3	30.65	1,037.9
28.35	960.0	29.50	999.0	30.70	1,039.6
28.40	961.7	29.55	1,000.7	30.75	1,041.3
28.45	963.4	29.60	1,002.4	30.80	1,043.0
28.50	965.1	29.65	1,004.0	30.85	1,044.7
28.55	966.8	29.70	1,005.7	30.90	1,046.4
28.60	968.5	29.75	1,007.4	30.95	1,048.1
		29.80	1,009.1		

Table LI.

Conversion of Millimetres to Millibars and Inches.

Mm.	Mb.	In.	Mm.	Mb.	In.	Mm.	Mb.	In.
695	926.6	27.37	743	990.6	29.25	759	1011.9	29.88
700	933.2	27.56	744	991.9	29.29	760	1013.2	29.92
705	939.9	27.76	745	993.2	29.33	761	1014.6	29.96
710	946.6	27.95	746	994.6	29.37	762	1015.9	30.00
715	953.2	28.15	747	995.9	29.41	763	1017.2	30.04
720	959.9	28.35	748	997.2	29.45	764	1018.6	30.08
725	966.6	28.54	749	998.6	29.49	765	1019.9	30.12
730	973.2	28.74	750	999.9	29.53	766	1021.2	30.16
735	979.9	28.94	751	1001.2	29.57	767	1022.6	30.20
736	981.2	28.98	752	1002.6	29.61	768	1023.9	30.24
737	982.6	29.02	753	1003.9	29.65	769	1025.2	30.28
738	983.9	29.06	754	1005.2	29.69	770	1026.6	30.32
739	985.2	29.10	755	1006.6	29.73	775	1033.2	30.51
740	986.6	29.13	756	1007.9	29.76	780	1039.9	30.71
741	987.9	29.17	757	1009.2	29.80	785	1046.6	30.91
742	989.2	29.21	758	1010.6	29.84			

Table LII.

Barometric change during 2 hours preceding observation.

Code Figure.
0 = Steady (rise or fall less than 1 mm.).
1 = Rising 1 mm.
2 = Falling 1 mm.
3 = Rising 1.5 mm.
4 = Falling 1.5 mm.
5 = Rising 2 mm.
6 = Falling 2 mm.
7 = Rising 2.5 mm.
8 = Falling 2.5 mm.
9 = Rise or fall 3 mm. or more. (Whether it is an increase or decrease can be determined by the tendency at surrounding stations.)

Table LIII.

Cloud amount.

Code Figure.

- 0 = 1 tenth or less of sky covered.
 2 = 2 to 3 tenths of sky covered.
 4 = 4 to 5 tenths of sky covered.
 6 = 6 to 7 tenths of sky covered.
 8 = 8 to 10 tenths of sky covered.

Table LIV.

Cloud Form and Speed.

Code Figure.

- 0 = 1 tenth clouds or less (kind not indicated).
 1 = upper clouds (cirrus, cirro-stratus, cirro-cumulus, alto-cumulus, or alto-stratus), speed not indicated.
 2 = strato-cumulus moving slowly.
 3 = strato-cumulus moving rapidly.
 4 = cumulus moving slowly.
 5 = cumulus moving rapidly.
 6 = stratus moving slowly.
 7 = stratus moving rapidly.
 8 = nimbus or cumulo-nimbus moving slowly.
 9 = nimbus or cumulo-nimbus moving rapidly.

WIRELESS STORM WARNINGS.

United States of America. (Pacific Coast.)

(C.W. and Spark Issues.)

THE following W/T Stations broadcast storm warnings at the times stated below. Ships may request any of the stations mentioned to furnish the latest storm warning. The warnings are for a period of 24 hours beginning at the hour indicated in the messages.

W/T Station and position (approx.).	Call Sign.	Wave-length, metres.	Broad-casting Time G.M.T.	Particulars.
Puget Sound - Lat. 47° 24' N. - Long. 122° 37' W.	NPC	2,939 (C.W.)	0100, 0300 0400, 1300 1700, 2100	Storm Warnings.
Tatoosh I., Wash. Lat. 48° 23' N. - Long. 124° 44' W.	NPD	800 (Spk.)	0100, 0400 1300, 1700 2100	
Eureka, Calif. - Lat. 40° 42' N. - Long. 124° 16' W.	NPW	2,776 (I.C.W.)	1700 2200	
" " -	"	2,883 (I.C.W.)	0130	Storm Warnings.
San Francisco, Calif. Lat. 37° 39' N. - Long. 122° 23' W.	NPG	7,005 (C.W.)	0330, 1700	Storm Warnings. In Part II of weather bulletin.
" " -	"	2,776 (I.C.W.)	0000, 0400 0800, 1200 1600, 2000	
San Diego, Calif. Lat. 32° 42' N. - Long. 117° 15' W.	NPL	2,939 (I.C.W.)	0500, 1630 2200	Storm Warnings. Broadcast on receipt and at times stated.

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. 191. 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 **UB**. 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. 191, 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 and 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 2,883 (A.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 2,883 metres (C.W.):—

At 1600 and 2200 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 (I.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 (I.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**, July 1 to November 15, inclusive.

At 0045 G.M.T., on 6,246 metres (C.W.) and 2,653 metres (I.C.W.), broadcasts hurricane warnings. These form Part II of the weather bulletin explained on p. 192. In the absence of a tropical storm the words "Weather normal over eastern Caribbean" will be sent each day. Hurricane warnings and information relating thereto are broadcast whenever issued by the Weather Bureaux at Washington D.C. and San Juan and repeated at 2 hour intervals until 0500 G.M.T.

Guantanamo (Cuba)—**NAW**—2,653 (I.C.W.)

Port au Prince (Haiti) **NSC**—2,271 (spk.)

St. Croix

St. Thomas

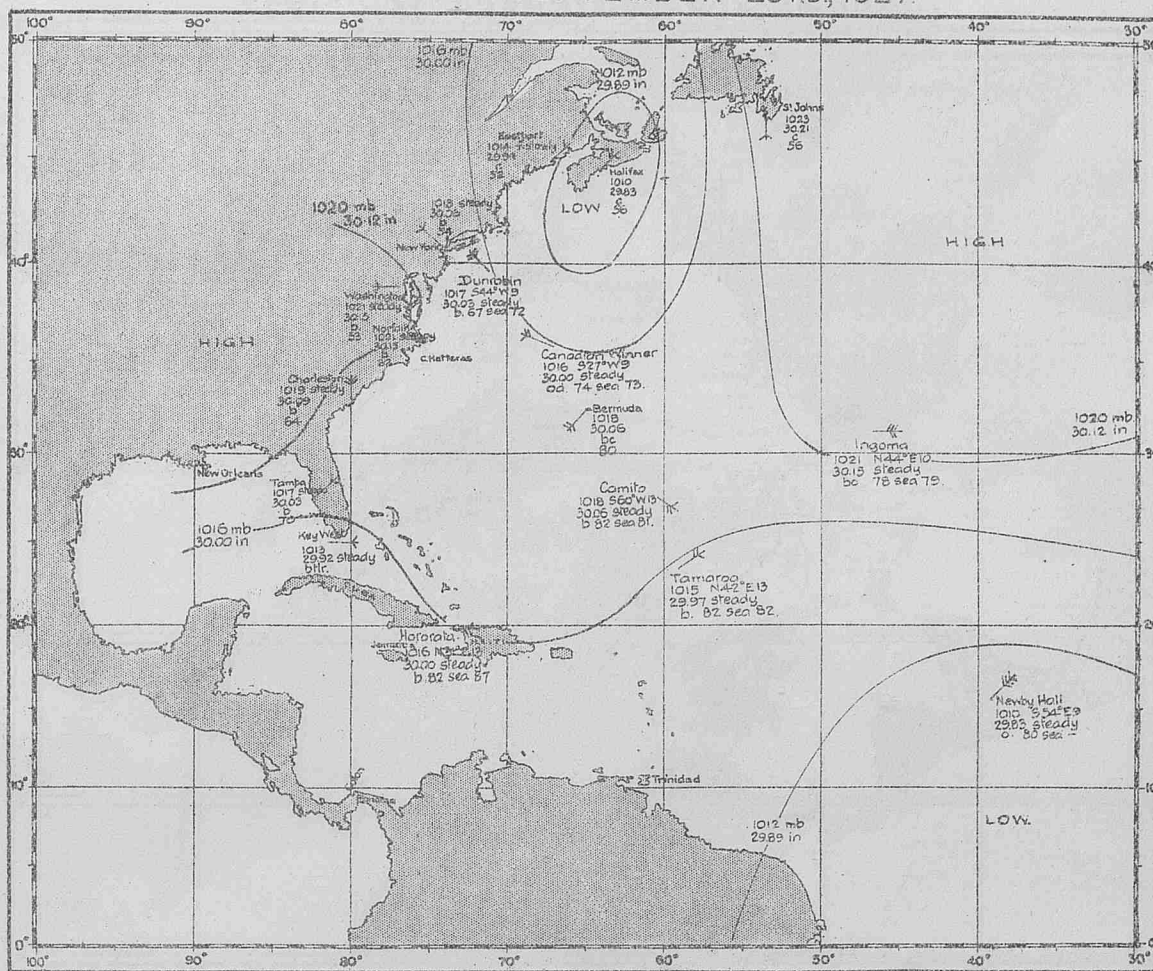
St. John's

Santo Domingo—**HIA**—600 (spk.)

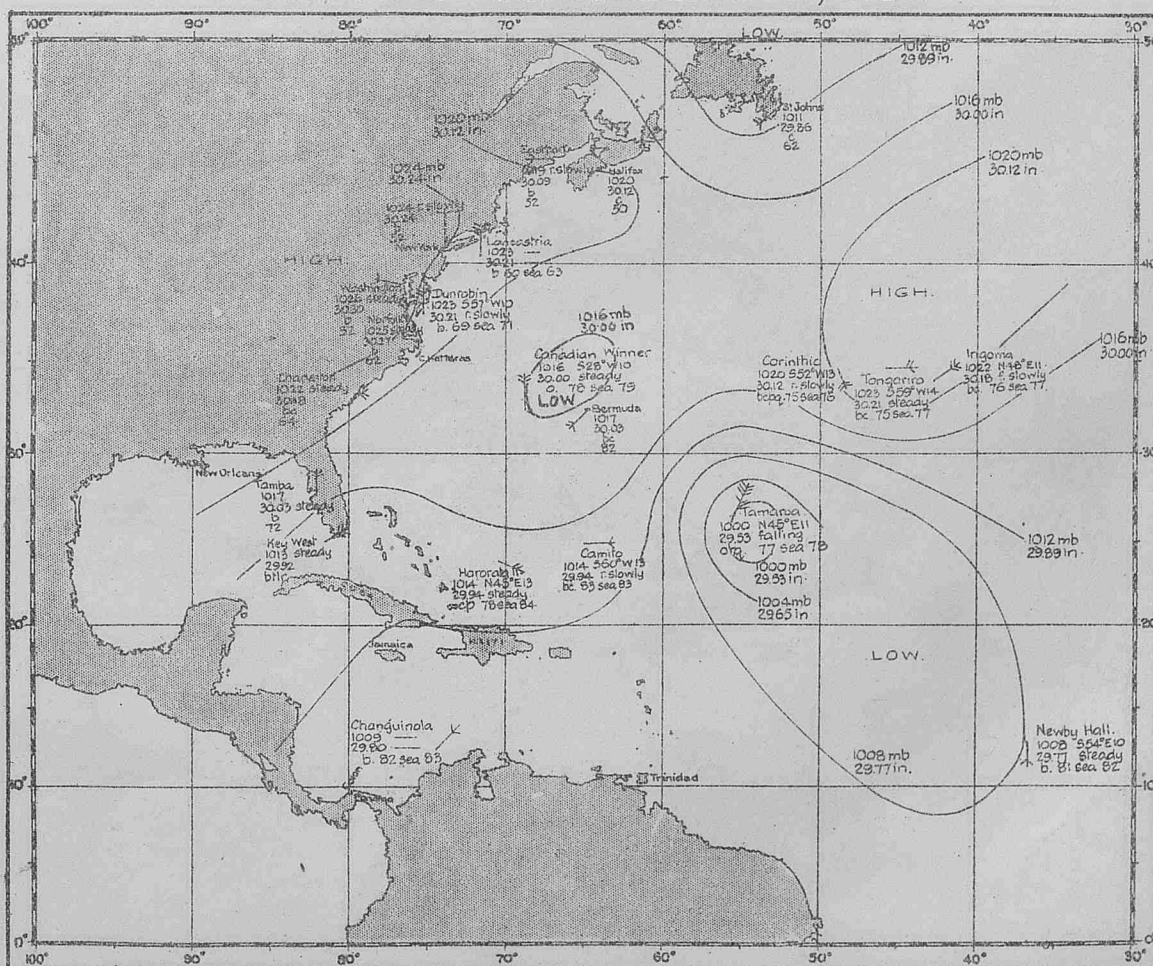
Ensenada (Porto Rico)—**WPR**—600 (spk.)

NOTE.—**Guantanamo W/T station** repeats the San Juan bulletin, containing hurricane warnings, explained on p. 192, during the hurricane season, July 1 to November 15, inclusive, on a wavelength of 2,653 metres (I.C.W.) at 0115 G.M.T.

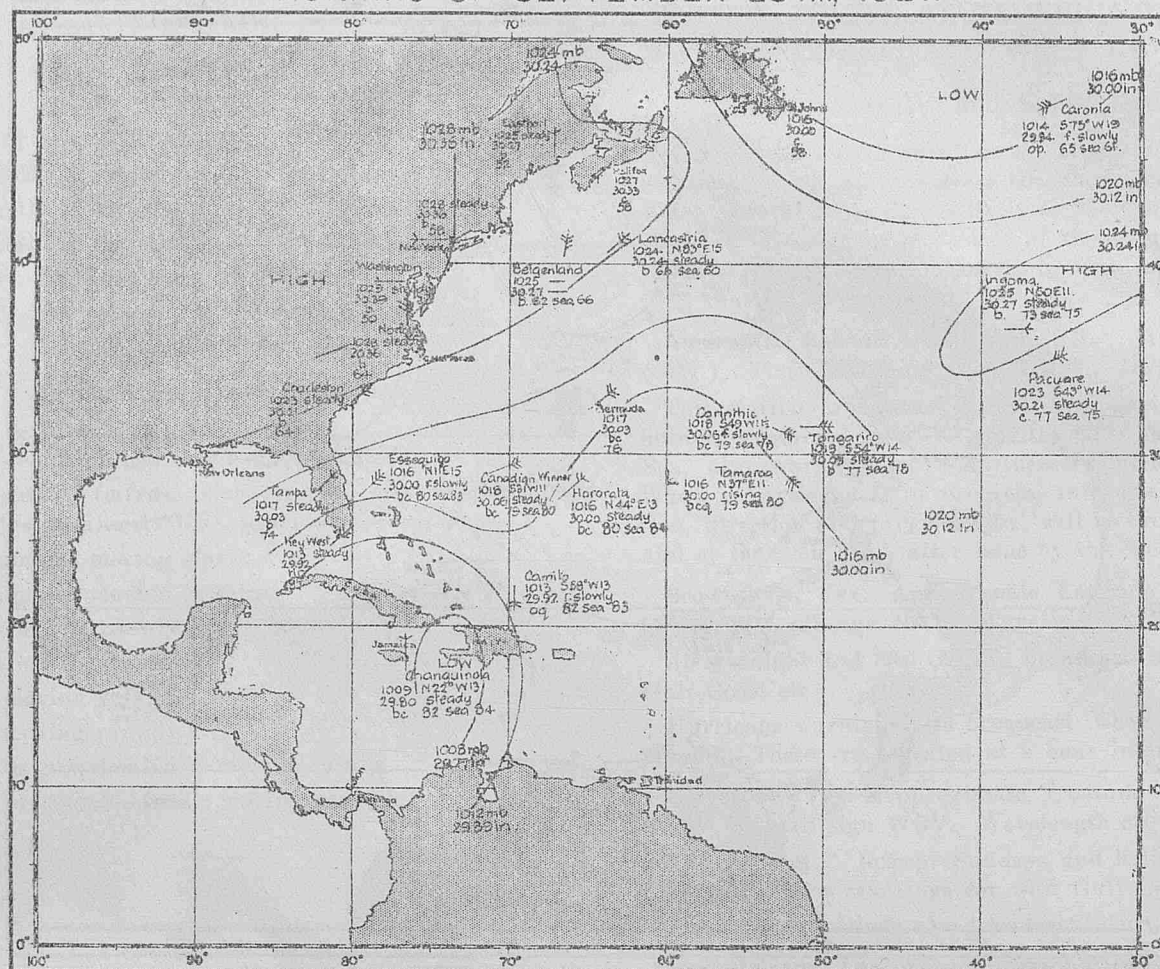
These W/T stations broadcast hurricane warnings when issued by the weather bureaux at Washington D.C. and San Juan, and repeat them at about 4-hour intervals.



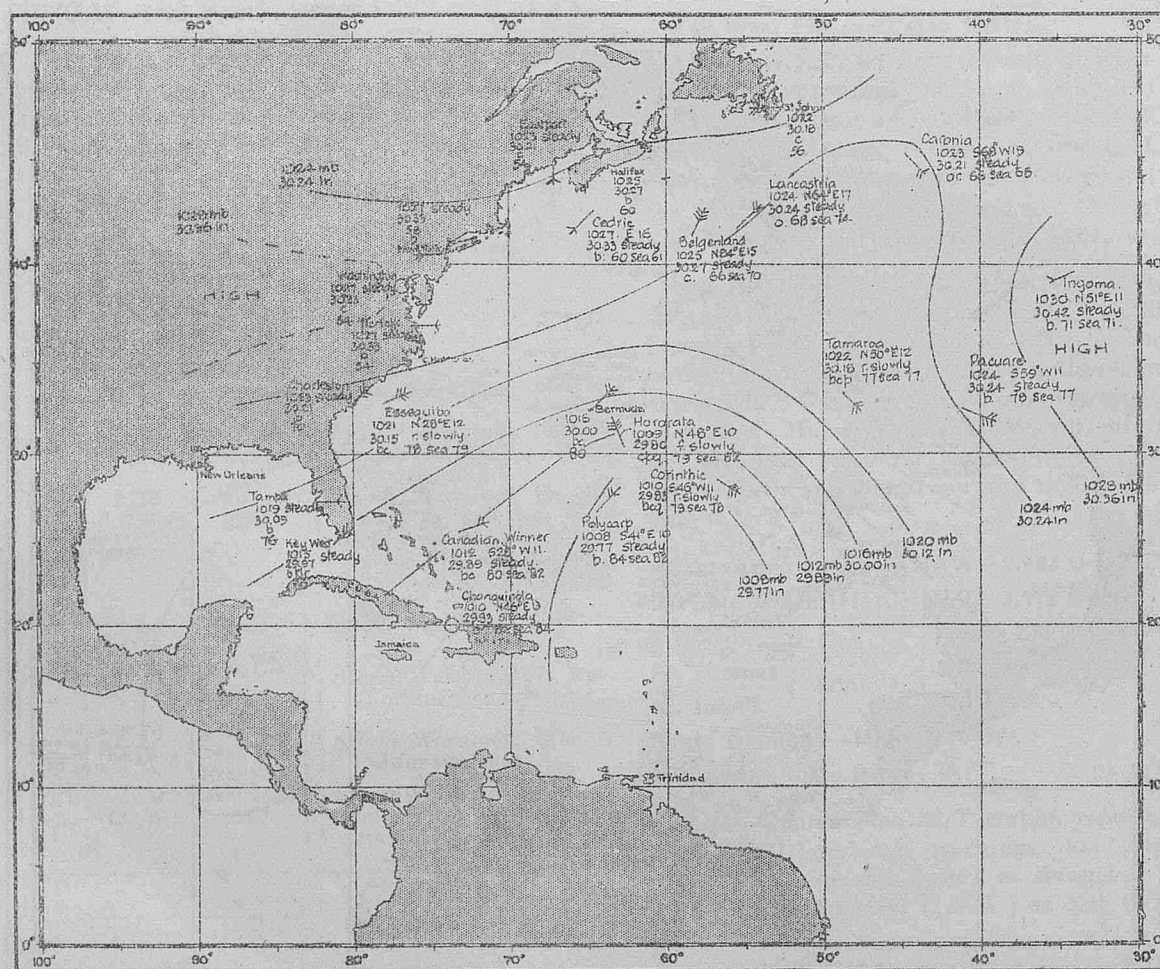
Weather Chart XIII.



