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SOMETHING ACCOMPLISHED, BUT ANOTHER THING STILL TO BE DONE.

In the November 1929 MARINE OBSERVER we made an appeal to Marine Observers for Special observations. The use of the hydrometer in port and measurements of sea and swell.

The information was required more in the direct interest of seamen themselves than for the scientific purposes of Meteorology.

Several ships had recently been lost through overloading, and when the Board of Trade required information of the specific gravity of the water at the ports at which they had loaded, it was not available in the Meteorological Office.

As may be seen by the tables published in the January number and in this number, Marine Observers have responded well to the first part of our appeal. This published information of specific gravity of water, at so many loading ports will be useful to the masters of ships the world over, as well as to shipowners, stevedores, and surveyors.

Marine Observers are asked to examine these lists and in future only to record the specific gravity of the water in their Meteorological Logs and Records at ports which are not given in these lists.

Now that the Board of Trade require the specific gravity to be entered in the official Log, along with the draught and freeboard, there will soon accumulate ample observations to establish reliable information for all ports where British ships load.

The response to the second part of our appeal has not been so evident, for up to the present comparatively few measurements of sea and swell have been returned. Now, not only is it desirable that dimensions should be defined for the different scale numbers and descriptions given to waves in the Douglas scale, for ultimate convenience of seamen and accuracy of routine observation; but to improve ship design, it is necessary for the naval architect to have more accurate information of the height, length, period and velocity of waves. So far the measurements returned by British Marine Observers since 1924 appear to indicate that the present accepted theoretical tables of wave lengths, periods and velocities may require modification.

Here then is work which the Corps of Voluntary Marine Observers may do usefully and are urged to do in the combined interests of seamen, naval architects and meteorologists for the benefit of all who use ships and the sea.

The methods advocated are given in the MARINE OBSERVER'S HANDBOOK, and special forms for returning the measurements made are supplied to observing ships by the Port Meteorological Officers and Merchant Navy Agents.

Other methods of measuring waves may be used if found to be more convenient than those given in the MARINE OBSERVER'S HANDBOOK, but in such cases a clear description of the methods used should accompany the observations.

MARINE SUPERINTENDENT.

April 7th, 1931.

THE MARINE OBSERVER'S LOG.

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

Responsibility for statements rests with the Contributor.

EQUATORIAL CURRENT.

Pacific Ocean.

THE following is an extract from the Meteorological Record of S.S. *Parcova*, Captain J. O. EVANS, from Apia, Samoa to Panama. Observer, Mr. C. PARRY, 2nd Officer.

From frequent observations taken between the 23rd and 26th of July, 1930, while crossing from the South Equatorial to the Counter Current, the effect of the current was clockwise, i.e. on the 23rd it was found to be setting S.W., then gradually changing W'ly., 24th from West to N.W., 25th from N.W. to N.N.W., 26th N.N.W. to Nly. and N.N.E. and N.E., 27th from N.E. to E.N.E. and definitely setting to the East as far as Cocos Island. Rate $\frac{3}{4}$ to $1\frac{1}{4}$ knots.

The log shows that this track, i.e. via 19 miles south of Malden Island and Latitude $4^{\circ} 18' N.$, Longitude $132^{\circ} 44' W.$ then direct to Cape Mala is exceptionally favourable for steam vessels at this time of the year, and can be recommended.

Ship's Position: 8 a.m. (A.T.S) on July 23rd, Latitude $0^{\circ} 18' N.$, Longitude $140^{\circ} 30' W.$; at 8 a.m. on July 26th, Latitude $5^{\circ} 08' N.$, Longitude $129^{\circ} 02' W.$

CURRENT.

South of Ceylon.

THE following is an extract from the Meteorological Record of S.S. *Barrabool*, Captain H. M. JACK, Australia to London via Suez. Observer Mr. J. PAICE.

While on passage from Fremantle to Colombo the currents experienced comparing well with the Quarterly Chart in the May 1930 issue of THE MARINE OBSERVER, course was shaped at noon on the 19th July, 1930, for 15 miles S.45° W. Point de Galle lighthouse to allow for the strong easterly set from the Equator to Ceylon. At noon on the 20th, 21st and 22nd the same position was steered for and an excellent landfall was made with cross bearings of Dondra Head and Point de Galle lights, at 0307 on the 23rd, the ship passing the latter light $8\frac{1}{2}$ miles distant at 0425.

Courses steered: Noon 20th to noon 21st—318 degrees.

Noon 21st to 0314 23rd—319 degrees.

0314 to Point de Galle light abeam—312 degrees.

All the above are Ship's Time.

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

THE following is an extract from the Meteorological Record of S.S. *Mulbera*, Captain F. CAFFYN.

S.S. *Mulbera*, Tonnage, Nett 5521, Gross 9100, Cargo and Passengers. Speed $12\frac{3}{4}$ knots.

During the past three S.W. Monsoon voyages in this vessel, I have endeavoured to make approximately No. 2 Track,* i.e. pass 15 miles south of Minikoi in Latitude $8^{\circ} 0' N.$ and keep to that Latitude to Longitude $53^{\circ} E.$

Departed Colombo 19th June, 1928.

The Monsoon was weak enough for me to get right across, but unfortunately I hauled up on Longitude $54^{\circ} E.$ and so caught the adverse current.

Departed Colombo 15th July, 1929.

I kept to the same Latitude to Longitude $60^{\circ} 30' E.$ when I hauled up North of Socotra as the Monsoon was too strong and the sea too heavy to continue.

Departed Colombo 29th July, 1930.

I had to haul up in Longitude $64^{\circ} E.$ for the same reason.

I feel convinced that it is better to keep south, on say, Latitude $8^{\circ} N.$, after passing Minikoi while the Monsoon is weak, hauling up when it becomes strong, and so have a much more free passage than if sailing direct from Minikoi. In years gone by, I have always been able to obtain either star or sun position up to within 24 hours of Guardafui. A little sleep may be lost going south of Socotra, but with soundings, W.T. bearings, and, when actually rounding Guardafui, the Light, I have no particular anxiety and am sure it is a much easier passage both for economy and comfort of passengers, etc.

I do not consider it fair to place the experience of one year against another as the Monsoon is active one week and moderate the next, but comparison should be made between ships sailing the same day. 1930 was especially a bad year and the Monsoon extended well south of me, but I considered all ships to the north were by the W.T. reports having an infinitely worse time.

WHIRLWIND.

St. Lawrence River.

THE following is an extract from the Meteorological Record of M.V. *Bulysses*, Captain B. P. HEAD, Montreal to Houston, Texas. Observer, Mr. G. P. HANSARD, 3rd Officer.

31st July, 1930, at 8.35 p.m. A.T.S. we observed a dark blotch in the sky on Starboard Quarter. This formed into a heavy nimbus followed by St-Cu, then A-St with Fr-Cu beneath. The cloud motion was from N.N.W. rate 3, and, as soon as nimbus came above the river a windspout was observed.

This was about 15 feet high and 4 feet wide, gradually increasing in width as it formed towards the clouds. It passed about 100 feet astern of vessel.

* The No. 2 Track referred to is that published in the June, 1929, MARINE OBSERVER, Vol. VI., No. 66. All interested in this matter of the best route during the S.W. Monsoon are referred to the recommendations given in the May, 1931, MARINE OBSERVER, Vol. VIII., No. 89.

As it travelled across the river it caused a disturbance on the water surface for about 10 feet in diameter causing small eddies 2 feet high within its area. It had a hissing sound and the contact with the water sounded like a waterfall.

It eventually struck the south bank of the river causing a heavy crash as the water struck bank.

The spout itself continued through its course travelling up the river bank and disturbing everything within its vicinity. Barometer reading after the squall 29.81 in.

Position of ship, in the St. Lawrence River off St. Croix, Latitude $46^{\circ} 43' N.$, Longitude $71^{\circ} 43' W.$ (approximately), Barometer at 8 p.m. 29.77 in. Wind N.N.W., force 1, river surface smooth, sky cloudless. Temperature air 56° , river 49° . The Airship R.100 has just passed out of sight proceeding towards Montreal course about S.W. The *Bulysse* was proceeding E. by N. (Mag.)

THUNDERSTORM.

North Atlantic.

THE following is an extract from the Meteorological Record of s.s. *Essequibo*, Captain D. R. MORGAN, New York to Callao via Panama. Observer, Mr. L. MARSLAND 4th officer.

July 3rd, 1930, 1700 GMT, the sky to the North-Eastward was observed to cloud over with heavy masses of nimbus clouds which gradually increased until at 1730 GMT the whole sky was heavily overcast, and the wind which by this time had veered to the North-East was steadily increasing.

At 1740 GMT vivid streaks of forked lightning were observed striking the water all round the vessel, accompanied by deafening crashes of thunder and deluges of rain. By this time the wind was approaching hurricane force, North-East.

At 1745 GMT the storm was directly overhead, wind hurricane force, sea lashed into foam, barometer 29.88 in., temperature of the air $75^{\circ} F.$, a fall of $9^{\circ} F.$ since commencement of storm.

At 1747 GMT foremast struck by lightning, peeling off the paint for about 3 feet down from the truck. While still looking up at the foremast to ascertain what damage had been sustained I was momentarily blinded by a brilliant flash of lightning which resembled a shell exploding at the truck of the mast. The topmast was splintered into small fragments which were scattered all over the ship and the truck was hurled violently down on the bridge.

The storm was intense until 1800 GMT, when the wind suddenly decreased and the rain almost ceased, the lightning disappearing to the southward and becoming less vivid.

The steering compass was found to be deflected 8° and is still in the same condition, i.e., 8° to the right of our standard compass on all courses. At 1815 GMT wind backed to S.W. force 1, air $80^{\circ} F.$, sky overcast Cu and Cu-Nb.

Position—Latitude $33^{\circ} 30' N.$ Longitude $76^{\circ} 32' W.$ Vessel steaming N. $39^{\circ} E.$ true, at 17.4 knots.

The barometer remained steady at 29.88 in. throughout entire storm.

VISIBILITY.

Nova Scotian Coast.

THE following is an extract from the Meteorological Log of s.s. *Mahana*, Captain J. M. CAMERON, Colon to Halifax N.S. Observer, Mr. H. C. SMITH, 2nd officer.

July 24th, 1930.—Fog clearing at 10 p.m. lighthouses on shore were visible at abnormal ranges. Lights having normal range of 12-14 miles were clearly visible at 30 miles. At 11.25 p.m. Sambro Island was observed ahead distant approximately 53 miles and remained visible with the exception of a brief period until approached. At about 1 a.m., July 25th, a fixed light was observed ahead, which on approach (after 3 a.m.) was found to be Sambro

Bank Light-buoy. Approximate distance when first seen 40 miles. During this time all shore lights were visible at distances of 20-30 miles.

From 11 p.m. until dawn on July 25th "Northern Lights," having the appearance of a bright glow, with occasional rays, were continuous, illumination approximating that of Moon at first quarter. Sky 2/10 to 4/10 covered with light Ci/Ci-St. Wind light variable to calms.

DOUBLE SOLAR HALO.

North Atlantic Ocean.

THE following is an extract from the Meteorological Record of s.s. *Edinburgh Castle*, Captain J. H. KERBEY, Cape Town to Southampton. Observer, Mr. J. WILFORD, 4th officer.

July 26th, 1930, 11 a.m. at ship (1200 GMT), observed bow circling sun, diameter 21° , altitude of sun 69° , also at same time a second bow concentric to the first but 23° lower. Both these bows resembled the ordinary rainbow in that they contained all the colours of the spectrum. The lower bow extended over an arc of about 30° only. Weather at the time of observation fine—cloud types Ci, Ci-St. and Cu. 4/10 sky clouded. Visibility 8. Temperature, Air 80° , Sea 78° . Barometer 30.02 in. falling slowly.

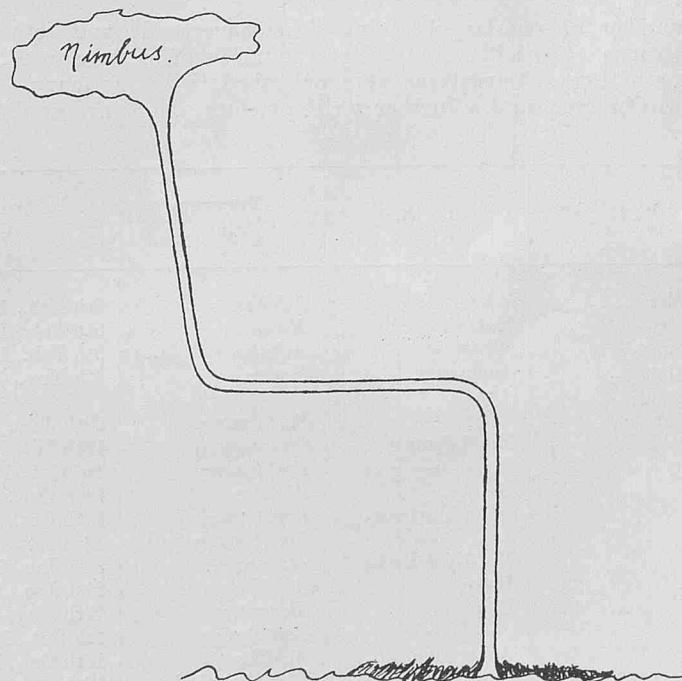
The above phenomenon was visible for 10 minutes. Six hours after this, incessant torrential rain was experienced which lasted for 18 hours.

Ship's position, Latitude $5^{\circ} 57' N.$ Longitude $13^{\circ} 12' W.$

WATERSPOUT.

North Atlantic.

THE following is an extract from the Meteorological Record of S.S. *Alondra*, Captain L. S. SCOTT, Lisbon to Madeira. Observer, M. G. HAMILTON, Chief Officer.



July 5th, 06.45 a.m. to 07.03 a.m., observed waterspout ahead on track of ship. Waterspout was connected to Nimbus and travelling S.E. It was a perfect column of water resembling a huge steam pipe. It was perpendicular to a height of about 300 feet, then bent to a right angle to a similar distance, then in a perpendicular to Nimbus. Ship passed waterspout within 5 cables.

Position of ship, Latitude $37^{\circ} 21' N.$, Longitude $11^{\circ} 06' W.$ Course, S. $47^{\circ} W.$ true.

Wind N.W. by W. force 4, Sea N.W. 3 to 4, Swell N.W.3. Clouds Cu, Cu-Nb, Nb.

METEOR AND SUMATRA SQUALL.

Straits of Malacca.

THE following is an extract from the Meteorological Record of S.S. *Talma*, Captain R. W. HOCKING, Singapore to Calcutta. Observer, Mr. M. H. VINCENT, 3rd Officer.

July 5th, 1930, 2140 (Zone Time -7), observed a single brilliant meteor, yellow in colour, and of magnitude -5.0 or -6.0 (approx.). (Comparison of magnitude made with that of Venus, magnitude -3.5 for July.) The meteor was first seen at an altitude of 35°, when it was falling almost vertically, finally disappearing at an altitude of approximately 5° above the horizon, bearing 037°. The duration of flight was two seconds.

Barometer 29.83 ins., air 85° F., wind S.E. force 3. Lower clouds, nil; middle clouds, nil; upper clouds, a veil of cirro-stratus covering the sky, so that only stars of the third magnitude were visible. The moon was near the zenith, age 9 days.

At 0000 hours, July 6th, the cirro-stratus had become considerably denser, forming alto-stratus; the barometer remained steady; wind variable between E.S.E. and S.S.E., force 3; frequent lightning, sometimes forked, between north and west.

Between 0000 hours and 0100 hours, heavy cumulo-nimbus clouds built up between north and west, stretching across the Straits, and moving slowly from N.W. At 0110 the wind backed to N.W., force 1-2, and at 0114 hours the squall struck the ship; wind N.W. by W., force 8-9, and torrential rain, continuing until 0140 hours, when

the wind fell light and variable in direction. Weather remained overcast, with light rain until 0400 hours, when the weather finally cleared, wind remaining light and variable.

Owing to thick weather, the fluctuations of the barometer and thermometer could not be observed during the actual passage of the squall, but at 0200 hours the temperature had dropped 6° F. since 0000 hours, whilst the barometer had remained steady when compared with the readings at 0000 hours.

Ship's position at 2140, Latitude 1° 29' N., Longitude 103° 03' E., Course 305°, Speed 11½ knots.

METEOR.

New Zealand Waters.

THE following is an extract from the Meteorological Record of s.s. *Turakina*, Captain F. ASHWORTH, Timaru to Wellington, N.Z. Observer, Mr. V. V. JOHNSTON, 3rd Officer.

On July 1st, 1930, 1034 G.M.T. observed an exceptionally bright blue meteor, lighting up entire ship and sea. First observed at altitude of 33° bearing 015° describing an arc passing approx. 2° above Altair and dying out at an altitude of 19° bearing 045°, after 4 or 5 seconds. When above Altair a small portion became detached, and followed in wake of main body.

Ship's Position, Latitude 42° 36' S., Longitude 173° 56' E. Clouds Cu. and St-Cu. 5.

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, 1931, Marine Observer, and a further series of observations are published below.

Similar information is desired for loading ports in all parts of the world which do not appear in the list below or that published in the January number, and the Corps of Voluntary Marine Observers are asked to observe and record once daily the specific gravity of the water when in ports not here given. These observations should be entered at the end of the Meteorological Log or Record. The date, time, port and berth should be given, also the state of the tide, together with information of freshets or other conditions which may temporarily affect the density of the water.

Port.	Berth.	Observing Ship.	Date and Time of Observation.	State of Tide.	Specific Gravity.	Temp. of Sea.	Remarks.
Marseilles ...	Wharf	<i>Achilles</i>	6th Feb., 1931—Noon	—	1017	—	
	Mole C.	<i>Modasa</i>	6th Feb., 1931	No Tide	1025	48°	
Casablanca ...	Wharf	<i>Achilles</i>	9th Feb., 1931—4 p.m.	—	1027	—	
Las Palmas...	Anchorage	<i>Nestor</i>	4th Nov., 1930—Noon	1 hour before high water	1025.5	73.5°	
				Low water	1027	58°	
Gibraltar ...	—	<i>Port Sydney</i>	29th Jan., 1931	—	1028	—	
Port Said ...	No. 6 Buoys	<i>Glenamoy</i>	16th May, 1930—7 p.m.	—	1027.5	80°	
	—	<i>Port Sydney</i>	3rd Oct., 1930	—	1021.5	—	
	Buoy	<i>Achilles</i>	14th Oct., 1930—3.30 p.m.	Half Flood	1031	—	
	Inner Harbour	<i>Port Campbell</i>	18th Oct., 1930	—	1027.5	66°	
	—	<i>Port Sydney</i>	13th Jan., 1931	—	1027	50°	
	No. 1 Oil Berth	<i>Modasa</i>	31st Jan., 1931	No Tide	1029	—	
	Buoy	<i>Achilles</i>	31st Jan., 1931—4 p.m.	—	1029.3	—	
Suez ...	Bay	<i>Glenamoy</i>	17th May, 1930—11 p.m.	—	1030	80°	
	—	<i>Port Sydney</i>	4th Oct., 1930	—	1031	—	
	Anchorage	<i>Achilles</i>	15th Oct., 1930—1.35 p.m.	Half Flood	1029.5	—	
	Roadstead	<i>Port Campbell</i>	18th Oct., 1930	—	1030	67°	
	Bay	<i>Port Sydney</i>	12th Jan., 1931	—	1031	—	
	Anchorage	<i>Achilles</i>	30th Jan., 1931—8 p.m.	High Water	1028	59°	
	Bay	<i>Modasa</i>	30th Jan., 1931	2 hours' Flood	1025	78°	
Port Sudan ...	No. 1 Berth	<i>Modasa</i>	27th Jan., 1931	No Tide	1024	—	
Aden ...	Inner Harbour	<i>Port Campbell</i>	23rd Oct., 1930	—	1027	79°	
	No. 1 Oil Berth	<i>Modasa</i>	24th Jan., 1931	4 hours' Flood	1021.3	—	
Colombo ...	No. 5 Buoys	<i>Glenamoy</i>	11th Oct., 1930—8.30 a.m.	4½ hours' Ebb	1018	—	
	Buoy	<i>Achilles</i>	20th Jan., 1931—4.30 p.m.	2 hours' Ebb	1019.3	—	
Penang ...	Roads	<i>Glenamoy</i>	5th June, 1930—Noon	3 hours' Ebb	1015	—	
	Wharf	<i>Achilles</i>	30th Oct., 1930—4.45 p.m.	Half Flood	1018	—	
	Wharf	<i>Achilles</i>	15th Jan., 1931—7.30 p.m.	Half Flood	—	—	

Port.	Berth.	Observing Ship.	Date and Time of Observation.	State of Tide.	Specific Gravity.	Temp. of Sea.	Remarks.
Port Swettenham ...	Wharf	<i>Achilles</i>	1st Nov., 1930—4 p.m.	Quarter Ebb	1013.5	—	
	Buoy	<i>Achilles</i>	14th Jan., 1931—1.40 p.m.	High Water	1009	—	
	Wharf	<i>Glenamoy</i>	6th June, 1930—3.30 p.m.	3 hours' Ebb	1021.2	—	
	Wharf	<i>Glenamoy</i>	7th June, 1930—Noon	High Water	1022	—	
	Wharf	<i>Glenamoy</i>	8th June, 1930—2.30 p.m.	2 hours' Ebb	1020	—	
	Wharf	<i>Glenamoy</i>	9th June, 1930—8.30 a.m.	2 hours' Flood	1021	—	
Singapore ...	Wharf	<i>Achilles</i>	4th Nov., 1930—3.30 p.m.	Low Water	1020	—	
	Wharf	<i>Achilles</i>	13th Jan., 1931—3 p.m.	High Water	1022	—	
	Pulo Bukum Wharf	<i>Glenamoy</i>	10th June, 1930—10.30 a.m.	High Water	1019	—	
	Tanjong Bagar Wharf	<i>Glenamoy</i>	10th June, 1930—4 p.m.	Low Water	1019.3	—	
	" "	<i>Glenamoy</i>	11th June, 1930—11 a.m.	High Water	1019.1	—	
Hong Kong ...	Wharf	<i>Achilles</i>	11th Nov., 1930—1.30 p.m.	High Water	1022	—	
	Buoy	<i>Achilles</i>	6th Jan., 1931—3.30 p.m.	Low Water	1024	—	
	Kowloon Wharf	<i>Glenamoy</i>	17th June, 1930—8 a.m.	3 hours' Flood	1017	—	
	" "	<i>Glenamoy</i>	18th June, 1930—8.30 a.m.	3 hours' Flood	1014.2	—	
Shanghai ...	Wharf	<i>Achilles</i>	16th Nov., 1930—12.30 p.m.	Half Ebb	1000	—	
	Buoy	<i>Achilles</i>	2nd Jan., 1931—6 a.m.	Low Water	1001	—	
Tsingtau ...	Wharf	<i>Achilles</i>	27th Dec., 1930—7 a.m.	—	1025	—	
	Quarantine Anchorage	<i>Glenamoy</i>	12th Sept., 1930—12.30 p.m.	5 hours' Flood	1020.8	—	
	" "	<i>Glenamoy</i>	13th Sept., 1930—Noon	4 hours' Flood	1024.8	—	
	Wharf	<i>Glenamoy</i>	14th Sept., 1930—Noon	3½ hours' Flood	1020.8	—	
Dalny ...	Oil Wharf	<i>Achilles</i>	21st Dec., 1930—11 a.m.	Low Water	1025	—	
Taku Bar ...	Anchorage	<i>Achilles</i>	19th Dec., 1930—6 p.m.	Half Ebb	1024	—	
Vladivostock ...	Wharf	<i>Achilles</i>	14th Dec., 1930—7 a.m.	Half Ebb	1027.5	—	
	Egerschelde Wharf	<i>Glenamoy</i>	11th—19th July, 1930	—	1022.9	—	
					Mean of 9 observations.		
			11th July, 1930—1 p.m.	3 hours' Flood	1025.5	—	
			15th—19th July, 1930	4 hours' Flood	Highest 1022.1	—	
					Lowest	—	
Moji ...	Buoy	<i>Achilles</i>	18th Nov., 1930—4 p.m.	High Water	1025	—	
	Roads	<i>Glenamoy</i>	28th June, 1930—11.30 a.m.	2 hours' Ebb	1019.0	—	
Kobe ...	Wharf	<i>Achilles</i>	21st Nov., 1930—7.30 a.m.	—	1024	—	
	No. 15 Buoy	<i>Glenamoy</i>	30th June, 1930—Noon	3 hours' Ebb	1015.5	—	
Yokohama ...	Buoy	<i>Achilles</i>	26th Nov., 1930—Noon	Half Ebb	1023	—	
	Wharf	<i>Glenamoy</i>	2nd July, 1930—Noon	3½ hours' Ebb	1019	—	
	Wharf	<i>Glenamoy</i>	5th July, 1930—7 p.m.	Low Water	1019.8	—	
	Wharf	<i>Glenamoy</i>	6th July, 1930—11 a.m.	4 hours' Ebb	1022.0	—	
Hakodate ...	Anchorage	<i>Achilles</i>	1st Dec., 1930—6 p.m.	Low Water	1024	—	
Otaru ...	Anchorage	<i>Achilles</i>	5th Dec., 1930—4 p.m.	—	1026	—	
Nagasaki ...	No. 4 Buoy	<i>Glenamoy</i>	26th—27th June, 1930	High Water and 4 hours' Flood	1023	—	
	No. 4 Buoy	<i>Glenamoy</i>	25th July—29th Aug., 1930	—	1020.3	—	
					Mean of 36 observations.		
			1st Aug., 1930—7 p.m.	3 hours' Flood	1023.2	—	
			24th Aug., 1930—6.30 p.m.	3½ hours' Flood	Highest 1012.0	—	Heavy rain.
					Lowest	—	
Cape Town ...	No. 2 Jetty	<i>Nestor</i>	20th Oct., 1930—Noon	2 hrs. 15 min. before High Water.	1026.0	54.5°	
Durban ...	Main Wharf	<i>Nestor</i>	16th Oct., 1930—Noon	1 hr. 2 min. after High Water	1024.5	69°	
Beira ...	No. 1 Anchorage	<i>Modasa</i>	8th Jan., 1931	1 hour Flood	1022	79°	
Dar-es-Salaam ...	No. 2 Anchorage	<i>Modasa</i>	12th Jan., 1931	3 hours' Ebb	1026	83°	
Zanzibar ...	No. 4 Berth	<i>Modasa</i>	13th Jan., 1931	Slack	1026	81°	
Tonga ...	Inner Anchorage	<i>Modasa</i>	14th Jan., 1931	4 hours' Ebb	1026	82°	
Mombasa ...	No. 1 Shed	<i>Modasa</i>	17th Jan., 1931	4 hours' Flood	1026	84°	
Fremantle ...	Killindini						
	Victoria Quay	<i>Nestor</i>	11th Aug., 1930—Noon	Irregular	1023.5	62°	
	C Shed	<i>Nestor</i>	12th Aug., 1930—Noon	Irregular	1020	62°	
	" "	<i>Nestor</i>	29th Sept., 1930—Noon	Irregular	1018	65°	
	Victoria Quay	<i>Nestor</i>	30th Sept., 1930—Noon	Irregular	1010.5	67°	About low water.
	E Shed	<i>Port Sydney</i>	23rd Dec., 1930	—	1022	70°	
Adelaide ...	Outer Harbour	<i>Nestor</i>	18th Aug., 1930—Noon	2 hrs. 49 min. after High Water	1028	54°	

