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THE MARINE OBSERVER.

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AN OCEANOGRAPHICAL SURVEY OF THE ARABIAN SEA.

In concluding his article "The proposed JOHN MURRAY Expedition to the Arabian Sea", Professor GARDINER said:—"The surface waters must also be analysed for temperature, salinity, and perhaps some other chemical factors, and it is hoped that the mercantile marine will co-operate in procuring the necessary samples".

For many years the Marine Division has through its branch office in Liverpool arranged for the supply to the Board of Agriculture and Fisheries Laboratory at Lowestoft, of water samples by British ships using the routes to the Brazils and West Indies.

Benefiting from the experience gained in doing this work, we have now made arrangements for a limited number of British ships to take water samples in the Arabian Sea. Their names will be found at the end of the Fleet List.

In order that there shall not be duplication and overlapping in this work in the British Merchant Navy, only sufficient ships will be included in the list to provide at regular intervals, for a year or so, water samples from the routes Aden to Karachi and Karachi to Aden, Aden to Bombay and Bombay to Aden, Aden to Colombo or Long. 80° E. and Colombo or Long. 80° E. to Aden. The ships undertaking to do this work will receive verbal advice and written instructions from the Port Meteorological Officers in Liverpool or London. They will receive the necessary bottles eastbound at Port Said from the Port Officer—the Captain of the Port—who will have the samples collected on return of the ship at Port Said westbound.

The analysis will be carried out in Egypt.

These samples of the surface water, together with the observations of the set and drift of the current made regularly by observing ships, and the sub-surface observations which *Mabahiss* is to make, should add to our knowledge of the circulation of the waters of the Arabian Sea, and may be of material assistance in unravelling the mysteries of ocean currents.

For this reason, ships taking these water samples will we hope not only be working in the interests of ocean zoology, but also in the interests of navigation.

Mabahiss is commanded by Captain K. N. MCKENZIE, an old member of the corps of voluntary marine observers and an officer of

the City Line, who for a time commanded the *Discovery* when she was working with Sir DOUGLAS MAWSON in the Southern Ocean and Antarctic waters.

The scientific leader of the JOHN MURRAY Expedition is Lieut.-Colonel R. B. SEYMOUR SEWELL of the Indian Museum, Calcutta; and the hydrographic work is in charge of Lieut.-Commander W. I. FARQUHARSON, Royal Navy.

When the organizers of the JOHN MURRAY Expedition asked us to suggest matters which might be investigated by *Mabahiss*, we pointed to the large volume of water flowing up the coast of Somaliland in the East African Current during the South West Monsoon, and the branch of it which is diverted to the eastward in the region of Latitude 8° N. to 10° N., which is reported to reach a velocity of six or seven knots at the surface in Latitude 9½° N. Longitude 54½° E. Where this current runs athwart the south-west monsoon wind there is a frequent confused sea and swell. This diversion of the current is possibly due to a ridge or some unevenness of the bottom; only soundings can prove this.

We also pointed to the seasonal variations in the Mozambique, Agulhas and East African Coast currents; and to the recently established fact that the general change of current circulation from counter-clockwise to clockwise off the shores of the Arabian Sea and Bay of Bengal at their heads usually occurs in February against the wind when the North East Monsoon is still blowing.

At this season a strong current sets westward between the Equator and Latitude 4° N.

Another point mentioned was that, if it could be done, measurements by current meter of the set and drift of the current at various depths off the East Coast of Africa at a number of stations lying athwart the stream and at nearly right angles to the coast, would yield information of great value.

We mention these suggestions because it will interest and encourage marine observers to know that the result of their work has been not only to establish facts regarding surface currents hitherto unknown, but by doing so, they have helped to point out more clearly where investigation of the depths may yield practical results.

OCEAN PILOTAGE IN THE SOUTHERN INDIAN OCEAN.

In this number in the general summary published with the charts of currents on the trade routes in the Southern Indian Ocean, we publish information of the seasonal mean set and drift of the current, found by observation between 1910 and 1932, in the western and eastern portions of the Southern Ocean between the Cape and Australia, for every two degrees of Latitude from Lat. 38° S. to Lat. 48° S.

In the April number, statistical information of the frequency of the different strengths of the winds in the "Roaring Forties" was given for each month of the year.

In this number will be found an article upon "Ice in the Southern Hemisphere", and in this volume the ice charts of the Southern Hemisphere have been brought up to date.

The question as to which is the best latitude to run the easting down in modern steamers and motor ships has been much debated. In fact, ever since composite Great Circle sailing was used in preference to Mercator or Great Circle sailing in sailing ships running the easting down to Australia during the early gold rush, this question has been discussed by the masters of ships sailing to the ports of Australasia round the Cape of Good Hope.

The information above referred to should be of assistance to the captains of ships in deciding the most favourable latitude in which to make their easting.

With regard to the ice charts of the Southern Hemisphere it should be remembered that the lines indicating the extreme limit of

all ice are drawn through the most northerly positions in which ice has been reported ever since the year 1772.

In some longitudes it may be that the chances of encountering icebergs as far north as these lines are remote; on the other hand in some longitudes, the probability of encountering ice anywhere south of these lines may be "very likely".

The density of bergs reported between 1902 and 1932 as shown by symbols on the charts, in the different zones gives some indication of the probability, but it must be remembered that of recent years there has been less shipping using higher latitudes than at the height of the clipper ship era.

All we can say is, that ice has been seen as far north as these lines in the different seasons of the year, and it may be there again.

For economic reasons connected with the rates of exchange during the last two years, a number of shipowners have sent their ships out round the Cape of Good Hope to Australia or New Zealand, which they have formerly sent out through the Suez or Panama Canals. In making this passage, some Captains have passed at considerable distance to the westward of the Cape, hoping to gain by avoiding the adverse current, and being helped more by an easterly set.

We should welcome the views of the captains of observing ships who have had experience in navigating the routes between the Cape of Good Hope and the ports of Australia and New Zealand, as to the best route, having regard to their own experience, and the collective experience of the British Merchant Navy, of winds currents and ice, as summarized in THE MARINE OBSERVER, with a view to publication in this journal.

THE OBSERVATION OF CURRENT.

A word to the navigating officers.

From time to time scraps of conversation which the Captain may not intend to hear, or wish to hear, and even less so the Marine Superintendent of the Meteorological Office, penetrate right through the bulkhead of the cabin, and of the walls of the Marine Division of the Meteorological Office.

There are some who, receiving the routine reports of "Selected Ships", have thrown doubt on the set and drift of the current said

to be found at some distance from their own ship, because there was a considerable difference indicated between the currents the two ships were in.

Remember, as the enormous amount of evidence published during the last 10 years in the current charts of THE MARINE OBSERVER indicates, that different currents may be close together, and lines of demarcation may vary. The set and drift may vary from day to day, sometimes when the wind is steady, as well as with the seasons.

Generally, fixing has wonderfully improved in accuracy during the last twenty years or so, for the proper use of position lines obtained by sights of stars, sun, and moon are more generally understood; and no ship need be in doubt of her chronometers with the wireless time signals which reach to all parts of the oceans.

Steering has improved, and the means for keeping the Dead Reckoning are more accurate.

By navigating skilfully and using information of the set and drift of the current, whether obtained in our own ship or received by wireless from other ships, with proper seamanlike prudence, we shall all benefit.

If there is reason to doubt the set and drift calculated between observed and D.R. positions, it should not be entered in the meteorological log or record nor reported to other ships by wireless.

THE DISPOSITION OF THE OBSERVING FLEET.

To-day, July 22nd, the number of British observing ships and the oceans which they traverse is shown in the following table:—

Oceanic Distribution of Voluntary Observing Fleet.

July 22nd 1933.

Ocean.	Form 911.	M.L.	Total Observing Ships.	Selected Ships.
Home Waters ..	10	2	12	1
North Atlantic ...	60	5	65	58
South Atlantic ...	42	0	42	40
North Indian ...	72	0	72	61
South Indian ...	69	1	70	63
North Pacific ...	14	22	36	32
South Pacific ...	26	18	44	41
Arctic ...	5	0	5	3
Antarctic ...	—	—	—	—
Stationary Training Ships and Stations.	—	—	5	—
Totals ...	298	48	351	299

The chart of the world below indicates the number of observing ships doing all branches of **The Work** on the different trade routes.

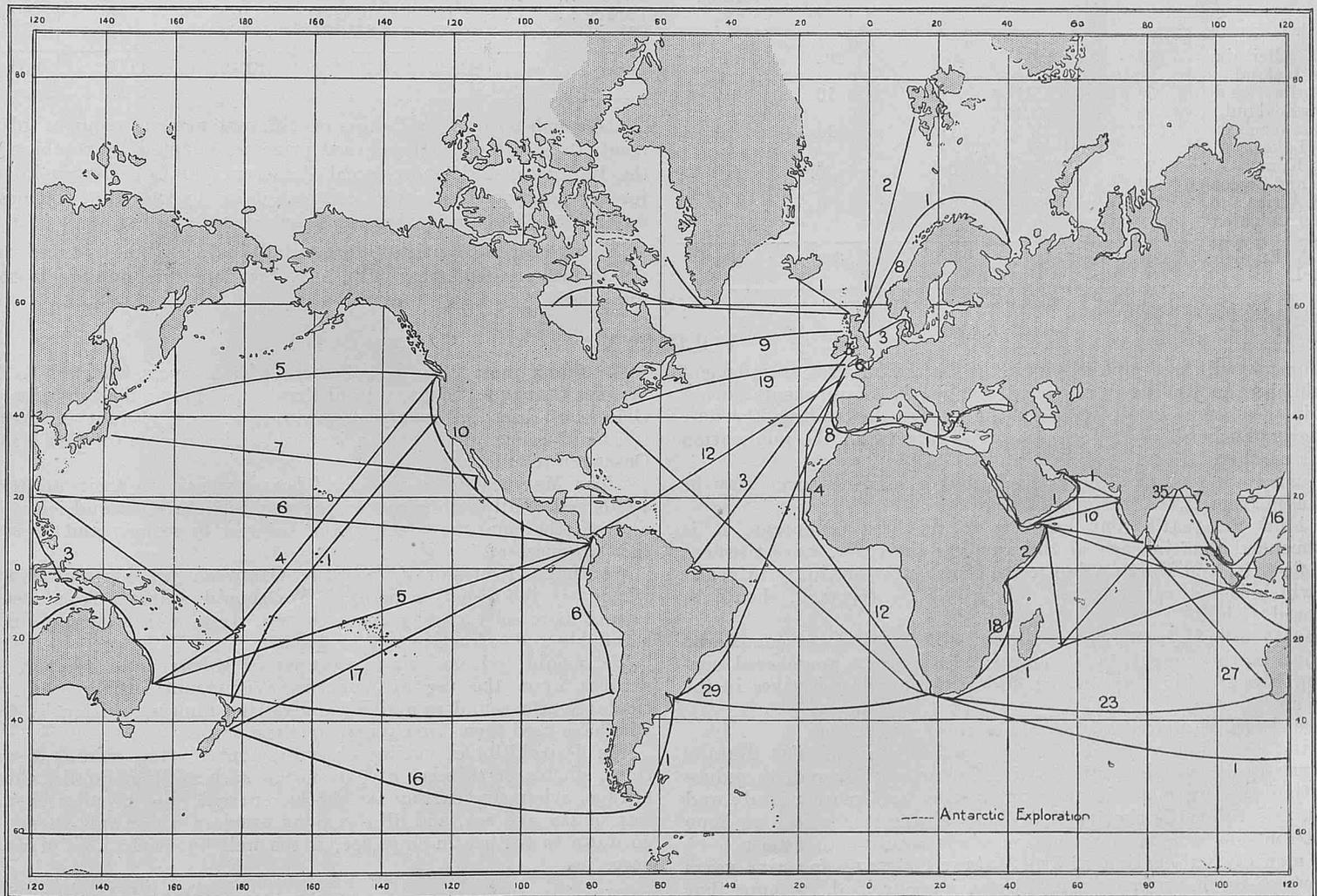
These numbers are approximate, and it should be understood that observing ships shown as traversing one ocean may also traverse other oceans, and that the majority of observing ships commence and end their voyages from ports in Great Britain.

About 35 per cent. of observing ships are at sea at any time.

Great credit is due to the officers of the British Merchant Navy for their good sense and loyal co-operation in not only acting as voluntary marine observers where desired, but also in foregoing participation in the routine work when their ships which have acted as observing ships are upon routes where their regular voluntary service is for the time being not required.

I have just returned from inspecting the Port Meteorological Offices, and visiting the Merchant Navy Agencies round the British coasts, and the Wireless Receiving station at Highbridge, Somerset, **GKU.**, and it gives great pleasure to record here that the whole system has never been in better order. Much credit is due to the Port Meteorological Officers and Merchant Navy Agents for their able assistance in keeping the Voluntary Corps of Marine Observers intact during what has been a time of great hardship to British shipping and seamen.

Chart of the World indicating the Number of British Observing Ships using the different Trade Routes.



Total 346 British Observing Ships indicated on Ocean Routes and in Home Waters.

WORLD TONNAGE AND MARINE METEOROLOGY.

Lloyd's Register of Shipping for 1933 to 1934 has just been published. It shows that the world tonnage of steam, motor and sailing vessels of 100 tons and upwards, was on July 1st, 1933, 67,920,185 tons gross, being 2,210,855 tons less than two years ago, and 1,814,125 tons less than one year ago.

It is necessary to revise the Table of merchant tonnage of steam and motor vessels of 100 tons and upwards, which appeared in the January, 1933, number, with the scheme for working "Selected Ships".

During the last year Great Britain's proportion of the world tonnage has been reduced by about seven thousandths. Germany's, Holland's and Italy's proportions of the world tonnage have been reduced by about two thousandths each; and Belgium's and Chile's proportions have also been reduced by about one thousandth each.

The countries whose tonnage has become proportionately increased are Russia and Panama, each by three thousandths; the United States, Finland and Japan, each by two thousandths; and Hong Kong, Brazil and Norway by one thousandth.

Total Merchant Tonnage approximate (Steam and Motor) of the World

(Vessels over 100 tons, Lloyd's Register Book, 1933-34)

and Number of Selected Ships reported for making W.T. Weather Reports, in all Oceans, World Wide.

Country.	Steamers and Motor Vessels.		Percentage of World Tonnage.	Number of "Selected Ships" required.	Number of Ships fitted for C.W. Long Wave Transmission (July 1933).
	Number.	Gross Tons.			
Great Britain and Ireland.	7,328	18,592,204	29.2	292	170
Australia and New Zealand.	556	637,757	1.0	10	0
Canada (excluding Lakes).	633	895,255	1.4	14	21
Hong Kong ...	122	303,375	0.5	5	6
India and Ceylon	153	187,142	0.3	3	1
South Africa and Other Colonies*	549	523,457	0.8	8	3
British Empire Total.	9,341	21,139,190	33.2	332	201

* Including Dominion of Newfoundland.

Country.	Steamers and Motor Vessels.		Percentage of World Tonnage.	Number of "Selected Ships" required.	Number of Ships fitted for C.W. Long Wave Transmission (July, 1933).
	Number.	Gross Tons.			
British Empire Total.	9,341	21,139,190	33.2	332	201
America (United States)(excluding Lakes).	2,763	10,186,112	16.0	160	568
Argentina ...	305	318,191	0.5	5	1
Belgium ...	211	454,784	0.7	7	9
Brazil ...	295	488,888	0.8	8	10
Chile ...	99	151,527	0.2	2	3
China ...	257	399,588	0.6	6	0
Danzig ...	42	255,635	0.4	4	0
Denmark ...	705	1,160,233	1.8	18	30
Finland...	278	351,250	0.6	6	0
France ...	1,511	3,469,538	5.4	54	24
Germany ...	2,071	3,887,987	6.1	61	44
Greece ...	537	1,417,071	2.2	22	0
Holland ...	1,392	2,758,812	4.3	43	25
Italy ...	1,052	3,092,772	4.9	49	75
Japan ...	2,019	4,258,159	6.7	67	232
Jugo-Slavia ...	180	374,467	0.6	6	0
Latvia ...	108	196,733	0.3	3	0
Norway ...	1,965	4,078,133	6.4	64	15
Panama ...	83	287,033	0.5	5	13
Portugal ...	177	242,876	0.4	4	14
Russia (Soviet Union).	441	840,261	1.3	13	12
Spain ...	800	1,217,968	1.9	19	16
Sweden ...	1,339	1,658,148	2.6	26	3
Turkey ...	187	188,461	0.3	3	0
Other Countries	661	843,772	1.3	13	5
Total ...	28,819	63,717,589	100.0	1,000	1,300

The number of selected ships of different nations requires adjustment, to accord with the agreed principle adopted by resolution at the International Meteorological Conference at Copenhagen in 1929, for carrying out the service contracted for by maritime nations in Article 35 of the Convention for Safety of Life at Sea.

The number of British "Selected Ships" will be reduced from 299 to 292 on September 27th, 1933 the date this number is to be published.

VOLUME X.

Volume X will be completed when the December, 1933, Supplement is published on November 29th next, but as the Supplements do not contain permanent information for the purpose of binding, the four quarterly numbers may be conveniently bound after the publication of this number.

As usual we remind all concerned that a binding cover may be purchased from H.M. Stationery Office.

To bind the year's four numbers to the best advantage, it is recommended that in each of the numbers the cover, advertisement page, fleet list and North Atlantic Ice Chart, all containing information which is not permanent or which may be repeated, should be dispensed with.

When these have been removed, there will remain pages numbered in sequence throughout each number, also pages unnumbered containing lithographic charts which follow the numbered pages in the quarterly numbers.

These should be placed in the volume cover and bound.

During this first year of quarterly publication of THE MARINE OBSERVER we have endeavoured to freshen up our journal, to reduce repetition, and to make it more interesting and more useful; and though this volume is shorter than those of previous years, we hope that it contains as much information which is useful to seamen.

The monthly publication of THE MARINE OBSERVER for nine years had become too heavy a task, and by easing our load, we hope that we have been able to do fuller justice to the Corps of Voluntary Marine Observers.

We thank most heartily all those who have contributed to THE MARINE OBSERVER. Our grateful thanks are due to the Captains and Officers of ships, without whose voluntary work of routine observations and written descriptions, it would be impossible for THE MARINE OBSERVER to exist as it is.

"The Marine Observer's Log" bears witness to their ability to write well of all matters concerning weather, currents, and ice at sea, and of other matters which are of interest to seamen and of which they are masters.

We thank Professor J. STANLEY GARDINER for his contribution which has interested so many. We should welcome from men of science more such articles about the sea, written in a simple, understandable and attractive way to seamen.

We should welcome more accounts of salvage and rescues, and articles upon the use of modern navigational instruments, particularly echo-sounders and W/T direction finders, written by those who have used them for navigating their ships.

The desirability of marine observers contributing careful descriptions, photos or sketches of phenomena such as line squalls, clouds, mirage, submarine earthquake shocks, current rips, peculiar colouration of sky and sea, and all the many wonders which only those who go down to the sea in ships see, is too well known to need stressing here.

MARINE SUPERINTENDENT.

London,

July 22nd, 1933.



October, November and December.

It is hoped that these pages will be filled each quarter 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.

SHIP "L'AVENIR".

THE accompanying photographs and remarks have been received with the Meteorological Record of S.S. *Port Caroline*, Captain G. W. HEARN, London to Melbourne, observer Mr. L. E. CRAVEN, 3rd officer.

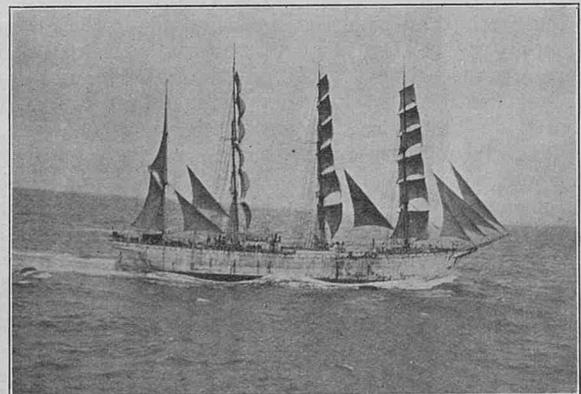
little controversy among the older members of the ship's company. On each of her royals she carried a different coat-of-arms, as can be seen in the photographs, which, I am told, are the Belgian Coat-of-Arms she used to carry as a training ship.



In the August issue of THE MARINE OBSERVER for this year you reproduce photographs of the four-masted barque *L'Avenir*, as a Belgian Training Ship, so I thought it might interest readers to know that she is now sailing under Captain GUSTAV ERIKSON'S flag, and is engaged in the Australian Wheat Trade. I cannot find out the date when she was sold, but fancy that she is now on her maiden voyage.

The accompanying photographs were taken by me at 6.30 a.m. on December 15th, 1932, in Latitude 45° 06' S., Longitude 95° 47' E., at which time we overhauled *L'Avenir* bound from the Baltic to S. Australia in ballast, doing 11 knots, with a strong breeze, fine on the starboard quarter. Having picked her up at 3.30 a.m. and judged her to be nine miles distant, it took us 3 hours to draw abreast of her. We were doing 14½ knots at the time.

Although it was a dull sunless morning, she was a beautiful and rare sight, and I noted that she still carried her triangular courses; the same bringing forth a great deal of comment and causing no

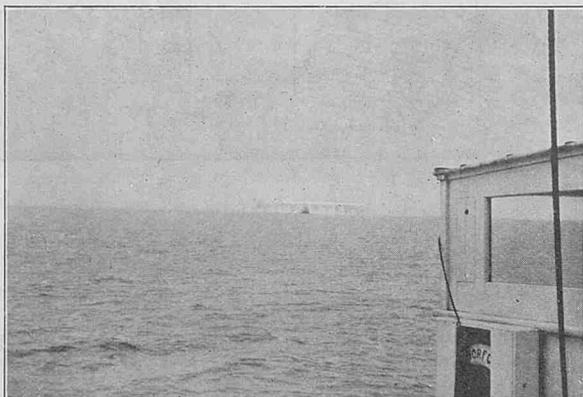


PHOTOGRAPH OF ICEBERG.

Southern Ocean.

THE accompanying photograph has been received from S.S. *Norfolk*, Captain R. L. H. McNISH, D.S.O., Wellington to Cape Horn, and was taken by Mr. G. E. MASON.

The berg was sighted on 8th December, 1932, in Latitude $59^{\circ} 00' S.$, Longitude $131^{\circ} 00' W.$ The dimensions of the berg were 2,500 feet long and 200 feet high (sextant angles), and it was tabular with a large cave-like hole in its side of about 100 feet in diameter.



TIDE RIP.

New Zealand Waters.

THE following is an extract from the Meteorological Log of M.V. *Port Fremantle*, Captain W. GILLING, London to Lyttleton, N.Z., observer Mr. C. J. GORLEY, 4th officer.

11th November 1932, 10.18 a.m. A.T.S., passed through strong tide rip stretching in an E. by S. and W. by N. direction. To northward of rip sea was light green in colour and very confused but to southward of rip the sea was dark blue in colour and only slightly confused. Large masses of weed were observed while passing through rip. Vessel was steering very well until passing through rip when ship's head swung to 200° ; 25° of starboard helm was required to bring her back to the course 196° . Temperature of water fell from 63° to 58° just after vessel passed through rip. Weather at time of observation was light S.S.E. breeze, slight sea and moderate S'y swell. Position of ship: Latitude $33^{\circ} 59' S.$ Longitude $172^{\circ} 37' E.$ 30 miles north of Cape Maria Van Diemen, course 196° speed reduced 8 knots.

PHOSPHORESCENT BEAMS.

Andaman Sea.

THE following is an extract from the Meteorological Record of S.S. *Karapara*, Captain R. W. WHITE, Calcutta to Singapore via Rangoon and Penang, observer Mr. C. JACKMAN, 2nd officer.

October 5th 1932 at 2025 G.M.T. observed numerous phosphorescent particles in the water. At 2030 G.M.T. phosphorescent particles gradually increasing and beams of light first made their appearance. The beams appeared to revolve about an axis, were well-defined and moved in quick succession. The position of the axis was never permanent but continually changing. When first observed, it was about a point on the starboard bow and slowly changed until it appeared right abeam when it apparently changed again, assuming a position about a point before the beam. The beams reached their greatest intensity at 2035 G.M.T. and lasted about five minutes, when they faded away and at 2045 G.M.T. were no longer visible. The intensity at the peak was greater than that observed last voyage in practically the same position. (See July 1933 MARINE OBSERVER page 86.) The spacing between the beams and also the timing were very uniform and regular. Weather at the time was light airs, calm sea, no swell. Sky was partly cloudy with cumulus. Air temperature $83^{\circ} F.$ Sea temperature $83^{\circ} F.$ At 2105 no more phosphorescence was visible in the water.

Position of ship—Latitude $14^{\circ} 38' N.$ Longitude $96^{\circ} 30' E.$

Ship steaming $11\frac{1}{2}$ knots on a 169° course.

December 29th 1932 at 1804 experienced the same phenomenon as reported above, in Latitude $14^{\circ} 31' N.$ Longitude $96^{\circ} 40' E.$ the positions being approximately identical. This phenomenon lasted about ten minutes longer and at the height it appeared that the ship was at the meeting point of converging beams of light, the centres of which were a little on either bow. In all, from commencement of phosphorescence in water until its final disappearance the phenomenon lasted 26 minutes.

PHOSPHORESCENCE.

South African Waters.

THE following is an extract from the Meteorological Record of S.S. *Hurunui*, Captain F. C. PRETTY, D.S.C., Durban to London, observer Mr. T. FARRAR, 3rd officer.

22nd October 1932, at 10.30 p.m. A.T.S. 2030 G.M.T., the first appearance of phosphorescence was noticed about four points on the starboard bow, and looked like a flashing light, then the same appeared ahead and on port bow. Fourteen minutes later the patches became more frequent and larger, and from 11.00 p.m. to 11.30 p.m. the sea was completely covered with phosphorescence. Very frequently exceptional bright flashes were observed due to the heavy rollers of the easterly swell breaking. The ship's side was also well lit from the breaking of the low wave.

The sky throughout was cloudy, cumulo-nimbus 4/10, all to the westward, and the dark clouds with the brilliance of the sea reduced the visibility to about three miles. A passing steamer which was just under three miles off when abeam, was not seen until two points before the beam.

Position of ship: Latitude $34^{\circ} 30' S.$ Longitude $24^{\circ} 04' E.$ Steering S. $82^{\circ} W.$ True.

LOCUSTS.

West Coast of Africa.

THE following is an extract from the Meteorological Record of M.V. *Carnarvon Castle*, Captain J. H. KERBEY, Cape Town to Southampton, observer Mr. G. PETTITT, 4th officer.

October 18th 1932, 7 p.m. A.T.S., in Latitude $23^{\circ} 55' N.$ Longitude $17^{\circ} 10' W.$ swarms of locusts commenced to arrive on board with a fresh E.N.E. breeze. The next morning some thousands of these insects were discovered about the decks, evidently driven off from the coast somewhere North of Cape Blanco.

Captain KERBEY remarks:—"I have never before experienced this in the 37 years I have been travelling on this route."

THE following is an extract from the Meteorological Record of S.S. *Windsor Castle*, Captain E. F. GILBERT, Southampton to Cape Town, observer Mr. W. S. BYLES, 4th officer.

October 19th-20th 1932, many locusts of the red species were blown on the ship during the night.

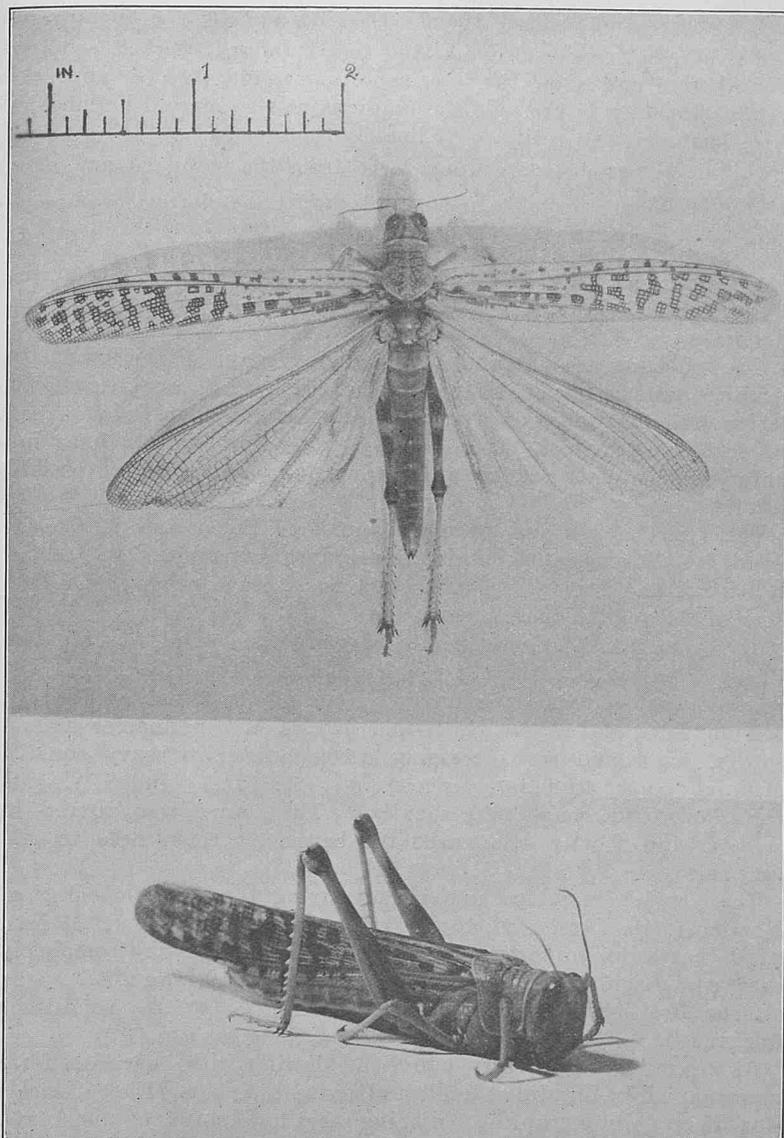
Position of ship at 1800 G.M.T. 19th Latitude $24^{\circ} 45' N.$ Longitude $17^{\circ} 43' W.$

THE following remarks and photograph were received with the Meteorological Record of S.S. *Arlanza*, Captain G. F. HUFF, Southampton to River Plate, observer Mr. B. A. GAMMON, 2nd officer.