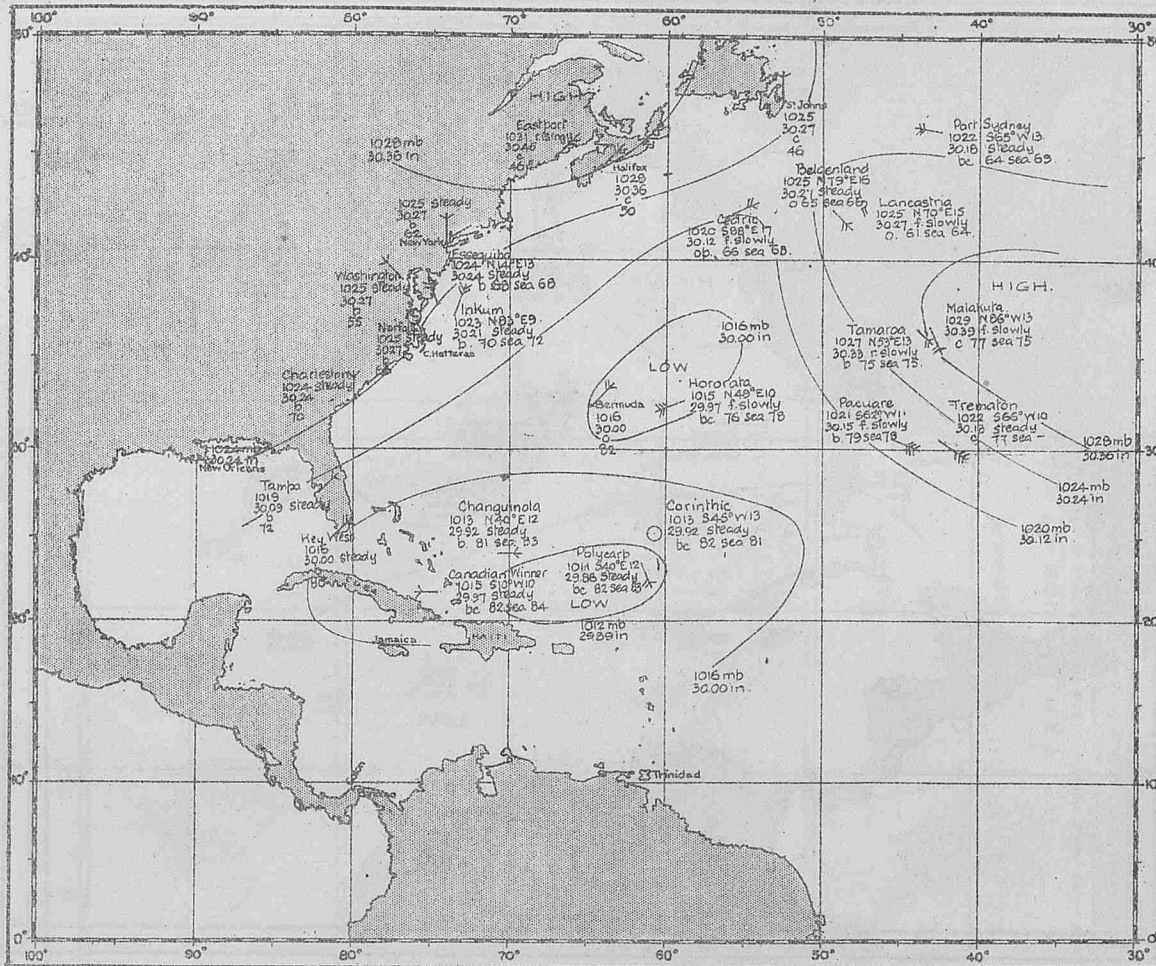
Weather Chart XIV.

MORNING OF SEPTEMBER 25TH, 1927.

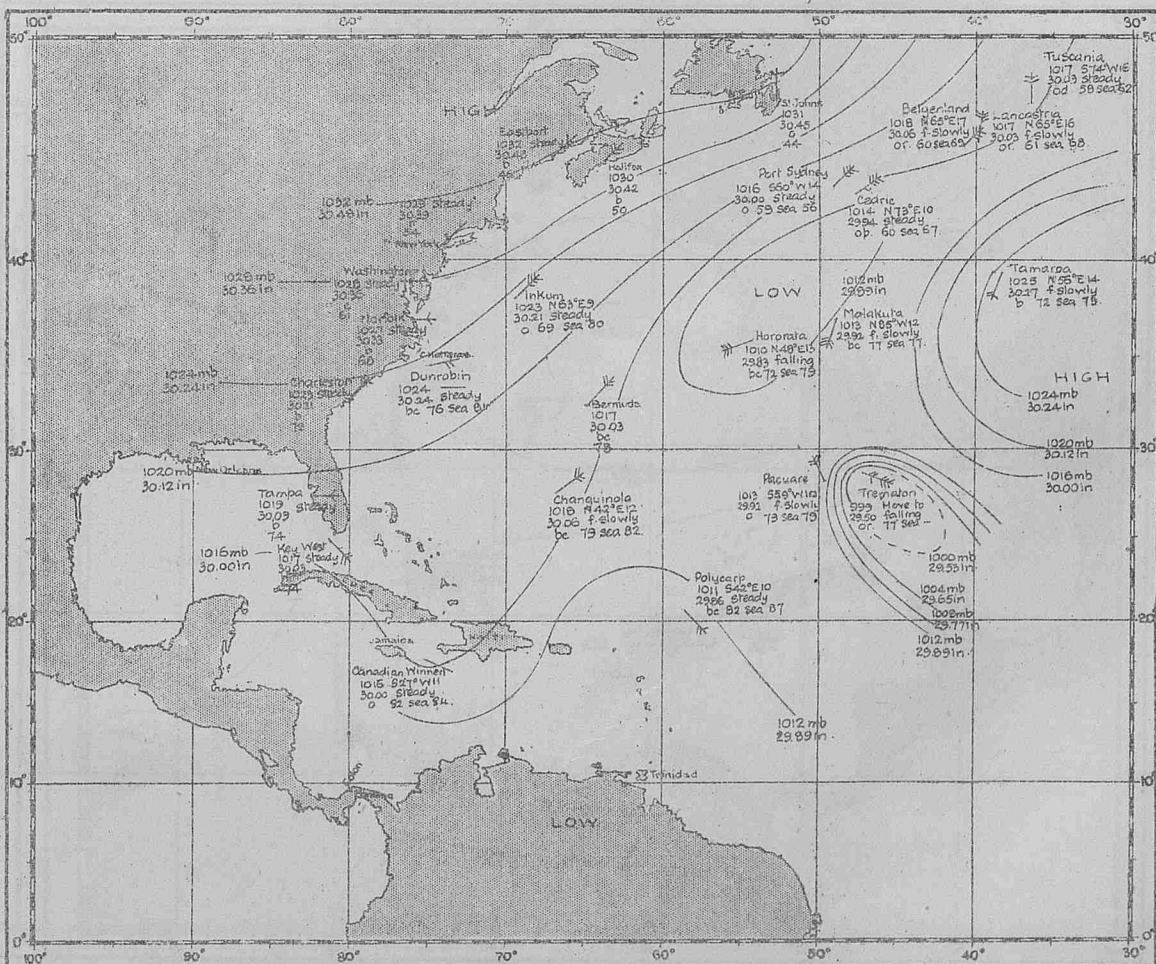
Weather Chart XV.

MORNING OF SEPTEMBER 26TH, 1927.

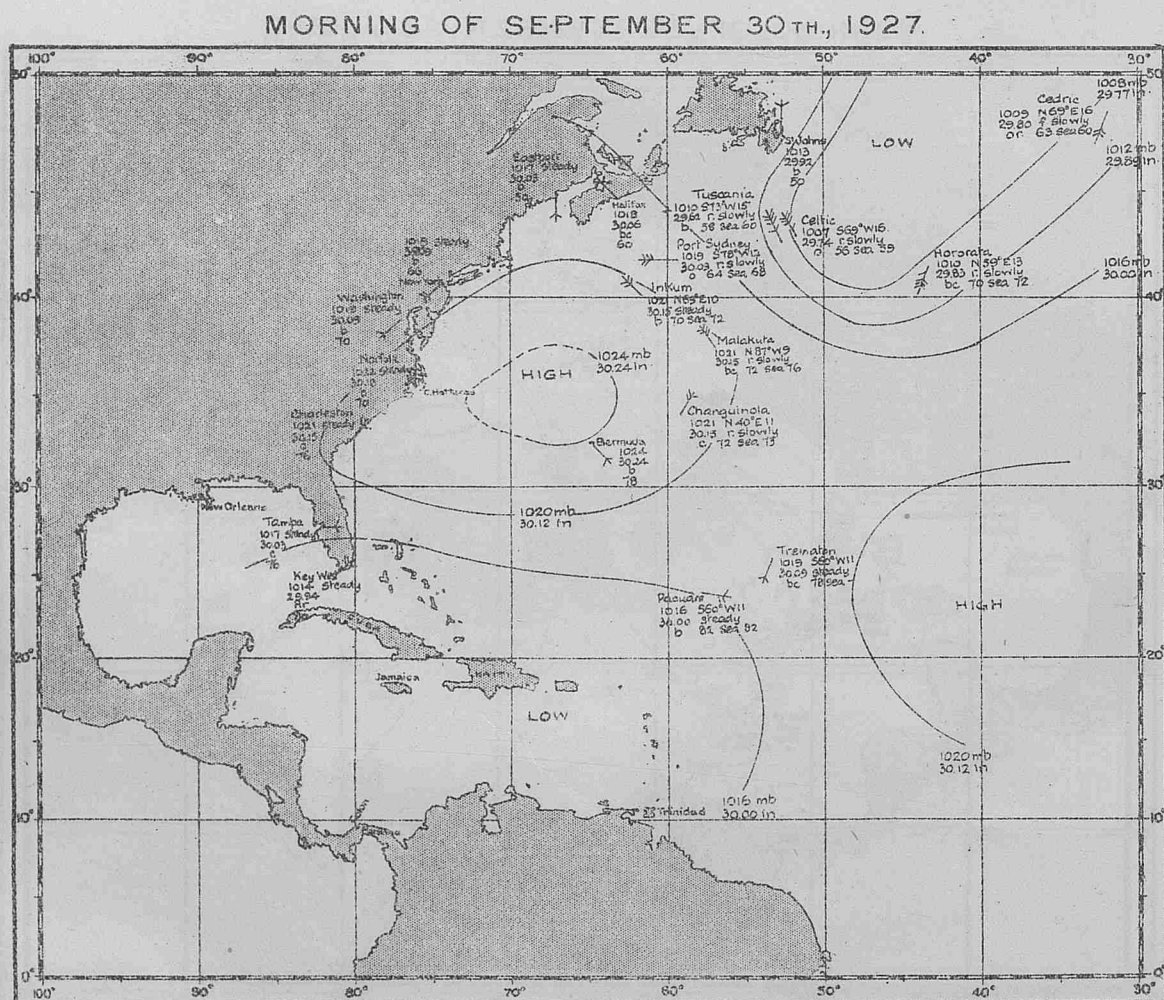
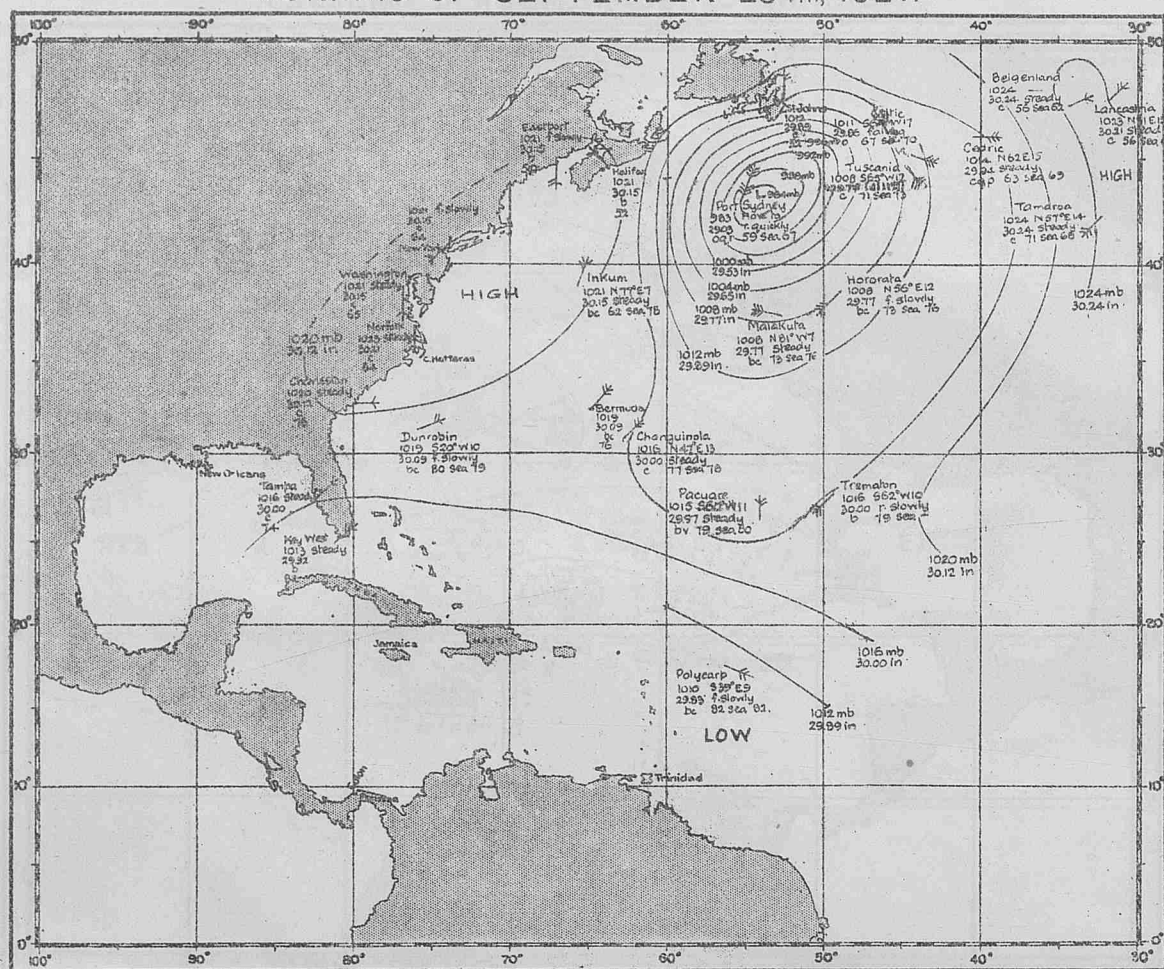
Weather Chart XVI.



Weather Chart XVII.



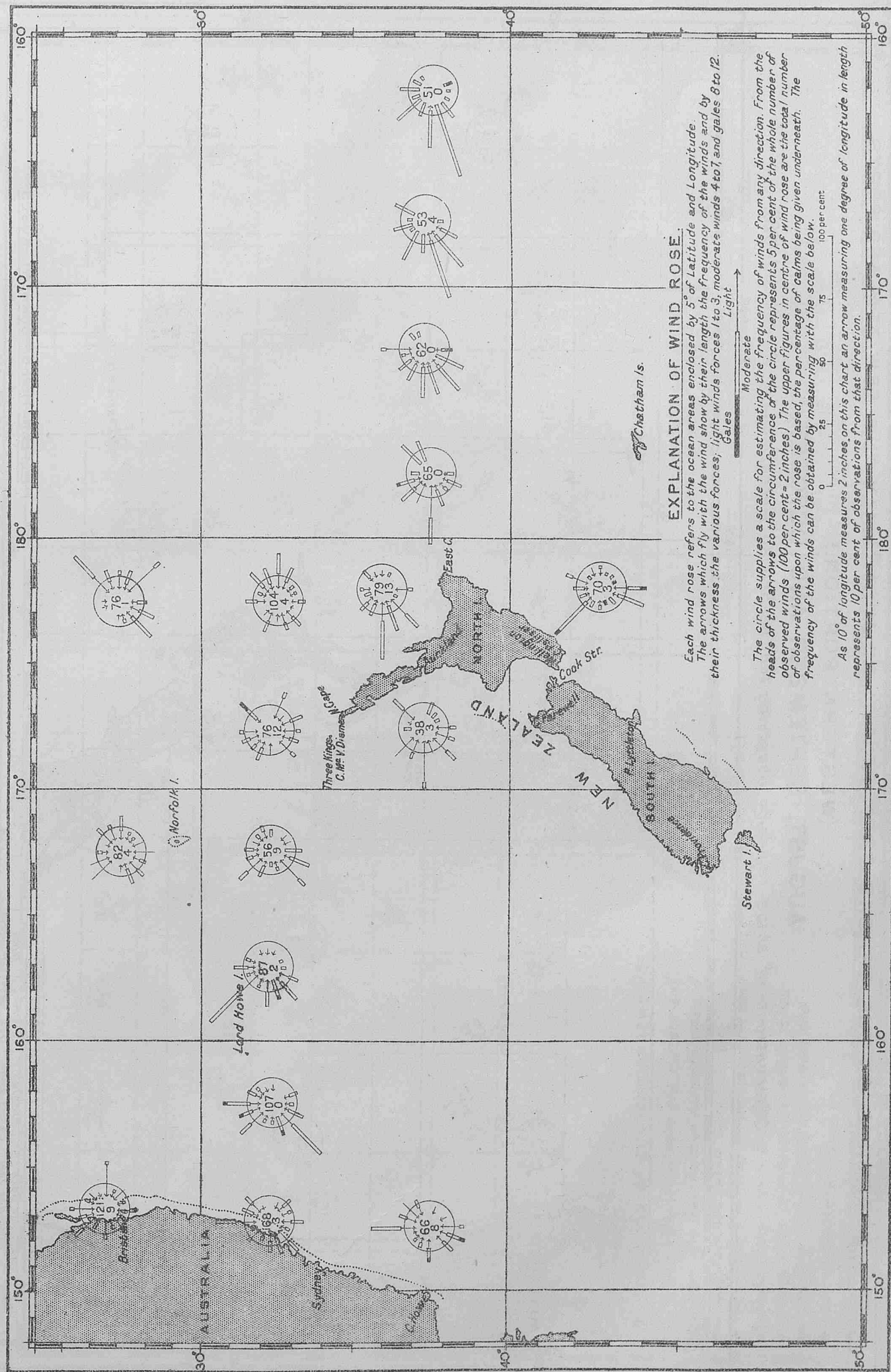
Weather Chart XVIII.



WINDS ON THE TRACKS FROM PANAMA TO AUSTRALIAN AND NEW ZEALAND PORTS.

(WESTERN PORTION.)

SEPTEMBER

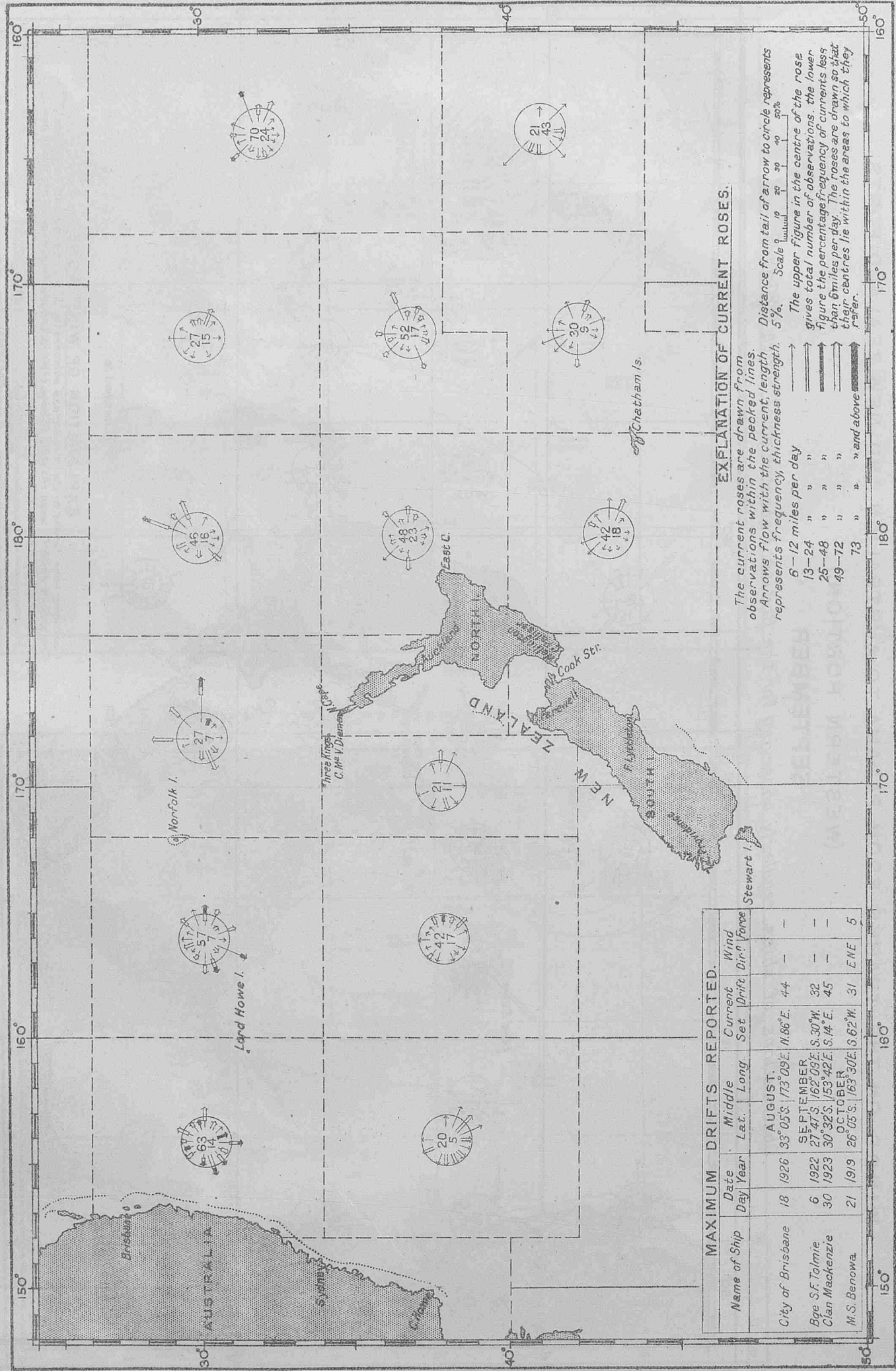
Observations of ships regularly observing for the British Meteorological Office 1920-1926.

