

VOL. IX. No. 103.

THE MARINE OBSERVER.

JULY, 1932.

TABLE OF PRINCIPAL CONTENTS.

	PAGE.		PAGE.
A Year of Special World Wide Meteorological Observation...	127	Wireless Stations Detailed to intercept Routine Coded	
The Marine Observer's Log (with illustrations)	128	Weather Reports from "B Selected Ships"	139
Notes on the History and Development of the Law of Storms.		China and Japan	141
Part III.—From the middle of the nineteenth century up		Lithographic illustrations after page 144 :—	
to the present day	132	Chart VIII.—Ships' Wireless Weather Signals.	
Hurricanes of the West Indies and North Atlantic	134	Wind for the region adjacent to S.W. approaches to Great	
Weather Signals :—		Britain—July.	
Wireless Stations Detailed to receive Routine Coded		Wind, Fog, Mist and Weather for the region N.E. and S.W. of	
Weather Reports from "A Selected Ships"	137	Panama Canal—July.	

A YEAR OF SPECIAL WORLD WIDE METEOROLOGICAL OBSERVATION.

From August 1st, 1882, to August 31st, 1883, following a proposal made by Lieutenant WEYPRECHT of Austria, that expeditions should be sent to the polar regions simultaneously to take meteorological and magnetic observations—Captain HENRY TOYNBEE made special arrangements for weather observations to be recorded by British ships in the North Atlantic. With the observations thus collected he had made daily synchronous weather charts of a large portion of the Northern Hemisphere which did much to reveal the distribution of weather over the North Atlantic, furthered weather forecasting in this country, and assisted in the execution of the International work now called the First International Polar Year.

Meteorologists are to make a special study of observations recorded between August 1st next and August 31st, 1933.

Expeditions are being sent by different nations to the polar regions to observe the atmospheric conditions, Terrestrial Magnetism, Aurora and Atmospheric Electricity—the British expedition being stationed as in the First Polar Year, at Fort Rae on the shore of the Great Slave Lake in Northern Canada. The state of organization and world wide distribution of the British Voluntary Observing fleet renders unnecessary special arrangements entailing much additional work, such as Captain TOYNBEE had to make in 1882-83, for "Selected Ships" are recording daily on all the trade routes in all oceans synchronized observations.

During the thirteen months August 1st, 1932 to August 31st, 1933, there will be a further use for these observations, which are always of value to aid navigation and the general purposes of meteorology.

They will help in this special study of the atmosphere during the Second Polar Year.

British Observing Ships are not asked to make more routine observations, they are asked to make the usual routine observations *well*, and "Selected Ships" can best assist by taking particular care in entering the observations on Form 911 and coding and entering them with great care, in their Registers, Form 138. By this means the observations may be readily made available for International co-operation. These registers containing the observations coded can be forwarded to the International Organization, while the original observations are preserved in the Marine Division on Form 911.

All British Observing Ships are asked to take special care in observing and recording as additional remarks—Unusual Atmospheric Conditions, Unusual and High Clouds with direction of movement, Unusual Sky Colouring, particularly at sunrise and sunset, anything unusual in the Magnetic Compass, Aurora, Northern or Southern Lights, Electric Storms, St. Elmos Fires, Abnormal Atmospherics.

These additional remarks should be written in a form suitable for publication in the Marine Observers' Log of this journal.

MARINE SUPERINTENDENT.

London.

April 15th, 1932.

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.

PAMPERO.

South Atlantic.

THE following is an extract from the Meteorological Record of S.S. *Navasota*, Captain A. G. MILES, Santos to Buenos Aires, observers Messrs. F. G. DAWSON and J. E. PARDOE MATTHEWS.

"23rd July, 1931, 9 p.m. Wind E.N.E., force 2, partly overcast—clouds moving from West. Low nimbus ahead from S.E. to N.W. with vivid lightning. 9.10 p.m., wind dropped suddenly and after about two minutes a series of quick gusts were experienced from S.S.W. force 7, and lasting about half a minute with one minute intervals. After five of these the wind died away for about three minutes by which time the lightning had become so vivid that it was possible to see the approaching squall whipping up the sea surface. When the squall struck the ship it appeared to reach force 10 in a few seconds accompanied by torrential rain and sheet and forked lightning from every point.

At 9.30 the wind dropped suddenly and moderate rain continued until 10 p.m. when rain ceased. Wind fell light E.N.E., and the clouds were observed moving from West as prior to the squall. Barometer 29.80 in. Temperature 64° F.

At 6.15 p.m. a similar series of gusts was experienced force 6-7 with rain—other characteristics being the same as those experienced at 9.30.

By 6 a.m. on July 24th, the wind had become S.S.W. 4, and the temperature had fallen to 50° F.

Ship's position, Latitude 31° 30' S., Longitude 50° 25' W."

SANDSTORM.

Mediterranean Sea.

THE following is an extract from the Meteorological Record of S.S. *Clan MacNair*, Captain W. G. HOLMAN, Birkenhead to Port Said. Observer Mr. F. H. PETHERIDGE, 2nd officer.

July 23rd, 1931, 1400 G.M.T. Heavy sandstorm observed forming over the land in the vicinity of Cape Ivi. Heavy sand clouds passed over ship from S.W. to N.E. causing total obscuration of sky and reducing the visibility to a great extent. Cloud then spread round to the S.E. and remained there.

1600 G.M.T.; Barometer 1014 mb. Heavy sand cloud right over sky. Wind N.E., force 5.

1700 G.M.T.; Position, Latitude 36° 40' N., Longitude 0° 42' E. Course 081° speed 11.5 knots. Wind N.E., 5, Swell N.E., 5, Visibility 6. Vessel passing through atmospheric disturbance. Atmosphere still heavily laden with sand. Disturbance took form of cyclonic nature, sea moderate to smooth but, in places, whipped up in a circular formation with spray rising from the water, in other places, not far distant, say half a mile, there appeared to be a flat calm.

Over the land, which was not visible, small fracto-cumulus clouds quickly formed and appeared to be forced upwards in a quick irregular right-handed motion, similar to steam from a funnel. These clouds grew to a fair size, then drifted away and just as quickly disappeared.

1710 G.M.T.; Ship appeared to pass through the centre of the disturbance as the wind suddenly increased to force 6 and then suddenly ceased altogether. Barometer 1009.7 mb.

1715 G.M.T.; Wind now came away from the S.E. force 4 and in squalls up to force 6, gradually easing to a steady force 4 from the E.S.E. 1730 G.M.T., Barometer 1011.0 mb.

At conclusion ship was covered on the forward side of all her fittings—masts, funnel stays, etc., with a fine layer of sand, the after sides being absolutely clear of any deposit.

THICK FOG AND LOW TEMPERATURE OF SEA WHILST CROSSING EQUATOR.

Atlantic Ocean.

THE following is an extract from the Meteorological Record of M.V. *Carnarvon Castle*, Captain W. MORTON BETTS, Cape Town to Southampton; Observer Mr. H. A. SHAW, 1st officer.

July 31st, 1931, 4.00 a.m. A.T.S. Calm, sea glassy, heavy dew, sky completely covered with masses of low-lying stratus and cumulus. Temperature Air 71°, Sea 71°. At about 6.00 a.m. sky rapidly cleared of clouds, although still dead calm. At 6.20 A.T.S. in Latitude 0° 18' S., Longitude 9° 18' W., a thick mist set in; a cold light air coming from Northward and temperature of sea falling to 69°. For two hours vessel was passing through dense white fog, the weather clearing at 8.30 a.m. and sea water rising to 74°. Current experienced between Latitude 4° S. and 1° N. } 326°

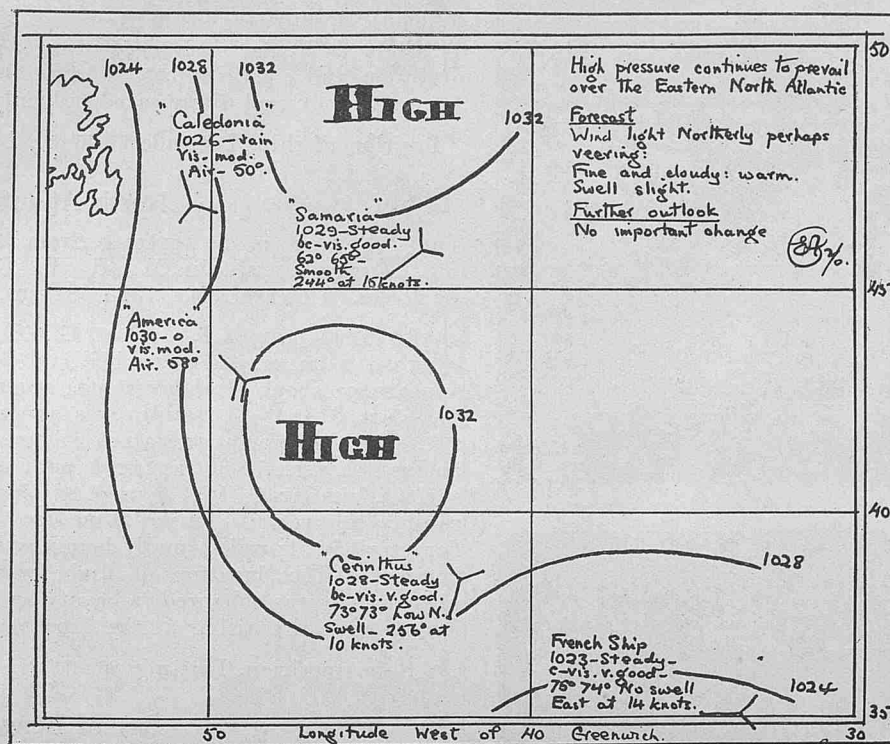
Longitude 6° W. and 10° W. } 18 miles.

Mid North Atlantic.

SS. "Cerinthus"

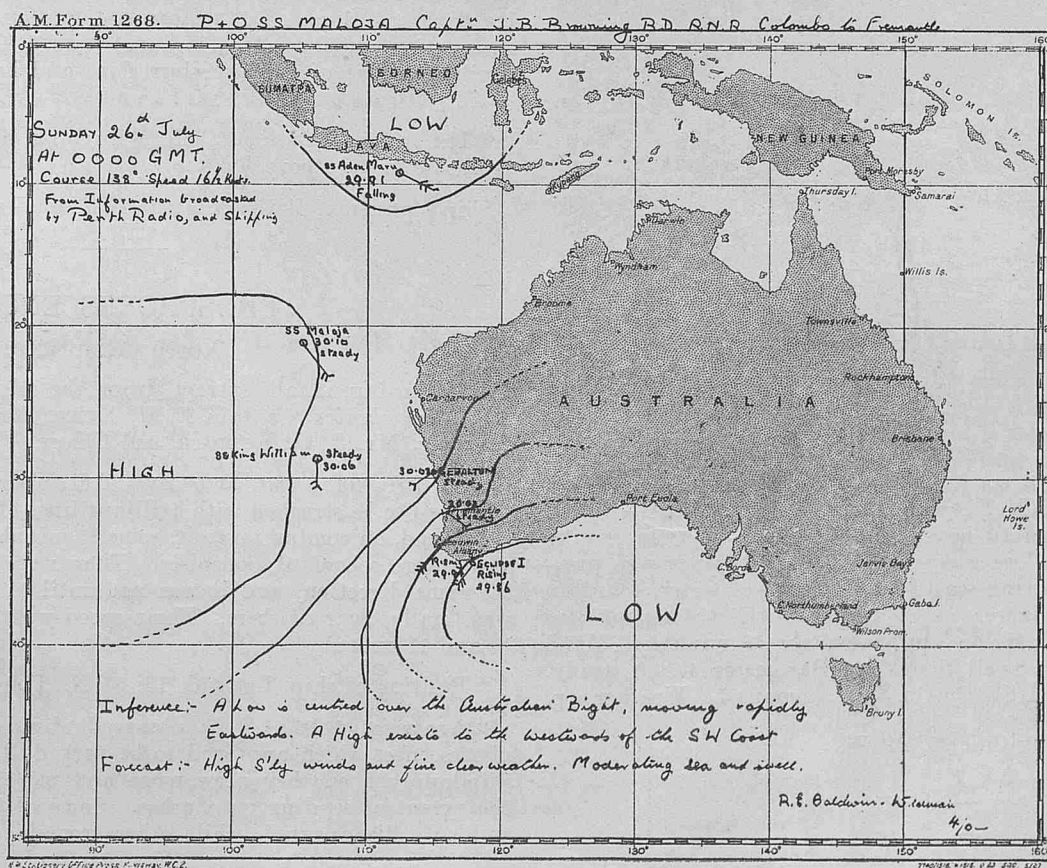
Havre to Port Arthur.

1200 GMT July 9th 1931



Inspected: N. Namoy
Master

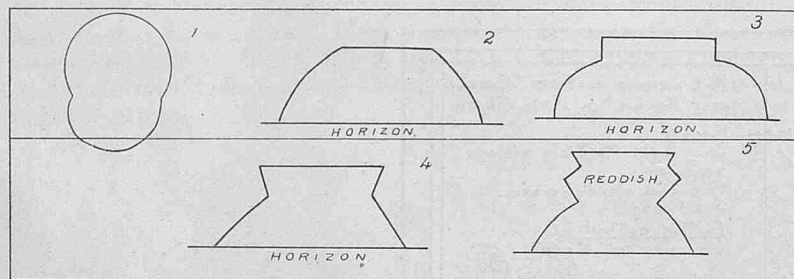
Weather Chart made at sea on board S.S. *Maloja*, Captain J. B. BROWNING, R.D., R.N.R., Colombo to Fremantle, by
Mr. R. E. BALDWIN-WISEMAN, 4th Officer.



REFRACTION.

North Atlantic.

THE following is an extract from the Meteorological Log of S.S. *Aeneas*, Captain W. K. WALLACE, Birkenhead to Penang, via Suez. Observer Mr. H. D. RUDD, 3rd officer.



July 21st, 1931, at 2000 G.M.T.

Wind N.N.E. force 5. Dry bulb, temperature 66° F. Wet bulb 63° F., temperature Sea 64° F. Cloudless sky, fine and clear, with greyish tint in sky near horizon, observed abnormal sunset. The total time of phenomenon was about 2½ mins.

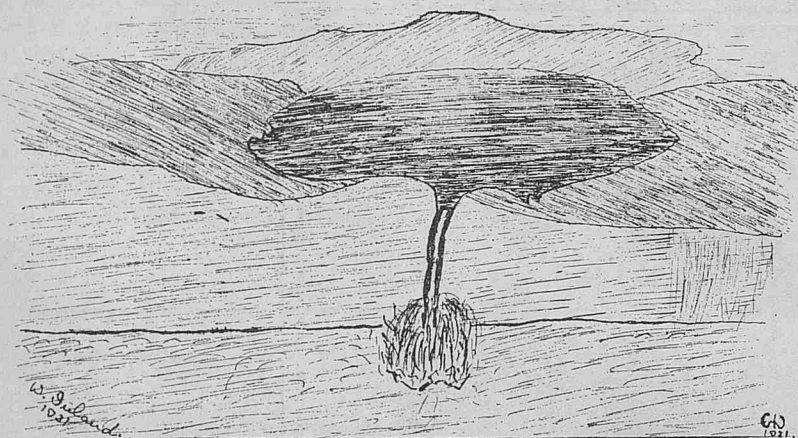
At 2010 G.M.T. the wind veered to East, then to S.E., decreasing to force 2.

Position of ship, Latitude 32° 57' N., Longitude 9° 30' W.

WATERSPOUT.

Caribbean Sea.

THE following is an extract from the Meteorological Log of S.S. *Camito*, Captain W. T. FORRESTER, O.B.E., Avonmouth to Kingston, West Indies. Observer, Mr. W. IRELAND.



July 5th, 1931, 1625 G.M.T., waterspout observed bearing 180°, distant 3 miles, connected to heavy nimbus cloud by twin spouts, resembling steam pipes, close to each other. Waterspout was practically stationary and meeting sea in huge column of water, fountain shape, which gradually increased in height until waterspout was completely dispersed. Duration approximately 12 minutes. Wind South 3. Sea South 2. Swell South 1. Barometer 1016.9 steady. Air 81°, Sea 82°, Clouds A-St. Cu.Cu.NB. Amount 7. Weather c.p.

Latitude 22° 59' N., Longitude 69° 01' W.

METEORS.

South Pacific.

THE following is an extract from the Meteorological Log of M.V. *Rangitane*, Captain A. W. McKELLAR, Balboa to Auckland, N.Z. Observer, Mr. A. BROWN.

July 19th, 1931, 11.40 p.m., observed small meteor about 10° N. and 10° W. of Arcturus. Very pink and of about 4th magnitude. Fell in a slight curve to the Eastward, after falling about 5° became as bright as Venus but a deep orange, passed behind a small layer of St-Cu and emerged just as bright but a bright pale blue; fell for another 10° and disappeared suddenly leaving no trail.

Position of ship, Latitude 2° 46' S., Longitude 91° 28' W.

North Atlantic.

THE following is an extract from the Meteorological Log of S.S. *Paneras*, Captain W. H. B. REYNOLDS, Pará, Brazil to Barbados. Observer, Mr. L. A. SAYERS, 3rd Officer.

"At 08.30 p.m. A.T.S. (0057 G.M.T. 13th) on July 12th, 1931, observed a meteor of very brilliant luminosity, which made its appearance about 5° of horizontal angular distance to the West of the stars β and γ Ursæ Majoris at an altitude of approximately 29°. The head was a pale green colour of dazzling intensity, illuminating the vessel and casting a path of greenish light on the sea surface, similar to that caused by the setting moon. Travelling rapidly towards the constellation Leo in the western sky, it left a fiery trail in its wake, finally being extinguished when 13° from the horizon. The duration of flight was about 4 seconds and the phenomenon was enhanced in beauty by the 'dark night with a clear atmosphere' prevailing at the time.

"Ship's position, Latitude 26° 09' N., Longitude 65° 35' W."

Bay of Bengal.

THE following is an extract from the Meteorological Record of S.S. *Balranald*, Captain C. E. SHORT, Colombo to Fremantle. Observer, Mr. J. A. STEWART, 4th Officer.

"On July 1st, at 1200 G.M.T., a meteor was observed at a very low altitude travelling in a northerly direction. Owing to the bridge obscuring the view, it was first observed when overhead and appeared exactly as an incendiary star thrown from a signal rocket. Its flight continued for approximately four seconds after time of observation, during which it burnt with a vivid bluish-white flame, similar to that of a magnesium flare and had a short faint yellow 'tail.'

"The meteor burnt out before reaching the sea. It passed from overhead to 30° above horizon."

Ship's position, Latitude 9° 20' N., Longitude 93° 08' E.

PHOSPHORESCENCE.

North Atlantic.

THE following is an extract from the Meteorological Record of S.S. *Berwickshire*, Captain E. H. EVENS, Manchester to Algoa Bay. Observer, Mr. J. O. WOODALL, 2nd Officer.

"On July 10th, 1931, at 00.20 A.T.S., observed that the sea ahead appeared to be streaked with brilliant lines of phosphorescence, which was found, on coming up to it, some 15 minutes later, to be the tracks of a large school of porpoises. They were apparently heading in the same direction, and it was not until 01.00 A.T.S. that the ship was finally clear of them. Their speed was estimated to be between 10 and 11 knots.

"Position of ship, Latitude 12° 56' N., Longitude 17° 39' W.

"Again at 02.00 A.T.S., observed ahead large patches of phosphorescence, which appeared to be very dull and lifeless, but as the ship approached they grew more and more brilliant, sometimes to the extent of sending out flashes. Some of these, on coming abeam, suddenly disappeared, while others remained sparkling until about

half a mile astern, when they once again became dull patches. This continued until 03.10 A.T.S. The weather at the time was Wind S., Sea 0, Swell S.1. Clouds Cu. and Cu.Nb. Sky 8/10ths covered.

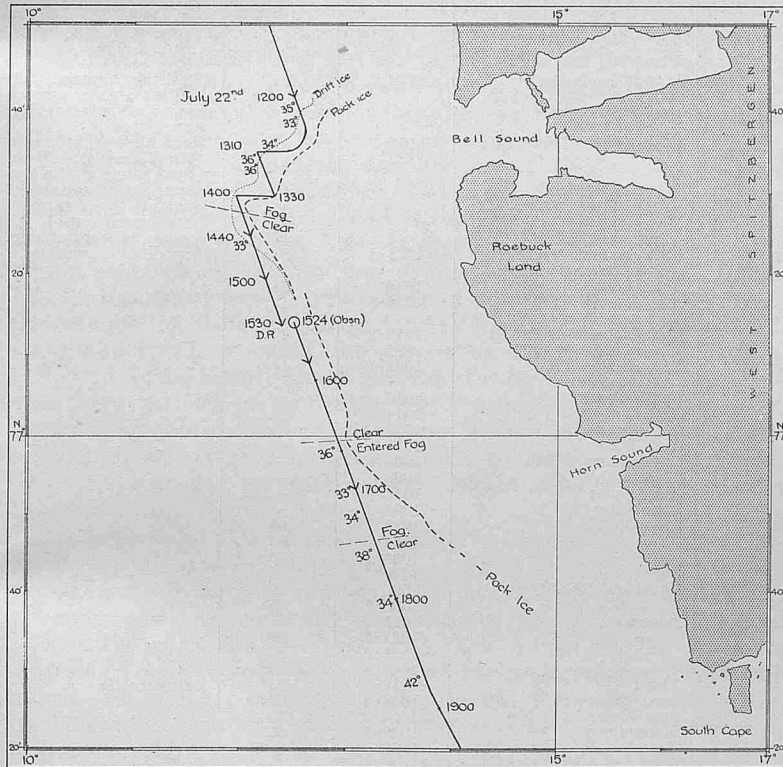
"Position of ship, Latitude 12° 35' N., Longitude 17° 37' W."

ICE OFF SPITZBERGEN.

The accompanying photographs were received with the Meteorological Record of S.S. *Arandora Star*, Captain E. W. MOULTON, cruising from Immingham to Iceland and Spitzbergen, observer Mr. H. PARTRIDGE, 3rd Officer.

July 22nd, 1931, 1000 G.M.T., Latitude 78° 05' N., Longitude 11° 54' E., set course for North Cape.