October 28th 1932, at dawn in Latitude $24^{\circ} 35' N.$ Longitude $19^{\circ} 16' W.$ course 215° , 15.8 knots, wind N.E. by E. force 4, a swarm of several hundred locusts appeared on board. The coast of Africa between Cape Juby and Cape Bojador distant 320 miles approximately.

NOTE.—Locusts were reported in this vicinity on 14th June, 1931, by M.V. *Upwey Grange*. See page 116, Volume IX.

In countries which are subject to invasion by locusts from neighbouring lands, such for instance as Egypt, where they have been known to come from Palestine and the Hedjaz, and may have come from as far away as Persia, traversing the Persian Gulf and Red



Sea, early information may be of great help to the authorities responsible for advising agriculture.

When locusts are seen at sea, Selected Ships may add to their useful service by adding the information to the next weather report which they send to the shore.

CURRENT DETECTION BY ENGINE REVOLUTIONS AND TEMPERATURE.

THE following is an extract from the Meteorological Record of S.S. *Duchess of York*, Commander R. N. STUART, V.C., D.S.O., R.D., R.N.R., Montreal to Liverpool, observer Mr. D. PARSONS, 4th officer.

An unusual method of current detection was successfully used this voyage as follows:—December 3rd, 1932. At 8 a.m. at ship in Latitude $48^{\circ} 40' N.$, Longitude $47^{\circ} 57' W.$, the surface water temperature rose 7° to 43° . At noon, ship's time, the average revolutions of the engines had also increased and water temperature 25 feet below sea surface risen from 38° to 45° indicating the presence of a warm and favourable current. This was found to be the case by observations on the 4th December, the ship having made an excellent run with unusually low slip per cent. All indications of the presence of the current remained till noon on the 4th December, when they disappeared.

The water temperature, both on the surface and 25 feet below, ranged from 53° — 57° . The surface temperature gradually decreased from 8 a.m., 4th December, till it reached 48° at noon, while the temperature 25 feet below the surface fell comparatively quickly 11° to 46° at noon. The engine revolutions also declined to normal at

noon, all indicative that the ship had run out of the current about this time.

Observations showed that the ship's mean course of 066° had been maintained and her progress unusually good. It is estimated then that the set was 066° at a rate of 0.7 of a knot, making a total drift of 16 miles. Noon position on 3rd December, Latitude $49^{\circ} 20' N.$, Longitude $46^{\circ} 26' W.$ Noon position on 4th December, Latitude $52^{\circ} 17' N.$, Longitude $36^{\circ} 03' W.$

The wind was light throughout the day, being W.N.W. During the afternoon of the 3rd December it backed to S. at 8 p.m. and remained so, at an average force of 2. Sea and swell were slight. Ideal conditions for detecting the presence of a current.

EXTREMELY LOW BAROMETRIC PRESSURES RECENTLY RECORDED AT SEA.

THE following extract is taken from the Meteorological Log of the R.R.S. *Discovery*, Commander W. M. CAREY, R.N. (Ret.), Observing Officer Sub.-Lieut. R. A. B. ARDLEY, R.N.R.

On October 28th, 29th and 30th, 1932, in the Bellingshausen Sea very low barometer readings were recorded. During the two preceding days the glass had been unsteadily falling. On the 28th at 2000 in Latitude $64^{\circ} 20' S.$, Longitude $80^{\circ} 06' W.$, the reading was 966.7 mb. (28.55 in.) with a fresh W.N.W. gale and fine clear weather. In the next 24 hours the glass fell steadily, the wind first moderating and then veering slowly through N. to N.E., the weather becoming overcast with light snow.

On the 29th at 2200 the reading was 934.8 mb. (27.61 in.) at which point the needles of the two aneroid barometers in the ship left the graduations. The barograph pen had already dropped clear of the drum. On the 30th at 0300 in Latitude $67^{\circ} 04' S.$, Longitude $80^{\circ} 00' W.$, the glass steadied at 927.7 mb. (27.40 in.) with a light variable northerly breeze. The glass remained perfectly steady at this reading until 0425 when it suddenly commenced to rise while at the same time the wind after a few preliminary gusts came away suddenly from W. by S., force 9, with driving fine snow. During the next 12 hours the glass continued to rise at a steady rate of 3 mb. an hour. During the forenoon the wind blew steadily at force 10 with squalls of 70 m.p.h. The anemometer became choked with snow and these forces may have been exceeded. Afternoon the weather moderated and fined and at 1800 in Latitude $60^{\circ} 44' S.$, Longitude $78^{\circ} 43' W.$, the barometer steadied at 962.2 mb. (28.41 in.), the wind having by this time fallen light.

No unusual weather or cloud conditions were remarked during this period. The ship was in drift ice and light pack from noon on the 29th.

Times given are Ship's Time Place. All barometer readings are corrected.

THE following extract is taken from the Meteorological Log of the S.S. *Somerset*, Captain C. R. PILCHER, Observing Officer Mr. J. N. A. Low, on passage from Wellington to Montevideo.

April 24th, 1933. At 8 a.m. when in Latitude $54^{\circ} 39' S.$, Longitude $148^{\circ} 36' W.$, the barometer was 995 mb. (29.38 in.), wind N.W., force 6. Pressure then commenced falling slowly and at 8 a.m. on the following day when in Latitude $54^{\circ} 42' S.$, Longitude $140^{\circ} 07' W.$, was 990 mb. (29.24 in.), the wind having fallen light from N.W. Light N.W'ly breezes continued but the barometer fell at an increasing rate, sky overcast, light rain and mist. At midnight on April 25th pressure was 976 mb. (28.82 in.) and the wind commenced to freshen.

Throughout the 26th the glass continued to fall and at 4 p.m. was 929 mb. (27.43 in.), the wind blowing a whole gale from the N.W. with rain and mist. The ship at this time was steering 091° , speed 11.5 knots. At 4.45 p.m. in Latitude $54^{\circ} 52' S.$, Longitude $128^{\circ} 36' W.$, pressure was 925.0 mb. (27.32 in.). The glass then commenced rising rapidly and a few minutes later the wind backed quickly to S.W., force 8, but again increased steadily in force and at midnight it was force 10, pressure 938 mb. (27.70 in.). The sky was overcast with nimbus and fracto-nimbus clouds, frequent heavy squalls of hail and sleet.

Throughout the 27th the barometer rose steadily but the wind gradually increased to noon when it reached hurricane force with violent gusts and squalls. Visibility was barely half a mile at this time due to spindrift whipped up from the wave tops. There was a precipitous sea and a very heavy long S.W'ly swell, the ship frequently shipped seas aft despite the alteration of course and speed to the best advantage. After noon the wind gradually decreased in force.

The following report was received from S.S. *Lepanto*, Commander J. C. WILLIAMS, R.N.R., compiled by Mr. C. M. COLBECK, officer.

Lepanto left Aberdeen December 26th 1932 bound Halifax on the seasonal lane route north about. Moderate gales were encountered during the earlier part of the passage, but on January 1st 1933 the barometer which had risen to 29.13 in. at 0400 commenced to fall, the wind which had previously been rather variable W.N.W. to W.S.W. force 5-3 came out S.S.W.5. The sky became heavily overcast, with heavy squalls of snow and hail. At 0800 the barometer stood at 28.97 in. steadily falling, in a D.R. position Lat. 54° 58' N., Long. 31° 40' W. At 1600 the barometer had fallen to 27.97 in., wind S.W. by W. with a very high sea and swell, not entirely accounted for by the force of wind blowing. Conditions grew rapidly worse and at 2000 hours with the barometer 27.81 in., wind W. by S.9. The ship became unmanageable and was hove to with the wind on the starboard bow. This was accomplished with leaving the helm half-a-starboard and although *Lepanto* rolled excessively she did not ship any very heavy seas. By 2230 the wind appeared to have hauled a little and was blowing force 12 with gusts of extraordinary severity, the barometer having fallen to 27.46 in. The sky was heavily overcast with a very low visibility caused by the continuous driving sleet. The barometer fell less rapidly after 0000 January 2nd and the lowest was reached at 0530, 27.43 in. with wind N.W. by W.12. Soon after the shift of wind at 0530 No. 2 hatch was stove in by a sea and *Lepanto* was allowed to fall off a little to repair it. The barometer commenced now to rise rapidly with the wind veering slightly but not lessening in force. At 1200 barometer 28 in. with the wind N.W. and easing a little. The position was then estimated to be Lat. 53° 59' N., Long. 31° 55' W. The barometer continued to rise slowly and steadily. The wind N.W.8 remained steady in direction but with some lulls. The sky was still overcast with driving snow and a very heavy confused breaking sea forced *Lepanto* to remain hove to. At 2000, barometer 28.59 in., conditions tended to improve slightly but it was not until 1500 on January 3rd in Lat. 52° 10' N., Long. 32° 24' W.

Barometer 29.09 in., Wind W.N.W. 6, that *Lepanto* was able to return to her course and proceed, the sky clearing at 1210.

The barometer was aneroid, and one standard checked in New York before and after the hurricane and found to have an error -.11 in. and during the gale the readings at the aneroid barometers were compared and read approximately the same.

The above barometer readings were from the standard and have been corrected.

West Indian Hurricane.

The following extract is taken from the Meteorological Log of the S.S. *Phemius*, Captain D. L. C. EVANS, Observing Officer Mr. H. NICHOLAS.

The following account and accompanying graph of the barometer readings during the hurricane experienced by the vessel November 5th to 10th 1932 while on a voyage from Savannah to Colon will I am sure be of interest. The M/O logs being kept at that time were unfortunately destroyed by water when the chartroom was washed out.

The vessel was bound from Savannah to Colon and up to the evening of November 4th nothing unusual was experienced in weather or barometer. The barometer showed the average pressure for that time of the year in those parts.

At 8 a.m. (A.T.S.) on the 4th November the wind was blowing strong from the N.E. with a rough sea and heavy S.E. swell. The weather was overcast and showery. Noon on the same day the ship was in Latitude 17° 03' N., Long. 75° 44' W., barometer falling slowly, wind and sea increasing accompanied by heavy squalls. Midnight on the 4th barometer 1000.3 mb. (29.54 in.), wind N.W., gale force, overcast, rough sea, squally. The course was altered to W.S.W. and shortly afterwards the barometer commenced to rise very slowly.

The weather remained unchanged during the early morning of November 5th. At 9 a.m. the barometer was 1000.7 mb. (29.55 in.), wind increasing in force, blowing from the N.W. Sky completely overcast. High sea and heavy rain squalls. Vessel hove to.

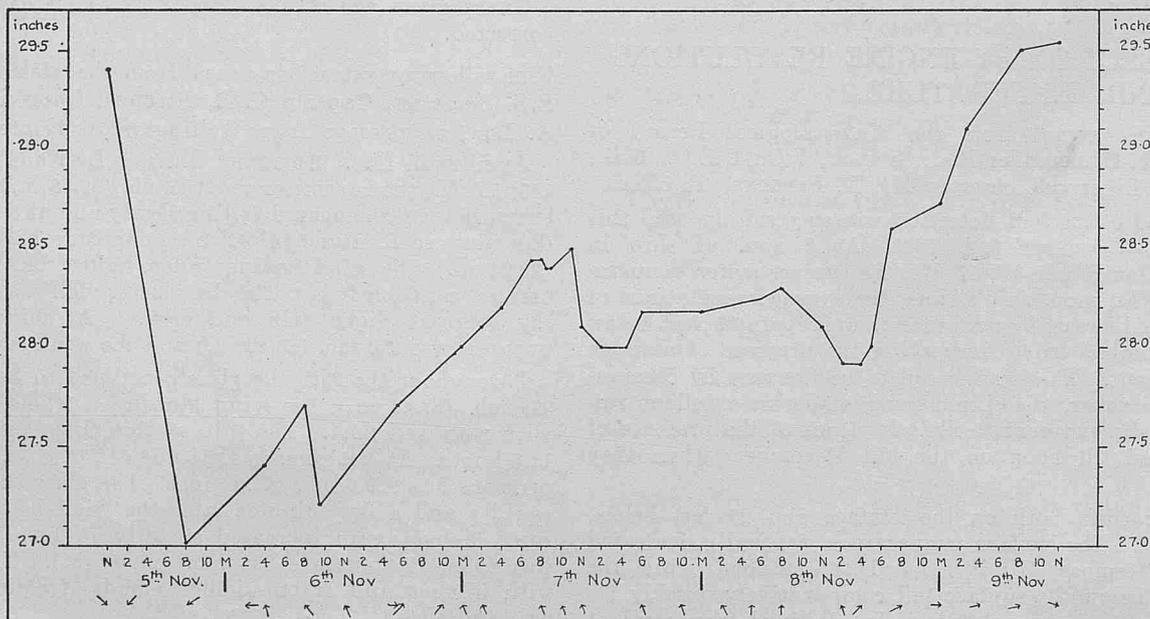
Noon Position, November 5th, 13° 57' N., 78° 40' W., conditions unchanged.

At 2 p.m. the wind shifted to N.E. blowing with hurricane force accompanied by blinding squalls and a very high sea. The barometer was then falling rapidly reaching the low point of 914.6 mb. (27.01 in.) by 8 p.m. A fierce hurricane was blowing and a very high sea running. The ship was enveloped in spindrift, reducing the

5th to 9th November, 1932.

Corrected readings during Hurricane in Caribbean Sea.

M.O. Barometer 804/31.



visibility to Nil, the No. 1 hatch not being visible from the bridge. The vessel was rolling heavily, the helm being of little use. So great was the force of the wind that shortly before 8 p.m. the funnel was blown overboard. The ship was rendered helpless and from then on was carried with the hurricane in an unmanageable state. It would not be overestimating to put the wind force at 200 m.p.h. Hatches were blown overboard like matchwood, derricks and lifeboats wrecked, upper and lower bridges blown in.

The weather conditions remained unchanged throughout the night. At 2 a.m. on November 6th there was a temporary lull wind being E. force 4. The sea was high and confused. This lasted about one hour, when the wind shifted to S.S.E. and blew with renewed vigour.

At 4 a.m. barometer 927.9 mb. (27.40 in.), wind S.S.E. force 12. Precipitous sea. The ship lay heading S.W. labouring heavily and rolling through an arc of 70°.

8 a.m. barometer 938.0 mb. (27.70 in.), wind S.E. 12. Conditions remained unchanged. Shortly after 8 a.m. the barometer commenced to fall and at 9.30 a.m. was reading 921.1 mb. the wind remaining steady in force and direction.

At noon on the 6th November the wind had decreased to storm force. The sea still running very high. A heavy confused swell was also to be seen.

4 p.m. the same day a lull occurred. The sea was confused and the wind variable in direction force 4. Sky completely overcast, visibility about half a mile.

During this period the ship was besieged by hundreds of birds, the majority being of the swallow type with a sprinkling of larger birds about the size of a seagull. They took refuge in every part of the ship but lived only a few hours.

At 5.30 p.m. the wind blew from the west with increasing force, barometer 938.3 mb. (27.71 in.).

By 6 p.m. it was again hurricane force blowing from S.W.

Shortly after 6 p.m. the barometer began to rise reaching 948.2 mb. (28.00 in.) at midnight, wind S.S.E. 12, very high sea and heavy rain squalls.

2 a.m. November 7th, Barometer 951.6 mb. (28.10 in.), rising wind S.S.E. 11, very high sea.

4 a.m. November 7th, Barometer 954.9 mb. (28.20 in.), conditions unchanged.

7 a.m. November 7th, Barometer 963.1 mb. (28.44 in.). Wind S. by E. increasing.

8 a.m. November 7th, Barometer 963.1 mb. (28.44 in.), conditions unchanged.

8.30 a.m. November 7th, Barometer 961.7 mb. (28.40 in.), falling wind S.S.E. 12. Very high sea, Vessel rolling dangerously heading E.N.E.

9 a.m. Barometer 961.7 mb. (28.40 in.), conditions unchanged.

11 a.m. 965.1 mb. (28.50 in.), wind S. by E. 11, rolling heavily in trough of sea.

By noon the barometer had again fallen. The reading being 951.6 mb. (28.10 in.), wind S.S.E., hurricane force. Precipitous sea. Shortly after noon the colour of the water was observed to change to a pale green and the seas began breaking dangerously over the ship fore and aft. Fuel oil was immediately used from the leeside fore and aft. Its effect was soon noticed and the seas were prevented from breaking on the vessel.

The barometer continued to fall till 2 p.m. It then showed 948.2 mb. (28.00 in.) and remained steady till 4.30 p.m. when a slight rise occurred.

6 p.m. Barometer 953.9 mb. (28.17 in.), wind S.S.E. 10. Very heavy rain squalls. High sea. Vessel riding well but rolling heavily.

During the night and early morning of November 8th conditions remained unchanged but the barometer was rising slowly.

8 a.m. November 8th, barometer 958.3 mb. (28.30 in.), wind south 10, very high sea.

10 a.m. November 8th, barometer falling, wind increasing in force but remaining steady in direction.

Noon November 8th, barometer 951.6 mb. (28.10 in.), wind south 12, mountainous sea and heavy confused swell.

At 2 p.m. a lull occurred, barometer 945.5 mb. (27.92 in.), wind S.S.E. 4, confused sea and swell.

Midnight November 9th, barometer 1005.1 mb. (29.68 in.), wind W. by N. 4, moderate rough sea. Confused swell.

4 a.m. November 10th. Moderate N.W. wind, moderate northerly swell. Cloudy, clear, barometer 1005.7 mb. (29.70 in.). Rolling heavily.

8 a.m. barometer 1008.1 mb. (29.77 in.), wind N.W. 4, sky clearing rapidly.

Noon November 10th, 29.78 in. Light breeze, moderate sea and swell, fine and clear weather.

Vessel taken in tow by salvage steamer.

The hurricane after leaving us continued its northerly direction, passing over and causing much damage to Grand Cayman island, finally blowing itself out over Cuba.

All the barometer readings contained herein are corrected readings of the Meteorological Office mercurial barometer.

NOTE.—Both barometric pressures observed by the *Discovery II* and *Somerset* are considerably lower than the lowest recorded extreme for high southern latitudes, namely 942.1 mb. (27.82 in.) given in "Some Recorded Extremes of Meteorological Elements" which was published in THE MARINE OBSERVER of January 1933, Vol. X. No. 109.

The *Somerset's* observation of 925.0 mb. (27.32 in.) is, to our knowledge, the lowest pressure that has yet been recorded in an extra-tropical cyclone in any part of the world, it being 0.5 mb. (.01 in.) lower than the previously recorded extreme of 925.5 mb. (27.33 in.) observed by R.M.S. *Tarifa* in the North Atlantic so long ago as 1870.

With regard to *Lepanto's* observation of 928.9 mb. (27.43 in.) on January 2nd 1933, it is interesting to note that she was then situated close to the centre of a deep depression which passed over Iceland on the following day when Reykjavik observed a pressure of 927.2 mb. (27.38 in.) which closely approximates that recorded by the *Tarifa* mentioned above.

It is a coincidence, that in addition to these low pressures experienced in extra-tropical cyclones we should have to record the very low value of 914.6 mb. (27.01 in.) reported by the *Phemius* in a West Indian Hurricane. This is 4.3 mb. (.13 in.) lower than the lowest verified barometer reading hitherto recorded in a tropical cyclone, namely that which passed over False Point, River Hooghly, on 19th September, 1885.

TYPHOON.

Japanese Waters.

THE following is an extract from the Meteorological Record of S.S. *Comorin*, Captain C. W. CARTWRIGHT, Kobe to Yokohama, observer Mr. R. E. TUCKER, 2nd officer.

The following conditions were experienced by S.S. *Comorin* during the typhoon which passed over Tokyo and Yokohama on the night of November 14th, 1932.

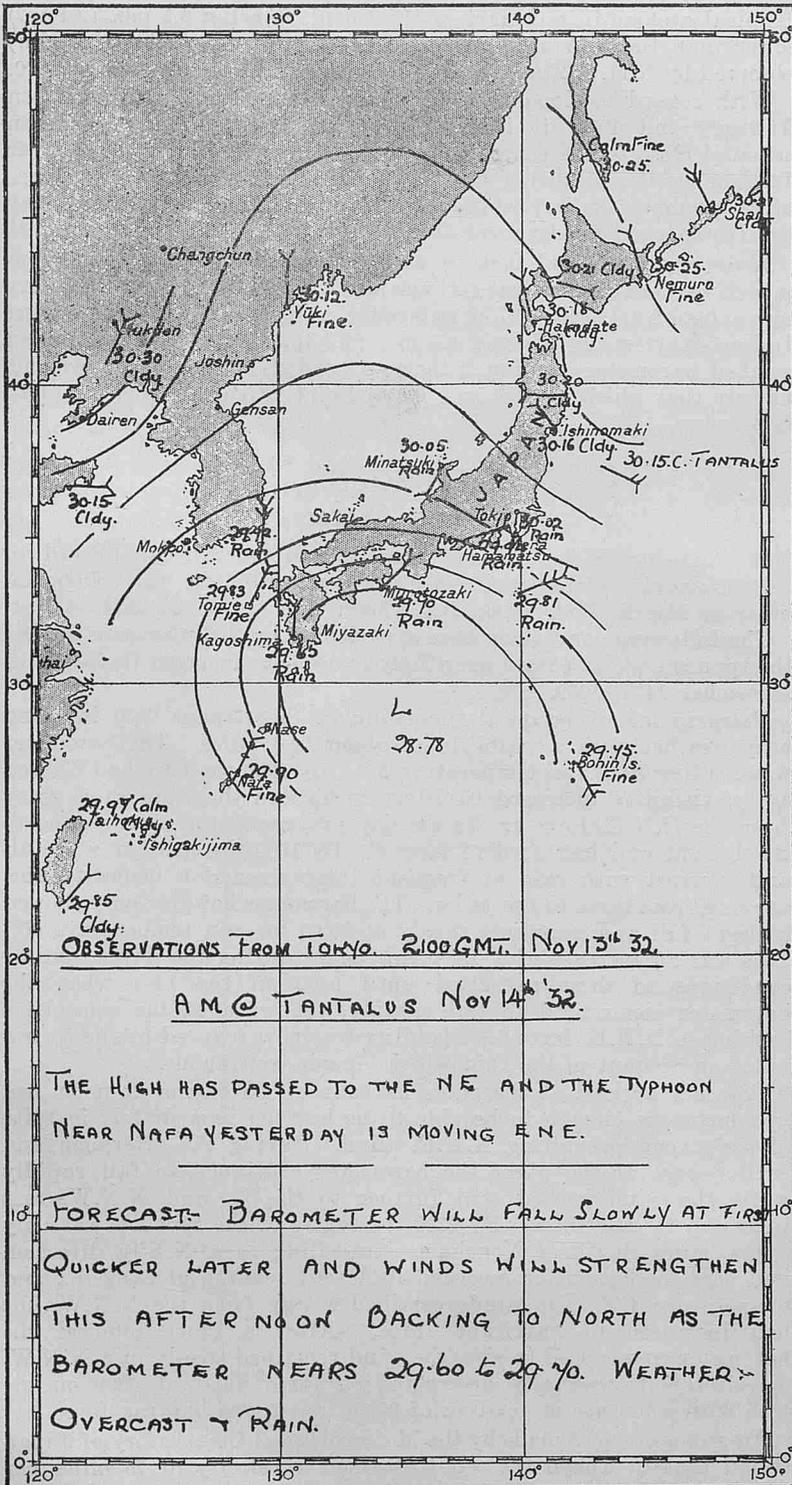
Comorin left Kobe on the morning of the 13th at 0830 in calm, hazy weather with a visibility of about two miles. The barometer was reading 30.08 in., temperature 52°. By 1000 the haze had cleared away, visibility increased to fifteen miles and the wind came away from the N.N.E. force 4. As the day progressed the wind veered to the E.N.E. and increased to force 6. By 1600 the weather was dull and overcast with rain at frequent intervals and a visibility now varying from three to five miles. The barometer however only showed a slight fall and remained steady at 30.00 in. and temperature 60°. This was an increase of 8° of temperature during the day. Similar conditions to these prevailed until 0800 on the 14th when the barometer commenced to fall rapidly, the wind at the same time backing to N.N.E. force 6. Visibility was now reduced to one to two miles on account of the rain which became continuous.

Comorin arrived at the outer harbour of Yokohama at noon and was fortunate enough to be able to be berthed immediately in spite of the strong prevailing N.N.E. wind. During the afternoon and earlier part of the night the barometer continued to fall rapidly while the wind backed still further to the N. and N.N.W. and increased to gale force. By 2330 the centre of the typhoon was only a few miles South of Yokohama, travelling in a N.E'ly direction and here the barometer recorded its lowest reading of 28.62 in., and temperature 49°. The wind remained steady from the N.N.W. but had increased to hurricane force. After a short interval the barometer commenced to rise, the wind remained steady in a N.N.W. direction but gradually decreasing in force until at 0800 on the 15th with a barometer reading of 29.16 in., it was blowing force 4.

An announcement made by the Meteorological Observatory of Japan stated that in Tokyo the wind attained a velocity of 75 miles per

hour and in Yokohama about 80 miles per hour. This typhoon originated in the Philippine Islands as a small depression, registering a little more than 29.53 in., passed through the Lu Chu islands and then swept away in a N.E. direction increasing in its intensity, touching Yokohama and Tokyo in its path, before passing out to sea again. The centre of this storm registered less than 28.35 in. It is stated that this is the severest typhoon that has been experienced during the out-of-typhoon season, as generally at this time a typhoon loses its strength as it approaches the Lu Chu islands, but this one gained in intensity as it approached Japan. When the storm was at its worst even the strongest buildings shook and the wind maintained a continuous howl throughout. The electric light and power lines went out in various sections of the city which added to the general confusion. Several deaths were reported and many people received minor injuries from the flying debris.

The following is an extract from the Meteorological Record of S.S. *Tantalus*, Captain C. F. MELLING, Vancouver to Yokohama, observer Mr. E. SAVILLE, 3rd officer.



On the morning of November 14th 1932, the barometer was steady at 30.12 in. with a freshening E. by S. wind and sky heavily overcast. The weather chart compiled from Tokyo list of observations for 2100 G.M.T. indicated that the deep depression of the 12th and 13th which later developed into a hurricane, had passed to the north and was moving quickly across the Pacific, and that the depression in Latitude 26° N., Longitude 132° E. was moving E.N.E., with an anticyclone over Japan. At noon 14th November in latitude 37° 18' N. longitude 143° 21' E., the barometer showed a decided tendency to fall, and at 1 p.m. commenced to fall rapidly with the wind steady at E. by S. force 6. At 2 p.m. the wind backed slightly to E. force 8 with heavy rain and the sea commenced to run high with a heavy confused swell. At 5 p.m. with the barometer at 29.64 in. and falling rapidly, wind E. force 9, *Tantalus* was hove to heading east. At 8 p.m. the rain ceased, the sky commenced to clear, and at 9 p.m. the wind backed to E.N.E. until 11 p.m. when it hauled back to E. At 2 a.m. 15th November the wind hauled to S.S.E. force 9 and we were of the opinion that the storm would pass to the north and that the barometer would soon commence to rise. Contrary to our opinion the barometer continued to fall rapidly and the heavy sea became cross and dangerous. At 8 a.m. 15th, with barometer 28.48 in., the wind backed to S.E. force 9, at 8.30 to E., and at 9.30 a.m. with lowest barometer 28.45 in. to N.W., falling to about force 6 until 10 a.m. when it increased to a whole gale, force 11 to 12, with a heavy dangerous cross sea. Immediately after the shift of wind to the N.W. the barometer commenced to rise rapidly and by 11 a.m. the sea commenced to run true from the N.W. or new wind direction, though there was a heavy confused swell. At 2 p.m. the wind commenced to decrease in violence but the sea continued to run high with a heavy confused swell and it was not until 8 p.m. that the sea and swell had subsided sufficiently to allow vessel to be put on her course, S. 44° W., with safety.

WATERSPOUT.

Red Sea.

The following is an extract from the Meteorological Record of s.s. *Thistleghen*, Captain G. A. WHITFIELD, O.B.E., Vizagapatam to Marseilles, observer Mr. G. L. HETHERINGTON, 2nd officer.



21st December, 1932, 10.15 a.m., A.T.S. observed a waterspout bearing N. by W., distance about 5 miles. The spout formed from a large Cumulo-Nimbus cloud, a funnel point of cloud descended slowly from its base, the sea beneath it became agitated and clouds of spray were lifted to about 25 feet, into which the funnel point slowly dipped. The spout which was about 1,000 feet high became very dark and

remained so for about eight minutes, then slowly returned to the cloud. As it disappeared two small spouts were observed bearing N.N.W. and W. by S., the latter one only partly forming and did not join the sea. The whole phenomenon lasted about 25 minutes. Weather at the time of observation, calm, smooth sea and very clear. Barometer 1016 mb., air 82°, sea 81°. Clouds Cu and Cu-Nb. Shortly afterwards the vessel passed under the bank of clouds and experienced a light rain shower and a moderate N'ly. wind. The wind remained so.

Position of ship, Latitude 17° 34' N., Longitude 40° 15' E.