CURRENTS ON THE TRACKS FROM PANAMA TO AUSTRALIAN AND NEW ZEALAND PORTS.

(WESTERN PORTION.)

AUGUST, SEPTEMBER AND OCTOBER.

Observations of ships regularly observing for the British Meteorological Office 1910-1926.

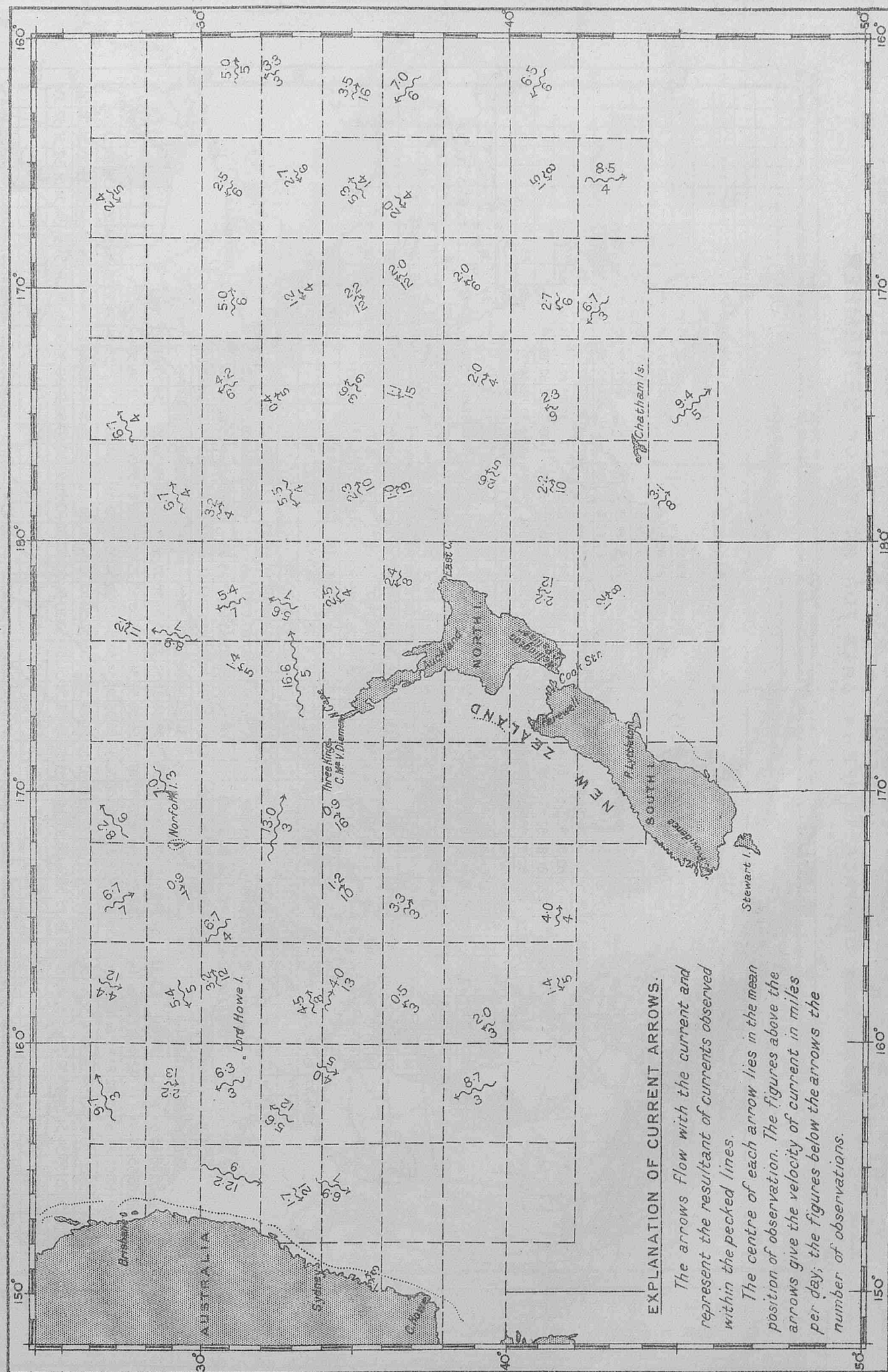


CURRENTS ON THE TRACKS FROM PANAMA TO AUSTRALIAN AND NEW ZEALAND PORTS.

(WESTERN PORTION.)

AUGUST, SEPTEMBER AND OCTOBER.

Observations of ships regularly observing for the British Meteorological Office, 1910-1926.



EXPLANATION OF CURRENT ARROWS.

The arrows flow with the current and represent the resultant of currents observed within the pecked lines.

The centre of each arrow lies in the mean position of observation. The figures above the arrows give the velocity of current in miles per day; the figures below the arrows the number of observations.

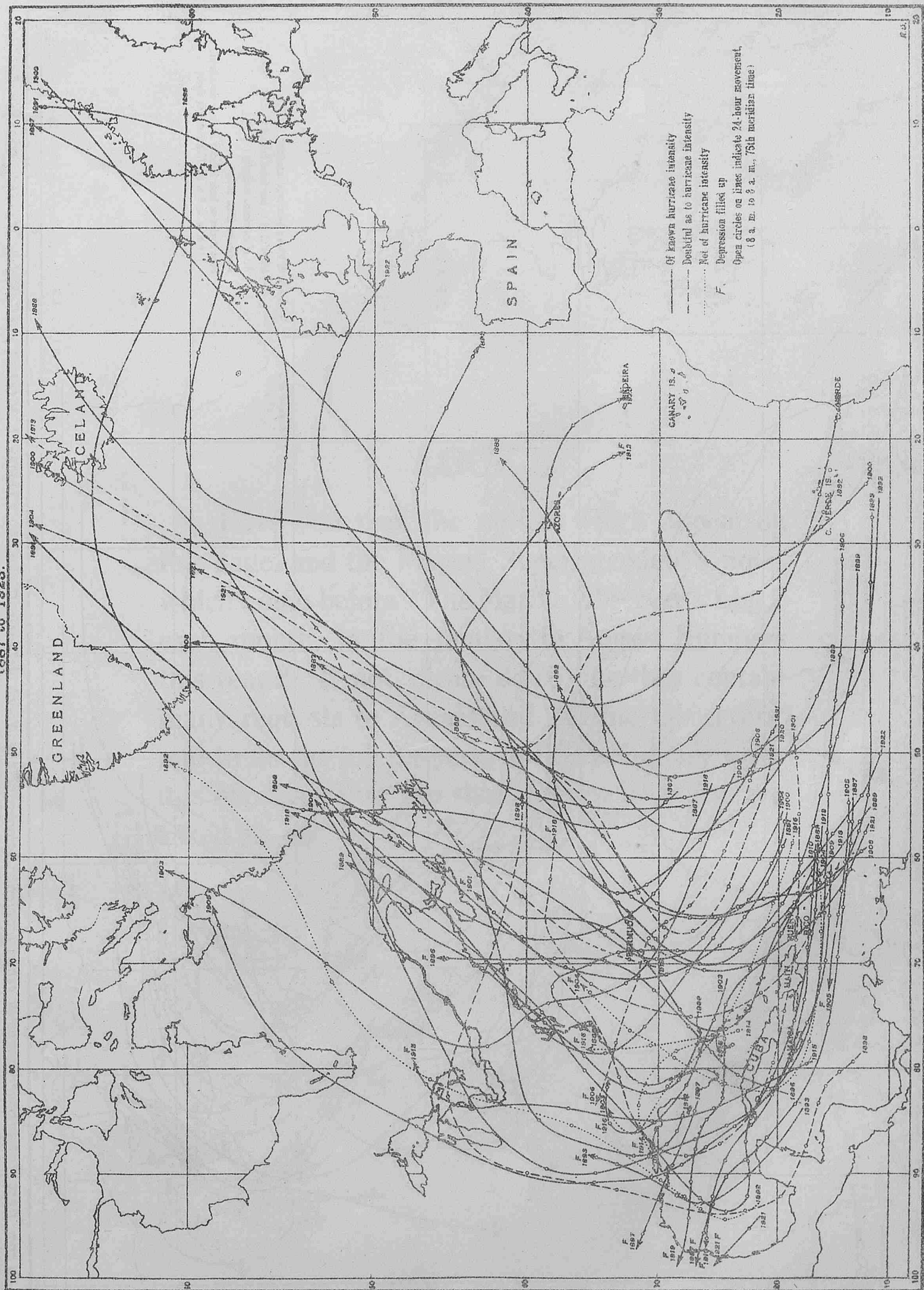
INDIAN OCEAN.

MEAN SEA SURFACE TEMPERATURES FOR MONTH OF SEPTEMBER



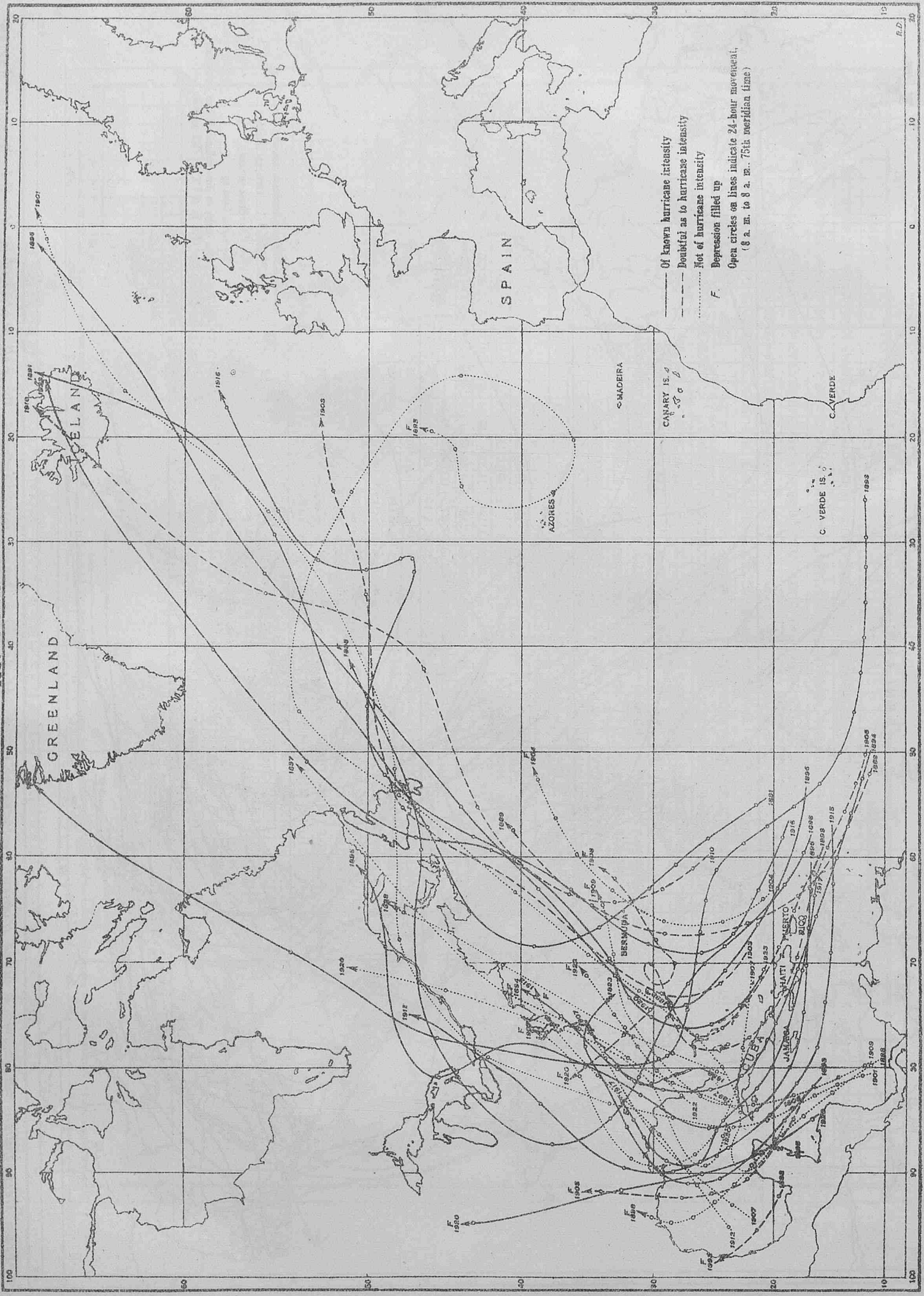
Computed from observations of British Ships during the years 1855 to 1917 except south of Latitude 30°S and eastward of Longitude 40°E. where the observations are for the years 1855 to 1878.

Tracks of Tropical Cyclones of North Atlantic, September 1-15
1887 to 1923.



From "West Indian Hurricanes & other Tropical Cyclones of the North Atlantic Ocean," by Charles L. Mitchell, published in "Monthly Weather Review," Supplement No. 24, of the U.S. Weather Bureau.

Tracks of Tropical Cyclones of North Atlantic, September 16-30
1887 to 1923.



From "West Indian Hurricanes & other Tropical Cyclones of the North Atlantic Ocean," by Charles L. Mitchell, published in "Monthly Weather Review," Supplement No. 24, of the U.S. Weather Bureau.

NOTICE.

LOOK !

Have you read the notices which appear on this page, and the Marine Superintendent's notes which come before "The Marine Observer's Log," each month, in the January to August Numbers this year ? If not, please do so, for they contain many requests to Agents and Marine Observers, and to do the job properly in this Voluntary work it is necessary that you should know what you are asked to do. _____

ICE CHART. WESTERN NORTH ATLANTIC.

LETTERS OF TRANSATLANTIC TRACKS INDICATE

- (C) From 1st September to 31st January, inclusive.
- (F) From 16th May to Opening of Belle Isle route, and to 30th November when not using the Belle Isle route.
- (W) Westbound, on approaching Cape Race steer a course to pass 10 miles S. of Cape Race.
- (E) Eastbound, steer from position 25 miles S. of Cape Race.
- (S) 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 73-4, Vol. V. No. 52 of this Journal.

SYMBOLS USED ON THE CHART.

- Iceberg.
- Floesberg.
- 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.
Sept. 2, 1883	Bque., Olivette ...	35°40'N. 30°09'W.	Lump of ice.
" - 1885	S.S. Gulf of Taranto	36°35'N. 71°36'W.	2 bergs 30 ft. high, 300-400 ft. long, and much field ice over 2 miles area.
" 19, 1906	S.S. Lord Lansdowne	54°30'N. 22°00'W.	Small berg 20 ft. by 6 ft.
" 10, 1908	S.S. Deutschland ...	45°28'N. 27°18'W.	2 small bergs and 1 large.
" 6, 1920	U.S. Hyd. Bulletin...	47°10'N. 38°04'W.	Bergs.
" 2, 1922	S.S. Hallgierd	50°00'N. 40°05'W.	Berg.
" 15, 1922	S.S. Empress of Britain.	52°52'N. 40°12'W.	Large berg.
" 3, 1923	S.S. Djambi ...	40°10'N. 31°36'W.	Piece of ice, about 30 ft. long, 1½ ft. out of water.

Reports of Ice sighted between 1st and July 31st, 1928, which have been received by the Meteorological Office, are shown by the Symbols plotted in addition reported, the figures indicating the day of the month.

DISCONTINUANCE OF INTERNATIONAL ICE PATROL SERVICE.

The International Ice Patrol Service was discontinued for the season on June 21st, 1928.

MARINE METEOROLOGY.

NOTICES.

LATE PRESS.

DERELICTS AND FLOATING WRECKAGE.

Date.	Position.		Description.
	Latitude.	Longitude	
NORTH SEA.			
6.7.28	Galloper Light Vessel bearing N.W. 3 miles.		Small boat about 30 ft. long, bottom up.
19.7.28	52°42'N.	4°03'E.	Drifting wreck of apparently a large vessel with mast projecting 2 metres out of the water.
ENGLISH CHANNEL.			
1.7.28	4 miles S.W. of Dungeness.		Ship's gangway, 18ft. long ; dangerous to navigation.
3.7.28	49°50'N.	6°56'W.	Cylindrical buoy, painted dark blue.
10.7.28	49°16'N.	2°24'W.	Spar standing 12 ft. out of water, apparently attached to submerged wreckage.
BRISTOL CHANNEL.			
8.7.28	8 m. S. by W. $\frac{1}{2}$ W. of Smalls Lt. House		Apparently a ship's lifeboat, bottom up and awash. Boat painted white and no marks could be seen.
NORTH ATLANTIC.			
1.7.28	46°10'N.	32°20'W.	Large spar, with part of top attached.
1.7.28	42°50'N.	47°58'W.	Small spar, floating horizontally.
1.7.28	35°46'N.	49°57'W.	Piece of wreckage consisting of several wooden beams.
1.7.28	42°50'N.	48°30'W.	Large fisherman's dory, half filled with water.
2.7.28	34°27'N.	73°49'W.	Rusty iron drum.
3.7.28	40°29'N.	45°50'W.	Large conical light buoy, showing 4 ft. out of water.
7.7.28	41°05'N.	57°32'W.	Yacht <i>Rollo</i> abandoned.
9.7.28	48°58'N.	8°35'W.	Spherical buoy, staff, circular cage and red flag, No. 35.
9.7.28	31°23'N.	79°08'W.	Black can buoy.
11.7.28	50°33'N.	16°39'W.	Heavy piece of timber, waterlogged and dangerous.
11.7.28	46°00'N.	55°38'W.	Schooner <i>La Frileuse</i> abandoned and on fire.
12.7.28	39°23'N.	49°21'W.	Large light and whistle buoy.
15.7.28	42°17'N.	48°43'W.	Large bell buoy, with the upper part of the structure damaged: the buoy was covered with marine growth, and rusty, and was drifting in a southeasterly direction.
20.7.28	51°02'N.	12°—W.	Heavy baulk of timber about 20 ft. long, covered with marine growth, dangerous to navigation.
GULF OF MEXICO.			
2.7.28	27°46'N.	95°26'W.	Large red mooring buoy, marked with the letter "O" on its side and heavily covered with marine growth.
6.7.28	29°19'N.	88°32'W.	Large log about 4 ft. in diameter, and partly submerged.
8.7.28	24°16'N.	82°11'W.	Two small spars projecting about 6 ft. out of water, apparently attached to submerged wreckage: these spars resembled the top masts of a small schooner.
11.7.28	27°37'N.	83°20'W.	Derelict schooner, bottom up ; drifting N.W.
CARIBBEAN SEA.			
5.7.28	11°20'N.	78°34'W.	Large spar attached to submerged wreckage.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

For sample weather report message see Chapter I. of "Wireless and Weather an Aid to Navigation," page 6, and page 18 of Vol V., No. 49, of this Journal.

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

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

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

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

Agents.

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

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

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

FREMANTLE,
W. Australia. Captain J. J. AIREY, Deputy Director of Naviga-
tion, Dalgety's Buildings.
(Telephone No.: B 1063).

Agents (contd.).

HONG KONG,
China. Lieut. Commander J. H. DRUMMOND, D.S.C.,
R.N., Superintendent, Admiralty Chart and
Chronometer Depot, H.M. Dockyard.

HULL ... Captain Geo. B. STURDY, c/o Mr. W. HAKES,
Commercial Road.

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

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

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

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

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

III. WIRELESS TIME SIGNALS.

UNITED STATES OF AMERICA.

For method of transmission of the undermentioned Time Signals see diagram, p. 173, Vol. V, No. 56.

United States of America, Pacific Coast.

(C.W. Issues.)

W/T Station.	Call Sign.	Wavelength metres.	Time of Signal being made G.M.T.	—
Astoria, Wash. Lat. 46° 11' N. - Long. 123° 51' W.	NPE	2,939 (I.C.W.)	h. m. s. h. m. s. 19 55 00-20 00 00	Sent daily.
Eureka, Calif. - Lat. 40° 41' 22" N. - Long. 124° 16' 10" W.	NPW	2,776 (I.C.W.)	19 55 00-20 00 00	Sent daily.
San Francisco, Calif. Lat. 38° 05' 55" N. - Long. 122° 16' 37" W.	NPG	4,543 (C.W.)	{ 5 55 00- 6 00 00 } 19 55 00-20 00 00	Sent daily.

NOTE.—The time signal, broadcast from San Francisco W/T Station, emanates from the Chronometer and Time Station, Mare Island.

Hawaiian Islands (C.W. Issue).

W/T Station.	Call Sign.	Wavelength metres.	Time of Signal being made G.M.T.	—
Honolulu, Pearl Hbr. Lat. 21° 20' 45" N. Long. 157° 57' 56" W.	NPM	2,828 (I.C.W.) and 11,490 (C.W.) simultaneously	h m s h m s 23 55 00-0 00 00	Sent daily.

NOTE.—These time signals are relayed from the standard clock at Pearl Harbour, which is checked periodically by means of the time signals broadcast from San Francisco. They are not so accurate as the Washington-Arlington time signals explained in this Journal, Vol. V, No. 56, page 173.

Panama.

(C.W. Issues.)

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

United States of America, Gulf Coast.

(C.W. Issues.)

W/T Station.	Call Sign.	Wavelength metres.	Time of Signal being made G.M.T.	—
New Orleans - - Lat. 29° 56' 50" N. - Long. 90° 02' 18" W.	NAT	2,883 (C.W.)	h. m. s. h. m. s. 16 55 00-17 00 00	Sent daily.
Key West - - - Lat. 24° 33' 22" N. - Long. 81° 48' 21" W.	NAR	2,828 (I.C.W.)	16 55 00-17 00 00	"Lag" of Key West time signal is 0'5 second or more.