Port.	Berth.	Observing Ship.	Date and Time of Observation.	State of Tide.	Specific Gravity.	Temp. of Sea.	Remarks.
Adelaide (cont). ...	Outer Harbour	<i>Nestor</i>	22nd-24th Sept., 1930—Noon	3 hrs. 50 min. after low water	1027·6 Mean of 3 observations	57°	
Melbourne ...	No. 2 Quay	<i>Port Campbell</i>	19th Dec., 1930	—	1028	—	
	Victoria Dock	<i>Nestor</i>	20th-22nd Aug., 1930—Noon	—	1005 Mean of 3 observations	52°	
	Station Pier	<i>Nestor</i>	18th-19th Sept., 1930—Noon	—	1025·5 Mean of 2 observations	55°	
	Victoria Dock	<i>Port Sydney</i>	28th Oct., 1930	High Water	1014	63°	The specific gravity may be greater than here recorded as the water in Victoria Dock is from the R. Yarra, there being much fresh water owing to recent heavy rains.
	Victoria Dock	<i>Port Sydney</i>	10th Dec., 1930	—	1010	62°	Floods within last two days, water very muddy.
Geelong ...	Meat Wharf	<i>Port Campbell</i>	12th Dec., 1930	—	1027	—	
Port Lincoln ...	Town Wharf	<i>Port Campbell</i>	15th Dec., 1930	—	1026	—	
Sydney ...	Walsh Bay	<i>Nestor</i>	25th Aug., 1930—Noon	2 hrs. 55 min. after High Water	1025	69°	
	" "	<i>Nestor</i>	27th Aug., 1930—Noon	1 hr. 24 min. after High Water	1025	60°	
	Anchorage at Bight	<i>Nestor</i>	8th Sept., 1930—Noon	3 hrs. 34 min. after High Water	1025·5	59°	
	Pymont	<i>Nestor</i>	9th-10th Sept., 1930—Noon	2 to 3 hrs. after High Water	1025·2 Mean of 2 observations	63°	
	Walsh Bay	<i>Nestor</i>	11th-14th Sept., 1930—Noon	0 to 1 hrs. after High Water	1025·1 Mean of 4 observations	63°	
	—	<i>Port Sydney</i>	4th Nov., 1930	—	1026	73°	
	Woolloomooloo Wharf	<i>Port Campbell</i>	19th Nov., 1930	—	1026	—	
	Pymont Wharf	<i>Port Sydney</i>	26th Nov., 1930	—	1024	70°	
Newcastle ...	Inner Basin	<i>Nestor</i>	29th Aug., 1930—Noon	0 hrs. 15 min. before High Water	1022	63°	
	Lee Wharf	<i>Nestor</i>	30th Aug., 1930—Noon	1 hr. 06 min. before High Water	1022	63°	
Port Kembla ...	City Wharf	<i>Port Campbell</i>	20th Nov., 1930	—	1024	—	
	—	<i>Port Sydney</i>	18th Nov., 1930	—	1025	76°	
	—	<i>Port Sydney</i>	26th Nov., 1930	—	1025	70°	
	Coaling Wharf	<i>Port Campbell</i>	3rd Dec., 1930	—	1026	—	
Brisbane ...	Mercantile Wharf	<i>Nestor</i>	4th Sept., 1930—2 p.m.	3 hrs. 26 min. after High Water	1015	65°	
	" "	<i>Nestor</i>	5th Sept., 1930—Noon	2 hrs. 38 mins. after High Water	1015·5	67°	
	" "	<i>Nestor</i>	6th Sept., 1930—Noon	1 hr. 58 min. after High Water	1015·5	67°	
	New Farm Wharf	<i>Port Campbell</i>	22nd Nov., 1930	—	1015	—	
	Borthwick's "	<i>Port Sydney</i>	22nd Nov., 1930	—	1020	72°	
Gladstone ...	Town Wharf	<i>Port Campbell</i>	25th Nov., 1930	—	1025	—	
Hobart ...	Risdon Wharf	<i>Port Sydney</i>	13th Nov., 1930	Low Water	1014	65°	Recent rains.
R. Tamar, Tasmania	Beauty Point	<i>Port Sydney</i>	15th Nov., 1930	High Water	1022	67°	
	Bell Bay	<i>Port Sydney</i>	13th Dec., 1930	—	1020	63°	Heavy rain within last two days.
Wellington ...	No. 1 North Queen's Wharf	<i>Ruapehu</i>	11th-16th Sept., 1930	—	1025·6 Mean of 6 observations	—	

Port.	Berth.	Observing Ship.	Date and Time of Observation.	State of Tide.	Specific Gravity.	Temp. of Sea.	Remarks.
Wellington (cont.)	No. 1 North Queen's Wharf	<i>Ruapehu</i>	13th Sept., 1930—Noon	Falling	1026.0	—	Water slightly oily.
			15th–16th Sept., 1930	—	Highest 1025.3	—	
	No. 2 King's Wharf	<i>Ruapehu</i>	6th–10th Oct., 1930	—	Lowest 1025.2	—	
Auckland	East Side Queen's Wharf	<i>Ruapehu</i>	20th–26th Sept., 1930	—	Mean of 5 observations 1024.7	—	
					Mean of 7 observations 1026.2		
Napier	Roadstead Anchorage	<i>Ruapehu</i>	29th Sept., 1930—1 p.m.	Falling	1026.2	—	
	" "	<i>Ruapehu</i>	30th Sept., 1930—Noon	High Water	1026.0	—	
Lyttelton	No. 7 East Wharf	<i>Ruapehu</i>	3rd Oct., 1930—3 p.m.	Falling	1025.5	—	
Rarotonga	Avaru Anchorage	<i>Ruapehu</i>	4th Oct., 1930—11 a.m.	Rising	1025.2	—	
		<i>Makura</i>	23rd June, 1930—Noon	—	1025.7	74°	
		<i>Makura</i>	19th July, 1930—4 p.m.	—	1025.0	73°	
			18th Aug., 1930—Noon	—	1024.7	72°	
			8th Nov., 1930—Noon	—	1024.5	76°	
Papeete	Harbour	<i>Makura</i>	21st June, 1930—Noon	—	1024.2	79°	
		<i>Makura</i>	16th Aug., 1930—8.30 a.m.	—	1024.7	78°	
		<i>Makura</i>	10th Nov., 1930—4 p.m.	—	1024.4	81°	
Balboa	In Canal	<i>Ruapehu</i>	18th Aug., 1930—2 p.m.	Falling	1016	—	
Colon	Coaling Jetty	<i>Ruapehu</i>	17th Aug., 1930—2.30 p.m.	Rising	1016.8	—	
St. John, N.B. ...	No. 8 Pier	<i>Minnedosa</i>	2nd Nov., 1930—2 p.m.	Falling	1020.2	—	
			Two series of observations extending over 6 days	—	1012	—	
				High Water	1016	—	
				Low Water	Highest 1007	—	
					Lowest 1025	—	
Puerto San Julian, S. America	—	<i>Parana</i>	11th Mar., 1930	Flood	1025	—	
				Finish of Ebb	1025	—	

CYCLONES OF THE BAY OF BENGAL.

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

Cyclones of the Bay of Bengal so named from the Greek word Kuklos meaning circle, have the same general characteristics as the Typhoons of the North Pacific and Hurricanes of the West Indies. They consist of immense whirls of air revolving in an anti-clockwise direction round a calm centre termed the "Eye of the Storm" and at the same time having a general progressive movement.

The wind at any place within the whirl is made up of two constituents; that due to the general motion of the whole storm and that due to the spin within the whirl itself. At points right of the path these two components move in the same direction, while at points left of the path, the two components are in opposite directions, the result being to give the strongest winds in that part of the storm right of path, *i.e.*, the right hand semi-circle.

When a cyclone is represented on a synoptic chart the distribution of isobars or lines drawn around the centre through points of equal barometric pressure, are rarely shown to be regular and symmetrical.

The whole storm field generally follows the form of the centre and is usually elliptical in shape. The wind blows in a more or less spiral direction towards the centre making an angle with the isobars which varies in the different quadrants of the storm, but is on the average about 30°. The indraught is usually greatest on the outskirts of the storm, decreasing towards the centre.

Intensity and Extent of Storms.

All storms commence as feeble circulations, and are of gradual growth; they are therefore of varying intensity and magnitude which differ greatly in different storms. The intensity of storms

is to a great extent independent of their magnitude, it being possible to have a storm of considerable extent but of feeble intensity, also to have a storm of small extent but of extraordinary intensity.

Sir JOHN ELIOT when Director General of Indian Observatories made a special study of the cyclones occurring in the Bay of Bengal and divided the storm field into three areas:—

- (1) The outer storm area in which the barometer falls slowly and in which winds of force 6–9 are experienced.
- (2) The inner storm area in which the barometer falls rapidly and in which winds of force 10–12 are experienced.
- (3) The Vortex of Eye of the Storm, rarely exceeding 15–20 miles in diameter is generally an area of absolute calm, without rain, and often with blue sky.

The width of the inner storm area gives an idea of the extent of the storm while the intensity of the storm is shown by the amount the barometer at the centre falls, taking the normal height of the barometer at the time as the standard of reference.

Cyclones usually increase in intensity as they approach the land, the lowest pressure being recorded in the calm centre shortly before reaching the coast. The danger of being caught in a cyclone near the land is therefore greatly increased by the exceptional strength of the storm when approaching it.

In the Bay of Bengal storms rarely exceed 600 miles in diameter, and in the majority of cases are less than 150 miles in diameter and are of small intensity. In the smaller storms there is rarely a calm

centre or inner area of hurricane winds, the weather conditions in these storms being similar to those existing in the outer storm area of the more vigorous storms.

Cyclone Season.

In the Bay of Bengal during the months of January and February, the moderate N.E. monsoon blows steadily with fine clear weather. Early in March the rapid increase in temperature over Northern and Central India causes local sea winds to set in and strengthen at the head of the Bay and to some extent spread down the Bay during April. In April and May the N.E. winds in the Bay decrease and become replaced by light, variable winds in the centre of the Bay, while at the beginning of June the S.W. monsoon advances rapidly up the Bay and continues until about the end of September.

From the above conditions the year is divided into four periods:—

(1) N.E. monsoon period from 1st January to the middle of March, when fine weather prevails.

(2) May transition period extending from 15th March to the beginning of June characterized by the extension of S.W. winds in the north and south of the Bay and terminated by the general advance and establishment of the south west monsoon.

(3) South west monsoon period from the 1st June to the 15th September which is the period of general rain in India.

(4) October transition period from 15th September to the end of December marked by the retreat and final disappearance of the south west monsoon. Storms only occur in the Bay during the period that S.W. winds are blowing more or less steadily over the entrance and south of the Bay; they never occur during the N.E. monsoon season. Storms may therefore be experienced from the middle of March to the end of December, and this is termed the cyclone season.

Frequency of Storms.

The Indian Meteorological Office limits the use of the word storm to those cyclonic circulations occurring in the Bay of Bengal in which the wind attains a force of from 8 to 9 of the Beaufort notation. When the wind reaches force 10 or above, the storm is termed a severe storm. In order to differentiate between them they are known as cyclonic storms and cyclones respectively.

From the 1st June to the 15th September when the S.W. monsoon is generally well established, there is a rapid succession of cyclonic storms. These storms form in the northern half of the Bay, thereby causing strong westerly and south westerly winds over the centre and north of the Bay after the storm centre has passed inland. They are generally of moderate extent and intensity, rarely having a calm centre and inner belt of hurricane winds. In the majority of cases strong winds are only experienced in the south and east quadrants of these storms.

During the May and October transition period storms on the whole occur less frequently than during the S.W. monsoon period, but are generally of greater extent and intensity, many of them containing a well-marked calm centre and an inner storm area of hurricane winds.

The following table compiled from the "Atlas of Storm Tracks in the Bay of Bengal" by C. W. B. NORMAND, M.A., D.Sc., published by the Indian Meteorological Department shows the monthly frequency of cyclonic storms and cyclones that occurred in the Bay in the thirty-three years 1891-1923.

—	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
Cyclonic Storms.	6	3	14	9	8	9	9	14	9	81
Cyclones	4	8	2	3	1	5	9	10	4	46

Region of Origin and Tracks of Storms.

Cyclonic storms do not form over or near the Equator. There is no record of a storm having formed to the south of Latitude 5° North. By far the greater number of storms experienced in the Bay are generated in the Bay itself north of the 8th parallel.

There are a few recorded instances of storms having passed from the Gulf of Siam across the Malayan Peninsula into the Bay, but no storms formed in the Arabian Sea pass across India into the Bay.

The conditions favouring the formation of a cyclone, i.e. the inrush of a moist southerly wind, exist during the whole period that the south west monsoon prevails in any part of the Bay. Storms may therefore originate north of the 5th parallel near the coast, in the centre of the Bay, or in the Gulf of Martaban during the months of April to December, their latitude of origin being governed by the advance and retreat of the south west monsoon in the Bay.

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

April.—The storms that occur during this month form in the south of the Bay or in the Andaman Sea, but are less probable in the Andaman Sea than in the Bay itself. They generally move in a north and N.E. direction towards the Burma and Pegu coasts.

May.—The storms that occur during this month generally form in the south of the Bay or in the Andaman Sea, but during the second half of the month may form north of the 16th parallel. They may travel in any direction between west and E.N.E. and are in the majority of cases of great intensity.

June.—The storms of this month are of frequent occurrence, but generally of moderate intensity. The majority form north of the 18th parallel, but may form as far south as Latitude 12° South. They generally travel in a west or N.W. direction towards the Orissa or Bengal coast, but instances are recorded of storms travelling in an E.N.E. direction to the coast of Burma.

July.—The storms of this month are mostly of moderate intensity; forming in the north of the Bay they move in a west to N.N.W. direction across the N.W. angle of the Bay.

August.—The storms of this month originate north of the 15th parallel and travel in a N.Wly. direction across the head of the Bay to the Orissa coast. They are of moderate intensity.

September.—During this month, storms may originate in the Gulf of Martaban or in any part of the Bay, north of the 14th parallel. They may be of moderate or violent force and move in any direction between west and N.N.E.

October.—Owing to the retreat of the S.W. monsoon down the Bay, during this month, storms may originate in any part of the Bay. They may be of moderate or violent force and move in any direction between west and N.E.

November.—The occurrence of severe storms attain maximum frequency during this month and may form in any part of the Bay south of the 17th parallel. The majority of storms forming between the 12th and 17th parallels, move in a north and N.Ely. direction to the head of the Bay, while those forming south of the 12th parallel generally move in a west to N.W. direction towards the Madras coast.

December.—While the majority of storms during this month are of moderate intensity, some attain great violence. They form south of the 16th parallel in the centre or in the S.W. portion of the Bay. They may move in a W.N.W. direction towards the Madras coast or recurve to the N.E. and move to the head of the Bay, or strike the Burma or Pegu coasts.

Rate of Progression.

The rate of progression in cyclonic storms varies considerably in different storms, also for the same storm at different periods of its life. In the earlier stages of formation, the storm may remain practically stationary or advance at less than 4 miles per

hour. When fully formed the average velocity is from 10 to 12 miles per hour, which remains fairly uniform until approaching the land, when it increases to an average of 15 miles per hour. In storms which recurve, the rate of advance usually decreases while the recurve is in progress.

Movement of the Barometer.

In ordinary weather the movement of the barometer in the Bay of Bengal is always small in amount and takes place gradually. The most noticeable change in pressure is the up and down movement of the barometer which takes place twice a day and is known as the diurnal range.

There is never a cessation of the diurnal range, and before the corrected or absolute pressure is used for comparison with the normal pressure as shown on the Meteorological Charts of the East Indian Seas, a correction for diurnal range must be applied. This correction may be taken from the following table which is applicable to all Longitudes and has been compiled from observations taken at sea between Latitudes 10° and 20°. This correction must never be applied to a barometer reading entered in the Meteorological Log or Register or used for transmission in a W/T weather message.

Table to correct Barometric Pressure for Diurnal Range.
Latitude 10° N. to 20° N. in all Longitudes at Sea.

Ship's Time.	Northern Spring.		Northern Summer.		Northern Autumn.		Northern Winter.	
	Mbs.	Ins.	Mbs.	Ins.	Mbs.	Ins.	Mbs.	Ins.
4 a.m. ...	+ 0.8	+ .02	+ 0.7	+ .02	+ 0.8	+ .02	+ 0.3	+ .01
8 a.m. ...	- 1.1	- .03	- 0.9	- .03	- 0.9	- .03	- 0.9	- .03
Noon ...	- 0.9	- .03	- 0.6	- .02	- 0.7	- .02	- 0.6	- .02
4 p.m. ...	+ 1.3	+ .04	+ 1.2	+ .04	+ 1.3	+ .04	+ 1.4	+ .04
8 p.m. ...	+ 0.1	.00	+ 0.1	.00	- 0.1	.00	0.0	.00
Midt. ...	- 0.4	- .01	- 0.3	- .01	- 0.3	- .01	- 0.2	- .01

By carefully watching the movement of the barometer and comparing it with the normal, timely warning of the existence of a cyclone may be obtained. On the outskirts of a storm that is generating in the Bay the barometer frequently stands unusually high and steady, sometimes as much as seven millibars (.20 in.) above normal.

If the corrected barometer reading is three millibars (.10 in.) below normal at any time during the cyclone season, the probability is three to one that a cyclonic storm has formed in the Bay; if five millibars (.15 in.) below, the probability is at least two to one, and if seven millibars (.20 in.) below, it is practically certain that a cyclonic storm has formed.

In the intense storms the barometer falls from 14 to 17 millibars (.40 to .50 in.) below normal in the outer storm field. The inner storm field is one of comparatively small area in which the barometer falls with great rapidity until the storm centre is reached. Within the calm area it is thought that the barometer remains at nearly the same height, only varying with the changes in the intensity of the storm.

Indications of the Formation or Approach of Cyclonic Storms.

From May 1st to June 15th and September 15 to December 31st, if in rear of the storm, the barometer begins to fall at first very slowly and afterwards more quickly. The south west winds in the

south of the Bay increase in strength and the weather becomes more squally and unsettled. Clouds increase in amount and show by their rapid movement indraught to a cyclonic disturbance.

If in front of the storm, north and west of the area in which the storm has formed light cirrus appears, and spreading northward gradually thickens. At sunset or sunrise these clouds often appear a very dark or vivid red colour. Halos appear round the sun or moon. Cirro-stratus forms below the cirrus extending north and west. The weather becomes more sultry and the wind in the north of the Bay begins to shift and gradually increase in force.

The cloud bank next appears low down on the horizon, its position being shown at night by the almost continuous lightning seen by reflection from distant clouds. The cloud bank and lightning may sometimes be seen from two to three days before the approach of the storm.

With the wind freshening cumulus and nimbus clouds appear and gradually cover the sky when light drizzling rain sets in. The wind becomes gusty and squally, the squalls increasing in force and frequency as the storm draws nearer.

At the head of the Bay the setting in of an increasing heavy swell often gives the first indications of the approach of a storm. When north of the storm the bearing of its centre is often indicated by the point of radiation of the cirrus clouds. An approximate bearing may also be obtained from the direction of the cloud bank or at night from the lightning which occurs as soon as the bank becomes visible. At a distance the cloud bank retains its shape and position for hours only changing when the storm is drawing near.

From 15th June to 15th September:—A strong squally monsoon blowing over the south and centre of the Bay and a rapid increase in the strength of the south west and south wind in the north of the Bay.

A rapid succession of severe rain squalls increasing in intensity and frequency as the storm area is approached.

Comparatively light cyclonic winds in the N.W. and S.W. quadrants even at moderate distances from the centre; these winds give no indication of the strength of the winds in the opposite quadrants.

Currents in Cyclonic Storms.

Cyclonic storms give rise to strong currents within the storm field. Near the coasts the direction of the current is greatly modified but in the open sea it is found that the set is approximately in the same direction as the wind. The drift in the inner storm area of intense storms in the Bay of Bengal may be as much as from 6 to 8 knots, and in the outer storm area from 2 to 3 knots, but near the head of the Bay the currents may be found stronger than this. A westerly increasing set at the head of the Bay is a marked indication of a cyclone forming or having formed in the Bay.

Interception of Wireless Weather Reports.

Amongst the great volume of shipping always navigating the Bay of Bengal, there will generally be found a number of British "Selected Ships" broadcasting Wireless Weather Reports at schedule times. When the Convention of Safety of Life at Sea 1929 is ratified the master of every ship meeting a dangerous tropical storm will be bound by Article 34 to communicate information by every means at his disposal to ships in the vicinity and also to the competent authorities at the first point of the coast with which he can communicate. These reports when intercepted will provide valuable data for the construction of simple weather charts giving a graphical illustration of the weather changes taking place over the Bay, and from which, in the case of a cyclone the Captain of a ship could act with far greater confidence and safety, than if depending on his own solitary observations.

"UPPER AIR OBSERVATIONS OVER THE SEA." A PRELIMINARY UPPER AIR CHART.

BY COMMANDER L. G. GARRETT, R.N. (RETIRED), SUPERINTENDENT ROYAL NAVAL METEOROLOGICAL SERVICES.

In previous articles published in this Journal on "Upper Air Observations over the Sea," emphasis has been laid on the necessity of accumulating observations of upper wind over all parts of the world in order that the problems of the general circulation of the upper air can be completely elucidated. The problem is one of the greatest importance, not only from the scientific but practical point of view also, in view of the rapid development of aviation and the opening up of air routes over the seas in both hemispheres.

A scheme for co-operation between the Admiralty and the Meteorological Office in the charting of the upper air over the ocean was initiated in 1925, but did not come into full operation until 1927. Since 1927 there has been a considerable development in the scheme and now forty of H.M. ships undertake observations of upper winds by means of pilot balloons distributed over all parts of the world. From 1925 to the end of 1927, 250 observations were received in the Meteorological Office, and from 1927 to 1930, 900 observations. It is anticipated that from this year onwards the number will be increased to 1,500 per year. 20 per cent. of the observations have reached a height of between 10,000 and 20,000 feet and 5 per cent. of over 20,000 feet; the maximum height obtained was 49,000 feet in Australian waters.

In addition to observations of pilot balloons a certain number of temperature observations have also been obtained.

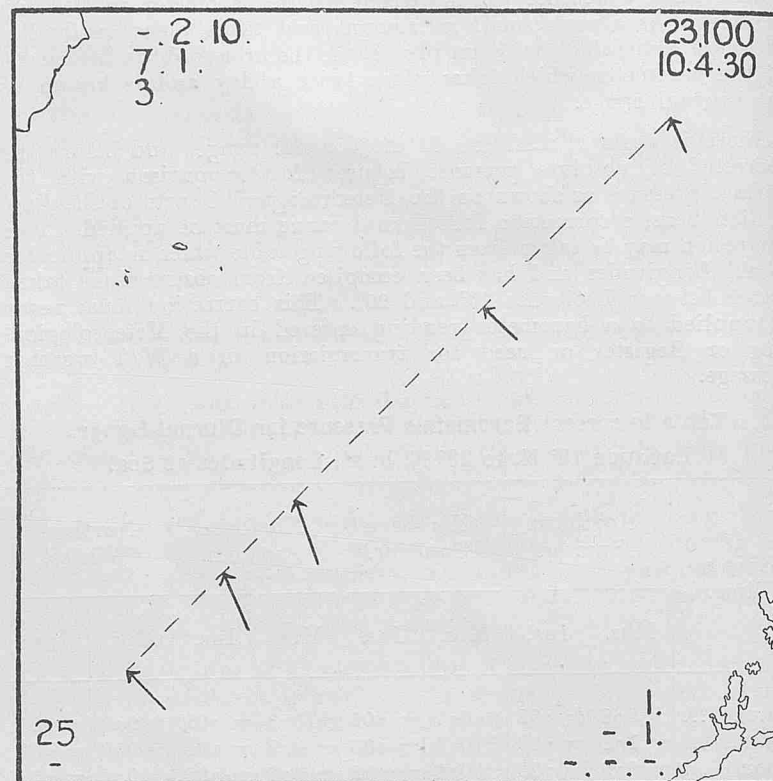
The results received in the Meteorological Office are extracted on to cards and filed under the month and square in which the observations were made. From these cards summaries showing the percentage frequencies of the winds at the surface and at 1,500, 3,000, 6,000 and 10,000 feet are compiled for each square and for each month. The frequency summaries will be represented finally on a series of monthly charts of the world by wind roses, but a very large number of observations will be required before a complete set of charts of wind roses for the world can be produced. It may, however, be of interest to readers of THE MARINE OBSERVER to know that as a preliminary a chart entitled "Distribution of Observations of Upper Winds and Upper Air Temperatures over the Oceans" has been prepared in the Naval Division of the Meteorological Office and has recently been published by the Admiralty under the superintendence of the Hydrographer of the Navy, Rear Admiral H. P. DOUGLAS, C.B., C.M.G. This chart, No. 5075, is now on sale, price 3s.