AURORA.

North Atlantic Ocean.

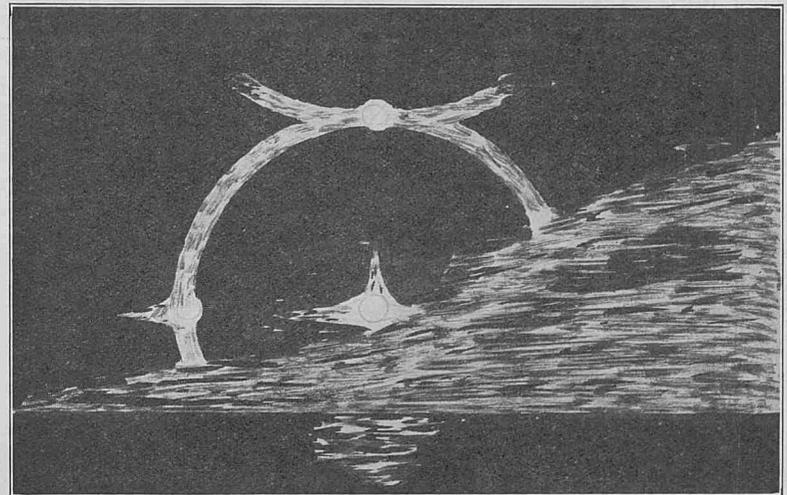
THE following is an extract from the Meteorological Record of s.s. *Minnewaska*, Captain F. H. CLARET, O.B.E., R.D., R.N.R., Halifax to London, observer Mr. E. PENGELLY.

October 20th, 1932, at 2030 G.M.T. (7.0 p.m. A.T.S.), observed Aurora Borealis. After sunset as darkness increased a diffused light was seen in the Northern sky and increased in strength until it culminated in a brilliant display of light between 7.00 and 7.30 p.m. at ship. The effect was accentuated by being seen against a heavy bank of cumulus clouds on the Northern horizon. Above this bank over an arc of about eight points of compass W. by N. to N. by E. was a bright band of diffused white light, reaching an altitude of 10°, from which emanated flickering shafts of light of varying brightness some of which were a beautiful pale green colour. At the height of the display a bright meteorite was seen bearing about W.N.W. travelling in a Northerly direction near to Arcturus. The Aurora faded with the rising of the Moon and the clouding over of the sky, being completely gone by about 8.30 p.m.

Position of ship, Latitude 50° 15' N., Longitude 26° 45' W.

LUNAR HALO. Mediterranean Sea.

THE accompanying report has been received from s.s. *Cerinthus*, Captain C. B. MUIR, U.K. to East African Ports, observer Mr. E. ALLEN, 2nd officer.



November 7th, 1932, 0010 G.M.T. (0045 ship's time), observed regular halo phenomena, a mock moon on the "horizontal circle," the "upper arc of contact" together with another mock moon at its point of junction with the halo. The halo was the normal one of 22½°. The moon was setting and was bearing 254° and had an altitude of about 6°. Part of the halo and probably the mock moon on the right-hand side were obscured by a bank of Alto-Stratus. At 0115 (ship's time) the Moon was observed setting below the Alto-Stratus clouds and showing a brilliant orange hue. The mock moons had by that time disappeared.

Weather conditions at the time:—Wind N.E., force 2. Fine and cloudy. Visibility very good. Clouds Ci/Ci-St/A-St. 5/10, Cirrus predominating. Slight N.E. sea, no swell.

ICE IN THE SOUTHERN HEMISPHERE.

PREPARED IN THE MARINE DIVISION BY COMMANDER J. HENNESSY, R.D., R.N.R.

Captain JAMES COOK during the years 1772-75 searching for a southern continent first circumnavigated the globe in high southern latitudes and crossed the Antarctic circle in four widely separated longitudes. COOK reached Latitude 71° 10' S. in Longitude 106° 54' W., when he was stopped from making further southing by impenetrable ice fields such as had never before been observed. He remarked "We saw ice mountains whose lofty summits were lost in the clouds. I was now fully satisfied that there was no southern continent."

Forty-four years later a Russian Expedition under BELLINGSHAUSEN discovered the first known land within the Antarctic Circle, namely, Peter I Island and Alexander I Land in 90° W. and 73° W. respectively and from this time onward interest in south-polar exploration has never flagged. Successive expeditions have discovered new lands and steadily added to man's knowledge of that area within the Antarctic Circle which is named Antarctica.

"Antarctica" is now known to be a desolate and uninhabitable continent of approximately 5,000,000 square miles in extent. The

greater part of its area is taken up by a plateau which is covered with ice and snow of enormous thickness. The edge of the plateau is very steep and bordered on the Pacific side by a narrow range of high mountains which is intersected at right angles by numerous valleys leading down to the sea.

The shelf of the Antarctic continent is very broad and unlike the shelves of other continents is extremely deep being upwards of 200 fathoms. Over the continental shelf, ice of immense thickness, termed shelf ice, surrounds and adjoins the coast line. Owing to the difficulty in detecting the line of demarcation between the ice covered land and the shelf ice, the true coast line of the Antarctic continent is only sparsely known in all but the Australian quadrant. **Figure 1** shows the coast line as at present delineated together with the supposed marginal limit of unexplored coast.

Due to the fact that the South Pole is situated in the centre of an extensive continent which is for the most part over 6,000 ft. in height and on the Plateau reaches to over 9,000 feet above sea level

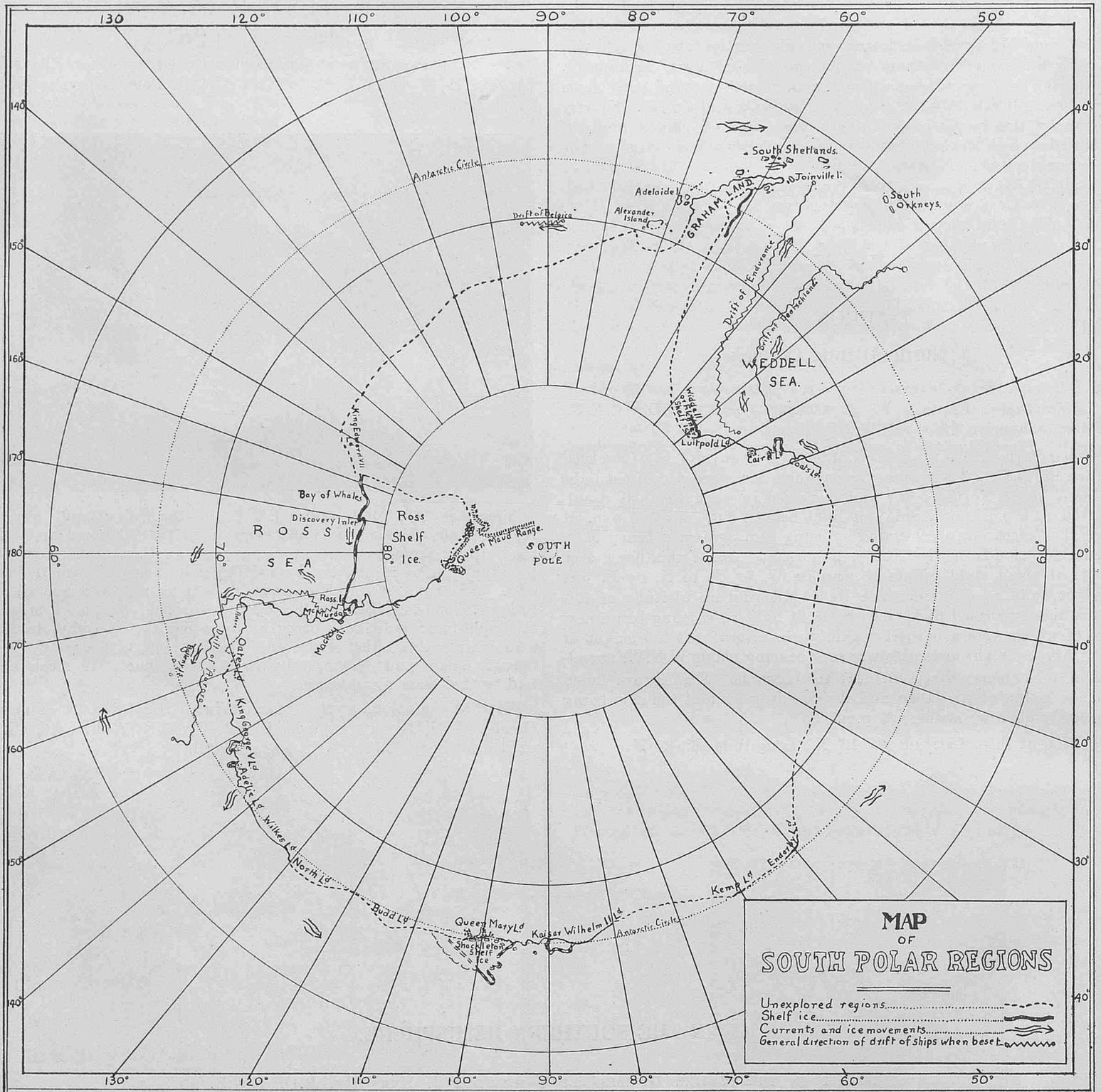


Figure 1.

the climatic conditions of Antarctica are more severe than those obtaining in the Arctic. Dr. SIMPSON's determinations show that the temperature in the vicinity of the South Pole corrected to sea level, during the month of January is 23.7° F. lower than that near the North Pole during the corresponding month of July.

Figure 2 shows the probable atmospheric pressure of the Antarctic at sea level as defined by Dr. SIMPSON who was Meteorologist to the British Antarctic Expedition 1910-13. In the figure the single hatched area on the Pacific side of the great escarpment is supposed to be at approximately sea level while the area on the Atlantic and Indian sides shown by cross hatching is high table land, the highest region being near the South Pole. Over that region from which there are no observations the isobars are shown as broken lines and are hypothetical.

It is seen that over the Antarctic continent itself a high pressure system exists while over the sea circling the continent an area of low pressure extends to 60° S. Latitude. The prevailing winds within the Antarctic circle are therefore from an easterly or south-easterly direction, while north of the 60th parallel the winds will blow from a west or north westerly direction.

The average velocity of the wind that is experienced during gales in the Australian Quadrant of Antarctica is higher than in any other part of the world and during blizzards is phenomenal. Sir DOUGLAS MAWSON in his book the "Home of the Blizzard" relating to the Australian Antarctic Expedition 1911-1914 says:—

"On July 2nd we noted: 'Thick as a wall outside with an 85 miler', and so it commenced and continued for a day, subsiding

slowly through the seventies to the fifties and then suddenly redoubling in strength rose to a climax about midnight on the 5th—one hundred and sixteen miles an hour! For eight hours it maintained an average of one hundred and seven miles an hour and the timbers of the Hut seemed to be jarred and wrenched as the wind throbbled in its mightier gusts. These were the highest wind velocities recorded during our two years' residence in Adelie Land and are probably the highest sustained velocities ever reported from a Meteorological station."

angles to the coast bounded on their seaward side by vertical cliffs varying in height from a few feet to 160 feet. The longest ice tongue yet discovered is the Termination Tongue on the coast of Mary Land which projects seaward for a distance of about 200 miles. The rate of advance of individual glaciers in the Antarctic varies considerably, but it is found that glaciers with a floating extension into the sea have a greater rate of advance than others. Observations made of the Makay Ice Tongue showed it to be moving seaward about three feet daily.

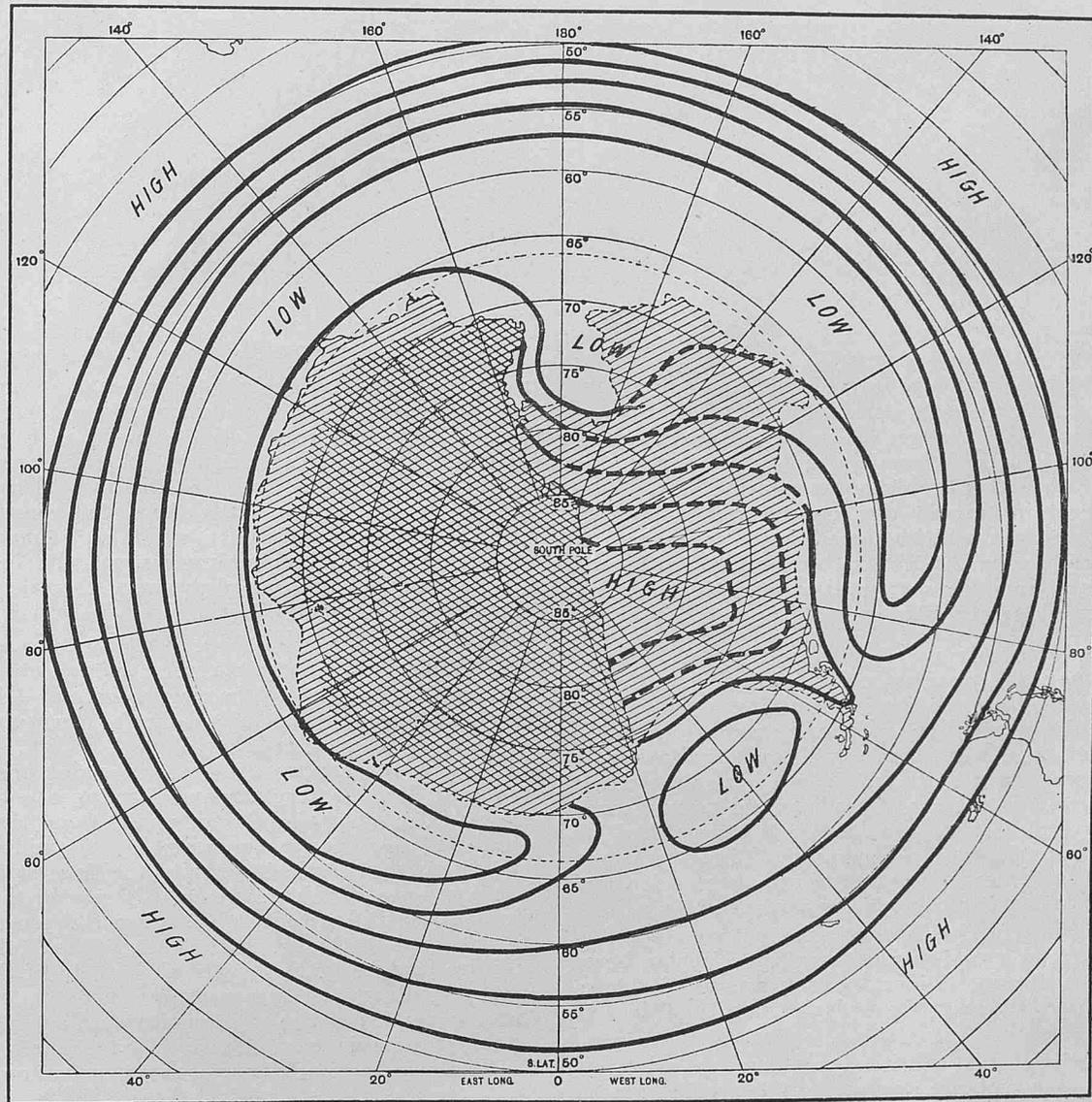


Figure 2.

Probable Antarctic Pressure sea level.

Floating ice which may be encountered on the shipping tracks in high southern latitudes is derived from ice formed within the Antarctic Circle on land or sea, the former constituting the bergs and the latter the field or flat ice.

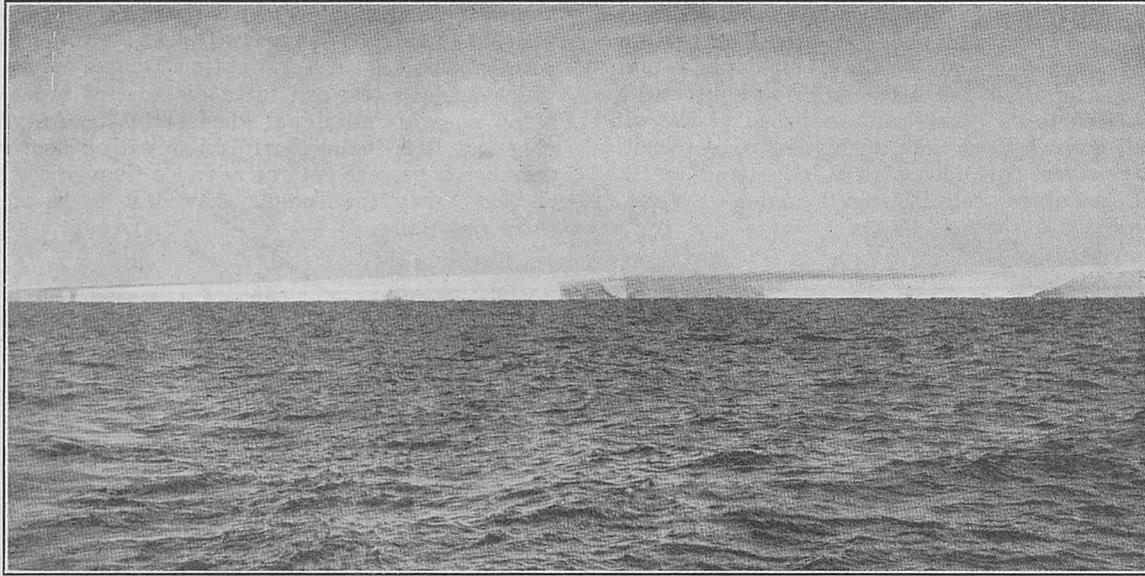
Land Ice.—The Plateau on which the South Pole is situated is covered with an immense ice sheet which is flowing outwards in all directions but mainly where its motion is least obstructed. The chief flow is therefore down the sloping valleys between the mountains fringing the Plateau in the form of glaciers. When the ice of a glacier reaches the coast it continues to move seawards, its weight being taken by the ocean bed, until the water deepens sufficiently to make the ice buoyant when it becomes water borne. Such an extension of glacier ice from the shore seawards is called an Ice Tongue.

Unlike the glaciers of North Polar regions those of the Antarctic, due chiefly to the lower summer temperature of both sea and air, have floating ice tongues extending for many miles seaward at right

angles to the coast bounded on their seaward side by vertical cliffs varying in height from a few feet to 160 feet. The longest ice tongue yet discovered is the Termination Tongue on the coast of Mary Land which projects seaward for a distance of about 200 miles. The rate of advance of individual glaciers in the Antarctic varies considerably, but it is found that glaciers with a floating extension into the sea have a greater rate of advance than others. Observations made of the Makay Ice Tongue showed it to be moving seaward about three feet daily.

In those places where a number of Ice tongues extend seaward in a restricted area they coalesce or are cemented together by the solidification of the sea between them which with the constant addition of snow, form in the course of time level masses of floating ice termed Shelf Ice; ranging from a few hundred to some two thousand feet in thickness.

The best known formation of Shelf Ice is the Ross Barrier which fills the southern end of the Ross Sea, extending from Cape Crozier on the West to King Edward VII Land on the East. It was first discovered by Sir JAMES ROSS in 1841, who finding it barring his way south sailed along its northern boundary. Expeditions of SCOTT, SHACKLETON, and AMUNDSEN have since traversed the Barrier which consists of a practically level snow laden floating sheet of ice, approximately 500 miles wide by 400 miles broad by 1,400 feet thick. Its height above sea level at the northern or seaward end varies from six feet to 160 feet, while its average surface above sea level is 170 feet.



Ross Barrier.

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the Director, Polar Research Institute, Cambridge.

Colour of Ice.—The white light of the sky reflected from numberless facets of the snow crystals when separated by the included air gives snow its white appearance. In the case of ice formed directly from a snow drift falling upon ice as is usual in the Antarctic clear air free ice is formed, which at great thicknesses appears blue. Most glacier ice however contains air in the form of small spherical bubbles which gives to the ice a whitish tinge like the appearance of frosted glass. Many crevices in the glaciers become filled with sand and debris blown down from the surrounding land thus forming silt bands in the ice which greatly discolours it.

Calving of Icebergs.—The calving of icebergs from the Glacier Tongues or Shelf Ice may take place in several ways and for one of several reasons, but chiefly through the undermining action of the surface sea water and development of cracks and crevices due to the strain exerted by the action of tides, heavy swells and wind pressure. The density of ice in icebergs is variable. In some the snow is not so completely transformed into ice as in others while some carry appreciable loads of rock material. An iceberg if composed of ice only would float with approximately one ninth of its mass above water, but for the above reasons some bergs may have more and others less than the normal proportion of ice above water.

The glacier bergs which are derived from the ice tongues of glaciers are irregular in shape and much smaller than the Tabular bergs derived from the Shelf Ice formations. They are usually of a greenish tint but appear dazzling white under certain conditions of light.

Compared with glacier bergs tabular bergs have a relatively large air content and at a distance appear as if formed of plaster of paris owing to their white colour. They are rectangular in shape and have frequently been measured up to twenty and thirty miles in length while one berg has been observed between sixty and seventy miles in length. The majority of bergs observed by the British Antarctic Expedition, 1910-13, varied in height from 40 to 120 feet, while the greatest measured height was 140 feet, but by the time they reach the shipping routes may exceed this height owing to unequal melting below the water line causing them to tilt. The largest bergs have been observed in the south Atlantic north of the Weddell Sea and are probably calved from the Filchner Barrier or from the Shelf ice on the unexplored western coast of the Weddell Sea.

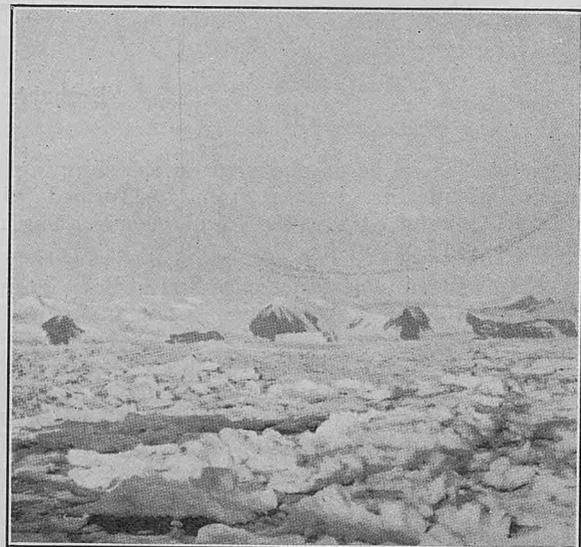
Pack Ice.—In the Antarctic owing to the fall in temperature towards the end of March the surface cooling of the sea causes it to freeze over and as the season progresses, becomes a rigid sheet of thick ice. At the break up of the ice in spring fast ice formed along the Antarctic coast line and land ice in the form of bergs join with the sea ice in forming a barrier of pack ice around the Antarctic continent which extends north to about the 60th parallel.

The predominating south-easterly winds and the resultant westerly surface drifts control the movement of the pack aided by the westerly component due to the earth's rotation. On Figure 1 is shown the

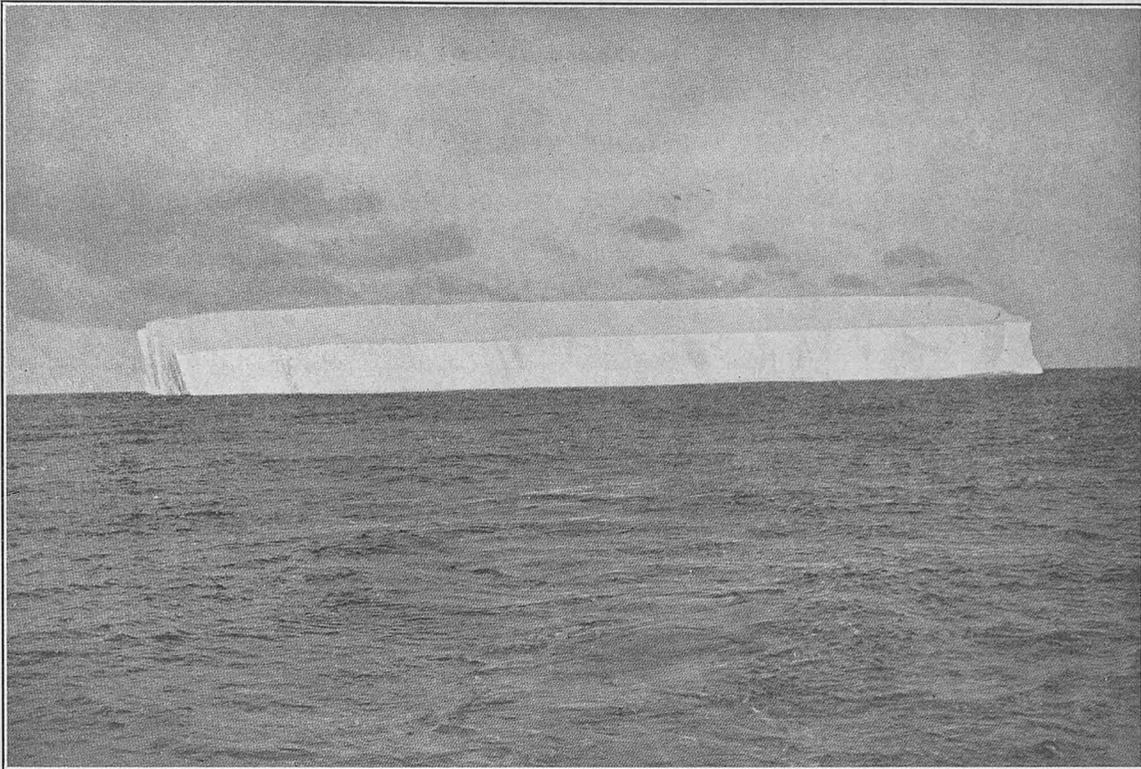
general direction of drifts of ships engaged in Antarctic exploration when beset in the ice, demonstrating the north westerly movement of the pack which is estimated to be at the rate of about four to five miles a day. The interposal of capes and ice tongues in the way of the moving ice fields and the unequal movement between the flow due to the various kinds of ice that constitute the pack exert pressure on the ice causing it to raft and hummock. The height of hummocky floes and pressure ridges met with in the pack constitute a great danger to ships endeavouring to make the Antarctic Continent. Captain SCOTT describes such ice when navigating the pack in the *Terra Nova* in 1910 as follows:—

“We first got among the very thick ice floes at 1 a.m. and jammed through some of the most monstrous I have ever seen. The pressure ridges rose 24 feet above the surface, the ice must have extended at least 30 feet below.”

The diverse character of the ice forming the pack prevents the fragments freezing together and forming a solid mass during the Polar winter, otherwise the ice would at no time be navigable and would probably become permanent by the addition of snow. It is this characteristic which permits the free movement of the pack in a north-westerly direction until it reaches the region of westerly winds in about Latitude 60° S. when the general drift changes to the eastward. Owing to the increase in both sea and air temperature field ice quickly melts when north of the 60th parallel and as the ordinary steamship tracks nowhere reach this latitude, Antarctic pack ice does not constitute a danger to navigation other than to the special vessels engaged on Antarctic Expeditions or in the Whale Fishery. Icebergs however acted upon by the prevailing

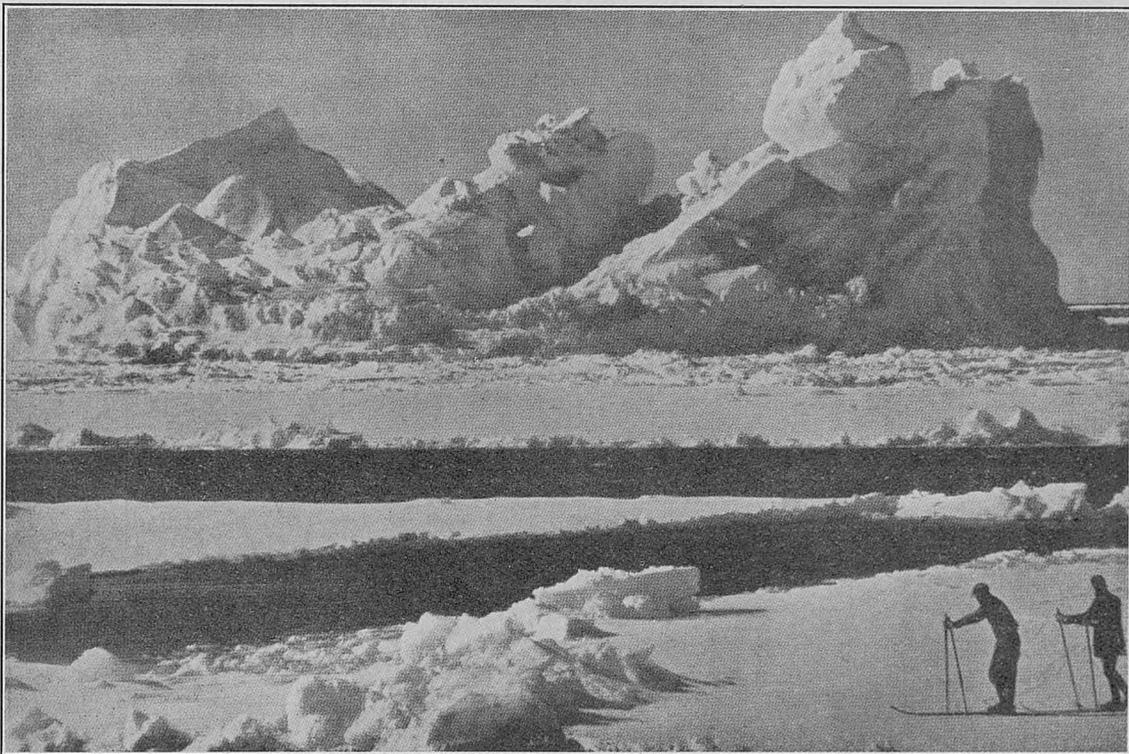


Pack Ice.