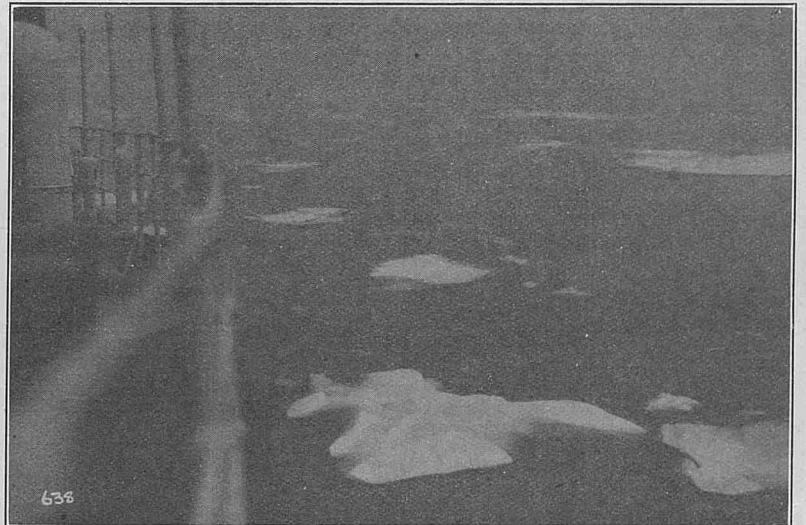
1330 G.M.T., in Latitude 77° 29' N., Longitude 12° 28' E., encountered heavy pack ice.



Track chart of S.S. *Arandora Star* indicating position of pack ice, etc., on July 22nd, 1931.

Scattered bergs and pieces of drift ice were frequently sighted in all directions, but mostly towards the coast of Spitzbergen and as far south as Latitude 76° N.

The photographs were taken at 1415 G.M.T. The chart indicates track of ship, position of pack, fog areas, sea temperatures, etc.



THE SPECIFIC GRAVITY OF THE WATER IN LOADING PORTS IN DIFFERENT PARTS OF THE WORLD.

In November, 1929, we appealed to Marine Observers for Hydro-meter readings when in port, with a view to providing information to all concerned of specific gravity for the purpose of calculating the change of draught upon a ship passing from her loading berth to the open sea in all parts of the world.

A number of regular observing ships have made and returned observations of specific gravity in a number of ports abroad. A number of these observations were published in the January and July, 1931, and January, 1932, *MARINE OBSERVERS*, and a further series of observations are published below.

Port.	Berth.	Observing Ship.	Date and Time of observation.	State of Tide.	Specific Gravity.	Temp. of Sea.	Remarks.
London	Tilbury Dock	<i>Orsova</i>	—	—	1017.0	67°	
	Tilbury Dock	<i>Clan Macindoe</i>	3rd July, 1931—3 p.m.	—	1010.0	—	
	South West India Dock.	<i>Clan Macindoe</i>	14th November, 1931—2 p.m.	—	1000	—	
Swansea	Dock	<i>Clan Macindoe</i>	25th June, 1931—Noon	—	1020	—	
Glasgow	Queens Dock	<i>Clan Macindoe</i>	20th June, 1931—11 a.m.	—	1010	—	
Dundee	—	<i>Clan Macindoe</i>	28th October, 1931—8 p.m.	—	1015	—	
Middlesborough	Railway Dock	<i>Clan Macindoe</i>	7th November, 1931—11 a.m.	—	1020	—	
Hamburg	Roochhoff	<i>Clan Macindoe</i>	24th October, 1931—4 a.m.	—	1005	—	
Toulon	Harbour	<i>Orsova</i>	—	—	1030	62°	
Malta	Valetta Harbour	<i>Bendigo</i>	7th February, 1932—6 p.m.	—	1029	61°	Mean of 3 observations.
Cochin	Inner Harbour	<i>Clan Macindoe</i>	1st August, 1931—10 a.m.	—	1015	—	
Chittagong	Railway Jetty	<i>Clan Macindoe</i>	5th September, 1931—11 a.m.	—	1000	—	
	No. 3 Berth	<i>Clan Macnaughton</i>	20th July, 1931	Four hours Flood	1000	—	Almost continuous heavy rain
Port Louis, Mauritius	Anchorage	<i>Dromore Castle</i>	18th September, 1931—3 p.m.	High Water	1025	72°	
Walvis Bay	Anchorage	<i>Dromore Castle</i>	21st August, 1931—9.30 a.m.	High Water	1026	57°	

Port.	Berth.	Observing Ship.	Date and Time of observation.	State of Tide.	Specific Gravity.	Temp. of Sea.	Remarks.
Manila	Anchorage	<i>Clan Macnaughton</i>	13th August, 1931—Noon	Half Ebb	1015	—	Torrential rain (over 12 in. in last 24 hours).
	West Breakwater Light House 74° 6 cables.	" "	14th August, 1931—Noon	Half Ebb	1023	—	Mod. rain with frequent torrential showers.
		" "	15th August, 1931—Noon	1½ hrs. after High Water	1005	—	Light showers at intervals.
		" "	16th August, 1931—Noon	½ hour after High Water	1012	—	Light showers at intervals.
		" "	17th August, 1931—Noon	High water	1000·5	—	
		" "	18th August, 1931—Noon	1 hour before High water	1000·5	—	
		" "	19th August, 1931—4 p.m.	¾ Flood	1001	—	Heavy rain at times. According to local knowledge, the water in the harbour is freshest when the wind is from S.W. or W. The river Pasig at the time of observation was in flood owing to torrential rains.
Cebu	No. 3 Quay	<i>Clan Macnaughton</i>	23rd–29th August, 1931—	—	1002	—	Mean of 7 observations.
Port Alma	Railway Wharf	<i>Limerick</i>	15th August, 1931—	2 hours ebb	1026	—	
Wanganui	Roadstead	<i>Opawa</i>	12th August, 1931—2 p.m.	Slack low	1025·5	51°	North Head Light bearing 65° 1·6 miles.
		"	13th August, 1931—1.50 p.m.	1 hour before low water	1026	51°	Heavy rain overnight. Strong fresh running from River mouth in a N. and S. direction approx. ¼ mile to the E. of ship.
		"	13th August, 1931—5 p.m.	3 hours flood	1024·2	51°	Flood tide spread discoloured water approximately ¼ mile to Westward of ship.
		"	14th August, 1931—2.30 p.m.	1½ hrs. before Low Water	1016·3	51°	North Head Light bearing 59° 2·2 miles. Strong fresh running from river and spreading some 2 miles to the E. ward and Southward and 1 mile to the W. ward of ship.
Fiji	Lautoka Wharf	<i>Wairuna</i>	11th March, 1931—Noon, 3 p.m., 6 p.m.	High water, Half ebb, Low Water slack.	1021·8	82°	Mean of 3 observations.
Vancouver	B.C. Sugar Refining Co's. Wharf.	"	12th March, 1931—10 a.m.	Half Flood	1022	81°	
		"	8th April, 1931—4.20 p.m.	Low Water	1019·5	47°	
Powell River	No. 6 Berth	"	9th April, 1931—8.25 a.m.	High Water	1018·2	47°	
Union Bay, Vancouver Island.	Coal Wharf	"	15th April, 1931—Noon	2 hours ebb	1011	46°	
Buenaventura	—	<i>Lautaro</i>	16th November, 1931—	Low Water	1010	—	
	—	"	13th June, 1931—	High Water	1014	—	
Puna Is., Guayaquil River.	—	"	17th June, 1931—	Low Water	1012	—	
Guayaquil	—	"	17th June, 1931—	High Water	1019	—	
	—	"	19th June, 1931—	Low Water	1000	—	
Corral	—	"	19th November, 1931—	2 hours Ebb	1002	—	
	—	"	28th December, 1931—	High Water	1018	—	
	—	"	28th December, 1931—	Low Water	1008	—	
Leixoes	—	<i>Alban</i>	15th July, 1931—	—	1025	66°	
Tutoya Bay	—	"	30th July, 1931	—	1023·5	79°	
Ceara Bay	—	"	5th August, 1931	—	1024	78°	
Maranhã	—	"	9th August, 1931—	Flood	1019	81°	
Para	—	"	19th August, 1931—	Flood and Ebb Tide	1000	83°	
Riachuelo	La Blancas Wharf	<i>Marquesa</i>	19th October, 1931—1400 G.M.T.	Slight Ebb	1002·5	65°	
La Plata	Gran Dock	"	21st October, 1931—1800 G.M.T.	Low Water	1001	65°	
Almirante	Wharf	<i>Ariguani</i>	23rd May, 1931—Noon	—	1021·5	87°	
	"	"	4th July, 1931—Noon	—	1021·0	87°	
	"	"	15th August, 1931—Noon	—	1020·5	86°	
Cristobal	Pier 6	<i>Rangitata</i>	18th June, 1931—3 p.m.	Flood	1019·5	81°	Rainy season.
La Guaira, Venezuela...	Buoys	<i>Ariguani</i>	19th May, 1931—Noon	Low Water	1024·0	81°	
	"	"	30th June, 1931—Noon	Low Water	1023·0	83°	
	"	"	11th August, 1931—Noon	2 hours flood	1024·5	82°	
Puerto Barrios	United Fruit Co., Wharf.	<i>Auditor</i>	24th August, 1931—11.20 a.m.	No tide	1015	87°	
Belize	Anchorage 4 fathoms	"	3rd September, 1931—Noon	No tide	1012	86°	
Port of Spain	Anchorage	<i>Ariguani</i>	17th May, 1931—Noon	2 hours Flood	1022·0	83°	
Trinidad	"	"	28th June, 1931—Midt.	¾ Flood	1019·4	82°	Heavy rain during day.
Kingston, Jamaica	No. 2 Pier	"	19th August, 1931—Noon	3 hours before High Water	1022·5	84°	
Guayabol Cuba	Railway Wharf	<i>Auditor</i>	21st August, 1931—4 p.m.	High Water	1022	86°	
	Anchorage	"	16th September, 1931—3 p.m.	No Tide	1026	87°	
Bridgetown, Barbados	5½ fathoms.	"	"	"	"	"	
	Carlisle Bay	<i>Ariguani</i>	16th May, 1931—Noon	Half Flood	1023·5	83°	
	Anchorage	"	27th June, 1931—Noon	High Water	1020·8	82·8°	Heavy rain before 9 a.m.
	"	"	8th August, 1931—Noon	3 hours Ebb	1022·0	83°	
Nassau, Bahamas	Prince George Wharf.	<i>Auditor</i>	16th August, 1931—Noon	2 hours after high water	1025	85°	
Baltimore	Texas Transport Co. Wharf, Curtis Bay	<i>British Lantern</i>	15th January, 1932—1300 G.M.T.	¾ Flood	1010	48°	
Halifax	Berth No. 21	<i>Minnewaska</i>	25th October, 1931—10.30 a.m.	Half Ebb	1029	52°	

NOTES ON THE HISTORY AND DEVELOPMENT OF THE LAW OF STORMS.

Part III.—From the middle of the nineteenth century up to the present day.

THE following is quoted as a good example of the result of carrying out storm-sailing rules by one ship and neglecting them in another, when conditions are similar; and it was the bringing to light of cases of this description which helped to show the tremendous advantages to be gained by this comparatively new aid to navigation.

The ships *Henry Tanner* and *Sea Park*, both bound for England, encountered bad weather to the southward of Mauritius, on the 13th January, 1850. The former was loaded with sugar, and the latter had 200 troops on board. In the log of *Henry Tanner* no barometer is mentioned, and she ran into a dangerous hurricane, sustained heavy damage, lost a considerable portion of her cargo, and was obliged to return to Mauritius; all very inconvenient and prejudicial to the interests of her Owners. *Sea Park*, noting a falling barometer with wind increasing fast from the northward, hove to on the port tack until the 15th January, when the wind being

S.W., and decreasing, with a rising barometer, she resumed her voyage to England. *Sea Park* thus avoided the hurricane by the warning supplied to the Master by his barometer, the wind and weather. By adopting the line of conduct recommended by his own experience, and by the information obtained from storm writers, he was enabled to avoid the danger and damage which he otherwise would have encountered. Putting back, in the case of *Sea Park* would have been a serious matter, as she was carrying troops.

In 1854 was constituted "The Meteorological Department of the Board of Trade" under the leadership of Admiral FITZROY, and one of the first matters to which he turned his attention was the construction of a mercury barometer suitable for use at sea, and the compiling of a code of instructions for its use as a weather-glass. Regarding storm investigation, this was carried out on the data obtained from the "Royal Charter" storm of October 25th-26th,

1859, in which nearly 350 vessels were lost around our coasts. This storm was discussed by FITZROY, and a series of charts constructed on a plan introduced by DOVE, of graphs of pressure and temperature along parallels and meridians. In 1860 Gale warning Signals were commenced at certain Stations on the Coasts of the British Isles. The signals devised by FITZROY were a cone and a drum, but some modifications have taken place on the original arrangement since that time, and the drum is now no longer used. FITZROY's attempt at Storm warning met with severe criticism in scientific circles in England, and after his death in 1865, when a change was made in the controlling body of the service, the issues were suppressed, but some time afterwards were restored in response to popular appeal.

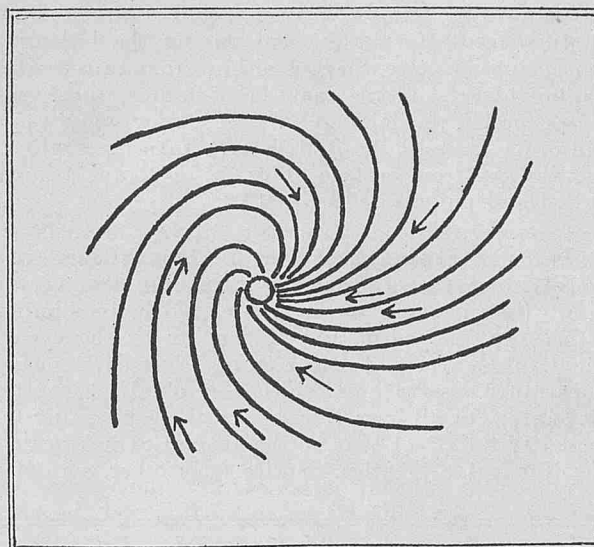
A study of synoptic charts, and calculations extending over a period of 34 years caused Professor BUYS BALLOT, of Utrecht, to enunciate, in 1857, his famous law which states that "if, in the Northern Hemisphere, you face the wind, pressure is lower on your right hand than on your left, whilst in the Southern Hemisphere the reverse is true." As previously mentioned the cause of this relationship between wind and the distribution of pressure has been traced to the earth's rotation, and though other investigators had in a manner recognised this before, yet as BUYS BALLOT based all his work upon this law, to him goes the credit of discovering it.

THOM's work at Mauritius, and his explanation of the origin of Storms in the Southern Indian Ocean, published in 1845, did not at the time receive much attention, but some years afterwards the Mauritius Meteorological Society was formed, and storms of that region became a constant subject of discussion amongst its members. Dr. C. MELDRUM, the able Secretary of the Society for many years, was enabled by fuller investigations to corroborate and develop the views and opinions enunciated earlier by THOM.

Now no place better than Mauritius, owing to its situation, could have been selected as a centre for a crucial examination of the theory regarding tropical revolving storms and their practical bearing upon navigation, as the subject to Members of the Society was always fresh, for every season brought disabled ships to Port Louis to refit.

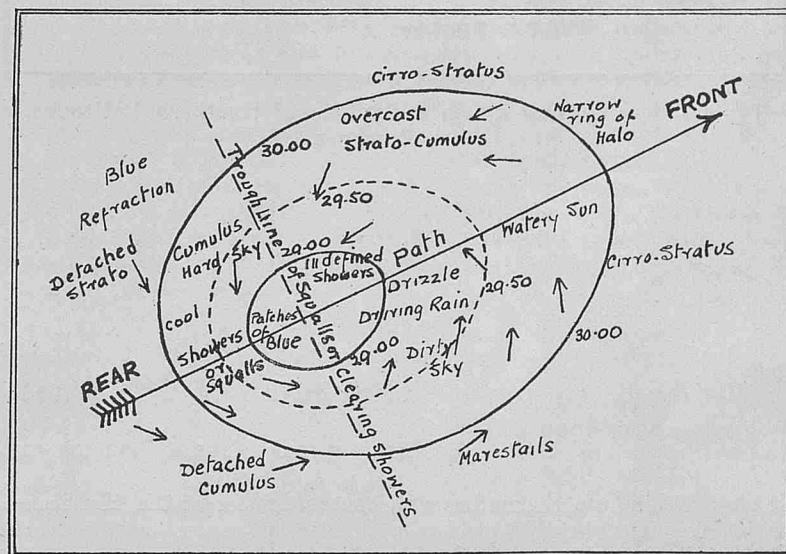
The improbabilities of many of the "well-established laws," and the errors of some of the "practical rules" were constantly discussed, and all sorts of forms for the cyclone, novel modes of progression, and new rules for avoiding the fury of the storm were constantly before the Members, and their value debated with considerable vigour. There were advocates of the circular theory, and others who strongly opposed it, and in 1861 the controversy was at its height. Numerous cases were discussed of losses occasioned by Masters of ships acting on the supposition that the bearing of the centre of the storm was at right-angles to the direction of the wind, and that the movement of the wind was in concentric circles. The perception of a theory differing from the truly circular one had dawned on some Members of the Society a few years before much notice was taken of their "Proceedings" in Europe, and in 1872, Captain DOUGLAS WALES, then Harbour-Master of Port Louis, laid before the Society his views regarding the definite incurving of the wind in cyclones, and his ideas regarding the handling of a ship derived therefrom, which he says—"as a sailor, I think worthy the serious attention of seamen, and the correctness of which they may put to the test of experience, whenever they have the opportunities of doing so."

Following final agreements and the acceptance of this incurving of the wind in cyclones, the Meteorological Society of the Island from 1872 onwards developed results of great value to practical navigation, among them being, the determination of the dangerous and navigable semicircles, the bearing of the centre at the commencement of a storm with its alteration relative to changes indicated by the barometer, and numerous other rules, the whole comprising the "Law of Storms" as later compiled into concise form for a single observer, and used to the present day with little alteration or modification. Much very useful local information regarding Mauritius hurricanes was also produced, perhaps the most valuable being that the S.E. trade-wind was found to curve round the Western side of the centre, thus giving a more or less circular appearance to that part in the diagram of a storm area; also that the wind curved sharply from Westerly and Northerly directions, whilst Easterly winds were found to blow nearly towards the centre, except when near it. The foregoing is clearly illustrated in the accompanying diagram of flow lines according to Meldrum.



Flow lines of surface winds in a Mauritius hurricane according to Meldrum.

As a result of charting pressure, temperature, wind and weather conditions, the Hon. RALPH ABERCROMBY, in 1883, devised what he termed the fundamental shape of the isobars in a cyclone; and by dividing his diagram into four parts, gave detailed prognostics concerning each quadrant lying to left and right of the line of progression, and in front and in rear of the trough. He also brought out the fact that the force of the wind and intensity of the character of the weather depended upon the closeness of the lines of equal barometric pressure (isobars).



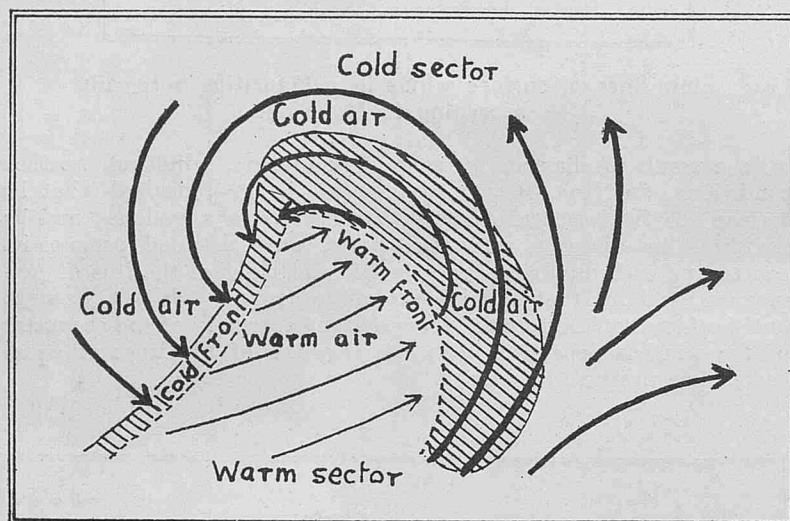
Cyclone prognostics according to Abercromby.

The scope of this article being thus completed, namely, to trace the development of the "Law of Storms," as we know it, little remains to be added, but a few further notes to bring the subject up to the present day may not be out of place.

Following the death of Admiral FITZROY in 1865, Captain HENRY TOYNBEE was appointed first Marine Superintendent of the re-constituted Meteorological Office, in 1867, and it is of interest here to mention that three years earlier, TOYNBEE, when in command of the frigate-built East Indiaman *Hotspur*, rode out a cyclone at the Sandheads, Calcutta, in 1864, which storm was the most intense on record. *Hotspur* had her three top-gallant masts blown away, although the rigging was well set up and the yards previously sent down. To mention Storm work only, during his period as Marine Superintendent, he carried out considerable investigations into the angle of indraft in Cyclones, and under his supervision Synchronous Weather Charts were published for a part of the years 1882-1883.

Lieut. BAILEY, R.N., followed TOYNEE, and was in turn followed by Captain CAMPBELL HEPWORTH, and during the latter's term of office, commencing in 1899, the transition from sail to steam was rapidly taking place, and the same keen interest in storm sailing could not be expected to continue. Wireless telegraphy was developing, and in order to assist the British gale warning service, weather reports by wireless from certain ships in the trans-Atlantic trade was organized and put into effect in 1909.

In 1918, Professor BJERKNES, of Norway, brought forward another method of dividing the cyclone, this time into two very unequal parts, by two lines meeting at the centre, which lines indicated the boundary between the warm and colder air of the cyclone, thus separating it into warm and cold sectors. This development of the use of temperature observations, which were obtained by establishing a network of stations all over Norway, came about owing to restrictions imposed by the Great War on the amount of information available to the Norwegian Weather Service from other countries.



Typical flow lines of air in a Cyclone of Northern Latitudes, after Bjerknes.

Certain interesting facts have been evolved by this method of investigation, among them being that a cyclone will tend to develop when the warm sector is of a marked higher temperature than the cold sector; whilst the cyclone will fill up if the warm section is cut off by the cold air surrounding it, thus stopping the supply of warm air to the centre.

This new theory, however, only seems to revert to what DOVE had in mind when he wrote in the middle of the last century:—

“It surely cannot be denied that violent storms may be produced by the sudden irruption of the cold air of the polar current into the warm and rarified air of an equatorial current (First rise after very low, indicates a stronger blow).”