The chart shows the distribution of existing observations of upper winds and upper air temperatures over the oceans and although it is primarily intended for the use of H.M. ships in selecting the regions and times for further observations, it is nevertheless a valuable index chart to all those interested in upper air observations over the sea.

The observations are graphed in 10° squares and a representative square for the area Lat. 10°-20° N., Long. 110°-120° E. is shown in FIGURE 1 on an enlarged scale.

In the top left hand corner of the square are given the total number of observations of Pilot Balloon ascents obtained by H.M. ships or by special expeditions at sea during each of the months February to June. The bottom right hand corner contains the corresponding total for the months of July to December. The month to which a particular number refers can be ascertained by the relative position of the figure. In the bottom left hand corner is given the total number of upper wind observations made by H.M. ships and below that the total number of upper air temperature observations. In the top right hand corner of the square are given the maximum height in feet reached by a pilot balloon ascent from one of H.M. ships and the date on which the maximum height took place.

In the central portion of the square are plotted on a specified scale arrows representing winds observed for direction and velocity at different levels in the ascent of maximum height in this particular square:—



Scale:—:1 in. = 25 knots. :1 in. = 2,500 ft.

Figure 1.

FIGURE 1 can be analysed as follows:—

Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total number of ascents. [No observations of upper air temperature.]
0	2	10	7	1	3	1	0	1	0	0	0	= 25

Maximum height reached 23,100 feet on 10.4.30.
Winds observed on ascents of maximum height.

Surface.		1,750 ft.		3,150 ft.		6,650 ft.		10,150 ft.	
Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.
135	7 kt.	157	8 kt.	161	9 kt.	134	6 kt.	155	5 kt.

Additional information is also given on the front and back of the chart, reference being made to publications containing data obtained at coast and inland stations and by special expeditions. Reports show that in recent years other countries have also been active in organizing special voyages to undertake upper air observations over the sea, one notable cruise being that of the German ship *Meteor*, which ship carried out systematic observations over the South Atlantic in the years 1925-27.

Since 1928 the Deutsche Seewarte has organized a scheme by which ships of the German Mercantile Marine running to America and the West Indies have undertaken upper air observations. This is being specially done in reference to the trans-Atlantic air traffic of the future. The scheme is being still further developed and valuable information is being obtained.

SOUTHERN ICE REPORTS.

During the Years 1929 and 1930.

July.

No reports of Ice, sighted in the Southern Ocean during the month of July, in years 1929 and 1930, have been received at the Meteorological Office.

WEATHER SIGNALS.

I.—SHIPS' WIRELESS WEATHER SIGNALS.

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

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

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

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

See List of W/T Stations detailed to receive reports from **A Selected Ships** with particulars up to date below, also on Chart 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 18 Vol. VIII, No. 85 (January, 1931, MARINE OBSERVER).

B Selected Ships broadcast their report to C.Q. on 600 m. spark, and these may be intercepted by the stations ringed in on Chart 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 153 and 154. The procedure given on pages 16 to 19, Vol. VIII, No. 85, should be adhered to as far as possible.

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

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

Request for Information.

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

Ocean.	Station.	Position.	Call Sign.	Frequency and Wave Length.		Area and limits covered by Station.	Telegraphic address of Meteorological Centre.	Information required—Limit of Groups.	Notes.
				For Station to call up "Selected Ships."	For "Selected Ships" to report to Station.				
North Atlantic and North Sea.	Portishead.	Lat. 51° 28' 41" N. Long. 2° 47' 30" W.	GPU.	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. or Sayville N.Y. West Palm Beach, Fla.	Lat. 41° 42' N. Long. 70° 00' W. Lat. 40° 42' N. Long. 73° 06' W. Lat. 26° 42' N. Long. 80° 02' W.	WCC. WSL. WMR.		142.9 kc/s. (2098 metres).	North Atlantic West of Longitude 40° W.	Observer Washington.	Weather only. First four groups of observations taken at 0000 and 1200 G.M.T. only required.	No control. All British "A Selected Ships" within area to address their 0000 and 1200 G.M.T. observations to Observer Washington and their 1800 G.M.T. observations to CQ in accordance with schedule.
	Horta, Azores.	Lat. 38° 32' N. Long. 28° 38' W.	CTH.		125 kc/s. (2400 metres).	North Atlantic South of Latitude 38° N. and East of Longitude 40° W.	Radio Horta.	Weather only, up to seven groups, preferably No. 3 Supplementary Groups.	No control—all British "A Selected Ships" within area should report in accordance with Schedule.

(Continued.)

[illegible]

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

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

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

(Continued.)

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

II.—WIRELESS WEATHER SIGNALS.

WIRELESS WEATHER BULLETINS.

FRENCH INDO-CHINA.

Spark Issue.

Mitho W/T Station, approximate Latitude $10^{\circ} 21' N.$, Longitude $106^{\circ} 22' E.$, 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 $25^{\circ} 08' N.$, Longitude $121^{\circ} 45' E.$, 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.

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 0548 and 1148 G.M.T. on 355 m. (R.T.).

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 report and forecasts based upon observations from about 90 stations in the Far East at:—

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

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

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

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

Part I. Particulars regarding general atmospheric pressure distribution including the location of high and low pressure areas.

Part II. Location and expected direction of movement of depression, or typhoon, affecting the China Sea, Eastern Sea, Yellow Sea, Japan Sea (including the Pacific Ocean to the eastward) or S.E.

of the Philippine Islands extending northward from Guam and adjacent islands to Northern Japan.

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

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

Weather reports are also transmitted on request free of charge.

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 650 metres (I.C.W.), repeated immediately on 1500 metres (I.C.W.), at:—

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

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

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

Meteorological observations 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 on a short wavelength of 23.5 metres at 1130 G.M.T. preceded by the general call and the call sign of **Shanghai W/T Station FFZ1**.

WIRELESS STORM WARNINGS.

HONG KONG.

Spark 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.

The warnings from Hong Kong observatory are broadcast on receipt and at 18 minutes past each hour until 1600 G.M.T. and the warnings from Shanghai and Manila are broadcast on receipt and repeated after an interval of 10 minutes.

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 received from Hong Kong observatory immediately following the weather bulletins at 0548 and 1148 but when the Hong Kong local storm signals are displayed they will be broadcast on receipt and at 48 minutes past every hour until the signals are lowered. The warnings from Shanghai and Manila will be broadcast on receipt and repeated after an interval of 10 minutes when the Hong Kong local storm signals are displayed.

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. 155 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 650 metres (I.C.W.), repeated immediately on 1500 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. } Wavelength 4000 metres (C.W.).
 „ 0550 G.M.T. }
 „ 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° 12' 39" N., Longitude 114° 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. 00s. and 1h. 54m. 00s., and between 12h. 53m. 00s. and 12h. 54m. 00s., G.M.T., as follows:—"CQ de 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° 13' 16" N., Longitude

121° 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 } 8 }	55	00	to	2 } 8 }	56	45	— — — — —
	57	00	„	57	50		— — — — — etc.
	57	55	„	58	00	{ 55 56 57 58 59 60	Time signal.
	58	08	„	58	10	— —	
	58	18	„	58	20	— —	
	58	28	„	58	30	— —	
	58	38	„	58	40	— —	
	58	48	„	58	50	— —	Time signal.
	58	55	„	59	00	{ 55 56 57 58 59 60	
	59	06	„	59	10	— — — —	
	59	16	„	59	20	— — — —	
	59	26	„	59	30	— — — —	
	59	36	„	59	40	— — — —	Time signal.
	59	46	„	59	50	— — — —	
2 } 8 }	59	55	„	3 } 9 }	00	00 { 55 56 57 58 59 60	
						— = 1 sec. ; ■ = 0·2 sec.	

— = 1 sec. ; ■ = 0.2 sec.










IV.—VISUAL STORM WARNINGS.

HONG KONG.

Local Storm Signals.

The following system of local storm signals came into force at Hong Kong on March 1st, 1931.

Day Signals.

Signal.	Symbol.	Signification.
1		A depression or typhoon exists which may possibly affect the locality.
2		Strong wind with squalls may possibly occur from the S.W. (S-W).
3		Strong wind with squalls may possibly occur from the S.E. (E-S).
5		Gale expected from the N.W. (W-N).
6		Gale expected from the S.W. (S-W).
7		Gale expected from the N.E. (N-E).
8		Gale expected from the S.E. (E-S).
9		Gale expected to increase.
10		Wind of typhoon force expected (any direction).

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

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

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

Day signals displayed at Harbour Office, H.M.S. *Tamar*, W/T mast Royal Observatory, Green Island signal mast, a flagstaff on the premises of the Hong Kong and Kowloon Wharf and Godown Coy., the Standard Oil Coy.'s flagstaff at Lai chi Kok, and a flagstaff near the field officers' quarters at Lyemun, Gough Hill Police Station and Taipo (District Officer's flagstaff).

Night Signals (Lights).

Signal No.	1	2	3	5	6	7	8	9	10
	WHITE	WHITE	GREEN	WHITE	GREEN	GREEN	WHITE	GREEN	RED
	WHITE	GREEN	WHITE	GREEN	WHITE	GREEN	WHITE	GREEN	GREEN
	WHITE	WHITE	GREEN	GREEN	WHITE	WHITE	GREEN	GREEN	RED

Night signals displayed, at sunset, on the tower of the railway station, W/T mast Royal Observatory, H.M.S. *Tamar*, Gough Hill Police Station, flagstaff near Field Officer's quarters at Lyemun, Knowloon City Police Station and on the Harbour Office flagstaff. **They have the same signification as the day signals.**

Signal No. 10 will be accompanied by explosive bombs, as above, in the event of the information conveyed by this signal being first published at night.

Supplementary Warnings.

When local signals are displayed in the harbour, signals will be displayed at the following stations:—

Aberdeen	Saikung
Cheung Chow	Shataukok
Gap Rock	Tsun Wan
Ping Shan	Tai O
Stanley	Waglan
Saukiwan	

The signals displayed are as follows:—

When No. 1 signal is displayed in the harbour:

Red T by day.

2 red lights vertically by night.

When Nos. 5 to 10 signals are displayed in the harbour:—

Black cone by day.

Two green lights vertically by night.

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

The object of the system is to give at least 24 hours' warning of a gale (force 8 Beaufort scale) and also warnings of expected changes in the direction and force of the wind. Owing, however, to the uncertain movements of typhoons and to insufficient telegraphic observations it will occasionally happen that Signals 5 to 10 may be displayed without a gale occurring at Hong Kong, or even Gap rock, but the reverse is not likely to happen, except in the case of typhoons forming in the vicinity and travelling rapidly towards Hong Kong, or should the direction of motion of a located typhoon alter or its rate of progression increase abnormally. Signal No. 1 is intended as a warning to "Stand by" and watch for the next signal. When it is hoisted after one of Nos. 5 to 8 has been displayed it will mean that on account of a change in the track of the typhoon or for some other reason, a gale is no longer expected from the direction indicated by the last signal and that another black signal may possibly be hoisted later.

PHILIPPINE ISLANDS.

Typhoon Warning Signals.

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

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

Night Signals.—Red and White lights shown vertically or horizontally, if horizontal they are read from left to right.

No. By Day. By Night. Meaning.

1



Indicates (a) A distant typhoon the direction of whose movements is still unknown. The signal will be changed in case the typhoon approaches.

(b) The direction of the distant typhoon is at present such that the storm may pass off without seriously affecting the archipelago.

(c) A general warning, viz., when the weather indications are dangerous but such as are not covered by any one of the other signals in use; for instance, when the typhoon recurves east of the archipelago. In such cases see the daily weather note posted at all the meteorological and telegraph stations and Custom houses.

Precautions.—Vessels should prepare to strengthen their moorings and to get up steam. Small vessels, especially open launches, should not risk going far from port.

2



Indicates that the centre of the typhoon will pass (or is passing) to the northward at a considerable distance. Winds from west to south are to be expected, which may acquire considerable force and continue for several days.

Precautions. — Vessels should strengthen their moorings. It is considered advisable that vessels should send down light yards and masts. Steam vessels should be ready to use their engines at short notice. Dangerous for small vessels to be in Manila bay.

3



Indicates that the centre of the typhoon will pass (or is passing) to the southward at a considerable distance. Winds from east to south are to be expected. These are generally less violent than those referred to in signal No. 2.

Precautions.—As for signal No. 2.

4



Indicates that the location of the typhoon is dangerous for the place where the signal is hoisted, though the danger is not imminent. Look out for the next signal.

Precautions. — Vessels should strengthen their moorings. Steam vessels must be ready to use their engines in case of sudden emergency. Small vessels must remain at their moorings.

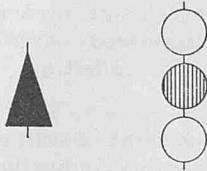
Signal

No. By Day. By Night.

Meaning.

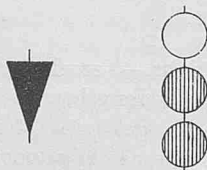
5 Indicates that the centre of the typhoon will pass (or is passing) to the northward at a short distance. Strong winds from north, through west, to south are to be expected, which may become very violent.

Precautions. — Vessels should strengthen their moorings as much as possible. Lower and secure all gear. Use steam to help anchors. Vessels outside Manila harbour may find it necessary to seek refuge in Kavite. No vessels should be under way while this signal is hoisted.



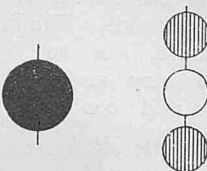
6 Indicates that the centre of the typhoon will pass (or is passing) to the southward at a short distance. Strong winds from north, through east, to south are to be expected, which may become very violent, though usually they are less severe than those referred to in signal No. 5.

Precautions.—As for signal No. 5.

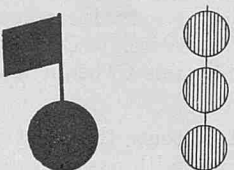


7 Indicates that the centre of the typhoon will pass over the place where the signal is hoisted.

Precautions.—As for signal No. 5. It must be noted, however, that after the absolute or relative lull, due to the actual passing of the centre, the wind will suddenly change to a direction opposite to the one from which it came before the lull; also that it may often be more violent than before.



8 Indicates very high tides, and floods. Precautions.—Vessels of any description must not attempt to enter or leave a harbour or river, nor to move about inland waters while this signal is hoisted. The flag in this signal is of any convenient colour.



CHINA SEAS STORM SIGNAL SYSTEM.

Typhoon and Storm Signals.

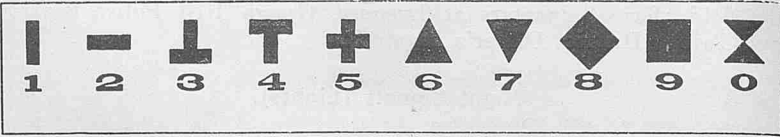
Non Local Storm Signal Code.

This system is a modification of the Old China Seas Storm Signal Code and was recommended by the Meteorological Conference at Hong Kong 1930 for all Weather Services in the Far East using a Non Local Storm Signal Code.

The code came into force on 1st March, 1931, and is in use at the following stations:—Hong Kong. The Stations of the Maritime Customs at Newchwang, Taku, Chefoo, Chinkiang, Woosung, Gutzlaff, Pagoda Anchorage and Amoy. The French Municipal station at Shanghai. The station at Weihaiwei. The French (Indo-China) stations at Haiphong, Tientcha, Ilot de l'Observatoire (Tourane), Cape Varella, Cape Padaran, Cape St. James, and Saigon.

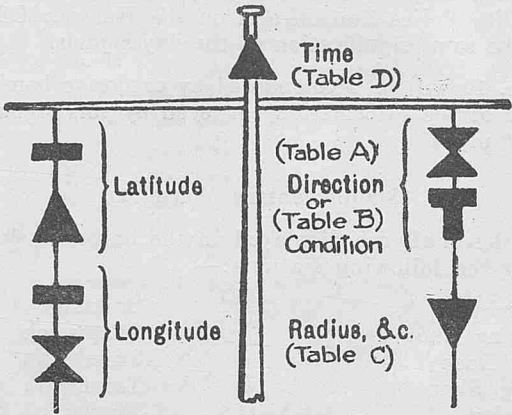
General Explanation.

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



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

Typhoon Signal.



Meaning.—A severe typhoon within 30 miles of Lat. 26° N., Long. 120° E., travelling N.E. The typhoon was in the above position at 11 a.m. yesterday.

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

The two upper symbols on the opposite yardarm indicate the direction in which a typhoon is travelling, see Table A or alternatively certain conditions of the typhoon see Table B.

Table A.

Direction Signal.

Direction of Motion	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	N	Unknown
Typhoon ...	02	04	06	08	10	12	14	16	18	20	22	24	26	28	30	32	53
Typhoon or Depression	62	64	66	68	70	72	74	76	78	80	82	84	86	88	90	92	93

Note. The display of the figure in the lower column is optional.

Table B.

Condition Signal.

Condition	Forming	Two centres	Stationary or Very Slow	Curving N	Curving NE	Curving E	Curving SE
Code figure	51	52	54	55	56	57	59

Condition	Curving S	Curving SW	Curving W	Curving NW	Filling up or curving N	Filling up or curving NE	Filling up	Filled up
Code figure	61	63	65	67	69	71	58	60

The lower symbol on the side indicates the radius of the circle in miles whose centre is shown by the latitude and longitude, together with the degree of intensity. Latitude and longitude is the centre of an indefinite area affected. See Table C.

Table C.

Radius and Intensity Signal.

Radius of position circle. Intensity	120		60		Deepening	30		Exceptionally high rate of travel	Continental depression	Position uncertain
	Un-known	Severe	Un-known	Severe		Un-known	Severe			
Code Figure	1	2	3	4	5	6	7	8	9	0

When signal 9 is shown i.e., a Continental depression, the position will be indicated by the figures in the lower column of Table A.

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

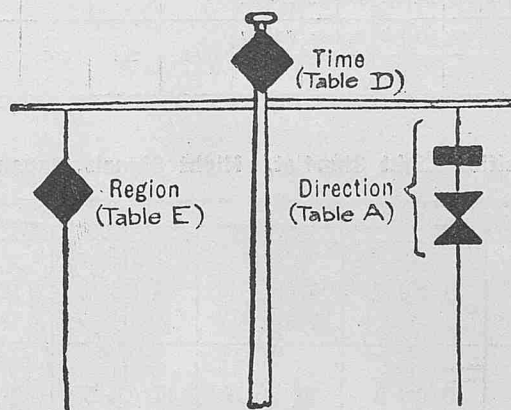
In the Old China Sea Code the signal at the masthead indicated the time the warning was issued by the Observatory. In the present code it shows the time at which the typhoon or depression was in the position indicated. See Table D.

Table D.

Time Signals.

Day		To-day.				Yesterday.				—
Code figures	...	1	2	3	4	5	6	7	8	9
120th meridian time.	E	6 a.m.	11 a.m.	2 p.m.	5 p.m.	6 a.m.	11 a.m.	2 p.m.	5 p.m.	Position deduced from supplementary information received since last warning.

GALE SIGNALS.



MEANING.—The north coast of Hokkaido threatened by a gale from S.W. The gale was in the region indicated at 5 p.m. yesterday.

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

Table E.

DISTRICT SIGNAL.

1	2	3	4	5	6	7	8	9	0
Coast of Annam.	G. of Tong-king to Swatow.	Formosa Strait.	Formosa to Yangtze.	Yangtze to Shanghai.	G. of Yalu to Pechihli.	Sea of Japan.	North of Japan.	East Coast of Japan.	South of Kiusiu.

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

The symbol at the masthead shows the time at which the typhoon or depression was in the region indicated. See Table D.

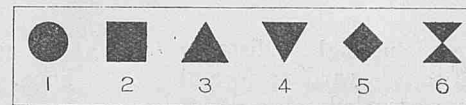
NOTE.—In addition to the above general signals, local storm signals are displayed at Hong Kong. See p. 156.

JAPAN.

Storm Signals.—The storm signals made at various places on the coasts of Japan consist of General storm signals and Local storm signals. The former, shown on special masts, give the time, the position, the direction, the rate of progressive movement and intensity of the storm, while the latter only furnish a general idea of the character of the storm expected.

General Storm Signals.

By day the signals are made from a mast with a yard by means of certain symbols; these symbols and their equivalent numbers are as follows:—

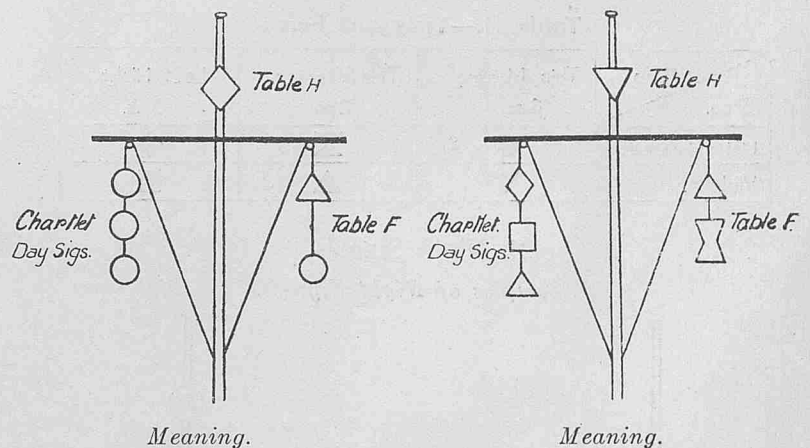


The symbols are usually *red*, but in some places, to suit local conditions, they are *white*.

By night the signals are made by means of *red*, *white*, and *green* lights.

1. Day Signals.

Examples of Day Signals.



Meaning.

Last night, at 10 p.m. a typhoon or cyclone off the north-east coast of Japan moving towards north-east with a velocity of 10 to 20 miles per hour, the intensity not indicated.

Meaning.

This morning, at 6 a.m. a violent typhoon in northern Formosa moving towards the north-west, its velocity not indicated.

Three symbols, vertical, at one yardarm of the storm-signal mast, indicate the number of the district in which the centre of a typhoon or cyclone is situated. See CHARTLET, DAY SIGNALS, p. 160.


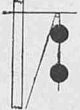
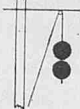
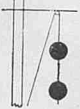
Two symbols at the other yardarm show the direction of the progressive motion. See Table F.

Table F.—Direction of Motion.

▲	▲	▲	●	●	●	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
▲	▲	▲	●	●	●	▼	▼	▼	▼	▼	▼	▼	▼	▼	▼
N.	NNE.	NE.	ENE.	E	ESE.	SE.	SSE.	S	SSW.	SW.	WSW.	W.			
▼	▲	▲	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆	◆
WNW.	NW.	NNW.	Forming		Filling up		Unknown.		Recurving		Steady or Slow.				

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

Table G.—Rate of Progression.

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

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

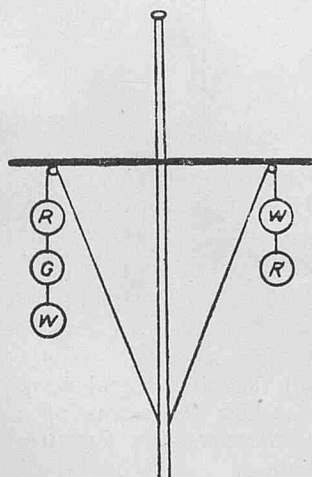
One symbol at the masthead shows the time at which the centre was located, and the intensity (force) of the typhoon. See Table H.

Table H.—Time and Force.

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

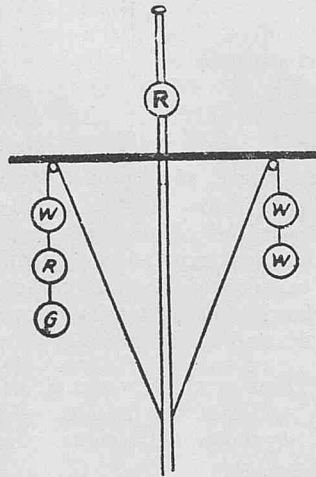
2. Night Signals.

Examples of Night Signals.



Meaning.

A cyclone or typhoon over Korea, moving towards the north-east.



Meaning.

A cyclone over Hokkaido, moving towards the east.

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

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

Table I.—Subdivision Light.

1 st Quadrant.	2 nd Quadrant.	3 rd Quadrant.	4 th Quadrant.
W	R	G	None

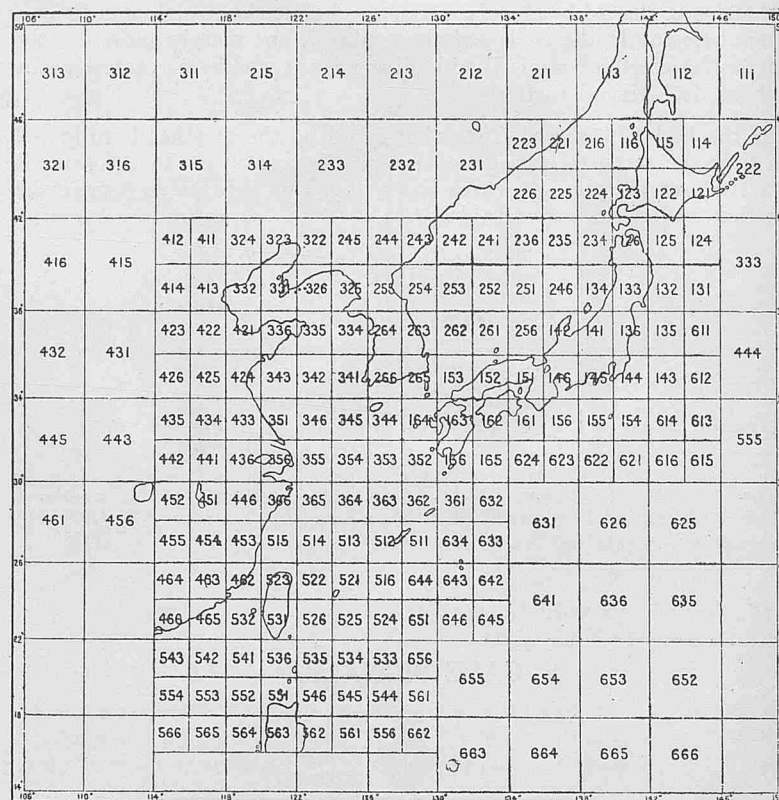
Two lights, vertical, at the other yardarm show the direction of the motion of the centre. See Table J.