Tabular Berg.

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the Director, Polar Research Institute, Cambridge.*



Glacier Berg.

*Reproduced by kind permission of
the Director, Polar Research Institute, Cambridge.*

westerlies and the resulting easterly set continue to drift in a north-easterly direction. Ice is more liable to be met on the shipping tracks from October to March than from April to September, but it may be encountered throughout the year when south of the 35th parallel with the exception of in the Southern Pacific where the limits generally do not extend so far north as in the other oceans.

In the Southern Pacific ice is rarely found north of the 45th parallel during the summer months or north of the 50th parallel in winter; as however the trade routes from New Zealand to the Horn extend below the 50th parallel the danger of meeting ice is

always prevalent especially when between the 130th meridian and Cape Horn.

Bergs are most frequently reported on the tracks from Cape Horn to the Brazils. In the vicinity of Cape Horn a branch of the westerly drift turns N.E. forming what is known as the Falkland Current. This current carries the bergs north and during the summer months they may be met with when south of the 30th parallel between Longitude 40° W. and the South American coast, but during the winter months they are rarely sighted north of the 40th parallel.

CURRENTS IN THE SOUTHERN INDIAN OCEAN, SUMMER SEASON AND GENERAL SUMMARY.

Charts for the quarters November to January and February to April.

In the region of the Roaring Forties, from Latitude 38° S. to Latitude 50° S., the same general conditions prevail as in May to October, described in the last number of this journal. The current is generally easterly but there is no strong or steady mean current over the region as a whole. For May to October it was found that the mean current is stronger between Longitudes 20° E. and 84° E. than it is between Longitudes 84° E. and 108° E. This is also true of November to April, so that in the Southern Indian Ocean the strongest mean current is found between Longitudes 20° E. and about 80° E. throughout the year.

The strength of the mean current between Longitudes 20° E. and 80° E. is not the same throughout the year. In November to April it is appreciably stronger than in May to October. This fact will be more fully brought out later in the table of seasonal variations. The strongest mean drifts are between 17 and 18 miles per day, in Latitude 40° S. to 42° S., Longitude 52° E. to 56° E. in February to April, and in Latitude 40° S. to 42° S., Longitude 44° E. to 48° E. in November to January.

During the period 1910 to 1932 the strongest drift experienced during November to January was that recorded by S.S. *Port Hobart* on January 21st, 1928, at the rate of 78 miles per day, S. 77° E., in mid-position, Latitude 39° 25' S., Longitude 30° 58' E. The strongest drift experienced during February to April was in the same neighbourhood, recorded by S.S. *Corinthic* on February 11th, 1917, 45 miles per day, S. 36° E., in mid-position, Latitude 39° 16' S., Longitude 30° 58' E. It is interesting to note that the strongest drift in the quarter August to October given in the preceding article, was also observed in an almost identical position.

Two special features of interest may be noted on the charts. In November to January there is a northward sweep of current from the latitude of the Crozet Islands (46° S.) between Longitudes 44° E. and 52° E. This flows northward at first, becoming north-easterly with decreasing latitude and passes into the general E.N.E. current in Latitude 38° S. to 40° S. There are also northerly sets in the neighbourhood of the Crozets in the other three seasons, but these cover

smaller areas. In February to April the mean current sets due north, 8 miles per day (based on 12 observations), immediately to the north of these islands.

In the preceding article a northerly flow from the region of the Roaring Forties from Latitude 45° S. up to about Latitude 34° S., between Longitudes 56° E. and 64° E. was also mentioned. This mean northerly set occurs in this region throughout the year. It is not so continuous as the northerly set near the Crozets, but is traceable on all the charts. It varies somewhat in character in different seasons. In August to October it flows due north, north of Latitude 40° S., while in November to January the sets in this region are mainly N.E.

There is no very clear evidence in the charts for November to April of the recurvature of part of the Agulhas Current into the easterly current of the Roaring Forties, but as in the case of the charts for May to October, the arrows indicate some south-easterly mean sets between Longitudes 20° E. and 36° E.

The currents north of Latitude 38° S. in the high-pressure area are weak and variable. There is a slight predominance of easterly sets in some parts of the region.

Seasonal Variations of the Currents.—As stated in previous years, the Indian Ocean is being divided into sections for the purpose of computing the mean seasonal currents. Eight sections have been added in this year's work, as shown in Figure 1. The present year's charts extend only to Longitude 108° E., charts for the region east of Longitude 108° E. having been published in THE MARINE OBSERVER, Volume VI, 1929. For the purpose of determining seasonal variations the whole of the Southern Indian Ocean from Latitude 38° S. to 50° S., Longitude 20° E. to 140° E., has been divided into six areas, each extending for 20 degrees of longitude. The area shown as Agulhas Current III has been computed to determine the recurvature of this current into the easterly current of the Roaring Forties. It includes currents charted in 1931 and also a small area which would otherwise have formed part of the first Southern

Areas for Calculating Mean Current.

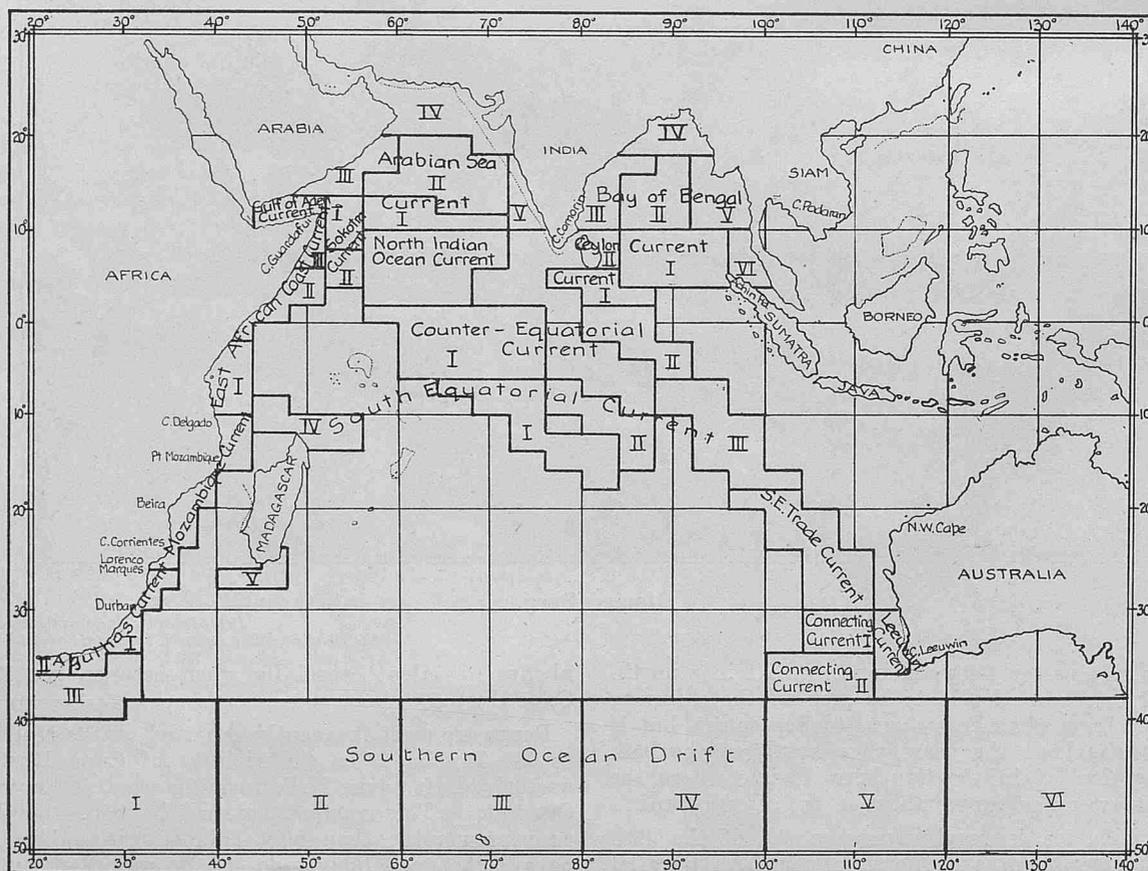


Figure 1.

Indian Ocean section. The area Connecting Current II has been computed in order to see whether the circulation on the eastern side of the ocean is complete. The mean set and drift for each quarter in the various sections are shown in Table 1.

areas are where the northerly sets referred to earlier in this article occur. East of Longitude 80° E. the sets are almost wholly south of east. The quarter August to October is strikingly regular, the sets, reading from Section I to VI, being E., N.E., N.E., E., S.E., S.E.

Table 1.
Southern Indian Ocean.
Mean Quarterly Current (drift in miles per day).

	February to April.		May to July.		August to October.		November to January.					
	Mean Set and Drift.	Number of Observations.	Mean Set and Drift.	Number of Observations.	Mean Set and Drift.	Number of Observations.	Mean Set and Drift.	Number of Observations.				
Agulhas III	S. 13° W.	3	121	S. 61° E.	2	97	S. 7° E.	3	107	S. 54° E.	4	121
Southern Ocean I	S. 89° E.	6	141	S. 87° E.	5	108	S. 76° E.	5	135	N. 83° E.	7	160
Southern Ocean II	N. 69° E.	9	218	N. 57° E.	6	166	N. 61° E.	6	204	N. 54° E.	8	246
Southern Ocean III	N. 53° E.	5	220	N. 43° E.	5	171	N. 43° E.	5	185	N. 53° E.	6	248
Southern Ocean IV	S. 85° E.	2	226	S. 79° E.	2	146	S. 80° E.	4	166	N. 87° E.	2	234
Southern Ocean V	S. 63° E.	3	163	S. 33° E.	2	109	S. 32° E.	3	150	S. 75° E.	2	180
Southern Ocean VI	S. 76° E.	2	144	S. 54° E.	0*	147	S. 30° E.	2	149	S. 79° W.	1	170
Connecting Current I	N. 60° E.	4	67	N. 71° E.	3	92	N. 42° E.	4	87	N. 10° W.	2	77
Connecting Current II	S. 15° E.	0*	74	N. 49° E.	1	76	N. 76° E.	4	50	N. 25° E.	1	69

* Less than 0.5 mile per day.

This table shows a number of very interesting facts. The flow of the surface water in the section Agulhas III clearly indicates the recurvature of the Agulhas Current into the general easterly current of the Roaring Forties. There is a considerable variation of set in the four seasons but the current flows between south and east save in February to April when it sets a little west of south. In MARINE OBSERVER 1931, Volume VIII, it was shown that the Agulhas Current was weakest in May to July and it is now shown that the weakest current in the area of recurvature occurs at this time of year.

Of the Southern Ocean sections the strongest mean current is in Section II, in February to April, with a mean drift of 9 miles per day. It is obvious that in Sections I and II, that is between Longitudes 20° E. and 60° E., the mean current is stronger in the summer half-year, November to April, than in the winter half-year, May to October. In the remaining sections there is less seasonal difference, but in Section IV there is an increase of current in the spring quarter, August to October. It is well-known that the frequency of gales in the Roaring Forties is much greater in winter than in summer. This was shown by Table 3 of the article, "General Meteorological Conditions in the South Indian Ocean" published in pages 60 to 62 of the April number of THE MARINE OBSERVER for the current year. It is also shown, for the Roaring Forties as a whole, by the table on page 12 of the "Meteorological Charts of the Southern Ocean", 3rd edition. Furthermore the wind roses on these meteorological charts show that only a very small proportion of the winter gales come from any easterly direction. Judging by the wind the easterly currents of the Roaring Forties should therefore be stronger in the winter months in all longitudes. The current investigation shows that this is not the case between Longitudes 20° E. and 60° E. One factor tending to increase the flow of current in the summer half-year is the increased flow from the Agulhas Current, but this seems quite inadequate to produce a considerable difference over a wide area.

So far it has been shown that the mean currents at all seasons are considerably stronger in the western half of the South Indian Ocean than in the eastern half. The stronger currents are in Sections I to III, the weaker currents in Sections IV to VI, the dividing line being Longitude 80° E. It has also been shown that between Longitude 20° E. to 60° E., that is in Sections I and II, the mean current increases in the summer half-year when the wind strength is least. The current is strongest throughout the year in Section II and weakest in Section VI. In Section VI, in one quarter, November to January, the mean set is reversed, becoming westerly, but is then very weak.

An examination of the mean sets in Sections I to VI is also of interest and these have been plotted in Figure 2, where the lengths of the arrows are proportional to the mean drifts. It will be seen that the longitude of 80° E. constitutes a dividing line also as regards set. In Section I the set is essentially easterly throughout the year. In Sections II and III it becomes north-easterly; these

Mean Set between the parallels of 38° S. and 50° S. for the four seasons of the year, in zones of longitude in the South Indian Ocean (Sections I to VI).

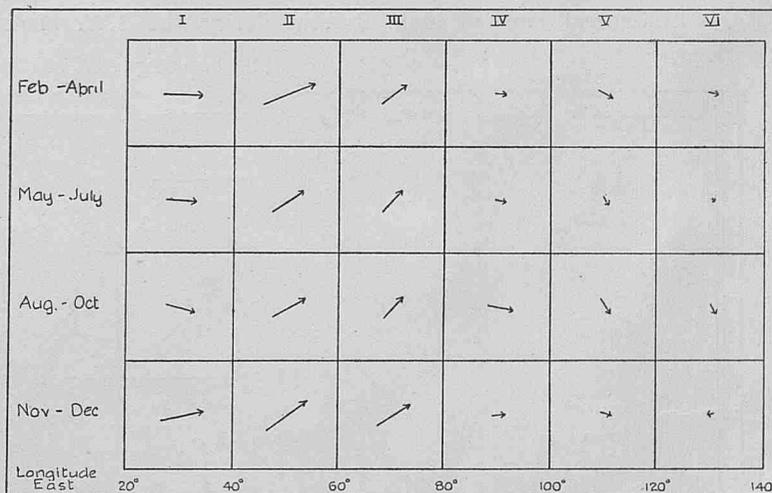


Figure 2.

The seasonal variation in the currents of the area Connecting Current I was computed in 1930. This area lies between the easterly current of the Roaring Forties and the north-westerly current of the South-East Trade region of the Indian Ocean. If the circulation of the South Indian Ocean is complete on the eastern side this intermediate area should show north-easterly mean sets. In Table 1 the figures for the area Connecting Current I are repeated and those for the new area Connecting Current II are given. It will be seen that during the period of the S.W. Monsoon the mean set is north-easterly in both areas. As, however, the current in the area South-East Trade Current is strongest during the period of the N.E. Monsoon, the continuity of the circulation in this part of the Indian Ocean is not very definite.

Variation of Easterly Current with Latitude.—In order to determine whether there is any marked variation in the mean strength of the current in different latitudes of the Roaring Forties an investigation has been made and the results are shown in Tables 2 and 3. The mean current has been computed for each belt of Latitude 2° wide, from Latitude 38° S. to 48° S., there being an insufficient number of observations for use in Latitude 48° S. to 50° S. In a few cases dashes indicate insufficient observations in other parts of the tables. The region covered by this year's work has been divided into two parts, Table 2 showing the currents for Longitude 20° E. to 60° E. and Table 3 those for Longitude 60° E. to 108° E.

Table 2 shows that in the western part of the Roaring Forties of the South Indian Ocean there is no general increase of mean current strength with increasing latitude. The latitude of greatest

Table 2.
Mean Quarterly Currents, Longitude 20° E. to 60° E. in belts of Latitude 2° wide.

Latitude.	February to April.		May to July.		August to October.		November to January.					
	Mean Set and Drift.	Number of Observations.	Mean Set and Drift.	Number of Observations.	Mean Set and Drift.	Number of Observations.	Mean Set and Drift.	Number of Observations.				
38°-40°	N. 84° E.	9	172	N. 74° E.	3	135	N. 78° E.	7	167	N. 75° E.	8	209
40°-42°	N. 80° E.	9	107	N. 79° E.	7	78	S. 85° E.	5	83	N. 76° E.	9	95
42°-44°	N. 54° E.	6	48	N. 51° E.	7	53	N. 64° E.	4	49	N. 49° E.	7	71
44°-46°	N. 37° E.	5	42	N. 60° E.	3	21	N. 3° W.	2	46	N. 33° E.	5	51
46°-48°	N. 33° E.	1	9	—	—	—	—	—	—	—	—	—

Table 3.
Mean Quarterly Currents, Longitude 60° E. to 108° E. in belts of Latitude 2° wide.

38°-40°	N. 18° W.	1	141	N. 17° E.	3	97	N. 18° E.	2	96	N. 54° E.	3	152
40°-42°	S. 84° E.	2	123	N. 64° E.	2	110	N. 60° E.	3	83	N. 65° E.	2	87
42°-44°	N. 60° E.	3	62	N. 74° E.	6	42	N. 88° E.	5	49	N. 51° E.	4	70
44°-46°	N. 74° E.	7	78	N. 76° E.	6	43	N. 74° E.	6	77	N. 82° E.	5	103
46°-48°	N. 61° E.	4	65	N. 84° E.	3	40	S. 87° E.	4	62	N. 80° E.	5	96

INDIAN OCEAN.

General Flow of Main Current during the S.W. Monsoon Season (Northern Summer). Charted in 1929 to 1932.

(To be completed as the investigation proceeds.)

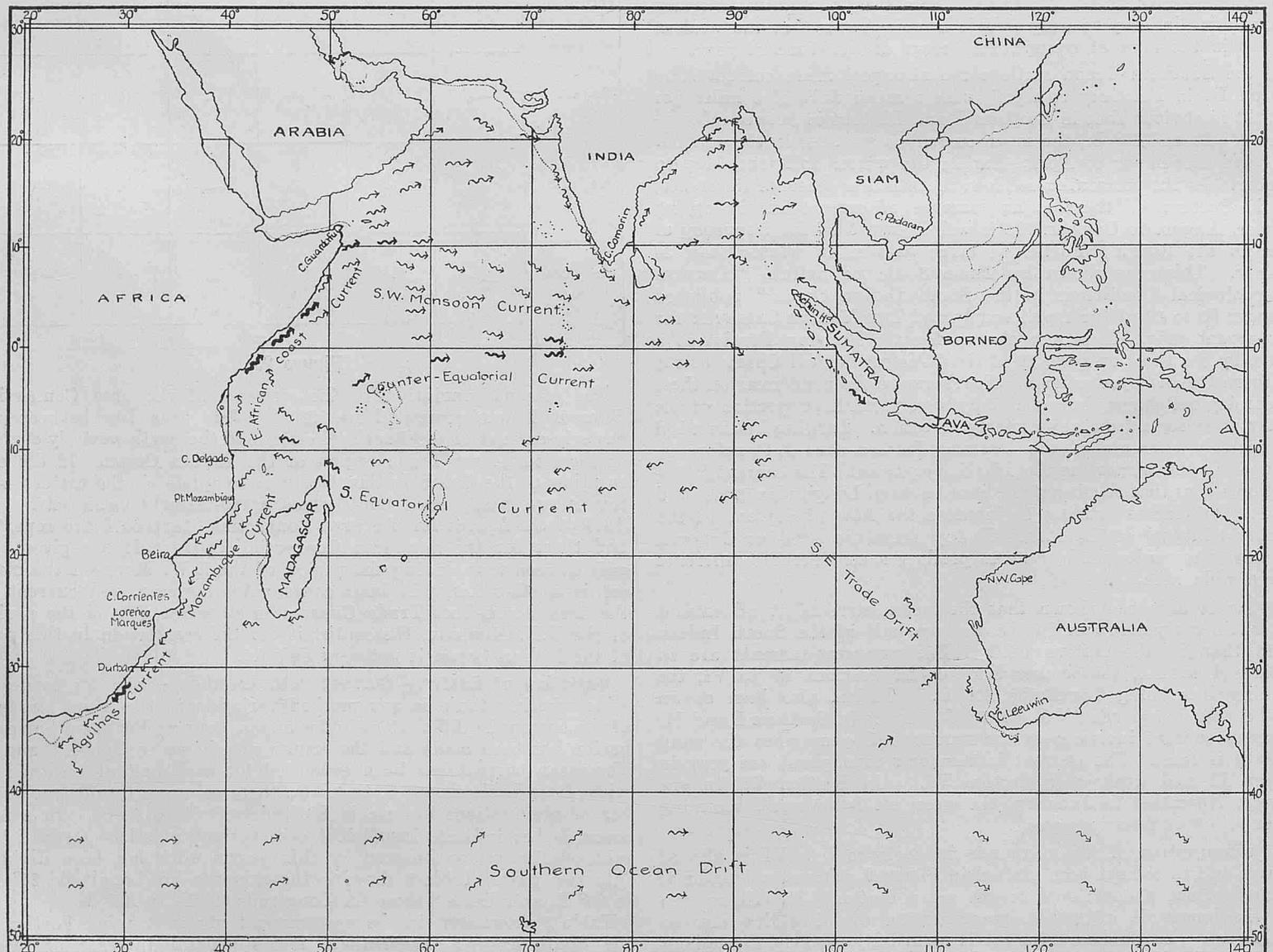


Figure 3.

strength varies somewhat in different quarters but is never south of the belt 42°-44°. Taking the whole year the maximum current strength is found in the belt 40° to 42°. Further east, from Longitude 60° E. to 108° E., as shown in Table 3, there is a definite increase of strength with increasing latitude down to the belt 44°-46°, where the maximum strength is found at all seasons. Here again, therefore, we find a difference in the character of the currents of the Roaring Forties, depending on longitude. Only in two instances have the sets a westerly component.

Ice.—Reference to the quarterly ice charts of the Southern Hemisphere published in THE MARINE OBSERVER show that the limits of ice observed generally lie more northerly in the western part of the Southern Indian Ocean than in the eastern part. The northerly component of current which we have found between Longitudes 40° E. and 80° E. in the Roaring Forties may contribute to this result.

General Summary.—The new knowledge which has been gained in the present investigation can now be briefly summarised. It has been shown that the currents of the Roaring Forties in the Southern Indian Ocean are not uniform in all longitudes. Whether we consider the mean drift, the mean set, the variation in latitude or the seasonal variation, the currents of the western side of the ocean differ from those of the eastern side.

Examination of the wind charts shows that there is no appreciable variation in wind force and direction between the western and the eastern parts of the ocean and therefore it would be expected that the currents would be more uniform in all longitudes. A second noteworthy discrepancy between wind and currents lies in the fact that between Longitudes 40° E. and 80° E. the currents are definitely stronger in the summer half-year than in the winter half-year.

The strongest current in the Roaring Forties is found on the western side of the ocean. West of Longitude 80° E. the mean sets incline to the north-east, east of this longitude they incline to the south-east. Considering the belts of latitude, the strongest current flows in a more northerly latitude on the western side of the ocean. Between Longitudes 20° E. and 60° E. the belt of maximum strength is Latitude 40° S. to 42° S.; between Longitudes 60° E. and 108° E. it lies in Latitude 44° S. to 46° S. There is a definite increase of strength with increase of latitude up to 46° S. between Longitudes 60° E. and 108° E., but not to the westward of Longitude 60° E.

Figures 3 to 5 showing the general flow of main current in the Indian Ocean are again reproduced with the addition of the general flow in the Southern Indian Ocean.

General Flow of Current during the months of February to April.

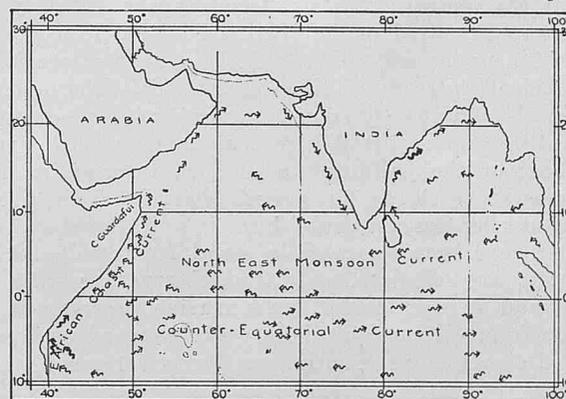


Figure 5.

INDIAN OCEAN.

General Flow of Main Current during the N.E. Monsoon Season (Northern Winter). Charted in 1929 to 1932. (To be completed as the investigation proceeds.)

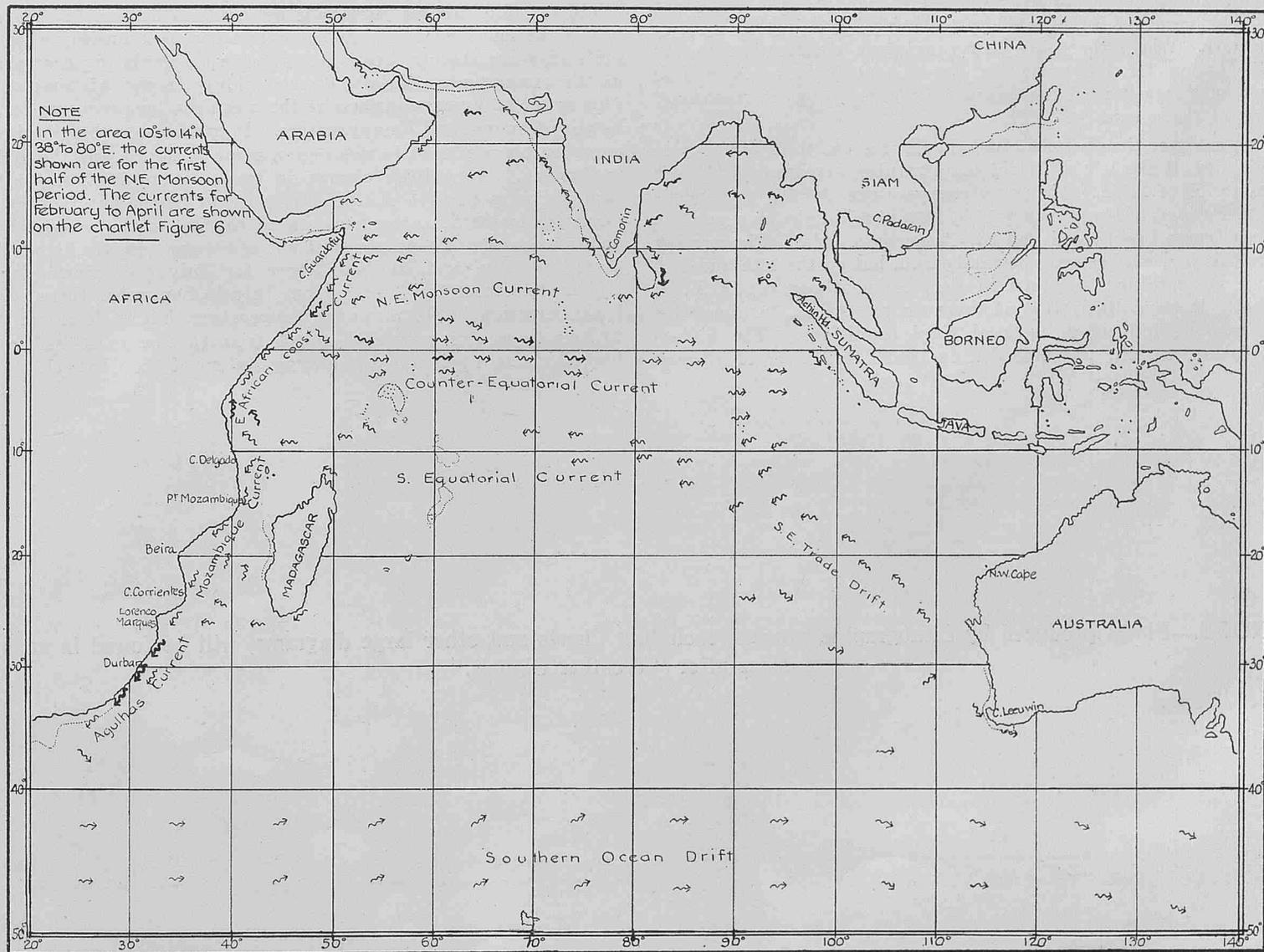


Figure 4.

MEAN SEA SURFACE TEMPERATURES IN BRITISH COASTAL WATERS.

PREPARED IN MARINE DIVISION BY L. E. FLETCHER.

Until recently the mean sea surface temperatures published in the Monthly Weather Report of the Meteorological Office were compiled from observations taken almost entirely from lightships and coast-guard stations. At some of these there was from a fathom to forty fathoms of water at any state of the tide, but at others the observers had difficulty in obtaining temperatures of the sea at low water. Owing to the tide being out it was very difficult for them to place the thermometer in water of sufficient depth to be of the same temperature as the surface water of the deep sea off shore.

The mean sea temperatures published in the Monthly Weather Report are now prepared in the Marine Division from observations taken by ships under way, light vessels and three stations where there is sufficient water at all times of the tide. The need has long been felt in the Marine Division for reliable information of mean sea temperatures round the British coasts, and with a view to the commencement of the building up of such information mean sea surface temperature charts for British coastal waters given at the end of this number are now published.

The charts have been compiled by hand from Hollerith cards so that the means are calculated only from observations taken in ships under way and in deep water. As marine observers know only observations from Meteorological Logs are punched on these cards; synchronised observations recorded on Forms 911 are used in other ways.

It will be seen that in the approaches to, and in, the English Channel there is a fair number of observations, the period of observation being 1921 to 1930, ten years only. The number of observations from which the means are calculated is indicated in the left-hand lower corner of each one-degree square. The mean sea surface temperature is indicated by the large figure in the centre of the square. Where there are thirty or more observations in the month during the ten years the lowest and highest sea surface temperature logged are indicated in the lower and upper right-hand corners of the square.