From a Seaman's point of view, however, little had been written of real practical utility regarding Storm knowledge since the days of the fine work of the Mauritius Meteorological Society, and the publication of its findings. This did not mean that knowledge afloat was not progressing, as Seamen in increasing numbers were working, observing and plotting, and only needing encouragement to develop Storm and Weather Work on a wide scale for their own benefit, and as a National asset. WIRELESS AND WEATHER, AN AID TO NAVIGATION, first published in 1924, gave this stimulus, and there the reader will find a practical combination of the development of Wireless Telegraphy and the Synoptic Chart, adapted for the use of Navigators, and by means of which, especially in these days of economic depression and fierce competition, considerable saving in time and fuel may be effected, not to mention the increased comfort to passengers obtained by making “better weather” when knowledge of advantageous conditions warrant a change of course.

To hark back once again to the early part of these notes, I will conclude with an extract from “The Book of Signs,” the work of a Greek Astronomer named Aratus, who was attached to the court of the King of Macedonia, about 278 B.C., and every Seaman knows how true to-day are the following words, written over two thousand years ago:—

“Be discreet concerning these things likewise, if you have a ship confided to your care, to learn the precursory signs of the wind and tempestuous sea. It is of little trouble and soon becomes of great use to a diligent observer.”

THE END.

HURRICANES OF THE WEST INDIES AND NORTH ATLANTIC.

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

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

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

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

Intensity and Extent of Storms.

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

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

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

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

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

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

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

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

Frequency of Storms.

The following table shows the monthly frequency of storms recorded during the years 1887-1930 by the United States Weather Bureau.

May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
1	18	18	49	91	76	17	2	272

From the above table it is seen that out of the 272 storms recorded, 216 or 79 per cent. occurred in the three months August to October and 167 or 61 per cent. occurred in the two months September and October.

Region of Origin and Track of Storms.

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

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

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

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

extending from the United States seawards in an east or south-easterly direction will also prevent a hurricane to the southward from recurving to the north and north-east.

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

"If a cyclone is travelling towards the north or north-east in a southerly or south-westerly current aloft and its progress is blocked by an anti-cyclone one of the two following things will happen.

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

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

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

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

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

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

September.—Hurricanes attain their maximum frequency this month and are twice as numerous as the storms in August. The majority occur in the first half of the month and are far less frequent both in number and intensity during the latter half of September.

They mostly originate east of the Lesser Antilles and in the vicinity of the Cape Verde Islands. A few generate in the Western Caribbean Sea and Gulf of Mexico, especially during the latter half of the month.

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

October.—The total number of storms recorded during this month is only a little less than in September, and like the storms of that month are most frequent in the first two weeks when more than five times as many occur than in the last fortnight of the month and nearly twice as many as in the second half of September. The storms of the first part of the month are generally of a more severe nature than those of the second part. The majority originate east of the Lesser Antilles, and in the Western Caribbean Sea, very few storms in this month originate in the Gulf of Mexico. At first progressing in a north-westerly direction, they recurve to the north-east, many continuing into high latitudes before dissipating. Anti-cyclonic areas moving eastward across the United States, extending further south in this month, influence the path of tropical storms causing them to become irregular, some storms describing loops in their paths.

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

Rate of Progression.

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

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

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

Precursory Signs of an Approaching Hurricane.

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

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

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

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

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

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

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

In his investigation of the paths taken by hurricanes, MITCHELL states:—"As this study of tropical storms progressed, it became more and more apparent that any tropical storm will recurve into a trough of relatively low pressure that may exist when the tropical storm arrives in the same region irrespective of the Longitude or the time of the year."

This being the case, it is obvious that the most reliable information a navigator can get of the probable development and path of a storm known to be in his vicinity, will be obtained from a weather chart made on board from the synchronized observations obtained from ships and those of the nearest coast. Such a chart will give him a graphic illustration of the existing pressure distribution from which he can draw his own conclusions.

SOUTHERN ICE REPORTS.

During the Year 1931—July.

No reports of Ice, sighted in the Southern Ocean during the month of July, 1931, have been received at the Meteorological Office.

WEATHER SIGNALS.

I.—SHIPS' WIRELESS WEATHER SIGNALS.

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

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

Ships encountering Ice or other navigational dangers should report immediately to all ships and the appropriate station; see instructions for Danger to Navigation Signals for all ships, pages 28 and 29, Vol. IX, No. 97.

For full particulars of "Selected Ships" Routine Meteorological Reports with Schedule for Communication, see pages 13 to 16, Vol. IX, No. 97.

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

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

on 2100 metres (143 kc/s) as stated on page 15, Vol. IX, No. 97 (January, 1932, MARINE OBSERVER).

B Selected Ships broadcast their report to C.Q. on 600 m. spark, and these may be intercepted by the stations ringed in on Chart VIII. In making these reports to C.Q. "B Selected Ships" should make special endeavour to ensure that the report is received at these shore stations. With a view to assisting Meteorological Services who have provided information and to ensuring that routine reports from all "Selected Ships" within range of certain coast stations may be received by those services a list of stations specially detailed to receive reports from "B Selected Ships" is also given on pages 139 and 140. The procedure given on pages 13 to 16, Vol. IX, No. 97, should be adhered to as far as possible.

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

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

Request for Information.

THE ATTENTION OF METEOROLOGICAL SERVICES IS INVITED TO THE INVITATION GIVEN ON PAGE 13 OF VOL. IX, NO. 97, JANUARY
MARINE OBSERVER.

Ocean.	Station.	Position.	Call Sign.	Frequency and Wave Length.		Area and limits covered by Station.	Telegraphic address of Meteorological Centre.	Information required—Limit of Groups.	Notes.
				For Station to call up "Selected Ships."	For "Selected Ships" to report to Station.				
North Atlantic and North Sea.	Portishead.	Lat. 51° 28' 41" N. Long. 2° 47' 30" W.	GKU.	149 kc/s. (2013 metres).	143 kc/s. (2100 metres).	North Sea and Eastern North Atlantic East of Longitude 40° W. and North of Latitude 38° N., but not within 300 miles of station. (see Chart VIII.)	Weather London.	Weather only, up to seven groups, preferably No. 3 Supplementary Groups.	Control system. "Selected Ships" chosen to report in given order notified by station daily at 2230, 0330, and 1030 G.M.T. Roll call thus—Weather begins—Call signs of chosen "Selected Ships"—Weather ends.
	Chatham Mass., Sayville N.Y. or West Palm Beach.	Lat. 41° 42' N. Long. 70° 00' W. Lat. 40° 45' N. Long. 73° 06' W. Lat. 26° 42' N. Long. 80° 02' W.	WCC. WSL. WMR.	}	142.9 kc/s. (2098 metres).	North Atlantic West of Longitude 40° W.	Observer Washington.	Weather only. First four groups of observations taken at 0000 and 1200 G.M.T. only required.	No control. All British "A Selected Ships" within area to address their 0000 and 1200 G.M.T. observations to Observer Washington and their 1800 G.M.T. observations to CQ in accordance with schedule.
	Horta, Azores.	Lat. 38° 32' N. Long. 28° 38' W.	CTH.		125 kc/s. (2400 metres).	North Atlantic South of Latitude 38° N. and East of Longitude 40° W.	Radio Horta.	Weather only, up to seven groups, preferably No. 3 Supplementary Groups.	No control—all British "A Selected Ships" within area should report in accordance with Schedule.

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

(Continued.)

Ocean.	Station.	Position.	Call Sign.	Frequency and Wave Length.		Area and limits covered by Station.	Telegraphic address of Meteorological Centre.	Information required—Limit of Groups.	Notes.
				For Station to call up "Selected Ships."	For "Selected Ships" to report to Station.				
Mediterranean and Red Sea.									
South Atlantic.									
Indian Ocean.	Bombay.	Lat. 19° 04' 55" N. Long. 72° 49' 54" E.	VWB	—	143 kc/s. (2100 metres).	Arabian Sea N. of line C. Comorin to Ras Fartak.	Weather.	Weather only. No. 6 Supplementary groups.	All British "A Selected Ships" are requested, when convenient, to report 0000 G.M.T. observations commencing at 0018 G.M.T. in addition to schedule times.
	Madras.	Lat. 12° 59' 17" N. Long. 80° 10' 56" E.	VWM	—	143 kc/s. (2100 metres).	Bay of Bengal N. of line C. Comorin to Achin Head.	Weather.	Weather only. No. 6 Supplementary groups.	All British "A Selected Ships" are requested, when convenient, to report 1200 G.M.T. observations commencing at 1218 G.M.T. in addition to schedule times.
	Colombo.	Lat. 6° 55' 14" N. Long. 79° 52' 46" E.	VPB	130 kc/s. (2300 metres).	143 kc/s. (2100 metres).	Indian Ocean South of a line Ras Fartak, C. Comorin and Achin Head, and within a range of about 1500 miles.	Obs.	Weather only. No. 6 Supplementary groups preferred.	No control—all British "A Selected Ships" within area should report in accordance with Schedule.
	Mombasa.	Lat. 4° 03' 11" S. Long. 39° 39' 51" E.	VPQ	—	125 kc/s. (2400 metres).	From Ras Hafun to Lat. 26° S. when westward of the Colombo area.	Weather Nairobi.	Weather only. No. 6 Supplementary groups.	No control—all British "A Selected Ships" within area should report 0600 G.M.T. observations.
	Perth.	Lat. 32° 01' 51" S. Long. 115° 49' 31" E.	VIP	—	125 kc/s. (2400 metres).	Indian Ocean and Southern Ocean between Long. 105° and 135° E.; but not within 100 miles of station.	Weather.	Weather only. No. 6 Supplementary groups.	No control—all British "A Selected Ships" within area should report in accordance with Schedule. Reports not required for observation times not starred on Chart I, p. 15, Vol. IX. No. 97 (January).
North Pacific and China Sea.	Cape d'Aguilar, Hong Kong.	Lat. 22° 12' 39" N. Long. 114° 15' 11" E.	VPS.		125 kc/s. (2400 metres).	China Sea and North Pacific to about 1,500 miles from station.	Royal Observatory.	Weather only, preferably No. 6 Supplementary Groups.	No control—all British "A Selected Ships" within area should report in accordance with Schedule.
South Pacific.	Sydney.	Lat. 33° 46' 00" S. Long. 151° 03' 09" E.	VIS	—	125 kc/s. (2400 metres).	S. Pacific, Coral and Tasman Seas and Southern Ocean between Long. 135° and 160° E.; but not within 100 miles of station.	Weather.	Weather only. No. 6 Supplementary groups.	No control—all British "A Selected Ships" within area should report in accordance with Schedule. Reports not required for observation times not starred on Chart I, p. 15, Vol. IX. No. 97 (January).

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

Ocean.	Station.	Position.	Call Sign.	Telegraphic address of Meteoro- logical Centre desiring information.	Information desired.	Notes.
North Atlantic.	Horta, Azores.	Lat. 38° 32' N. Long. 28° 38' W.	CTH.	Radio Horta	Weather only, up to 7 groups, preferably No. 3 Supplementary Groups.	
South Atlantic.	Salinas S. Luiz Fortaleza Natal F. Noronha Olinda Amaralina Abrolhos Victoria Rio Santos Floriano- polis. Juncçao	Lat. 0° 35' 00" S. Long. 47° 18' 45" W. Lat. 2° 31' 48" S. Long. 44° 16' 51" W. Lat. 3° 46' 21" S. Long. 38° 32' 26" W. Lat. 5° 46' 41" S. Long. 35° 18' 24" W. Lat. 3° 50' 24" S. Long. 32° 24' 48" W. Lat. 8° 00' 35" S. Long. 34° 51' 00" W. Lat. 13° 00' 12" S. Long. 38° 30' 45" W. Lat. 17° 57' 30" S. Long. 38° 41' 05" W. Lat. 20° 10' 00" S. Long. 40° 17' 46" W. Lat. 22° 53' 42" S. Long. 43° 13' 24" W. Lat. 23° 56' 27" S. Long. 46° 19' 28" W. Lat. 27° 36' 00" S. Long. 48° 30' 18" W. Lat. 32° 04' 00" S. Long. 52° 07' 00" W.	PPL. PXM. PPC. PXN. PXF. PP0. PPA. PXH. PPT. PPR. PPS. PPF. PPJ.	Meteoro Rio.	Weather only, including supplementary groups.	
Indian Ocean.	Calcutta. Rangoon. Madras. Bombay. Karachi. Matara. Mombasa. Dar-es- Salaam. Mauritius. Geraldton. Perth. Esperance.	Lat. 22° 33' 31" N. Long. 88° 20' 16" E. Lat. 16° 45' 57" N. Long. 96° 11' 51" E. Lat. 12° 59' 17" N. Long. 80° 10' 56" E. Lat. 19° 04' 55" N. Long. 72° 49' 54" E. Lat. 24° 51' 05" N. Long. 67° 02' 32" E. Lat. 6° 01' 07" N. Long. 80° 35' 39" E. Lat. 4° 03' 11" S. Long. 39° 39' 51" E. Lat. 6° 50' 38" S. Long. 39° 17' 24" E. Lat. 20° 23' S. Long. 57° 35' E. Lat. 28° 47' 15" S. Long. 114° 36' 24" E. Lat. 32° 01' 51" S. Long. 115° 49' 31" E. Lat. 33° 52' 40" S. Long. 121° 53' 34" E.	VWC. VTR. VWM. VWB. VWK. GZP. VPQ ZBZ VRS. VIN VIP VIE	Weather. Weather Nairobi. Weather Nairobi. Observatory Mauritius. Weather.	Weather only up to 6 groups, No. 6 Supplement- ary Groups preferred. Weather 4 universal groups and first of No. 6 Supplementary Groups. Weather only, including No. 6 Supplementary Groups.	

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

(Continued.)

Ocean.	Station.	Position.	Call Sign.	Telegraphic address of Meteorological Centre desiring information.	Information desired.	Notes.
North Pacific and China Sea.	Cape d'Aguilar, Hong Kong.	Lat. 22° 12' 39" N. Long. 114° 15' 11" E.	VPS.	Royal Observatory.	Weather only, preferably No. 6 Supplementary Groups.	
South Pacific.	Auckland.	Lat. 36° 50' 36" S. Long. 174° 46' 08" E.	ZLD.	Weather Wellington.	Weather only, up to 7 groups.	
	Wellington.	Lat. 41° 16' 26" S. Long. 174° 45' 55" E.	ZLW.			
	Awarua.	Lat. 46° 30' 27" S. Long. 168° 22' 21" E.	ZLB.			
	Chatham Island.	Lat. 43° 57' 02" S. Long. 176° 31' 04" W.	ZLC.			
	Rarotonga.	Lat. 21° 11' 54" S. Long. 159° 48' 51" W.	ZKR.			
	Apia.	Lat. 13° 15' 17" S. Long. 170° 49' 42" W.	ZMA.			
	Thursday I.	Lat. 10° 35' 14" S. Long. 142° 12' 43" E.	VII	Weather	Weather only, including No. 6 Supplementary Groups.	
	Townsville	Lat. 19° 16' 09" S. Long. 146° 49' 47" E.	VIT			
	Brisbane	Lat. 27° 25' 34" S. Long. 153° 07' 19" E.	VIB			
	Sydney	Lat. 33° 46' 00" S. Long. 151° 03' 09" E.	VIS			
	Melbourne	Lat. 37° 46' 56" S. Long. 144° 52' 09" E.	VIM			
	Adelaide	Lat. 34° 51' 14" S. Long. 138° 31' 55" E.	VIA			

II.—WIRELESS WEATHER SIGNALS.

WIRELESS WEATHER BULLETINS.

The method of decoding station weather reports made in code from shore stations intended for shipping was described in the British "Weather Shipping" Bulletin, on page 47 of Volume IX, No. 98 (The February, 1932 Number.)

The same method of decoding weather reports applies in all cases where the International Code is used having regard to the Key figures given in each case where they differ from the British Weather Shipping Bulletin.

FRENCH INDO-CHINA.

Spark Issue.

Mitho W/T Station, approximate Latitude 10° 21' N., Longitude 106° 22' E., call sign **FRM**, broadcasts a weather bulletin at 1330 G.M.T. on a wavelength of 600 metres. This bulletin is sent *en clair* and gives a summary of 0900 G.M.T. observations taken at Indo-China stations and 0700 G.M.T. weather conditions at Hong Kong. The observations of each station are broadcast in the following order:—

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

FORMOSA.

Spark Issue.

Keelung W/T Station, approximate Latitude 25° 08' N., Longitude 121° 45' E., call sign **JFK**, wavelength 600 m. spark, broadcasts weather forecasts, issued by Taihoku Meteorological Observatory, *en clair*, in English at 0800 G.M.T. The message is preceded by the signal CQ CQ CQ and contains the direction and force of the wind (Beaufort) and general weather conditions for the following day for the N. and E. coasts of Formosa and the Formosa Channel.

Example:—N.E. Monsoon moderate, cloudy some rain, Northern and Eastern coast areas; N.E. Monsoon strong, cloudy Formosa Channel.

HONG KONG.

C.W. and I.C.W. Issues.

Stonecutters I. W/T Station, Latitude 22° 19' N., Longitude 114° 09' E., approx., call sign **GZO**, broadcasts weather bulletins as follows:—

at 0400 }
and at 1200 } on 2650 m. C.W. and 35.5 m. C.W. simultaneously.

The 0400 G.M.T. bulletin is based upon observations made at 2200 G.M.T. and that broadcast at 1200 G.M.T. upon observations made at 0600 G.M.T.

Part I of the bulletin is made in the International Ships' Wireless Weather Telegraphy Code and contains observations made at different stations given in the list below.

The stations' observations are broadcast in three groups of five figures, the key to these being as follows:—

IIIAW DDFww BBVTT.

A description of the key letters is given on p. 24, January number, and in the DECODE, for use with the International Wireless Weather messages from ships, M.O. 329.

List of Stations.

Code Letter.	Code No.	Station.	Position.	
			Latitude.	Longitude.
CH	—	Chemulpo ...	37° 26' N.	126° 37' E.
TI	734	Tientsin ...	39° 09' N.	117° 09' E.
NG	—	Nagasaki ...	32° 44' N.	129° 52' E.
OS	—	Oshima ...	28° 23' N.	129° 30' E.
GL	769	Gutzlaff ...	30° 48' N.	122° 10' E.
HW	772	Hankow ...	30° 36' N.	114° 20' E.
BO	—	Bonin I. ...	27° 05' N.	142° 11' E.
IS	—	Ishigakijima ...	24° 20' N.	124° 10' E.
CS	781	Changsha ...	28° 12' N.	112° 47' E.
AM	803	Amoy ...	24° 28' N.	118° 05' E.
TK	—	Taihoku ...	25° 02' N.	121° 31' E.
PD	—	Pescadores ...	23° 32' N.	119° 33' E.
GR	812	Gap Rock ...	21° 49' N.	113° 56' E.
PR	814	Pratas I. ...	20° 40' N.	116° 47' E.
PL	—	Phulien ...	20° 48' N.	106° 37' E.
TR	—	Tourane ...	16° 08' N.	108° 17' E.
CJ	—	Cape St. James ...	10° 20' N.	107° 05' E.
BS	850	Basco... ...	20° 28' N.	121° 59' E.
MN	864	Manila ...	14° 35' N.	120° 58' E.
SU	890	Surigao ...	9° 48' N.	125° 29' E.
Alternative.				
YU	—	Yuensan ...	39° 11' N.	127° 26' E.
TT	744	Tsingtao ...	36° 03' N.	120° 20' E.
QU	—	Quelpart ...	33° 20' N.	126° 30' E.
KA	—	Kagoshima ...	31° 34' N.	130° 33' E.
NK	763	Nanking ...	32° 07' N.	118° 47' E.
IC	770	Ichang ...	30° 42' N.	111° 16' E.
SA	—	Saipan ...	15° 14' N.	145° 46' E.
NA	—	Naha... ...	26° 13' N.	127° 41' E.
KK	777	Kiukiang ...	29° 44' N.	116° 08' E.
SP	801	Foochow (Sharp Peak)	26° 03' N.	119° 39' E.
TA	—	Taichu ...	24° 09' N.	120° 41' E.
KH	—	Koshun ...	22° 00' N.	120° 45' E.
HK	810	Hong Kong ...	22° 18' N.	114° 10' E.
FB	—	Fort Bayard ...	21° 05' N.	110° 30' E.
DH	—	Dong Hoi ...	17° 33' N.	106° 37' E.
PD	—	Padaran ...	11° 21' N.	109° 02' E.
AP	852	Aparri ...	18° 22' N.	121° 38' E.
IL	887	Iloilo ...	10° 42' N.	122° 34' E.

These station observations are followed by re-transmitted ships' observations and are sent in the four universal groups of the International Ships' Wireless Weather Telegraphy Code, i.e., PQLLL IIIGG DDFww BBVTT, description of the key letters is given on p. 24, January number, and in the DECODE, M.O. 329.

This is followed by information of upper air for Airmen.

Part II. "General Inference" is made by this station in a code peculiar to the Far East, but is repeated in plain English by **Cape d'Aguila W/T Station**, see below.

Part III. Forecast for the sea districts indicated on the chart below.

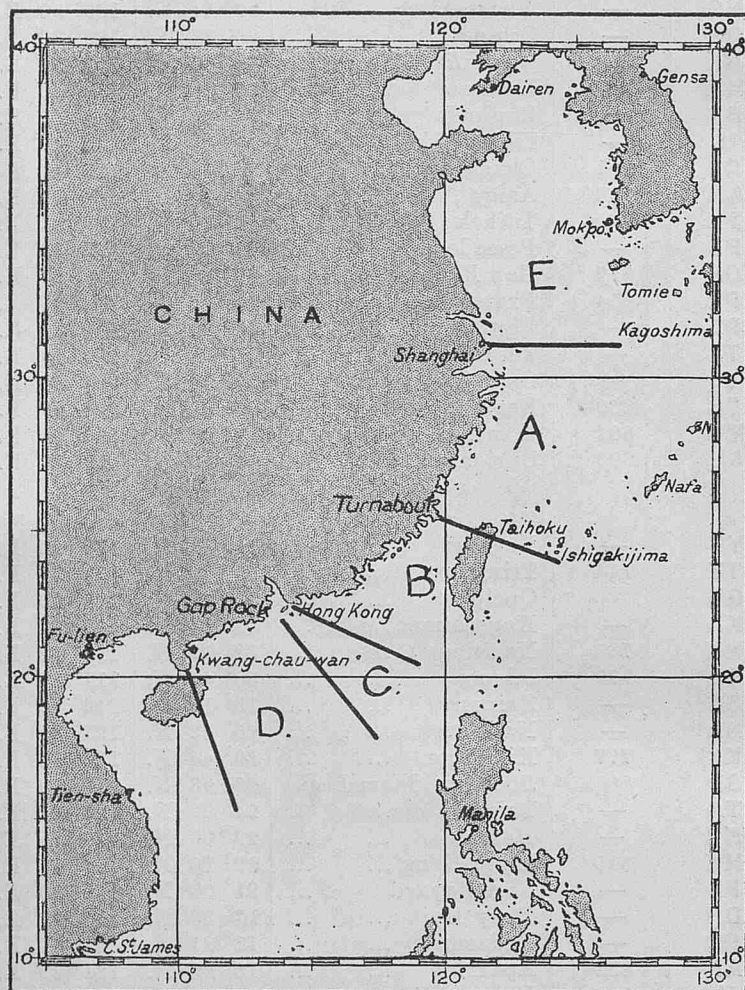
Cape d'Aguila W/T Station, approx. Latitude $22^{\circ} 13' N.$, Longitude $114^{\circ} 15' E.$, call sign **VPS**, broadcasts a "general inference" and weather forecast for the five districts given on the chart below, in plain English, on 600 metres I.C.W. at 0400 and 1200 G.M.T. A repetition of these messages is made on 2913 metres I.C.W. at 0500 and 1300 G.M.T. respectively.