Table J.—Direction of Motion Lights.

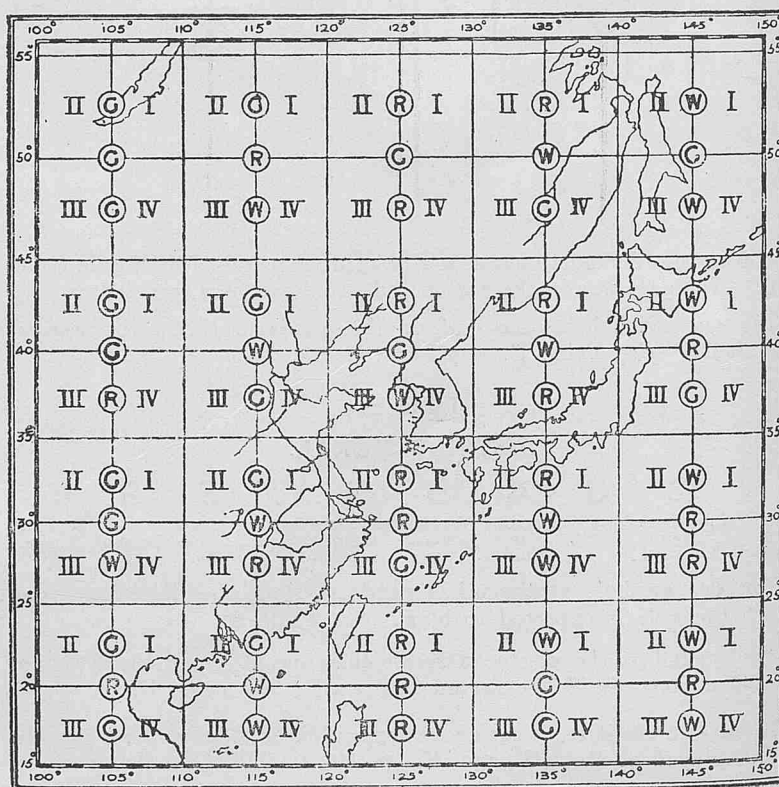
G	W	W	R	R	R	G	W
W	R	W	R	G	W	G	G
N.	NE.	E.	SE.	S.	SW.	W.	NW.

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

Chartlet indicating position of Storm Centre. Day Signals. Japan.



Position Light Chartlet. Night Signals, Japan.



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

Local Storm Signals.

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

Day Signals.	Night Signals.	Signification.
A <i>red</i> ball ...	A <i>red</i> light ...	Strong wind or gales expected.
A <i>red</i> cylinder	A <i>green</i> light ...	Rain or snow storm.
A <i>red</i> cone ...	A <i>red</i> light over a <i>green</i> light	Approach of a cyclonic storm of dangerous intensity.

Special Notices Regarding Personnel.

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

1912-1913

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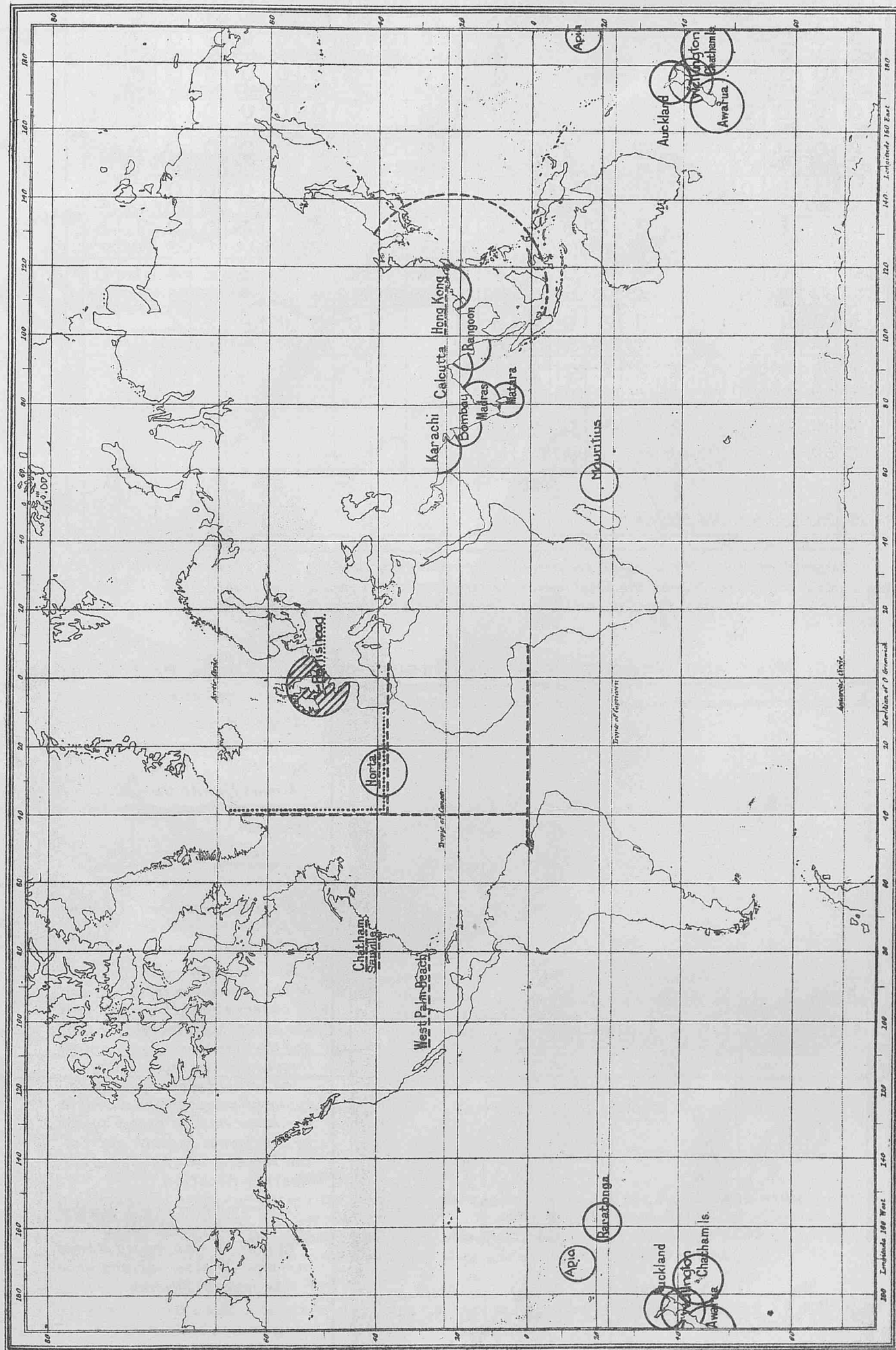
Author	Title	Date
...

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Chart VIII.— SHIPS' WIRELESS WEATHER SIGNALS.

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

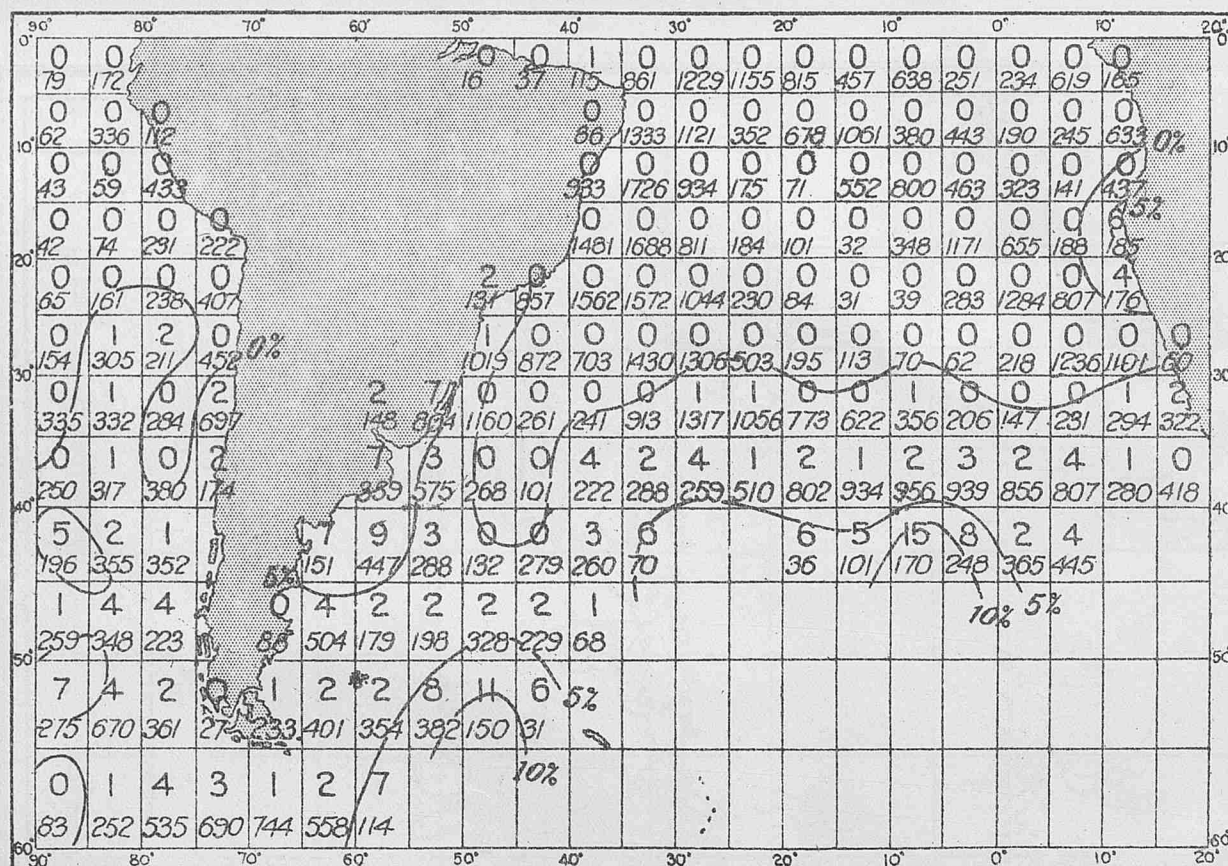


The dotted line indicates the area in which British 'A' Selected Ships' report under control to Portishead. The small shaded circle indicates the area from which reports are prohibited to Portishead.

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

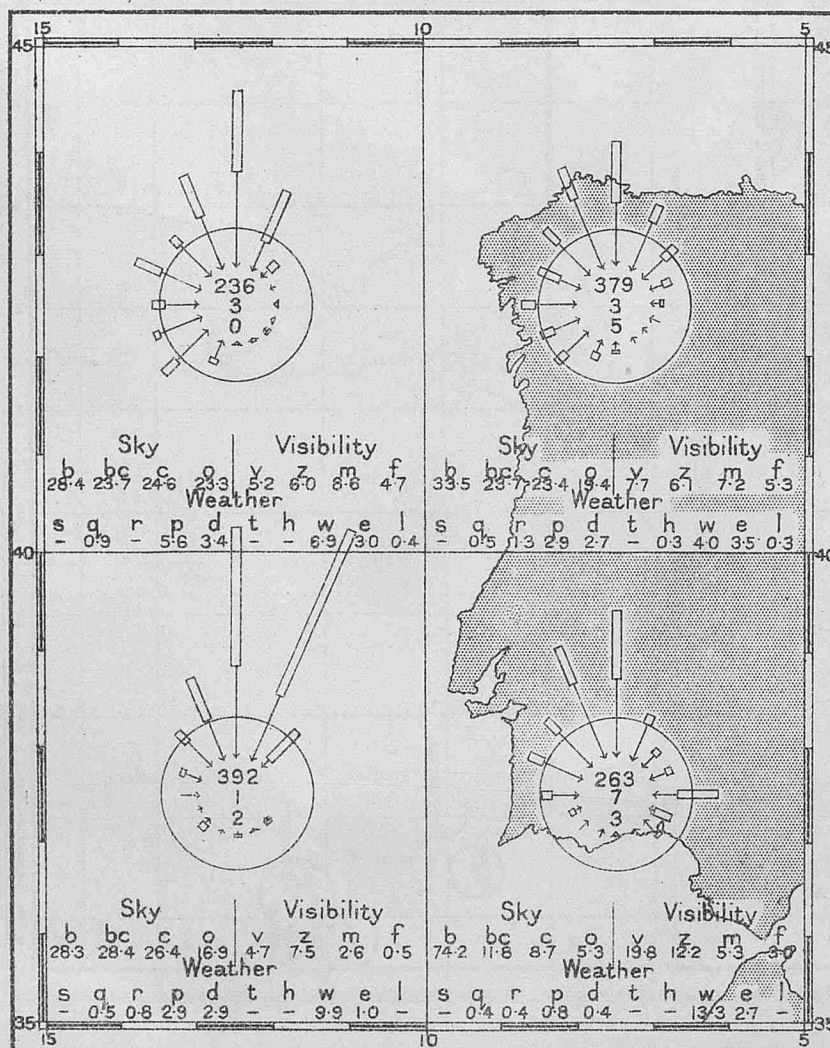
The full-line circles indicate the areas round islands and coast stations which could receive spark Selected Ships' reports to C.Q.

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



The upper figures in the 5° squares give the percentage frequency of occasions upon which Fog was logged, the lower figures the total number of observations. Lines are drawn for 0, 5, 10, 20 and 30%. The chart is compiled from observations from British Ships for the period 1855 to 1899.

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



EXPLANATION.

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

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

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

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

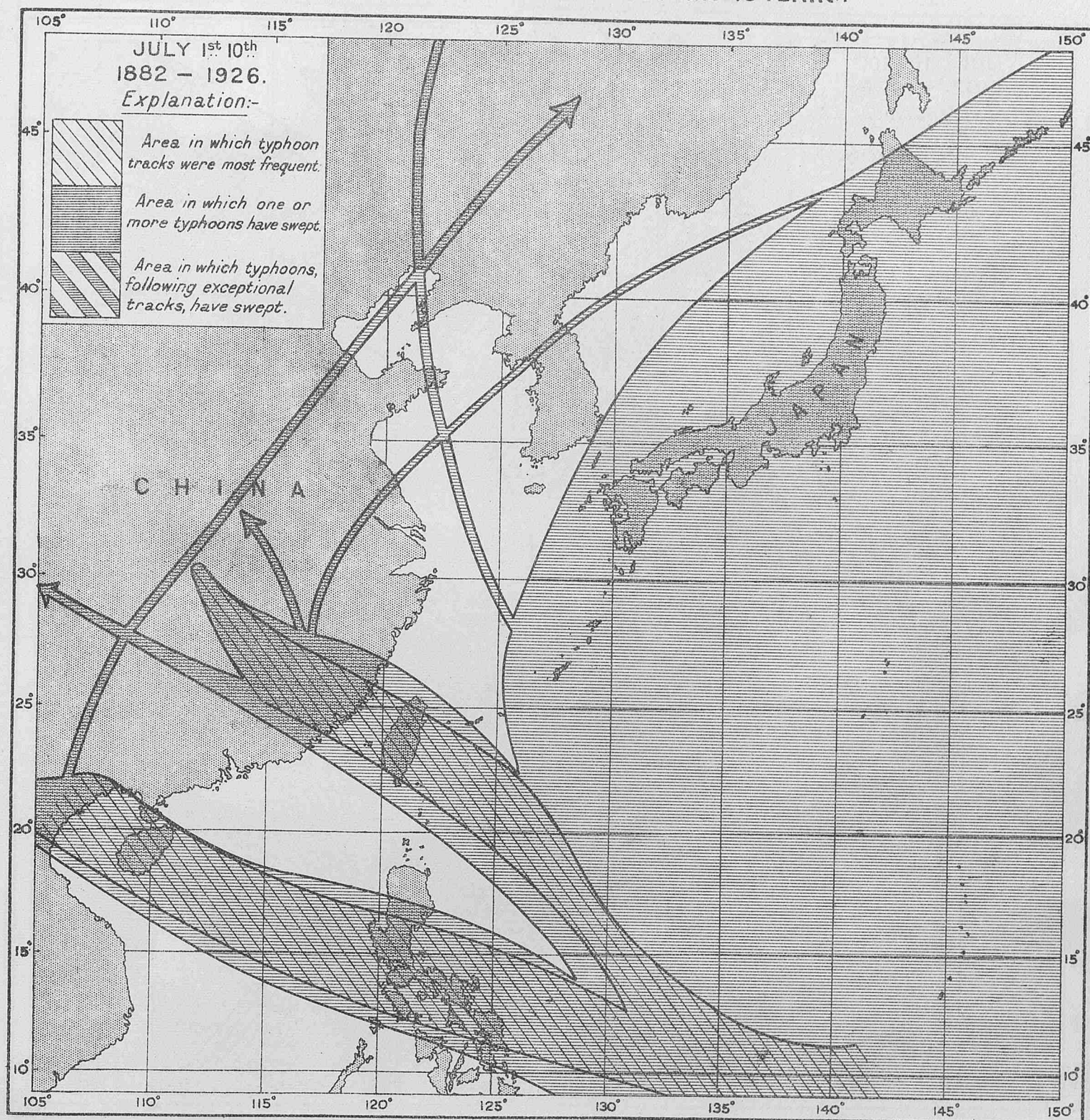
The upper figure in the centre of the rose gives total number of observations, the middle figure the percentage frequency of calms and the lower figure the percentage frequency of variable winds.

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

For example, in the 5° square Latitude 35° to 40°N. Longitude 5° to 10°W. b was logged 74 times in every 100 observations while f was logged 3 times.

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

TYPHOONS IN THE FAR EAST DURING 45 YEARS.



JULY - Three charts: Total observations of Typhoons for month - 115.

Chart I - July 1st to 10th.

Various strips of the Coast of China escape, although at a hundred miles or more to each side of the track of the typhoon bad weather may be experienced.

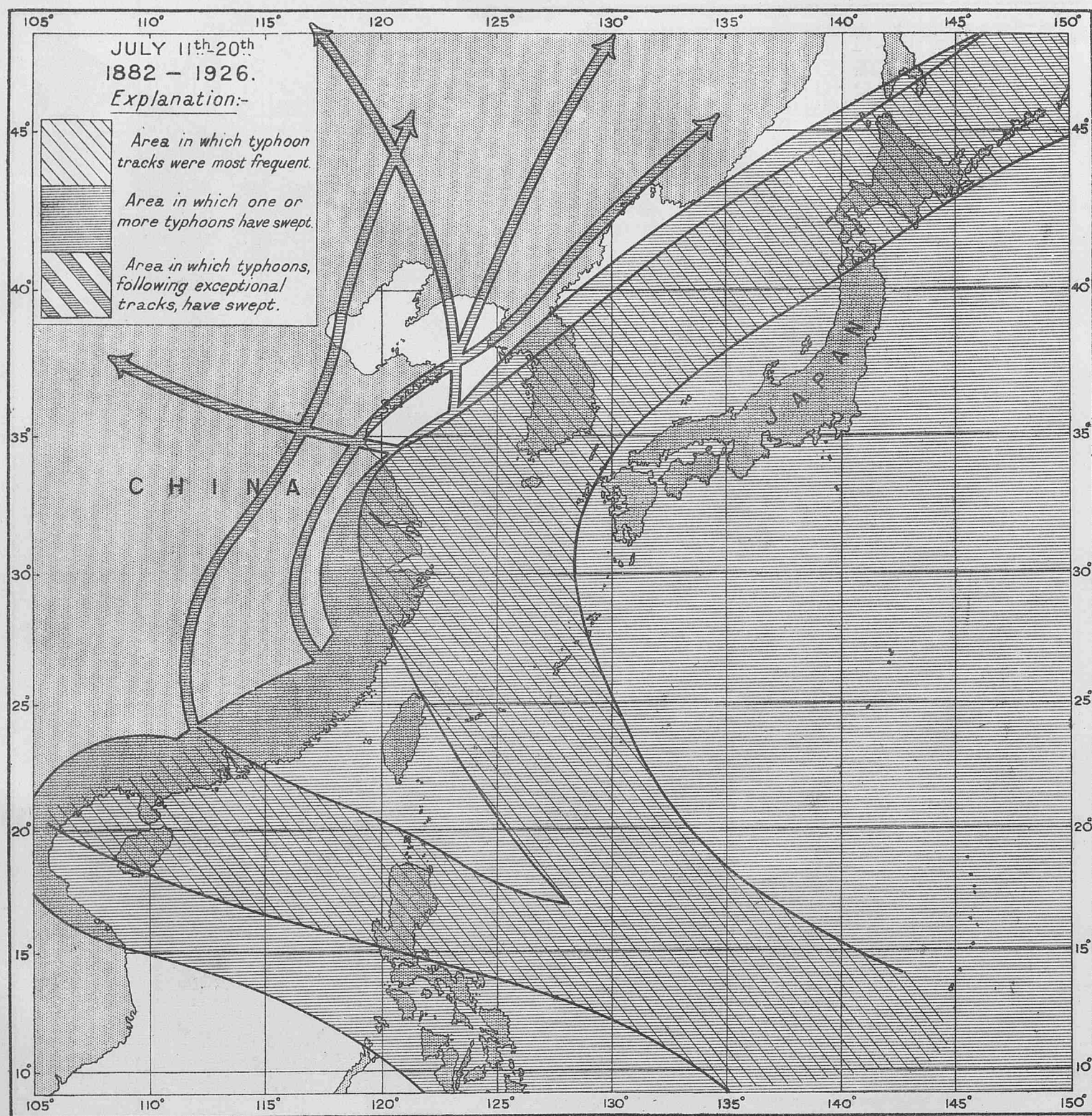
Two principal tracks, one across the Vizayas (Calamianes) Islands and the S. of Luzon, across the Macclesfield Bank, and Paracel Islands towards Hainan and the Gulf of Tonking, the other track passes N.E. of Luzon, across Formosa and the Formosa Straits to the Coast of China. The typhoons which strike the high mountains in the Centre or North of Formosa, diminish in intensity, but are still violent and dangerous in the Straits and over the Chinese coast.

Starting point: between Guam and Yap.

Along the Chinese coast where there is not a typhoon the summer monsoon blows from S.W. & S.E. accompanied by great heat especially in the neighbourhood of Shanghai.

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

TYPHOONS IN THE FAR EAST DURING 45 YEARS.



JULY—Three charts: *Total observations of Typhoons for month—115.*

Chart II.—July 11th to 20th

The relative number of typhoons increases.

Two principal and very long tracks; only the Southern portion of the South China Sea is safe, and the neighbourhood of the Bonin Islands, although the latter are shown to be in the danger zone on the map because the data with regard to this area are less reliable.

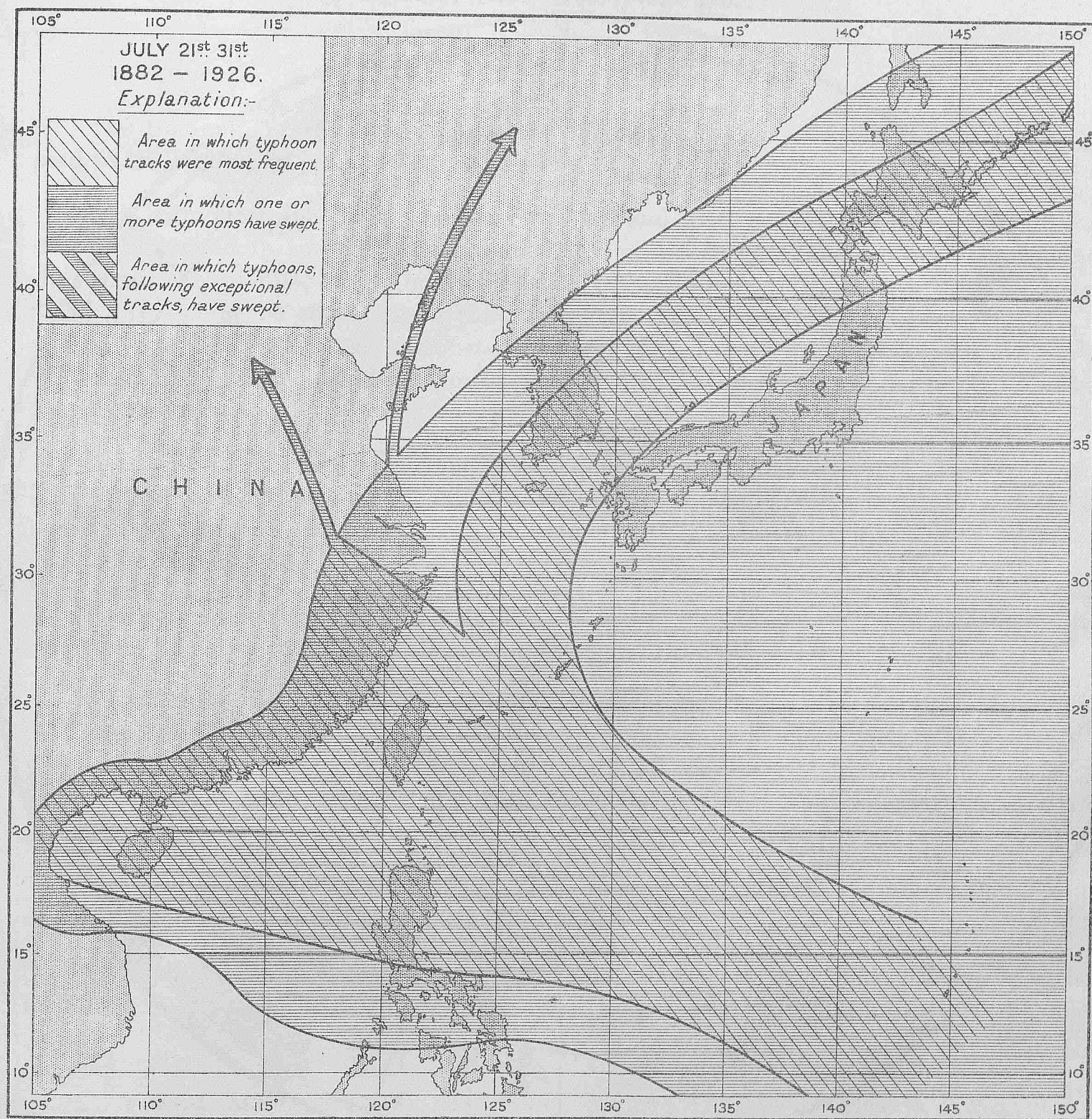
1st. track: Across Luzon the Northern half of the South China Sea, over Hainan and the neighbourhood of Hongkong.