If we examine the charts we find that in the month of January in the vicinity of the Isle of Wight temperatures were recorded which had a range of 14° F. The lowest temperature, 40° F., was logged by S.S. *Bolingbroke* on January 17th, 1922, at midnight, in a position between Owers Light-vessel and St. Catherine's Point. The weather before this had not been exceptionally cold, but on the 16th and 17th the air temperature had been in the neighbourhood of 40° F. at Calshot. It seems likely that at times the sea temperature near the land may be influenced by local tidal conditions. The highest temperature, 54° F., was recorded on board S.S. *Port MacQuarie*

S.W. of St. Catherine's Point on January 2nd, 1921. The air temperature over the British Isles had been generally above the normal during November, 1920. There was a cold spell at the beginning of December, but the air temperature again rose until it was well over 50° F. in the south-west of England during the last week of December. There seems no reason to doubt that these figures represent the actual temperature of the sea surface when the observations were taken. Now we see that with a mean temperature of 48° F. there may be fluctuations in one month during a period of ten years amounting to 14° F. Off the north coast of Scotland and in other squares on the charts the mean temperature indicated is derived from one or very few observations. Maybe these observations were taken when the sea surface temperature was several degrees above or below its true mean for the month, so that these figures must be used with caution. Generally the information for the English Channel and its approaches is to be relied upon.

At present two observing ships only keep Meteorological Logs entirely in the waters adjacent to the British Isles. In many foreign-going ships the Meteorological Log is discontinued on the British coast when it is supposed that the coast stations supply the Meteorological Office with all the necessary data. As we have shown at the beginning of this article it is not possible for them to supply reliable information of sea temperature, and therefore all ships keeping a Meteorological Log are asked, so far as the duties of the officers and the work of the ship will permit, to continue the sea observations during the time that they are in British coastal waters.

Because water has a greater capacity for absorbing heat without appreciable rise in temperature than any other substance, whether liquid or solid, the sea surface is not warmed by the sun's rays to nearly the same extent as land, nor does it cool so quickly when the sun's rays are absent. Sea water goes on accumulating heat slowly as the summer proceeds and loses it slowly in the winter months. This is shown by examination of the mean sea temperatures for the English Channel and its approaches. It can be seen that the lowest mean sea temperatures in this region occur in March and the highest in August. Very little change in mean sea surface temperature occurs during the five months December to April, but in May the mean sea temperature has commenced to rise, to the extent of two or three degrees. The means for June are several degrees higher than those for May, and similarly those for July are several degrees higher than those for June. From July to September there is very little variation in the mean sea temperature, but it decreases three to four degrees or more each month from October to December, the biggest changes being in the narrow waters of the Channel.

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

SOUTHERN ICE REPORT.

During the Year 1932.

October.

Year.	Day.	Position.		Description.	Remarks.	Name of Ship reporting.
		Latitude.	Longitude.			
1932	29	From 65° 58' S. To 66° 17' S.	80° 20' W. 80° 20' W.	Drift ice and brash	In first position met fragments, mainly small, of young sea-ice, and between the positions, ragged patches and streams of drift ice and brash, were frequent. The ice was much broken up by the swell, and none of the young ice floes was more than 6 feet across or two feet thick. Several large fragments of old heavy floes were observed.	R.R.S. <i>Discovery II</i> .
	29	From 66° 17' S. To 66° 55' S.	80° 20' W. 80° 22' W.	No ice	Ice-free sea	do.
	29	66° 55' S.	80° 22' W.	Pack ice	Came up to the edge of, and entered a body of pack-ice, consisting of young unpressured floes about 4 feet thick and averaging 12 feet in diameter bound together with a thick, newly frozen sludge, in which were frequent pans of young ice about 6 inches thick. The main floes were not densely distributed, but the sludgy binding rendered them sticky to work through. The edge of thick ice was quite clean-cut and ran roughly E.S.E. and W.N.W. A number of very old heavy floes were scattered among the young ice.	do.
	30	From 66° 57' S. To 67° 06' S. To 67° 00' S. To 66° 54' S. To 66° 49' S.	80° 16' W. 79° 58' W. 79° 36' W. 79° 15' W. 78° 57' W.	Drift ice and brash	At first position, on an Easterly course, cleared the body of compact pack-ice, and from then on, between positions, the ship passed through patches and streams of drift ice, occasionally thickly distributed, but mainly ragged and strung out by the wind. This ice was very much lighter, consisting mainly of small floes and pans, none more than 2 feet thick, and generally much broken up.	do.
	30	From 66° 49' S. To 66° 38' S.	78° 57' W. 78° 27' W.	Drift ice	Frequent patches and streams of drift ice, usually of small light floes. The sea-surface was everywhere littered with detached floes and fragments.	do.
	30	From 66° 38' S. To 66° 33' S.	78° 27' W. 77° 58' W.	Pack ice	Between these positions, a body of pack was crossed, and cleared on a N.E.'ly course. This ice consisted mainly of fairly light, unpressured floes, bound together with mushy sludge and fragments.	do.
	30	From 66° 33' S. To 66° 24' S.	77° 58' W. 76° 12' W.	Fragments of floe and brash	Between these positions, the sea was generally ice-free except for occasional fragments of floes and brash.	do.
	31	66° 26' S.	76° 38' W.	Berg	Tabular and well-preserved, 100 feet high, 2,000 feet long.	do.
	31	66° 41' S.	75° 33' W.	Pancake ice	Patches and fields of very small pancake ice	do.
	31	66° 45' S.	75° 21' W.	Pack ice	Came to edge of body of pack-ice. The floes composing this pack were mainly young and unpressured, but some of them were 3 or 4 feet thick. This pack was fairly close and appeared to extend to the southward, where strong blink showed in the sky.	do.
	31	66° 44' S.	75° 14' W.	Berg	Tabular and level-topped but apparently old, and much crevassed, 100 feet high, 2,000 feet long.	do.
	31	From 66° 40' S. To 66° 20' S.	75° 14' W. 74° 05' W.	Drift ice and Pack ice	Between these positions the vessel was worked on a general northerly course, through loose pack of varying density. The bulk of the floes were of young, unpressured ice, about 3 feet thick, but a fair number of broken, heavy, very old floes were passed. None of the floes was of very large area, the average being about ten feet in diameter. Several large, water-smooth, pale bergy bits were passed during this time.	do.
	31	66° 02' S.	73° 50' W.	3 bergs	Large. Each about 1,500 feet long, 200 feet high. Breaking down.	do.

Reports of Ice previous to October, 1932, will be found in the Marine Observer, Vol. VIII, No. 94, p. 213.

November.

1932	11	44° 21' S.	2° 20' E.	Berg and growlers about 20 feet high		S.V. <i>Abraham Rydberg</i> .
	12	42° 21' S.	2° 29' E.	Berg	40 feet high	do.
	13	42° 50' S.	9° 50' E.	Very large berg	50 feet high	do.
	14	42° 20' S.	11° 10' E.	Berg	40 feet high	do.
	1	65° 43' S.	73° 45' W.	No ice	Sea ice free	R.R.S. <i>Discovery II</i> .
	1	65° 10' S.	72° 13' W.	2 bergs	Both of moderate size. One irregular and weathered; one tabular about 80 feet high.	do.
	1	65° 06' S.	71° 36' W.	Berg	Tabular and level-topped, but old. Much caverned and sea worn, 100 feet high, 1,000 feet long.	do.
	1	65° 06' S.	71° 05' W.	Berg	Tabular with inclined top. Caverned and sea-worn, 60 to 100 feet high, 800 feet long.	do.
	1	65° 05' S.	70° 32' W.	Brash ice	Passed through scattered streams and patches of brash ice consisting of fragments of floes, much broken up, and sea-worn remains of old floes.	do.
	1	From 65° 01' S. To 64° 54' S.	69° 15' W. 68° 44' W.	Edge of pack ice and 1 small berg ...	Between positions, skirted the ragged edge of a body of pack ice. This was not closely examined, but appeared to be fairly loose and light. One small berg was seen in it.	do.
	2	From 64° 48' S. To 63° 11' S.	68° 10' W. 60° 44' W.	Few pieces of brash	Between positions, no ice was seen, except for a few scattered small fragments of brash sighted from time to time.	do.
	3	West of Deception Is.		12 bergs	Within 10 miles to the westward of Deception Island, majority probably being aground. 10 of these were small, and 2 of moderate size, these being broken down tabulars. The small bergs were all irregular and sea-worn. A few floes of broken-up fast ice were present in Pendulum Cove. The northern half of Port Foster Bay was covered with unbroken fast-ice.	do.
	3	Deception Island.		Floes and fast ice	These bergs were within a ten-mile radius of Tower Island. No doubt all the larger bergs were grounded. A cluster of them were gathered round the Kendall Rocks, and the rest were fairly evenly distributed. 18 of these bergs were of moderate size, of which ten were tabulars from 60 to 150 feet high, and the remainder were small and, mainly, water-worn. One tilted tabular about 350 feet in height, was grounded just north of Ohlin Island.	do.
	5	Tower Island.		28 bergs	Large and Tabular	do.
	6	From 63° 04' S. To 62° 52' S.	59° 02' W. 58° 27' W. 57° 32' W.	Berg 16 bergs	Within 7 miles of track, fairly evenly distributed. Of these 7 were large tabulars, though none more than 200 feet high or 2,500 feet long. Eight were tabulars of moderate size, and one moderate sized weather berg.	do.

Year.	Day.	Position.		Description.	Remarks	Name of Ship reporting.
		Latitude.	Longitude.			
1932	6	62° 46' S.	56° 59' W.	Berg	Tabular 200 feet sloping to 150 feet high. 1,500 feet long. A spur 200 feet long and awash ran out from the higher corner, terminating in a small hummock.	R.R.S. <i>Discovery II.</i>
	6	62° 45' S.	56° 54' W.	Berg	Irregular, 120 feet high, 800 feet long, much water-worn and weathered.	do.
	6	62° 42' S.	56° 21' W.	Berg	Tabular, 200 feet high, 1,200 feet long, straight-sided and very well preserved, with clean cut faces.	do.
	6	From 62° 40' S. To 61° 57' S.	56° 21' W. 56° 20' W.	19 bergs	Within 10 miles of track, fairly evenly distributed. Of these 3 were large tabulars, averaging 150 feet in height and 2,000 feet in length, 6 tabulars of moderate size, and 10 irregulars and sea-worn bergs, mainly small.	do.
	7	Elephant Island.		14 bergs	All within a 12 miles radius of the western side of Elephant Island, most of them probably aground. Of these 4 were large tabulars, 8 moderate sized tabulars, and the remaining two small and weathered.	do.
	21	58° 25' S.	44° 23' W.	Berg	Of moderate size and tabular. Distant.	do.
	22	60° 13' S.	44° 24' W.	Berg	Large and tabular. Distant.	do.
	22	From 12m. N.W. of C. Dundas, along south side of Laurie Island.		About 400 bergs	Within 15 miles off the eastern and southern sides of Laurie Island, an enormous number of bergs were present. Probably the majority were aground. None of these bergs was of any extraordinary size, the largest being a tabular about 2,000 feet long and 100 feet high. About 250 of the bergs were of tabular form, though many were tilted and broken down. They ranged in height from 40 to 200 feet. The remaining 150 were mainly of moderate size and small, weathered and sea-worn. No definite glacier bergs were seen, and the irregular shaped specimens were probably fragments of tabular or capsized tabulars. So densely was this ice disposed off the coast that hardly any horizon was visible while coasting the south shore of Laurie Island.	do.
	24	From Scotia Bay, S. Orkneys. To 61° 52' S.	44° 44' W.	About 180 bergs	Bergs within 10 miles of track. 150 of them were grounded within 15 miles of the south coast of Laurie Island. Of the remaining 30, twelve were large tabulars of new appearance. All were about 120 feet high, and they varied in length from 1,500 feet to half-a-mile. The remainder were mainly tabulars of moderate size, usually broken-down.	do.
	24	From 61° 55' S. To 61° 53' S.	44° 44' W. 44° 30' W.	Drift ice	In first position met with streams of drift ice, raggedly disposed to the southward. The floes composing these streams were extremely heavy, old; and pressured and screwed till in some cases the tops of the floes stood 10 feet above water. They were much broken up. The ragged fringe of this ice was skirted to last position.	do.
	25	From 61° 53' S. To 61° 52' S.	44° 30' W. 42° 55' W.	24 bergs	Within 10 miles of track. Of these, 6 were large tabulars, averaging 120 feet in height and 1,000 feet in length, 7 tabulars of moderate size, and the remainder mainly small and sea-worn. Occasional heavy, detached floes of sea-ice were passed.	do.
	25	From 61° 52' S. To 61° 52' S.	42° 55' W. 42° 23' W.	Drift ice and 33 bergs	Between these positions, the ragged edge of patches and streams of drift ice was skirted. This ice was of a similar nature to that met to the westward. Patchy blink was observed on the southern horizon. The bergs were within ten miles of track. Eight were fairly large tabulars, the remainder mainly small and broken down.	do.
	25	From 61° 51' S. To 61° 32' S.	42° 21' W. 40° 50' W.	82 bergs	Within 12 miles of track, fairly evenly distributed. None of these bergs was very large, and a high percentage of weathered, irregular bergs prevailed. About half of the total were tabular, of which some were much broken-down.	do.
	25	From 61° 32' S. To 61° 33' S.	40° 50' W. 40° 00' W.	31 bergs	Within 12 miles of track. The majority of these were of moderate size, and all of them had an old and weathered appearance. One bottle-green growler was passed, and one small irregular berg had a band of brownish-green ice, about four feet in width, running through it.	do.
	25	From 61° 35' S. To 61° 37' S. To 61° 35' S.	40° 00' W. 39° 58' W. 39° 39' W.	Drift-ice, brash and 33 bergs	At first position encountered patches of light drift ice. This ice was quite young, some floes being only about a foot thick, and very much broken-up. In 61° 37' S., 39° 58' W. encountered heavier ice, in ragged patches and streams. This ice was old and pressured, but not as heavy as that met further westward. From this position the ragged edge of drift ice was skirted till last position. Strong blink was observed to the southward. The bergs were within ten miles of track, and mainly were small and much weathered.	do.
	26	From 61° 35' S. To 61° 38' S.	39° 39' W. 37° 51' W.	28 bergs	Within 12 miles of track. Two of these were large tabulars, each about 1,500 feet long and 150 high. The remainder were all of moderate size, and almost all of old appearance and much weathered.	do.
	26	From 61° 38' S. To 61° 30' S. To 61° 19' S. To 60° 50' S. To 60° 31' S.	37° 50' W. 37° 18' W. 37° 08' W. 37° 06' W. 36° 19' W.	Drift ice and 25 bergs	Skirted the Northerly border of drift ice, which ran out in ragged streams and patches, while the sea was dotted with detached fragments of floes. The ice composing this drift was very varied, the majority of it being much-broken floes of fairly heavy ice. Blink was strong to the southward all day. The bergs were within 10 miles of track, mainly to the southward. None of them were very large and all were of old and weathered appearance.	do.
	26	From 60° 30' S. To 60° 15' S.	36° 16' W. 35° 46' W.	161 bergs and drift ice	Within 10 miles of track, fairly evenly distributed. These bergs appeared newer and were in a very much better state of preservation than those seen further west. About half of them were tabulars, none of any great size; and half weather and sea-worn, and mainly of moderate size. During this time, drift ice, in thin ragged streams, was usually in evidence to the southward, and the sea was at times dotted with detached fragments of floes.	do.
	27	From 60° 03' S. To 60° 08' S.	34° 41' W. 34° 19' W.			
	27	From 60° 05' S. To 60° 14' S. To 60° 01' S.	34° 11' W. 33° 06' W. 32° 22' W.	81 bergs and drift ice	Within eight miles of track. Of these about half were tabulars, two of them very large (about half-a-mile long). The remainder were irregular in outline and of various sizes. The tabulars seen to-day were mainly of very new appearance with clean-cut scarps, and they varied in height from 100 to 150 feet. Occasional patches of brash were met, and until middle position patches and streams of much broken-up drift ice were occasionally in sight to the southward.	do.
	28	From 59° 56' S. To 59° 53' S. To 59° 43' S.	32° 05' W. 31° 00' W. 30° 13' W.	13 bergs and brash	Bergs within three miles of track. Three were large tabulars, four tabulars of moderate size, and the remainder weathered and irregular. Throughout this time, brash ice, sometimes in large fragments, generally littered the sea, in sparse streams and detached lumps. Between middle and last positions this became heavier and denser, and blink to the southward indicated the presence of pack.	do.
	28	From 59° 43' S. To 59° 40' S. To 59° 41' S.	30° 13' W. 30° 00' W. 30° 04' W.	21 bergs	Within five miles of track. About half of these were well preserved tabulars, and half irregular; none of any great size. Frequent detached fragments of sea-ice floes were passed.	do.

Year.	Day.	Position.		Description.	Remarks.	Name of Ship reporting.
		Latitude.	Longitude.			
1932	28	From 59° 41' S. To 59° 30' S. To 59° 08' S.	30° 04' W. 29° 25' W. 29° 08' W.	42 bergs and drift ice	Within six miles of track. About half these bergs were tabulars averaging 100 feet in height, and the largest 1,500 feet long. The remainder were of various sizes, none very large. Throughout this time, drift ice was usually visible to southward.	R.R.S. <i>Discovery II</i> .
	29	From 59° 08' S. To 59° 00' S.	29° 08' W. 28° 45' W.	56 bergs and drift ice	Bergs within six miles of track. About half of them tabular, and none of any great size. Between these positions the sea was studded with innumerable fragments of floes, and in last position a line of heavy pack-ice, running E.N.E. and W.S.W. was met. This ice was not examined, but appeared very loose and much broken up.	do.
	29	From 59° 00' S. To 58° 45' S. To 58° 33' S.	28° 45' W. 28° 22' W. 27° 05' W.	52 bergs and drift ice	Bergs within ten miles of track, fairly evenly distributed. Three large tabulars, the largest about 2,000 feet long and 150 high, the remainder mainly of moderate size, and about half of them tabular. During this time, drift ice was intermittently in sight to the S.E., and the edge of it was reached in last position, consisting of heavy sea-worn floes raggedly scattered over the sea, and here and there forming straggling streams. Bristol Island appeared to be surrounded with loose drift ice.	do.
	29	From 58° 33' S. To 58° 20' S.	26° 59' W. 26° 54' W.	Drift ice and eight bergs	Between these positions, the vessel worked through ragged streams of heavy drift ice, mainly composed of very old overcut floes, many of them 20 feet thick, and standing, with their snow covering, 10 feet out of the water in some cases. The bergs were within a mile of the track. Two of them were low tabulars, about 40 feet high, and the remainder of moderate size and was-worn. After this, to the Northward and Northeast, no ice was seen till 58° 06' S., 26° 30' W., the weather being foggy.	do.
	29	From 58° 06' S. To 58° 02' S. To 57° 54' S. To 57° 43' S.	26° 30' W. 26° 16' W. 25° 34' W. 25° 49' W.	35 bergs, innumerable bergy bits and growlers, and drift ice.	Within one mile of track. Only six of these bergs were tabular. The remainder being mainly of moderate size and greatly varied in shape. Throughout this time the sea was dotted with wreckage of old sea-ice floes and innumerable bergy bits and large growlers. In 57° 54' S., 25° 34' W. streams of loose heavy drift ice were met, and course was altered to the Northwest.	do.
	30	57° 27' S.	26° 09' W.	Berg	Tabular, 80 feet high, 300 feet long	do.
	30	From 57° 26' S. To Nelson Strait, Candlemas Is.	26° 09' W.	11 bergs	Within seven miles of track. Four large tabulars, each about 1,000 feet long. The remainder all of moderate size and irregular. Three of these were stranded on the southern side of Candlemas Island.	do.
	30	N.E. of Candlemas Is.		24 bergs	Within a ten mile radius of the Northern side of the Islands. Fifteen of these, mainly small, were grounded on the shelf of the island, the remainder were in the offing. Three of these were large tabulars, the rest mainly small.	do.
	30	Between Candlemas and Visokoi Is.		3 bergs	One moderate sized tabular, two small, much weathered and sea-worn bergs.	do.
	30	Visokoi Island.		33 bergs	Within a 10 mile radius of the island. Five small bergs were grounded off the west and southern shores, and off the eastern point a cluster of bergs was grounded, there being eleven in about two square miles. Four of these were low tabulars, 30 feet in height, and the largest 1,200 feet long, and the remainder mainly capsized and sea-worn. The remaining 17 bergs were scattered about in the offing, mainly to the North and East, and none was very large.	do.
	30	Between Visokoi and Zavodovski Is.		13 bergs	Within 10 miles of track. Five tabulars of moderate size, the rest irregular in shape. Three small bergs were grounded round Zavodovski.	do.
	30	55° 51' S.	26° 00' W.	Berg	Of moderate size and weathered	do.

Reports of Ice previous to November, 1932, will be found in the Marine Observer, Vol. IX, No. 107, p. 209.

December.

1932	4	52° 04' S.	152° 29' W.	Growler ... ..	...	M.V. <i>Port Dunedin</i> .
	7	58° 25' S.	139° 30' W.	Berg	500 feet by 250 feet at highest point (estimated). Very irregular with large peak at one end.	S.S. <i>Norfolk</i> .
	7	58° 30' S.	137° 38' W.	Berg	Very irregular with high central peak about same size as above.	do.
	7	58° 27' S.	137° 23' W.	Berg	500 feet by 100 feet (sextant angles) irregular in shape ...	do.
	8	58° 46' S.	134° 45' W.	Berg	Large tabular	do.
	8	59° 00' S.	131° 00' W.	Berg	2,500 feet by 200 feet high, tabular with a large cave-like hole in its side of about 100 feet diameter (sextant angles).	do.
	7	58° 11' S.	129° 40' W.	Large berg	Much weathered	M.V. <i>Port Dunedin</i> .
	9	59° 14' S.	125° 00' W.	Berg	Tabular	S.S. <i>Norfolk</i> .
	7	59° 36' S.	124° 11' W.	Small berg and growlers ... ..	...	M.V. <i>Port Dunedin</i> .
	7	59° 25' S.	123° 58' W.	Large berg ... ..	...	S.S. <i>Norfolk</i> .
	9	59° 32' S.	123° 22' W.	Growlers	One large and several small and chips	M.V. <i>Port Dunedin</i> .
	7	59° 44' S.	123° 07' W.	Large berg ... ..	...	do.
	7	59° 48' S.	123° 04' W.	Large berg ... ..	...	S.S. <i>Norfolk</i> .
	9	59° 34' S.	122° 54' W.	Berg	Tabular, 500 feet by 100 feet high (sextant angles) ...	do.
	9	59° 30' S.	122° 50' W.	Small berg	About 60 feet by 300 feet	do.
	9	59° 24' S.	121° 20' W.	Berg	Cylindrical in shape about 10 feet by 60 feet	do.
	9	59° 20' S.	121° 20' W.	Berg ... ..	...	do.
	9	59° 00' S.	121° 20' W.	Two bergs	Tabular	do.
	8	59° 40' S.	121° 10' W.	One berg and growler	One very large	M.V. <i>Port Dunedin</i> .
	8	59° 52' S.	121° 10' W.	One berg ... ..	...	do.
	9	59° 44' S.	121° 09' W.	Berg ... ..	...	do.
	9	59° 35' S.	121° 08' W.	2 small bergs and several growlers	1,000 feet by 300 feet high and 100 feet thick	S.S. <i>Norfolk</i> .
	9	59° 49' S.	118° 52' W.	Berg and several growlers ... ..	...	do.
	8	60° 01' S.	117° 25' W.	One berg	Tabular with several pinnacles	do.
	9	59° 49' S.	116° 12' W.	Berg	150 feet high, 230 feet long (measured).	M.V. <i>Port Dunedin</i> .
	8	59° 50' S.	115° 38' W.	Small berg and growler	Large tabular	S.S. <i>Norfolk</i> .
	8	59° 54' S.	112° 14' W.	Small berg, growler, and bergy bit ... ..	...	M.V. <i>Port Dunedin</i> .
	9	59° 48' S.	104° 55' W.	Large berg ... ..	...	do.
	9	59° 55' S.	103° 43' W.	Small berg and growler ... ..	...	do.
	1	From 55° 43' S. To 54° 51' S.	28° 24' W. 29° 33' W.	10 bergs	Within 10 miles of track. Three tabulars, each about 60 feet high and 500 long, four moderate sized irregular bergs, and three small and pinnacled.	R.R.S. <i>Discovery II</i> .
	1	54° 45' S.	29° 47' W.	2 bergs	Both small and much sea-worn	do.
	1	54° 31' S.	29° 43' W.	2 bergs	One moderate sized tabular, one small pinnacle berg. After this, visibility poor.	do.
2	From 53° 47' S. To 52° 50' S.	31° 09' W. 31° 58' W. 32° 36' W.	2 bergs 4 bergs	One moderate sized tabular, one small pinnacle berg ...	do.	
2	52° 47' S.	32° 32' W.	11 bergs	Within four miles of track. One very large tabular, 120 feet high and about four miles long, one moderate sized weathered berg, and two small sea-worn bergs.	do.	
2	52° 41' S.	32° 50' W.	Berg	In a cluster on this position, seven tabulars, three of them large and four of moderate size, and all about 140 feet high; four irregular bergs of moderate size.	do.	
2	52° 34' S.	32° 52' W.	Berg	Of moderate size and tabular	do.	
3	50° 54' S.	34° 52' W.	Berg	Of moderate size and pinnacled	do.	
5	52° 36' S.	36° 46' W.	Berg	Tilted and weathered tabular	do.	
			Berg	Of moderate size. Tilted tabular.	do.	

Year.	Day.	Position.		Description.	Remarks.	Name of Ship reporting.
		Latitude.	Longitude.			
1932	5	52° 46' S.	36° 46' W.	Berg	Small and pinnaced	R.R.S. <i>Discovery II.</i>
	5	53° 17' S.	36° 35' W.	Berg	Of moderate size and irregular	do.
	5	53° 44' S.	36° 33' W.	Bergy bit	Low; almost awash	do.
	10	From Cumberland Bay To 20m. North of C. Crewe.		20 bergs	Off the coast of South Georgia, between these positions and within 15 miles of track. Ten small, broken-down bergs were grounded on the coast between Cape Larsen and Cape Constance; the remaining ten were fairly equally distributed to seaward. Two of these were broken-down tabulars of moderate size, the remainder mainly small.	do.
	10	From 20m. North of C. Crewe To 53° 21' S. 37° 06' W.		12 bergs	Within 15 miles of track. Four of these were broken-down tabulars of moderate size, none over 150 feet in height. The remainder were mainly small and much weathered.	do.
	10	From 53° 21' S. 37° 12' W. To 52° 42' S. 37° 23' W.		7 bergs	Within 10 miles of track. Two tabulars of moderate size, two moderate-sized irregular bergs and three small and pinnaced.	do.
	11	From 52° 41' S. 37° 23' W. To 53° 35' S. 39° 23' W.		76 bergs	Within 15 miles of track, and fairly evenly distributed, on both sides. Of these bergs only five were of moderate size, and they were all broken-down tabulars; the largest was 180 feet high and about 600 feet long. The remaining bergs were nearly all small, and in all cases, much weathered, or water worn. Probably they were mainly fragments of broken-up tabular bergs.	do.
	12	From 35' West of Willis Islands. To Willis Islands.		13 bergs	Within 15 miles of track. Four large tabulars, all about 180 feet high and 2,000 feet long, were seen 35 m. W. of Willis Is. They were possibly aground. The remainder were fairly evenly distributed, and all of them were of moderate size and weathered. Three small bergs were grounded near the islands.	do.
	12	54° 11' S.	38° 27' W.	Berg	Of moderate size and irregular	do.
	13	54° 38' S.	37° 20' W.	2 bergs	Both of moderate size and irregular	do.
	13	From 15m. S.E. of Pickersgill Islands. To 4m. S. of Green Islands.		20 bergs	Of these only three were to seaward, the remainder being grounded inshore. They were fairly evenly distributed down the coast, and were nearly all tabulars, mainly large. Two of them were very large; one off Novosilski Bay was half-a-mile long, and one off Green Islands a mile long; both these bergs being only about 60 feet in height.	do.
	13	Within 15m. radius of Cooper Is.		4 bergs	One of these, a broken-down tabular, was grounded near Cooper Island. The other three were scattered in the offing. All of them were of moderate size, and two were tabular.	do.
	13	From 17m. E. of Cooper Is. To 54° 24' S. 34° 06' W.		11 bergs	Within 15 miles of track. Three large tabulars, each about 1,000 feet long and 180 feet high, two tabulars of moderate size, all well-preserved. The remainder were mainly small and much weathered or water-worn.	do.
	14	From 54° 24' S. 35° 08' W. To 54° 24' S. 35° 45' W.		15 bergs	Within 12 miles of track, mainly to southward. Six large tabular bergs, ranging from 1,000 to 3,000 feet in length and all about 180 feet high, six irregular bergs of moderate size, and two small and much seaworn.	do.
	14	Between C. Vakop and Cumberland Bay.		4 bergs	Three grounded along the coast between these positions, and one to seaward off Cape George. All these bergs were small and breaking down.	do.

Reports of Ice previous to December, 1932, will be found in the Marine Observer, Vol. IX, No. 108, p. 228.

WIRELESS WEATHER SIGNALS.

I.—SHIPS' WIRELESS WEATHER SIGNALS.

A full description of the system of communication for British "Selected Ships" with instructions was given on pp. 28-38 of the January number of this volume of THE MARINE OBSERVER.

The list which follows contains the latest information of stations to which "A Selected Ships" should report in accordance with those instructions, and stations detailed to intercept reports from "B Selected Ships" also in accordance with those instructions.

To decode these reports, and for ships other than "Selected Ships" to have information of the system of communication of "Selected Ships", all concerned are referred to the PAMPHLET, M.O. 329, concerning which special notice to the masters of British ships will be found on p. 39 of the January 1933 number of THE MARINE OBSERVER and in Board of Trade Notices to Mariners dated January 1st, 1933.