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

IV. VISUAL STORM WARNINGS.

United States of America (Pacific and Gulf Coasts) and West Indian Islands.

The United States system of Visual Small-craft, Storm, and Hurricane Warnings as explained on p. 174 of Vol. V, No. 56, is

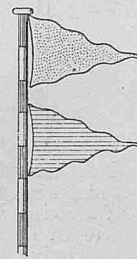
in operation at a number of stations on the Pacific and Gulf Coasts of the United States.

These warnings are also displayed at certain places in the following West Indian Islands:—St. Kitts, Porto Rico, Jamaica (Kingston), Vieques Island, Santa Domingo, Haiti, Dominica, St. Thomas, Virgin Islands of the U.S.A., Grand Turk Island, Swan Island, Turks Island and Cuba.

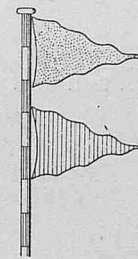
MEXICO.

The following system of (1) visual storm and (2) wind signals has been established at ports on the coasts of Mexico.

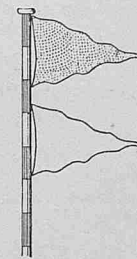
(1) Storm signals are used to give warning of the existence of cyclonic disturbances whether distant or near, or, of the existence of bad weather outside the port. The storm signals consist of pennants only and their meanings, are as follows:—



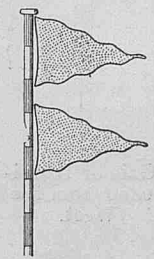
Bad weather North of the port.



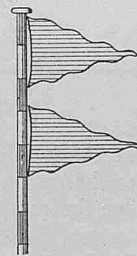
Bad weather South of the port.



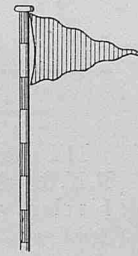
Bad weather East of the port.



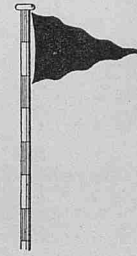
Bad weather West of the port.



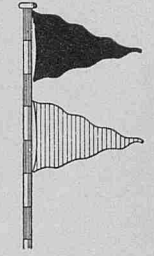
Northerly gale from Matamoros begun. (Gulf ports only.)



Gulf ports.—Cyclone in Caribbean Sea. Pacific ports.—Distant cyclone.



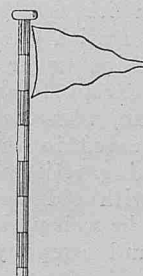
Gulf ports.—Cyclone in Gulf of Mexico. Pacific ports.—Cyclone close by.



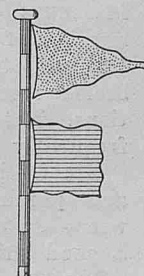
Cyclone at the Port, or will pass close by on that day.

Night Signals.—Two red lights, vertical, are hoisted to indicate that navigation may be dangerous.

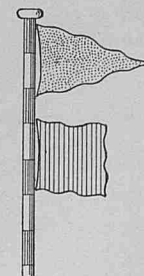
(2) The following signals consisting of pennants, denoting the strength, and flags the direction of the wind, are used to indicate its probable strength and direction from the time of hoisting the signal until the following 0600. They will be lowered, if necessary, to hoist a storm signal and in the evening when no longer visible:—



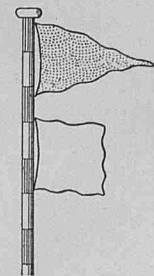
Light or moderate winds.



Moderate or strong North-easterly winds.



Moderate or strong South-easterly winds.



Moderate or strong Easterly winds.

I.—SHIPS' WIRELESS WEATHER SIGNALS— AMENDMENT.

Page 18, Vol. V, No. 49 (January 1928 Number).

(3) North Atlantic "Decode."

COLUMN 2, LINE 19 FROM TOP.

The sentence commencing "Those addressed to Weather, London" should be amended to read as follows:—

"Those addressed to Weather, London, are made to **Portishead W/T Station**, call sign **GKU**, the ship reporting first calling Portishead on the wavelength of 2,013 metres (C.W.), unless otherwise instructed by Portishead, and passing her report on the wavelength designated by Portishead."

NOTE.—The amendment published on page 79 of Volume V, No. 52, (April 1928 Number) is cancelled.

The position of Portishead W/T Station is Latitude 51° 28' 41" N., Longitude 2° 47' 30" W. (See Board of Trade "Notices to Mariners," of July 1st, 1928, page 2.)

II.—WIRELESS WEATHER SIGNALS—CANCELLATION.

Page 102, Vol. V, No. 53 (May 1928 Number).

Wireless Storm Warnings, Algeria.

The information regarding W/T Storm Warnings broadcast by Oran-Ain-el-Turck W/T station, is cancelled.

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 Commodore Sir JAMES CHARLES, K.B.E., C.B., R.D., R.N.R., at Southampton on July 15th, 1928, at the termination of his last voyage before retirement is noted with deep regret.

JAMES THOMAS WALTER CHARLES was born at Hursley on August 2nd, 1865, and went to sea in a sailing ship in 1880. After seven years in sail he went into steam and served as an officer in the BRITISH INDIA STEAM NAVIGATION and SHAW SAVILL and ALBION COMPANYS' services.

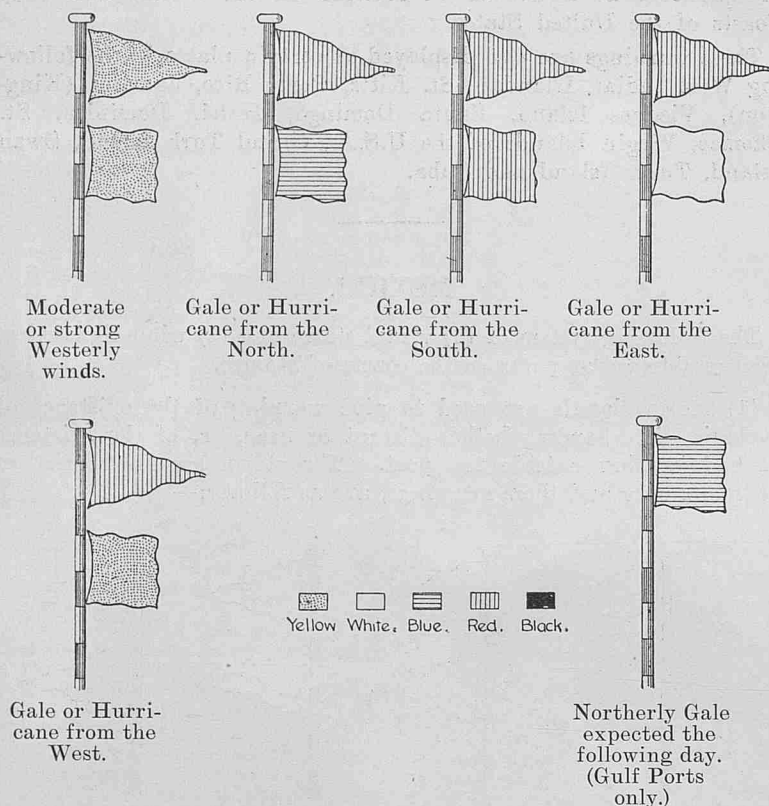
He joined the CUNARD LINE as fourth officer on June 10th, 1895, and rose to command in nine years.

Sir JAMES CHARLES commanded a number of the finest Cunarders in peace and war, including *Aquitania*, his last command. In this ship he was Captain when she flew the white ensign during the latter part of the Great War, being one of the few Captains of the Royal Naval Reserve to remain in command of their own ships when commissioned as His Majesty's ships.

He held the appointment of Commodore of the CUNARD COMPANY'S fleet from 1921, was a British nautical representative at the International Conference of Safety of Life at Sea 1913-1914 and a Mariner Warden of the HONOURABLE COMPANY OF MASTER MARINERS from its establishment. Commodore CHARLES was a member of the British Corps of Voluntary Marine Observers since 1904 and the ships under his command have maintained an unbroken record, except during the Great War, in returning observations. His name, with that of his principal observing officers, has frequently appeared in the list of "Excellent" Awards.

His forthcoming retirement from the sea, leaving his fine ship and parting with old shipmates appears to have been a great wrench, as will be well understood by all those who have commanded a good ship and company.

The Corps of Marine Observers join with the Marine Division in sympathy with Lady CHARLES and the Management, Officers and men of the CUNARD FLEET.



LIST OF VOLUNTARY OBSERVING SHIPS

1

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

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

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

Only in special cases will individual letters be sent.

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

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

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

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

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

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

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

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

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

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

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

Selected Ships.

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

Name of Vessel.	Captain.	Observing Officers.	Official Meteorological Equipment.	Line.	Last Log, Register, or Report Contributed. Received up to 13.7.28.	Date Received.
<i>Aba</i> ...	Williams, T. E. ...	S. J. Bristow, O. E. Jones, A. H. Perkins.	M.L.	Elder Dempster ...	Met. Log. 14.10.27 to 10.2.28 ...	16.3.28
<i>Abinsi</i> ...	Millson, H. E. ...	...	No. A.	...	...	...
<i>Achilles</i> ...	Dodds, R. ...	J. Powell, L. Hutchinson, G. M. Kirk, F. W. Hilton.	M.L.	A. Holt " ...	Form 911 16.5.28 to 23.6.28 ...	27.6.28
<i>Actor</i> ...	Haylett, E. ...	E. Pearce, F. M. Eales, G. Morrice.	"	Harrison ...	Met. Log. 31.1.28 to 7.5.28 ...	11.5.28
<i>Adda</i> ...	Toft, J. T. ...	A. E. Longlen, J. S. Turner, A. Kay.	M.L.	Elder Dempster ...	" 15.1.28 to 23.4.28 ...	9.5.28
50 <i>Adriatic</i> ...	Binks, J. W., R.D., Lt.-Commr. R.N.R.	O. V. Lucas, R. H. Shaw ...	W.T.	White Star ...	Form 911 6.7.27 to 3.11.27 ...	14.12.27
<i>Aeneas</i> ...	Wallace, W. K. ...	E. R. Owen ...	No. A.	A. Holt ...	W.T. Reg. 27.5.28 to 16.6.28 ...	19.6.28
<i>Agapenor</i> ...	Ramsay, J. ...	S. G. Ellams ...	" A.	...	Form 911 2.3.28 to 9.5.28 ...	12.5.28
<i>Aidan</i> ...	Evans, L. ...	R. A. Broad ...	" A.	Booth ...	" 8.6.28 to 18.6.28 ...	27.6.28
<i>Alban</i> ...	Barlow, F. P. ...	E. M. Lyons ...	" A.	...	" 24.4.28 to 9.6.28 ...	30.6.28
<i>Alipore</i> ...	Smith, H. E., R.D., Lt.-Commr. R.N.R.	C. H. Stokes ...	" M.	P. and O. ...	" 16.5.28 to 31.5.28 ...	14.6.28
<i>Almanzora</i> ...	Clarke, E. C. ...	J. W. Smith ...	" A.	R.M.S.P. ...	" 18.4.28 to 17.6.28 ...	11.7.28
63 <i>Albion</i> ...	Summers, F. F., R.D., Commr. R.N.R.	J. W. Paine, W. Hill, E. Smith.	W.T.	White Star ...	21.4.28 to 4.6.28 ...	8.6.28
<i>Alondra</i> ...	Scott, L. S. ...	H. Peters ...	No. A.	Yeoward ...	W.T. Reg. 5.6.28 to 21.6.28 ...	25.6.28
<i>Alynbank</i> ...	Clayton, W. E. ...	R. Ardley ...	" A.	A. Weir & Co. ...	Form 911 16.6.28 to 8.7.28 ...	9.7.28
<i>Amuscade</i> ...	Abbey, A. T. N., D.S.O., Commr. R.N.R.	F. G. Bullock ...	M.L.	His Majesty's Ship ...	" 15.5.28 to 4.6.28 ...	9.7.28
<i>Ampetco</i> ...	Vandenkerckhove, A. ...	...	No. A.	American Petroleum ...	" ...	...
<i>Andalucia</i> ...	Thomas, R. J. ...	R. A. Brock, A. Vaughan ...	" M.	Blue Star ...	Form 911 21.4.28 to 1.6.28 ...	14.6.28
<i>Anchises</i> ...	Woodgett, R. J. ...	R. Fountain, G. Brown ...	" A.	A. Holt ...	" 29.4.28 to 10.6.28 ...	19.6.28
<i>Andes</i> ...	Smith, W. E., D.S.O., R.D., Commr. R.N.R.	H. Whittle, S. G. Page, A. E. Nicholls, J. E. E. Hadlow.	M.L.	R.M.S.P. Co. ...	" 25.3.28 to 13.4.28 ...	8.5.28
<i>Antillian</i> ...	Hannaford, W. T. ...	...	No. A.	Leyland ...	" 17.3.28 to 26.6.28 ...	30.6.28
<i>Antiochus</i> ...	Salter, G. H. ...	O. P. H. Wynne ...	" A.	A. Holt ...	...	...
<i>Aorangi</i> ...	Crawford, R. ...	G. H. Kime, E. Anderson, E. V. Bilger, W. J. Weber.	M.L.	Canadian- Australasian ...	Met. Log. 20.5.28 to 31.5.28 ...	8.6.28
30 <i>Aquitania</i> ...	Diggie, E. G., R.D., Capt. R.N.R.	J. L. Croasdaile, J. Locke, G. Duguid.	W.T.	Cunard ...	Met. Log. 11.1.28 to 27.4.28 ...	29.5.28
2 <i>Arabic</i> ...	Bulman, J. B. ...	W. Jackman, T. W. Wills, W. N. Jenkins.	"	White Star ...	W.T. Reg. 10.6.28 to 25.6.28 ...	28.6.28
<i>Arafura</i> ...	Diamond, S. L. ...	F. O. Colvin, F. R. Miller, C. Stratford.	M.L.	Eastern and Australian ...	" 17.6.28 to 6.7.28 ...	9.7.28
<i>Arawa</i> ...	Summers, W. G. ...	A. Chrystal, A. C. Jones, G. Campbell.	"	Shaw, Savill and Albion ...	Met. Log. 28.10.27 to 3.3.28 ...	8.6.28
<i>Archimedes</i> ...	Downs, E. B. ...	...	No. A.	Lampart & Holt ...	" 13.12.27 to 17.4.28 ...	30.4.28
<i>Argyllshire</i> ...	Wallace, J. ...	J. C. Robinson ...	" M.	Federal ...	Form 911 10.10.27 to 5.1.28 ...	18.1.28
<i>Arguani</i> ...	Scudamore, J. H. H., D.S.O., R.D., Commr. R.N.R.	G. McKee, A. J. J. Moar, J. W. Dodd, W. Ireland.	M.L.	Elders & Fyffes ...	" 11.4.28 to 20.5.28 ...	6.6.28
<i>Ariosto</i> ...	Biggins, R. L. ...	R. Heneage, D. A. Stokes ...	No. A.	Ellerman Wilson ...	Met. Log. 12.2.28 to 29.4.28 ...	3.5.28
<i>Armada Castle</i> ...	Imlah, C. B. ...	E. Roach, G. D. Pennick, E. Fullick.	M.L.	Union Castle ...	Form 911 26.5.28 to 9.6.28 ...	18.6.28
<i>Arracan</i> ...	Duncan, S. S. ...	J. Summers, J. Henderson, C. C. Weir.	"	P. Henderson ...	Met. Log. 12.11.27 to 4.3.28 ...	8.3.28
<i>Arundel</i> ...	Short, H. ...	Mr. Hill ...	C.C.	Southern Rly. ...	" 2.11.27 to 27.3.28 ...	23.4.28
<i>Arundel Castle</i> ...	Knight, A. ...	A. G. Bidwell ...	No. A.	Union Castle ...	Telegraphic Report 28.6.28 ...	28.6.28
<i>Astronomer</i> ...	Richards, J. ...	A. Browne, C. C. Heaton, H. W. FitzSimons.	M.L.	Harrison ...	Form 911 31.3.28 to 20.5.28 ...	23.5.28
<i>Ascanius</i> ...	Wilson, C. A. ...	T. Robb, J. B. Marshall, W. Cook.	"	A. Holt ...	Met. Log. 28.10.27 to 7.1.28 ...	13.1.28
<i>Athenic</i> ...	Binks, J. W. ...	W. Hill ...	No. A.	White Star ...	" 31.10.27 to 5.3.28 ...	14.3.28
<i>Atreus</i> ...	Rundle, G. G. ...	H. Nicholas ...	" A.	A. Holt ...	Form 911 20.2.28 to 7.3.28 ...	9.3.28
					" 13.5.28 to 28.5.28 ...	8.6.28