2nd. track: Passing N.E. of Luzon over the North of Formosa following the coast of the provinces of Fukien and Chekiang (China) the mouth of the Yangtse, the Yellow Sea, the East China Sea, the Riu-Kiu Islands, Korea, the Sea of Japan & Yezo.

Starting point: between Guam and Yap and off Mindanao Is.

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

TYPHOONS IN THE FAR EAST DURING 45 YEARS.



JULY - Three charts Total observations of Typhoons for month - 115.

Chart III. - July 21st to 31st

The whole coast of China is still dangerous, only the Southern portion of the South China Sea remaining safe.

The Southern track of the typhoons is extended northwards, whereas the Northern track has diminished and is deflected eastwards.

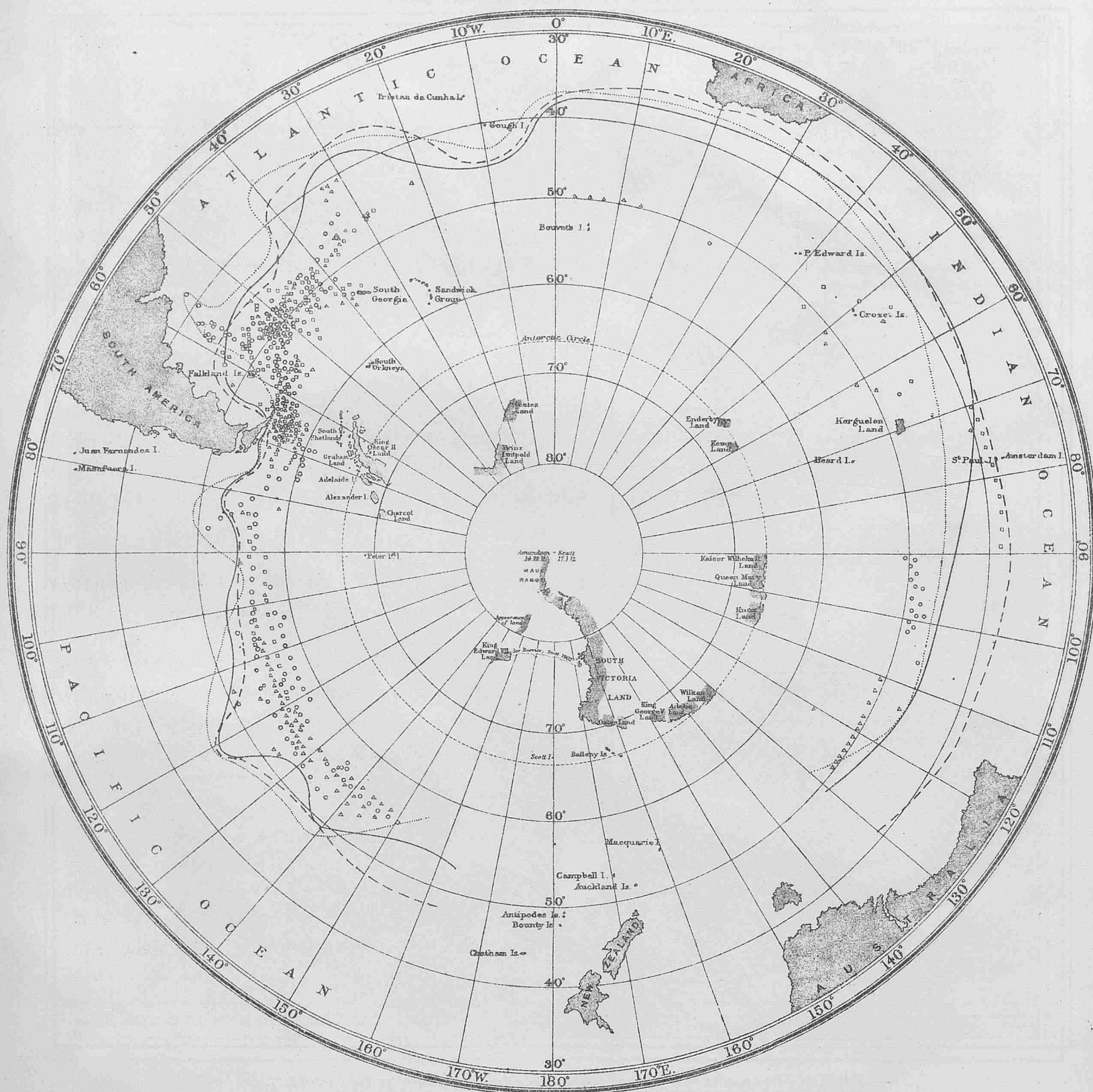
The Southern track extends over Luzon, the North of the South China Sea, with Hainan, the Gulf of Tonking, and the coast of the Kwangtung, Fukien, Che-kiang provinces, with Formosa and the South of the East China Sea. At this point, the Northern track branches off towards the Straits of Korea, across the Sea of Japan and the North of Honshiu & Yezo. This is the period of greatest danger for the whole Chinese coast.

Few of the late-July typhoons turn N.E. when they reach the coast of China. They travel inland causing great floods.

On the South China Sea W.S.W. tracks begin to appear.

Starting point: between Guam & Yap and also North of Guam for those typhoons travelling generally towards the coast of Shanghai.

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



ICE CHART OF THE SOUTHERN HEMISPHERE, 1902—1930. JULY, AUGUST AND SEPTEMBER

EXPLANATION.

The symbols used to distinguish the records of each of the three months represented during the period 1902—1930, are as follows:—July bergs Δ , pack ice, wavy lines August bergs \square , pack ice, wavy lines September bergs \circ ; pack ice, $\circ-\circ-\circ$. Extreme limits are given thus:— July ———, August ———, September ———; these include ice reported since 1772.

No reports of Ice sighted in the Southern Ocean during the years 1929 and 1930 for the months of July, August and September have been received at the Meteorological Office.

NOTICES.

OCEAN CURRENTS.

OBSERVATION OF SET AND DRIFT.

The Commanders of all regular observing ships are asked to have special attention paid to the logging of set and drift of current.

It is very desirable that whenever the set and drift can be accurately obtained, it should be logged in the columns provided in the Meteorological Log or Meteorological Record in the manner given in the Marine Observer's Handbook—5th Edition, pages 86-87. It should be remembered that the current charts which have been constructed and those which have yet to be constructed and indeed most information and knowledge of Ocean Currents are derived from the recorded observations of the Corps of Voluntary Marine Observers.

With improved compasses, logs, revolution indicators and steering, also W.T. time signals and modern methods of fixing, navigation is becoming more accurate and the set and drift of current can therefore be obtained with greater reliability. Full advantage should be taken.

The Commanders of "Selected Ships" are asked, whenever possible in making routine reports to all ships, to include reliable information of the set and drift of current.

Where these reports are not addressed to a Meteorological centre through a Shore W.T. Station, but are made to C.Q. the coded message may be conveniently abbreviated to the four universal groups and the set and drift of current added in standard form as follows:—C.Q. Weather 50307 61713 06302 19873 Current W.S.W. three quarters knot from 28 N. 65 W. to 30 N. 61 W. Christales.

If the set is given in miles, it is necessary to state the interval, but a knot being a unit of speed, the interval is not necessary.

A chapter is devoted to the use of current information in "Wireless and Weather, an aid to Navigation" and remarks upon uses made of such information will be welcome.

POSTAL ARRANGEMENTS.

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

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

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

Port of Call.....

Date of Homeward Departure.....

Postal Address.....

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

ICE REPORTS.

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

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

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

ICE CHART.

WESTERN NORTH ATLANTIC.

LETTERS OF TRANSATLANTIC TRACKS INDICATE.

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

- (C) From 1st July to 10th April, inclusive.
- (F) From 16th May to Opening of Belle Isle route and to 30th November when not using the Belle Isle route.
- (G) W stbound, 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 87-88 of Vol. VIII, No. 88, April, 1931, Number, and Notice of Changes on the Ice Chart in May, 1931 number.

SYMBOLS USED ON THE CHART

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

PHENOMENAL POSITIONS OF ICE.

Date.	Ship or Source of Report.	Position.	Remarks.
July, —, 1890	S.S. Slavonia	48°53' N. 24°11' W.	Last remnants of berg.
—, 1902	2 reports by Fishermen.	56°30' N. 69°30' W.	40 to 50 ft. long, 15 ft. wide, 2 ft. 6 in. out of water.
" 31, 1909	S.S. Shimosa	38°59' N. 30°01' W.	25 ft. long, 3 to 8 ft. wide.
" 10, 1913	S.S. Lothian	37°27' N. 30°48' W.	Piece 6 ft. high, 50 ft. in cir.
" 18, 1916	U.S. Hydrographic Bulletin	32°09' N. 54°26' W.	Piece of berg 3 or 4 ft. out of water.
" 23, 1916	S.S. San Giorgio	42°09' N. 63°24' W.	Berg, 60 ft. long.
" 23, 1918	U.S. Hyd. Bulletin	44°25' N. 35°01' W.	Large berg.
" 18, 1921	Do.	44°30' N. 39°28' W.	Small berg about 15 ft. sq.
" 21, 1921	Do.	39°09' N. 40°30' W.	Berg.
" 31, 1921	Do.	37°37' N. 27°23' W.	Berg.
" 10, 1926	S.S. Chelatos	42°42' N. 36°45' W.	2 pieces of ice.

Reports of Ice sighted between May 1st and May 31st, 1931, which have been received by the Meteorological Office, are shown by the Symbols plotted in the position reported, the figures indicating the day of the month.

LATEST ICE REPORT FROM CANADA.

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

"All points no ice in sight, Berge Belle Isle Strait."

ICE IN GREENLAND WATERS.

INFORMATION RECEIVED BY CABLEGRAM FROM DANISH METEOROLOGICAL INSTITUTE, COPENHAGEN.

May 10th....."Free of ice 40 miles off Cape Farewell."

CO-OPERATION OF SHIPOWNERS, MASTERS AND MATES.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

DERELICTS AND FLOATING WRECKAGE.

Date.	Position.		Description.
	Latitude.	Longitude	
ENGLISH CHANNEL.			
15.5.31	49°34'N.	6°53'W.	Buoy about 15 ft. high showing fixed white light.
IRISH SEA.			
14.5.31	4 m. S.E. by S. of Douglas Head.		Large spar.
BAY OF BISCAY.			
9.5.31	48°46'N.	7°23'W.	Heavy waterlogged spar, approximately 50 ft. long : danger to navigation.
MEDITERRANEAN.			
3.5.31	8 m. S. of Planier.		Drifting buoy surmounted by a tricolour flag.
NORTH ATLANTIC.			
1.5.31	37°30'N.	74°57'W.	Mast projecting about 6 ft., apparently attached to submerged wreckage.
1.5.31	28°26'N.	68°45'W.	Spar about 22 ft. long.
2.5.31	48°— N.	25°52'W.	One square timber, 2 ft. square, 16 ft. long.
2.5.31	40°34'N.	71°14'W.	Boat about 30 ft. long, bottom up and awash ; the boat was painted green and had a brass keel.
3.5.31	32°45'N.	35°22'W.	Drifting light buoy, no lantern.
3.5.31	48°12'N.	31°27'W.	Buoy.
4.5.31	41°— N.	68°27'W.	White nun buoy, marked <i>B</i> .
6.5.31	36°59'N.	70°37'W.	Derelict with broken mast showing out of the water.
7.5.31	25°30'N.	72°55'W.	Obstruction, possibly a derelict, about 50 ft. long and showing 3 ft. out of water.
8.5.31	32°31'N.	77°37'W.	Log about 3 ft. in diameter, floating upright and projecting about 6 ft. out of water.
9.5.31	38°13'N.	63°37'W.	Red buoy with black bottom, marked 3-2 <i>NFN Telegraph</i> .
12.5.31	46°18'N.	20°57'W.	Large floating log, dangerous to navigation.
14.5.31	48°13'N.	5°25'W.	Four red conical buoys, apparently marking salvage operations on ss. <i>Egypt</i> , dangerous to navigation.
14.5.31	39°10'N.	12°03'W.	Can buoy adrift ; covered with barnacles.
16.5.31	36°51'N.	12°49'W.	Large buoy adrift, rusty condition, 8 ft. above water, dangerous to navigation.
GULF OF MEXICO.			
3.5.31	26°39'N.	86°18'W.	Rusty spherical buoy floating on its side ; ring at spherical end and a shackle at conical end.
NORTH PACIFIC.			
1.5.31	43°02'N.	159°17'W.	Mast about 40 ft. long and 2 ft. in diameter.
3.5.31	37°40'N.	122°33'W.	25 ft. sailing boat, swamped with broken mast trailing overboard.
6.5.31	42°11'N.	124°43'W.	Partly submerged derelict fishing boat with 20 ft. of mast and about 6 ft. of bow projecting out of water. (NOTE.—This derelict is probably the fishing boat <i>HELEN K.J.</i>)
6.5.31	45°31'N.	124°18'W.	Small boat, painted grey, partly submerged with bow projecting about 4 ft. out of water.
7.5.31	36°17'N.	126°53'W.	Nun buoy covered with marine growth.
8.5.31	35°08'N.	121°07'W.	Log about 40 ft. long.

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LIST OF VOLUNTARY OBSERVING SHIPS

i

FLEET LIST.

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

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

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

Only in special cases will individual letters be sent.

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

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

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

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

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

Explanation of Abbreviations.

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

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

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

No. = No Meteorological Office instrumental equipment on board.

M = Ship's barometer *mercurial*.

A = Ship's barometer *aneroid*.

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

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

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

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

** = Short range transmission and reception.

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

Selected Ships.

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

Name of Vessel.	Captain	Observing Officers.	Meteoro-logical Equipment.	Line.	Last Log, Register, or Record Contributed. Received up to 16.5.31.	Date Received.
233 †† <i>Aba</i> , M.V. ...	Lawson, J. H. ...	G. L. Donald, R. A. Cherry	W.T.	Elder Dempster ...	Forms 911 & 138 26.3.31 to 28.4.31	30.4.31
121 †† <i>Abinsi</i> ...	Sola, P. ...	B. White, J. J. Smith. ...	"	" " ...	" " 19.2.31 to 27.3.31	31.3.31
122 †† <i>Accra</i> , M.V. ...	Toft, J. T. ...	R. B. Ellis ...	W.T.-M.	" " ...	" " 11.3.31 to 14.4.31	18.4.31
155 *† <i>Achilles</i> ...	Cosker, W. ...	C. Broad, R. E. Agar, J. S. Stratford.	M.L.	A. Holt " ...	Form 915 4.10.30 to 13.2.31 ...	19.2.31
055 *† <i>Actor</i> ...	Whyte, D. L. ...	G. Penston, E. Pearce, G. Howard.	No. M.	Harrison ...	Forms 911 & 138 14.11.30 to 24.1.31	28.1.31
123 †† <i>Adda</i> , M.V. ...	Shooter, J. C. ...	J. Boyd, F. C. Langton ...	W.T.-M.	Elder Dempster ...	" " 12.2.31 to 16.3.31	18.3.31
050 †† <i>Adriatic</i> ...	Binks, J. ...	O. V. Lucas, N. Fisher, G. T. Kavanagh.	W.T.	White Star ...	" " 2.2.31 to 23.2.31	25.2.31
<i>Aeneas</i> ...	Wallace, W. K. ...	A. McL. Pitcher ...	No. A.	A. Holt ...	Form 911 14.3.31 to 25.3.31	11.5.31
166 *† <i>Agamemnon</i> ...	Beswick, W., D.S.C., Commr., R.N.R.	W. K. Hale, O. V. Jones ...	W.T.	" " ...	Forms 911 & 138 18.3.31 to 1.4.31	4.5.31
<i>Aidan</i> ...	Reynolds, W. H. B. ...	A. A. Gerrard ...	No. A.	Booth ...	Form 911 13.2.31 to 28.3.31 ...	16.3.31
<i>Aiaunia</i> ...	Prothero, M. ...	T. O. Ellis ...	" A.	Cunard ...	" 16.11.30 to 6.12.30 ...	8.12.30
<i>Aiban</i> ...	Evans, L. ...	J. G. Tippet ...	" A.	Booth ...	" 16.8.30 to 7.10.30 ...	27.10.30
310 †† <i>Aleantara</i> , M.V. ...	Wakeman, E. C. ...	R. H. Tepper ...	W.T.	R.M.S.P. ...	" 21.2.31 to 8.4.31 ...	14.4.31
178 *† <i>Altipore</i> ...	Lyndon, E. P. ...	J. P. McArthur ...	No. M.	P. & O. ...	" 27.1.31 to 22.3.31 ...	13.4.31
175 †† <i>Almanzora</i> ...	Hannam, F. S. ...	W. W. Lowe ...	W.T.	R.M.S.P. ...	" 14.2.31 to 28.3.31 ...	1.4.31
012 †† <i>Almeda Star</i> ...	Turner Russell, W. ...	E. K. Watkins, H. Metcalf, C. Potts, E. Russell.	No. M.	Blue Star ...	Forms 911 & 138 31.1.30 to 17.3.31	21.3.31
<i>Alondra</i> ...	Scott, L. S. ...	G. Hamilton, E. W. Thomas	" A.	Yeoward ...	Form 911 12.4.31 to 2.5.31 ...	5.5.31
<i>Alynbank</i> ...	Robertson, J. ...	G. E. Beaton ...	" A.	A. Weir & Co. ...	" 6.3.31 to 29.3.31 ...	15.5.31
103 †† <i>Andalucia Star</i> ...	Vernon, R. ...	W. Cumming, G. Clarke, J. Bradshaw.	" M.	Blue Star ...	Forms 911 & 138 22.2.31 to 5.4.31	13.4.31
<i>Antiochus</i> ...	Dougall, W. T. ...	C. F. Lock ...	" A.	A. Holt ...	" 25.4.31 to 5.5.31 ...	14.5.31
209 †† <i>Aorangi</i> , M.V. ...	Martin, W. ...	J. Watling, D. H. Richards, J. Billingham, H. Weston.	M.L.	Canadian- Australasian	Form 915 21.8.30 to 13.1.31 ...	18.4.31
120 †† <i>Apapa</i> , M.V. ...	Beith, A. ...	J. R. Sergiades, V. Feeney.	W.T.-M.	Elder Dempster ...	Forms 911 & 138 9.4.31 to 10.5.31 ...	14.5.31
129 †† <i>Appam</i> ...	Draper, J. M. ...	W. M. M. Hutchings, C. V. Evans, H. O. Forster.	W.T.	" " ...	" " 18.3.31 to 24.4.31	27.4.31
<i>Araby</i> ...	Lee, J. ...	H. Haigh ...	No. A.	MacIver ...	Form 911 8.12.30 to 26.2.31 ...	9.3.31
115 †† <i>Arandora Star</i> ...	Moulton, E. W. ...	C. O. Worth, F. Gudgeon, R. F. Hales, F. Graham, H. F. Partridge.	" M.	Blue Star ...	Forms 911 & 138 21.3.31 to 17.4.31	21.4.31
278 *† <i>Architect</i> ...	Mowat, I. ...	A. C. Banister ...	" M.	Harrison ...	Forms 911 & 138 1.1.31 to 18.3.31	22.3.31
293 *† <i>Ariguaní</i> ...	Scudamore, J. H. H., D.S.C., R.D., Commr., R.N.R.	G. McKee, J. S. Bell, M. F. Moss, J. Hillman, A. Crone, G. Binks.	M.L.	Elders & Fyffes ...	Form 915 28.12.30 to 28.4.30 ...	1.5.31
<i>Ariosto</i> ...	Biggins, R. L. ...	N. F. Hewetson, R. W. Holdsworth.	No. A.	Ellerman Wilson ...	Form 911 22.9.30 to 27.12.30 ...	6.1.31
144 †† <i>Arlanza</i> ...	Clarke, E., R.D., Commr., R.N.R.	S. A. Gammon, H. V. Todd, F. T. Brett.	W.T.	R.M.S.P. ...	Forms 911 & 138 14.3.31 to 27.4.31	29.4.31
091 †† <i>Armada Castle</i> ...	Whitfield, G. J. ...	W. Pace, C. Lloyd, A. H. Parry, L. G. May.	M.L.	Union Castle ...	Form 915 6.12.30 to 28.4.31 ...	29.4.31
296 *† <i>Arracan</i> ...	Thomson, S. ...	K. Currie, G. Davidson, H. H. Brown.	M.L.	P. Henderson ...	Form 915 14.11.30 to 15.4.31 ...	18.4.31
<i>Arundel</i> ...	Shaw, B. ...	E. Hill ...	C.C.	Southern Rly. Union Castle	Telegraphic Report 5.4.31 ...	5.4.31
095 †† <i>Arundel Castle</i> ...	Morton Betts, W. ...	G. L. Clarke, O. Pitts, H. Baty.	M.L.	" " ...	Form 915 10.1.31 to 3.5.31 ...	14.5.31
156 *† <i>Ascantius</i> ...	Wilson, C. A. ...	R. Robinson, E. Radford, R. Holdstock.	"	A. Holt ...	" 14.9.30 to 15.1.31 ...	23.1.31
280 *† <i>Astronomer</i> ...	Richards, J. ...	T. R. Hill ...	No. M.	Harrison ...	Forms 911 & 138 4.11.30 to 30.11.30	4.12.30