Sample message of "General Inference" :—

An anticyclone, central in Latitude $36^{\circ} N.$ and Longitude $110^{\circ} E.$ is strengthening and moving eastward, and a depression, central in Latitude $38^{\circ} N.$ and Longitude $142^{\circ} E.$ has deepened and is moving eastward.

Wireless Telephony, R/T Issues.

Victoria Peak, W/T Station, approximate Latitude $22^{\circ} 17' N.$, Longitude $114^{\circ} 09' E.$, call sign **ZBW**, broadcasts by word of mouth weather reports and forecasts at 0500 and 1200 G.M.T. on 355 m. (R.T.) for District C.



CHINA.

Pratas Island.

Spark and C.W. Issues.

Pratas Island W/T Station, approximately Latitude $20^{\circ} 42' N.$, Longitude $116^{\circ} 43' E.$, call sign **XPI**, broadcasts a daily weather Bulletin at :—

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

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

Repeated on a wavelength of 1450m. (C.W.).

The weather Bulletins are broadcast in English and are preceded by CQ CQ CQ de XPI XPI XPI. The message is broadcast twice and contains the following information :—

Part I. The location of high and low pressure areas.

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

Part III. Wind and weather forecast for Southeast coast of China and northern portion of China Sea.

Part IV. Wind direction and force, visibility, state of sea, and state of the weather at Pratas Island during previous six hours.

Weather reports are also transmitted on request free of charge at other times.

Shanghai.

C.W. and I.C.W. Issues.

Shanghai W/T Station, approximate Latitude $31^{\circ} 12' N.$, Longitude $121^{\circ} 26' E.$, call sign **FFZ**, broadcasts weather bulletins *en clair*, for China and the China Seas, on a wavelength of 600 metres (I.C.W.), repeated immediately on 1850 metres (I.C.W.), at :—

0300 G.M.T., after Time Signal, a weather bulletin based upon observations made at 0100 G.M.T.

0900 G.M.T., after Time Signal, a weather bulletin based upon observations made at 0700 G.M.T.

1400 and 1800 G.M.T., a weather bulletin based upon observations made at 1200 G.M.T.

Weather Bulletins are also broadcast at 0945 G.M.T. and a repetition of the 0900 G.M.T. weather bulletin and storm warning is also made at 1130 G.M.T., both are sent on a short wavelength of 28.5 metres, C.W., preceded by the general call and the call sign of Shanghai W/T Station FFZ1.

WIRELESS STORM WARNINGS.

FORMOSA.

Spark Issue.

Keelung W/T Station, call sign **JFK**, wavelength 600 metres spark, at 1230 G.M.T., broadcasts storm warnings *en clair* in English commencing CQ, CQ, CQ, giving date and hour of observation, type of storm, position of centre, direction of motion and brief remarks. The message may also contain information concerning strong winter monsoons whenever a sudden threatening change is anticipated off the N. and E. coast of Formosa or in the Formosa Channel.

HONG KONG.

I.C.W. Issue.

Cape d'Aguilar W/T Station, approximate Latitude $22^{\circ} 13' N.$, Longitude $114^{\circ} 15' E.$, call sign **VPS**, broadcasts typhoon warnings on 600 metres I.C.W., on receipt and at the two subsequent hours, also at 0400 and 1200 G.M.T. The warnings are repeated at 0500 and 1300 G.M.T. on a wavelength of 2913 metres I.C.W.

When a typhoon is definitely threatening Hong Kong the warnings are sent every hour.

Wireless Telephony R/T Issues.

Victoria Peak W/T Station, approximate Latitude $22^{\circ} 17' N.$, Longitude $114^{\circ} 09' E.$, call sign **ZBW**, wavelength 355 m. R/T, broadcasts by word of mouth typhoon warnings on receipt and at the two subsequent hours, also at 0500 and 1200 G.M.T. When a typhoon is definitely threatening Hong Kong the warnings are sent every hour.

CHINA.

C.W., I.C.W. and Spark Issues.

Pratas Island W/T Station, call sign **XPI**, broadcasts typhoon warnings for the China Sea when necessary. The warnings are broadcast *en clair* in English and are preceded by the Safety Signal TTT (— — —). They are issued as frequently as changes are observed, or at such intervals as may be deemed most expedient. Wave length, 600 metres (spark).

Shanghai W/T Station, call sign **FFZ**, broadcasts typhoon and gale warnings, when necessary after the weather bulletins described on p. 142 at 0300 (after Time Signal), 0900 (after Time Signal), 1400 and 1800 G.M.T. The warnings are broadcast *en clair* and give information concerning the position of the centres of typhoons or continental depressions, for China and the China Seas.

Wavelength 600 metres (I.C.W.), repeated immediately on 1850 metres (I.C.W.).

Typhoon Warnings Broadcast on Short Wavelength by Shanghai W/T FFZ1.

For the benefit of ships who experience difficulty in the reception of W/T messages from **Shanghai W/T Station FFZ**, these warnings will be broadcast on a short wavelength of 28.5 metres C.W. at 0945 and 1130 G.M.T. from **Shanghai W/T Station FFZ1**.

JAPAN.

I.C.W. and C.W. Issues.

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

Time 2350 G.M.T.)
 „ 0550 G.M.T. } Wavelength 4000 metres (C.W.).
 „ 1100 G.M.T. }

In cases of urgency they will be broadcast immediately on 600 metres I.C.W. and repeated at the end of the next compulsory silent period.

III.—WIRELESS TIME SIGNALS.

HONG KONG.

I.C.W. Issues.

Wireless time signals controlled by the Royal Observatory, Hong Kong, are broadcast from **Cape d'Aguilar W/T Station**, Latitude $22^{\circ} 12' 39'' N.$, Longitude $114^{\circ} 15' 19'' E.$, call sign **VPS**, on a wavelength of 2913 metres (I.C.W.) at the following times:—

G.M.T.

h. m. s. h. m. s.
 1 55 00 to 2 00 00

and from 12 55 00 to 13 00 00

The time signals consist of dots (— — — — etc.) each of about 0.2 seconds duration, sent at every second, the 28th, 29th, 54th, 55th, 56th, 57th, 58th, and 59th seconds being omitted for the purpose of identifying the signals.

Preliminary warning signals are transmitted between 1h. 53m. and 1h. 55m. and between 12h. 53m. and 12h. 55m., G.M.T., as follows:—“CQ de VPS. HK Time wait.”

In the event of failure the time signals are transmitted 30 minutes later.

The signals are not transmitted on Sundays or Public Holidays.

CHINA.

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

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

— = 1 sec.; ■ = 0.2 sec.

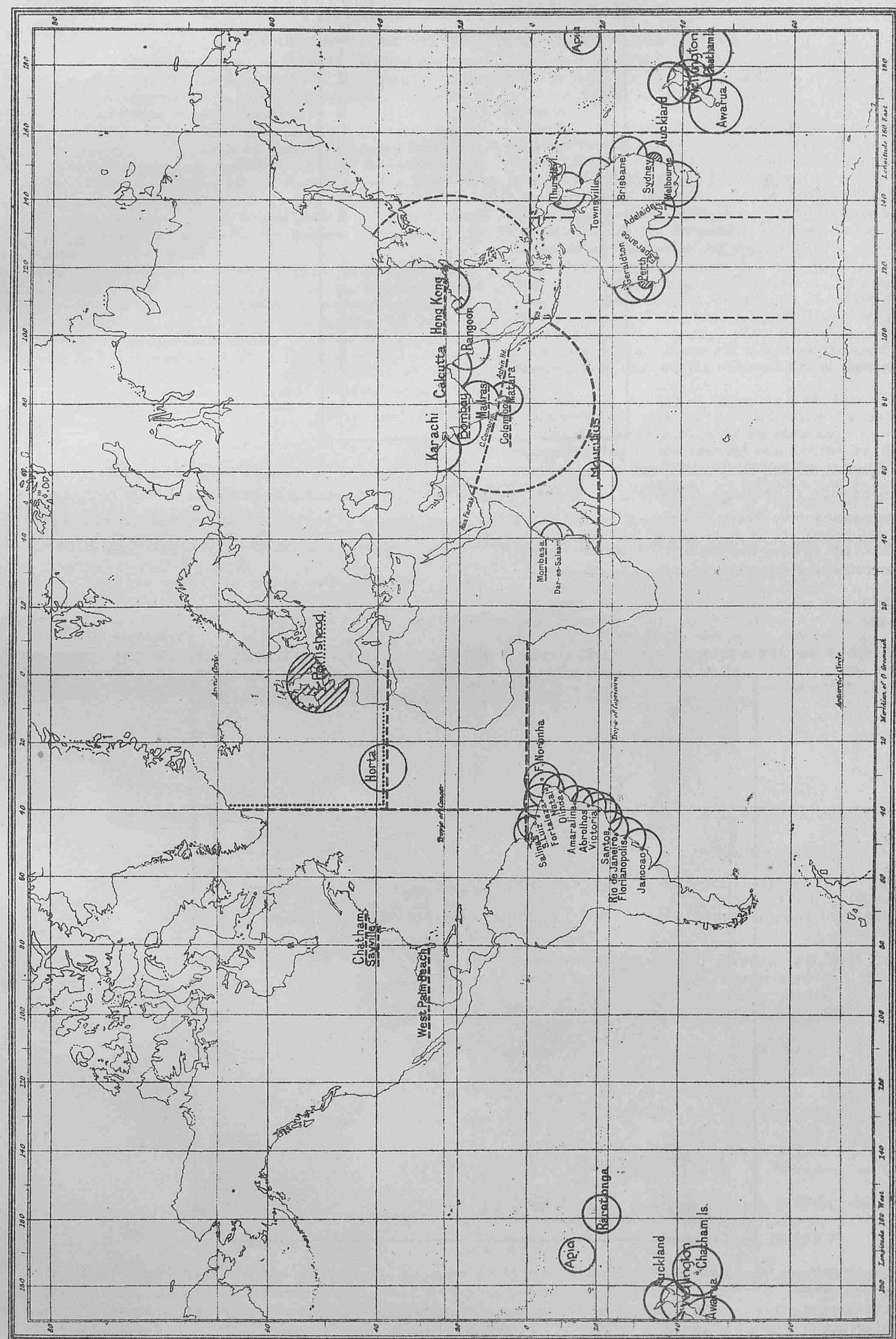
NOTE.—Plates produced by Lithographic process, including Charts and other large diagrams, will be found in each number after “Weather Signals.”

Special Notices Regarding Personnel.

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

Chart VIII - SHIPS' WIRELESS WEATHER SIGNALS.

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



The dotted line indicates the area in which British "A" Selected Ships report under control to Portishead.

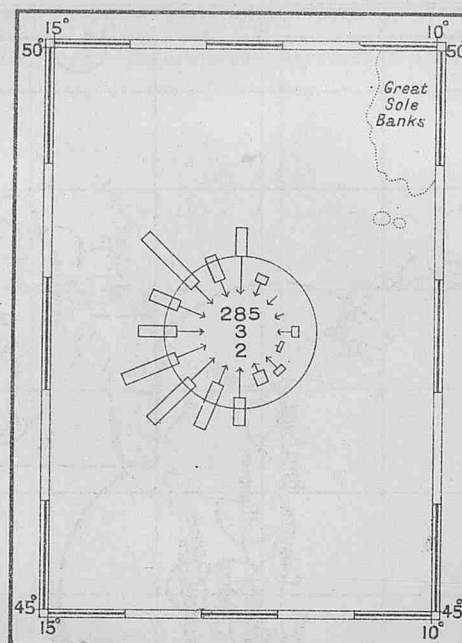
to which British "A" Selected Ships should report. The names of such stations being underlined with a pecked line.

The small shaded areas round stations detailed to receive reports from "A" Selected Ships indicate where these ships should not report on account of congestion.

The full circles indicate the areas round islands and coast stations which are detailed to intercept "B" Selected Ships' reports made to C.Q. on 600 metres.

JULY,

WIND FOR THE OCEAN REGION ADJACENT TO THE S.W. APPROACHES TO GREAT BRITAIN.



EXPLANATION.

The wind rose is drawn from observations within the 5° square. Arrows fly with the wind, length represents frequency, thickness strength.

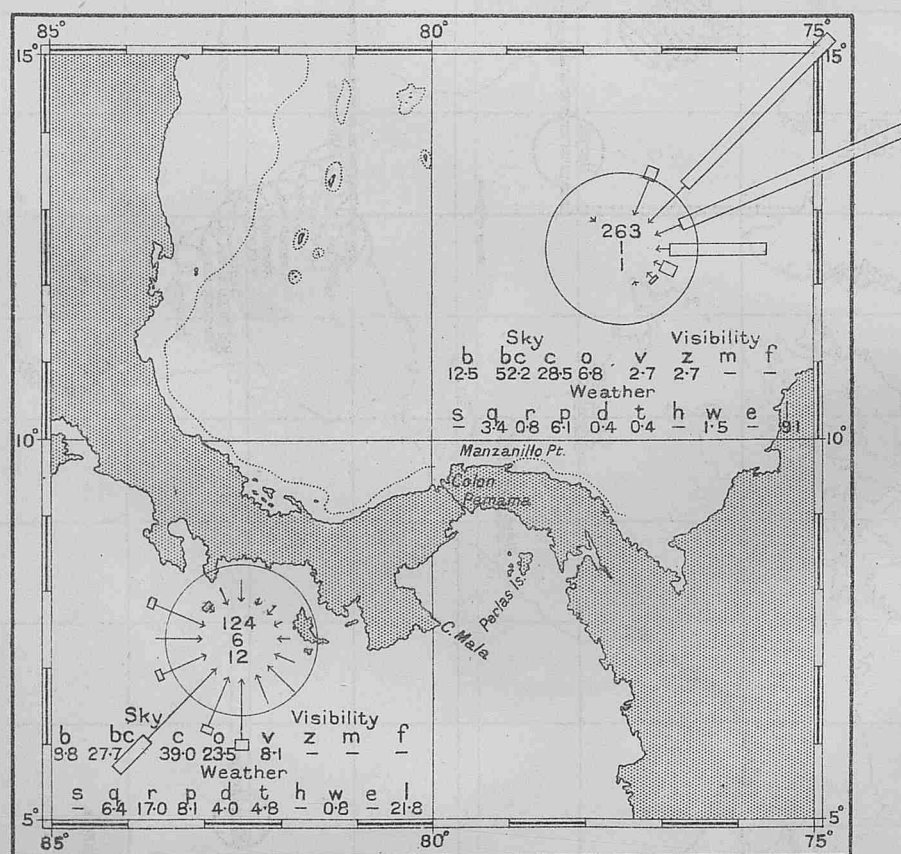
GALE	MODERATE	LIGHT
8-12	4-7	1-3

 Distance from head of arrow to circle represents 5%. Scale:—

10%	20%
-----	-----

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

WIND, FOG, MIST AND WEATHER FOR THE OCEAN REGIONS TO THE N.E. AND S.W. OF THE PANAMA CANAL.



EXPLANATION.

The wind roses are drawn from Sea observations within the 5° squares. Arrows fly with the wind, length represents frequency, thickness strength.

GALES	MODERATE	LIGHT
8-12	4-7	1-3

 Distance from head of arrow to circle represents 5%. Scale:—

10%	20%
-----	-----

 The upper figure in the centre of the rose gives total number of observations, The middle figure the percentage frequency of calms, and the lower figure the percentage frequency of variable winds. The percentage frequency of types of weather are shown in the lower half of each 5 square by the figures beneath each of the letters of the Beaufort weather notation. For example in the 5° square Latitude 5° to 10°N, Longitude 80° to 85°W, c was logged 39 times in every 100 observations while r was logged 17 times.

Compiled from observations of British Ships received since the adoption of the Hollerith system of extraction covering the years 1921-1930.

MARINE METEOROLOGY.

Co-operation of Shipowners, Masters and Mates.

Captains and Officers of ships registered in Great Britain and Northern Ireland, who wish to co-operate regularly with the Meteorological Office should apply to the appropriate Port Meteorological Officer or Agent, a list of whom, with addresses, is given below.

In accordance with the International Convention for Safety of Life at Sea, the Meteorological Office arranges for certain "Selected Ships" to take meteorological observations at specified hours, and to transmit such observations by wireless telegraphy, for the benefit of other ships and the various meteorological services.

Arrangements are also made for a limited number of ships to keep meteorological logs in certain trades for the purpose of completing the meteorological survey of the oceans.

Ships performing these voluntary duties are known as Observing Ships; the whole as the Voluntary Observing Fleet; and the commanders and officers of these ships as the Corps of Voluntary Marine Observers.

At present the observing fleet is limited to a number not exceeding 366 observing ships. The number of British "Selected Ships" is determined upon the British proportion of world tonnage, on the assumption that there should be a total of 1,000 "Selected Ships" of all nations.

The observing fleet list indicating which are "Selected Ships," with the names of commanders, officers, and other particulars, is published in THE MARINE OBSERVER and kept up to date monthly.

A general description of marine meteorological work, including the particulars desired from intending marine observers, is given in Chapter I of THE MARINE OBSERVER'S HANDBOOK, 5th Edition, which is supplied to all observing ships, and may also be obtained from H.M. Stationery Office, direct, or through any bookseller, price 2s. 6d.

THE MARINE OBSERVER is sent monthly to the captain of every observing ship, for the information and guidance of his observing officers, and in the case of "Selected Ships," the wireless operators also. The Captains of observing ships are also supplied on request with charts, and atlases, according to trade, if available, as meteorological equipment.

Ships keeping the Meteorological Log, Form 915, are lent a complete set of official tested instruments.

"Selected Ships," other than meteorological log keeping ships, keep the Ships' Meteorological Record, Form 911. All "Selected Ships" also keep the Ships' Wireless Weather Register, Form 138.

No observing ship is detailed as a "Selected Ship" unless she has on board a reliable mercurial barometer.

Official tested instruments are lent to "Selected Ships" when necessary.

The commanders of observing ships keeping the meteorological log are requested to return it (accompanied by Form 138 in the case of "Selected Ships") through the appropriate Port Meteorological Officer or Agent at intervals of not more than five months.

Commanders of observing ships keeping Forms 911 are requested to return them (accompanied by Form 138 in the case of "Selected Ships") by post direct to the Meteorological Office, London, at the end of each voyage, or at intervals of not more than two months.

These forms have the address and "On His Majesty's Service" printed upon them, and should be folded for posting accordingly.

The Port Meteorological Officers and Merchant Navy Agents inspect official instruments in Meteorological log ships half-yearly, and in "Selected Ships" quarterly, when possible; and they will replace defective gear. These officers will also check the accuracy of barometers in observing ships, but marine observers should themselves frequently check by comparison.

The work of the British observing fleet, that of the observing fleets of other nations party to the Convention for Safety of Life at Sea, together with Weather Shipping Bulletins and Gale and Hurricane Warnings conforming to the International Convention for Safety of Life at Sea, provide the necessary information for shipping. Thus a world wide service for all shipping, at the minimum cost to national funds, is provided. Shipowners are asked to facilitate this voluntary work which is done by the commanders and officers of their ships.

Shipowners will greatly assist by facilitating the forwarding of postal matter from the Air Ministry addressed to the Captains of ships.

Ships which are not regular observing ships are advised to procure the DECODE for use with the International Code for Wireless Weather Messages from Ships, M.O. Pubn. 329, which can be obtained from H.M. Stationery Office, price 3d. This gives a description of the system of communication of "Selected Ships," as well as the DECODE.

For guidance in the practical use of wireless weather intelligence, WIRELESS AND WEATHER AN AID TO NAVIGATION may be obtained from H.M. Stationery Office, through any bookseller, price 5s.

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

LONDON ... Captain L. A. BROOKE SMITH, R.D., R.N.R.,
Marine Superintendent.

Commander J. HENNESSY, R.D., R.N.R., Senior
Nautical Assistant.

Room 319, Adastral House, Kingsway, W.C.2.
(Telephone No.: Holborn 3434 Extension 421).
Nearest station Temple, District Railway.

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

MERSEY ... Commander M. CRESSWELL, R.N.R., Port
Meteorological Officer, Dock Office, Liverpool.
(Telephone No.: Bank 8959. Telegraphic
Address: Meteorite, Liverpool).

Agents.

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

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

CLYDE ... Mr. ROBERT CLEARY, Master Mariner, The
Clutha Stevedoring Co., Ltd., Princes Dock,
Glasgow. (Telephone No.: 513 Ibrox).

Agents (contd.).

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

HONG KONG, China. Lieut. Commander G. B. R. RUDYERD-HELPMAN,
R.N., Superintendent, Admiralty Chart and
Chronometer Depot, H.M. Dockyard.
(Telephone No.: 108 Dockyard).

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

SOUTHAMPTON Captain Sir BENJAMIN CHAVE, K.B.E.
Room 35.
R.M.S.P. Building.
Southampton.

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

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

ICE CHART. WESTERN NORTH ATLANTIC.

LETTERS OF TRANSATLANTIC TRACKS INDICATE

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

- (C) From 1st July to 10th April, inclusive.
- (F) From 16th May to Opening of Belle Isle route and to 30th November when not using the Belle Isle route.
- (E) 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.
- (G) From the opening of the Straits of Belle Isle to 14th November.

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

ROUTE NOTICES.

For latest information re Tracks see pages 80 and 81 of Vol. IX, No. 100, April, 1932, Number.

SYMBOLS USED ON THE CHART.