Name of Vessel.	Captain.	Observing Officers.	Official Meteorological Equipment.	Line.	Last Log, Register, or Report Contributed. Received up to 13.7.28.	Date Received.
<i>Atsuta Maru</i> ...	Narui, N. ...	Y. Osada ...	No. A.	Nippon Yusen Kaisha	Form 911 16.3.28 to 16.4.28 ...	24.4.28
<i>Auditor</i> ...	Owen, W. T. ...	L. A. Bennett, W. Moore ...	" M.	Harrison ...	" 19.1.28 to 18.4.28 ...	5.5.28
<i>Autolyceus</i> ...	Dunlop, J. K. ...	J. J. Wiseman ...	" A.	A. Holt ...	" 3.5.28 to 29.5.28 ...	27.6.28
<i>Ausonia</i> ...	Stafford, W. D.S.C., R.D., Lt-Commr., R.N.R.	J. J. Wiseman ...	" A.	Cunard ...	" 21.8.27 to 8.10.27 ...	11.10.27
<i>Avon</i> ...	Spriddell, F. G., R.D., Commr., R.N.R.	R. H. East ...	" M.	R.M.S.P. ...	" 17.2.28 to 28.3.28 ...	29.3.28
<i>Balmoral Castle</i> ...	Chave, Sir B., K.B.E.	...	" A.	Union Castle ...	6.4.28 to 23.4.28 ...	24.4.28
<i>Balranald</i> ...	Townshend, W. P., Commr., R.N.R.	C. Hadden, F. Ward, R. E., Cowell, J. C. Davis, L. S. Bailey.	M.L.	P. & O. Branch ...	Met. Log. 9.6.27 to 13.10.27 ...	22.11.27
<i>51 Baltic</i> ...	White, E. R., R.D., Commr., R.N.R.	A. C. Janson, A. Thompson, E. P. Hughes.	W.T.	White Star ...	W.T. Reg. 10.6.28 to 2.7.28 ...	5.7.28
<i>Bampton Castle</i> ...	Hutchings, H. H. ...	J. P. Malley ...	No. A.	Union Castle ...	Form 911 10.6.28 to 2.7.28 ...	11.7.28
<i>Banffshire</i> ...	Wynne, R. H. ...	C. B. Roche, B. H. Pollitt, D. F. Lambard, G. C. Case.	" A.	Turnbull Martin ...	" 17.9.27 to 14.10.27 ...	24.10.27
<i>Baradine</i> ...	Rollo, W. ...	B. R. Faithfull ...	M.L.	P. & O. Branch ...	Met. Log. 26.1.28 to 1.6.28 ...	4.6.28
<i>Barpeta</i> ...	Chandler, H. ...	G. S. B. Collard ...	No. M.	British India ...	Form 911 25.4.28 to 23.5.28 ...	12.6.28
<i>Barrabool</i> ...	Strachan, J. ...	W. H. Deans ...	" M	P. & O. Branch ...	" 2.2.28 to 20.4.28 ...	15.5.28
<i>Baychimo</i> ...	Cornwall, S. A. ...	F. Good, F. Clitty, C. H. Otterson.	" A	Hudson's Bay Co. ...	" 7.7.27 to 14.9.27 ...	13.10.27
<i>59 Belgenland</i> ...	Morehouse, W. A. ...	D. M. Stafford ...	W.T.	Red Star ...	W.T. Reg. 27.5.28 to 14.6.28 ...	16.6.28
<i>Beltana</i> ...	Allin, C. H. C. ...	L. A. Sayers ...	No. M.	P. & O. Branch ...	Form 911 27.5.28 to 15.6.28 ...	18.6.28
<i>Benalder</i> ...	Fairweather, J. J. ...	S. W. Du Fosse ...	" A.	Ben Line ...	" 23.3.28 to 7.4.28 ...	8.6.28
<i>Benalla</i> ...	Sheepwash, J. ...	R. M. Richardson ...	" M.	P. & O. Branch ...	" 17.6.28 to 28.6.28 ...	11.7.28
<i>Bendigo</i> ...	Nicholl, R. N. C. ...	J. A. Myles, W. C. A. Robson, S. A. T. Bullock.	" M.	Harrison ...	" 10.2.28 to 3.7.28 ...	11.7.28
<i>Benefactor</i> ...	Jones, C. W. ...	G. Davidson ...	" M.	Ben Line ...	" 11.5.28 to 29.5.28 ...	19.6.28
<i>Bengloe</i> ...	McCorquodale, A. ...	J. A. Myles, W. C. A. Robson, S. A. T. Bullock.	" A.	Ben Line ...	" 25.4.28 to 26.5.28 ...	14.6.28
<i>31 Berengaria</i> ...	Rostron, Sir A. H., K.B.E., R.D., Capt. R.N.R.	J. A. Myles, W. C. A. Robson, S. A. T. Bullock.	W.T.	Cunard ...	W.T. Reg. 11.4.28 to 21.5.28 ...	8.6.28
<i>Berrima</i> ...	Short, C. E. ...	A. Hughes ...	No. M.	P. & O. Branch ...	Form 911 9.12.27 to 13.4.28 ...	16.4.28
<i>Bogota</i> ...	Pape, E. R. ...	G. A. Thexton ...	" M.	R.M.S.P. Co. ...	" 27.5.28 to 15.6.28 ...	11.7.28
<i>Brenda</i> ...	Lamont, A. ...	M. McInnes ...	" A.	Scottish Fishery Board.	" 1.6.28 to 28.6.28 ...	3.7.28
<i>Brighton</i> ...	Hill, A. ...	Mr. Munton ...	C.C.	Southern Railway ...	Telegraphic Report 13.7.28 ...	13.7.28
<i>British Colonel</i> ...	Taylor, R. J. ...	F. W. Sherlock ...	No. M.	British Tankers ...	Form 911 18.4.28 to 16.6.28 ...	21.6.28
<i>British Consul</i> ...	Putt, R. O. ...	C. H. Humphries ...	" M.	" ...	" 13.5.28 to 28.6.28 ...	11.7.28
<i>Bronte</i> ...	Crapper, J. S. ...	J. B. Scott ...	" A.	Lampert & Holt ...	" 25.3.28 to 26.4.28 ...	8.6.28
<i>Bryure</i> ...	Birch, A. ...	R. B. Langley ...	" A.	" ...	" 19.4.28 to 8.5.28 ...	24.5.28
<i>Bulysses M.V.</i> ...	Head, B. P. ...	A. J. Clatworthy ...	" M.	Anglo-Saxon Petroleum Co	" 13.5.28 to 7.6.28 ...	21.6.28
<i>Cambria</i> ...	Copland, C. P. ...	O. W. L. Jones ...	C.C.	L.M. & S. Rly ...	Telegraphic Report 30.6.28 ...	30.6.28
<i>Cameronia</i> ...	Gemmell, W. ...	H. H. Dunning, W. E. Grant, C. M. Schofield, G. M. Roberts.	M.L.	Anchor ...	Form 911 25.3.28 to 16.4.28 ...	18.4.28
<i>Camito</i> ...	Forrester, W. T., O.B.E.	H. H. Dunning, W. E. Grant, C. M. Schofield, G. M. Roberts.	"	Elders & Fyffes ...	Met. Log. 30.1.28 to 27.5.28 ...	7.6.28
<i>Canadian Importer</i> ...	Forson, A. ...	...	No. A.	Canadian Gov. Mercantile Marine.	Form 911 15.4.28 to 16.5.28 ...	29.5.28
<i>Canadian Inventor</i> ...	Boulton, F. W. ...	O. D. Alcorn ...	" A.	" ...	" 17.9.27 to 30.10.27 ...	19.11.27
<i>Canadian Scottish</i> ...	Wallace, C. ...	R. J. Watson ...	" M.	" ...	" 26.5.27 to 11.7.27 ...	19.8.27
<i>Canadian Winner</i> ...	Hocking, N. P. ...	T. Wetherall ...	" M.	Furness Houlder ...	" 21.3.28 to 24.4.28 ...	8.5.28
<i>Canonesa</i> ...	Brodie, W. H. ...	J. J. Lewis ...	No. A.	Lyle S.S. Co. ...	" 13.2.28 to 3.4.28 ...	11.4.28
<i>Cape of Good Hope</i> ...	Lamont, J. ...	W. M. Stewart, E. Taylor, V. P. Britten.	W.T.	Cunard ...	W.T. Reg. 31.3.28 to 15.5.28 ...	8.6.28
<i>35 Carmania</i> ...	Brown, F. G., R.D., Capt., R.N.R.	W. M. Stewart, E. Taylor, V. P. Britten.	"	" ...	Form 911 11.6.28 to 29.6.28 ...	2.7.28
<i>Carnarvon Castle</i> ...	Strong, H., R.D., Commr., R.N.R.	H. A. Deller, E. Fullick, W. G. Smith, J. B. McReynolds.	M.L.	Union Castle ...	Form 911 7.8.27 to 26.8.27 ...	30.8.27
<i>34 Caronia</i> ...	Hossack, W. H., R.D., Capt., R.N.R.	H. G. Hayward, D. McMillan, T. Parry.	W.T.	Cunard ...	Met. Log. 2.9.27 to 27.2.28 ...	6.3.28
<i>Casanare</i> ...	Browne, S. ...	H. A. Tilley ...	No. A.	Elders & Fyffes ...	W.T. Reg. 29.5.28 to 16.6.28 ...	19.6.28
<i>Cavina</i> ...	Riseley, A. D. ...	R. L. Stevenson ...	" A.	" ...	Form 911 29.5.28 to 15.6.28 ...	19.6.28
<i>52 Cedric</i> ...	Smith, R. G. ...	N. E. Banks, S. Fieldwood, W. Rogers.	W.T.	White Star ...	" 3.6.28 to 7.7.28 ...	9.7.28
<i>53 Celtic</i> ...	Berry, G. ...	J. Law, D. K. Crawford, A. R. Stevens.	"	" ...	W.T. Reg. 23.4.28 to 27.5.28 ...	4.6.28
<i>Centaur</i> ...	Rose, A. F. ...	E. D. Potts, N. L. Thompson, J. Cockburn.	M.L.	A. Holt & Co. ...	W.T. Reg. 18.6.28 to 8.7.28 ...	10.7.28
<i>Ceramic</i> ...	Musgrave, T. ...	— Thomas, — Tyer, — Allan.	No. A.	White Star ...	Form 911 17.6.28 to 8.7.28 ...	11.7.28
<i>Change</i> ...	Gambrill, F. C. ...	— Thomas, — Tyer, — Allan.	M.L.	Yuill & Co. ...	W.T. Reg. 4.6.28 to 23.6.28 ...	26.6.28
<i>Changuinola</i> ...	Thorburn, R. A., R.D., Commr., R.N.R.	W. G. Chanter ...	No. A.	Elders & Fyffes ...	Form 911 3.6.28 to 23.6.28 ...	28.6.28
<i>Chindwin</i> ...	Esslemont, C. ...	...	" A.	Henderson ...	Met. Log. 21.8.27 to 6.2.28 ...	26.4.28
<i>Chinkiang</i> ...	Stringer, C. ...	...	M.L.	China Navigation Co	Form 911 30.5.28 to 1.7.28 ...	9.7.28
<i>Chirripi</i> ...	McColm, F. ...	H. Rawston, R. Laycock ...	No. A.	Elders & Fyffes ...	" 24.12.27 to 8.3.28 ...	28.3.28
<i>City of Baroda</i> ...	McMillan, J. ...	A. Beaton, T. C. Hodgkinson.	M.L.	Ellerman ...	" 26.5.28 to 1.7.28 ...	9.7.28
<i>City of Benares</i> ...	Anderson, W. W. ...	F. Forsyth ...	No. A.	" ...	Met. Log. 5.3.28 to 20.5.28 ...	6.6.28
<i>City of Brisbane</i> ...	Seaborne, F. O., D.S.C.	R. Jones ...	" A.	" ...	Form 911 15.3.28 to 16.4.28 ...	19.4.28
<i>City of Canterbury</i> ...	Bremner, D. M. ...	R. H. Hodgson ...	" A.	" ...	" 3.2.28 to 14.28 ...	10.4.28
<i>City of Carlisle</i> ...	Mordue, J. A. ...	C. C. Duncan, A. J. Barnett, R. Mowbray.	M.L.	" ...	" 2.4.28 to 4.6.28 ...	8.6.28
<i>City of Chester</i> ...	Letton, F. W. ...	...	"	" ...	" 13.4.28 to 5.5.28 ...	29.5.28
<i>City of Edinburgh</i> ...	Wyper, J. ...	G. Hummell ...	No. M.	" ...	Met. Log. 22.10.27 to 26.2.28 ...	21.3.28
<i>City of Hong Kong</i> ...	Walton, H. L., O.B.E., R.D., Commr., R.N.R.	...	" A.	" ...	Form 911 22.2.28 to 1.4.28 ...	21.5.28
<i>City of London</i> ...	Parker, F. W., R.D., Commr., R.N.R.	H. H. Asher ...	No. A.	" ...	" 18.2.28 to 9.3.28 ...	24.4.28
<i>City of Osaka</i> ...	Smith, W. H. ...	E. R. Wildermath, R. W. May, R. H. Stewart.	No.	" ...	Form 911 4.2.28 to 22.4.28 ...	27.4.28
<i>City of Rangoon</i> ...	Jones, P. ...	...	M.L.	" ...	Met. Log. 4.7.27 to 5.1.28 ...	1.2.28
<i>City of Venice</i> ...	Lee, A. ...	...	No. A.	" ...	Form 911 18.2.28 to 1.3.28 ...	12.3.28

LIST OF VOLUNTARY OBSERVING SHIPS

iii

Name of Vessel.	Captain.	Observing Officers.	Official Meteorological Equipment.	Line.	Last Log, Register, or Report Contributed. Received up to 13.7.28.	Date Received.
<i>City of Yokohama</i>	Singleton, J. G.	R. Willott Leese	No. A.	Ellerman	Form 911 25.3.28 to 4.5.28	25.6.28
<i>Clan Alpine</i>	Lyall, A. B.	K. M. Banks	" A.	Clan	" 12.4.28 to 23.6.28	25.6.28
<i>Clan Lamont</i>	Urquhart, P., D.S.C.	P. de Gruchy	" A.	"	" 25.1.28 to 27.4.28	8.5.28
<i>Clan Lindsay</i>	Giles, H. J., R.D., Commr., R.N.R.	"	" A.	"	" 18.5.28 to 7.6.28	25.6.28
<i>Clan MacBean</i>	Worthington, J. H.	J. E. Clayton	" A.	"	" 2.3.28 to 17.3.28	16.4.28
<i>Clan Macbeth</i>	Horn, R.	T. A. Watkinson	" A.	"	" 1.4.28 to 27.4.28	21.5.28
<i>Clan Macfadyen</i>	Stenson, F. J., R.D., Capt. R.N.R.	A. Dowds	" A.	"	" 30.4.28 to 18.5.28	8.6.28
<i>Clan Macfarlane</i>	Redford, L. F.	"	" A.	"	" 18.4.28 to 9.5.28	4.6.28
<i>Clan Macgillivray</i>	Law, A.	J. Garis	" A.	"	" 16.12.27 to 7.4.28	10.4.28
<i>Clan Macindoe</i>	Holman, W. G.	D. McAllister	" A.	"	" 30.1.28 to 12.5.28	29.5.28
<i>Clan Mackellar</i>	Smith, W. P.	A. Woodrow	" A.	"	" 9.6.28 to 21.6.28	30.6.28
<i>Clan Macphee</i>	Gourlay, J. B.	G. Short, B. Edgar, E. Mowatt.	M.L.	"	Met. Log. 21.11.27 to 18.4.28	17.5.28
<i>Clan Macnaughton</i>	Simpson, A. W.	J. W. Fox	No. A.	"	Form 911 26.3.28 to 20.4.28	14.5.28
<i>Clan MacTaggart</i>	Makepeace, F.	E. A. Hewson	" A.	"	" 3.3.28 to 22.4.28	5.5.28
<i>Clan Macwhirter</i>	Waterhouse, J.	W. A. Robbie, E. A. Brown, S. W. Brown.	M.L.	"	Met. Log. 1.10.27 to 26.4.28	30.4.28
<i>Clan Malcolm</i>	George, L. S.	R. L. Ranford, J. F. Hubbard, P. Evans.	"	"	" 23.2.28 to 9.6.28	29.6.28
<i>Clan Morrison</i>	Porterfield, W. M.	H. R. Crosscombe	No. A.	"	Form 911 5.3.28 to 11.4.28	30.4.28
<i>Clan Murdoch</i>	Neill, G. A.	W. J. Jones	" A.	"	" 15.5.28 to 27.5.28	9.7.28
<i>Clan Randal</i>	Fraser, R. K.	R. Cameron	" A.	"	" 21.5.28 to 12.6.28	3.7.28
<i>Clan Ross</i>	Openshaw, L. G.	R. K. Phillips	" A.	"	" 11.4.28 to 12.5.28	8.6.28
<i>Clan Sinclair</i>	Taylor, P. V.	J. H. Dennis	" A.	"	" 29.5.28 to 10.6.28	14.6.28
<i>Clan Urquhart</i>	Baker, E. W.	R. Silk	" A.	"	" 30.4.28 to 19.5.28	25.6.28
<i>Comorin</i>	Borland, J., McL., C.B., D.S.O., R.D., Capt. R.N.R.	E. C. White	" M.	P. & O.	" 20.3.28 to 6.5.28	23.5.28
<i>Corinthic</i>	Lloyd, W.	E. M. Burt, M. Bennett, I. A. Macnaughton.	M.L.	White Star	Met. Log. 4.2.28 to 18.5.28	22.5.28
<i>Cornwall</i>	Wilde, H. J.	H. M. Knight	No. A.	Federal	Form 911 27.3.28 to 9.5.28	15.5.28
<i>Crawford Castle</i>	Morgan, A. O., R.D., Commr., R.N.R.	J. A. Wilson	" A.	Union Castle	" 30.10.27 to 1.12.27	15.12.27
<i>Culebra</i>	Rathkins, C.E., R.D., Commr., R.N.R.	P. Cooper, R. N. Fletcher, W. S. Thomas.	M.L.	R.M.S.P. Co.	Met. Log. 23.4.28 to 28.6.28	6.7.28
<i>Cumberland</i>	Macmillan, D.	J. Marks	No. A.	Federal	Form 911 25.2.28 to 3.4.28	24.4.28
<i>Cyclops</i>	Cosker, W.	"	" A.	A. Holt	" 22.4.28 to 22.5.28	18.6.28
<i>Daga</i>	Wiles, N.	"	No. A.	P. Henderson	"	"
<i>Dakotian</i>	Robb, J.	W. R. Atkinson	" A.	Leyland	Form 911 30.3.28 to 24.6.28	2.7.28
<i>Dardanus</i>	Clarke, J. W.	R. Millar	" A.	A. Holt	Form 911 4.2.28 to 11.4.28	18.4.28
<i>Darian</i>	Masters, W.	"	" A.	Leyland	" 12.11.27 to 24.11.27	5.12.27
<i>Darro</i>	Matthews, G. P.	A. T. Walker	" M.	R.M.S.P. Co.	" 9.3.28 to 23.4.28	5.5.28
<i>Demerara</i>	Willan, F. G. L., R.D., Capt. R.N.R.	F. Jeyes	" M.	"	" 30.4.28 to 21.6.28	25.6.28
<i>Demosthenes</i>	Ogilvy, A.	"	" M.	Aberdeen	" 14.3.28 to 23.4.28	28.4.28
<i>Denis</i>	Harris, F. C. P.	A. Blewett	" A.	Booth	" 19.5.28 to 30.5.28	8.6.28
<i>Desado</i>	Hannam, F. S.	"	" M.	R.M.S.P. Co.	" 17.3.28 to 9.4.28	25.5.28
<i>Desna</i>	Green, J.	L. G. Peterson	" M.	"	" 2.4.28 to 24.5.28	6.6.28
<i>Deucalion</i>	Melling, C. F.	"	" A.	A. Holt	" 19.4.28 to 4.5.28	8.6.28
<i>Dieppe</i>	Marmery, S.	Mr. Parsons	C.C.	Southern Railway	Telegraphic Report 12.7.28	12.7.28
<i>Dimboola</i>	Roy, C. M.	H. L. Price	No. A.	Melbourne S.S. Co.	Form 911 13.4.28 to 9.5.28	8.6.28
<i>Domala, M.V.</i>	Kitson, A. G.	H. Robertson	" M.	British India	" 19.4.28 to 26.5.28	26.6.28
<i>Dominia, C.S.</i>	Campos, V., O.B.E., Lt.-Commr., R.N.R.	H. Hutchins, T. J. C. Dexter, J. Dyer.	M.L.	Telegraph Construction & Maintenance.	Met. Log. 4.1.28 to 24.1.28	1.3.28
<i>Dominie</i>	Saxton, C.	J. A. Moon	No. A.	Booth	Form 911 14.3.28 to 1.5.28	8.5.28
<i>Dorie</i>	Bolton, S., D.S.C., R.D., Commr., R.N.R.	G. T. Kavanagh	" M.	White Star	Form 911 3.6.28 to 25.6.28	26.6.28
<i>Dorington Court</i>	Clarke, E. J.	P. Jones	" A.	Haldin & Co.	" 30.4.28 to 31.5.28	2.7.28
<i>Dromore Castle</i>	MacMahon, J., R.D., Commr., R.N.R.	D. P. Klasen	" A.	Union Castle	" 11.3.28 to 11.4.28	30.4.28
<i>Dryden</i>	Major, T. W.	E. W. Hardie	" M.	Lampert & Holt	" 6.4.28 to 1.5.28	5.5.28
<i>Dunaff Head</i>	Milner, T. F., R.D., Lt.-Commr., R.N.R.	S. Duff	" A.	Ulmost S.S. Co.	" 7.3.28 to 13.6.28	18.6.28
<i>Dundrum Castle</i>	Goodacre, R.W., R.D., Commr., R.N.R.	A. R. J. Tilston	" A.	Union Castle	" 13.4.28 to 11.5.28	21.5.28
<i>Dunluce Castle</i>	Jackson, C. R.	F. O. Wilbraham	" A.	"	" 26.4.28 to 16.5.28	18.5.28
<i>Dunrobin</i>	Ramsay, J. D.	C. H. Kendall	" A.	Glen & Co.	" 6.3.28 to 23.4.28	5.5.28
<i>Duquesa</i>	Owen, R.	C. G. Adlard	" M.	Furness Withy	" 22.1.28 to 15.3.28	19.3.28
<i>Durenda</i>	Beeching, P. H.	"	" M.	British India	" 25.4.28 to 20.5.28	2.7.28
<i>Edinburgh Castle</i>	Owen, S. H.	G. H. Mayhew	" A.	Union Castle	" 13.4.28 to 3.6.28	8.6.28
<i>Egrot</i>	Sola, P., D.S.O.	R. W. Pattinson	" A.	Elder Dempster	" 5.5.28 to 5.7.28	9.7.28
<i>El Paraguayo</i>	Fletcher, G.	F. F. Feint, D. Murray	" M.	Houlder Bros.	" 23.10.27 to 15.12.27	20.12.27
<i>Elpenor</i>	Gordon, A. L.	C. Kavanagh, J. E. Clifft	M.L.	A. Holt	Met. Log. 5.2.28 to 29.5.28	18.6.28
<i>Elysia</i>	Duncan, A. R.	A. Laidlaw, G. S. Sinclair, H. M. Sanders.	"	Anchor	" 15.2.28 to 19.4.28	28.4.28
<i>Empress of Asia</i>	Hailey, A. J., Lt.-Commr., R.N.R.	R. H. Foley, L. C. Hogg, D. Smith.	"	Canadian Pacific	" 14.10.27 to 12.2.28	19.3.28
<i>Empress of Canada</i>	Robinson, S., C.B.E., R.D., Commr., R.N.R.	A. G. Simmons	"	"	" 4.11.27 to 4.3.28	12.4.28
<i>Empress of France</i>	Griffiths, E.	E. Roberts, L. Outram, W. Griffith.	"	"	" 7.1.28 to 25.4.28	10.5.28
<i>Empress of Russia</i>	Hosken, A. J.	L. C. Barry, R. A. Leicester, J. S. Clarke, J. H. Reid.	"	"	" 10.11.27 to 25.3.28	22.6.28
<i>Endeavour</i>	Law, E. F., B., Commr., R.N.	C. S. E. Lansdown, A. Jones, M. L. Harrison, W. H. Dickinson.	"	His Majesty's Ship	" 15.11.27 to 13.3.28	16.4.28
<i>Essequibo</i>	Kirkwood, J. H.	J. H. E. Evans	No. M.	R.M.S.P. Co.	Form 911 23.3.28 to 7.5.28	21.5.28
<i>Eumaeus</i>	Read, J. W.	"	" A.	A. Holt	" 16.1.28 to 22.4.28	30.4.28
<i>Euryades</i>	Findlay, J.	W. H. Hole	No. A.	A. Holt	Form 911 17.5.28 to 7.6.28	9.7.28
<i>Explorer</i>	Ling, J. T.	A. M. Hughes	" M.	Harrison	" 6.8.27 to 4.11.27	15.11.27
<i>Explorer</i>	Allan, J.	F. O. Sheehy	" A.	Scottish Fishery Board.	" 2.6.28 to 28.6.28	9.7.28
<i>Ferndale</i>	Daniel, F.	"	No. M.	Aberdeen Commonwealth.	" 25.4.28 to 27.5.28	11.7.28
<i>Flandria</i>	Maars, L.	"	" M.	Holland Lloyd	" 27.4.28 to 14.6.28	18.6.28
<i>Fordsdale</i>	Richardson, A. V.	F. J. Llewellyn	" M.	Aberdeen Commonwealth.	"	"
<i>Francisco</i>	Scales, H.	F. Elgin	" A.	Ellerman Wilson	" 4.5.28 to 13.6.28	19.6.28