Name of Vessel.	Captain.	Observing Officers.	Meteoro-logical Equipment.	Line.	Last Log, Register, or Record Contributed. Received up to 16.5.31.	Date Received.
065 † <i>Asturias</i> M.V. ...	LeBrecht, H. A. ...	H. G. Whittle, S. J. Hill, T. W. Stevens, L. H. Smith.	W.T.	R.M.S.P. Co. ...	Forms 911 & 138 29.3.31 to 9.4.31	28.4.31
<i>Atlantian</i> ...	Masters, W. ...	G. W. A. Jolly ...	No. A	Leyland ...	Form 911 1.3.31 to 8.4.31 ...	7.5.31
<i>Atrous</i> ...	Wilcox, J. H. ...	E. A. H. Gepp ...	" A.	A. Holt ...	" 25.12.30 to 12.4.31 ...	17.4.31
281 † <i>Auditor</i> ...	Owen, W. T. ...	L. Richardson ...	" M.	Harrison ...	Forms 911 & 138 31.8.30 to 15.11.30	25.11.30
<i>Ausonia</i> ...	Peel, R. V., R.D., Capt. R.N.R.	E. R. Taylor ...	" A.	Cunard ...	Form 911 19.4.31 to 7.5.31	12.5.31
212 † <i>Australia</i> ...	Parkin, J. W. ...	H. Falkiner, E. H. Lidstone, A. G. Brooks.	M.L.	British India ...	Form 915 27.9.30 to 10.2.31	23.2.31
010 † <i>Avelona Star</i> ...	Thomas, R. J. ...	F. N. Johnson, A. Malcou-ronne, L. Parsons, C. Boothby.	No. M.	Blue Star ...	Forms 911 & 138 7.3.31 to 22.4.31	4.5.31
124 † <i>Avila Star</i> ...	Hopper, G.E. ...	W. J. Stratta, C. Barratt, R. C. Freaker, D. Marshall.	" M.	" ...	" 21.3.31 to 6.5.31	11.5.31
179 † <i>Balranald</i> ...	Short, C. E. ...	E. R. Physick, H. P. Mallet, G. E. Owen.	" M.	P. & O. Branch ...	Forms 911 & 138 7.4.31 to 5.5.31...	9.5.31
051 † <i>Baltic</i> ...	Davies, E. ...	J. Law, F. W. Laws, N. E. Banks.	W.T.	White Star ...	" 13.4.31 to 3.5.31	6.5.31
248 † <i>Banffshire</i> ...	Page, W. J. ...	A. Banks, N. Stewart ...	No. M.	Turnbull Martin ...	Forms 911 & 138 12.3.31 to 17.4.31	30.4.31
180 † <i>Baradine</i> ...	Elliot Smith, H. ...	C. B. Roche, A. G. Jenkins, L. A. Hill, C. F. Halliday, G. L. Farnfield.	M.L.	P. & O. Branch ...	Form 915 21.11.30 to 27.2.31	3.3.31
037 † <i>Baronesa</i> ...	Compton, R. W. ...	H. N. Sherwell, F. W. Kent, J. G. Freeman.	No. M.	Houlder ...	Forms 911 & 138 9.2.31 to 4.4.31	7.4.31
<i>Baron Forbes</i> ...	Cairns, W. ...	J. Maclean ...	" A.	H. Hogarth & Sons...	Form 911 4.2.31 to 26.2.31	9.3.31
213 † <i>Barpeta</i> ...	Partridge, H. ...	J. H. Kerr, R. H. A. Bond, H. Cray.	" M.	British India ...	Forms 911 & 138 13.3.31 to 16.4.31	11.5.31
181 † <i>Barrabool</i> ...	Sheepwash, J. S. ...	F. N. Mosey, G. Hussey, J. Jones.	" M.	P. & O. Branch ...	" 17.1.31 to 23.4.31	28.4.31
294 † <i>Barranca</i> ...	Edwards, A. C. ...	" ...	M.L.	Elders & Fyffes ...	" 23.1.31 to 25.2.31	2.3.31
070 † <i>Bayano</i> ...	Swain, F. H. ...	F. Leach, A. Sandham, W. Hannak.	W.T.	" ...	" 23.1.31 to 25.2.31	2.3.31
<i>Baychimo</i> ...	Cornwell, S. A. ...	" ...	No. A.	Hudson Bay Co ...	Form 911 8.7.30 to 29.9.30	6.11.30
059 † <i>Belgenland</i> ...	Morehouse, W. A. ...	J. R. Loe, J. H. A. Mackie, F. Good.	W.T.	Red Star ...	Forms 911 & 138 20.4.31 to 8.5.31	9.5.31
<i>Benalder</i> ...	Fairweather, J. J. ...	E. D. Copeman ...	No. A	Ben Line ...	Form 911 10.3.30 to 18.4.30	24.4.30
133 † <i>Bendigo</i> ...	Wyatt, F. N. ...	J. K. Krone, H. Morgan, R. S. Frost.	" M.	P. & O. Branch ...	Forms 911 & 138 8.12.30 to 12.2.31	2.3.31
<i>Bengore Head</i> ...	Milligan, J. ...	C. J. Rea ...	" A.	Ulster S.S. Co. ...	Form 911 24.4.31 to 29.4.31	4.5.31
233 † <i>Berwickshire</i> ...	Evans, E. H. ...	J. O. Woodall, R. Frankish, C. Allister.	W.T.	Turnbull Martin ...	Forms 911 & 138 15.2.31 to 5.3.31	13.4.31
<i>Bhutan</i> ...	Lawrie, J., D.S.O., D.S.C.	C. J. Williams ...	No. A.	Hain, S.S. Co ...	" ...	"
<i>Brenda</i> ...	Wright, J. ...	N. Ross ...	" A.	Scottish Fishery Bnd.	Form 911 3.4.31 to 28.4.31	1.5.31
057 † <i>Britannic</i> ...	Summers, F. F., R.D., Commr., R.N.R.	J. W. Peters, D. Chamberlain, F. E. Patchett.	W.T.	White Star ...	Forms 911 26.2.31 to 11.4.31	13.4.31
269 † <i>British Consul</i> ...	Putt, R. O. ...	C. Galley, W. Barnfield ...	No. M.	British Tankers ...	" 15.4.31 to 25.4.31	7.5.31
311 † <i>British Dominion</i> ...	Taylor, R. J. ...	J. E. Jones, C. A. James ...	" M.	" ...	" 13.10.30 to 21.1.31	26.1.31
308 † <i>Bulyses</i> M.V. ...	Head, B. P. ...	G. P. Hansard ...	" M.	Anglo-Saxon Petroleum Co.	Forms 911 & 138 2.7.30 to 10.9.30	22.9.30
249 † <i>Buteshire</i> ...	Gibb, A. W. P. ...	P. McMillan, S. W. Brown, F. C. Doyle.	M.L.	Turnbull Martin ...	Form 915 20.4.30 to 24.8.30	12.9.30
031 † <i>Caledonia</i> ...	Collie, A. ...	W. Harvey, R. Leiper, J. McMillan.	W.T.	Anchor... ...	Forms 911 & 138 3.5.31 to 9.5.31...	12.5.31
<i>Calgarie</i> ...	Jackson, W. ...	J. W. Paine ...	"	White Star ...	Form 911 2.2.31 to 10.3.31	12.3.31
139 † <i>California</i> ...	Smart, R. W. ...	E. Stormont ...	"	Anchor... ...	Forms 911 & 138 11.4.31 to 4.5.31...	8.5.31
<i>Cambria</i> ...	Copland, C. P. ...	O. W. L. Jones ...	C.C	L.M. & S. Rly ...	Telegraphic Report 18.4.31	18.4.31
036 † <i>Cameronia</i> ...	Gemmell, W. ...	D. C. Shedden ...	W.T.	Anchor ...	Forms 911 & 138 25.3.31 to 26.4.31	28.4.31
295 † <i>Camito</i> ...	Forrester, W. T., O.B.E.	H. H. Dunning, G. M. Roberts, E. F. Witchell, A. H. Peacock, W. A. C. Wood, H. J. Perrett.	M.L.	Elders & Fyffes ...	Form 915 6.10.30 to 11.2.31	21.2.31
101 † <i>Canonesa</i> ...	Brodie, W. H. ...	F. E. Flint ...	No. M.	Furness Houlder ...	Forms 911 & 138 1.3.31 to 22.3.31	13.4.31
<i>Cape of Good Hope</i> ...	Jacobson, T. A. ...	W. R. G. Carling ...	" A.	Lyle S.S. Co. ...	Form 911 15.2.31 to 10.3.31	7.4.31
282 † <i>Carinthia</i> ...	Hawkes, W. A., R.D., Commr., R.N.R.	P. O. Davis, A. B. Fasting, G. S. Hutchinson.	W.T.	Cunard ...	Forms 911 & 138 15.12.31 to 8.2.31	1.4.31
035 † <i>Carmania</i> ...	Townley, J. C. ...	J. McKie, E. R. B. Freeman, N. Kingscote.	"	" ...	" 15.3.31 to 22.3.31	26.3.31
092 † <i>Carnarvon Castle</i> M.V.	Chave, Sir B., K.B.E.	L. H. Farrow, E. Clancy ...	"	Union Castle ...	" 14.2.31 to 4.4.31	7.4.31
034 † <i>Caronia</i> ...	Oram, B. B., R.D., Commr., R.N.R.	W. B. Tanner, E. R. Taylor, R. D. McCallum.	"	Cunard ...	" 13.4.31 to 1.5.31	5.5.31
<i>Casanare</i> ...	Browne, S. ...	" ...	No. A.	Elders & Fyffes ...	Form 911 11.2.31 to 13.3.31	23.3.31
184 † <i>Cathay</i> ...	Niven, J. D. ...	A. M. Askin ...	" M.	P. & O ...	Forms 911 & 138 30.1.31 to 29.4.31	4.5.31
<i>Cavina</i> ...	Riseley, A. D. ...	B. R. Coe ...	" A.	Elders & Fyffes ...	Form 911 11.3.31 to 13.4.31	17.4.31
052 † <i>Cedric</i> ...	Freeman, C. P., R.D., Commr., R.N.R.	R. Hawkins, J. Farrell, H. R. Wilkinson.	W.T.	White Star ...	Forms 911 & 138 2.3.31 to 23.3.31	25.3.31
157 † <i>Centaur</i> M.V. ...	Ward Hughes, J. ...	J. Cockburn, B. L. Brind, D. M. McAdam.	M.L.	A. Holt & Co. ...	Met. Log. 19.2.30 to 21.7.30	7.10.30
056 † <i>Ceramic</i> ...	Lloyd, W. ...	R. H. Shaw, W. F. Denison ...	W.T.	White Star ...	Forms 911 & 138 25.1.31 to 25.2.31	7.4.31
<i>Cerintus</i> M.V. ...	Hammond, M. J. ...	E. Allen ...	M.L.	Hadley Shipping ...	" 20.10.30 to 22.11.30	28.11.30
<i>Changuinola</i> ...	Thorburn, R. A., R.D., Commr., R.N.R.	H. K. Houghton ...	No. A.	Elders & Fyffes ...	" 18.1.31 to 1.4.31	8.4.31
<i>Chindwin</i> ...	Paterson, G. ...	C. R. Roy ...	" A.	Henderson ...	" 25.7.30 to 10.10.30	16.10.30
<i>Chirripo</i> ...	Sapsworth, S. A. ...	S. Waddington ...	" A.	Elders & Fyffes ...	Forms 911 & 138 15.3.31 to 23.3.31	4.5.31
192 † <i>Chitral</i> ...	Holland, R. ...	T. D. Forbes, N. H. Thompson, N. S. Gerrans.	" M.	P. & O. ...	" ...	"
265 † <i>City of Baroda</i> ...	McMillan, J. ...	H. G. Williams, J. E. Jenkins, R. W. Leese, A. G. Daniels.	M.L.	Ellerman ...	Form 915 16.3.30 to 2.1.31	3.3.31
<i>City of Benares</i> ...	Wyper, J. ...	R. W. Kellie ...	No. A.	" ...	Form 911 5.8.30 to 15.8.30	1.9.30
<i>City of Cambridge</i> ...	Wilson, E. G. ...	H. H. Asher ...	" A.	" ...	" 25.7.30 to 22.3.31	4.5.31
<i>City of Carlisle</i> ...	Mordue, J. A. ...	" ...	" A.	" ...	" 3.4.31 to 14.4.31	21.4.31
268 † <i>City of Chester</i> ...	Letton, F. W. ...	P. R. Winship, C. W. Nelson, W. V. Highton.	M.L.	" ...	Form 915 5.5.30 to 19.9.30	11.12.30
266 † <i>City of Exeter</i> ...	McNiel, N. ...	H. Burns, J. Fyffe ...	W.T.	" ...	Forms 911 & 138 12.4.31 to 2.5.31	15.5.31
274 † <i>City of Harvard</i> ...	MacMillan, J. ...	E. Brook-Williams ...	M.L.	" ...	Form 911 11.2.31 to 1.4.31	13.4.31
<i>City of Hong Kong</i> ...	Walton, H. L., O.B.E., R.D., Commr., R.N.R.	H. Saunders ...	No. A.	" ...	Forms 911 & 138 3.3.31 to 3.4.31	9.4.31
286 † <i>City of London</i> ...	Brown, J. G. ...	A. J. Barrett, E. Gillies, W. H. Mathesen.	W.T.	" ...	Forms 911 & 138 10.4.31 to 30.4.31	4.5.31
287 † <i>City of Paris</i> ...	MacMillan, J. ...	E. A. Davidson, W. J. Nixon, J. Fairgreaves.	"	" ...	" 21.4.31 to 10.5.31	12.5.31
271 † <i>City of Roubaix</i> ...	Radcliffe, A. V., R.D., Lt.-Comr., R.N.R.	J. A. Williams, J. L. Robertson, A. N. G. Jones.	No. M.	" ...	Forms 911 & 138 31.4.31 to 10.5.31	15.12.30

LIST OF VOLUNTARY OBSERVING SHIPS

iii

Name of Vessel.	Captain.	Observing Officers.	Meteoro-logical Equipment.	Line.	Last Log. Register, or Record Contributed. Received up to 1953.	Date Received.
272 *† City of Singapore	Kendall, J. W. ...	F. Wrigley ...	No. M.	Ellerman ...	Forms 911 & 133 27.2.31 to 22.3.31	13.4.31
273 *† City of Valencia ...	Ewing, W. ...	A. Travis, C. C. Duncan, C. B. P. Bradbury.	" M.	" ...	" " 3.2.30 to 5.3.31	14.3.31
City of Yokohama	Singleton, J. G. ...	J. Kinley, N. Dawson, H. Nish	" A.	" ...	Form 911 29.10.30 to 20.11.30	25.11.30
Clan Alpine ...	Young, A. H., R.D., Commr., R.N.R.	R. R. Baxter ...	" A.	Clan ...	" 30.3.31 to 18.4.31	11.5.31
Clan Kenneth ...	" ...	T. A. Pearson ...	" A.	" ...	" 17.12.30 to 22.1.31	2.2.31
Clan Macalister ...	Stenson, F. J., A.D.C., R.D., Capt., R.N.R.	T. M. Rees Davis ...	" A.	" ...	" 21.3.31 to 11.4.31	5.5.31
Clan MacBean ...	Boag, J. ...	G. W. Spiller ...	" A.	" ...	" 5.12.30 to 15.12.30	22.12.30
Clan Macbeth ...	Worthington, C. D. ...	W. R. Woodruffe, I. Cape Scott, L. W. Gibbins.	" A.	" ...	" 22.12.30 to 21.3.31	27.3.31
Clan Macfadyen ...	Laird, C. ...	W. C. Dazell ...	" A.	" ...	" 25.2.31 to 9.4.31	22.4.31
Clan Macfarlane ...	Redford, L.F., Lieut.-Commr., R.N.R.	W. H. Simpson, W. Wright, H. F. Town, J. R. Moss.	" A.	" ...	" 20.12.30 to 5.4.31	14.4.31
Clan Macgillivray ...	Mackinlay, A. ...	S. R. J. Woods ...	" A.	" ...	" 20.1.31 to 5.3.31...	7.4.31
Clan Macindoe ...	Scott-Smith, H. E. G.	J. C. Dunphy ...	" A.	" ...	" 9.2.31 to 17.3.31...	13.4.31
Clan Mackellar ...	Lyall, A. B. ...	A. V. Howard ...	M.L.	" ...	" 23.1.31 to 7.2.31	7.3.31
001 *† Clan Macphee ...	Gourlay, J. B. ...	E. H. Stone, G. Drake, A. Pollock.	"	" ...	Form 915 19.12.30 to 30.3.31	4.5.31
004 *† Clan MacNair ...	Holman, W. G. ...	F. H. Petheridge, A. Woodrow, J. Napier.	W.T.	" ...	Forms 911 & 138 15.3.31 to 5.4.31	4.5.31
Clan Macnaughton	Clark, J. ...	R. C. Steel ...	No. A.	" ...	Form 911 18.5.30 to 19.6.30	28.6.30
Clan Macquarrie ...	West, W. F. ...	J. H. Thorpe ...	" A.	" ...	" 4.1.31 to 17.4.31	21.4.31
002 *† Clan Macwhirter ...	Low, A. ...	T. G. Mitchell, M. J. Lewis, L. Grant.	M.L.	" ...	Form 915 10.6.30 to 2.9.30	11.12.30
003 *† Clan Malcolm ...	George, L. S. ...	A. Lynch, J. W. Innes, B. Hind, R. F. Carter.	"	" ...	" 19.12.30 to 21.3.31	10.4.31
Clan Morrison ...	Porterfield, W. M. Lt.-Commr., R.N.R.	R. J. Brittain ...	No. A.	" ...	Form 911 1.4.31 to 26.4.31	11.5.31
Clan Murdoch ...	Wynne, R. H. ...	P. S. Evans ...	" A.	" ...	" 5.1.31 to 7.2.31	25.2.31
Clan Ranald ...	Douglas, R. ...	J. W. Rennie ...	" A.	" ...	" 7.8.30 to 30.8.30...	13.10.30
Clan Ross ...	Neill, G. A. ...	R. H. McElligott ...	" A.	" ...	" 28.12.30 to 20.1.31	23.1.31
Clan Sinclair ...	Cater, H. ...	L. Thomson ...	" A.	" ...	" 4.9.30 to 10.12.30	17.12.30
017 *† Colonial ...	Baird ...	" ...	No. M.	Harrison ...	" ...	"
298 *† Comedian ...	Cadogan, A. ...	F. M. Eales ...	" M.	" ...	" ...	"
185 *† Comorin ...	Cartright, C.W., D.S.C.	E. J. R. North ...	" M.	P. & O. ...	Forms 911 & 138 17.2.31 to 5.3.31...	17.3.31
198 *† Contractor ...	Harraden, ...	L. Seddon ...	" M.	" ...	" ...	"
049 *† Coptic, M.V. ...	Williams, G. ...	R. E. Nicholson, T. H. Davies, W. Burt.	W.T.	Shaw, Savill & Albion	Forms 911 & 138 4.3.31 to 6.4.31...	9.4.31
040 *† Corinthic ...	Bowan, H. ...	R. Orangle, W. Nicholl, E. Burt	"	White Star ...	" 9.11.30 to 24.2.31	26.2.31
Cornwall ...	Almond, J. G. ...	W. H. G. Timberlake ...	No. A.	New Zealand S.S. ...	Form 911 12.2.31 to 7.3.31	10.4.31
006 *† Coronado ...	Legge, A. W. ...	W. J. Dodd, B. E. Druce, A. Orchard.	W.T.	Elders & Fyffes	Forms 911 & 138 17.3.31 to 19.4.31...	21.4.31
214 *† Counsellor ...	Jackson, J. ...	G. C. Heaton ...	No. M.	Harrison ...	" ...	"
301 *† Culebra ...	Rathkins, E. C., Commr., R.N.R.	H. D. Hooper, T. Powell, R. J. Finch.	M.L.	R.M.S.P. Co. ...	Form 915 14.2.31 to 28.4.31	5.5.31
285 *† Custodian ...	O'Connor, T. ...	J. Johnson, W. Rennie, W. F. O'Neill.	No. M.	Harrison ...	Forms 911 & 138 25.11.30 to 4.3.31	11.3.31
Cyclops ...	Glossop, S. ...	R. A. Hanney ...	" A.	A. Holt ...	Form 911 8.12.30 to 5.2.31	13.2.31
Dakotian ...	Atkinson, W. H. ...	R. J. S. Pope ...	" A.	Leyland ...	" 10.11.30 to 17.12.30	24.12.30
Dardanus ...	Christie, W. ...	J. S. Ogilvie ...	" A.	A. Holt ...	" 27.2.31 to 12.3.31	28.3.31
Darlan ...	Hannaford, W. ...	A. S. Holland ...	" A.	Leyland ...	" 27.9.30 to 8.10.30	14.10.30
302 *† Darro ...	Green, J. ...	J. M. Phillip ...	W.T.-M.	R.M.S.P. Co. ...	Forms 911 & 138 4.2.31 to 25.3.31...	18.4.31
Davision ...	Trickey, J. ...	F. M. Ralston ...	No. A.	Leyland ...	Form 911 29.8.30 to 22.10.30	28.10.30
303 *† Demerara ...	Matthews, G. P. ...	H. H. Treweeks, E. N. Gillet, F. Crankshaw.	W.T.-M.	R.M.S.P. Co. ...	Forms 911 & 138 27.10.30 to 17.12.30	22.12.30
073 *† Demosthenes ...	W. S. Quinn ...	H. G. Williams, J. D. Mason, J. Atkin, D. M. Blair, J. Muggleston.	"	Aberdeen Common-wealth.	" 2.3.31 to 16.3.31	27.4.31
008 *† Dents ...	Harris, C. E. P. ...	A. W. Hanchett, J. H. Stoker.	W.T.	Booth ...	" 26.3.31 to 10.4.31	4.5.31
304 *† Desado ...	Buret, J. ...	H. Fraser, F. Collinson ...	W.T.-M.	R.M.S.P. Co. ...	" 14.2.31 to 9.4.31	13.4.31
117 *† Desna ...	Huff, G. ...	G. L. Elliott, H. Lang...	"	" ...	" 2.3.31 to 2.4.31	15.5.31
252 *† Devon ...	Russell, A. ...	G. Chaplin, J. D. Marks. M. Willinott.	No. M.	Federal ...	" 22.3.31 to 5.4.31	25.4.31
Dieppe ...	Lidbetter, W. ...	E. A. Biles ...	C.C.	Southern Railway ...	Telegraphic Report 14.5.31	14.5.31
284 *† Director ...	Worthington, B. ...	M. G. O'Brien, A. M. Hughes, A. E. Rogers.	No. M.	Harrison ...	Forms 911 & 138 20.10.30 to 12.3.31	25.4.31
080 *† Discovery, Axy. Barque.	MacKenzie, K. N. ...	W. R. Colbeck ...	M.L.	Douglas Mawson Expedition.	" ...	"
081 *† Discovery II, R.R.S.	Carey, W. M. Commr., R. N.	A. L. Nelson, R. A. B. Ardley, F. E. G. Davies.	"	Falkland Islands Government.	Form 915 11.12.30 to 27.3.31	11.5.31
Domintia, C.S. ...	Campos, V., O.B.E., Lt.-Commr., R.N.R.	W. E. Allen, A. S. Muir, W. F. Anderson.	M.L.	Telegraph Construction & Maintenance.	Form 915 5.9.30 to 24.11.30	6.12.30
Domitic ...	Griffith, W. ...	F. W. Boden ...	No. A.	Booth ...	Form 911 14.2.31 to 10.3.31	13.3.31
Dorellian ...	Hugan, C. ...	F. R. Hicken ...	" A.	Leyland ...	" 11.1.31 to 22.1.31	11.2.31
251 *† Doric ...	Jackson, W. H. P. ...	" ...	W.T.	White Star ...	" ...	"
Doric Star ...	Mills, D. H. ...	— Anderson ...	No. M.	Blue Star ...	" ...	"
275 *† Dramatist ...	Meek, A. J. ...	I. W. Page, G. H. Howard ...	" M.	Harrison ...	Form 911 22.2.31 to 6.4.31	27.4.31
Dromore Castle ...	Heanly, T. W. ...	P. Swan ...	" A.	Union Castle ...	" 18.1.30 to 3.7.30	9.9.30
142 *† Duchess of Atholl ...	McQueen, D. S. ...	G. Mowatt ...	W.T.-M.	Canadian Pacific ...	Forms 911 & 138 18.4.31 to 6.5.31...	9.5.31
152 *† Duchess of Bedford ...	Sibbons, H. ...	A. Mawsey, J. H. Tudor, J. Stewart.	"	" ...	" 29.3.31 to 16.4.31	20.4.31
151 *† Duchess of Richmond.	Freer, A., R.N.R. ...	F. H. Stell ...	"	" ...	" 12.4.31 to 30.4.31...	4.5.31
143 *† Duchess of York ...	Stuart, R. N., V.C., D.S.O., Commr., R.N.R.	N. Scallan, D. Parsons ...	"	" ...	" 18.1.31 to 12.3.31...	23.3.31
098 *† Dunbar Castle, M.V.	Vincent, E. S., R.D., Commr., R.N.R.	J. Daziel, G. D. Pennick, P. G. MacIver.	W.T.	Union Castle ...	" 10.3.31 to 29.3.31	31.3.31
Dunluce Castle ...	Hutchings, A. H. ...	A. C. M. Black ...	No. A.	" ...	Form 911 5.9.30 to 13.11.30	19.11.30
Dunrobin ...	Ramsay, J. D. ...	W. R. Holt, J. R. Butt ...	" A.	Glen & Co. ...	" 10.3.31 to 19.3.31	22.4.31
102 *† Duquesa ...	Williams, W. E. ...	F. D. Jones ...	" M.	Furness Withy ...	Forms 911 & 138 3.11.30 to 7.1.31	12.1.31
215 *† Durenda, M.V. ...	Parkes, C. E. ...	W. T. T. Barnes, C. F. Okill...	" M.	British India ...	Form 911 3.3.31 to 16.3.31...	20.4.31
077 *† Edinburgh Castle ...	Gilbert, E. F. ...	C. Harvey, R. Longman, E. F. Day.	W.T.	Union Castle ...	" 18.10.30 to 7.12.30	9.12.30
Egori ...	Nelson, J. A. ...	J. T. Townson, R. A. Cherry	No. A.	Elder Dempster ...	" 16.9.30 to 3.10.30	6.10.30
107 *† El Argentino, M.V.	Ellis, F., D.S.C.	W. Findlay, J. Burch, C. G. Adlard.	" M.	Houlder ...	Forms 911 & 138 2.3.31 to 22.4.31	12.5.31
090 *† Eldon Park ...	Burns, R. ...	J. Macrae, W. Walker, H. L. Roberts.	No. M.	Denholme S.S. Co. ...	Forms 911 & 138 10.10.30 to 25.12.30	13.2.31
009 *† Elmworth, M.V. ...	Wilson, T. P. ...	J. M. Whyte ...	" M.	R. S. Dalgleish ...	" 26.2.31 to 23.3.31...	8.4.31
158 *† Elpenor ...	Wilson, R. J. ...	E. Roberts, H. Skinks, J. F. Browning.	M.L.	A. Holt ...	Form 915 1.5.30 to 6.2.31	13.2.31
108 *† Elstree Grange ...	Williams, W. E. ...	P. A. Hawkesworth ...	No. M.	Houlder ...	Forms 911 & 138 2.2.31 to 27.4.31	30.4.31
109 *† El Paraguayo ...	Frost, C. R. ...	G. Fletcher, F. J. G. Rice, R. L. Aldridge.	" M.	" ...	" 24.2.31 to 1.5.31	5.5.31
110 *† El Uruguayo ...	McNamara, T. ...	F. E. Hailstone ...	" M.	" ...	" 11.1.31 to 12.3.31	24.3.31