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 28 OF VOL. X, No. 109, JANUARY MARINE OBSERVER.

Ocean.	Station.	Position.	Call Sign.	Frequency and Wave Length.		Area and limits covered by Station.	Telegraphic address of Meteorological Centre.	Information required—Limit of Groups.	Notes.
				For Station to call up "Selected Ships."	For "Selected Ships" to report to Station.				
North Atlantic and North Sea.	Portishead.	Lat. 51° 28' 41" N. Long. 2° 47' 30" W.	GKU.	149 kc/s. (2013 metres).	143 kc/s. (2100 metres).	North Sea and Eastern North Atlantic East of Longitude 40° W. and North of Latitude 38° N., but not within 300 miles of station. (see Chart V.)	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 London—call sign of chosen "Selected Ships" to report through GKU at schedule times on 2100 m.
	Chatham Mass.,	Lat. 41° 42' N. Long. 70° 00' W.	WCC.	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.	
	Sayville N.Y.	Lat. 40° 45' N. Long. 73° 06' W.	WSL.						
	Rockland.	Lat. 44° 09' N. Long. 69° 13' W.	WAG.						
	West Palm Beach.	Lat. 26° 42' N. Long. 80° 02' W.	WMR.						
Palm Beach.	Lat. 26° 42' N. Long. 80° 02' W.	WOE.							
Mediterranean and Red Sea.									
South Atlantic.	Slangkop (Cape Town)	Lat. 34° 08' 46" S. Long. 18° 19' 18" E.	ZSC	—	143 kc/s. (2100 metres).	South Atlantic Westward of 25° E. and within a range of about 2 000 miles of station.	Met.	Weather only. Four universal groups and first group of No. 6 Supplementary groups.	No control. Only 600 G.M.T. observation required. All British "A Selected Ships" within area should report, commencing at 0618 G.M.T.

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

(Continued.)

Ocean.	Station.	Position.	Call Sign.	Frequency and Wave Length.		Area and limits covered by Station.	Telegraphic address of Meteorological Centre.	Information required—Limit of Groups.	Notes.
				For Station to call up "Selected Ships."	For "Selected Ships" to report to Station.				
Indian Ocean.	Jacobs (Durban).	Lat. 29° 55' 51" S. Long. 30° 58' 38" E.	ZSD	—	143 kc/s. (2100 metres).	Indian Ocean S. of 20°S. and Eastward of 25°E. and within a range of about 2,000 miles of station.	Met.	Weather only. Four universal groups and first group of No. 6 Supplementary groups.	No control. Only 0600 G.M.T. observations required. All British "A Selected Ships" within area should report, commencing at 0618 G.M.T.
	Bombay.	Lat. 19° 04' 55" N. Long. 72° 49' 54" E.	VWB	—	143 kc/s. (2100 metres).	Arabian Sea N. of line C. Comorin to Ras Fartak.	Weather.	Weather only. No. 6 Supplementary groups.	All British "A Selected Ships" are requested, when convenient, to report 0000 G.M.T. observations commencing at 0018 G.M.T. in addition to schedule times
	Madras.	Lat. 12° 59' 17" N. Long. 80° 10' 56" E.	VWM	—	143 kc/s. (2100 metres).	Bay of Bengal N. of line C. Comorin to Achin Head.	Weather.	Weather only. No. 6 Supplementary groups.	All British "A Selected Ships" are requested, when convenient, to report 1200 G.M.T. observations commencing at 1218 G.M.T. in addition to schedule times.
	Colombo.	Lat. 6° 55' 14" N. Long. 79° 52' 46" E.	VPB	130 kc/s. (2300 metres).	143 kc/s. (2100 metres).	Indian Ocean South of a line Ras Fartak, C. Comorin and Achin Head, and within a range of about 1500 miles.	Obs.	Weather only. No. 6 Supplementary groups preferred.	No control — all British "A Selected Ships" within area should report in accordance with Schedule.
	Mombasa.	Lat. 4° 03' 11" S. Long. 39° 39' 51" E.	VPQ	—	125 kc/s. (2400 metres).	From Ras Hafun to Lat. 20° S. when westward of the Colombo area.	Weather Nairobi.	Weather only. No. 6 Supplementary groups.	No control — all British "A Selected Ships" within area should report 0600 G.M.T. observations.
	Perth.	Lat. 32° 01' 51" S. Long. 115° 49' 31" E.	VIP	125 kc/s. (2400 metres).	143 kc/s. (2100 metres).	Indian Ocean and Southern Ocean between Long. 105° and 135° E.; but not within 100 miles of the coast.	Weather.	Weather only. No. 6 Supplementary groups.	No control — all British "A Selected Ships" within area should report in accordance with Schedule. Reports not required for observation times not starred on Chart I, p. 30, Vol. X. No. 109 (January).
North Pacific and China Sea.	Cape d'Aguilar, Hong Kong.	Lat. 22° 12' 39" N. Long. 114° 15' 11" E.	VPS.	—	125 kc/s. (2400 metres).	China Sea and North Pacific to about 1,500 miles from station.	Royal Observatory.	Weather only, preferably No. 6 Supplementary Groups.	No control — all British "A Selected Ships" within area should report in accordance with Schedule.
South Pacific	Sydney.	Lat. 33° 46' 00" S. Long. 151° 03' 09" E.	VIS	125 kc/s. (2400 metres).	143 kc/s. (2100 metres).	S. Pacific, Coral and Tasman Seas and Southern Ocean between Long. 135° and 160° E.; but not within 100 miles of the coast.	Weather.	Weather only. No. 6 Supplementary groups.	No control — all British "A Selected Ships" within area should report in accordance with Schedule. Reports not required for observation times not starred on Chart I, p. 30, Vol. X. No. 109 (January).
	New Zealand.	—	—	—	—	—	Weather Wellington.	Weather only, up to seven groups.	The Meteorological Office, Wellington, will be glad to receive routine reports from British Selected Ships within range of New Zealand W/T Stations through the normal commercial channels.

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

In cases where routine weather reports made to CQ might not be received by the appropriate station within range, indicated in this list, they should be made to that station by call sign, but so that they may be readily intercepted by all ships.

Ocean.	Station.	Position.	Call Sign.	Telegraphic address of Meteorological Centre desiring information.	Information desired.	Notes.
North Atlantic.						
South Atlantic.	Salinas	Lat. 0° 35' 00" S. Long. 47° 18' 45" W.	PPL.	Meteoro Rio.	Weather only, including supplementary groups.	
	S. Luiz	Lat. 2° 31' 48" S. Long. 44° 16' 51" W.	PXM.			
	Fortaleza	Lat. 3° 46' 21" S. Long. 38° 32' 26" W.	PPC.			
	Natal	Lat. 5° 46' 41" S. Long. 35° 18' 24" W.	PXN.			
	F. Noronha	Lat. 3° 50' 24" S. Long. 32° 24' 48" W.	PXF.			
	Olinda	Lat. 8° 00' 35" S. Long. 34° 51' 00" W.	PP0.			
	Amaralina	Lat. 13° 00' 12" S. Long. 38° 30' 45" W.	PPA.			
	Abrolhos	Lat. 17° 57' 30" S. Long. 38° 41' 05" W.	PXH.			
	Victoria	Lat. 20° 10' 00" S. Long. 40° 17' 46" W.	PPT.			
	Rio	Lat. 22° 53' 42" S. Long. 43° 13' 24" W.	PPR.			
	Santos	Lat. 23° 56' 27" S. Long. 46° 19' 28" W.	PPS.			
	Florianopolis.	Lat. 27° 36' 00" S. Long. 48° 30' 18" W.	PPF.			
	Juncçao	Lat. 32° 04' 00" S. Long. 52° 07' 00" W.	PPJ.			
Indian Ocean.	Jacobs (Durban).	Lat. 29° 55' 51" S. Long. 30° 58' 38" E.	ZSD	Met.	Weather only, 4 universal groups and first group of No. 6 Supplementary groups.	
	Algoa Bay (Port Elizabeth).	Lat. 33° 57' 16" S. Long. 25° 35' 30" E.	ZSQ	Met.	Weather only, 4 universal groups and first group of No. 6 Supplementary groups.	
	Calcutta.	Lat. 22° 33' 31" N. Long. 88° 20' 16" E.	VWC.	Weather.	Weather only up to 6 groups, No. 6 Supplementary 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.			
	Mombasa.	Lat. 4° 03' 11" S. Long. 39° 39' 51" E.	VPQ	Weather Nairobi.		
	Dar-es-Salaam.	Lat. 6° 50' 38" S. Long. 39° 17' 24" E.	ZBZ	Weather Nairobi.		
	Mauritius.	Lat. 20° 23' S. Long. 57° 35' E.	VRS.	Observatory Mauritius.	Weather 4 universal groups and first of No. 6 Supplementary Groups.	
	Geraldton.	Lat. 28° 47' 15" S. Long. 114° 36' 24" E.	VIN	Weather.	Weather only, including No. 6 Supplementary Groups.	
	Esperance.	Lat. 32° 01' 51" S. Long. 121° 53' 34" E.	VIE			

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

(Continued.)

In cases where routine weather reports made to CQ might not be received by the appropriate station within range, indicated in this list, they should be made to that station by call sign, but so that they may be readily intercepted by all ships.

Ocean.	Station.	Position.	Call Sign.	Telegraphic address of Meteorological Centre desiring information.	Information desired.	Notes.
North Pacific and China Sea.	Cape d'Aguilar, Hong Kong.	Lat. 22° 12' 39" N. Long. 114° 15' 11" E.	VPS.	Royal Observatory.	Weather only, preferably No. 6 Supplementary Groups.	
South Pacific.	Auckland.	Lat. 36° 50' 36" S. Long. 174° 46' 08" E.	ZLD.	Weather Wellington.	Weather only, up to 7 groups.	The Meteorological Office, Wellington will be glad to receive routine reports from British Selected Ships within range of New Zealand W/T Stations through the normal commercial channels.
	Wellington.	Lat. 41° 16' 26" S. Long. 174° 45' 55" E.	ZLW.			
	Awarua.	Lat. 46° 30' 27" S. Long. 168° 22' 21" E.	ZLB.			
	Chatham Island.	Lat. 43° 57' 02" S. Long. 176° 31' 04" W.	ZLC.			
	Rarotonga.	Lat. 21° 11' 54" S. Long. 159° 48' 51" W.	ZKR.			
	Apia.	Lat. 13° 15' 17" S. Long. 170° 49' 42" W.	ZMA.			
	Thursday I.	Lat. 10° 35' 14" S. Long. 142° 12' 43" E.	VII	Weather	Weather only, including No. 6 Supplementary Groups.	
	Townsville	Lat. 19° 16' 09" S. Long. 146° 49' 47" E.	VIT			
	Brisbane	Lat. 27° 25' 34" S. Long. 153° 07' 19" E.	VIB			
	Melbourne	Lat. 37° 46' 56" S. Long. 144° 52' 09" E.	VIM			
	Adelaide	Lat. 34° 51' 14" S. Long. 138° 31' 55" E.	VIA			
	Talcahuano	Lat. 36° 41' 27" S. Long. 73° 06' 19" W.	CCT	Meteo, Santiago.	Weather only, including supplementary groups.	
	Llanquihue	Lat. 41° 08' 00" S. Long. 73° 02' 00" W.	CCW			
	Juan Fernandez.	Lat. 33° 38' 09" S. Long. 78° 47' 50" W.	CCJ			
	Magallanes	Lat. 53° 10' 00" S. Long. 70° 54' 00" W.	CCN			

CHILE.

II.—WEATHER SHIPPING BULLETINS.

Santiago Central W/T Station, approximate position Latitude 33° 26' S., Longitude 70° 38' W.

Call sign **CCS**.

Wavelengths 3,000 metres and 25 metres C.W.

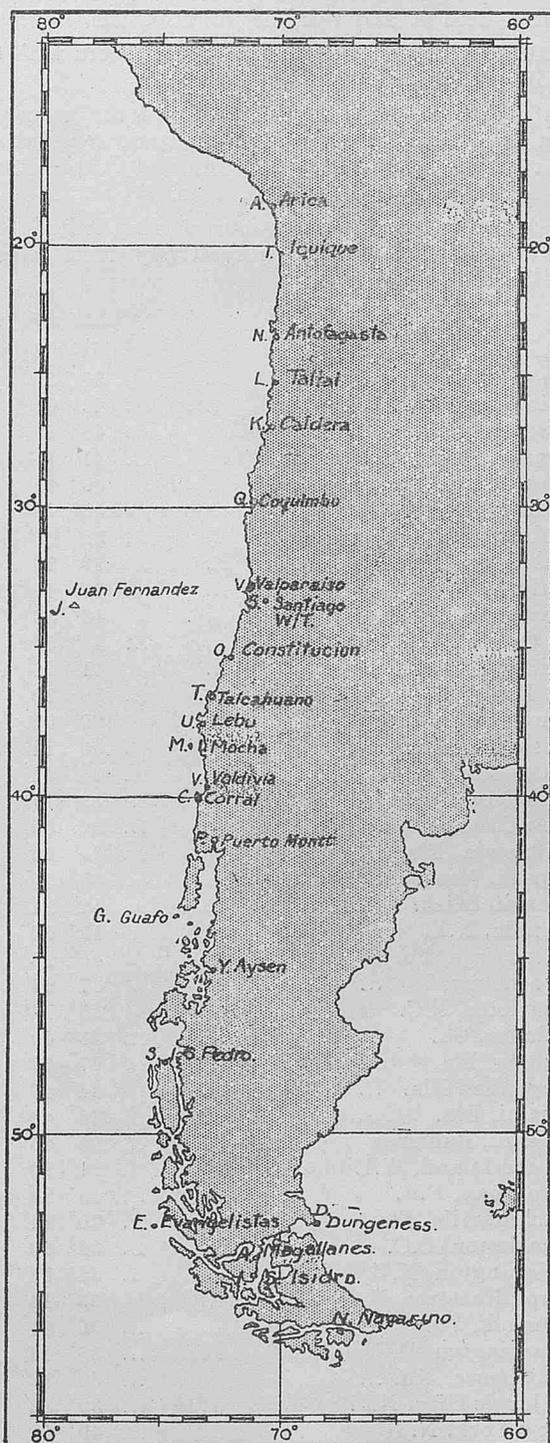
Times of transmission 0130, 1430 and 2030 G.M.T.

The messages are based upon observations taken at 2300, 1200 and 1800 G.M.T. respectively.

They consist of three parts:—

Part I.—General statement of weather conditions *en clair* (Spanish).

Chart showing Stations for Weather Shipping Bulletin for coast of Chile.



No information as to Forecast Areas is available.

Part II.—Weather Report in code giving actual observations at stations shown on the chart on this page.

Part III.—Forecast of weather in plain language.

The stations are sent in groups of five, the distinguishing letters of the stations, which are shown alongside each station on the chart, forming the initial group of each eleven groups. The stations are transmitted in the order from North to South.

The station reports are made in the International Ships Wireless Weather Telegraphy Code.

To decode these reports the tables given in the Decode M.O. 329 are required. The Key letters are fully described on p. 35 of the January, 1933, number and in M.O. 329.

Key letters used for station reports—DDFww BBVTT.

WIRELESS STORM WARNINGS.

Valparaiso W/T Station, call sign **CCE**, broadcasts storm warnings when necessary, on a wave length of 600 metres (I.C.W.).

III.—WIRELESS TIME SIGNALS.

W/T Station.	Call Sign.	Wave-length Metres.	G.M.T. of Time Signal.
Valparaiso Lat. 33° 01' 03" S. Long. 71° 39' 25" W.	CCL	2,150 (C.W.).	h m s h m s 00 55 00—01 00 00

SYSTEM.—The Time Signal commences at 00h. 55m. 00s. G.M.T. and continues for 5 mins., and consists of a series of dots which represent each second, except that the dots at the 29th, 51st, 52nd, 53rd, 54th, 55th, 56th, 57th, 58th and 59th seconds of each of the five minutes are omitted. The dot at the 60th second of each minute is the time signal.

NOTES.—

Time Signal controlled by the Hydrographic Office.

In the event of failure or irregularities in the Time Signal the word "Señal nula" (Signal annulled) will be made three times in succession, one minute after 0100 G.M.T.

ARGENTINA.

II.—WIRELESS WEATHER BULLETINS.

The following W/T Stations broadcast a weather forecast, for 24 hours, for the coast of Argentina *en clair* in Spanish.

W/T Station.	Position.		Call Sign.	Time of transmission.	Wavelength.
	Latitude.	Longitude.			
Comodoro Rivadavia.	45°52' S.	67°28' W.	LOX	GMT 2000	600 metres C.W.
Buenos Aires — Darsena Norte.	34°36' S.	58°22' W.	LOL	0230	1053 „ „
Buenos Aires — General Pacheco.	34°28' S.	58°38' W.	LPD	1700	600 „ I.C.W.
Parana ...	31°44' S.	60°27' W.	LPE	1830	600 „ C.W.

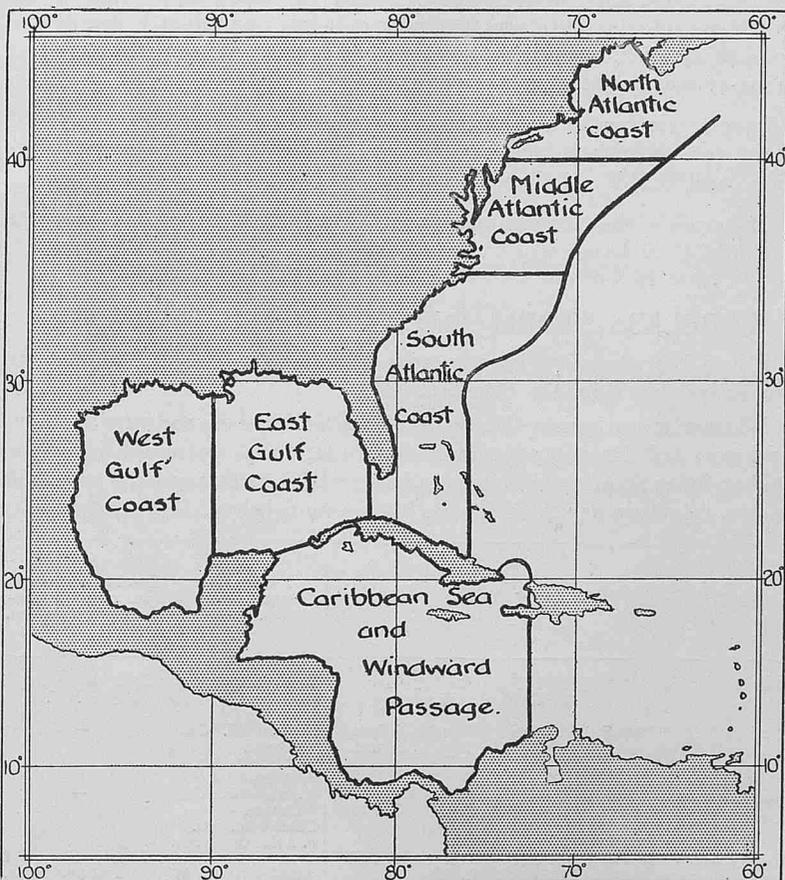
Indicator letters	Name of station	Latitude north	Longitude west
BN	Boston, Mass. ...	42° 22'	71° 02'
N	Northfield, Vt. ...	44° 08'	72° 40'
E	Eastport, Me. ...	44° 54'	67° 00'
CK	Cochrane, Ont. ...	49° 04'	80° 58'
DC	Doucet, Que. ...	48° 17'	76° 40'
PN	Parry Sound Ont. ...	45° 20'	80° 01'
ML	Montreal, Que. ...	45° 31'	73° 34'
FP	Father Point, Que. ...	48° 30'	68° 30'
BC	Port Aux Basques, N.F. ...	47° 33'	59° 10'
CR	Cape Race, N.F. ...	46° 40'	53° 04'
SAB	Sable Island, N.S. ...	43° 56'	60° 00'
HX	Halifax, N.S. ...	44° 38'	63° 35'
B	Bermuda ...	32° 18'	64° 42'
HT	Horta, Azores ...	38° 32'	28° 29'

WIRELESS STORM WARNINGS.

Storm warnings are broadcast when necessary by the following stations, at the times and for the areas stated below:—

W/T Station.	Call Sign.	Position. (Approx.) Latitude, Longitude.	Time. G.M.T.	Wave-length. (Metres.)	Area (see Chart).
Jupiter, Fla. ...	NAQ	26° 57' N. 80° 05' W.	1630, 2300	1,621 (I.C.W.)	Middle and South Atlantic and E. Gulf coasts.
St. Augustine, Fla.	NAP	29° 53' N. 81° 17' W.	1700	1,621 (C.W.)	Do.
Savannah, Ga.	WSV	32° 05' N. 81° 06' W.	1600, 2330	1,765 (I.C.W.)	Do.
Charleston, S.C.	NAO	32° 52' N. 79° 58' W.	1530, 2300	2,458 (I.C.W.)	Do.
Washington (Arlington)	NAA	38° 52' N. 77° 05' W.	0200* 1500*	2,653, 4,690 C.W. simultaneously.	N. Atlantic and Gulf coasts.
New York ...	NAH	40° 28' N. 74° 00' W.	1530, 2200	2,939 (C.W.)	N. and middle Atlantic coasts.
Boston, Mass.	NAD	42° 21' N. 70° 57' W.	1600, 2200	2,941 (C.W.)	N. Atlantic Coast.

Chart showing Forecast and Storm Warning Areas for Atlantic and Gulf Coasts of United States.



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

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

W/T Station.	Call Sign.	Position (approx.)		Time, G.M.T.	Wave length. Metres.
		Latitude.	Longitude		
Tuckerton, N.J. ...	WSC	39° 33' N.	74° 23' W.	1400, 2200	650, 2256 (I.C.W. and C.W.)
Marion, Mass. ...	WCC	41° 43' N.	70° 46' W.	1400, 2200	2326 (C.W.)
Rockland Mt. ...	WAG	44° 09' N.	69° 13' W.	1400, 2200	718, 2479 (I.C.W. and C.W.)

* In Part II of the Weather Bulletin.

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

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

III.—WIRELESS TIME SIGNALS.

Time Signals are broadcast according to the United States System (See Diagram of Washington—Annapolis W/T Time Signals p. 148), from the following W/T Stations:—

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

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

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

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

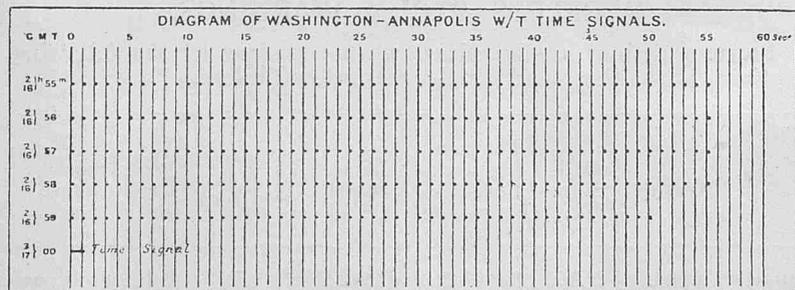
Washington—Annapolis, Latitude 38° 59' 00" N., Longitude 76° 27' 00" W., call sign **NSS**, on a wavelength of 16,840 metres (C.W.), at 3h. 00m. 00s., 5h. 00m. 00s., 8h. 00m. 00s., 17h. 00m. 00s., and 21h. 00m. 00s., G.M.T.

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

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

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

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



The following W/T Stations broadcast a time signal at 17h. 00m. 60s., G.M.T., only when Washington—Arlington is out of action (Sundays and holidays excepted):—

Station	Latitude.	Longitude.	Call Sign.	Wavelength. Metres.
New York ...	40° 48' 00" N.	73° 50' 00" W.	NAH	2,939 (C.W.).
Norfolk ...	36° 49' 33" N.	76° 17' 46" W.	NAM	2,458 (I.C.W.).
Charleston ...	32° 51' 36" N.	79° 57' 49" W.	NAO	2,458 (I.C.W.).

IV.—WIRELESS ICE WARNINGS.

North Atlantic International Ice Patrol.

The North Atlantic International Ice Patrol commences in March, continuing during April, May and June and longer if necessary. The Patrol vessels, call sign NIDK, transmits wireless warnings giving the limits and position of the ice in the neighbourhood of the regular Transatlantic Lane Routes.

The warnings are broadcast daily at 0100 and 1300 G.M.T. on a wavelength of 1713m. C.W. and at 1100 and 2300 G.M.T. on a wavelength of 706m. C.W.

Ice information will also be sent on request at all times to any ship with which the Patrol Vessel can communicate, without charge.

The following W/T Stations broadcast messages received from the Patrol Vessel:—

W/T Station.	Call Sign.	Times of Transmission. G.M.T.	Wavelength. Metres.
Washington ...	NAA	0400, 1700	2653 C.W.
Boston ...	NAD	1600, 2200	2939 C.W.
New York ...	NAH	1530, 2130	2939 C.W.
Norfolk ...	NAM	0900, 1600, 2100	2458 C.W.

Caribbean Sea, Gulf Coast and West Indian Islands.

Weather forecasts are issued for the following stations at the times and for the areas given:—

W/T Station.	Position.		Call Sign.	Times of Transmission. G.M.T.	Wavelength.	Area affected (see chart, p 147).
	Latitude.	Longitude.				
Limon ...	10° 00' N.	83° 03' W.	TIM	1630	750 m.	E. Gulf, W. Gulf, Caribbean Sea, Windward passage.
New Orleans	30° 00' N.	90° 06' W.	WFB	0430, 1630	3331 m. C.W.	E. Gulf, W. Gulf, Caribbean Sea, Windward passage.

W/T Station.	Position.		Call Sign.	Times of Transmission. G.M.T.	Wave-length.	Area affected (see chart, p. 147).
	Latitude.	Longitude.				
Key West	24° 33' N.	81° 48' W.	NAR	0400 1800	2653 m. C.W. 2653 m. C.W.	Jacksonville to Florida Strait, E. Gulf, W. Gulf, Caribbean Sea, Windward passage, Florida, E. Gulf.

Barbados.

Bridgetown W/T station, approximate position latitude 13° 06' N., longitude 59° 37' W., call sign VPO, wavelength 600m. I.C.W., broadcasts the following weather information, received from the Meteorological Station, Codrington (latitude 13° 07½' N., longitude 59° 36' W.), when unsettled weather conditions prevail or indications of stormy weather are observed:—

Barometric pressure, barometric tendency, wind direction and force (or velocity in miles per hour), weather at time of observation, and G.M.T. of the observation.

If possible the approximate position of the centre of a tropical cyclonic disturbance will be broadcast.

WIRELESS STORM AND HURRICANE WARNINGS.

Storm Warnings are broadcast by the following W/T Stations for the areas shown on the Chart p. 147.

When a storm exists that is likely to affect the area, the location and expected direction of movement of the storm centre will be given.

Hurricane Warnings are broadcast when necessary and repeated at the intervals as stated in the last column below.

W/T Station.	Call Sign.	Position (approx.) Latitude. Longitude.	Wave length Metres.	Time (G.M.T.) of Storm Warnings.	Area (see Chart, p. 147).	Intervals at which hurricane warnings are repeated.
Galveston, Tex.	WGV	29° 19' N. 94° 47' W.	720 (I.C.W.)	1400	West Gulf Coast	Each hour until 2300 G.M.T.
Port Arthur ..	WPA	29° 52' N. 93° 56' W.	600 and 720 (I.C.W.)	When issued.	E. and W. Gulf Coasts, Caribbean Sea, S. Atlantic Coast	—
New Orleans .	WFB	30° 00' N. 90° 06' W.	3331 (C.W.)	0300, 0430 1500, 1630	E. and W. Gulf Coasts, Caribbean Sea, S. Atlantic Coast	—
Key West ..	NAR	24° 33' N. 81° 48' W.	2653 (C.W.)	0400, 1800	S. Atlantic Coast and E. and W. Gulf Coasts.	Hourly after each silent period for 12 hours. About 4 hourly.
Guantanamo (Cuba)	NAW	19° 55' N. 75° 09' W.	600 (I.C.W.)	—	—	—
Santo Domingo	HIA	18° 28' N. 69° 53' W.	600 (Spk.)	—	—	4 hourly.
Ensenada (Porto Rico)	WPR	17° 53' N. 66° 56' W.	600 (Spk.)	—	—	4 hourly.

III.—WIRELESS TIME SIGNALS.

Panama.

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

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

BERMUDA.

II.—WIRELESS WEATHER BULLETIN.

Bermuda W/T Station, approximate position Latitude 32° 23' N., Longitude 64° 40' W.

Call sign, **VRT**.

Times of Transmission—0100 and 1300 G.M.T. on wavelength of 665m. I.C.W. and 0130 and 1330 G.M.T. on wavelength of 2250m. C.W. giving 0000 and 1200 G.M.T. observations respectively at Bermuda of Barometer, Barometric tendency, wind direction and force, past weather, and visibility when it reaches 5 or less.

SAMPLE MESSAGE—“ *Barometer 30.03 falling, wind N.E. 4. Weather cloudy* ”.

A brief weather forecast for the area 30° to 40° N., 60° to 70° W. (20° to 40° N., 60° to 70° W. during August and September), and 30° to 40° N., 50° to 60° W. when conditions are exceptional, is broadcast at 2100 G.M.T. on a wavelength of 665m. I.C.W. repeated at 2118 G.M.T. on 2250m. C.W.

CANADA, NOVA SCOTIA, NEWFOUNDLAND, LABRADOR, ETC.

II.—WIRELESS WEATHER BULLETINS.