Name of Vessel.	Captain.	Observing Officers.	Official Meteorological Equipment.	Line.	Last Log, Register, or Report Contributed. Received up to 13.7.28.	Date Received.
<i>Freya</i> ...	Angus, W. ...	J. M. Murray ...	No. A.	Scottish Fishery Board.	Form 911 9.6.28 to 26.6.28 ...	27.6.28
<i>Gaika</i> ...	Jackson, C. R. ...	L. G. May ...	" A.	Union Castle ...	" 11.9.27 to 4.11.27 ...	7.11.27
<i>Galtymore</i> ...	Yeoman, J. T. ...	" ...	" M.	Furness Withy ...	" 25.9.27 to 24.11.27 ...	1.12.27
<i>Garth Castle</i> ...	Linklater, H. ...	D. F. H. Klasen ...	" A.	Union Castle ...	" 14.5.28 to 15.6.28 ...	19.6.28
<i>Gascoyne</i> ...	Johnson, L. ...	" ...	M.L.	A. Holt & Co. ...	" ...	"
<i>Gelria</i> ...	Veldkamp, C. J. ...	" ...	" M.	Holland Lloyd ...	Form 911 22.3.28 to 9.5.28 ...	12.5.28
<i>Glamorganshire</i> ...	Clayton, R. G., D.S.C., R.D., Lt.-Commr., R.N.R.	K. H. Whitaker ...	" M.	R.M.S.P. Co. ...	Form 911 24.2.28 to 12.5.28 ...	18.5.28
<i>Glenamoy, M.V.</i> ...	Homan, C. E. ...	R. H. Bishop, R. W. Emerson, F. S. Howell.	M.L.	Glen Line ...	Met. Log. 5.12.27 to 16.4.28 ...	29.5.28
<i>Glengarry</i> ...	Angier, J. ...	F. C. White ...	No. M.	" ...	Form 911 20.5.28 to 5.6.28 ...	18.6.28
<i>Glenluce</i> ...	Kennett, W. H. ...	H. B. Porter ...	" A.	" ...	" 8.5.28 to 22.5.28 ...	24.5.28
<i>Glenishane</i> ...	Neil, P. G. ...	" ...	" A.	" ...	" 19.2.28 to 25.5.28 ...	8.6.28
<i>Glenworth</i> ...	Kilgour, H. A. ...	" ...	No.	R. S. Dalgleish ...	" ...	"
<i>Gloucestershire</i> ...	Robin, E. ...	C. F. Hicks ...	" A.	Bibby ...	" 28.1.28 to 24.3.28 ...	10.4.28
<i>Gloacina</i> ...	Pool, F. G. ...	" ...	" A.	Stag Line ...	" 8.4.28 to 12.6.28 ...	30.6.28
<i>Grantully Castle</i> ...	Whitfield, G. T. ...	R. Wren ...	" A.	Union Castle ...	" 3.6.27 to 14.8.27 ...	17.8.27
<i>Halesius</i> ...	Samuels, C. ...	R. W. Cook ...	" A.	R. P. Houston ...	" 29.5.28 to 27.6.28 ...	30.6.28
<i>Haliartius</i> ...	Marsh, L. V. ...	W. H. Upton ...	" A.	" ...	" 5.2.28 to 29.2.28 ...	24.2.28
<i>Harmonides</i> ...	Hughes, W. F. ...	K. T. Roper ...	" A.	" ...	" 13.3.28 to 29.5.28 ...	8.6.28
<i>Hatimura</i> ...	Lane, S. R., R.D., Capt., R.N.R.	" ...	" M.	British India ...	" 27.11.27 to 6.1.28 ...	6.2.28
<i>Hauraki, M.V.</i> ...	Hannafor, J. ...	T. Marshall, R. B. Denniston, F. C. Cochran.	M.L.	Union S.S. Co., N.Z. ...	Met. Log. 29.11.27 to 5.3.28 ...	1.6.28
<i>Henry Holmes, C.S.</i> ...	Norton, A. T. ...	A. R. Moss ...	No. M.	W. I. & Panama Telegraph Co.	Form 911 28.4.28 to 17.5.28 ...	26.6.28
<i>Herald</i> ...	Bicker Caarten, A. ...	A. R. Moss ...	No. M.	His Majesty's Ship ...	Met. Log. 18.10.27 to 19.11.27 ...	31.1.28
<i>Herefordshire</i> ...	Haselfoot, F.E.B., Capt., R.N.	D. G. V. Williams ...	M.L.	" ...	" ...	"
<i>Hermintus</i> ...	Mann, R. P. ...	M. D. Loutill ...	No. A.	Bibby ...	Form 911 21.4.28 to 30.6.28 ...	9.7.28
<i>Herschel</i> ...	Roberts, T. V. ...	D. W. MacGregor ...	" A.	Shaw, Savill & Albion	" 17.4.28 to 27.5.28 ...	4.6.28
<i>Hertford</i> ...	Watson, W. W. ...	J. F. Maurey ...	" A.	Lampport & Holt	" 13.2.28 to 6.5.28 ...	25.5.28
<i>Hibernia</i> ...	Urquhart, D. ...	J. R. Ricketts ...	" A.	Federal ...	" 3.3.28 to 10.4.28 ...	14.4.28
<i>Highland Laddie</i> ...	Roberts, W. Ivor, M.B.E.	R. Woodall, A. Marsh ...	C.C.	L.M. & S. Railway ...	Telegraphic Report 13.7.28 ...	13.7.28
<i>" Piper</i> ...	Jones, T. J. ...	E. F. Smart ...	No. A.	Nelson ...	Form 911 22.4.28 to 12.6.28 ...	9.7.28
<i>" Pride</i> ...	Collings, D. ...	S. E. Jackson, R. G. Owen, A. Southgate.	M.L.	" ...	Met. Log. 13.5.27 to 4.11.27 ...	1.12.27
<i>" Prince</i> ...	Robinson, R. H. ...	" ...	No. A.	" ...	Form 911 24.3.28 to 19.5.28 ...	22.5.28
<i>" Rover</i> ...	Davis, J. ...	J. Harrison ...	" A.	Prince ...	" 13.5.28 to 25.5.28 ...	8.6.28
<i>Hildebrand</i> ...	Ashby Graves, F. ...	" ...	" A.	Nelson ...	" 9.4.28 to 25.5.28 ...	8.6.28
<i>Hobson's Bay</i> ...	Peregrine, D. ...	" ...	" A.	Booth ...	" 15.5.28 to 28.6.28 ...	2.7.28
<i>Holbein</i> ...	Kydd, O. J. ...	R. Pearce, H. Benson, A. McLeod, K. McKenzie.	M.L.	Aberdeen Common-wealth.	Met. Log. 7.2.28 to 18.5.28 ...	7.6.28
<i>54 Homerie</i> ...	Gough, W. A. ...	S. Ranson ...	No. A.	Lampport & Holt	Form 911 3.3.28 to 23.5.28 ...	29.5.28
<i>Hororata</i> ...	Parker, W. H., C.B.E., R.D., Capt., R.N.R.	H. G. Morgan, S. B. Morfee, W. T. Poustie.	W.T.	White Star ...	W.T. Reg. 7.6.28 to 22.6.28 ...	6.7.28
<i>Hubert</i> ...	Holland, E. ...	A. E. Bamforth ...	No. A.	New Zealand S.S. Co.	Form 911 29.10.27 to 8.3.28 ...	12.3.28
<i>Huntingdon</i> ...	Briscoe, W. ...	E. C. McGuinness ...	" A.	Booth ...	" 31.5.28 to 14.6.28 ...	25.6.28
<i>Huntsman</i> ...	Ashworth, W. ...	H. G. Letts ...	" A.	Federal ...	" 10.6.28 to 21.6.28 ...	3.7.28
<i>Hurumi</i> ...	Russell, H. ...	J. Richardson ...	" M.	Harrison ...	" 6.12.27 to 14.2.28 ...	23.2.28
<i>Hydaspes</i> ...	Upton, E. C. S. ...	J. Oxnard, F. Longheed, G. R. Hogg, K. Goldsworthy.	M.L.	New Zealand S.S. Co.	Met. Log. 12.8.27 to 5.2.28 ...	10.2.28
<i>Ingoma</i> ...	Williams, — ...	" ...	No. M.	R. P. Houston ...	" ...	"
<i>Inkum</i> ...	Barrow, R. K. ...	W. P. Baker ...	" M.	Harrison ...	Form 911 5.4.28 to 18.5.28 ...	24.5.28
<i>Iris, C.S.</i> ...	Meetham, J. T. ...	" ...	" M.	J. H. Welsford ...	" 28.3.28 to 12.4.28 ...	28.4.28
<i>Iroquois</i> ...	Hughes, H. R. ...	L. V. Vicker, D. MacDonald	M.L.	Pacific Cable Board ...	Met. Log. 25.8.27 to 3.10.27 ...	21.3.28
<i>Iacon</i> ...	Jackson, A. L., Commr., R.N.	H. L. Jenkins ...	"	His Majesty's Ship ...	" 2.8.27 to 21.11.27 ...	31.1.28
<i>Javanese Prince</i> ...	Reed, G. C. ...	C. W. A. Murphy ...	No. A.	A. Holt ...	Form 911 7.6.28 to 23.6.28 ...	3.7.28
<i>Jervis Bay</i> ...	Marshall, F. ...	W. Venn ...	" A.	Prince ...	" 9.6.28 to 24.6.28 ...	3.7.28
<i>Justin</i> ...	Chaplin, W. R. ...	R. W. Laycock ...	" M.	Aberdeen Common-wealth.	" 20.12.27 to 23.4.28 ...	14.5.28
<i>Katsar-i-Hind</i> ...	Bush, H. ...	G. E. Thomas ...	" A.	Booth ...	" 21.4.28 to 6.5.28 ...	4.6.28
<i>Kalyan</i> ...	Manley, G. ...	R. H. Hand ...	" M.	P. & O. ...	" 14.4.28 to 5.6.28 ...	12.6.28
<i>Kamo Maru</i> ...	Cornewall Jones, B. ...	S. Gerrans ...	" M.	P. & O. ...	" 18.2.28 to 13.5.28 ...	15.5.28
<i>Kangaroo</i> ...	Enya, S. ...	" ...	" A.	Nippon Yusen Kaisha	" 20.5.28 to 22.6.28 ...	25.6.28
<i>Karapara</i> ...	Buckeridge, G. ...	E. Hutchinson, J. Kavanagh, H. Brackenridge.	M.L.	State Service Australia.	Met. Log. 7.9.27 to 6.3.28 ...	22.5.28
<i>Kashmir</i> ...	Kavanagh, J. ...	" ...	"	" ...	" ...	"
<i>Kenilworth Castle</i> ...	Norris, H. C. ...	" ...	"	" ...	" ...	"
<i>Kent</i> ...	Miller, A. C. ...	J. Ruddiman, J. Miln ...	No. M.	British India ...	Form 911 11.4.28 to 25.5.28 ...	12.6.28
<i>Khiva</i> ...	Mallalae, R., R.D., Lt.-Commr., R.N.R.	A. J. McHattie ...	" M.	P. & O. ...	" 8.3.28 to 17.4.28 ...	24.4.28
<i>Khyber</i> ...	Chave, Sir B., K.B.E.	R. C. Longman, L. A. J. Keeble, W. Dryden, W. Wyeth.	M.L.	Union Castle ...	Met. Log. 18.4.27 to 8.8.27 ...	19.10.27
<i>Knight Companion</i> ...	Matthews, C. ...	W. C. Wilkinson ...	No. A.	Federal ...	Form 911 21.12.27 to 24.1.28 ...	31.1.28
<i>Koolinda, M.V.</i> ...	Stringer, R. H., O.B.E., R.D., Commr., R.N.R.	G. W. Wood, D. Meakle, V. A. Nicolls, A. Robson.	M.L.	P. & O. ...	Met. Log. 13.10.27 to 14.4.28 ...	23.4.28
<i>Kovno</i> ...	Hester, C. W., R.D., Commr., R.N.R.	C. S. Pirie ...	"	P. & O. ...	" 16.12.27 to 24.3.28 ...	2.4.28
<i>37 Laconia</i> ...	Cox, B. T., D.S.O., R.D., Lt. Commr., R.N.R.	J. H. Isherwood ...	No. M.	A. Holt ...	Form 911 20.4.28 to 18.5.28 ...	12.6.28
<i>Laguna</i> ...	Buckeridge, J. ...	" ...	" M.	State Service, Australia.	" 27.3.28 to 22.4.28 ...	29.5.28
<i>Lahore</i> ...	Dossor, W. A. ...	F. Barnard, S. Butcher ...	M.L.	Ellerman Wilson ...	Met. Log. 24.12.27 to 2.7.28 ...	6.7.28
<i>Lalande</i> ...	Britten, E. T., R.D., Commr., R.N.R.	J. Ashcroft, E. W. Connell, J. O. Chambers.	W.T.	Cunard ...	W.T. Reg. 28.5.28 to 17.6.28 ...	20.6.28
<i>3 Lancashire</i> ...	Mander, T. ...	" ...	"	" ...	Form 911 27.5.28 to 17.6.28 ...	20.6.28
<i>6 Lancastria</i> ...	Gordon, L. M., R.D., Commr., R.N.R.	E. B. Elcoate ...	No. A.	Pacific S.N. Co. ...	Form 911 21.2.28 to 14.3.28 ...	20.6.28
	Hamill, H. ...	A. E. Warburton ...	No. A.	P. & O. ...	" 15.5.28 to 29.6.28 ...	12.7.28
	Crumplin, W. E. ...	R. Allen ...	" A.	Lampport & Holt ...	Form 911 16.2.28 to 13.5.28 ...	29.5.28
	Oram, B.B., R.D., Commr., R.N.R.	L. R. Sharp, F. G. Russell, P. L. Williams.	W.T.	Bibby ...	" 12.2.28 to 18.4.28 ...	24.4.28
				Cunard ...	W.T. Reg. 21.5.28 to 6.6.28 ...	11.6.28
					Form 911 20.5.28 to 7.6.28 ...	12.6.28

LIST OF VOLUNTARY OBSERVING SHIPS

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Name of Vessel.	Captain.	Observing Officers.	Official Meteorological Equipment.	Line.	Last Log, Register, or Report Contributed. Received up to 13.7.28.	Date Received.
<i>Laomedon</i> ...	Beswick, W., D.S.C., Lt.-Commr., R.N.R.	H. A. Standfield ...	No. A.	A. Holt...	Form 911 9.5.28 to 1.7.28 ...	9.7.28
<i>La Paz</i> , M.V. ...	Benson, C. W. ...	J. W. Richards ...	" M.	Pacific S.N. Co.	" 31.1.28 to 10.5.28 ...	16.5.28
<i>Laplace</i> ...	Hickman, V. G. ...	A. L. Murray, R. D. Cottam	" A.	Lampport & Holt	" 15.4.28 to 28.6.27 ...	30.8.27
55 <i>Lapland</i> ...	Harvey, H. ...	L. A. Williams, J. Flett ...	W.T.	Red Star ...	W.T. Reg. 11.6.28 to 29.6.28 ...	2.7.28
64 <i>Laurentic</i> ...	Trant, E. L., R.D., Commr. R.N.R.	J. W. Peters, E. A. A. Crowley	"	White Star ...	Form 911 10.6.28 to 30.6.28 ...	2.7.28
<i>Lautaro</i> , M.V. ...	Dunn, R. E., O.B.E.	" " " " " " " "	No. M.	Pacific S.N. Co.	W.T. Reg. 27.5.28 to 15.6.28 ...	19.6.28
<i>Leicestershire</i> ...	de Legh, P. ...	R. S. Evans H. G. Walton, J. K. Gemmell, D. Burt.	M.L.	Bibby ...	Form 911 27.5.28 to 15.6.28 ...	19.6.28
<i>Leighton</i> , M.V. ...	Lindesay, J. M. ...	" " " " " " " "	No. A.	Lampport & Holt	Met. Log. 24.1.27 to 11.3.28 ...	29.3.28
<i>Leitrim</i> ...	Robertson, A. ...	" " " " " " " "	" A.	" " " " " " " "	" 24.3.28 to 30.5.28 ...	4.6.28
<i>Limerick</i> ...	Molyneux, P. L. ...	" " " " " " " "	" M.	Dowie, J., & Co.	Form 911 1.5.28 to 20.5.28 ...	19.6.28
<i>Llmaria</i> ...	Robinson, J. J. ...	" " " " " " " "	" A.	Federal...	" 15.4.28 to 26.5.28 ...	2.7.28
<i>Llandaf Castle</i> ...	Gilbert, E. F. ...	R. Bayer	" A.	J. Robinson	" " " " " " " "	"
<i>Llandovery Castle</i> ...	Kerby, J. H. ...	C. H. Williams, G. Moon, P. Clissold.	M.L.	Union Castle ...	" " " " " " " "	"
<i>Loch Katrine</i> ...	Buret, T. J. C. ...	R. A. Stenhouse, E. E. Collins.	No. A.	R.M.S.P. Co. ...	Form 911 10.3.28 to 11.4.28 ...	31.5.28
<i>Logician</i> ...	Gibbins, W. ...	" " " " " " " "	No.	Harrison	Form 911 19.4.28 to 8.5.28 ...	9.6.28
<i>London Commerce</i> ...	Young, H. J., D.S.C.	W. Edmonds ...	" A.	Furness Withy	Met. Log. 5.4.28 to 13.6.28 ...	28.6.28
<i>London Importer</i> ...	Fowler, W. H. ...	F. F. Feint, J. H. Metcalfe, J. G. Freeman.	M.L.	" " " " " " " "	Form 911 1.3.28 to 25.5.28 ...	4.6.28
<i>Lord Antrim</i> ...	Jarvis, F. E. ...	" " " " " " " "	No. A.	Ulster S.S. Co.	" " " " " " " "	"
<i>Loriga</i> , M.V. ...	Clapham, E. C. ...	R. W. Gill ...	" A.	Pacific S.N. Co.	Form 911 29.5.28 to 10.6.28 ...	18.6.28
<i>Losada</i> , M.V. ...	Ross, J. ...	D. Beamer ...	" M.	" " " " " " " "	" 23.12.27 to 17.2.28 ...	20.2.28
					" 3.4.28 to 20.4.28 ...	8.5.28
<i>Macedonia</i> ...	Potter, H. W., R.D., Commr. R.N.R.	C. J. L. Hayward ...	" M.	P. & O. ...	" 2.6.28 to 20.6.28 ...	28.6.28
<i>Macharda</i> ...	Hanna, R. G. ...	T. Johnston ...	" M.	Brocklebank ...	" 14.5.28 to 7.6.28 ...	12.7.28
<i>Mahia</i> ...	McIntosh, A. ...	R. James, P. Campbell, J. Jackson.	M.L.	Shaw, Savill & Albion	Met. Log. 25.2.28 to 28.6.28 ...	6.7.28
<i>Mahrona</i> ...	Addy, M. J. ...	J. Kettlewell ...	No. M.	Brocklebank ...	Form 911 18.3.28 to 13.4.28 ...	14.5.28
<i>Maihar</i> ...	Charlton, W. L. ...	J. W. B. Robertson, C. Cadwallader, S. S. Slade.	M.L.	" " " " " " " "	Met. Log. 27.1.28 to 21.4.28 ...	7.6.28
<i>Maimyo</i> ...	Smith, G. C. ...	H. M. Drummond ...	No. A.	" " " " " " " "	Form 911 16.7.27 to 8.10.27 ...	11.10.27
<i>Maivara</i> ...	Blain, A. W. ...	J. J. Skinner, A. M. Stanton	No. A.	Burns Philp ...	" 14.2.28 to 3.3.28 ...	26.4.28
58 <i>Majestic</i> ...	Metcalfe, G. R., Lt.-Commr. R.N.R.	W. W. Pearson, L. Thompson, W. T. FitzGerald.	W.T.	White Star ...	W.T. Reg. 14.6.28 to 28.6.28 ...	30.6.28
<i>Makalla</i> ...	Maughan, J. W. ...	J. B. Newman ...	No. M.	Brocklebank ...	Form 911 22.5.28 to 10.6.28 ...	21.6.28
<i>Makambo</i> ...	Blain, A. W. ...	R. Perry, R. W. Holmes, T. MacRae.	M.L.	Burns Philp ...	Met. Log. 20.8.27 to 22.1.28 ...	20.3.28
<i>Makura</i> ...	Brown, T. M. ...	W. A. Todd, D. Burgess, A. Gell.	"	Canadian-Australasian	" 26.1.28 to 11.5.28 ...	11.7.28
<i>Malabar</i> , M.V. ...	Donaldson, A. ...	K. Morris ...	No. M.	Burns, Philp & Co. ...	Met. Log. 28.12.27 to 13.4.28 ...	4.7.28
<i>Malakuta</i> ...	Adamson, F. L. ...	N. Grayson ...	" M.	Brocklebank ...	Form 911 26.2.28 to 23.4.28 ...	28.4.28
<i>Malancha</i> ...	Whitham, F. ...	R. Humble, F. Moore ...	" M.	" " " " " " " "	" 3.4.28 to 19.6.28 ...	30.6.28
<i>Malda</i> ...	Gray, T. N. ...	S. G. James ...	" M.	British India ...	" 15.4.28 to 24.5.28 ...	2.7.28
<i>Malaja</i> ...	Warner, S. C. ...	A. D. Dennis ...	" M.	P. & O. ...	" 22.12.27 to 26.1.28 ...	31.1.28
<i>Maluca</i> ...	Norman, W. A. ...	B. Rudkin ...	" M.	" " " " " " " "	" 18.5.28 to 27.6.28 ...	30.6.28
<i>Mamari</i> ...	Falconer, H. ...	W. S. Eustance ...	" A.	Shaw, Savill & Albion	" 16.5.28 to 27.6.28 ...	9.7.28
<i>Manchester Brigade</i> ...	Stott, C. H. ...	Williams, H. ...	M.L.	Manchester Liners ...	" 10.1.28 to 18.2.28 ...	23.2.28
<i>Manchester Corporation</i> ...	" " " " " " " "	" " " " " " " "	No. A.	" " " " " " " "	" 16.1.28 to 2.3.28 ...	19.3.28
<i>Manchester Hero</i> ...	Riley, J. E. ...	H. Anderton, J. H. Emmett, A. W. Hanchett.	M.L.	" " " " " " " "	Met. Log. 6.9.27 to 18.2.28 ...	23.2.28
<i>Manchester Producer</i> ...	Struss, F. ...	J. W. Moss ...	No. A.	" " " " " " " "	Form 911 5.5.28 to 3.6.28 ...	9.6.28
<i>Manchester Regiment</i> ...	Foale, J. R. ...	P. D. Barr ...	" A.	" " " " " " " "	Form 911 4.2.28 to 9.3.28 ...	14.3.28
<i>Manipur</i> ...	Cochran, G. N. ...	R. Penston, G. B. Falconer ...	No. M.	Brocklebank ...	Form 911 6.5.28 to 31.5.28 ...	26.6.28
<i>Manistee</i> ...	Steidelmann, H. ...	J. D. Patterson, A. Sandham, L. Rowe.	M.L.	Elders & Fyffes ...	Met. Log. 27.12.27 to 10.5.28 ...	20.6.28
<i>Manora</i> ...	Hudson, H. T., R.D., Commr. R.N.R.	W. H. Cruse ...	No. M.	British India ...	Form 911 9.1.28 to 14.3.28 ...	3.4.28
<i>Mantua</i> ...	Davis, H. C., D.S.C., Commr. R.N.R.	" " " " " " " "	" M.	P. & O. ...	Form 911 13.5.28 to 5.7.28 ...	12.7.28
<i>Marella</i> ...	Mortimer, S. ...	A. G. Hill, R. Duddell, A. G. Thomas.	M.L.	Burns Philp ...	Met. Log. 1.10.27 to 30.1.28 ...	1.6.28
<i>Marengo</i> ...	Curlie, J. ...	H. Bryan, J. Ford, F. Barnard, S. Butcher.	"	Ellerman Wilson ...	" 27.3.28 to 30.6.28 ...	6.7.28
<i>Maresfield</i> ...	Berry, V. ...	T. Connolly ...	No. A.	Woods, Tyler & Brown	Form 911 3.5.28 to 19.5.28 ...	9.6.28
<i>Margha</i> ...	Hughes, C. G. ...	P. Wright, P. B. Moore, W. E. Jones, W. G. Jones.	M.L.	British India ...	Met. Log. 11.3.28 to 3.6.28 ...	11.6.28
<i>Marquesa</i> ...	Smiles, R. S. ...	L. Owen ...	No. M.	Furness Houlder ...	Form 911 29.4.28 to 4.7.28 ...	12.7.28
<i>Matakana</i> ...	Thurston, H. P. ...	J. Hart, J. Dickson, C. E. Mayer.	M.L.	Shaw, Savill & Albion	Met. Log. 17.10.27 to 27.2.28 ...	2.3.28
<i>Matheran</i> ...	Ison, W. A. ...	J. R. Precious ...	No. M.	Brocklebank ...	Form 911 10.4.28 to 29.4.28 ...	6.6.28
<i>Matiana</i> ...	Green, F. V. ...	J. A. C. McGregor ...	No. M.	British India ...	Form 911 20.12.27 to 12.2.28 ...	20.2.28
<i>Matra</i> ...	Cornish, N. P. ...	W. Gibson, R. E. Johnson ...	" M.	Brocklebank ...	" 6.4.28 to 20.5.28 ...	25.5.28
<i>Maunganui</i> ...	Davey, A. H. ...	F. Gibson, V. Knight, H. Kemp.	" M.	Union S.S. Co. of N.Z.	" 29.4.27 to 22.7.27 ...	5.9.27
32 <i>Mauretania</i> ...	Charles, Sir J. T. W., K.B.E., C.B., R.D., Commr. R.N.R.	R. H. Crawford, C. B. Osborne B. J. P. Tuck.	W.T.	Cunard ...	W.T. Reg. 3.6.28 to 18.6.28 ...	21.6.28
<i>Megantic</i> ...	Trant, E. L., R.D., Commr. R.N.R.	" " " " " " " "	No. A.	White Star ...	" 24.6.28 to 5.7.28 ...	9.7.28
22 <i>Melita</i> ...	Stewart, A. ...	J. Shearer, T. Gillette ...	W.T.	Canadian Pacific ...	Form 911 30.7.27 to 20.8.27 ...	24.8.27
<i>Memnon</i> ...	Dougall, W. T. ...	J. A. C. McGregor ...	No. A.	A. Holt ...	W.T. Reg. 16.4.28 to 8.5.28 ...	14.5.28
21 <i>Metagama</i> ...	Freer, A., Capt., R.N.R.	A. M. Watt, W. P. Haines, S. Keay.	W.T.	Canadian Pacific ...	Form 911 29.4.28 to 26.5.28 ...	9.7.28
<i>Middlesex</i> ...	MacRae, A., D.S.C., Lt.-Commr. R.N.R.	C. Roberts ...	No. M.	Federal ...	W.T. Reg. 25.4.28 to 12.5.28 ...	18.5.28
<i>Minna</i> ...	Mackenzie, G. G. ...	A. M. Campbell ...	" A.	Scottish Fishery Board.	Form 911 23.3.28 to 7.5.28 ...	12.5.28
<i>Minnesota</i> ...	Finch, E. ...	T. W. Pullen ...	" M.	Atlantic Transport ...	Form 911 23.5.28 to 6.7.28 ...	10.7.28
<i>Minnetonka</i> ...	Gates, T. F., C.B.E. ...	H. E. McCartney ...	" M.	" " " " " " " "	" 10.6.28 to 30.6.28 ...	3.7.28
<i>Minnewaska</i> ...	Claret, F. H., C.B.E., Commr. R.N.R.	" " " " " " " "	" M.	" " " " " " " "	" 17.6.28 to 7.7.28 ...	12.7.28
<i>Mirror</i> , C.S. ...	Jones, T. M.B.E. ...	J. G. West ...	" M.	Eastern Tel. Co. ...	" 3.6.28 to 23.6.28 ...	30.6.28
<i>Mississippi</i> ...	Wylie, J. T. ...	" " " " " " " "	No. A.	Atlantic Transport ...	Form 911 13.2.28 to 18.3.28 ...	10.4.28
<i>Modasa</i> ...	Gilchrist, J. W. ...	R. E. T. Parsons ...	" M.	British India ...	" 6.11.27 to 15.11.27 ...	26.11.27
					" 18.2.28 to 10.5.28 ...	25.5.28