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

PHENOMENAL POSITIONS OF ICE.

Date.	Ship or Source of Report.	Position.	Remarks.
July, —, 1890	S.S. Slavonia	48°53' N. 24°11' W.	Last remnants of berg.
" —, 1902	2 reports by Fishermen.	56°30' N. 6°30' W.	40 to 50 ft. long, 15 ft. wide, 2 ft. 6 in. out of water.
" 31, 1909	S.S. Shimosa	30°59' N. 30°01' W.	25 ft. long, 3 to 8 ft. wide.
" 10, 1913	S.S. Lothian	37°27' N. 38°48' W.	Piece 6 ft. high, 50 ft. in cir.
" 18, 1916	U.S. Hydrographic Bulletin.	32°09' N. 54°28' W.	Piece of berg 3 or 4 ft. out of water.
" 23, 1916	S.S. San Giorgio	42°09' N. 63°24' W.	Berg, 60 ft. long.
" 23, 1918	U.S. Hyd. Bulletin	44°25' N. 35°01' W.	Large berg.
" 18, 1921	Do.	44°30' N. 39°26' W.	Small berg about 15 ft. sq.
" 21, 1921	Do.	38°09' N. 40°39' W.	Berg.
" 31, 1921	Do.	37°37' N. 27°28' W.	Berg.
" 10, 1926	S.S. Chelatos	42°42' N. 36°45' W.	2 pieces of ice.

Reports of Ice sighted between which have been received by the by the Symbols plotted in the indicating the day of the month.

LATEST ICE REPORT FROM CANADA.

The following cablegram, dated 12th May, 1932, was received from the Canadian Signal Service, Quebec:—

"Belle Isle Strait, heavy close packed and open ice everywhere, numerous bergs and growlers. Other points, no ice in sight."

ICE IN GREENLAND WATERS.

INFORMATION RECEIVED BY CABLEGRAM FROM DANISH METEOROLOGICAL INSTITUTE, COPENHAGEN.

May 12th..... "Free of ice 20 miles off Cape Farewell.
"Julianehaab Bay, ice edge 30 miles off shore."

NOTICES.

POSTAL ARRANGEMENTS.

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

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

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

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

DESPATCH OF INFORMATION

REQUIRED IMMEDIATELY FOR THE CONDUCT OF THE WORK AT SEA.

Shipowners, Marine Superintendents and all concerned in the despatch of mails to Ships abroad are asked to kindly facilitate the despatch and delivery of postal matter received at their offices from the Meteorological Office and Air Ministry Publication Depot to their Ships abroad.

This matter addressed to the Commanders of Ships contains information which is required for the Conduct of Marine Meteorological Work at Sea and is most effective if received by the Commanders at the earliest possible date.

Much of the information referred to is published in the Marine Observer and is of a seasonal nature. This journal also contains advice to Regular Observing Ships which enables them to perform voluntary service by Wireless Communication for the benefit of all shipping.

DERELICTS AND FLOATING WRECKAGE.

Date.	Position.		Description.
	Latitude.	Longitude.	
ENGLISH CHANNEL.			
12.5.32	50°22'N.	2°01'W.	Vertical object, apparently a torpedo, about 4 ft. above water.
NORTH ATLANTIC.			
2.5.32	36°59'N.	74°50'W.	Marker buoy showing 2 flags, and a black barrel buoy marked "15."
2.5.32	40°10'N.	65°50'W.	Large red cylindrical buoy.
4.5.32	43°09'N.	65°30'W.	Fishing schooner "Louis B. Marshall" on fire, also empty dory 3 miles N.E. of schooner.
4.5.32	40°08'N.	66°17'W.	Large black cylindrical buoy.
5.5.32	37°00'N.	65°25'W.	Spar projecting 12 ft. out of water, attached to submerged wreckage.
7.5.32	40°09'N.	62°15'W.	Nun buoy painted in black horizontal bands.
8.5.32	54°47'N.	18°54'W.	Conical buoy.
9.5.32	45°24'N.	26°45'W.	Large red conical buoy.
11.5.32	40°43'N.	58°30'W.	Hull of a vessel about 50 ft. long, bottom up and awash.

Date.	Position.		Description.
	Latitude.	Longitude.	
North Atlantic—contd.			
12.5.32	57°59'N.	14°44'W.	Submerged wreckage.
16.5.32	51°12'N.	10°24'W.	Wrecked aeroplane, floating, tail about 14 ft. above water, wings awash; danger to navigation.
20.5.32	50°— N.	12°10'W.	Black can buoy, approximately 4 ft. in diameter, with white numerals; dangerous to navigation.
21.5.32	48°05'N.	6°34'W.	5 floating red conical buoys; dangerous to navigation.
21.5.32	49°29'N.	11°53'W.	Log 20 ft. long, covered with marine growth; dangerous to navigation.
MEDITERRANEAN.			
21.5.32	35°48'N.	15°55'E.	Spars attached to submerged wreckage; dangerous to navigation.
BAY OF BISCAY.			
14.5.32	45°— N.	4°43'W.	Black buoy, marked "Telegraph," projecting 1 metre; dangerous to navigation.

LIST OF VOLUNTARY OBSERVING SHIPS

1

FLEET LIST.

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

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

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

Only in special cases will individual letters be sent.

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

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

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

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

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

Explanation of Abbreviations.

Unless otherwise stated, vessels on the following list are s.s.—M.V. indicates Motor Vessel; S.T. = Steam Trawler.

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

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

No. = No Meteorological Office instrumental equipment on board.

M = Ship's barometer *mercurial*.

A = Ship's barometer *aneroid*.

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

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

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

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

** = Short range transmission and reception.

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

Selected Ships.

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

Name of Vessel	Captain.	Observing Officers.	Meteoro-logical Equipment.	Line.	Last Log, Register, or Record Contributed. Received up to 13.5.32.	Date Received.
122 †† <i>Accra</i> , M.V.	Shooter, J. C.	R. B. Ellis	W.T.-M.	Elder Dempster	Forms 911 & 138 10.2.32 to 20.3.32	23.3.32
155 *† <i>Achilles</i>	Cosker, W.	C. Broad, J. Simpson	W.T.	A. Holt	Form 915 5.9.31 to 19.1.32	23.1.32
055 *† <i>Actor</i>	Whyte, D. L.	G. Penston, E. Pearce, P. Harrow.	No. M.	Harrison	Forms 911 & 138 27.11.31 to 31.1.32	19.2.32
123 †† <i>Adda</i> , M.V.	Lawson, J. H.	J. Boyd, F. C. Langton	W.T.-M.	Elder Dempster	" " 25.2.32 to 2.4.32	7.4.32
050 †† <i>Adriatic</i>	Freeman, C. P., R.D., Commr., R.N.R.	T. Holmes, G. Dray, R. Walker.	W.T.	White Star	" " 27.3.32 to 17.4.32	20.4.32
090 *† <i>Aeneas</i>	Wallace, W. K.	W. Williams, R. A. Hanney, P. Dunsire.	"	A. Holt	" " 7.1.32 to 26.3.32	30.3.32
166 *† <i>Agamemnon</i>	Beswick, W., D.S.C., Commr., R.N.R.	W. K. Hole, W. G. Harrison, O. Thomas.	"	"	" " 22.12.31 to 22.4.32	25.4.32
127 *† <i>Albion Star</i>	Hall, J. B.	T. Gilchrist	No. M.	Blue Star	Form 911 8.7.31 to 29.10.31	25.11.31
080 †† <i>Alcantara</i> , M.V.	Clarke, E., R.D., Commr., R.N.R.	W. W. Dovell, T. Davies, R. Smith.	W.T.	R.M.S.P.	Forms 911 & 138 24.1.32 to 4.3.32	12.3.32
178 *† <i>Alipore</i>	Carter, E. A. J. W.	J. P. McArthur	No. M.	P. & O.	" " 19.3.32 to 29.3.32	25.4.32
175 †† <i>Almanzora</i>	Shillitoe, B., R.D., Commr., R.N.R.	E. W. Martin, F. J. Brett.	W.T.	R.M.S.P.	" " 20.3.32 to 3.5.32	4.5.32
012 †† <i>Almeda Star</i>	Turner Russell, W.	H. Metcalf, E. Russell, C. L. Williams.	No. M.	Blue Star	" " 7.3.32 to 20.4.32	25.4.32
<i>Alynbank</i>	Robertson, J.	A. Hunter	" A.	A. Weir & Co.	Form 911 2.2.32 to 28.3.32	22.4.32
103 †† <i>Andalucia Star</i>	Vernon, R.	W. Cumming, P. Clarke, J. A. Coldwell.	" M.	Blue Star	Forms 911 & 138 22.2.32 to 4.4.32	7.4.32
079 *† <i>Antiochus</i>	Dougall, W. T.	C. F. Lock	W.T.	A. Holt	Form 911 15.2.32 to 14.3.32	17.3.32
209 †† <i>Aorangi</i> , M.V.	Spring-Brown, J. F.	E. Anderson, D. H. Richards, R. N. Turner.	M.L.	Canadian-Australasian	" 915 12.11.31 to 25.2.32	5.5.32
120 †† <i>Apapa</i> , M.V.	Beith, A.	W. B. Hunter, S. S. Franklin.	W.T.-M.	Elder Dempster	Forms 911 & 138 10.3.32 to 15.4.32	19.4.32
029 †† <i>Appam</i>	Draper, J. M.	W. M. M. Hutchings, O. Owens, B. C. Haigh.	W.T.	"	" " 28.3.32 to 2.5.32	4.5.32
017 †† <i>Aquitania</i>	Irving, R. B., O.B.E., R.D., A.D.C., Capt., R.N.R.	G. F. Jeffries, S. Payne, G. V. Locke.	"	Cunard	" " 6.3.32 to 3.5.32	6.5.32
115 †† <i>Arandora Star</i>	Moulton, E. W.	C. O. Worth, F. Graham, R. T. Hales.	No. M.	Blue Star	" " 18.3.32 to 15.4.32	19.4.32
<i>Architect</i>	Mowat, I.	G. Dewar	" M.	Harrison	Form 911 14.12.31 to 21.3.32	5.4.32
293 *† <i>Ariguani</i>	Scudamore, J. H. H., D.S.C., R.D., Commr., R.N.R.	A. Crone, A. Orchard, W. J. Maxwell.	W.T.	Elders & Fyffes	Form 915 9.2.32 to 24.4.32	27.4.32
144 †† <i>Arlanza</i>	Huff, G. F.	B. A. Gammon, H. V. Todd, J. S. Wrake.	"	R.M.S.P.	Forms 911 & 138 14.2.32 to 28.3.32	30.3.32
091 †† <i>Armada Castle</i>	Whitfield, G. J.	W. Pace, A. H. Parry, C. L. Lloyd.	"	Union Castle	" " 20.3.32 to 8.5.32	10.5.32
296 *† <i>Arracan</i>	Thomson, S.	G. Davidson	"	P. Henderson	Form 911 13.12.31 to 31.1.32	29.3.32
<i>Arundel</i>	Shaw, B.	E. Hill	C.C.	Southern Rly.	Telegraphic Report 21.3.32	21.3.32

THE MARINE OBSERVER

Name of Vessel.	Captain.	Observing Officers.	Meteoro-logical Equipment.	Line.	Last Log, Register, or Record Contributed. Received up to 13.5.32.	Date Received.
095 † <i>Arundel Castle</i> ...	Stuart, C. E., R.D., Capt., R.N.R.	G. L. Clarke ...	W.T.	Union Castle ...	Form 911 24.1.32 to 12.3.32 ...	19.3.32
280 † <i>Astronomer</i> ...	Richards, J. ...	W. P. Baker, R. Williams, E. B. Stephens.	No. M.	Harrison ...	Forms 911 & 138 7.12.31 to 2.3.32	14.3.32
065 † <i>Asturias M.V.</i> ...	Hannam, F. S. ...	H. G. Whittle, S. J. Hill, T. W. Stevens.	W.T.	R.M.S.P. Co. ...	" " 6.3.32 to 17.4.32	19.4.32
281 † <i>Auditor</i> ...	Owen, W. T. ...	L. Richardson ...	No. M.	Harrison ...	" " 2.8.30 to 29.9.31...	14.10.31
212 † <i>Australia</i> ...	Scutt, W. ...	H. Falkner, E. H. Lidstone, L. Smith.	" M.	British India ...	Form 915 5.9.31 to 19.1.32	3.2.32
124 † <i>Avila Star</i> ...	Thomas, R. J. ...	F. N. Johnson, R. C. Freaker, E. Potts.	" M.	Blue Star ...	Forms 911 & 138 27.3.32 to 11.5.32	13.5.32
068 † <i>Balmoral Castle</i> ...	Barron, A. ...	J. O. Lloyd, A. G. C. Price, G. F. Oakley	W.T.	Union Castle ...	Form 911 20.2.32 to 10.4.32 ...	12.4.32
179 † <i>Balranald</i> ...	Short, C. E. ...	J. A. Stewart ...	No. M.	P. & O. Branch ...	" 15.4.32 to 3.5.32	12.5.32
051 † <i>Baltic</i> ...	Hume, R. ...	S. Boden, G. Law, N. E. Banke.	W.T.	White Star ...	Forms 911 & 138 11.4.32 to 1.5.32	4.5.32
248 † <i>Banffshire</i> ...	Page, W. J. ...	A. Banks ...	No. M.	Turnbull Martin ...	" 16.12.31 to 19.1.32	22.2.32
180 † <i>Baradine</i> ...	Elliot Smith, H. ...	G. L. Farnfield ...	" M.	P. & O. Branch ...	Form 911 25.11.31 to 20.2.32	25.2.32
087 † <i>Baronesa</i> ...	Compton, R. W. ...	J. R. Faulkner, F. W. Kent, J. G. Freeman.	" M.	Houlder ...	Forms 911 & 138 21.2.32 to 18.4.32	27.4.32
213 † <i>Barpeta</i> ...	Partridge, H. ...	D. Clundison, J. Pool, R. C. H. Davies.	" M.	British India ...	" " 10.2.32 to 9.3.32	29.3.32
181 † <i>Barrabool</i> ...	Sheepwash, J. S. ...	W. Elvy, D. Swabey, C. Holmes.	" M.	P. & O. Branch ...	" " 3.1.32 to 9.4.32	12.4.32
070 † <i>Bayano</i> ...	Legge, A. W. ...	T. Leach, A. Sandham, R. Walker.	W.T.	Elders & Fyffes ...	Form 911 26.2.32 to 16.4.32 ...	25.4.32
<i>Beaverburn</i> ...	McCombie, G. F. ...	L. L. Thornton, W. J. P. Roberts, W. E. Halberd.	M.L.	Canadian Pacific ...	Form 915 1.11.31 to 7.3.32 ...	10.3.32
059 † <i>Belgenland</i> ...	Morehouse, W. A. ...	F. Good, J. Mackie, J. R. Loe.	W.T.	Red Star ...	Forms 911 & 138 3.11.31 to 21.11.31	24.11.31
183 † <i>Bendigo</i> ...	Wyatt, F. N. ...	H. Morgan, T. Hopkins, G. C. Forrest.	No. M.	P. & O. Branch ...	" " 25.3.32 to 4.4.32	2.5.32
<i>Bengore Head</i> ...	Kane, G. ...	C. J. Rea ...	" A.	Ulster S.S. Co. ...	Form 911 8.4.32 to 29.4.32	2.5.32
237 † <i>Berengaria</i> ...	Britten, E. T., R.D., Commr., R.N.R.	J. A. Croasdaile, W. A. Robson, G. Duguid.	W.T.	Cunard ...	Forms 911 & 138 24.4.32 to 10.5.32	12.5.32
145 † <i>Berwickshire</i> ...	Evens, E. H. ...	E. Coulthart, J. O. Woodall, R. Frankish.	"	Turnbull Martin ...	" " 22.10.31 to 22.1.32	28.1.32
057 † <i>Britannic M.V.</i> ...	Summers, F. F., R.D., Commr., R.N.R.	G. N. Jones, A. J. Fisher, O. W. Lucas.	"	White Star ...	" " 2.4.32 to 7.4.32	11.4.32
269 † <i>British Admiral</i> ...	Putt, R. O. ...	H. J. Were, D. J. Baird ...	No. M.	British Tankers ...	" 17.4.32 to 27.4.32	6.5.32
249 † <i>Buteshire</i> ...	Westropp, T. G. ...	P. McMillan, S. W. Brown, F. C. Doyle.	W.T.	Turnbull Martin ...	Form 915 " 22.6.31 to 7.2.32 ...	10.3.32
031 † <i>Caledonia</i> ...	Collie, A. ...	R. Blake, J. Green, R. Macfee	W.T.	Anchor ...	Forms 911 & 138 13.12.31 to 22.12.31	4.1.32
139 † <i>California</i> ...	Smart, R. W. ...	D. Morrison, A. C. Johnston, J. F. Adams.	"	" ...	" " 10.1.32 to 12.4.32	16.4.32
<i>Cambria</i> ...	Copland, C. P. ...	O. W. L. Jones ...	C.C.	L.M. & S. Rly. ...	Telegraphic Report 7.4.32	7.4.32
190 † <i>Cambridge</i> ...	Williams, R. ...	T. Farrar ...	M.L.	Federal ...	Form 911 17.7.31 to 10.11.31	23.11.31
266 † <i>Cameronia</i> ...	Gemmell, W. ...	D. Blair, E. Stormont, D. Bone.	W.T.	Anchor ...	Forms 911 & 138 10.4.32 to 30.4.32	4.5.32
295 † <i>Camito</i> ...	Jack, D. A. ...	A. Kissack, G. Binks, R. King.	"	Elders & Fyffes ...	" " 2.3.32 to 1.4.32	4.4.32
<i>Cape of Good Hope</i> ...	Jacobson, T. A. ...	W. R. Carling ...	No. A.	Lyle S.S. Co. ...	Form 911 2.3.31 to 23.3.32	18.4.32
282 † <i>Carinthia</i> ...	Townley, J. C., R.D., Capt., R.N.R.	J. Chapman, A. B. Fasting, G. S. Hutchinson.	W.T.	Cunard ...	Forms 911 & 138 11.4.32 to 16.4.32	19.4.32
092 † <i>Carnarvon Castle</i> ...	Morton Betts, W. ...	G. F. Pettitt, E. Clancy ...	"	Union Castle ...	" " 28.2.31 to 17.4.32	19.4.32
273 † <i>Carnarvonshire</i> ...	Gulston, H. S. ...	S. W. Spencer, W. B. Blair, D. T. Sherwell.	No. M.	Glen ...	" " 29.1.32 to 27.4.32	10.5.32
184 † <i>Cathay</i> ...	Daziell Riven, J. ...	A. J. McHatlie, B. H. Nonkivell, M. G. Morris.	" M.	P. & O ...	" " 10.4.32 to 24.4.32	9.5.32
<i>Cavina</i> ...	Forrester, W. T. ...	B. R. Coe ...	" A.	Elders & Fyffes ...	Form 911 8.3.32 to 11.4.32	15.4.32
<i>Cerintus M.V.</i> ...	Ramsay, N. ...	E. Allen, C. L. Seaman, G. B. Williams.	M.L.	Hadley Shipping ...	Form 915 19.10.31 to 5.2.32	9.2.32
<i>Changuinola</i> ...	Bostock, R. J. ...	O. H. Pullman ...	No. A.	Elders & Fyffes ...	Form 911 12.10.31 to 23.10.31	27.10.31
191 † <i>Chindwin</i> ...	Hughes, E. ...	J. A. Wilson ...	W.T.	Henderson ...	" 19.12.31 to 2.3.32	15.3.32
<i>Chinese Prince</i> ...	Uncles, H. ...	" ...	M.L.	Furness Withy ...	" ...	"
192 † <i>Chitral</i> ...	Siggers, O. ...	T. D. Forbes, S. N. Gerrans, W. S. Jolliffe	No. M.	P. & O. ...	Forms 911 & 138 20.3.32 to 8.4.32	2.5.32
265 † <i>City of Baroda</i> ...	Bremner, D. M. ...	H. G. Williams, E. Bonfield, R. W. Leese.	W.T.	Ellerman ...	Form 915 22.11.31 to 29.1.32	8.2.32
<i>City of Cambridge</i> ...	Ewing, W. ...	H. H. Asher ...	No. A.	" ...	Form 911 15.2.32 to 7.3.32	2.5.32
061 † <i>City of Exeter</i> ...	Nichol, L. ...	H. Burns, J. Fyfe, W. V. Mighton.	W.T.	" ...	Forms 911 & 138 30.10.31 to 1.1.32	9.1.32
274 † <i>City of Harvard</i> ...	MacMillan, J. ...	E. Brook-Williams ...	"	" ...	Form 911 18.3.32 to 1.4.32	25.4.32
089 † <i>City of Hereford</i> ...	Ricketts, R. J. ...	F. Tibbetts, J. H. T. Vizer ...	No. M.	" ...	Forms 911 & 138 16.2.32 to 4.3.32	29.3.32
300 † <i>City of Paris</i> ...	McMillan, J. ...	J. Cook, E. A. Davidson, W. Charlton.	W.T.	" ...	" 11.10.31 to 1.11.31	4.1.32
271 † <i>City of Roubaix</i> ...	Radcliffe, A. V., R.D., Lt.-Commr., R.N.R.	A. N. G. Jones ...	No. M.	" ...	Form 911 8.3.32 to 30.3.32	25.4.32
272 † <i>City of Singapore</i> ...	Kendall, J. W. ...	F. Wrigley, C. C. Collard ...	" M.	" ...	Forms 911 & 138 19.1.32 to 8.4.32	20.4.32
035 † <i>City of Sydney</i> ...	Mason, E. ...	C. S. Humphries, H. G. Griffith.	" M.	" ...	" " 19.3.32 to 9.4.32	2.5.32
027 † <i>Clan Keith</i> ...	Waterhouse, J. ...	W. N. Tudman, A. H. Black, D. W. Gibbons.	W.T.	Clan ...	" " 21.1.32 to 15.2.32	18.2.32
<i>Clan Macalister</i> ...	Stenson, F. J., A.D.C., R.D., Capt., R.N.R.	J. L. Jones ...	No. A.	" ...	Form 911 19.3.32 to 25.3.32	19.4.32
<i>Clan Macbeth</i> ...	Giles, H. J., R.D. R.N.R.	I. Cape Scott, L. W. Gibbons.	" A.	" ...	" 29.11.31 to 22.12.31	30.12.31
287 † <i>Clan Macfarlane</i> ...	Redford, L. F., Lt.- Commr., R.N.R.	W. H. Simpson ...	W.T.	" ...	" 15.11.31 to 12.3.32	7.4.32
<i>Clan Macindoe</i> ...	Scott-Smith, H. E. G. O.B.E., R.D., Lt.- Commr., R.N.R.	J. C. Dunphy ...	No. A.	" ...	" 25.1.32 to 24.2.32	12.3.32