Name of Vessel.	Captain.	Observing Officers.	Meteoro- logical Equipment.	Line.	Last Log, Register, or Record Contributed. Received up to 18.5.31.	Date Received.
027 *† <i>Elysia</i> ...	Henderson, F. M. ...	C. Mitchell, J. Herbert, W. A. Beveridge.	M.L.	Anchor ...	Form 915 13.9.30 to 4.1.31 ...	26.1.31
088 *† <i>Empire Star</i> ...	Owen, G., R.D., Lieut.- Commr., R.N.R.	... ..	"	Blue Star ...	... ..	...
066 †† <i>Empress of Australia</i>	Griffiths, E., Lieut.- Commr., R.N.R.	A. Tippet, M. Williams, O. F. Pennington.	W.T.	Canadian Pacific ...	Forms 911 & 138 25.3.31 to 25.4.31	28.4.31
154 †† <i>Empress of Canada</i>	Hailey, A. J., Lieut.- Commr., R.N.R.	C. W. G. Patterson, G. M. Fawcett, A. M. Barff, G. O. Baugh.	M.L.	" "	Form 915 27.11.30 to 20.3.31 ...	18.4.31
061 †† <i>Empress of France</i>	Turnbull, J., C.B.E., R.D., Capt., R.N.R.	... ..	W.T.	" "	... ..	...
153 †† <i>Empress of Japan</i>	Robinson, S., C.B.E., R.N.R.	R. Goss, R. Wolfenden, A. Le Maistre.	M.L.	" "	Form 915 7.8.30 to 13.1.31 ...	16.2.31
<i>Eumaeus</i> ...	Hodgson, R. N. ...	W. G. Coxshall... ..	No. A.	A. Holt ...	Form 911 17.2.31 to 8.5.31 ...	14.5.31
<i>Euryades</i> ...	Ewan, W. B. ...	D. S. Bruce	No. A.	" ...	" 21.1.31 to 26.1.31 ...	17.2.31
<i>Explorer</i> ...	Allan, J. ...	A. Stout	" A.	Scottish Fishery Brd.	" 8.4.31 to 22.4.31 ..	1.5.30
067 *† <i>Ferndale</i> ...	Beighton, J. N. ...	... ..	" M.	Aberdeen Common- wealth.	... ..	...
074 *† <i>Fordsdale</i> ...	Thompson, W. J. ...	M. Harries	" M.	Aberdeen Common- wealth.	Forms 911 & 138 26.3.31 to 28.4.31	5.5.31
<i>Francisco</i> ...	Scales, H. ...	B. Scholefield	" A.	Ellerman Wilson ...	Form 911 27.4.30 to 3.6.30... ..	11.6.30
030 †† <i>Franconia</i> ...	Irving, R. B. ...	W. M. Stewart, J. H. Ken- worthy, R. Pollitt.	W.T.	Cunard	" 11.1.31 to 20.1.31 ...	23.1.31
<i>Freya</i> ...	Lamont, A. ...	W. Pirrie... ..	No. A.	Scottish Fishery Brd.	" 3.3.31 to 31.3.31 ...	7.4.31
159 ** <i>Gascoyne</i> ...	Johnson, L. ...	J. S. Macbryde, C. O. Melson, W. Uttley.	M.L.	A. Holt & Co....	Form 915 2.5.30 to 22.9.30 ...	13.1.31
307 *† <i>Glamorganshire</i> ...	Miles, F. R., R.D., Commr., R.N.R.	T. W. Boleard	No. M.	R.M.S.P. Co. ...	Forms 911 & 138 14.12.30 to 6.1.31	13.1.31
125 *† <i>Glenamoy, M.V.</i> ...	Homan, C. E....	F. Laycock, G. Morgan, N. B. Jones.	M.L.	Glen Line ...	Form 915 5.5.30 to 5.11.30 ...	18.11.30
<i>Glenbeg, M.V.</i> ...	Newing, L. ...	G. A. C. Barnard	No. A.	" ...	Form 911 20.1.31 to 1.3.31 ...	7.4.31
126 *† <i>Glenegarry, M.V.</i> ...	Angier, J. ...	J. Tyler, J. W. Leslie, S. W. Bell.	" M.	" ...	Forms 911 & 138 29.3.31 to 10.4.31	14.4.31
<i>Gleniffer</i> ...	Baker, W. H. ...	A. H. D. Shaw	" A.	" ...	Form 911 15.3.31 to 26.3.31 ...	7.4.31
<i>Glenluce, M.V.</i> ...	Kennett, W. H. ...	J. A. Evans	" A.	" ...	" 31.8.30 to 24.12.30 ...	30.12.30
<i>Glenishane</i> ...	Martin, V. F. ...	S. Merrick	" A.	" ...	" 27.10.30 to 17.2.31 ...	24.2.31
<i>Glenworth</i> ...	Aitchison, D. M. ...	A. Bone	" A.	R. S. Dalgleish ...	" 21.12.30 to 8.4.31 ...	15.4.31
<i>Gloucester Castle</i> ...	MacMahon, J. ...	J. L. Goatley	" A.	Union Castle ...	" 1.11.30 to 1.1.31 ...	3.1.31
085 *† <i>Governor</i> ...	Windsor, G. R. ...	... ..	" M.	Harrison ...	... ..	...
<i>Guildford Castle</i> ...	Schalefield, H. L. ...	E. Hamlyn	" A.	Union Castle ...	Form 911 22.4.30 to 10.5.30 ...	10.6.30
<i>Halestus</i> ...	Hawley, F. J. ...	A. S. P. May	" A.	R. P. Houston ...	" 1.9.30 to 25.11.30 ...	28.11.30
111 *† <i>Hardwicke Grange</i>	Fowler, W. H. ...	W. L. Baker, A. D. Seybold, W. E. Ellis.	" M.	Houlder ...	Forms 911 & 138 15.2.31 to 7.4.31...	14.4.31
<i>Harmonides</i> ...	Elwell, F. R. ...	L. Pogson, J. Craig-Robert- son, E. McLachlan.	" A.	R. P. Houston ...	Form 911 27.3.31 to 25.4.31 ...	29.4.31
262 ** <i>Hawraki, M.V.</i> ...	Norton, A. T. ...	D. McLeish, A. W. Rabbitts, R. Kendall.	M.L.	Union S.S. Co., N.Z....	Form 915 15.8.29 to 31.10.30 ...	8.1.31
<i>Herminius</i> ...	Roberts, T. V., R.D., Lieut.-Commr., R.N.R.	F. W. Gilroy	No. A.	Aberdeen Common- wealth.	Form 911 6.3.31 to 12.4.31 ...	18.4.31
<i>Herschel</i> ...	Watson, W. W. ...	S. Ranson	" A.	Lamport & Holt ...	" 9.1.31 to 18.3.31 ...	20.3.31
253 *† <i>Hertford</i> ...	Burton Davies, J. ...	W. Redwood, G. D. Baldwin, E. Hopkins, P. Shakespeare P. Block.	M.L.	Federal ...	Form 915 16.8.30 to 27.12.30 ...	31.12.30
<i>Heston</i> ...	McCormish, A. B. ...	W. H. Ball	No. A.	R. P. Houston ...	Form 911 15.4.30 to 11.5.30 ...	10.6.30
<i>Hibernia</i> ...	Dudgeon, L. T. ...	A. Marsh	C.C.	L.M. & S. Railway ...	Telegraphic Report 15.5.31 ...	15.5.31
182 †† <i>Highland Brigade</i>	Lloyd, H. ...	W. Stephen, N. Hersee, C. Morgan.	No. M.	Nelson ...	Forms 911 & 138 14.1.31 to 3.3.31	23.3.31
116 †† <i>Highland Chieftain,</i> <i>M.V.</i>	Robinson, R. H. ...	W. J. Presland, W. Irving ...	" M.	" ...	" 25.2.31 to 12.4.31	18.4.31
099 †† <i>Highland Monarch,</i> <i>M.V.</i>	Ashby Graves, F. ...	R. Polden	" M.	" ...	" 9.2.31 to 1.4.31	7.4.31
250 †† <i>Highland Princess</i> <i>M.V.</i>	Collins, D. ...	I. Shearer	" M.	" ...	... ..	...
079 *† <i>Hildebrand</i> ...	Buck, R. H., R.D., Capt., R.N.R.	W. H. Cross	W.T.	Booth ...	" 21.3.31 to 26.4.31	5.5.31
075 *† <i>Hobson's Bay</i> ...	Kydd, O. J. ...	J. Worrall, B. F. Moffatt, C. Carroll, C. Campbell, C. C. Good.	M.L.	Aberdeen Common- wealth.	Form 915 28.5.30 to 9.1.31 ...	5.2.31
<i>Holbein</i> ...	Gough, W. A....	F. Delaney	No. A.	Lamport & Holt ...	Form 911 9.12.30 to 8.1.31... ..	7.1.31
054 †† <i>Homerie</i> ...	Bulman, J. B. ...	H. G. Morgan, M. Bennett, W. Poustie.	W.T.	White Star ...	Forms 911 & 138 2.4.31 to 7.5.31	9.5.31
<i>Hubert</i> ...	Briscoe, W. ...	T. E. Williams	M.L.	Booth ...	Form 911 4.2.31 to 1.4.31	14.4.31
261 *† <i>Huntingdon</i> ...	Field, H. G. B. ...	M. J. Broadhead, P. S. Cal- cutt, J. H. Strand Jones, H. F. Wilkinson.	W.T.	Federal... ..	" & 138 17.11.30 to 3.3.31	14.3.31
200 *† <i>Huntsman</i> ...	Russell, H. ...	H. Wells	No. M.	Harrison ...	... ..	...
289 *† <i>Ingoma</i> ...	Gibbings, W. ...	S. M. Smith, D. Douglas Kerr, R. Sutcliffe.	" M.	" ...	Forms 911 & 138 27.3.31 to 6.5.31	11.5.31
160 *† <i>Ixon</i> ...	Dougall, W. T. ...	G. L. Oldrich, W. H. Deans, D. Trail.	M.L.	A. Holt ...	Form 915 19.4.30 to 18.9.30 ...	26.11.30
<i>Jamaica Merchant</i>	Bach, L. G., R.D., Lieut. - Commr., R.N.R.	B. W. Smith	"	Jamaica Direct Fruit	Form 911 21.11.30 to 27.12.30 ...	13.1.31
072 ** <i>Jamaica Planter</i> ...	Towell, W. C....	C. P. Winand	W.T.	" "	Forms 911 & 138 9.4.31 to 3.5.31	15.5.31
<i>Jamaica Producer</i>	Allen, P. D. ...	J. Quick	No. A.	" "	Form 911 27.3.31 to 24.4.31 ...	30.4.31
<i>Javanese Prince, M.V.</i>	Smith, J. ...	C. E. Edney	" A.	Prince ...	" 11.2.31 to 15.3.31 ...	7.4.31
187 *† <i>Jeypore</i> ...	Harris, W. L. ...	A. G. Edwards... ..	" M.	P. & O. ...	Forms 911 & 138 29.11.30 to 23.2.31	2.3.31
188 †† <i>Kaisar-i-Hind</i> ...	Headlam, P. C., R.D., Commr., R.N.R.	T. T. Ferguson, H. Flint, S. Hopkins.	" M.	" ...	" 1.2.31 to 25.3.31	31.3.31
189 *† <i>Kalyan</i> ...	Cooper, C. P., O.B.E., R.D., Capt., R.N.R.	M. G. Morris	" M.	" ...	" 9.12.30 to 25.1.31	27.1.31
041 *† <i>Karamea, M.V.</i> ...	McIntosh, A. ...	K. D. Fisher, N. S. Milne, C. Sendall, A. S. White.	M.L.	Shaw, Savill & Albion	Form 915 15.10.30 to 8.2.31 ...	17.2.31
217 *† <i>Karapara</i> ...	Maclean, A. ...	B. Paul, J. B. Walker... ..	No. M.	British India... ..	Forms 911 & 138 14.1.31 to 27.2.31	23.3.31
190 *† <i>Kashgar</i> ...	Sudell, F., R.D., Commr., R.N.R.	R. P. Eddy, C. H. Long ...	" M.	P. & O. ...	" 14.12.30 to 8.3.31	24.3.31
191 *† <i>Kashmir</i> ...	Mallaloe, R., Lt.- Commr., R.N.R.	H. M. Webb, F. C. Fairburne	No. M.	P. & O. ...	Forms 911 & 138 19.12.30 to 22.2.31	26.2.31
114 †† <i>Kenya</i> ...	Grant, W. E. ...	L. Y. Ken. R. Lord, A. Ralph	" M.	British India ...	" 25.1.31 to 10.2.31	2.3.31
218 *† <i>Khandalla</i> ...	Baird, S. K. ...	W. Gordon Jones	" M.	" ...	" 27.2.31 to 10.4.31	4.5.31
283 *† <i>Khiva</i> ...	Dawson, E. E. N. ...	E. V. Lewis	" M.	P. & O. ...	Form 911 22.12.30 to 12.4.31 ...	18.4.31
186 *† <i>Kidderpore</i> ...	Woodroffe, S. Y. ...	R. H. Hand, G. S. B. Coleard	" M.	" ...	Forms 911 & 138 18.12.30 to 25.2.31	16.3.31
169 ** <i>Kwangchow</i> ...	Stringer, C. B. L. ...	O. Fox	M.L.	China Nav. Co. ...	Form 915 1.5.30 to 1.11.30 ...	6.1.31

LIST OF VOLUNTARY OBSERVING SHIPS

v

Name of Vessel.	Captain.	Observing Officers.	Meteoro-logical Equipment.	Line.	Last Log, Register, or Record Contributed. Received up to 16.5.31.	Date Received.
147 †† <i>Laconia</i> ...	Doyle, M. ...	J. D. Archer, R. V. Youd, M. Boston.	W.T.	Cunard... ..	Forms 911 & 138 21.4.31 to 10.5.31	15.5.31
<i>Laguna</i> , M.V. ...	Dunn, R.E., O.B.E. ...	W. Billington	No. A.	Pacific S.N. Co. ...	Form 911 24.2.31 to 12.3.31 ...	7.4.31
193 *† <i>Lahore</i> ...	Hollow, T. H. ...	J. G. K. Gregory, F. Hull, S. R. Ewa.	" M.	P & O	Forms 911 & 138 21.9.30 to 11.2.31	17.2.31
<i>Lalande</i> ...	Symons, P. ...	C. Legg	" A.	Lampport & Holt ...	Form 911 30.1.30 to 24.2.31	4.3.31
036 †† <i>Lancastria</i> ...	Murchie, P. A., R.D., Capt., R.N.R.	J. S. Glendenning, S. Troodman, N. Kingscote.	W.T.	Cunard	Forms 911 & 138 20.4.31 to 8.5.31	12.5.31
<i>Laomedon</i> ...	Watson, C. J. ...	A. E. Martin	No. A.	A. Holt	Form 911 31.1.31 to 23.3.31	30.3.31
082 *† <i>La Paz</i> , M.V. ...	Morgan, D. R. ...	R. W. Hanson, J. Sutherland, G. Pattison.	" M.	Pacific S.N. Co. ...	Forms 911 & 138 15.3.31 to 13.4.31	16.4.31
<i>Laplace</i> ...	Hickman, V. G. ...	N. R. Perons	" A.	Lampport & Holt ...	Form 911 10.2.31 to 4.5.31 ...	11.5.31
134 †† <i>Laplant</i> ...	Harvey, H. ...	"	W.T.	Red Star	"	"
076 *† <i>Largs Bay</i> ...	Jernyn, W. M. ...	F. B. Marsden	No. M.	Aberdeen Common-wealth.	Forms 911 & 138 14.12.30 to 21.2.31	30.4.31
112 *† <i>La Rosarina</i> ...	Webb, C. ...	W. S. Hamblin	" M.	Houlder	" 25.12.30 to 21.2.31	27.2.31
<i>Lassell</i> ...	Lindsay, J. ...	P. Casey	" A.	Lampport & Holt ...	Form 911 11.2.31 to 6.5.31 ...	14.5.31
064 †† <i>Laurentic</i> ...	Hume, R. ...	C. Cochran, G. Kavanagh, R. Conway.	W.T.	White Star	Forms 911 & 138 30.3.31 to 19.4.31	21.4.31
083 *† <i>Lautaro</i> , M.V. ...	Leyne, R. W. ...	G. A. Thexton	No. M.	Pacific S.N. Co. ...	" 4.11.30 to 22.2.31	2.3.31
254 *† <i>Limerick</i> ...	Molyneux, P. L. ...	A. M. Downman, N. A. Thomas	" M.	Federal	" 22.2.31 to 3.4.31	8.4.31
093 *† <i>Llandaff Castle</i> ...	Attwood, J. B. ...	J. E. Revittford	W.T.	Union Castle	Form 911 2.1.31 to 9.3.31 ...	17.3.31
097 †† <i>Llangibby Castle</i> , M.V. ...	Harvey, H. B. ...	H. S. Warren	"	"	Forms 911 & 138 31.1.31 to 3.4.31	15.4.31
094 *† <i>Llandovery Castle</i> ...	Morgan, A. O., R.D., Commr., R.N.R.	L. H. Farrow, T. C. Goldstone, F. R. Pope.	M.L.	"	Form 915 20.9.30 to 24.11.30	3.12.30
216 *† <i>Llanstephan Castle</i> ...	Bickford, C. N. ...	T. Campbell, H. Bunn, I. Duncan.	W.T.	"	Form 911 9.3.31 to 7.5.31 ...	14.5.31
084 *† <i>Lobos</i> , M.V. ...	Grant, F. H. ...	R. W. Gill	No. M.	Pacific S.N. Co. ...	Forms 911 & 138 27.12.30 to 16.2.31	21.2.31
<i>Loch Katrine</i> ...	Cocks, A. ...	J. E. Pardoe Matthews ...	" A.	R.M.S.P. Co.	Form 911 24.12.30 to 21.3.31	27.3.31
<i>Lochnagar</i> , M.V. ...	Purvis, A. ...	F. G. Dawson, A. Yeatman.	" A.	"	" 26.1.31 to 24.4.31	7.5.31
<i>London Exchange</i> ...	Griffiths, J. ...	C. T. V. Rixham	" A.	Furness Withy	" 28.2.31 to 4.4.31	7.4.31
<i>Lord Antrim</i> ...	Jarvis, F. E. ...	C. A. Milligan	" A.	Ulster S.S. Co. ...	" 21.9.30 to 4.10.30	7.10.30
<i>Loriga</i> , M.V. ...	Grant, F. H. ...	J. D. Richards, W. Horsfall ...	" A.	Pacific S.N. Co. ...	" 27.3.31 to 16.4.31	1.5.31
194 †† <i>Macedonia</i> ...	Dickenson, C. C. ...	C. C. Dickinson	W.T.-M.	P. & O.	Forms 911 & 138 29.3.31 to 23.4.31	4.5.31
013 *† <i>Macharda</i> ...	Hanna, R. G. ...	C. Lindsay Miller, C. Parry, G. A. Jackson, R. J. Mayne.	No. M.	Brocklebank	" 3.4.31 to 1.5.31	5.5.31
232 *† <i>Madura</i> ...	Parker, A. A. ...	A. Usher, D. S. Hutton, F. C. Conolly.	" M.	British India	" 9.1.31 to 14.3.31	17.3.31
078 *† <i>Magician</i> ...	Bury, E. R. ...	W. E. Shotton	" M.	Harrison	"	"
048 *† <i>Mahana</i> ...	Cameron, J. M. ...	H. C. Smith, A. E. Masters, M. G. Stuart.	M.L.	Shaw, Savill & Albion	Form 915 13.9.30 to 5.1.31	8.1.31
141 *† <i>Mahia</i> ...	Andrews, C. M. ...	G. Sangwin, M. P. Congdon, J. Jackson.	W.T.	"	Forms 911 & 138 17.9.30 to 18.1.31	26.1.31
140 *† <i>Mahratta</i> ...	Williams, E. R. ...	T. C. Eddy	No. M.	Brocklebank	"	"
014 *† <i>Mahronda</i> ...	Sharpe, G. ...	A. Melville, H. Willington, W. Le Brocq.	" M.	"	" 10.3.31 to 2.4.31	27.4.31
015 *† <i>Mahsud</i> ...	Kershaw, R. W. ...	S. Richardson, E. Walker, J. R. Paisley.	" M.	"	" 10.12.30 to 10.3.31	20.4.31
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
<i>Maihar</i> ...	Charlton, W. L. ...	C. Cadwallar, H. Gillespie, A. D. Spring.	" A.	"	Form 915 6.7.30 to 25.9.30 ...	4.11.30
042 *† <i>Maimoa</i> ...	Johnson, J. W. ...	J. W. Hart, A. Winton, E. Sainsbury, J. F. H. Stroud	M.L.	Shaw, Savill & Albion	" 22.9.30 to 8.12.30	30.12.30
<i>Maimyo</i> ...	Smith, G. C. ...	J. L. Rodgers	No. A.	Brocklebank	Form 911 5.3.31 to 21.4.31	27.4.31
018 *† <i>Makalla</i> ...	Maughan, J. W. ...	E. Williams	" M.	"	Forms 911 & 138 4.1.31 to 1.4.31	7.4.31
225 *† <i>Makura</i> ...	MacDonald, D. ...	J. W. S. Madden, A. P. Cousin, S. H. Crawford, M. V. Langdale, R. B. Denniston.	M.L.	Canadian-Australasian	Form 915 4.9.30 to 20.12.30	19.2.31
019 *† <i>Malakuta</i> ...	Adamson, F. L. ...	H. Simpson	No. M.	Brocklebank	Forms 911 & 138 28.11.30 to 4.3.31	1.4.31
020 *† <i>Malancha</i> ...	Whitham, F. ...	R. Humble, H. B. Kelly, M. Mackenzie.	" M.	"	" 10.1.31 to 10.4.31	15.4.31
219 *† <i>Malda</i> ...	Denne, G. H. A. ...	D. B. Lattin, G. W. P. King, E. B. Cutlack.	" M.	British India	Form 138 25.10.30 to 15.1.31	29.1.31
195 †† <i>Maloja</i> ...	Browning, J. B., R.D., Commr., R.N.R.	R. H. Turner, C. H. Hand, R. E. Baldwin-Wiseman.	" M.	P. & O.	Forms 911 & 138 27.1.31 to 7.2.31	21.3.31
196 †† <i>Malwa</i> ...	Britten, P. O. ...	P. J. Lawrence	" M.	"	" 1.1.31 to 2.4.31	8.4.31
053 *† <i>Manaar</i> ...	Thowless, E. ...	A. L. Harrop	" M.	Brocklebank	Forms 911 & 138 23.3.31 to 1.4.31	9.4.31
<i>Manchester Brigade</i> ...	Stott, C. H. ...	J. H. Round, E. E. Bonnaud, J. Gregory.	M.L.	Manchester Liners ...	Form 915 10.5.30 to 25.11.30	5.12.30
<i>Manchester Hero</i> ...	Mitchell, G. M. ...	R. O. Jones	No. A.	"	Form 911 11.11.30 to 16.12.30	1.1.31
<i>Manchester Producer</i> ...	Struss, F. D. ...	T. J. Boyd	" A.	"	" 1.6.30 to 3.7.30	23.7.30
028 †† <i>Mandala</i> ...	Whittingham, A. G., R.D., Capt., R.N.R.	W. E. F. Powell	" M.	British India	Forms 911 & 138 17.11.30 to 6.2.31	14.3.31
146 *† <i>Mandasor</i> ...	Richardson, T. ...	F. C. Madden, T. S. Cullen, J. Alexander.	" M.	Brocklebank	" 18.12.30 to 1.3.31	10.3.31
220 *† <i>Manela</i> ...	Maples, S. H. ...	T. M. Robertson, L. W. Kerton, F. C. Conolly.	" M.	British India	" 12.4.31 to 23.4.31	30.4.31
022 *† <i>Manipur</i> ...	Cochran, G. N. ...	L. F. Dodson, R. Penston, A. Hill.	" M.	Brocklebank	" 16.2.31 to 18.3.31	13.4.31
221 *† <i>Manora</i> ...	Hudson, H. T., R.D., Commr., R.N.R.	W. Brawn, A. Pyatt, S. A. Richards.	" M.	British India	" 2.3.31 to 3.4.31	8.4.31
197 †† <i>Mantua</i> ...	Hignett, R.D., Commr., R.N.R.	F. R. N. Greasley, C. Hayward, H. J. Cholerton.	W.T.-M.	P. & O.	" 3.1.31 to 25.2.31	2.3.31
299 *† <i>Marella</i> ...	Donaldson, A. ...	M. Pemberton, W. D. Colquhoun, A. G. W. Thomas.	M.L.	Burns Philp	Form 915 2.9.30 to 21.12.30	19.2.31
<i>Marengo</i> ...	Aspinall, A. E. ...	H. Bryan, G. W. Revell, W. L. Hepson, F. Brown, C. Newton, J. E. Dobson.	"	Ellerman Wilson ...	" 21.10.30 to 16.3.31	19.3.31
222 †† <i>Margha</i> ...	Bean, A. ...	P. Wright, H. Watkins ...	" M.	British India	" 28.12.30 to 21.3.31	26.3.31
104 *† <i>Marquesa</i> ...	Smiles, R. S. ...	J. Wetherall	No. M.	Furness Houlder ...	Forms 911 & 138 15.12.30 to 13.3.31	17.2.31
021 *† <i>Masula</i> ...	Fitt, W. A. ...	E. B. Cutlack	" M.	British India	"	"
044 †† <i>Mataroa</i> ...	Kershaw, W. A. R. ...	F. Badon, H. A. Hill, F. C. Charnley, W. West, K. Owen.	M.L.	Shaw, Savill & Albion	Form 915 3.1.31 to 12.4.31	18.4.31
023 *† <i>Matheran</i> ...	Mulcahy, J. J. ...	S. S. Slade, J. F. Butterworth, W. Cowrie.	No. M.	Brocklebank	Forms 911 & 138 28.3.31 to 16.4.31	11.5.31
223 *† <i>Mattiana</i> ...	Green, F. V. ...	L. A. Burn, P. M. Wilson, J. W. F. Daly.	" M.	British India	" 10.2.31 to 9.4.31	13.4.31
024 *† <i>Matra</i> ...	Cornish, N. P. ...	C. Shaw, W. Robertson, O. Jones, J. Campbell.	" M.	Brocklebank	" 29.1.31 to 20.2.31	27.2.31
032 †† <i>Mauretania</i> ...	McNeil, S. G. S., R.D., Capt., R.N.R.	W. C. A. Robson, J. Wiseman, W. L. Cox.	W.T.	Cunard	" 19.4.31 to 3.5.31	7.5.31
287 †† <i>Melita</i> ...	Stewart, A. ...	L. N. Outram, S. W. Keay ...	"	Canadian Pacific ...	" 18.4.31 to 7.5.31	11.5.31
<i>Mercian</i> ...	Hughan, C. ...	"	No. A.	Leyland	Form 911 28.7.30 to 30.9.30	8.10.30
<i>Meriones</i> ...	Hannay, T. W. ...	J. G. Jones, G. H. Oldridge ...	" A.	A. Holt	" 19.4.31 to 27.4.31	6.5.31