Name of Vessel.	Captain.	Observing Officers.	Official Meteorological Equipment.	Line.	Last Log, Register, or Report Contributed. Received up to 13.7.28.	Date Received.
<i>Moldavia</i> ...	Burleigh, C. W., D.S.O., R.D., Capt., R.N.R.	W. L. Dobbin ...	No. M.	P. & O. ...	Form 911 18.4.28 to 30.5.28 ...	6.6.28
<i>Mongolia</i> ...	Furlong, G. H. S., R.D., Capt., R.N.R.	E. Allen ...	" M.	" ...	" 2.2.28 to 15.5.28 ...	18.5.28
24 <i>Montcalm</i> ...	Landy, E. ...	F. H. Steel, M. Williams, L. Thornton.	W.T.	Canadian Pacific ...	W.T. Reg. 27.5.28 to 14.6.28 ...	18.6.28
25 <i>Montclare</i> ...	Griffiths, J. N. ...	A. Mansey, F. E. Bevis, C. Draper.	"	" ...	" 10.6.28 to 28.6.28 ...	3.7.28
27 <i>Montnairn</i> ...	Notley, A. H., R.D., Commr., R.N.R.	K. Hutchings, E. A. Shergold, W. S. Roberts.	W.T.	Canadian Pacific {	W.T. Reg. 19.5.28 to 12.6.28 ...	14.6.28
<i>Montoro</i> ...	Williams, D. J. ...	J. Campbell ...	M.L.	Burns, Philp & Co. ...	Form 911 31.1.28 to 6.3.28 ...	10.4.28
26 <i>Montrose</i> ...	Notley, A. H., R.D., Commr., R.N.R.	J. A. Coldwell ...	W.T.	Canadian Pacific ...	W.T. Reg. 16.6.28 to 4.7.28 ...	7.7.28
20 <i>Montroyal</i> ...	Freer, A. R.D., Capt., R.N.R.	A. Mackie ...	"	" ...	" 16.6.28 to 29.6.28 ...	3.7.28
<i>Moresby</i> ...	Edgell, J. A., O.B.E., Capt., R.N.	W. H. Martin ...	M.L.	His Majesty's Australian Ship.	Met. Log. 29.8.27 to 15.12.27...	23.1.28
	Henderson, D. A., Commr., R.N.					
<i>Morvada</i> ...	Mills, T. L., O.B.E., R.D., Commr., R.N.R.	H. J. O'Donohoe ...	No. M.	British India ...	Form 911 23.5.28 to 18.6.28 ...	21.6.28
<i>Mulbera</i> ...	Caffyn, F. ...	J. Rose ...	" M.	" ...	" 23.4.28 to 25.5.28 ...	18.6.28
<i>Nagara</i> ...	Foster, E. ...	C. K. Brown ...	" M.	R.M.S.P. Co. ...	" 26.8.27 to 21.1.28 ...	26.1.28
<i>Nagoya</i> ...	Bedwell, L. A. ...	T. A. Sergeant ...	" M.	P. & O. ...	" 26.3.28 to 3.5.28 ...	19.5.28
<i>Naldera</i> ...	Dayas, C. T. E. ...	C. H. Hand, W. T. Banks, Hartley, J. W. ...	M.L.	" ...	Met. Log. 10.3.28 to 14.6.28 ...	20.6.28
<i>Nardana</i> ...	Moth, F. L. ...	S. C. T. Smith ...	No. M.	British India ...	Form 911 17.3.28 to 20.4.28 ...	30.4.28
<i>Narkunda</i> ...	Collyer, R. M. M., R.D., Commr., R.N.R.	J. Biggs ...	" M.	P & O. ...	" ...	"
<i>Nellore</i> ...	Hignett, A. H., R.D., Lt.-Commr., R.N.R.	A. J. Brown ...	" M.	P. & O. ...	" 25.5.28 to 14.6.28 ...	12.7.28
<i>Nerbudda</i> ...	Williams, B. N. ...	J. A. Farley, S. Henderson ...	" M.	British India ...	" 6.5.28 to 25.5.28 ...	19.6.28
<i>Nestor</i> ...	Houghton, G. K. ...	A. Caird, N. Anderson, R. T. Dryden.	M.L.	A. Holt ...	Met. Log. 8.1.28 to 13.5.28 ...	24.5.28
<i>Newby Hall</i> ...	Storey, J. K. ...	" ...	"	Ellerman ...	" 13.10.27 to 21.3.28...	20.6.28
	Zeal, R. C. ...					
<i>Newfoundland</i> ...	Westgarth, W. A., D.S.C.	R. F. Handley, E. Sainty, E. B. Burke.	"	Furness Withy ...	" 6.10.27 to 11.2.28 ...	29.2.28
<i>Niagara</i> ...	Hill, T. V. ...	R. N. Turner, V. Knight, L. B. Ehlert.	"	Canadian-Australasian	" 14.12.27 to 30.3.28...	28.4.28
<i>Ningchow</i> ...	Beale, H. E. ...	M. H. Vincent ...	No. A.	A. Holt... Federal	Form 911 7.4.28 to 7.5.28 ...	17.5.28
<i>Norfolk</i> ...	Robinson, F. W. ...	E. M. Foster ...	" A.	" ...	" 14.1.28 to 28.2.28 ...	9.2.28
<i>Norna</i> ...	Wright, J. W. ...	" ...	" A.	Scottish Fishery Board	" 1.6.28 to 20.6.28 ...	27.6.28
<i>Norseman, C.S.</i> ...	Douglas, W. ...	R. W. Greenfield ...	" M.	Western Tel. Co. ...	" 5.5.28 to 12.5.28 ...	12.6.28
<i>Northumberland</i> ...	Upton, H. L., D.S.C., R.D., Lt.-Commr., R.N.R.	A. J. Robertson, A. Weatherall, J. F. Clements.	M.L.	Federal ...	Met. Log. 30.10.27 to 25.3.28...	17.4.28
<i>Nova Scotia</i> ...	Furneaux, S. ...	" ...	No. A.	Furness Withy ...	Form 911 8.6.28 to 6.7.28 ...	10.7.28
<i>Novshera</i> ...	Rowe, S. N. ...	W. D. L. Reeves ...	" M.	British India ...	" 16.4.28 to 24.5.28 ...	29.5.28
<i>Nubian</i> ...	Watmough, T. M. ...	" ...	" A.	Leyland ...	" 19.8.27 to 30.10.27...	11.11.27
<i>Nudea</i> ...	Morrison, N. C. ...	" ...	" M.	British India...	" 23.5.28 to 3.7.28 ...	12.7.28
<i>Oaklands Grange</i> ...	St. Clair, C., D.S.C. ...	C. F. Foxwell ...	" A.	Houlder Bros. ...	Form 911 1.4.28 to 28.4.28 ...	30.4.28
57 <i>Olympic</i> ...	Marshall, W., C.B., D.S.O., R.D., Commr., R.N.R.	A. Fisher, H. J. C. Day, A. E. Weller.	W.T.	White Star ...	W.T. Reg. 31.5.28 to 14.6.28 ...	16.6.28
	Matheson, C. G., D.S.O., R.D., Capt., R.N.R.	W. Elliot, C. K. Blake, J. M. M. Swanson.	M.L.	Orient ...	Form 911 21.6.28 to 4.7.28 ...	5.7.28
<i>Orama</i> ...	Hoskins, W. ...	" ...	"	" ...	Form 911 30.5.28 to 5.7.28 ...	9.7.28
<i>Oranian</i> ...	Dominy, R. H., O.B.E., Commr., R.N.R.	" ...	No. A.	Leyland ...	" 4.3.28 to 7.6.28 ...	14.6.28
<i>Orbita</i> ...	Pearse, A. W. ...	W. M. Horsfall, J. N. Laylor, D. L. Jones.	" M.	R.M.S.P. Co. ...	" 9.3.28 to 29.5.28 ...	4.6.28
<i>Orcoma</i> ...	Daniel, T. ...	R. D. Eckford ...	No. M.	Pacific S.N. Co. ...	Met. Log. 7.2.28 to 15.4.28 ...	30.4.28
<i>Orduna</i> ...	Flynn, G. A. ...	R. Martin... ..	" A.	" ...	Form 911 21.9.27 to 16.2.28 ...	27.2.28
<i>Orestes</i> ...	Duncan, E. E. ...	D. W. Hutchinson, H. D. Griffiths.	M.L.	R.M.S.P. Co. ...	Form 911 7.4.28 to 18.6.28 ...	21.6.28
<i>Orita</i> ...	Rice, W. V., D.S.O., D.S.C., Commr., R.N.	H. P. Price ...	"	A. Holt... Pacific S.N. Co.	Form 911 26.3.28 to 29.6.28 ...	10.7.28
<i>Ormonde</i> ...	Sarson, M. J. ...	" ...	No. A.	" ...	Met. Log. 21.12.27 to 24.5.28...	4.6.28
<i>Oronsay</i> ...	Shelford, W. S., Lt.-Commr., R.N.R.	" ...	M.L.	His Majesty's Ship ...	" 30.10.27 to 26.2.28...	2.5.28
<i>Oroya</i> ...	Ridyard, A. ...	P. H. Ray ...	No. M.	Orient ...	Form 911 8.10.27 to 30.10.27...	5.12.27
<i>Orsova</i> ...	Cameron, E. P., R.D., Commr., R.N.R.	H. Schofield, L. J. Vesty, A. Croft Cohen, H. A. Whittle, A. Addison.	M.L.	" ...	Met. Log. 5.2.28 to 8.5.28 ...	12.5.28
<i>Orvieto</i> ...	O'Sullivan, F. R. ...	J. G. Goldsworthy, G. L. Carter, T. Fox Russell, N. Smith	"	" ...	Form 911 22.2.28 to 30.4.28 ...	8.5.28
<i>Osterley</i> ...	Sarson, M. J. ...	A. F. C. Gray ...	No. A.	" ...	Met. Log. 1.4.28 to 4.7.28 ...	10.7.28
<i>Otahi</i> ...	McNish, R. ...	J. McCulloch ...	" A.	" ...	" 25.12.27 to 27.3.28...	16.4.28
<i>Otira</i> ...	Wood, C., D.S.C. ...	S. Winton ...	" M.	New Zealand S.S. Co. Shaw, Savill & Albion	Form 911 19.2.28 to 23.5.28 ...	2.6.28
<i>Otranto</i> ...	Staunton, H. G., C.B.E., R.D., Commr., R.N.R.	O. C. Davies ...	" M.	" ...	" 30.3.28 to 7.5.28 ...	12.5.28
<i>Oxfordshire</i> ...	Foster, W. L. ...	E. A. Insley ...	" A.	Orient ...	" 22.3.28 to 28.4.28 ...	8.5.28
					" 29.1.28 to 30.3.28 ...	14.4.28
<i>Pacific Shipper, M.V.</i> ...	Fairclough, H. ...	" ...	" A.	Bibby Bros. ...	" 4.2.28 to 11.4.28 ...	18.4.28
<i>Pacure</i> ...	Sapsworth, S. A. ...	V. R. Watkins ...	" A.	" ...	" 16.4.28 ...	16.4.28
<i>Pakeha</i> ...	W. P. Clifton Mogg, Lt.-Commr., R.N.R.	H. C. Smith, G. Almond, G. Lindsay	M.L.	Furness Withy Elders & Fyffes Shaw, Savill & Albion	" 27.12.27 to 22.3.28...	24.1.28
<i>Panaras</i> ...	Peregrine D. ...	" ...	M.L.	" ...	Met. Log. 20.1.28 to 25.5.28 ...	1.6.28
<i>Parseora</i> ...	Evans, J. O. ...	J. Greenaway ...	No. A.	Booth ...	" ...	"
<i>Paris</i> ...	Cook, C. L. ...	Mr. Biles ...	C.C.	Hain S.S. Co. ...	Form 911 13.1.28 to 11.2.28 ...	10.4.28
<i>Patia</i> ...	Makepeace, S. ...	R. W. King ...	No. A.	Southern Rly. ...	Telegraphic Report. 31.7.27	31.7.27
<i>Peisander</i> ...	Slater, H. ...	H. E. Readslaw ...	" A.	Elders & Fyffes ...	Form 911 16.4.28 to 30.6.28 ...	3.7.28
<i>Pennland</i> ...	Doughty, G. ...	C. J. Murray, A. Lewis, J. Mackie.	No.	A. Holt... Red Star	" 2.6.28 to 12.6.28 ...	21.6.28
<i>Peshawur</i> ...	Wilding, H. G. ...	J. C. Mellonie, S. H. Baldwin, A. M. Tolfree.	M.L.	" ...	W.T. Reg. 6.5.28 to 22.6.28 ...	26.6.28
<i>Polycarp</i> ...	Jackson, T. H. ...	G. H. Clark ...	No. A.	P. & O. ...	Met. Log. 19.11.27 to 25.3.28...	11.4.28
					Form 911 31.3.28 to 21.5.28 ...	9.6.28