LIST OF VOLUNTARY OBSERVING SHIPS

iii

Name of Vessel.	Captain.	Observing Officers.	Meteoro- logical Equipment.	Line	Last Log, Register, or Record Contributed. Received up to 13.5.32.	Date Received.
33 *† <i>Clan Mackellar</i> ...	Lyall, A. B. ...	A. V. Howard, G. S. Bullock, E. E. Arthur.	W.T.	Clan ...	Forms 911 & 138 10.11.31 to 26.1.32	16.2.32
001 *† <i>Clan Macphie</i> ...	Gibb, A. W. P. ...	R. G. Bagnall ...	"	" ...	Form 911 15.2.32 to 8.3.32	11.4.32
004 *† <i>Clan MacNair</i> ...	Holman, W. G. ...	F. H. Petheridge A. Wood- row, J. F. Vooght.	"	" ...	Forms 911 & 138 22.11.31 to 15.2.32	17.2.32
168 *† <i>Clan Mac'aggart</i> ...	West, W. F. ...	M. J. Lewis, H. Whitehead, C. Rodger.	"	" ...	Form 915 11.6.31 to 30.10.31	7.11.31
002 *† <i>Clan Macw'urter</i> ...	O'Bryne, C. E. ...	A. Lynch, M. Banks, N. N. Birtley.	"	" ...	" 25.3.32 to 5.4.32	14.4.32
003 *† <i>Clan Malcolm</i> ...	George, L. S. ...	A. G. Beynon ...	"	" ...	Form 911 10.4.32 to 15.4.32	19.4.32
283 *† <i>Clan Morrison</i> ...	Porterfield, W. M., Lt.- Commr., R.N.R.	D. Mc Allister ...	No. A.	" ...	" 2.4.32 to 16.4.32	10.5.32
<i>Clan Sinclair</i> ...	Cater, H. ...	W. Moore, A. P. Brown. A. Smart.	" M.	Harrison ...	" 14.2.32 to 17.3.32	23.3.32
298 *† <i>Comedian</i> ...	Cadogan, A. ...	F. M. Eales, W. G. Ellis ...	" M.	" ...	Forms 911 & 138 8.4.32 to 28.4.32	9.5.32
185 †† <i>Comorin</i> ...	Cartwright, C. W. D.S.C.	R. E. Tucker ...	" M.	P. & O. ...	Form 911 28.2.32 to 20.3.32	2.5.32
198 *† <i>Contractor</i> ...	Owen, W. J. ...	N. F. Neill, L. Seddon, R. Myles.	" M.	Harrison ...	Forms 911 & 138 21.3.32 to 16.4.32	9.5.32
049 ** <i>Coptic, M.V.</i> ...	Williams, G. ...	J. G. James, P. Saville, W. Burt.	W.T.	Shaw, Savill & Albion	" " 14.3.32 to 16.4.32	19.4.32
301 †† <i>Corfu</i> ...	French, F. E., R.D., Captain, R.N.R.	" ...	W.T.-M.	P. & O. ...	" ...	"
100 *† <i>Cornwall</i> ...	Reilly, H. E. ...	H. Hopkins, C. Saul, R. S. Miller.	M.L.	Federal ...	Form 915 16.8.31 to 12.12.31	27.1.32
006 †† <i>Coronado</i> ...	Thorburn, R. A., R.D., Commr., R.N.R.	A. Orchard, H. Holmes, A. Magill.	W.T.	Elders & Fyffes ...	Forms 911 & 138 1.4.32 to 29.4.32...	2.5.32
214 *† <i>Counsellor</i> ...	Jackson, J. ...	G. C. Heaton, J. Davidson, J. L. Curle.	No. M.	Harrison ...	" " 6.12.31 to 7.3.32	19.3.32
036 *† <i>Cumberland</i> ...	Maltby, T. L. ...	S. R. Leggett, J. Brooke Smith, F. R. F. Wilson.	M.L.	Federal ...	Form 915 18.10.31 to 20.2.32	1.3.32
285 *† <i>Custodian</i> ...	O'Connor, T. ...	W. H. Corlett, J. L. Williams, J. Glen.	No. M.	Harrison ...	Forms 911 & 138 4.12.31 to 5.2.32	19.3.32
169 *† <i>Dalgoma</i> ...	Beeching, P. H. ...	" ...	No. M.	British India ...	Forms 911 & 138 18.1.32 to 10.3.32	14.3.32
302 †† <i>Darro</i> ...	Matthews, G. P. ...	F. Jury ...	W.T.-M.	R.M.S.P. Co. ...	Form 915 14.11.31 to 21.1.32	26.1.32
<i>Denis</i> ...	Griffiths, W. ...	A. W. Hanchett, J. H. Stoker, S. Pollock.	M.L.	Booth ...	" " 7.12.31 to 28.1.32	2.2.32
304 †† <i>Deseado</i> ...	Buret, J. F. C. ...	L. T. Peterson, H. Lang ...	W.T.-M.	R.M.S.P. Co. ...	Forms 911 & 138 15.2.32 to 8.4.32	12.4.32
117 †† <i>Desna</i> ...	Schlanbusch, O. V. ...	W. Lowe, L. T. Peterson ...	"	" ...	" " 29.2.32 to 8.3.32	19.3.32
252 *† <i>Devon</i> ...	Clarke, P. B. ...	G. Chaplin, J. D. Marks, M. Willinott.	No. M.	Federal ...	" " 26.1.32 to 15.4.32	18.5.32
<i>Dieppe</i> ...	Lidbetter, W. ...	E. A. Biles ...	C.C.	Southern Railway ...	Telegraphic Report 12.5.32	12.5.32
284 *† <i>Director</i> ...	Worthington, B. ...	M. G. O'Brien, A. E. Rogers, H. W. Jones.	No. M.	Harrison ...	Forms 911 & 138 15.9.31 to 30.11.31	15.12.31
138 *† <i>Discovery II, R.R.S</i>	Carey, W. M., Commr., R.N.	R. A. B. Ardley, A. L. Nelson, L. C. Hill.	M.L.	Falkland Is. Govt. ...	Form 915 5.1.32 to 4.3.32	7.4.32
136 *† <i>Doric Star</i> ...	Mills, D. H. ...	L. Vernon, H. Butt, J. McLean	No. M.	Blue Star ...	Form 911 2.11.31 to 25.1.32	11.2.32
275 *† <i>Dramatist</i> ...	Meek, A. J. ...	G. H. Howard, I. W. Page, R. L. Bryde.	" M.	Harrison ...	Forms 911 & 138 4.2.32 to 17.3.32	21.3.32
142 †† <i>Duchess of Atholl</i> ...	McQueen, D. S. ...	P. A. Shergold, C. E. Duggen, E. Glennie.	W.T.-M.	Canadian Pacific ...	" " 26.3.32 to 15.4.32	18.5.32
152 †† <i>Duchess of Bedford</i> }	Sibbons, H. ...	L. Outram, G. Billot, F. Stell.	"	" " " ...	" " 30.12.31 to 23.4.32	25.4.32
151 †† <i>Duchess of</i>	Freer, A., R.D., Capt., R.N.R.	J. B. Hewson, E. N. Lloyd ...	"	" " " ...	" " 18.4.32 to 6.5.32	10.5.32
143 †† <i>Duchess of York</i> ...	Stuart, R. N., V.C., D.S.O., Commr., R.N.R.	D. Parsons, S. W. Keary ...	"	" " " ...	" " 26.3.32 to 29.4.32	6.5.32
098 †† <i>Dunbar Castle, M.V</i>	Vincent, E. S., R.D., Commr., R.N.R.	J. Daziel, P. G. MacIver, H. A. Causton.	W.T.	Union Castle ...	" " 26.1.32 to 12.2.32...	16.2.32
<i>Dunrobin</i> ...	Ramsay, J. D. ...	T. J. Hewlett ...	No. A.	Glen & Co. ...	Form 911 13.2.31 to 31.3.32	10.5.32
052 *† <i>Dunster Grange</i> ...	Wilson, G. F. ...	J. Allerton, E. G. Raynor, D. Murray.	" M.	Houlder ...	Forms 911 & 138 17.1.32 to 23.3.32	29.3.32
102 *† <i>Duquesa</i> ...	Frost, C. R. ...	R. Rushton, C. W. Denman, F. D. Jones.	" M.	Furness Withy ...	" " 30.11.31 to 28.1.32	2.2.32
15 *† <i>Durenda, M.V.</i> ...	Blencowe, J. ...	T. R. Jackson, G. H. Davies...	" M.	British India ...	" " 30.11.31 to 12.2.32	19.2.32
077 †† <i>Edinburgh Castle</i> ...	Gilbert, E. F. ...	L. H. Farrow, W. Aldous ...	W.T.	Union Castle ...	Forms 911 & 138 5.3.32 to 24.4.32	5.5.32
107 *† <i>El Argentino, M.V.</i>	Ellis, F., D.S.C. ...	W. Findlay, J. Burch, C. G. Adlard.	No. M.	Houlder ...	" " 8.12.31 to 9.2.32	18.2.32
009 *† <i>Elmworth, M.V.</i> ...	Dick, J. ...	J. Macfarlane, F. Vose, F. Scott.	" M.	R. S. Dalgleish ...	Form 911 18.3.32 to 7.4.32	4.5.32
158 *† <i>Elpenor</i> ...	Wilson, R. J. ...	" ...	W.T.	A. Holt ...	Form 915 23.8.31 to 3.1.32	11.1.32
108 *† <i>Elstree Grange</i> ...	Williams, W. E. ...	P. A. Hawkesworth ...	No. M.	Houlder ...	Forms 911 & 138 16.2.32 to 28.4.32	12.5.32
190 *† <i>El Paraguayo</i> ...	Owen, R. ...	G. Fletcher, R. L. Aldridge...	" M.	" ...	Forms 911 & 135 13.12.31 to 5.2.32	12.2.32
110 *† <i>El Uruguayo</i> ...	McNamara, T. ...	F. E. Hailstone ...	" M.	" ...	" " 8.2.32 to 15.4.32	18.4.32
088 *† <i>Empire Star</i> ...	Owen, G., R.D., Lt.- Commr., R.N.R.	R. Thorne, R. McKraith, P. H. Hunt.	W.T.	Blue Star ...	Form 915 31.8.31 to 3.1.32	30.1.32
006 †† <i>Empress of Australia</i>	Griffiths, E. ...	O. F. Pennington, E. Roberts, A. H. Pigott.	"	Canadian Pacific ...	Forms 911 & 138 17.4.32 to 3.5.32	5.5.32
034 †† <i>Empress of Britain</i>	Latta, R. G. ...	J. R. Bubbs, W. P. Phillips, J. H. Tudor.	"	" " " ...	" " 10.4.32 to 14.4.32	18.5.32
154 †† <i>Empress of Canada</i>	Hailey, A. J., Lt.- Commr., R.N.R., Douglas, L. D., Lieut.-Commr., R.N.R.	G. O. Baugh, R. H. Foley, H. Kennedy, G. W. R. Graves.	M.L.	" " " ...	Form 915 19.7.31 to 16.12.31	18.1.32
153 †† <i>Empress of Japan</i>	Robinson, S., C.B.E., R.D. Commr., R.N.R.	R. Goss, R. Walfenden, E. Newell.	"	" " " ...	" " 5.2.31 to 24.7.31	18.2.32
011 †† <i>Euripides</i> ...	Vaughan, P. R., D.S.C., R.D., Commr., R.N.R.	R. H. Shaw, D. Don, J. H. Campbell.	W.T.-M.	White Star ...	Forms 911 & 138 23.12.31 to 28.1.32	1.2.32
<i>Explorer</i> ...	Allan, J. ...	A. Stout ...	No. A.	Scottish Fishery Brd.	Form 911 5.4.32 to 22.4.32	6.5.32

Name of Vessel.	Captain.	Observing Officers.	Meteoro-logical Equipment.	Line.	Last Log, Register, or Record Contributed. Received up to 13.5.32.	Date Received.
067 *† <i>Ferndale</i> ...	Beighton, J. N. ...	L. J. Hopkins, H. C. Howie, D. W. Campbell.	No. M.	Aberdeen Common-wealth.	Forms 911 & 138 3.9.31 to 8.10.31	26.11.31
074 *† <i>Fordsdale</i> ...	Avern, J., Commr. R.N.R.	L. Hopkins, F. Davies, M. Harrier.	" M.	" "	" " 7.2.32 to 16.3.32	25.4.32
030 †† <i>Franconia</i> ...	Gibbons, G., R.D., Capt., R.N.R.	J. Ashcroft, C. Taylor, R. Pollitt.	W.T.	Cunard ...	Form 911 28.12.31 to 1.1.32 ...	15.1.32
159 *† <i>Fresno City</i> ...	Davies, D. ...	F. W. P. Davies ...	M.L.	Sir W. Reardon Smith and Sons Ltd.	... ..	...
234 *† <i>Glaucus</i> ...	Beale, H. E. ...	...	M.L.	A. Holt...	...	...
125 *† <i>Glenamoy</i> , M.V. ...	Ings, W. J. ...	F. Laycock, L. Eccles, A. C. Radley.	W.T.	Glen Line ...	Form 915 22.6.31 to 27.10.31 ...	2.11.31
126 *† <i>Glengarry</i> , M.V. ...	Angier, J. ...	G. Morgan, I. G. Neill, S. W. Bell.	No. M.	" ...	Forms 911 & 138 12.11.31 to 13.3.32	19.3.32
085 *† <i>Governor</i> ...	Windsor, G. R. ...	A. Watson, J. Stanhope ...	" M.	Harrison ...	" " 3.11.31 to 31.1.32	4.2.32
111 *† <i>Hardwicke Grange</i>	Fowler, W. H. ...	W. L. Baker, A. W. Seybold, W. E. Ellis.	No. M.	Houlder ...	Forms 911 & 138 2.8.31 to 7.10.31	13.10.31
<i>Harmonides</i> ...	Elwell, F. R. ...	J. H. Kirkwood, — MacLeod, F. Mitchell.	" A.	K. P. Houston ...	Form 911 8.3.32 to 7.4.32 ...	18.4.32
262 ** <i>Hawaki</i> , M.V. {	Hender, W. ...	H. A. Brockett, J. Sadleir, E. R. Pate.	M.L.	Union S.S. Co., N.Z. ...	Form 915 2.8.31 to 19.1.32 ...	24.3.32
206 *† <i>Herminius</i> ...	Thurston, H. P. ...	E. Riccard, A. G. Collins, G. MacNab.	"	Shaw, Savill & Albion	" 22.11.31 to 14.3.32 ...	21.3.32
253 *† <i>Hertford</i> ...	Burton Davies, J. ...	P. Shakespeare, W. H. Timberlake, P. Block.	"	Federal ...	" 18.11.31 to 28.2.32 ...	5.3.32
<i>Hibernia</i> ...	Williams, E. R. ...	C. A. Marsh ...	C.C.	L.M. & S. Railway ...	Telegraphic Report 18.4.32 ...	18.4.32
182 †† <i>Highland Brigade</i>	Lloyd, H. ...	W. Stephen, N. Hersee, C. Morgan.	No. M.	Nelson ...	Forms 911 & 138 25.12.31 to 16.2.32	23.2.32
116 †† <i>Highland Chieftain</i> , M.V.	Robinson, R. H. ...	W. J. Presland, L. Irving, J. E. Pink.	W.T.—M.	" ...	" " 8.2.32 to 29.3.32	1.4.32
099 †† <i>Highland Monarch</i> , M.V.	Ashby Graves, F. ...	R. Polden ...	No. M.	" ...	" " 25.1.32 to 16.3.32	24.3.32
250 †† <i>Highland Princess</i> , M.V.	Collings, D. ...	C. E. Leech, J. H. Fitton, T. W. Seabrook	W.T.—M.	" ...	" " 25.2.32 to 10.4.32	14.4.32
075 *† <i>Hobson's Bay</i> ...	Roberts, T. V., R.D., Lt.-Commr., R.N.R.	F. L. Gross, C. Smith, C. Carroll.	No. M.	Aberdeen Common-wealth.	Form 915 9.7.31 to 11.10.31 ...	19.10.31
026 †† <i>Homerie</i> ...	Field, H. G. B. ...	P. S. Calcutt, H. F. Wilkinson, M. T. D. Walter.	W.T.	White Star	...	...
261 *† <i>Huntingdon</i> ...	Field, H. G. B. ...	P. S. Calcutt, H. F. Wilkinson, M. T. D. Walter.	"	Federal ...	Forms 911 & 138 26.1.32 to 6.4.32	25.4.32
200 *† <i>Huntsman</i> ...	Russell, H. ...	J. Richardson ...	No. M.	Harrison ...	" 15.12.31 to 25.2.32	29.3.32
289 *† <i>Inanda</i> ...	Gibbings, W. H. ...	D. C. Brown, R. L. Williams, T. W. Kent.	No. M.	Harrison ...	Forms 911 & 138 31.1.32 to 14.3.32	29.3.32
<i>Ingoma</i> ...	Richardson, R. ...	D. D. Kerr ...	" M.	" ...	Form 911 28.2.32 to 7.4.32 ...	12.4.32
160 *† <i>Ixion</i> ...	Stewart, J. A. ...	C. S. Pope, G. Collier, F. G. Brown.	M.L.	A. Holt ...	Form 915 11.4.30 to 9.9.31 ...	16.11.31
072 ** <i>Jamaica Planter</i> ...	P. D. Allen ...	G. R. Wortley ...	W.T.	Jamaica Direct Fruit	Forms 911 & 138 22.2.32 to 25.3.32	6.4.32
203 ** <i>Japanese Prince</i> ...	Hardcastle, E. ...	...	M.L.	Prince ...	...	...
<i>Japanese Prince</i> , M.V.	Morrison, B. ...	W. A. Hall ...	No. A.	" ...	Form 911 26.3.32 to 2.4.32 ...	15.4.32
187 *† <i>Jeyapore</i> ...	Harris, W. L. ...	A. G. Edwards ...	" M.	P. & O. ...	Forms 911 & 138 7.2.32 to 12.3.32	29.3.32
188 †† <i>Katsar-i-Hind</i> ...	Headlam, P. C., R.D., Commr. R.N.R.	J. D. Strike, L. J. Cooke, P. J. Sturdee.	No. M.	P. & O. ...	Forms 911 & 138 13.3.32 to 22.4.32	29.4.32
041 *† <i>Karamea</i> , M.V. ...	Kenworthy, V. ...	N. S. Milne, C. Sendall, P. Campbell.	M.L.	Shaw, Savill & Albion	Form 915 11.12.31 to 4.4.32 ...	7.4.32
217 *† <i>Karapara</i> ...	White, R. W. ...	L. G. Jones, J. H. Pratt ...	No. M.	British India ...	Forms 911 & 138 12.3.32 to 4.4.32	25.4.32
114 *† <i>Kenya</i> ...	Miller, A. C. ...	G. E. Stephenson, P. Lusher, G. Spedding.	" M.	" " ...	" " 25.2.32 to 7.4.32	9.4.32
218 *† <i>Khandalla</i> ...	Eadie, J. D. ...	D. W. Dix, A. T. U. Baillie	" M.	" " ...	" " 11.2.32 to 25.3.32	22.4.32
186 *† <i>Kidderpore</i> ...	Wright, C. S., R.D., Commr., R.N.R.	F. R. M. Greasley, G. B. Roche	" M.	P. & O. ...	" " 18.1.32 to 15.3.32	11.4.32
147 †† <i>Laconia</i> ...	Hawkes, W., R.D., Capt. R.N.R.	J. D. Archer ...	W.T.	Cunard ...	Forms 911 & 138 30.11.31 to 19.12.31	29.12.31
193 *† <i>Lahore</i> ...	Hollow, J. H. ...	J. G. K. Gregory, F. Hull, S. R. Eva.	No. M.	P. & O. ...	" " 8.11.31 to 5.2.32	11.2.32
167 †† <i>Lancastria</i> ...	Dolphin, G. R., R.D., Commr., R.N.R.	J. S. Glendinning, J. C. Dawson, R. V. Yould.	W.T.	Cunard ...	Form 911 21.2.32 to 10.4.32 ...	12.4.32
082 *† <i>La Paz</i> , M.V. ...	Morgan, D. R. ...	G. Pattison ...	No. M.	Pacific S.N. Co. ...	Forms 911 & 138 4.1.32 to 17.4.32	22.4.32
131 †† <i>Lapland</i> ...	Harvey, H. ...	L. Williams, H. Patterson, R. M. Farmer.	W.T.	Red Star ...	" " 19.10.31 to 24.10.31	10.11.31