Name of Vessel.	Captain.	Observing Officers.	Meteoro-logical Equipment.	Line.	Last Log, Register, or Record Contributed Received up to 16.5.31.	Date Received.
255 *† Middlesex ...	Clarke, P. B. ...	J. Lunnon, J. Ricketts, R. Stephens, J. Halliday.	No. M.	Federal... ..	Forms 911 & 138 8.7.30 to 12.8.30	20.11.30
312 *† Minderoo ...	Macphedran ...	E. Lancaster	" M.	Western Australian S.N. Co.	" " " " " "	"
068 † Minna ...	Mackenzie, G. G. ...	A. M. Campbell	" A.	Scottish Fishery Brd.	Form 911 5.3.31 to 10.4.31	13.4.31
† Minnetonka ...	Gates, T. F., C.B.E. ...	H. E. D. McCartney, W. T. Harrison, L. C. Hill.	" M.	Atlantic Transport...	Forms 911 & 138 16.4.31 to 2.5.31	5.5.31
069 † Minnewaska ...	Claret, F. H., C.B.E., Commr., R.N.R.	E. Pengelly, J. Grier, T. Pollen.	W.T.-M.	" " " "	" " 1.4.31 to 18.4.31	21.4.31
Mississippi, M.V. ...	Finch, E. ...	A. C. Clay	No. A.	" " " "	Form 911 10.2.31 to 26.3.31	2.4.31
224 *† Modasa ...	Gilchrist, J. W. ...	W. Ascroft, H. C. Pearson, B. H. Pollitt.	" M.	British India ...	Forms 911 & 138 8.1.31 to 13.2.31...	19.2.31
199 † Mongolia ...	Rhodes, H. R. ...	H. Tee	" M.	Union S.S. of N.Z. ...	" " 20.4.31 to 30.4.31	14.5.31
† Monowai ...	Toten, A. T. ...	M.L.	M.L.	Canadian Pacific ...	Forms 911 & 138 15.2.31 to 7.3.31...	11.3.31
148 † Montcalm ...	Rothwell, A. ...	T. L. Gillette, A. Mackie, A. Vaughan.	W.T.	" " " "	" " 1.3.31 to 21.3.31	27.3.31
149 † Montclare ...	McCombie, J. ...	A. Watt, J. Sharples, J. Soames.	"	" " " "	" " 4.4.31 to 23.4.31 ...	27.4.31
150 † Montrose ...	Dott, J. F. ...	K. Hutchings, J. M. Roche, E. A. Shergold, R. M. A. Stapleton.	W.T.-M.	" " " "	" " " " " "	"
164 † Mooltan ...	Morton, A. J. ...	R. M. Richardson	No. M.	P. & O. ...	Forms 911 & 138 29.3.31 to 30.4.31	5.5.31
226 † Mulbera ...	Caflryn, F. ...	G. H. Springer	" M.	British India ...	" " " " " "	"
290 *† Musician ...	Bostock, O. ...	K. H. Davies	" M.	Harrison ...	" " " " " "	"
201 † Naldera ...	Harrison, R., D.S.O., R.D., Capt. R.N.R.	J. O. Divers, O. W. Mayne, M. F. Shute, H. J. Mann.	M.L.	P. & O. ...	Form 915 13.12.30 to 18.3.31 ...	26.3.31
227 *† Nardana ...	Reilly, J. V. ...	H. Goater, H. Grace, A. Woodward, R. D. Macfadyen.	"	British India ...	" 1.11.30 to 1.3.31 ...	4.3.31
118 ** Narenta ...	Falconer, A. C. ...	G. S. Grant, G. D. Bonner, M. A. Murch.	No. M.	R.M.S.P. Co. ...	Forms 911 & 138 3.1.31 to 26.3.31	2.4.31
202 † Narkunda ...	Parker, J. J. W., R.D., Commr. R.N.R.	C. H. Moulton, J. K. King ..	" M.	P. & O. ...	" " 1.2.31 to 15.4.31	17.4.31
136 *† Navigator ...	Curphey, E. B. ...	T. R. Hill	W.T.	Harrison ...	Forms 911 & 138 1.2.31 to 6.4.31	9.4.31
305 *† Nebraska ...	Bridges, E. A. ...	A. Frogbrook, W. S. Thomas, P. R. Cocks.	No. M.	R.M.S.P. Co. ...	" 20.2.31 to 23.3.31	7.4.31
203 † Nellore ...	Gordon, A. S. ...	L. J. Dixon, J. F. M. Heddle, H. E. Nuzum, J. Kavanagh.	M.L.	E. & A. S.S. Co. ...	Form 915 31.10.30 to 28.1.31 ...	28.2.31
162 *† Nestor ...	Adecock, F. ...	W. L. Harris, A. E. Stephenson, P. Elder.	"	A. Holt ...	" 6.7.30 to 10.11.30 ...	15.11.30
† Nevistan ...	McCormick, J. ...	" " " " " "	No. A.	Leyland ...	Form 911 4.4.30 to 5.7.30 ...	10.7.30
† Newfoundland ...	Foxworthy, A. W. ...	R. F. Handley, E. Sainty, J. L. Macklin.	M.L.	Furness Withy ...	Form 915 18.9.30 to 1.2.31 ...	14.2.31
210 ** Niagara ...	Hill, T. V. ...	G. H. Kime, D. A. Menlove, S. P. Bourke, J. W. T. Madden.	"	Canadian-Australasian	" 13.11.30 to 23.2.31 ...	30.4.31
† Ningchow ...	Beale, H. E. ...	E. Butler	No. A.	A. Holt ...	Form 911 5.1.31 to 16.1.31 ...	23.1.31
229 *† Nirvana ...	Ayres, R. M. ...	S. H. Kinson, J. B. Hore, A. H. Baird.	" M.	British India ...	Forms 911 & 138 17.6.30 to 6.7.30	29.7.30
256 *† Norfolk ...	Howell - Price, J., D.S.O., D.S.C.	G. C. Hocart, K. M. Lloyd Jones, L. Hanley.	M.L.	Federal ...	Form 915 1.12.30 to 22.3.31 ...	25.3.31
270 *† Norman Star ...	Sinclair, J. ...	R. J. Wills	No. M.	Blue Star ...	Form 911 19.4.31 to 30.4.31 ...	5.5.31
† Norma ...	Angus, W. ...	J. M. Murray	No. A.	Scottish Fishery Brd.	" 13.7.30 to 6.8.30 ...	28.8.30
100 *† Norseman, C.S. ...	Hammond, S. M. ...	R. Moss	" M.	Western Tel. Co. ...	Forms 911 & 138 9.11.30 to 16.12.30	22.4.31
297 *† Northumberland ...	Upton, H. L., D.S.C., R.D., Commr., R.N.R.	R. S. Miller, H. Rogers, G. B. Cathie.	" M.	Federal ...	" " " " " "	"
† Novara ...	Dene, R. C. ...	N. W. Leach	" M.	P. & O. ...	" " " " " "	"
† Nova Scotia ...	Furneaux, S. J. ...	J. E. Wilson, A. Hender, N. Forsythe, F. H. Jones.	M.L.	Furness Withy ...	Form 915 8.10.30 to 12.3.31 ...	20.3.31
230 *† Nowshera ...	Longhurst, J. H. ...	R. Burch, B. H. Bentall.	No. M.	British India ...	Forms 911 & 138 18.1.31 to 29.1.31	11.5.31
231 *† Nuddea ...	Beeching, P. H. ...	D. A. Jones, W. Monk, W. G. Pitcher.	" M.	" " " "	" 17.2.31 to 22.3.31 ...	20.4.31
† Oaklands Grange ...	Phillips, A. G. M. ...	J. C. Thomas	" A.	Houlder Bros. ...	Form 911 30.5.30 to 18.9.30 ...	4.10.30
243 *† Opawa ...	Robinson, F. W. ...	J. W. Pring	" M.	New Zealand S.S. Co.	" " " " " "	"
170 † Orama ...	Staunton, H. G., C. B. E., R. D., Commr., R.N.R.	W. Eliot, K. Morrison, R. W. Roberts.	W.T.	Orient ...	Forms 911 & 138 2.2.31 to 5.5.31	8.5.31
† Oranlian ...	Gittings, R. P. ...	H. O. Quinn	No. A.	Leyland ...	Form 911 26.11.30 to 17.1.31 ...	29.1.31
309 † Orbita ...	Kite, E. ...	D. W. Hutchinson, L. J. Smith	W.T.-M.	Pacific S.N. Co. ...	Forms 911 & 138 3.2.31 to 10.4.31	21.4.31
086 † Orcoma ...	Harvey, J. G. ...	W. J. Rutter, G. H. Pilling, W. Pearce.	"	" " " "	" " 2.12.30 to 9.2.31...	19.2.31
087 † Orđuna ...	Ridyard, A., O.B.E. ...	T. J. Naylor, R. F. A. Cox, E. B. James.	"	" " " "	" " 10.1.31 to 23.3.31	2.4.31
171 † Orford ...	Owens, A. L., Commr. R.D., R.N.R.	S. C. K. Dowding	No. M.	Orient ...	" " 11.11.30 to 27.1.31	2.2.31
174 † Ormonde ...	James, L. V., D.S.C.	T. L. Shurrock, N. Smith, C. Blake.	W.T.	" " " "	" " 8.12.30 to 10.3.31	1.4.31
172 † Cronsay ...	Cameron, E. P., R.D., Commr., R.N.R.	E. M. Mackay, E. V. Bilger	"	" " " "	" " 18.1.31 to 21.4.31	30.4.31
173 † Orontes ...	O'Sullivan, F. R. ...	J. M. N. Swanson, S. Burnand, W. McKay.	No. M.	" " " "	" " 4.1.31 to 7.4.31	28.4.31
089 *† Oroya ...	Galloway, M. ...	J. M. Forsyth, J. Ayland, E. S. Jones.	" M.	Pacific S.N. Co. ...	" " 20.8.30 to 28.10.30	1.11.30
105 † Orsova ...	Thorne, G. G., R.D., Commr., R.N.R.	R. B. Stannard	W.T.	Orient ...	" " 22.12.30 to 24.3.31	8.4.31
237 *† Otaki ...	Maltby, T. L. ...	A. V. Pearce, N. Baddeley, J. H. Underwood.	M.L.	New Zealand S.S. Co.	Form 915 31.8.30 to 6.2.31 ...	17.2.31
177 † Otranto ...	Matheson, C. G., D.S.O., R.D., Capt. R.N.R.	A. E. Coles, G. R. Grandase, R. Addison.	W.T.	Orient ...	Forms 911 & 138 22.3.31 to 30.3.31	4.5.31
† Pacific Enterprise, M.V. ...	Newman, G. W. A. ...	" " " " " "	No. A.	Furness Withy ...	" " " " " "	"
279 *† Pacific Exporter ...	Nuttall, E. L. ...	A. Knapp	W.T.	" " " "	" " 17.11.30 to 11.2.31	16.2.31
† Pacific Shipper, M.V. ...	Goodwin, J. ...	S. Porter	No. A.	" " " "	Form 911 1.11.30 to 2.2.31	6.2.31
176 *† Pakeha ...	Elford, H. C. ...	A. J. Tillott	M.L.	Shaw, Savill & Albion	Forms 911 & 138 2.2.31 to 13.3.31...	17.3.31
† Pancras ...	Barlow, F. P. ...	L. A. Sayers, S. Adams ...	"	Booth ...	Form 915 13.12.30 to 2.2.31 ...	13.2.31
† Pareora ...	Evans, J. O. ...	C. Parry	No. A.	"P" Steamers, Ltd.	Form 911 15.7.30 to 6.8.30...	23.9.30
† Paris ...	Cook, C. L. ...	Mr. Biles	C.C.	Southern Rly. ...	Telegraphic Report. 13.5.31 ...	13.5.31
† Patia ...	Sapsworth, S. A. ...	R. O. Laycock, R. S. Howlett, S. A. Duff.	No. A.	Elders & Fyffes ...	Form 911 26.3.31 to 25.4.31 ...	29.4.31
† Peisander ...	Findlay, J. ...	C. T. Morgan	" A.	A. Holt ...	" 3.2.31 to 23.4.31	12.5.31
058 † Pennland ...	Making, V. L. ...	— Jenkins, — Otterson, J. C. Flett.	W.T.	Red Star ...	Forms 911 & 138 6.4.31 to 25.4.31	27.4.31
204 *† Peshawur ...	McBryde, A. M. ...	D. Meikle, J. T. Sheffield, T. E. Wrigley, M. P. Fyrth, G. A. Nixon.	M.L.	P. & O. ...	Form 915 1.8.30 to 5.12.30 ...	9.12.30
238 *† Piako ...	Aslin, E. P. C. ...	A. D. Wilson, A. W. Marshall, R. H. Carter.	No. M.	New Zealand S.S. Co.	Forms 911 & 138 6.12.30 to 24.1.31	7.2.31

LIST OF VOLUNTARY OBSERVING SHIPS

vii

Name of Vessel.	Captain.	Observing Officers.	Meteoro-logical Equipment.	Line.	Last Log. Register, or Record Contributed. Received up to 18.5.31.	Date Received.
039 *† <i>Planter</i> ...	Packe, M. G. ...	— Eustance ...	No. M.	Harrison ...	Form 911 16.2.31 to 26.3.31 ...	13.4.31
127 *† <i>Polycarp</i> ...	Furner, F. S. ...	A. S. Richardson ...	" A.	Booth ...	Form 915 9.9.30 to 1.1.31 ...	20.1.31
128 *† <i>Port Adelaide</i> ...	Williams, R. ...	J. G. A. Dunn, F. W. Elgar, D. Morgan, E. N. Lawrey, W. Craig, A. Brown, E. Mickleburgh.	M.L.	Commonwealth & Dominion.	" 31.7.30 to 4.12.30 ...	13.1.31
129 *† <i>Bowen</i> ...	Brown, A. H. ...	F. R. Gorman ...	No. A.	" " "	Form 911 3.1.31 to 28.4.31 ...	5.5.31
129 *† <i>Campbell</i> ...	Gregory, S. ...	J. C. Goddard, N. M. Muzzell, C. Midwinter.	M.L.	" " "	Form 915 7.10.30 to 25.1.31 ...	31.1.31
130 *† <i>Caroline</i> ...	Hearn, G. W. ...	V. G. Battle, E. W. R. Young, R. E. Garner.	"	" " "	" 16.12.30 to 23.4.31 ...	1.5.31
131 *† <i>Darwin</i> ...	Lewis, J. G. ...	K. D. Morgan, W. R. Johnson, A. J. Knell, L. C. Asser.	"	" " "	" 19.10.30 to 22.3.31 ...	1.4.31
132 *† <i>Denison</i> ...	Hall, G. S. ...	A. G. Newbury, R. A. Holloway, H. Duckling.	"	" " "	" 4.11.30 to 10.3.31 ...	1.4.31
133 *† <i>Dunedin, M.V.</i> ...	Mason, W. S., D.S.C.	H. M. Post, C. A. Hodson, R. W. Chamberlain.	"	" " "	" 7.12.30 to 30.3.31 ...	9.4.31
" <i>Fairy</i> ...	Farmar, F. ...	J. Stannard, W. G. Jones, P. J. Howe.	No. A.	" " "	Form 911 20.11.30 to 5.2.31 ...	12.3.31
" <i>Fremantle, M.V.</i> ...	Gilling, W. ...	" " " " " " " "	" A.	" " "	" 27.2.31 to 5.2.31 ...	18.4.31
" <i>Gisborne, M.V.</i> ...	Hayter, S. W. ...	L. J. Skailies ...	" A.	" " "	" 6.9.30 to 10.10.30 ...	17.10.30
" <i>Hobart, M.V.</i> ...	Cottell, S. C. ...	E. R. Rowlands, G. Jinman, L. Copeland.	M.L.	" " "	Form 915 15.7.30 to 2.11.30 ...	26.11.30
135 *† <i>Hunter</i> ...	Higgs, W. G. ...	G. T. C. Harris, C. R. Townshend, W. M. Clough, P. A. Manday.	"	" " "	" 7.10.30 to 29.1.31 ...	5.2.31
137 *† <i>Nicholson</i> ...	Gregory, S. E. A. ...	E. N. Rogerson, R. D. Elson, E. N. Howard, S. Ward.	"	" " "	" 7.9.30 to 8.1.31 ...	15.1.31
138 *† <i>Pirie</i> ...	Jack, J. ...	G. W. Horton, H. E. Braine, E. C. H. Webb.	"	" " "	" 6.12.30 to 26.4.31 ...	11.5.31
" <i>Wellington</i> ...	Jones, C. N. ...	W. B. Hopkins ...	No. A.	" " "	Form 911 24.10.30 to 12.2.31 ...	16.2.31
106 *† <i>Princesa</i> ...	Friend, A. B. ...	E. Loughheed, A. M. Tilsley ...	" M.	Houlder " " "	Forms 911 & 138 25.2.31 to 19.3.31 ...	24.3.31
163 *† <i>Protesilaus</i> ...	Holden, W. R. F. ...	J. Cooper, J. Holden, H. N. Hardie.	M.L.	A. Holt ...	Form 915 17.5.30 to 30.11.30 ...	2.2.31
" <i>Pyrrihus</i> ...	Wilkinson, T. G. ...	J. C. Podmore ...	No. A.	" " " " " "	Form 911 4.4.31 to 15.4.31 ...	23.4.31
205 †† <i>Rajputana</i> ...	Cadiz, F. G., D.S.C. ...	G. A. Wild, D. Hockley, D. B. Beecley.	" M.	P. & O. ...	Forms 911 & 138 7.12.30 to 29.1.31 ...	2.2.31
063 *† <i>Rancher</i> ...	McCullum, J. ...	G. Harvey, C. F. Minshall, A. L. Lewis.	" M.	Harrison ...	" " 12.3.31 to 10.4.31 ...	4.5.31
228 †† <i>Ranchi</i> ...	Brooks, C., D.S.O., R.D., Capt. R.N.R.	T. A. Sergeant ...	" M.	P. & O. ...	" " 15.2.31 to 22.4.31 ...	29.4.31
236 †† <i>Rangitane M.V.</i> ...	McKellar, A. W., R.D., Capt. R.N.R.	J. J. Youngs, A. Brown C. Edgecombe.	M.L.	New Zealand S.S. Co.	Form 915 26.9.30 to 9.1.31 ...	15.1.31
257 †† <i>Rangitata M.V.</i> ...	Hunter, J. L. B. ...	J. Oxnard, L. Griffiths, D. Chadwick, W. Jarvis.	W.T.-M.	" " "	Forms 911 & 138 30.8.30 to 10.12.30 ...	1.1.31
240 †† <i>Rangitiki M.V.</i> ...	Barnett, H. ...	L. F. Malcournne, H. K. Cockerill, C. Cruttenden.	"	" " "	" " 22.11.30 to 3.3.31 ...	14.3.31
207 †† <i>Ranpura</i> ...	Furlong, G. H. S. ...	J. Strike, R. A. Perry, D. S. Charks.	No. M.	P. & O. ...	" " 28.2.31 to 9.4.31 ...	13.4.31
071 †† <i>Rawalpindi</i> ...	Stringer, O.B.E., R.D., Commr., R.N.R.	C. F. C. Wright ...	" M.	" " " " " "	" " " " " " " "	"
247 *† <i>Recorder</i> ...	Egerton, J. J. ...	G. Morrice ...	" M.	Harrison ...	" " 24.1.31 to 30.4.31 ...	8.5.31
306 *† <i>Reina del Pacifico, M.V.</i> ...	Roberts, E. ...	" " " " " "	" M.	Pacific S.N. Co. ...	" " " " " " " "	"
239 *† <i>Remuera</i> ...	Holland, E. A. ...	A. J. Angell, A. T. H. Weatherall, J. R. Vincent, H. N. Lawson.	M.L.	New Zealand S.S. Co.	Form 915 24.10.30 to 8.2.31 ...	14.2.31
" <i>Rhexenor</i> ...	Stout, G. L. ...	C. Anderson ...	No. A.	A. Holt ...	Form 911 4.2.31 to 16.3.31 ...	19.3.31
" <i>Rhodesian Trans-port</i> ...	Bowen, A. C. ...	H. S. Butler ...	" A.	Houlder Bros. ...	" " 17.10.30 to 1.2.31 ...	17.2.31
" <i>Ripley Castle</i> ...	Goodacre, R. W. ...	J. A. Ferguson ...	" A.	Union Castle ...	" " 10.3.31 to 31.3.31 ...	8.4.31
" <i>Rother</i> ...	Woodhead, T. H. ...	F. Wright ...	" A.	Goole Steam Shipping ...	" " 21.3.31 to 11.4.31 ...	14.5.31
241 *† <i>Rotorua</i> ...	Lamb, C. B. ...	G. C. Saul, L. W. Fulcher, H. Hill, A. I. Robertson.	M.L.	New Zealand S.S. Co.	Form 915 4.10.30 to 14.2.31 ...	19.2.31
062 *† <i>Royal Star</i> ...	Walsh, W. ...	A. F. Day, J. Hoggins ...	No. M.	Blue Star ...	Forms 911 & 138 16.12.30 to 10.3.31 ...	18.3.31
246 *† <i>Ruahine</i> ...	Urquhart, D. ...	A. Hocken, R. Warren, R. Hamilton.	W.T.	New Zealand S.S. Co.	" " 20.12.30 to 6.4.31 ...	9.4.31
300 ** <i>St. Albans</i> ...	Diamond, S. L. ...	F. O. Colvin, C. Stratford, Skinner, M. B. ...	M.L.	Eastern and Aus-tralian.	Met. Log 4.4.30 to 8.6.30 ...	21.8.30
" <i>St. Helier</i> ...	Pitman, R. ...	H. Nuzum.	C.C.	G.W. Railway ...	Telegraphic Report 11.4.31 ...	11.4.31
" <i>St. Julien</i> ...	Richardson, L. ...	E. A. Hawkyard, H. D. Freeman.	"	" " " " " "	" " 14.5.31 ...	14.5.31
" <i>St. Patrick</i> ...	" " " " " "	F. E. Martin ...	"	" " " " " "	" " 10.9.30 ...	10.9.30
038 †† <i>Samaria</i> ...	Malin, R. G., Lieut.-Commr., R.N.R.	A. MacKellar, F. G. Watts, J. A. Myles.	W.T.	Cunard ...	Forms 911 & 138 3.3.31 to 7.4.31 ...	14.4.31
" <i>Sandgate Castle</i> ...	Aylen, C. E. H. ...	M. L. Hodson, G. Thomson.	No. A.	Union Castle ...	Form 911 21.1.31 to 23.4.31 ...	14.5.31
" <i>Sardinian Prince</i> ...	Pearson, F. T. ...	H. P. Clegg ...	" A.	Prince ...	" " 17.3.31 to 1.4.31 ...	15.4.31
" <i>Saxon</i> ...	Jackson, C. R. ...	C. G. Cuthbertson ...	" A.	Union Castle ...	" " 3.1.31 to 22.2.31 ...	24.2.31
291 *† <i>Scholar</i> ...	Peterkin, A. G. ...	J. Richardson ...	" M.	Harrison ...	Forms 911 & 138 12.2.30 to 20.2.31 ...	27.2.31
" <i>Scotia</i> ...	O'Neill, J. ...	W. H. Hughes ...	C.C.	L.M. & S. Railway ...	Telegraphic Report 9.5.31 ...	9.5.31
033 †† <i>Seythia</i> ...	Gibbons, G., R.D., R.N.R.	F. P. Collins, A. Bridgewater, H. L. Pryse.	W.T.	Cunard ...	Forms 911 & 138 6.4.31 to 25.4.31 ...	28.4.31
" <i>Sea Victory</i> ...	Gammon, G. H. ...	P. Curley ...	No. A.	Dover Navigation ...	" " " " " " " "	"
211 *† <i>Shropshire, M.V.</i> ...	English, G. L. ...	R. Cumming, C. F. Hicks, E. W. Jefferies, D. Hetherington.	M.L.	Bibby ...	Form 915 10.1.31 to 19.3.31 ...	21.3.31
" <i>Silksworth</i> ...	Blacklock, G. ...	F. J. Muttitt ...	No. A.	R. S. Dalgleish ...	Form 911 7.2.31 to 13.3.31 ...	8.4.31
" <i>Somali</i> ...	Kemp, T. H. ...	" " " " " "	" A.	P. & O. ...	" " " " " " " "	"
258 *† <i>Somerset</i> ...	Pilcher, C. R. ...	D. Hughes, H. M. Knight, M. I. D. Walters, T. E. Davies.	M.L.	Federal ...	Form 915 19.7.30 to 23.11.30 ...	28.11.30
277 *† <i>Spero</i> ...	Montgomery, H. ...	H. W. Vickers, A. Kirk ...	"	Ellerman Wilson ...	" " 3.1.31 to 21.3.31 ...	27.3.31
" <i>Stephen</i> ...	Jones, W. C. H., R.D., Commr., R.N.R.	J. Whayman, D. H. Daniels.	"	Booth ...	Form 911 17.10.30 to 12.12.30 ...	29.12.30
259 *† <i>Surrey</i> ...	Lettington, A. E. ...	R. Rees, D. J. Murray, — Lock, — MacRillican.	"	Federal ...	Form 915 24.11.30 to 7.4.31 ...	15.4.31
" <i>Sutherland Grange</i> ...	Matthews, S. ...	J. R. Faulkner ...	No. A.	Houlder Bros. ...	Form 911 26.12.30 to 23.4.31 ...	6.5.31
" <i>Sylvafeld, M.V.</i> ...	MacDonald, W. ...	J. Johnson ...	" A.	Hunting & Son ...	" " 4.4.31 to 8.5.31 ...	14.5.31
045 †† <i>Tainui</i> ...	Clifton Mogg, W. P., Lieut.-Commr., R.N.R.	G. A. Harvey, E. Baker, A. G. Collins.	M.L.	Shaw, Savill & Albion	Form 915 13.9.30 to 26.12.30 ...	30.12.30
" <i>Tairoa</i> ...	Christie, D. ...	" " " " " "	"	" " " " " "	" " " " " " " "	"
234 *† <i>Taina</i> ...	Harley, G. ...	M. H. Vincent ...	No. M.	British India ...	Forms 911 & 138 19.10.30 to 14.12.30 ...	12.1.31
046 †† <i>Tamara</i> ...	Hartman, W. H. ...	L. R. Bull, F. Altwood, R. R. Roseman, B. D. Atkin.	W.T.-M.	Shaw, Savill & Albion	" " 11.10.30 to 18.1.31 ...	20.1.31
264 ** <i>Tanda</i> ...	Pilcher, E. T., Lieut.-Commr., R.N.R.	V. C. Lette, R. Lloyd-Harry, B. M. Dun, G. Chadwick-Smith.	M.L.	E. & A. S.S. Co. ...	Form 915 5.12.30 to 25.2.31 ...	4.5.31
165 *† <i>Tantalus, M.V.</i> ...	Dodds, R. ...	F. C. Oppen, R. M. Gray, W. J. Ryan.	"	A. Holt ...	" " 6.9.30 to 8.1.31 ...	16.1.31