LIST OF VOLUNTARY OBSERVING SHIPS

vii

Name of Vessel.	Captain.	Observing Officers.	Official Meteorological Equipment.	Line.	Last Log. Register, or Report Contributed. Received up to 13.7.28.	Date Received.
<i>Port Adelaide</i> ...	Swan, L. H. ...	E. N. Rogerson, F. J. Lavers, L. H. Potter.	M.L.	Commonwealth & Dominion.	Met. Log. 3.2.28 to 18.6.28 ...	6.7.28
" <i>Albany</i> ...	Needham, R. ...	" " " " " " " "	"	" " " "	" 22.1.28 to 4.7.28 ...	11.7.28
" <i>Auckland</i> ...	Durham, R. S. ...	G. L. Hazlewood, C. F. Post, J. H. Sloan, H. E. Braine.	"	" " " "	" 10.9.27 to 25.1.28 ...	15.2.28
" <i>Bowen</i> ...	Hearn, G. W. ...	W. R. Johnston ...	No. A.	" " " "	Form 911 28.10.27 to 15.12.27 ...	6.1.28
" <i>Campbell</i> ...	Reynolds, P. J. ...	J. G. Thom ...	"	" " " "	" 6.1.28 to 13.5.28 ...	18.5.28
" <i>Caroline</i> ...	Hoad, A. C. ...	L. M. Bayly, R. Forrest, J. Stannard.	M.L.	" " " "	Met. Log. 4.12.27 to 31.3.28 ...	30.4.28
" <i>Darwin</i> ...	Sawbridge, I. R. ...	S. Hearn, E. M. Fenton, J. S. Moore.	"	" " " "	" 13.8.27 to 9.1.28 ...	13.1.28
" <i>Denison</i> ...	Ferris, J. ...	E. T. N. Lawrey, G. W. B. Lovegrove, P. J. Howe, L. W. Cady.	"	" " " "	" 23.7.27 to 25.2.28 ...	28.2.28
" <i>Dunedin</i> ...	Farmar, F. ...	E. G. Jones, H. M. Post, N. M. Muzzell.	"	" " " "	Met. Log. 5.11.27 to 1.3.28 ...	14.3.28
" <i>Fremantle</i> , M.V.	Kearney, F. J. ...	A. G. Rhind ...	No. A.	" " " "	Form 911 5.5.28 to 8.6.28 ...	15.6.28
" <i>Gisborne</i> , M.V.	Craven, R. ...	R. D. Elson ...	" A.	" " " "	" 28.1.28 to 23.5.28 ...	4.6.28
" <i>Hobart</i> ...	Hayter, S. W. ...	R. Carter, L. Copeland, G. G. Langford, C. L. Webb.	M.L.	" " " "	Met. Log. 1.1.28 to 28.4.28 ...	15.5.28
" <i>Hunter</i> ...	Cottell, S. C. ...	J. C. Goddard, A. McClounan, J. T. Weldin.	"	" " " "	" 7.1.28 to 11.5.28 ...	16.5.28
" <i>Huon</i> ...	Compton, J. ...	" " " " " " " "	No. A.	" " " "	Form 911 20.3.28 to 17.4.28 ...	24.4.28
" <i>Melbourne</i> ...	Hudson, J. J. ...	A. R. Martin, L. H. B. Bloye, W. E. Simpson.	M.L.	" " " "	Met. Log. 12.11.27 to 1.4.28 ...	10.4.28
" <i>Nicholson</i> ...	Jack, J. ...	J. G. Lewis, G. L. H. Dean, A. G. Newbury, W. B. Hopkins.	M.L.	" " " "	Met. Log. 17.9.27 to 17.1.28 ...	6.2.28
" <i>Pirie</i> ...	Kippins, T. ...	W. G. Jones, J. F. Martin, E. O. Round.	"	" " " "	" 12.10.27 to 27.3.28... ..	12.4.28
" <i>Sydney</i> ...	Higgs, W. G. ...	T. L. Kidwell, E. E. Roswell, K. D. Morgan.	"	" " " "	" 21.9.27 to 3.3.28 ...	8.3.28
" <i>Victor</i> ...	Williams, R. ...	R. Stannard, W. B. Craig, C. E. Midwinter.	"	" " " "	" 3.2.28 to 9.6.28 ...	27.6.28
" <i>Wellington</i> ...	Jones, C. ...	D. F. Morgan ...	No. A.	" " " "	Form 911 26.1.28 to 25.2.28 ...	21.3.28
<i>President Jackson</i> ...	Griffith, J. ...	J. A. Cartwright ...	" A.	Pacific Mail S.S. Co.	" 25.4.28 to 8.5.28 ...	10.7.28
<i>President Jefferson</i> ...	Nichols, F. R. ...	C. H. Moen, S. Hansson ...	" A.	Admiral Oriental Line	" 5.1.28 to 29.1.28 ...	20.2.28
<i>Protea</i> , H.M.S.A.S.	Dalglish, J. ...	A. C. Matson ...	M.L.	South African Naval Service.	" 1.2.28 to 10.5.28 ...	12.6.28
<i>Protesilaus</i> ...	Williams, T. G. ...	" " " " " " " "	"	A. Holt ...	Met. Log. 28.9.27 to 16.5.28 ...	21.6.28
<i>Pyrrhus</i> ...	Elford, W. J. ...	R. E. Wilks ...	No. A.	" " " "	Form 911 23.5.28 to 6.6.28 ...	27.6.28
<i>Quiloa</i> ...	Cave, S. ...	" " " " " " " "	No. M.	British India...	" " " " " " " "	"
<i>Ranpura</i> ...	King, A. M., D.S.C. ...	E. J. Spurling ...	No. M.	P. & O. ...	" 11.5.28 to 1.6.28 ...	26.6.28
<i>Rawalpindi</i> ...	Thornton, E. J. ...	A. G. Stansfield ...	" M.	" " " "	" " " " " " " "	"
<i>60 Regina</i> ...	Davies, E. ...	R. S. Walker, J. C. Boyce, R. Conway.	W.T.	White Star - Dominion	" 17.6.28 to 6.7.28 ...	12.7.28
<i>Reindeer</i> ...	Pitman, R. R. ...	" " " " " " " "	C.C.	G.W. Railway	W.T. Reg. 17.6.28 to 6.7.28 ...	10.7.28
<i>Remuera</i> ...	Cameron, J. J. ...	H. Horwood ...	No. A.	New Zealand S.S. Co.	Form 911 17.2.28 to 2.6.28 ...	23.2.28
<i>Rhexenor</i> ...	Stout, G. L. ...	A. Yarwood ...	" A.	A. Holt...	" 9.5.28 to 29.5.28 ...	9.6.28
<i>Rhodesian Transport</i> ...	Bullock, F. W. H. ...	F. D. Betts ...	" A.	Houlder Bros.	" 3.12.27 to 17.3.28 ...	3.7.28
<i>Rimutaka</i> ...	Hemming, F. A. ...	H. A. Fryer, M. A. D. Stewart, G. C. Saul, H. Vernon.	M.L.	New Zealand S.S. Co.	Met. Log. 11.11.27 to 15.3.28... ..	21.3.28
<i>Ripley Castle</i> ...	Morgan, A. O., R.D., Commr., R.N.R.	T. E. Wilford ...	No. A.	Union Castle ...	Form 911 2.3.28 to 4.5.28 ...	8.5.28
<i>Risaldar</i> ...	Matthews, E. G. ...	R. H. Friedlander ...	No. M.	Asiatic S.N. Co.	" 4.11.27 to 19.11.27... ..	12.12.27
<i>Rona</i> ...	Wallis, J. A. ...	W. G. Balharrie ...	No. M.	Colonial Sugar Refining Co.	" 8.2.28 to 21.3.28 ...	2.7.28
<i>Rother</i> ...	Woodhead, T. H. ...	S. Duckels ...	No. A.	Goole Steam Shipping	" 27.4.28 to 9.6.28 ...	14.6.28
<i>Rotorua</i> ...	Hunter, J. L. B. ...	E. Lawrence, L. Griffiths, T. M. Devitt.	M.L.	New Zealand S.S. Co.	Met. Log. 21.1.28 to 8.5.28 ...	23.5.28
<i>Royal Transport</i> ...	Oliver, R. C. ...	R. Hughes ...	No. A.	Houlder Bros.	Form 911 14.3.28 to 30.5.28 ...	15.6.28
<i>Ruapehu</i> ...	McKellar, A. W., R.D., Capt., R.N.R.	A. Landles, D. M. Lambert, W. J. Newton.	M.L.	New Zealand S.S. Co.	Met. Log. 19.1.28 to 14.5.28 ...	23.5.28
<i>St. Albans</i> ...	Smith, G. L., Commr., R.A.N.R.	W. McIntyre, J. Kavanagh, R. L. Harry, B. W. Dun.	"	Eastern and Australian.	" 30.9.27 to 16.2.28 ...	7.5.28
<i>St. Helier</i> ...	" " " " " " " "	" " " " " " " "	"	G.W. Railway	Telegraphic Report 11.7.28 ...	11.7.28
<i>St. Julien</i> ...	Richardson, L. ...	C. W. Sanders ...	C.O.	" " " "	" 12.7.28 ...	12.7.28
<i>St. Andrew</i> ...	Bearpark, E. W. ...	E. E. Moodie ...	No. A.	Rankin Gilmour	Form 911 21.3.28 to 20.5.28 ...	9.6.28
<i>38 Samaria</i> ...	Malin, R. G., Lieut.-Commr., R.N.R.	C. S. Williams, W. B. Tanner, D. E. Sibson.	W.T.	Cunard ...	" 3.6.28 to 23.6.28 ...	28.6.28
<i>Sardinian Prince</i> ...	Brown, J. F. ...	W. O. Young ...	No. A.	Prince ...	W.T. Reg. 4.6.28 to 23.6.28 ...	27.6.28
<i>Sacon</i> ...	Gardner, G. F., O.B.E.	R. May ...	" A.	Union-Castle ...	Form 911 13.5.28 to 13.6.28 ...	30.6.28
<i>Scholar</i> ...	Whyte, D. L. ...	" " " " " " " "	" A.	" " " "	" 25.5.28 to 11.6.28 ...	2.7.28
<i>Scotia</i> ...	Prichard, S. D., M.B.E.	W. T. Griffith ...	C.O.	L.M. & S. Railway	" 11.4.28 to 27.5.28 ...	30.5.28
<i>33 Scythia</i> ...	Prothero, W. ...	R. Sell, G. H. Morris, J. G. Bradley.	W.T.	Cunard ...	Telegraphic Report 7.7.28 ...	7.7.28
<i>Sheaf Mount</i> ...	Whitfield, G. A., O.B.E.	" " " " " " " "	No. A.	W. A. Souter ...	W.T. Reg. 11.6.28 to 1.7.28 ...	5.7.28
<i>Sheaf Spear</i> ...	" " " " " " " "	" " " " " " " "	"	" " " "	Form 911 10.6.28 to 2.7.28 ...	12.7.28
<i>Shropshire</i> , M.V. ...	Adamson, B. W. ...	S. J. Dring, T. B. Fishley, W. L. Whiteside, R. Cumming, W. H. Brittain, L. McDermott.	M.L.	Bibby ...	" 22.4.28 to 24.5.28 ...	29.5.28
<i>Socrates</i> ...	Taylor, F. C. ...	W. E. Jordan ...	No. A.	Lampart & Holt ...	Met. Log. 4.2.27 to 25.7.27 ...	17.9.27
<i>Somerset</i> ...	Howell Price, J. ...	W. Redwood ...	"	" " " "	" 6.4.28 to 16.6.28 ...	21.6.28
<i>Spero</i> ...	Montgomery, H. ...	H. W. Vickers ...	M.L.	Federal... ..	Form 911 1.10.27 to 21.12.27... ..	27.1.28
<i>Statesman</i> ...	Mowat, J. G. ...	R. Letten ...	No. M.	Ellerman Wilson ...	" 17.5.28 to 26.6.28 ...	30.6.28
<i>Stephen</i> ...	Evans, L. G. ...	R. Lugg ...	No. A.	Harrison ...	Met. Log. 6.1.28 to 1.7.28 ...	6.7.28
<i>Stockwell</i> ...	Smith, W. ...	" " " " " " " "	" A.	Booth ...	Form 911 3.3.28 to 22.6.28 ...	13.7.28
<i>Surrey</i> ...	Lamb, C. B. ...	S. C. Bradley ...	" A.	Brocklebank ...	" 1.3.28 to 19.4.28 ...	24.4.28
<i>Suva Maru</i> ...	Gotoh, M. ...	" " " " " " " "	" A.	Federal... ..	" 20.5.28 to 31.5.28 ...	27.6.28
<i>Sylviafield</i> , M.V. ...	Biddick, E. ...	A. M. Tully ...	" A.	Hunting & Son ...	" 26.1.28 to 3.3.28 ...	12.3.28
<i>Tainui</i> ...	Elford, H. C. ...	L. J. Hopkins ...	" A.	Shaw, Savill & Albion	" 29.4.28 to 27.5.28 ...	4.6.28
<i>Tahiti</i> ...	Aldwell, B. M. ...	C. R. Carlyon ...	" A.	" " " "	" 10.5.28 to 12.6.28 ...	19.6.28
<i>Tai ping</i> ...	Martin, W. ...	F. Stratford, A. C. Kennedy, R. Bargent.	M.L.	Yuill & Co. ...	" 27.4.28 to 2.6.28 ...	10.7.28
<i>Takada</i> ...	Baird, S. K. ...	" " " " " " " "	No. M.	" " " "	" 21.3.28 to 11.5.28 ...	30.5.28
<i>Taihybius</i> ...	Wilson, R. J. ...	" " " " " " " "	" A.	" " " "	Met. Log. 15.11.27 to 9.4.28 ...	23.6.28
<i>Tamara</i> ...	Hartman, W. H. ...	F. W. Lutyens ...	" M.	" " " "	" " " " " " " "	"

Name of Vessel.	Captain.	Observing Officers.	Official Meteorological Equipment.	Line.	Last Log, Register, or Report Contributed. Received up to 13.7.28.	Date Received.
Tania	Pilcher, E. T., Lieut.-Commr., R.N.R.	G. C. Smith, H. Munday, J. W. Kavanagh, R. Millington.	M.L.	E. & A. S.S. Co. ...	Met. Log. 2.9.27 to 31.1.28	3.4.28
Taranaki	Kershaw, W. A. R. ...	... ..	No. A.	Shaw, Savill & Albion Anchor	Form 911 10.3.28 to 5.4.28	14.4.28
Tarantia	Munro, D. ...	... ..	" A.	A. Holt & Co.	" 2.3.28 to 2.5.28	29.5.28
Teiresias	Wilkinson, W. H. ...	... ..	" M.	New Zealand S.S. Co.	" 12.5.28 to 26.5.28	15.6.28
Tekoa	Barnett, H. ...	T. K. MacDonald	" A.	A. Holt	" 20.2.28 to 14.3.28	2.4.28
Telamon	Willcox, J. H. ...	F. A. Brown	" A.	Elders & Fyffes	" 5.5.28 to 9.6.28	14.6.28
Tetela	Brice, E. H. ...	E. Swale	" A.	A. Holt	" 21.3.28 to 4.4.28	10.5.28
Teucer	Dodds, R. ...	J. M. Kirk	" M.	Aberdeen	" 4.2.28 to 22.2.28	16.4.28
Themistocles	Young, A. D. ...	H. C. Howe	" A.	A. Holt	" 8.6.28 to 23.6.28	10.7.28
Theseus	Jones, E. ...	W. A. Fyffe	M.L.	"	Met. Log. 17.9.27 to 6.1.28	18.1.28
Titan	Power, J. ...	D. Hey, D. MacTavish, G. W. Best, C. F. Bailey.	"	New Zealand S.S. Co. ...	Form 911 4.3.28 to 27.6.28	2.7.28
Tongariro	Burton Davies, J. ...	E. A. Burton, A. E. Williams, E. A. Quick, D. Baldwin.	No. A	Anchor	" 9.6.28 to 1.7.28	10.7.28
Transylvania	Bone, D. W. ...	P. Middleton	" M.	T. & J. Harrison	" 3.12.27 to 29.2.28	5.3.28
Traveller	Worthington, B. ...	E. L. Stockley	" A.	Hain S.S. Co.	" 9.3.28 to 31.3.28	28.4.28
Trefusis	Cordy, C. ...	R. H. Silley	M.L.	Hain S.S. Co.	Met. Log. 25.1.28 to 5.5.28	11.5.28
Trematon	Evans, B. ...	J. Jenkyn, C. Warren, R. Kitson.	No. M.	New Zealand S.S. Co. ...	Form 911 3.4.28 to 23.4.28	12.6.28
Turakina	Hamilton, E. S. ...	J. D. B. Fisher	W.T.	Anchor	W.T. Reg. 4.6.28 to 23.6.28	28.6.28
Il Tuscania	Rome, W. ...	... ..	"	Form 911 3.6.28 to 24.6.28	28.6.28	
Tyndareus	Christie, W. ...	A. F. Barclay, T. R. Phillips, F. H. Gray.	M.L.	A. Holt	Met. Log. 29.11.27 to 23.4.28	1.6.28
Ulimaroa	Wylie, W. J. ...	A. N. Robertson	No. M.	Huddart Parker, Ltd. ...	Form 911 3.2.28 to 27.2.28	11.4.28
Ulysses	Owen, R. D., O.B.E. ...	W. E. Ford	" A.	A. Holt	" 20.5.28 to 8.6.28	19.6.28
Umvolsi	Barnes, E. W. ...	R. Dyns	" A.	Bullard King	" 17.5.28 to 7.6.28	2.7.28
Valacia	Inch, F. ...	... ..	" M.	Cunard	" 26.3.28 to 13.5.28	17.5.28
Vardulia	Gronow, S. ...	W. H. Barker	" A.	"	" 22.3.28 to 19.5.28	4.6.28
Vigilant	Simpson, E. S. S. ...	J. Hunter	" A.	Scottish Fishery Board.	" 4.5.28 to 30.5.28	4.6.28
Waiotapu	Todd, D. ...	A. J. McKenzie	" M.	Canadian - Australasian.	" 9.2.28 to 9.4.28	28.4.28
Wairuna	Ryan, J. ...	J. E. Broughton, R. Tulloch, J. Ritchie.	M.L.	Union S.S. Co. of N.Z.	Met. Log. 14.10.27 to 20.1.28... ..	20.3.28
Walmer Castle	Lang, T. W. ...	A. E. Denn	No. A.	Union Castle	Form 911 30.9.27 to 20.11.27... ..	22.11.27
Wangaratta	Stuart, C. B. ...	Scutt, W. ...	M.L.	British India	Met. Log. 2.10.27 to 29.2.28	2.3.28
Warfield	Steel, R. ...	T. W. Wordingham, S. R. Millard, A. G. Brooks, M. Harvey.	No. A.	... ..	Form 911 2.3.28 to 9.3.28	26.3.28
War Nizam	Moncrieff, T. ...	F. J. Marshall	" M.	British Tankers	" 5.5.28 to 11.6.28	26.6.28
Westmoreland	Gardner, H. W. ...	G. A. Shepherd, K. S. Phillips, R. L. Warren.	M.L.	Federal... ..	Met. Log. 22.1.28 to 2.6.28	7.6.28
William Scoresby, R.S.S.	De la Motte, J. B. B., Lieut., R.N.	... ..	"	Falkland Islands Government.	... ..	...
Windsor Castle	Chave, Sir B., K.B.E.	A. J. Tweddell, J. Montgomery, P. G. McIver, A. G. Bedwell.	"	Union Castle	" 15.10.27 to 5.2.28	15.2.28
Winifredian	Harrocks W. ...	A. Crone	No. M.	Leyland	Form 911 30.10.27 to 22.12.27	6.1.28
Wonganella	Williamson, A. D. ...	G. F. Phillips	"	W. Crossby & Sons	" 17.3.28 to 10.4.28	21.5.28
Woodarra	Reilly, J. V. ...	H. Goater, L. J. C. Simpson, G. F. Alexander J. McPhail.	M.L.	British India... ..	Met. Log. 1.1.28 to 25.5.28	1.6.28
Zent	Roberts, H. ...	J. B. Wookey	No. A.	Elders & Fyffes	Form 911 28.4.28 to 3.6.28	9.6.28
Conway, H.M.S	Richardson, F. A., D.S.C., Commr., R.N.	The Senior Cadets	Cadets' M.L.	... ..	Cadets' Met. Log. 22.1.28 to 31.3.28	11.4.28
Pangbourne Nautical College	Tracy, A. F. G., Commr., R.N.	" " ... ..	"	... ..	Cadets' Met. Log. 18.1.28 to 27.3.28	13.4.28
Worcester, H.M.S.	Sayer, M.B., C.B.E., A.D.C., R.D., Capt., R.N.R.	" ... ..	"	... ..	Cadets' Met. Log. 20.1.28 to 11.4.28	16.4.28
Abaco ... ..	... ..	The Keepers'	Lighthouse Register.	... ..	Lighthouse Register 1.7.26 to 20.10.26	20.4.27
Cay Lobos ... ..	... ..	" ... ..	"	... ..	Lighthouse Register 1.1.27 to 11.7.27	29.9.27
Double Headed Shot ... ..	... ..	" ... ..	"	... ..	Lighthouse Register 4.9.27 to 29.2.28	24.4.28
Inagua ... ..	... ..	" ... ..	"	... ..	Lighthouse Register 4.7.27 to 13.1.28	24.4.28
Sombrero ... ..	... ..	" ... ..	"	... ..	Lighthouse Register 1.7.27 to 31.12.27	7.2.28
Watling Island ... ..	... ..	" ... ..	"	... ..	Lighthouse Register 21.7.27 to 31.12.27	24.4.28
Cape Pembroke (Falkland Is.).	... ..	" ... ..	"	... ..	Lighthouse Register 1.7.27 to 31.12.27	21.2.28

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

Name of Vessel.	Captain.	Observing Officer.	Line.	Last Case of Water Samples, Reports, etc., received up to 30.6.28.	Date Received.
<i>Dakottan</i> ...	Robb, J. ...	...	Leyland	Water Samples ...	30.6.28
<i>Darro</i> ...	Matthews, G. P. ...	A. F. Walker ...	R.M.S.P. Co. ...	" " ...	4.5.28
<i>Descado</i> ...	Hannon, F. S. ...	J. N. Duncan ...	" ...	" " ...	17.5.28
<i>Hildebrand</i> ...	...	A. G. Malcolm ...	Booth ...	" " ...	2.5.28
<i>Oranian</i> ...	Hoskins, W. ...	...	Leyland	" " ...	4.6.28

September, M.O., 1928.

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

MARINE METEOROLOGY, ATLASES, BOOKS AND MEMOIRS.

CHARTS:—

ATLANTIC:—

Monthly Current Charts for the Atlantic Ocean, from information collated and prepared in the Meteorological Office. (No. 132, 1897) ($22\frac{1}{2} \times 18$ in.) (Published by the Admiralty.)

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

ATLANTIC (NORTH):—

Meteorological Charts of the North Atlantic for each month of the year, giving normals of Pressure, Air and Sea Surface Temperature and Ocean Currents, with Frequencies of Winds, also Ice Limits. (No. 149A, 1923) 1s. each ($35 \times 22\frac{1}{2}$ in.). Sold by J. D. Potter, 145, Minories, E.1.

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

Charts of Meteorological Data for Square 3, Lat. 0° - 10° N., Long. 20° - 30° W. ($20 \times 13\frac{1}{2}$ in.) and Remarks to accompany the Monthly Charts, which show the Best Routes across the Equator for each Month, &c. ($17 \times 16\frac{1}{2}$ in.) (No. 20, 1874). 20s.

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

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