LIST OF VOLUNTARY OBSERVING SHIPS

v

Name of Vessel.	Captain.	Observing Officers.	Meteoro-logical Equipment.	Line.	Last Log. Register, or Record Contributed. Received up to 13.5.32.	Date Received.
076 *† <i>Largs Bay</i> ...	Jermyn, W. M. ...	F. B. Marsden ...	No. M.	Aberdeen Common-wealth.	Forms 911 & 138 15.10.31 to 25.11.31	15.2.32
112 *† <i>La Rosarina</i> ...	Webb, C. ...	W. S. Hamblin, S. W. Hawell	" M.	Houlder ...	" " 11.1.32 to 13.3.32	7.3.32
287 *† <i>Lassell</i> ...	Lindsay, J. M. ...	" " " " " "	W.T.	Lampert & Holt ...	Form 911 " 24.8.31 to 13.11.31	16.12.31
064 †† <i>Laurentie</i> ...	Vaughan, P. R. ...	J. H. Walker ...	" M.	White Star ...	Forms 911 & 138 17.4.32 to 8.5.32	11.5.32
083 *† <i>Lautaro, M.V.</i> ...	Kite, E. ...	J. Lloyd Jones, J. Williams, C. Stowe.	No. M.	Pacific S.N. Co. ...	" " 8.1.32 to 10.2.32	27.2.32
251 *† <i>Limerick</i> ...	Molyneux, P. L. ...	J. Trotter, N. A. Thomas ...	" M.	Federal ...	" " 5.1.32 to 3.2.32	21.3.32
093 *† <i>Llandaff Castle</i> ...	Linklater, H. ...	J. M. Goode ...	W.T.	Union Castle ...	" " 26.2.32 to 2.5.32	6.5.32
097 †† <i>Llangibby Castle, M.V.</i> ...	Nicholl, D. ...	G. W. Lloyd ...	"	" " ...	" " 1.1.32 to 4.3.32	10.3.32
094 *† <i>Llandovery Castle</i> ...	Morgan, A. O., R.D., Commr., R.N.R.	R. C. J. Hatt ...	"	" " ...	" " 10.2.32 to 3.4.32	20.4.32
216 *† <i>Llanstephan Castle</i> ...	Bickford, C. N. ...	S. Smith, H. Close, G. Willis	"	" " ...	" " 25.1.32 to 19.3.32	30.3.32
084 *† <i>Lobos, M.V.</i> ...	Good, W. T. ...	R. H. Sissons, J. Kerr, E. Potter.	No. M.	Pacific S.N. Co. ...	" " 3.10.31 to 4.1.32	9.1.32
137 *† <i>Logician</i> ...	Herschel, R. J. ...	E. L. Stockley, J. Wallis, W. R. Mackenzie.	" M.	Harrison ...	" " 1.11.31 to 8.2.32	15.2.32
008 *† <i>Losada</i> ...	Ridyard, A. ...	L. W. Hutchinson ...	" M.	Pacific S.N. Co. ...	" " 24.1.32 to 9.3.32	15.3.32
013 *† <i>Macharda</i> ...	Hanna, R. G. ...	C. Lindsay Miller, C. Parry, G. A. Jackson.	No. M.	Brocklebank ...	Forms 911 & 138 17.1.32 to 15.2.32	7.3.32
232 *† <i>Madura</i> ...	Wright, J. A. ...	A. Usher, W. Bain ...	" M.	British India ...	" " 4.12.31 to 11.2.32	17.2.32
078 *† <i>Magician</i> ...	Bury, E. R. ...	W. E. Shotton, J. Johnson ...	" M.	Harrison ...	" " 30.10.31 to 5.1.32	21.1.32
141 *† <i>Mahia</i> ...	Andrews, C. M. ...	G. Sangwin, M. P. Congdon, J. Jackson.	W.T.	Shaw, Savill & Albion	" " 24.12.31 to 14.4.32	18.4.32
140 *† <i>Mahratta</i> ...	Owen, I. T. ...	T. C. Eddy, H. F. Scoins, J. Wilson.	No. M.	Brocklebank ...	" " 15.3.32 to 24.3.32	1.4.32
014 *† <i>Mahronda</i> ...	Whitham, F. ...	W. Le Brocq, M. Melville, H. Willington.	" M.	" " ...	" " 29.2.32 to 28.3.32	18.4.32
015 *† <i>Mahsud</i> ...	Kershaw, R. W. ...	S. Richardson, J. R. Paisley	" M.	" " ...	" " 2.10.31 to 22.1.32	1.2.32
016 *† <i>Maidan</i> ...	Ison, W. A. ...	F. Moore, F. L. Attwood, L. E. Jeans.	" M.	" " ...	" " 26.2.31 to 8.5.31	12.5.31
042 *† <i>Matmoa</i> ...	Johnson, J. W. ...	A. Winton, D. O. V. Pickers-gill, W. A. Rogers.	M.L.	Shaw, Savill & Albion	Form 915 19.6.31 to 29.10.31	3.11.31
054 †† <i>Majestic</i> ...	Trant, E. L., R.D., Commr., R.N.R.	E. Stuart ...	W.T.	White Star ...	Forms 911 & 138 15.4.32 to 27.4.32	30.4.32
018 *† <i>Makalla</i> ...	Maughan, J. W. ...	A. C. Hocking, J. Richardson	No. M.	Brocklebank ...	" " 9.12.31 to 20.2.32	25.2.32
225 *† <i>Makura</i> ...	MacDonald, D. ...	A. P. Cousin, J. Billingham, H. McKae.	M.L.	Canadian-Australasian	Form 915 6.8.31 to 17.12.31	15.3.32
019 *† <i>Malakuta</i> ...	Adamson, F. L. ...	H. Simpson ...	No. M.	Brocklebank ...	Forms 911 & 138 11.5.31 to 2.12.31	29.1.32
020 *† <i>Malancha</i> ...	Cochran, G. N. ...	L. F. Dodson, A. Hill, R. Penston.	" M.	" " ...	" " 15.2.32 to 16.3.32	11.4.32
303 *† <i>Malayan Prince</i> ...	Holloway, J. ...	D. Macfadyen, F. M. Ben-castle, K. K. Boyd.	M.L.	Prince ...	" " 18.10.31 to 12.1.32	15.1.32
219 *† <i>Malda</i> ...	Denne, G. H. A. ...	R. E. Baldwin - Wiseman, G. R. Peters, J. J. Manning.	No. M.	British India ...	Forms 911 & 138 18.10.31 to 12.1.32	15.1.32
195 †† <i>Maloja</i> ...	Browning, J. B. R.D., Commr. R.N.R.	F. E. Berner ...	" M.	P. & O. ...	" " 30.1.32 to 4.5.32	11.5.32
196 †† <i>Malwa</i> ...	Britten, P. O. ...	A. L. Harrop, J. Robinson, R. G. Widdon.	" M.	" " ...	Form 911 20.3.32 to 8.4.32	9.4.32
053 *† <i>Manaar</i> ...	Thowless, E. ...	E. E. Bonnaud, J. Eccles, G. L. Southern.	" M.	Brocklebank ...	Form 911 & 138 20.7.31 to 9.10.31	21.10.31
<i>Manchester Brigade</i>	Stott, C. H. ...	" " " " " "	M.L.	Manchester Liners ...	Form 915 8.8.31 to 15.2.32	19.2.32
<i>Manchester Commerce.</i>	Linton, P. ...	" " " " " "	"	" " " " " "	" " " " " " " "	"
<i>Manchester Hero</i> ...	Mitchell, G. M. ...	R. O. Jones, J. N. Emmitt, M. Barnes	"	" " " " " "	Form 915 27.6.31 to 4.10.31	21.10.31
028 †† <i>Mandala</i> ...	Stockwell, H. ...	E. Ashby, A. Pyatt, G. Singer.	No. M.	British India ...	Forms 911 & 138 18.11.31 to 25.1.32	8.2.32
146 *† <i>Mandasor</i> ...	Richardson, T. ...	H. Fosbrooke, F. C. Madden, J. B. Leigh.	" M.	Brocklebank ...	" " 12.1.32 to 30.3.32	5.4.32
220 *† <i>Manela</i> ...	Maples, S. H. ...	W. F. Solly, T. M. Robertson, G. B. Adam.	" M.	British India ...	" " 4.4.32 to 21.4.32	9.5.32
022 *† <i>Manipur</i> ...	Fulcher, H. D. ...	J. L. Rodger ...	" M.	Brocklebank ...	" " 6.2.32 to 8.3.32	4.4.32
221 *† <i>Manora</i> ...	Hudson, H. T., R.D., Commr., R.N.R.	A. F. Baber, W. Brawn, J. W. Elcoat.	" M.	British India ...	" " 25.10.31 to 29.11.31	4.12.31
177 *† <i>Mantola</i> ...	James, D. F. ...	W. R. Day, S. Henderson, H. I. Fisher.	" M.	" " ...	" " 20.1.32 to 11.4.32	19.4.32
197 †† <i>Mantua</i> ...	Hignett, R.D., Commr. R.N.R.	J. D. Homidge, J. A. Wild, E. J. Sparling.	W.T.-M.	P. & O. ...	" " 22.8.31 to 9.11.31	2.12.31
299 *† <i>Marella</i> ...	Donaldson, A. ...	A. W. Blair, D. Pemberton, A. G. W. Thomas.	M.L.	Burns Philp ...	Form 915 3.6.31 to 23.10.31	7.1.32
<i>Marengo</i> ...	Sibree, J. S. ...	F. Brown, C. Newton, J. E. Dobson.	"	Ellerman Wilson ...	" " 26.3.31 to 29.10.31	6.11.31
222 †† <i>Margha</i> ...	Kitson, G. A. ...	L. F. Wattkins, J. Smail, P. Wright.	W.T.	British India ...	Forms 911 & 138 13.2.32 to 16.3.32	18.3.32
104 *† <i>Marquesa</i> ...	Smiles, R. S. ...	J. Wetherall ...	No. M.	Furness Houlder ...	" " 22.12.31 to 25.2.32	2.3.32
021 *† <i>Masula</i> ...	Fitt, W. H. ...	J. L. Richardson, W. Ascroft, P. Sims.	" M.	British India ...	" " 23.2.32 to 3.5.32	9.5.32
251 *† <i>Matakana</i> ...	Gordon, H. R. ...	H. Thompson, D. L. G. Turner, G. C. Allen.	W.T.	Shaw, Savill & Albion	Form 915 10.11.31 to 2.2.32	9.3.32
044 †† <i>Mataroa</i> ...	Gaskell, J. H., R.D., Lt.-Commr., R.N.R.	H. A. Hill, F. C. Charnley, K. Owen.	M.L.	" " " " " "	" " 6.11.31 to 15.2.32	23.2.32
023 *† <i>Matheran</i> ...	Mulcahy, J. J. ...	S. S. Slade, J. F. Butterworth, W. Cowrie.	No. M.	Brocklebank ...	Forms 911 & 138 3.4.32 to 13.4.32	22.4.32
223 *† <i>Matiana</i> ...	Green, F. V. ...	L. A. Bunn, D. Robertson ...	" M.	British India ...	" " 9.4.32 to 20.4.32	30.4.32
024 *† <i>Matra</i> ...	Cornish, N. P. ...	" " " " " "	" M.	Brocklebank ...	" " 18.8.31 to 3.12.31	9.12.31
032 †† <i>Mauvetania</i> ...	Peel, R. V., R.D., Capt., R.N.R.	E. W. Connell, R. H. C. Crawford, L. R. Sharpe.	W.T.	Cunard ...	" " 7.4.32 to 20.4.32	22.4.32
101 †† <i>Melita</i> ...	Stewart, A. ...	H. W. Saunders, A. M. Watt, G. Mowatt.	W.T.-M.	Canadian Pacific ...	" " 20.3.32 to 8.4.32	11.4.32
278 *† <i>Middlesex</i> ...	Almond, J. G. ...	J. R. Ricketts, E. G. Henry, L. G. Gould.	M.L.	Federal ...	Forms 911 & 138 16.10.31 to 31.12.31	7.1.32
224 †† <i>Minnetonka</i> ...	Gates, T. S., C.B.E. ...	" " " " " "	W.T.-M.	Atlantic Transport ...	" " " " " " " "	"
157 †† <i>Minnewaska</i> ...	Claret, F. O.B.E., R.D., Commr., R.N.R.	" " " " " "	"	" " " " " "	" " " " " " " "	"
194 †† <i>Moldavia</i> ...	Allin, C. H. C. ...	T. E. Heath, J. K. Crone, E. J. Kerridge.	"	P. & O. ...	Forms 911 & 138 21.1.32 to 31.3.32	6.4.32
199 †† <i>Mongolia</i> ...	Rhodes, H. R. ...	H. Tee, H. C. Slinn, G. K. Fox.	No. M.	" " " " " "	" " 27.2.32 to 24.3.32	6.4.32

Name of Vessel.	Captain.	Observing Officers.	Meteoro-logical Equipment.	Line.	Last Log, Register, or Record Contributed Received up to 13.5.32.	Date Received.
260 †† <i>Monowai</i> ...	Spring-Brown, J. F.	L. B. Elhert, E. W. Gibson, D. W. Richards.	M.L.	Union S.S. of N.Z.	Form 915 28.5.31 to 19.11.31 ...	17.2.32
148 †† <i>Montcalm</i> ...	Toten, A. T. ... Rothwell, A. ...	W. P. Haines, T. L. Gillette, A. Mackie.	W.T.-M.	Canadian Pacific	Forms 911 & 138 3.4.32 to 22.4.32	25.4.32
149 †† <i>Montclare</i> ...	Turnbull, J., C.B.E., R.D., Capt. R.N.R.	J. Shearer, J. Soames, A. Watt.	W.T.	" "	" " 11.4.32 to 30.4.32	2.5.32
150 †† <i>Montrose</i> ...	Dott, J. F. ...	R. Fegan, K. Hutchings, N. Duck.	W.T.-M.	" "	" " 21.2.32 to 4.4.32	6.4.32
164 †† <i>Mooltan</i> ...	Morton, A. J. ...	R. M. Richardson, J. L. Dunkley, A. D. Dennis.	"	P. & O. ...	" " 10.1.32 to 13.4.32	16.4.32
226 †† <i>Mulbera</i> ...	Caffyn, F. ...	J. M. Peters, J. Marsland ...	No. M.	British India ...	" " 7.3.32 to 5.4.32	2.5.32
290 †† <i>Musicien</i> ...	Bostock, O. ...	K. H. Davies, H. Philpott, S. H. Diamond.	" M.	Harrison ...	" " 7.12.31 to 29.2.32	3.3.32
073 *† <i>Nagara</i> ...	Miles, A. G. ...	E. N. Giller, H. Marker, R. P. Bennett.	No. M.	R.M.S.P. Co. ...	Forms 911 & 138 4.2.32 to 21.4.32	27.4.32
201 †† <i>Naldera</i> ...	Harrison, R., D.S.O., R.D., Capt. R.N.R.	P. Tankin, S. H. Baldwin, J. Brown.	W.T.	P. & O. ...	" " 25.12.31 to 31.3.32	4.4.32
286 *† <i>Natia</i> ...	Womersley, H. ...	F. Thacker, J. E. P. Matthews	No. M.	R.M.S.P. ...	" " 20.12.31 to 10.2.32	15.2.32
227 *† <i>Nardana</i> ...	Reilly, J. V. ...	D. B. Lattin, A. Woodward, H. Grace.	" M.	British India ...	Form 915 1.11.31 to 17.3.32 ...	23.3.32
118 *† <i>Narenta</i> ...	Miles, F. R. ...	R. N. Fletcher, F. B. Collinson M. W. Weeks.	" M.	R.M.S.P. Co. ...	Forms 911 & 138 18.1.32 to 6.4.32	9.4.32
202 †† <i>Narkunda</i> ...	Cadiz, F. G., D.S.C.	J. Travis ...	W.T.-M.	P. & O. ...	Form 911 24.3.32 to 17.4.32 ...	9.5.32
305 *† <i>Nebraska</i> ...	Bridges, A. E. ...	H. L. Bowkes, C. K. Brown, P. R. Cocks.	No. M.	R.M.S.P. Co. ...	Forms 911 & 138 24.1.32 to 19.4.32	27.4.32
162 *† <i>Nestor</i> ...	Adecock, F. ...	P. Elder, W. Pearce, J. M. Kirk.	W.T.	A. Holt ...	Form 915 22.1.32 to 1.5.32 ...	6.5.32
210 *† <i>Niagara</i> ...	Hill, T. V. ...	G. H. Kime, D. A. Menlove, L. P. Bourke.	M.L.	Canadian-Australasian	" 20.8.31 to 4.12.31 ...	3.2.32
256 *† <i>Norfolk</i> ...	Howell - Price, J., D.S.O., D.S.C.	K. M. L. Jones, G. D. Lyver, G. E. Mason.	"	Federal ...	" 12.12.31 to 20.3.32 ...	9.4.32
297 *† <i>Northumberland</i> ...	Upton, H. L., D.S.C., R.D., Commr., R.N.R.	H. Rogers, G. B. Cathie, H. I. Phillips.	No. M.	" ...	Forms 911 & 138 27.9.31 to 25.1.32	2.2.32
231 *† <i>Nuddea</i> ...	Ramsay, — ...	D. A. Jones, T. Hougkinson, B. Emmerson.	" M.	British India ...	" " 20.2.32 to 8.3.32...	29.3.32
294 †† <i>Olympic</i> ...	Binks, J. W., R.D., Lt.-Commr., R.N.R.	O. N. Tugwell, G. Brooks ...	W.T.	White Star ...	Forms 911 & 138 31.3.32 to 14.4.32	18.4.32
243 *† <i>Opawa</i> , M.V.	Robinson, F. W. ...	H. D. Horwood, H. P. Williamson, R. H. Chapman.	No. M.	New Zealand Shipping	Form 915 30.11.31 to 23.3.32 ...	13.4.32
170 †† <i>Orama</i> ...	Matheson, C. G., D.S.O., R.D., Capt. R.N.R.	R. W. Roberts, R. Galpin, C. H. Denton.	W.T.	Orient ...	Forms 911 & 138 26.10.31 to 26.1.32	3.2.32
086 †† <i>Orcoma</i> ...	Benson, E. W. ...	T. R. Scott, H. J. Jones, H. D. Dillon.	W.T.-M.	Pacific S.N. Co. ...	" " 2.8.31 to 30.9.31	7.10.31
087 †† <i>Orduna</i> ...	Galloway, M. ...	P. L. Hockey, F. W. Hockey, F. W. McKie.	"	" " ...	" " 22.12.31 to 26.2.32	3.3.32
258 *† <i>Oregon Star</i> ...	Lewis, G. ...	E. T. Blaxland ...	No. M.	Blue Star ...	" " ...	"
171 †† <i>Orford</i> ...	Kennedy, G. S. ...	C. B. Hubert ...	" M.	Orient ...	Form 911 8.2.32 to 11.3.32 ...	9.5.32
174 †† <i>Ormonde</i> ...	James, L. V., D.S.C.	T. L. Shurrock, N. Smith, C. Blake.	W.T.	" ...	Forms 911 & 138 9.11.31 to 9.2.32	17.2.32
172 †† <i>Cronsay</i> ...	Cameron, E. P., R.D., Commr., R.N.R.	R. B. Stannard, C. W. Pinckney O. C. Davies.	"	" ...	" " 5.12.31 to 8.3.32	15.3.32
173 †† <i>Orontes</i> ...	O'Sullivan, F. R. ...	J. M. Swanson, W. L. Mackay	No. M.	" ...	" " 4.1.32 to 5.4.32	11.4.32
105 †† <i>Orsova</i> ...	Hubbard, L. F. ...	J. L. Skilling, J. D. Birch, E. V. Bilger.	W.T.	" ...	" " 25.1.32 to 26.4.32	6.5.32
156 †† <i>Otranto</i> ...	Staunton, H. G., C.B.E., R. D. Commr., R.N.R.	A. E. Coles, A. Addison, E. M. McKay.	W.T.-M.	Orient ...	" " 28.1.32 to 8.3.32	10.3.32
279 *† <i>Pacific Exporter</i> ...	Holland, C. E., R.D., Commr., R.N.R.	W. Edmonds ...	W.T.	Furness Withy ...	Forms 911 & 138 22.10.31 to 14.1.32	9.2.32
<i>Pacific Shipper</i> , M.V.	Nuttall, E. L. ...	S. Porter ...	No. A.	" " ...	Form 911 16.6.31 to 16.9.31 ...	21.9.31
<i>Pancras</i> ...	Reynolds, W. ...	W. H. Cross, L. A. Sayers, S. Adams.	M.L.	Booth ...	Form 915 26.7.31 to 9.3.32 ...	15.3.32
<i>Paris</i> ...	Hill, A. ...	T. Mahoney ...	C.C.	Southern Rly. ...	Telegraphic Report. 11.5.32 ...	11.5.32
<i>Patrician</i> ...	Lowe, J. ...	W. E. Williams ...	No. M.	Harrison ...	Form 911 8.10.31 to 20.12.31 ...	22.1.32
058 †† <i>Pennland</i> ...	Making, V. L. ...	C. H. Otterson, G. T. Boyle, J. Cross.	W.T.	Red Star ...	Forms 911 & 138 11.4.32 to 30.4.32	2.5.32
204 *† <i>Peshawur</i> ...	Roche, C. B. ...	P. Haworth, J. A. Hunter, A. Nicklen.	No. M.	P. & O. ...	Form 915 2.8.31 to 2.12.31 ...	7.12.31
238 *† <i>Plako</i> ...	Aslin, E. P. C. ...	A. D. Wilson, A. W. Marshall, R. H. Carter.	"	New Zealand Shipping	Forms 911 & 138 11.6.31 to 30.7.31	13.8.31
039 *† <i>Planter</i> ...	Ling, J. T. ...	W. S. Eustance, J. J. Devereux, W. H. Slaughter.	"	Harrison ...	" " 3.1.32 to 6.4.32	11.4.32
040 *† <i>Port Adelaide</i> ...	Williams, R. ...	F. W. Elger, D. F. Morgan, D. Chamberlain.	W.T.	Commonwealth & Dominion.	" " 27.9.31 to 18.1.32	26.1.32
255 *† <i>Port Alma</i> ...	Hayter, S. W. ...	G. Dean, E. Wheeler, J. Moate.	M.L.	" " "	Form 915 11.7.31 to 4.12.31 ...	9.12.31
128 *† <i>Port Auckland</i> ...	Robinson, C. A. ...	A. Brown ...	"	" " "	" 15.7.31 to 29.10.31 ...	11.11.31
268 *† <i>Port Bowen</i> ...	Brown, A. H. ...	F. R. Gorman, T. L. Kidwell, T. Soames.	W.T.	" " "	Forms 911 & 138 7.1.32 to 29.3.32	5.4.32
129 *† <i>Port Campbell</i> ...	Gregory, S. E. A. ...	J. C. Goddard, N. M. Muzzell, C. Midwinter.	"	" " "	Form 915 1.8.31 to 29.11.31 ...	14.12.31
130 *† <i>Port Caroline</i> ...	Hearn, G. W. ...	E. W. R. Young, J. G. Thorn, R. E. Garner.	"	" " "	" 5.11.31 to 26.3.32 ...	31.3.32
131 *† <i>Port Darwin</i> ...	Hudson, J. J. ...	R. D. Morgan, H. R. Hill, H. Duckling.	"	" " "	" 6.10.31 to 28.1.32 ...	20.2.32