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

Country.	W/T Station.	Call Sign.	Position (approx.)		Time, G.M.T.	Wave-length.	
			Lat. N.	Long. W.			
Canada (Nova Scotia).	Lurcher Lt. Vsl.	VDR	43° 49'	66° 32'	—	600 m.	
	Yarmouth ...	VAU	43° 46'	66° 07'	0430, 1630	720 m.	
	Chebucto Head	VAV	44° 30'	63° 31'	0440, 1640	750 m.	
	North Sydney	VCO	46° 13'	60° 15'	—	600 m.	
	Sable Island ...	VCT	43° 56'	60° 02'	—	600 m.	
	Louisburg ...	VAS	46° 09'	59° 57'	0400, 1600	2804 m.	
Canada ...	Grindstone Island	VCN	47° 23'	61° 54'	—	600 m.	
	*Fame Point, Que.	VCG	49° 07'	64° 36'	0430, 1630	660 m.	
	*Clarke City, Que.	VCK	50° 11'	66° 37'	—	600 m.	
	*Father Point, Que.	VCF	48° 31'	68° 28'	0420, 1620	600 m.	
	*Quebec ...	VCC	46° 48'	71° 12'	0410, 1610	600 m.	
	*Montreal ...	VCA	45° 34'	73° 38'	0400, 1600	600 m.	
Canada (New Brunswick).	St. John ...	VAR	45° 14'	66° 03'	0400, 1600	650 m.	
	Newfoundland and Labrador.	Belle Isle ...	VCM	51° 53'	55° 22'	0440, 1640	620 m.
		Cape Race ...	VCE	46° 39'	53° 04'	0215, 1415	660 m.
Point Amour ...		VCL	51° 27'	56° 50'	—	600 m.	
St. Pierre and Miquelon Is.	St. Pierre ...	FQN	46° 47'	56° 11'	0130, 1330	600 m.	
	Hudson Bay and Strait.	†*Port Churchill	VAP	58° 47'	94° 09'	1600	600 m.
†*Cape Hopes		VAY	61° 05'	69° 33'	—	600 m.	
†*Nottingham Is.		VCB	63° 06'	77° 56'	—	600 m.	
†*Resolution Is.		VAW	61° 20'	64° 50'	1620	600 m.	

† Forecast and weather conditions for Hudson Bay and Strait and N. Atlantic adjacent thereto.

Wireless Telephony R/T Issues.

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

Country.	Station.	Call Sign.	Position (approx.)		Time G.M.T.	Wave-length R/T.
			Lat. N.	Long. W.		
Canada (New Brunswick).	St. John... ..	CFBO	45° 14'	66° 03'	1000, 1200	337 m.
Canada (Nova Scotia).	Sambro Outer Bank Lt.-V.	VCX	44° 22'	63° 26'	1200, 1730	435 m.
	Louisburg ...	VAS	46° 09'	59° 57'	0800, 1700	438 m.

III.—WIRELESS TIME SIGNALS.

Chebucto Head D/F Station, Latitude 44° 30' 01" N., Longitude 63° 31' 20" W., call sign **VAV** broadcasts a time signal daily (Sundays excepted) at 14h. 00m. 00s., G.M.T., on a wavelength of 750 metres (spark).

The procedure is as follows:—

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

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

IV.—WIRELESS ICE WARNINGS.

The following W/T stations broadcast ice warnings:—

W/T Station.	Latitude N. (approximate).	Longitude W. (approximate).	Call Sign.	Wavelength (Metres).	G.M.T. of issue.
Lurcher Lt.-V....	43° 49'	66° 32'	VDR	600 (Spk.)	On request.
*Chebucto Head ..	44° 30'	63° 31'	VAV	750 (I.C.W.)	On request.
Sable Island ...	43° 56'	60° 02'	VCT	600 (Spk.)	On request.
*North Sydney ...	46° 13'	60° 15'	VCO	600 (Spk.)	On request.
*Louisburg ...	46° 09'	59° 57'	VAS	2804 (C.W.)	0400, 1600.
*Grindstone Island	47° 24'	61° 51'	VCN	600 (Spk.)	On request.
Fame Point ...	49° 07'	64° 36'	VCG	660 (I.C.W.)	0430, 1630
Clarke City ...	50° 11'	66° 37'	VCK	600 (Spk.)	On request.
*Cape Race ...	46° 39'	53° 04'	VCE	660 (Spk.)	0420, 1620
Pt. Amour ...	51° 27'	56° 52'	VCL	600 (Spk.)	On request.
Belle Isle ...	51° 53'	55° 22'	VCM	620 (I.C.W.)	0440, 1640
Port Churchill...	58° 47'	94° 11'	VAP	600 (I.C.W.)	On request.
Cape Hopes	61° 05'	69° 33'	VAY	600 (I.C.W.)	On request
Advance					
Nottingham Is.	63° 06'	77° 56'	VCB	600 (I.C.W.)	On request.
Resolution ...	61° 19'	64° 53'	VAW	600 (I.C.W.)	On request.

* Broadcasts Gulf of St. Lawrence Ice Patrol report as explained below.

THE GULF OF ST. LAWRENCE ICE PATROL.

The Gulf of St. Lawrence Ice Patrol commences from the opening of navigation in the Gulf and continues until the route is clear of ice.

The Patrol Vessel, call sign **VCQP**, transmits wireless warnings of ice conditions from Cape Race to Quebec and recommendations as to route to be followed.

The warnings are broadcast at 0100 and 1300 G.M.T. on a wavelength of 705 m. I.C.W. preceded by the general call C.Q. on a wavelength of 600 m., and 0130 and 1330 on a wavelength of 1621 m. I.C.W.

The warnings will also be sent on request to any ship, ships should call **VCQP** on 600 m.

The above warnings are also transmitted by the stations marked * in the list above.

PACIFIC COAST.

II.—WIRELESS WEATHER BULLETIN.

San Francisco, California, W/T station, approximate position Latitude 38° 06' N., Longitude 122° 17' W.

Call sign NPG.

Times of Transmission—0330 G.M.T. and 1530 G.M.T.

Wavelengths—7000 and 2776 metres (CW) simultaneously.

The bulletins commence with the letters U.S.W.B. and are in two parts.

Part I—In plain language giving summary of general pressure distribution and forecasts of wind and weather for the off-shore areas—N. of Cape Blanco; between Cape Blanco and Point Conception; and S. of Point Conception.

The period covered by the forecasts in the 0330 G.M.T. bulletin is for 24 hours beginning at 0800 G.M.T. and in the 1530 G.M.T. bulletin for 24 hours beginning at 2000 G.M.T.

Part II—Actual weather observations in United States code for stations in the list below, taken at 0100 G.M.T. for the 0330 G.M.T. bulletin and 1300 G.M.T. for the 1530 G.M.T. bulletin, except as follows, where the observations do not synchronise:—

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

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

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

Observations taken at Midway at 0630 G.M.T.

Indicator Letters and Stations.

Indicator Letters.	Station.	Position (approx.).	
		Latitude.	Longitude.
<i>Alaska.</i>			
NM	Nome	64° 30' N.	165° 24' W.
SPI	St. Paul	57° 15' N.	170° 10' W.
DH	Dutch Harbour	53° 55' N.	166° 30' W.
TN	Tanana	65° 10' N.	152° 06' W.
EA	Eagle	64° 46' N.	141° 12' W.
KD	Kodiak	57° 47' N.	152° 22' W.
CV	Cordova	60° 32' N.	145° 42' W.
JU	Juneau	58° 18' N.	134° 24' W.
<i>Canada.</i>			
ED	Edmonton, Alberta	53° 33' N.	113° 30' W.
KA	Kamloops, B.C.	50° 41' N.	120° 29' W.
CY	Calgary, Alberta	51° 02' N.	114° 02' W.
SC	Swift Current, Sask.	50° 19' N.	108° 02' W.
PR	Prince Rupert, B.C.	54° 18' N.	130° 18' W.
<i>United States, etc.</i>			
TAT	Tatoosh I, Wash.	48° 23' N.	124° 44' W.
SE	Seattle, Wash.	47° 38' N.	122° 20' W.
NH	North Head, Wash.	46° 16' N.	124° 04' W.
PD	Portland, Oreg.	45° 32' N.	122° 41' W.
RO	Roseburg, Oreg.	43° 13' N.	123° 20' W.
EUR	Eureka, Calif.	40° 48' N.	124° 11' W.
RB	Red Bluff, Calif.	40° 10' N.	122° 15' W.
SM	Sacramento, Calif.	38° 35' N.	121° 30' W.
SF	San Francisco, Calif.	37° 48' N.	122° 26' W.
FN	Fresno, Calif.	36° 43' N.	119° 49' W.
SPE	San Pedro, Calif.	33° 44' N.	118° 16' W.
PAR	Point Arguello, Calif.	34° 35' N.	120° 39' W.
LA	Los Angeles, Calif.	34° 03' N.	118° 15' W.
DI	San Diego, Calif.	32° 43' N.	117° 10' W.
SPO	Spokane, Wash.	47° 40' N.	117° 25' W.
WW	Walla Walla, Wash.	46° 02' N.	118° 20' W.
BA	Baker, Oreg.	44° 46' N.	117° 50' W.
HL	Helena, Mont.	46° 34' N.	112° 04' W.
BS	Boise, Idaho	43° 37' N.	116° 13' W.
LD	Lander, Wyo.	42° 50' N.	108° 45' W.
WM	Winnemucca, Nev.	40° 58' N.	117° 43' W.
R	Reno, Nev.	39° 32' N.	119° 49' W.
SLC	Salt Lake City, Utah	40° 46' N.	111° 54' W.
MD	Modena, Utah	37° 48' N.	113° 54' W.

Indicator Letters.	Station.	Position (approx.).	
		Latitude.	Longitude.
<i>United States, etc.—cont.</i>			
DV	Denver, Colo.	39° 45' N.	105° 00' W.
GJ	Grand Junction, Colo.	39° 04' N.	108° 34' W.
SA	Santa Fe, N. Mex.	35° 41' N.	105° 57' W.
PH	Phoenix, Ariz.	33° 28' N.	112° 00' W.
YU	Yuma, Ariz.	32° 45' N.	114° 36' W.
HO	Honolulu, Hawaii	21° 19' N.	157° 52' W.
MDI	Midway Island	28° 12' N.	177° 22' W.
FMA	Manila P.I.	14° 35' N.	120° 59' E.
FGM	Guam.	13° 27' N.	144° 45' E.

China and Japan, etc.

FHO	Hong Kong, China	22° 18' N.	114° 10' E.
FSH	Shanghai, China	31° 15' N.	121° 29' E.
FBI	Bonin Island	27° 05' N.	142° 11' E.
FKO	Koshun, Formosa	22° 00' N.	120° 45' E.
FNA	Naha, Japan	26° 13' N.	127° 41' E.
FKA	Kagoshima, Japan	31° 34' N.	130° 33' E.
FTO	Tokio, Japan	35° 41' N.	139° 45' E.
FNE	Nemuro, Japan	43° 20' N.	145° 35' E.

San Francisco W/T Station also transmits a report containing barometric pressure, wind direction and force and state of weather in the Bonita Channel, at 0900, 0430, 0800, 1200, 1630 and 2000 G.M.T. Wavelength 2,776 metres (C.W.). The message is also sent on request.

WIRELESS STORM WARNINGS.

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

W/T Station and position (approx.).	Call Sign.	Wave-length metres.	Broad-casting Time G.M.T.	Particulars.
Puget Sound Lat. 47° 42' N. Long. 122° 37' W.	NPC	2,941 (I.C.W.)	0100 0400, 1300 1700, 2100	Storm Warnings.
Eureka, Calif. Lat. 40° 42' N. Long. 124° 16' W.	NPW	2,776 (I.C.W.)	0018, 0433 0818, 1218 1633, 2018	
" "	"	600	When issued and repeated after the first silent period.	Storm Warnings for the N. coast of California, Washington and Oregon coasts.
San Francisco, Calif. Lat. 38° 06' N. Long. 122° 17' W.	NPG	7000 (C.W.) 2,776 (C.W.)	0330, 1530	
" "	"	"	0000, 0430 0800, 1200 1630, 2000	Storm Warnings. In Second part of weather bulletin.
San Diego, Calif. Lat. 32° 42' N. Long. 117° 15' W.	NPL	2,941 (C.W.) and 600	When issued and repeated after the first silent period.	Storm Warnings. For N. California coast.

III.—WIRELESS TIME SIGNALS.

For method of transmission of the undermentioned Time Signals see diagram, p. 148.

W/T Station.	Call Sign.	Wavelength metres.	Time of Signal being made G.M.T.	
San Francisco, Calif. Lat. 38° 05' 55" N. Long. 122° 16' 37" W.	NPG	2,776 and 7,005 (C.W.)	h. m. s. h. m. s. { 2 55 00— 3 00 00 7 55 00— 8 00 00 16 55 00—17 00 00 }	Sent daily.

NOTE.—The above time signal is a rebroadcast of Arlington Va. time signal and is normally correct to one tenth of a second.

HAWAIIAN ISLANDS.

II.—WIRELESS WEATHER BULLETIN.

Honolulu-Pearl Harbour W/T Station, approximate Latitude 21° 12' N., Longitude 157° 58' W., call sign **NPM**, broadcasts weather forecasts daily (except Sundays and holidays), for the Hawaiian Islands and neighbouring ocean areas at 2230 G.M.T., on a wavelength of 600 metres (I.C.W.). The station also broadcasts the barometric reading, wind direction and force and state of weather at Honolulu at 0230, 0630, 1830 2230 G.M.T. on a wavelength of 600 metres (I.C.W.).

III.—WIRELESS TIME SIGNALS.

For method of transmission of the undermentioned Time Signals see diagram, p. 148.

Honolulu, Pearl Hbr. Lat. 21° 20' 45" N. Long. 157° 57' 56" W.	NPM	2,828 (I.C.W.)	h m s h m s 23 55 00-0 00 00	Sent daily.
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NOTE.—These time signals are relayed from the standard clock at Pears Harbour, which is checked periodically by means of the time signal broadcast from San Francisco. They are normally correct to less than 0.5 sec. having a generally constant lag.

GREAT BRITAIN AND IRELAND.

AMENDMENT.

WIRELESS GALE WARNINGS.

Wireless Telegraphy (R/T) Issues.

Vol. X. No. 110.

Page 70, column 2, Under Sundays. For 1615 G.M.T. substitute 1630 G.M.T.

III.—WIRELESS TIME SIGNALS.

Wireless Telephony (R/T) Issues.

Vol. X. No. 110.

Page 71, column 1, Under Sunday. For 1615 G.M.T. substitute 1630 G.M.T.

PERSONNEL.

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

Captain A. Beith.

Captain ALEXANDER BEITH, Commodore of the Elder Dempster Fleet and commander of the M.V. *Apapa* has retired after a sea career extending over 49 years.

Captain BEITH first went to sea in 1884 in the ship *Maraval* which was then commanded by his Uncle. After a voyage to the Far East in this vessel he was indentured to the Shaw Savill and Albion Co. and served his apprenticeship in their vessels *Helen Denny*, *Himalaya* and *Langstone*, employed in the New Zealand trade.

On obtaining his 2nd mates certificate he served as a junior officer in tramp steamers and on passing for mate in 1892 joined Messrs. Elder Dempster & Co. as third officer of the s.s. *Gaboon*. Rising through the different grades, he was appointed to the command of the s.s. *Sansu* in 1901 and has since commanded several vessels of the Fleet including the *Kano*, *Zaria*, *Bathurst*, *Batanga*, *Appam* and *Apapa*.

Captain G. Owens.

Captain G. OWENS, Commander of the R.M.S. *Warwick Castle*, and Commodore of the Union Castle Fleet, has retired after over 50 years' service afloat.

Captain OWENS commenced his sea career in 1883, serving his time in the ship *Bay of Cadiz*. Later he served in the ships *British General* and *British Ambassador*. In 1890 he transferred to steam,

serving in cargo steamers as 2nd and Chief Officers until he joined the Castle Line as a Junior Officer in 1894.

In 1913 he was appointed master of the *Corfe Castle* and has since commanded several vessels of the Union Castle Fleet, including the Mail ships *Walmer Castle*, *Kenilworth Castle*, *Carnarvon Castle* and *Warwick Castle*. He was appointed Commodore of the Company's Fleet in 1932.

Captain W. M. Porterfield.

Captain PORTERFIELD of S.S. *Clan Morrison*, Commodore of the Clan Line Fleet since 1930, retired in June.

He served his apprenticeship from June, 1884, in the ship *Siren* of Greenock, sailing under the house flag of the Golden Fleece, Messrs. A. & J. H. Carmichael.

In February, 1890, he joined the Clan Line as fourth officer of S.S. *Clan Macpherson*; and was appointed to his first command, the old *Clan Ogilvy* in 1901; since when he has commanded *Clan Ranald*, *Clan Gordon*, *Clan Fraser*, *Clan Macneil*, *Clan Robertson*, *Clan Buchanan*, new *Clan Ogilvy*, *Clan Maciver* and *Clan Morrison*.

In 1917, *Clan Buchanan*, under Captain PORTERFIELD's command, repelled a submarine attack, by gunfire with her defensive 4.7 gun.

An old officer of the Royal Naval Reserve, he holds the rank of Lieut.-Commander on the retired List, and has been a member of the corps of voluntary marine observers since 1904.

Personnel—*continued.*

Captain E. Roberts.

Captain E. ROBERTS commander of the R.M.S. *Orduna* has retired from active service afloat after 46 years sea service.

Captain ROBERTS commenced his sea career at the early age of 13 in small coasting schooners sailing out of Caernarvon.

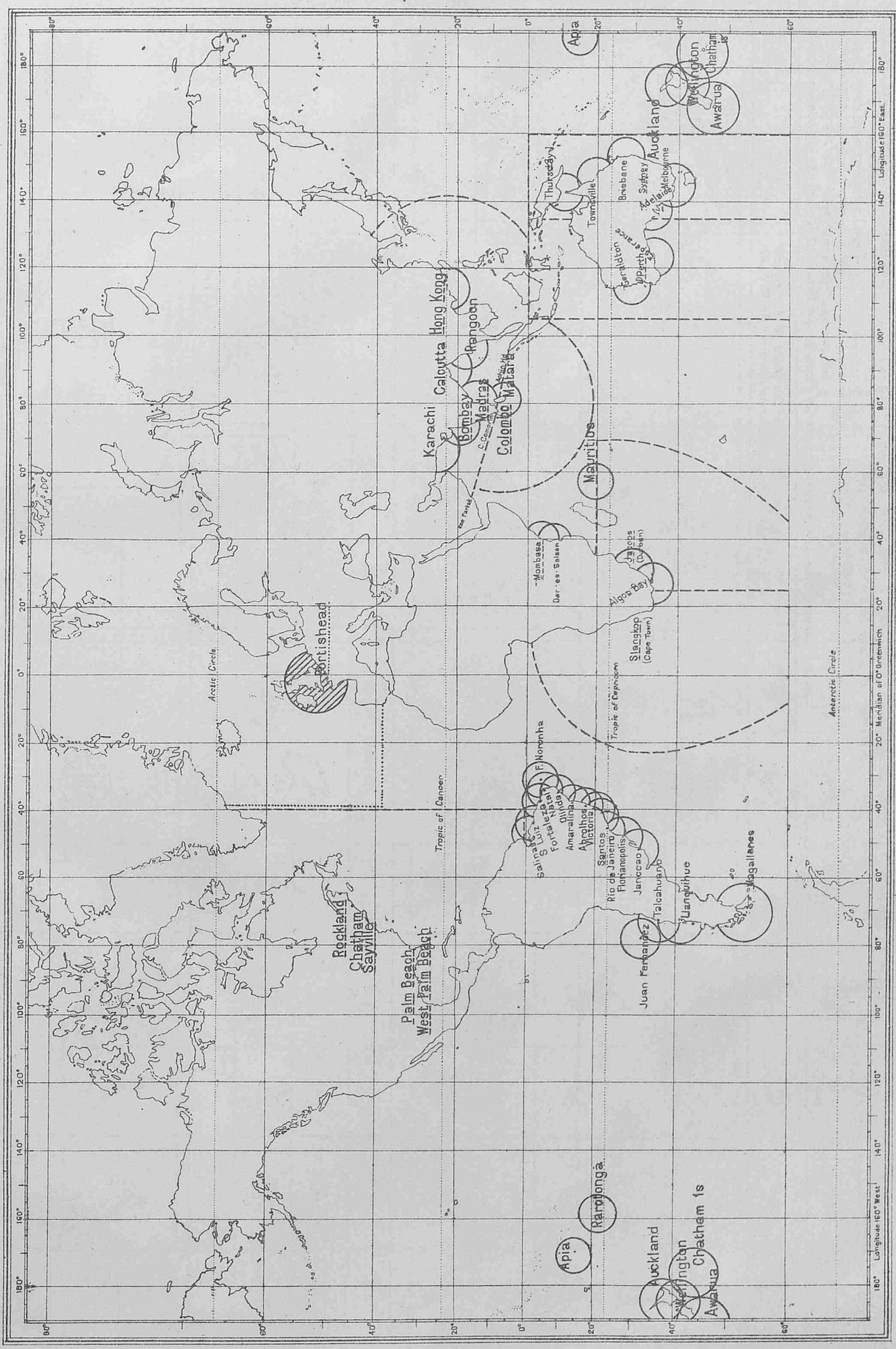
After twelve months' service in these craft he served as an apprentice in the barques *Glanwa* and *Cambrian King*, and later as an officer in the sailing ships *Glenesslin*, *Principality*, *Portia*, *Embleton* and *Edward Seymour*.

On obtaining his masters certificate in 1899 he joined the Pacific Steam Navigation Company as fourth officer of the *Orellana* and rising through the different grades was appointed to command the *Nitrokvivis* in 1918. Since then Captain ROBERTS has commanded several cargo and mail ships of the P.S.N.C. fleet including the *Magellan*, *Essequibo*, *Ebro*, *Orbita*, *Reina del Pacifico* and *Orduna*.

We wish these officers health and happiness in their retirement and thank them for their work as members of the Corps of Voluntary Marine Observers.

Chart V - 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.

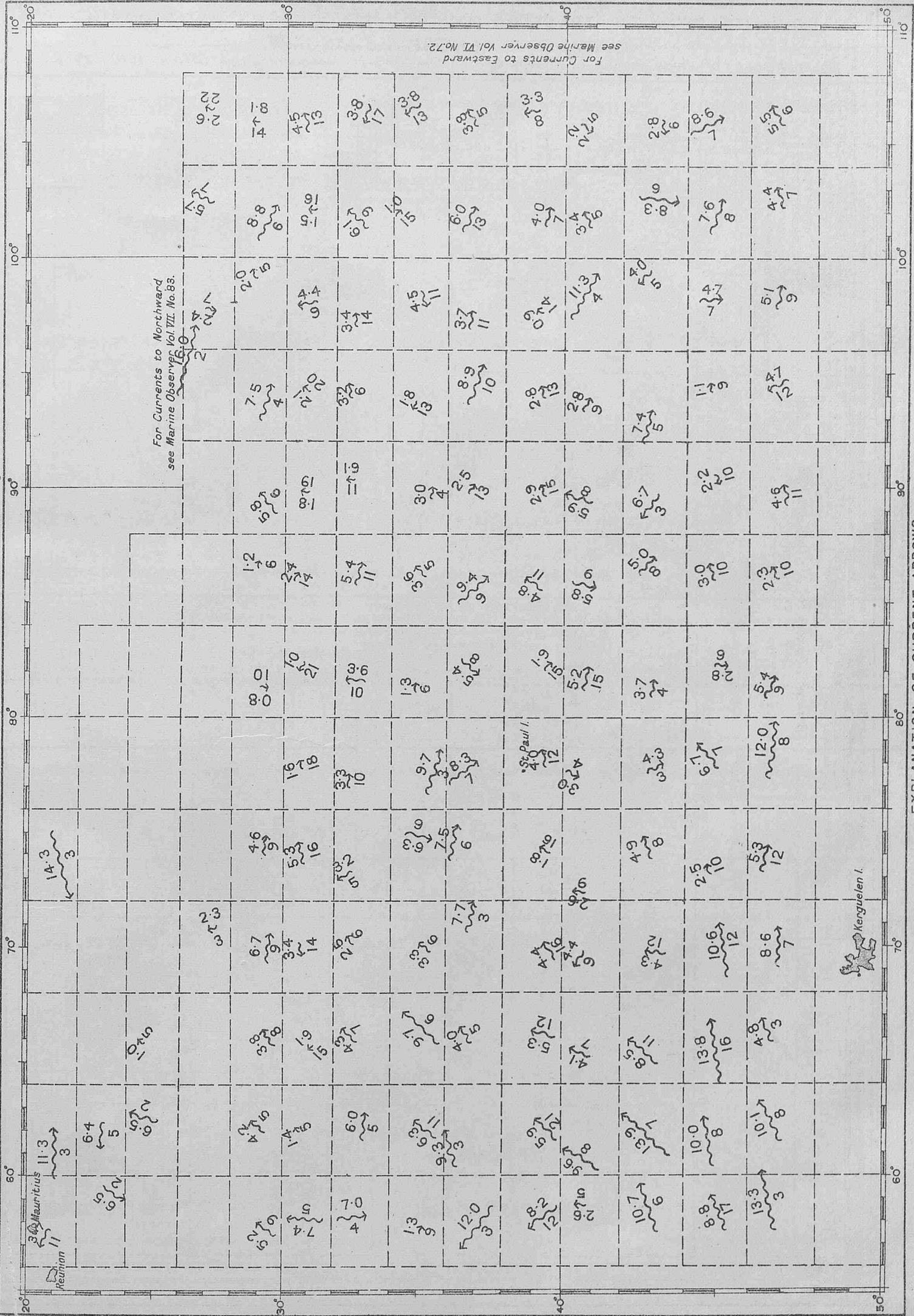
A pecked line indicates the reporting area round stations in other countries to which British 'A Selected Ships' should report. The names of such stations being underlined with a pecked line.

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

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

CURRENTS ON THE TRADE ROUTES IN THE SOUTHERN INDIAN OCEAN. NOVEMBER DECEMBER and JANUARY.

Observations of ships regularly observing for the British Meteorological Office, 1910-1932.



For Currents to Northward
see Marine Observer Vol. VII. No. 83.

For Currents to Eastward
see Marine Observer Vol. VI No. 72.

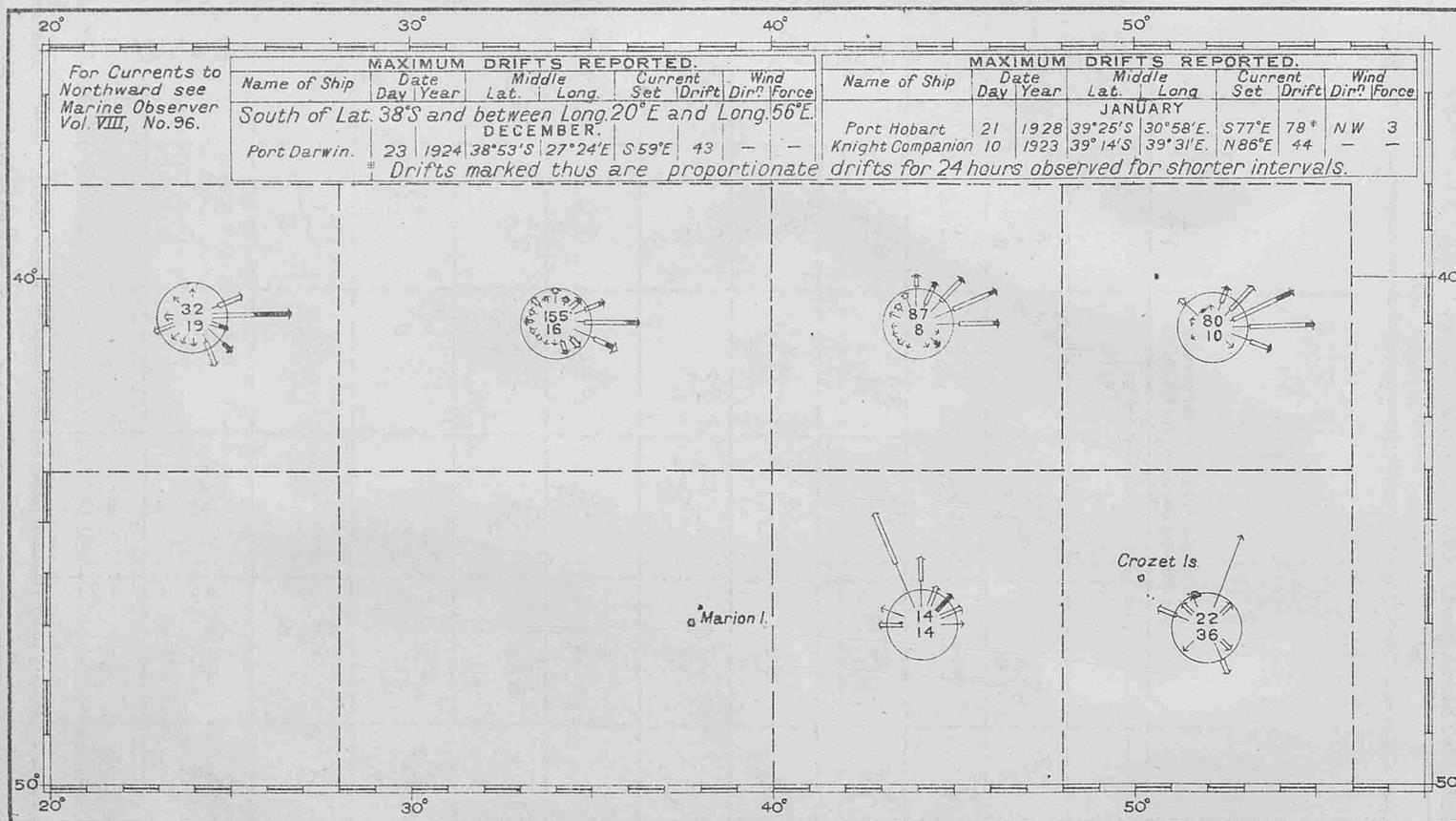
EXPLANATION OF CURRENT ARROWS.