LIST OF VOLUNTARY OBSERVING SHIPS

vii

Name of Vessel.	Captain.	Observing Officers.	Meteoro-logical Equipment.	Line.	Last Log, Register, or Record Contributed. Received up to 13.5.32.	Date Received
132 ** <i>Port Denison</i> ...	Hall, G. S. ...	P. L. Holloway, E. Leavett, E. A. Rogerson.	W.T.	Commonwealth and Dominion.	Form 915 4.1.31 to 3.3.32 ...	15.3.32
133 *† <i>Port Dunedin</i> , M.V.	Mason, W. S., D.S.C.	H. M. Post, C. A. Hodson, R. Betters.	M.L.	" " "	" 5.10.31 to 29.1.32 ...	2.2.32
010 *† <i>Port Fremantle</i> , M.V.	Gilling, W. ...	A. Naismith, G. F. Parnett, E. J. H. Gorley.	"	" " "	" 21.11.31 to 12.3.32 ...	17.3.32
176 *† <i>Port Gisborne</i> , M.V.	Higgs, W. G. ...	R. B. Linklater, L. J. Skales, C. E. Midwinter.	"	" " "	" 19.12.31 to 23.3.32 ...	9.4.32
135 *† <i>Port Hunter</i> ...	Durham, R. S., D.S.C.	G. T. C. Harris, C. R. Townshend, P. A. Mundy.	"	" " "	" 9.1.32 to 30.4.32 ...	5.5.32
<i>Port Wellington</i> ...	Jones, C. N. ...	W. B. Hopkins ...	No. A.	" " "	Form 911 26.8.31 to 4.1.32 ...	11.1.32
106 *† <i>Princesa</i> ...	Friend, A. B. ...	F. Poulson, E. Lougheed, O. Sheard.	" M.	Houlder " ...	Forms 911 & 138 29.2.32 to 17.3.32 ...	21.3.32
163 *† <i>Protesilaus</i> ...	Rundle, G. G. ...	W. C. McGuigan ...	M.L.	A. Holt ...	Form 915 28.5.31 to 14.9.31 ...	23.10.31
205 †† <i>Rajputana</i> ...	Holland, R. ...	G. Aspinall, H. M. Askin, C. F. Wright.	W.T.-M.	P. & O. ...	Forms 911 & 138 30.1.32 to 28.4.32 ...	9.5.32
063 *† <i>Rancher</i> ...	McCullum, J. ...	G. Harvey ...	No. M.	Harrison ...	" " 26.10.31 to 14.1.32 ...	19.1.32
228 †† <i>Ranchi</i> ...	Brooks, C., D.S.O., R.D., Commr., R.N.R.	T. A. Sargeant ...	" M.	P. & O. ...	" " 7.2.32 to 23.3.32 ...	29.3.32
236 †† <i>Rangitane</i> , M.V. ...	McKellar, A. W., R.D., Capt., R.N.R.	A. Brown, R. C. Aldridge, C. J. P. Guille.	W.T.-M.	New Zealand Shipping	" " 20.11.31 to 3.3.32 ...	9.3.32
257 †† <i>Rangitata</i> , M.V. ...	Hunter, J. L. B. ...	J. Oxnard, D. Chadwick, S. Leggett.	"	" " "	" " 24.10.31 to 3.2.32 ...	11.2.32
240 †† <i>Rangitiki</i> , M.V. ...	Barnett, H. ...	H. Hill, L. F. Malcouronne, J. V. Halliday.	"	" " "	" " 17.1.32 to 25.4.32 ...	29.4.32
207 †† <i>Ranpura</i> ...	Furlong, G. H. S., R.D., Capt. R.N.R.	F. Ferguson, R. A. Perry, H. Toon.	No. M.	P. & O. ...	" " 20.12.31 to 10.2.32 ...	19.2.32
071 †† <i>Rawalpindi</i> ...	Stringer, O. B. E., R.D., Commr., R.N.R.	H. G. M. Perry, D. E. C. Otter, W. R. Stockglen.	W.T. M.	" " "	" " 1.11.31 to 3.2.32 ...	8.2.32
247 *† <i>Recorder</i> ...	Egerton, J. J. ...	A. S. Milne, H. C. Blyth, A. Robertson.	No. M.	Harrison ...	" " 15.2.32 to 20.4.32 ...	25.4.32
306 *† <i>Reina del Pacifico</i> , M.V.	Roberts, E. ...	W. A. Hearle, R. Bridson, J. K. Campbell.	" M.	Pacific S.N. Co. ...	" " 24.1.32 to 28.3.32 ...	4.4.32
239 *† <i>Remuera</i> ...	Wilde, H. J. ...	F. Cooke, A. J. Angell, J. R. Vincent.	M.L.	New Zealand Shipping	Form 915 19.12.31 to 4.4.32 ...	9.4.32
<i>Rhexenor Rhodesian Transport.</i>	Stout, G. L. ...	J. S. Parry ...	No. A.	A. Holt ...	Form 911 14.9.31 to 6.12.31 ...	18.1.32
189 *† <i>Rother</i> ...	Woodhead, T. H. ...	H. Robinson, H. L. Marshall, W. Glasborow, L. W. Fulcher.	W.T.	Goole Steam Shipping	Forms 911 & 138 16.4.32 to 7.5.32 ...	11.5.32
241 *† <i>Rotorua</i> ...	Lamb, C. B. ...	W. Branch, A. F. Day, J. Higgin, J. W. McHugh.	M.L.	New Zealand Shipping	Form 915 31.10.31 to 19.2.32 ...	25.2.32
062 *† <i>Royal Star</i> ...	Walsh, W. ...	A. F. Day, J. Higgin, J. W. McHugh.	No. M.	Blue Star ...	" 24.12.31 to 16.3.32 ...	23.3.32
246 *† <i>Ruahine</i> ...	Kinnell, G. ...	A. Hocken, R. Warren, L. Mercer.	W.T.	New Zealand Shipping	Forms 911 & 138 12.2.32 to 19.3.32 ...	10.5.32
<i>St. Heler</i> ...	Pitman, R. ...	A. C. Ricketts ...	C.C.	G.W. Railway ...	Telegraphic Report 23.4.32 ...	23.4.32
<i>St. Julien</i> ...	Richardson, L. ...	A. E. Ricketts, H. D. Freeman.	"	" " "	" " 10.5.32 ...	10.5.32
<i>St. Minver</i> , S.T. ...	Hatton, A. ...	" " " " " "	No. A.	Bunch Steam Fishing Co.	Form 911 8.4.32 to 7.5.32 ...	10.5.32
<i>St. Patrick</i> ...	" " " " " "	F. E. Martin ...	C.C.	G. W. Railway	Telegraphic Report 15.9.31 ...	15.9.31
038 †† <i>Samaria</i> ...	Malin, R. G., Lt.-Commr., R.N.R.	F. G. Watts, J. A. Myles, H. Hudson.	W.T.	Cunard ...	Forms 911 & 138 18.1.32 to 23.1.32 ...	25.2.32
291 *† <i>Scholar</i> ...	Peterkin, A. G. ...	R. J. Mackinnon, W. A. Pemberton.	No. M.	Harrison ...	" " 15.1.32 to 29.3.32 ...	9.9.32
<i>Scotia</i> ...	O'Neill, J. ...	W. H. Hughes ...	C.C.	L.M. & S. Railway	Telegraphic Report 12.4.32 ...	12.4.32
033 †† <i>Seythia</i> ...	Oram, B. B., R.D., Commr., R.N.R.	W. H. Stewart, A. Bridge-water, H. L. Pryse.	W.T.	Cunard ...	Forms 911 & 138 24.1.32 to 10.4.32 ...	12.4.32
211 *† <i>Shropshire</i> , M.V. ...	English, G. L. ...	D. Hetherington, I. D. Minto, G. W. Dobson.	"	Bibby ...	" " 7.2.32 to 15.4.32 ...	20.4.32
121 *† <i>Siamese Prince</i> ...	Jones, E. E. ...	" " " " " "	M.L.	Prince ...	" " " " " "	" " " " " "
<i>Silksworth</i> ...	Blacklock, G. ...	W. S. Allen ...	No. A.	R. S. Dalgleish ...	Form 911 4.12.31 to 19.1.32 ...	19.2.32
230 *† <i>Somerses</i> ...	Pilcher, C. R. ...	C. Edgecombe, H. M. Knight, H. V. G. Hastings.	M.L.	Federal ...	Form 915 7.1.32 to 1.5.32 ...	5.5.32
277 *† <i>Spero</i> ...	Montgomery, H. ...	H. W. Vickers, A. Kirk ...	"	Ellerman Wilson ...	" 10.10.31 to 5.3.32 ...	15.3.32
<i>Stephen</i> ...	Barlow, E. P. ...	G. H. Daniels, C. G. Powell, R. H. Hand ...	W.T.-M.	Booth ...	" 26.6.31 to 30.10.31 ...	27.11.31
270 †† <i>Strathaird</i> ...	Townshend, W. P. ...	" " " " " "	"	P. & O. ...	" " " " " "	" " " " " "
259 *† <i>Surrey</i> ...	Lettington, A. E. ...	R. Rees, D. J. Murray, H. H. Mackillican.	W.T.	Federal ...	Form 915 15.11.31 to 31.3.32 ...	12.4.32
<i>Tacoma City</i> ...	Paul, H. ...	H. Small ...	No. A.	Reardon Smith ...	Form 911 7.8.31 to 25.11.31 ...	1.12.31
229 *† <i>Tactician</i> ...	Trinick, F., O.B.E. ...	E. P. Simmons ...	" M.	Harrison ...	" 19.7.31 to 7.10.31 ...	10.10.31
045 †† <i>Tainui</i> ...	McIntosh, A. ...	G. A. Harvey, J. Worrall, D. Pickersgill.	M.L.	Shaw, Savill & Albion	Form 915 5.12.31 to 20.3.32 ...	30.3.32
081 *† <i>Tairoa</i> ...	Grayston, E. T., D.S.C., R.D., R.N.R.	G. L. Almond, W. Thowless, L. B. Miller.	"	" " "	" 30.10.31 to 24.2.32 ...	3.3.32
046 †† <i>Tamaroa</i> ...	Hartman, W. H. ...	L. R. Bull, R. R. Roseman, F. Lutyen.	W.T.-M.	" " "	Forms 911 & 138 29.1.32 to 8.5.32 ...	11.5.32
264 ** <i>Tanda</i> ...	Pilcher, E. T., Lt.-Commr., R.N.R.	B. W. Dun, F. O. Colvin, R. Milne.	M.L.	E. & A. S.S. Co. ...	Form 915 3.9.31 to 30.11.31 ...	12.2.32
165 *† <i>Tantalus</i> , M.V.	Melling, C. F. ...	A. C. H. Jones, J. R. C. Evans, E. Saville.	W.T.	A. Holt ...	Forms 911 & 138 21.12.31 to 23.3.32 ...	30.3.32
047 *† <i>Taranaki</i> , M.V.	Wood, C., D.S.C. ...	R. Bitmead, S. P. Wallis, A. M. Whiteford.	M.L.	Shaw, Savill & Albion	Form 915 29.8.31 to 15.12.31 ...	28.12.31
<i>Tarantia</i> ...	Caithness, J. B. ...	J. M. Cherry ...	No. A.	Anchor ...	Form 911 1.2.32 to 21.2.32 ...	15.3.32
069 *† <i>Tekoa</i> ...	McNish, R. H. L., D.S.O., Lt.-Commr., R.N.R.	C. W. Roberts ...	" M.	New Zealand Shipping	" 30.12.31 to 25.1.32 ...	15.2.32
048 †† <i>Themistocles</i> ...	Young, A. D. ...	F. C. Muggleston, A. S. Marshall, J. W. Best.	W.T. M.	Aberdeen Commonwealth.	Forms 911 & 138 10.7.31 to 3.3.32 ...	20.4.32
007 *† <i>Thistleglen</i> ...	Whitfield, G. A., O.B.E.	S. B. Davis, H. B. Meek, G. L. Hetherington.	No. M.	Allan Black & Co. ...	Form 915 15.10.31 to 11.1.32 ...	19.1.32

Name of Vessel.	Captain.	Observing Officers.	Meteoro-logical Equipment.	Line.	Last Log, Register, or Record Contributed. Received up to 13.5.32.	Date Received.
235 *† <i>Tilawa</i> ...	Coleborn, E. ...	E. Cullerne, F. B. Cutlack, R. A. Spiers.	No. M.	British India...	Forms 911 & 138 23.1.32 to 20.3.32	11.4.32
161 *† <i>Titan</i> ...	Elford, W. J. ...	F. B. Smith, A. K. Sanderson, B. L. Parker.	W.T.	A. Holt...	" " 22.11.31 to 25.3.32	30.3.32
244 *† <i>Tongariro</i> ...	Hamilton, F. S. ...	E. A. Quick, D. Baldwin, H. Dawson.	M.L.	New Zealand Shipping	Form 915 27.7.31 to 1.12.31...	7.12.31
025 †† <i>Transylvania</i> ...	Bone, D. W. ...	A. Middleton ...	W.T.	Anchor ...	Forms 911 & 138 27.3.32 to 4.4.32	19.4.32
288 *† <i>Traveller</i> ...	Barrow, W. T. C. ...	R. Ledger ...	No. M.	Harrison ...	Form 911 20.1.32 to 28.3.32	1.4.32
119 *† <i>Trojan Star</i> ...	Griffin, G. A. ...	L. S. Hassell, K. Griffiths, D. W. Marshall.	" M.	Blue Star ...	Forms 911 & 138 9.10.31 to 30.12.31	29.1.32
245 *† <i>Turakina</i> ...	Laird J. ...	H. G. Letts, E. G. Williams, J. Reeve.	" M.	New Zealand Shipping	" " 29.11.31 to 18.4.32	30.4.32
276 †† <i>Tuscania</i> ...	Rome, W. B. ...	J. Noble, G. Squires, G. Robertson.	W.T.	Anchor...	" " 23.3.32 to 2.5.32	5.5.32
113 *† <i>Uffington Court</i> ...	Clarke, E. J. ...	T. Glover ...	No. A.	Haldin & Co. ...	Form 911 25.3.31 to 8.6.31	23.6.31
<i>Upwey Grange, M.V.</i>	Goodrick, H. P. ...	A. Bradbury, G. T. Hurst, P. J. Walker.	" M.	Houlder ...	Forms 911 & 138 6.1.32 to 7.3.32	12.3.32
292 †† <i>Viceroy of India</i> ...	Thornton, E. J., R.D., Capt., R.N.R.	R. H. Turner, M. F. Shute ...	W.T.-M.	P. & O. ...	Forms 911 & 138 21.3.32 to 25.4.32	2.5.32
242 ** <i>Waioapu</i> ..	Davis, —	" " " " " "	M.L.	Union S.S. Co. of N.Z.	" " " " " "	" " " " " "
263 ** <i>Wairuna</i> ...	Hender, W. H. ...	J. B. Williams, R. E. Suckling.	"	" "	Form 915 7.12.31 to 3.3.32	5.5.32
005 †† <i>Warwick Castle</i> ...	Owens, G. ...	P. Clissold, W. D. Roach, J. K. Wilson.	W.T.	Union Castle ...	Form 911 13.2.32 to 3.4.32	5.4.32
060 †† <i>Westernland</i> ...	Doughty, J. H. ...	C. Clark, J. R. Loe, J. McLaren.	"	Red Star ...	Forms 911 & 138 2.3.32 to 16.4.32	18.4.32
033 *† <i>Westmoreland</i> ...	Holland, E. ...	" " " " " "	"	New Zealand Shipping	" " " " " "	" " " " " "
<i>William Scoresby, R.R.S.</i>	Joliffe, T. A., Commr., R.N.	W. A. Ellison, F. E. C. Davies	M.L.	Falkland Islands Government.	Form 915 1.4.31 to 30.7.31...	5.10.31
208 †† <i>Winchester Castle M.V.</i>	Gardner, G. F., O.B.E., Lt.-Commr., R.N.R.	G. F. Moon, A. G. Patey ...	W.T.	Union Castle ...	Forms 911 & 138 12.3.32 to 30.4.32	3.5.32
096 †† <i>Windsor Castle</i> ...	Kerby, J. H. ...	F. Hunter ...	"	" " " " " "	12.3.32 to 27.3.32	19.4.32
<i>Worthing</i> ...	Marmery, S. ...	C. Munton, E. Balcombe ...	C.C.	Southern Railway ...	Telegraphic Report 30.4.32	30.4.32
043 ** <i>Zealandic, M.V.</i> ...	Elford, H. C. ...	P. Horwood, J. Thompson, B. Morris.	W.T.	Shaw, Savill & Albion	Forms 911 & 138 14.3.32 to 6.5.32	9.5.32
<i>Conway, H.M.S.</i> ...	Richardson, F. A., D.S.C., Commr., R.N.	The Senior Cadets ...	Cadets' M.L.	" " " " " "	Cadets' Met. Log. 17.1.32 to 19.3.32	29.3.32
<i>Pangbourne Nautical College</i>	Tracy, A. F. G., Commr., R.N.	" " " " " "	"	" " " " " "	Cadets' Met. Log. 17.1.32 to 19.3.32	29.3.32
<i>Worcester, H.M.S.</i>	Steele, G. C., V.C., Commr., R.N.	" " " " " "	"	" " " " " "	Cadets' Met. Log. 22.1.32 to 13.4.32	18.4.32
<i>Abaco</i> ...	" " " " " "	The Keepers ...	Lighthouse Register.	" " " " " "	Lighthouse Register 1.7.31 to 31.12.31	27.2.32
<i>Cay Lobos</i> ...	" " " " " "	" " " " " "	"	" " " " " "	Lighthouse Register 1.7.31 to 31.12.31	27.2.32
<i>Double Headed Shot</i>	" " " " " "	" " " " " "	"	" " " " " "	Lighthouse Register 1.7.31 to 31.12.31	27.2.32
<i>Inagua</i> ...	" " " " " "	" " " " " "	"	" " " " " "	Lighthouse Register 1.7.31 to 31.12.31	27.2.32
<i>Sombrero</i> ...	" " " " " "	" " " " " "	"	" " " " " "	Lighthouse Register 26.2.31 to 5.9.31	5.10.31
<i>Watling Island</i> ...	" " " " " "	" " " " " "	"	" " " " " "	Lighthouse Register 1.7.31 to 31.12.31	28.1.32
<i>Cape Pembroke</i> ...	" " " " " "	" " " " " "	"	" " " " " "	Lighthouse Register 17.7.31 to 31.12.31	27.2.32
(Falkland Is.)	" " " " " "	" " " " " "	"	" " " " " "	Lighthouse Register 1.7.31 to 31.12.31	18.2.32

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

Name of Vessel.	Captain.	Observing Officer.	Line.	Last Case of Water Samples, Reports, etc., received up to 30.4.32.	Date Received.
<i>Dakartan</i> ...	Brown, W. ...	A. A. Johnson ...	Leyland ...	Water Samples ...	17.3.32
<i>Darian</i> ...	Hannaford, W. ...	W. R. Vaughan ...	" " " " " "	" " " " " "	18.9.31
<i>Darro</i> ...	Matthews, G. P. ...	F. R. Jeyes ...	R.M.S.P. Co. ...	" " " " " "	17.3.32
<i>Davistan</i> ...	Thomas, R. ...	F. Stevenon ...	Leyland ...	" " " " " "	5.4.32
<i>Dorelian</i> ...	Hughan, O. ...	A. W. Wood ...	" " " " " "	" " " " " "	23.4.32
<i>Hilary</i> ...	Jones, W. C. H., R.D., Commr., R.N.R.	" " " " " "	Booth ...	" " " " " "	"

July, M.O., 1932.

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 (NORTH AND SOUTH):—

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):—

Atlas of Currents on the Main Trade Routes of the North Atlantic. (No. 323, 1930. 6s. 6d.) ($29\frac{1}{4} \times 19\frac{1}{2}$ in.)

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.)

ATLANTIC (SOUTH):—

Wind Charts for the Coastal Regions of South America, from information collated and prepared in the Meteorological Office. (No. 159, 1902.) ($27 \times 20\frac{1}{2}$ in.) (Published by the Admiralty.)

The relation between Pressure, Temperature, and Air Circulation over the South Atlantic Ocean. By M. W. Campbell Hepworth, C.B., R.D., Captain R.N.R., Marine Superintendent. (No. 177, Second Edition, 1917.) 1s. (8vo.)

BAFFIN BAY AND DAVIS STRAIT:—

Monthly Meteorological Charts of Baffin Bay and Davis Strait. (No. 221, 1917.) 8s. ($30 \times 25\frac{1}{2}$ in.)

CHARTS:—*continued.*

INDIAN OCEAN:—

Meteorological Charts of the East Indian Seas for each month of the year, giving Normals of Pressure, Air and Sea Temperatures and Ocean Currents, with Frequencies of Winds. (No. 181A, 1923.) 1s. each. ($35 \times 22\frac{1}{2}$ in.) Sold by J. D. Potter, 145, Minories, E.1.

Monthly Current Charts for the Indian Ocean, from information collated and prepared in the Meteorological Office. (No. 124, 1896.) ($20 \times 24\frac{1}{2}$ in.) (Published by the Admiralty.)

PACIFIC OCEAN:—

Quarterly Current Charts for the Pacific Ocean, from information collated and prepared in the Meteorological Office. (No. 134, 1897.) ($26\frac{1}{2} \times 28\frac{1}{2}$ in.) (Published by the Admiralty.)

Wind Charts for the Coastal Regions of South America, from information collated and prepared in the Meteorological Office. (No. 159, 1902.) ($27 \times 20\frac{1}{2}$ in.) (Published by the Admiralty.)

RED SEA:—

Meteorological Charts of the Red Sea. (No. 106, 1895.) 21s. ($22 \times 13\frac{1}{2}$ in.)

SOUTHERN OCEAN:—

Meteorological Charts of the Southern Ocean between the Cape of Good Hope and New Zealand. (No. 123, 1917.) 7s. 6d. ($12\frac{1}{2} \times 9\frac{1}{2}$ in.)

BOOKS:—

Wireless and Weather, An Aid to Navigation, with Appendices. (No. 297, 1928.) 5s. (4to.)

The Marine Observer's Handbook. Fifth Edition. (No. 218, 1930.) 2s. 6d. (8vo.)

PAMPHLET:—

Decode for use with the International Code for Wireless Weather Messages from Ships. Second Edition. (No. 329, 1931.) 3d. (8vo.)

GEOPHYSICAL MEMOIRS (4to.):—

19. **Hurricanes and Tropical Revolving Storms.** By Mrs. E. V. Newnham, M.Sc. With an Introduction on "The Birth and Death of Cyclones," by Sir Napier Shaw, F.R.S. (No. 220i, 1922.) 12s. 6d.

28. **The Doldrums of the Atlantic.** By C. S. Durst, B.A. (No. 254h, 1926.) 1s. 6d.

The Admiralty Publications are on sale by J. D. POTTER, 145, Minories, London, E.1.

The other Publications mentioned in this list, unless otherwise marked, can be purchased directly from

H.M. STATIONERY OFFICE at the following addresses:—

Adastral House, Kingsway, London, W.C.2; 120, George Street, Edinburgh; York Street, Manchester; 1, St. Andrew's Crescent, Cardiff; 15, Donegall Square West, Belfast; or through any Bookseller.

[To face page viii]