The arrows flow with the current and represent the resultant of currents observed within the pecked lines. The centre of each arrow lies in the mean position of observation. The figures above the arrows give the velocity of current in miles per day; the figures below the arrows the number of observations. In cases where the arrows drawn to scale are inconveniently long the symbol is substituted.

CURRENTS ON THE TRADE ROUTES IN THE SOUTHERN INDIAN OCEAN.

NOVEMBER DECEMBER and JANUARY.

Observations of ships regularly observing for the British Meteorological Office, 1910-1932.



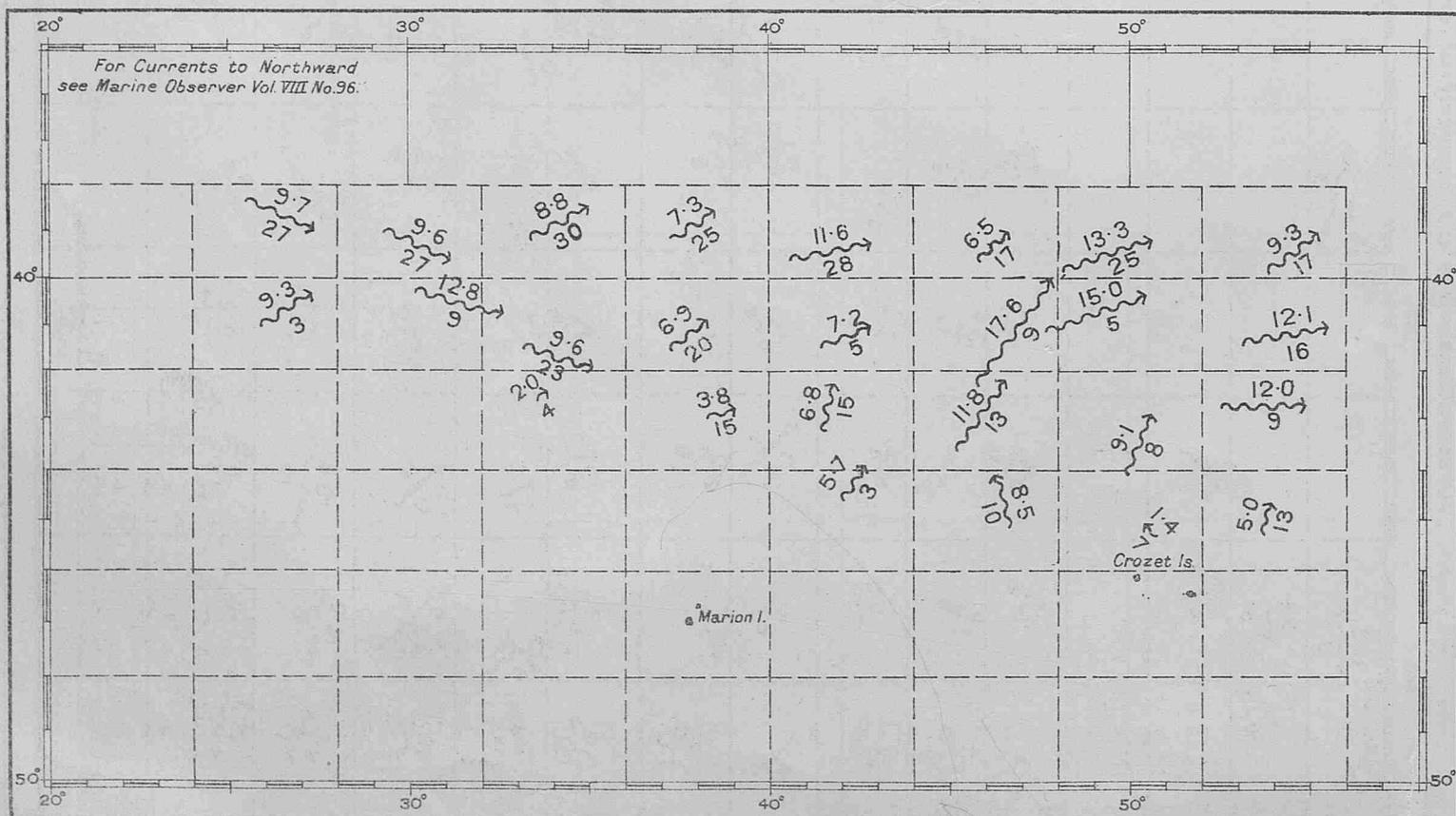
EXPLANATION OF CURRENT ROSES.

The current roses are drawn from observations within the pecked lines. Arrows flow with the current, length represents frequency, thickness strength;—

6-12 miles per day, 13-24 miles per day 25-48 " " " " 49-72 " " " " 73 miles per day and above

Distance from tail of arrow to circle represents 5%. Scale 0 10 20 30 40 50%

The upper figure in centre of rose gives total number of observations, the lower figure the percentage frequency of currents less than 6 miles per day.

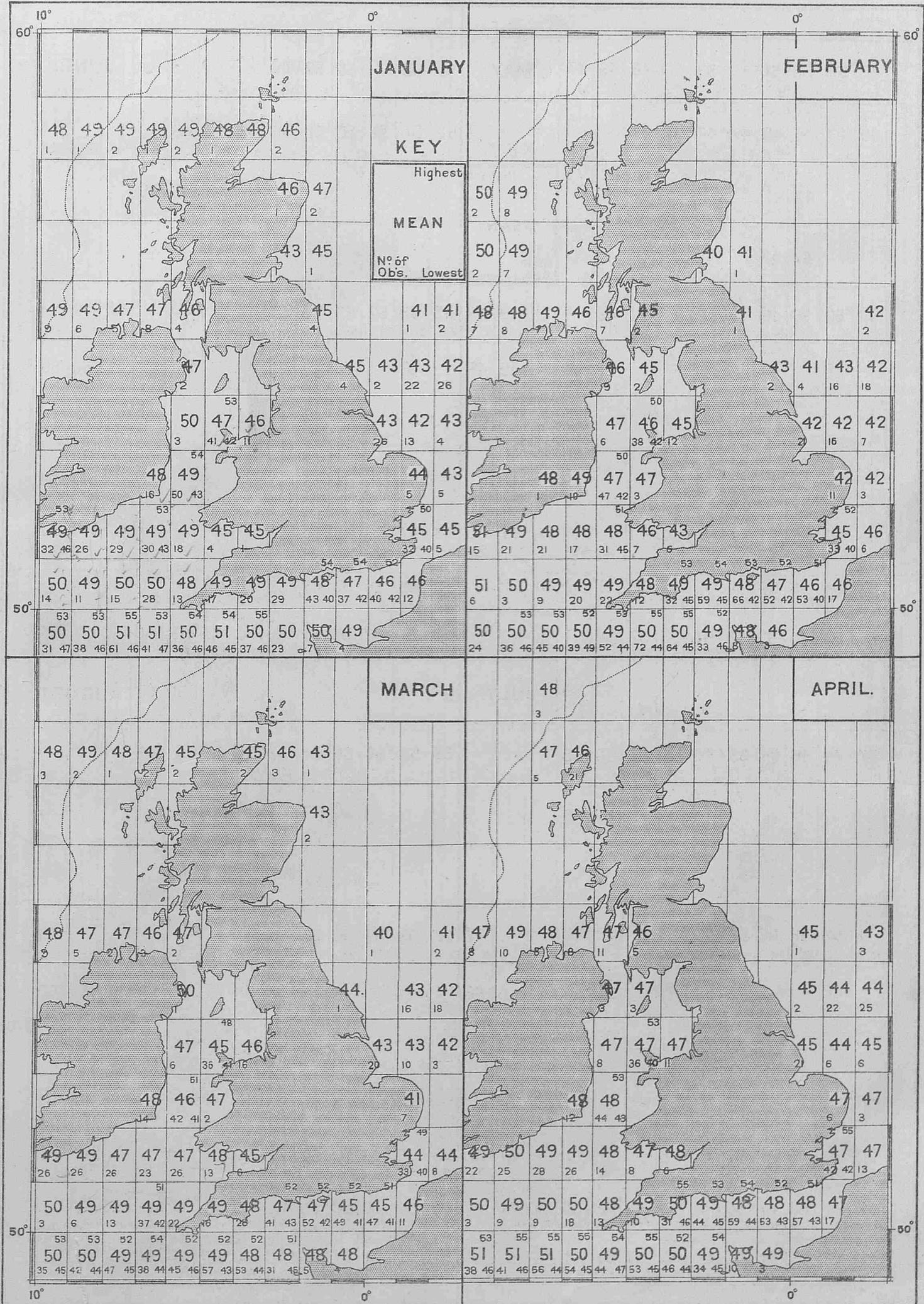


EXPLANATION OF CURRENT ARROWS.

The arrows flow with the current and represent the resultant of currents observed within the pecked lines. The centre of each arrow lies in the near position of observation. The figures above the arrows give the velocity of current in miles per day; the figures below the arrows the number of observations. In cases where the arrows drawn to scale are inconveniently long the symbol is substituted.

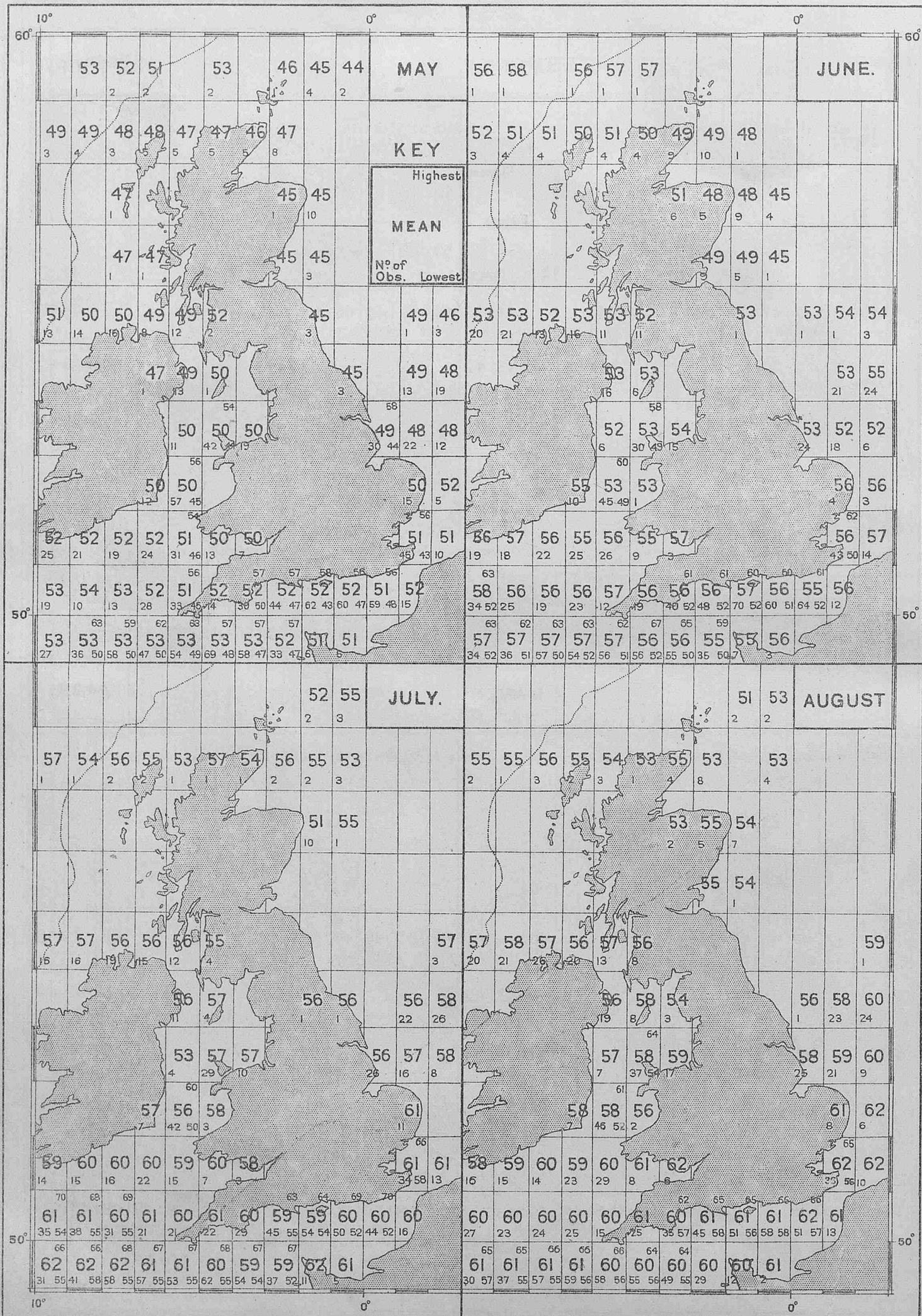
COASTAL WATERS OF THE BRITISH ISLES,
MONTHLY MEAN SEA SURFACE TEMPERATURES.

Calculated from observations made from British Observing Ships During the Years 1921-1930.



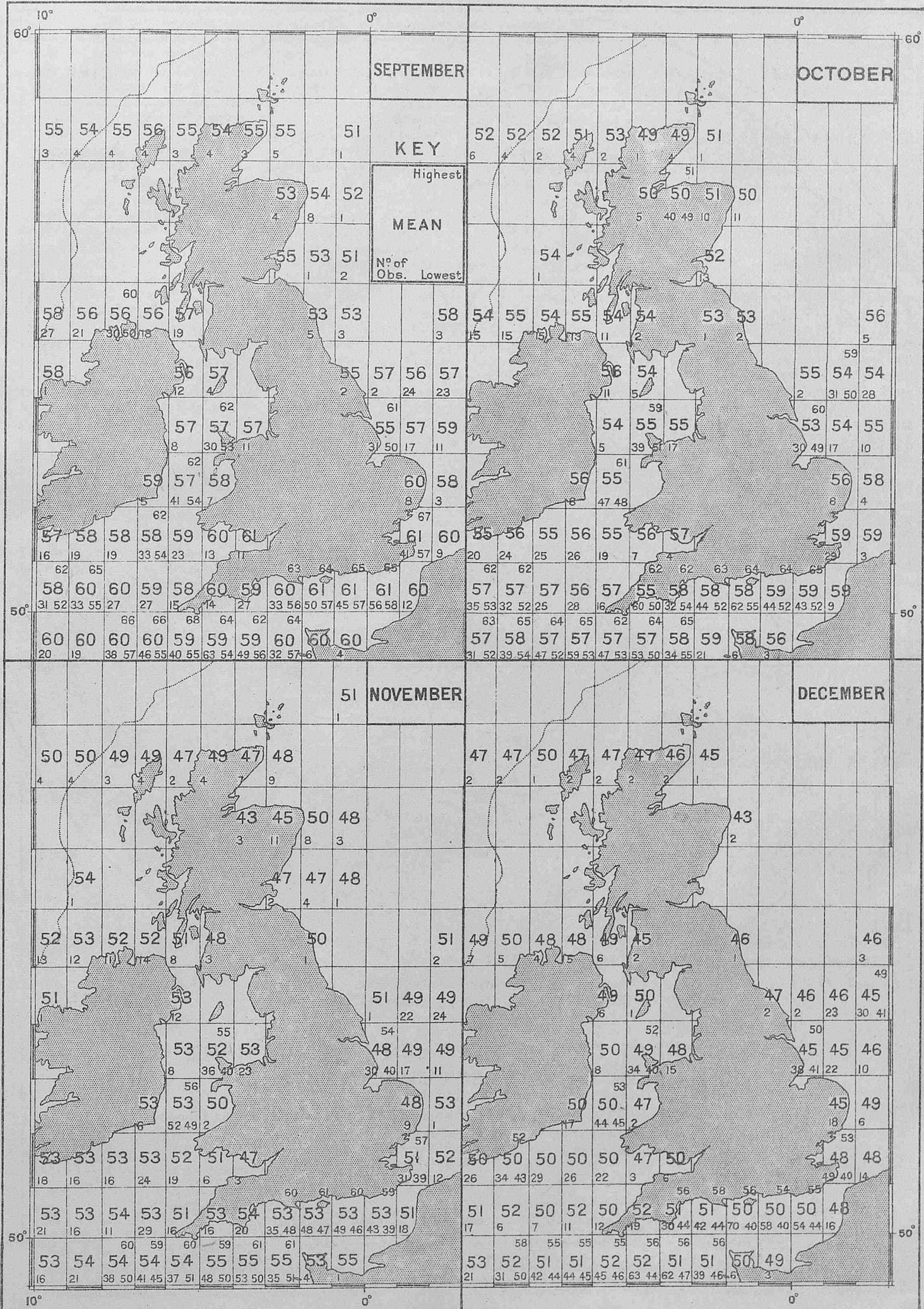
COASTAL WATERS OF THE BRITISH ISLES,
MONTHLY MEAN SEA SURFACE TEMPERATURES.

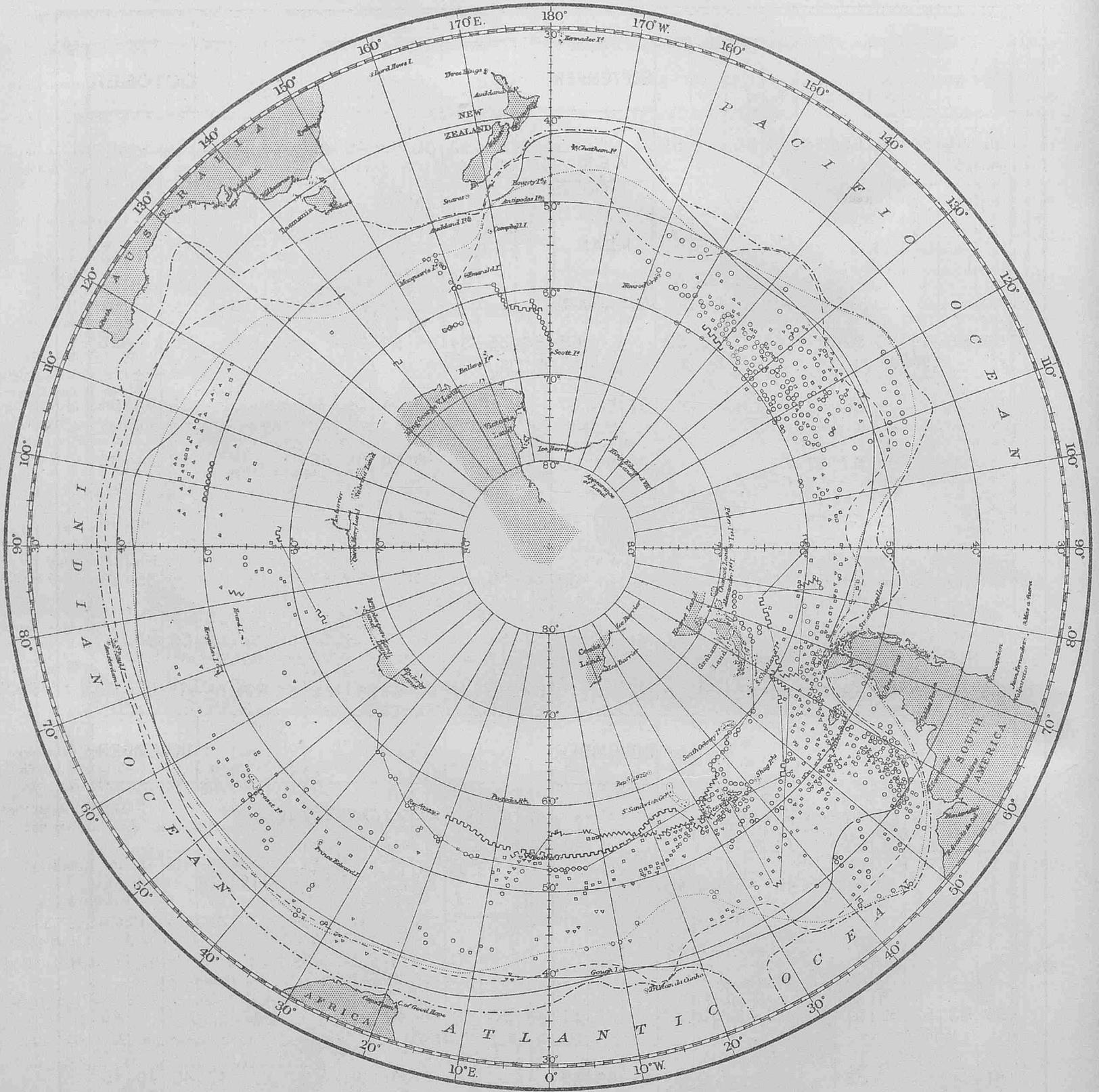
Calculated from observations made from British Observing Ships During the Years 1921-1930.



COASTAL WATERS OF THE BRITISH ISLES.
MONTHLY MEAN SEA SURFACE TEMPERATURES.

Calculated from observations made from British Observing Ships During the Years 1921-1930.





**ICE CHART OF THE SOUTHERN HEMISPHERE,
OCTOBER NOVEMBER and DECEMBER
EXPLANATION.**

The symbols used to distinguish the ice of each of the three months are as follows:-

	Bergs, 1902-1932.	Position of northernmost pack ice actually observed 1885-1932.	Extreme limit of all ice, 1772-1932.
October	△	~~~~~	-----
November	□	|||||	-----
December	○	—○—○—○—○—○—	-----

Extreme limit of all ice, all months. - - - - -

NOTE - The symbols for pack ice are joined by hair line where desirable.

The coast line of the Antarctic continent as shown on this chart is not completely corrected to accord with the latest survey information. It is intended in a later volume of *The Marine Observer*, after the Admiralty Ice chart of the Southern Hemisphere N° 1241 has been revised, to again publish this chart in *The Marine Observer* with coast lines as complete as possible and to bring the ice information up to date annually.

MARINE METEOROLOGY.

Co-operation of Shipowners, Masters and Mates.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

All ships fitted with W/T are advised to procure the DECODE for use with the International Code for Wireless Weather Messages from Ships, M.O. Pubn. 329, which can be obtained from H.M. Stationery Office, price 3d. This gives a description of the system of communication of "Selected Ships," as well as the DECODE.

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

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

LONDON	Captain L. A. BROOKE SMITH, R.D., R.N.R., Marine Superintendent. Commander J. HENNESSY, R.D., R.N.R., Senior Nautical Assistant. Room 324, Adastral House, Kingsway, W.C.2. (Telephone No.: Holborn 3434 Extension 421). Nearest station Temple, District Railway.				
THAMES	Lieut. Commander C. H. WILLIAMS, R.N.R., Port Meteorological Officer, P.L.A. Building, King George V Dock (south side), London, E.16. (Telephone No.: Albert Dock 2659. Telegraphic Address: Barometric Aldock, London).	HONG KONG, China.	Lieut. Commander E. H. C. BRANSON, R.N., Chart Depot, H.M. Dockyard. (Telephone No.: 108 Dockyard).		
MERSEY	Commander M. CRESSWELL, R.N.R., Port Meteorological Officer, Dock Office, Liverpool. (Telephone No.: Bank 8959. Telegraphic Address: Meteorite, Liverpool).				
	Agents				
BRISTOL CHANNEL	Captain T. JOHNSTON, Technical College, Cathays Park, Cardiff (Telephone No.: Cardiff 6813).	CLYDE	Mr. ROBERT CLEARY, Master Mariner, The Clutha Stevedoring Co., Ltd., Princes Dock, Glasgow. (Telephone No.: 513 Ibrox).		
		FORTH	Captain C. G. BONNER, V.C., D.S.C., Leith Salvage and Towage Co., Ltd., 2, Commercial Street, Leith.		
		HUMBER	Captain A. M. BROWN, Ellerman Wilson Line Office, Hull. (Telephone No.: Central 16130).		
		SOUTHAMPTON	Captain Sir BENJAMIN CHAVE, K.B.E. Room 35 Royal Mail Buildings.		
		SYDNEY, New South Wales	Commander G. D. WILLIAMS, D.S.O., R.D., R.N.R., Captain G. B. MERCER. Customs House. (Telephone No.: B6421).		
		TYNE	Captain J. J. MCEWAN, Marine School, South Shields.		

DERELICTS AND FLOATING WRECKAGE.

Date.	Position.		Description.	Date.	Position.		Description.				
	Latitude.	Longitude.			Latitude.	Longitude.					
ENGLISH CHANNEL.											
8.9.33	49°18'N.	3°25'W.	Buoy painted red.	North Atlantic—contd.							
IRISH SEA.											
12.9.33	54°38'N.	4°30'W.	Conical buoy adrift.	4.9.33	41°05'N.	71°32'W.	Upright square post with steel band projecting about 2 feet out of water, apparently attached to submerged wreckage.				
NORTH ATLANTIC.											
2.9.33	37°38'N.	75°10'W.	Wreckage consisting of stern of barge awash with red man-hole showing above water.	7.9.33	27°01'N.	79°21'W.	Black can buoy.				
3.9.33	36°—'N.	73°50'W.	White launch awash.	9.9.33	43°—'N.	9°34'W.	Submerged object.				
3.9.33	24°27'N.	80°30'W.	Sloop awash with broken mast showing 6 feet out of water.	GULF OF MEXICO.							
				3.9.33	23°57'N.	80°45'W.	Large black can buoy.				
				7.9.33	24°17'N.	82°06'W.	Wooden mast projecting about 8 feet out of water, apparently attached to submerged wreckage.				

CHART OF THE WESTERN NORTH ATLANTIC.

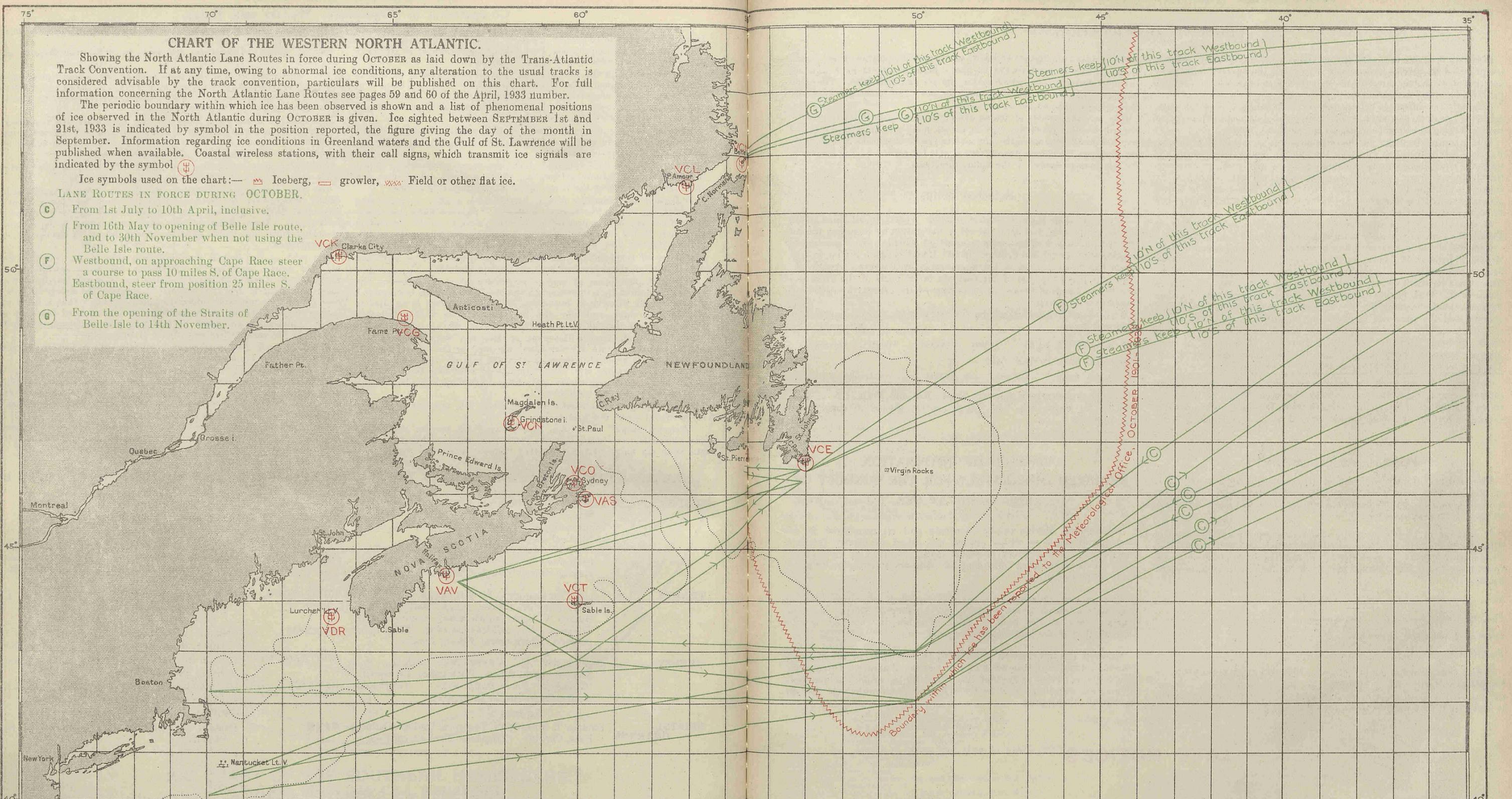
Showing the North Atlantic Lane Routes in force during OCTOBER as laid down by the Trans-Atlantic Track Convention. If at any time, owing to abnormal ice conditions, any alteration to the usual tracks is considered advisable by the track convention, particulars will be published on this chart. For full information concerning the North Atlantic Lane Routes see pages 59 and 60 of the April, 1933 number.

The periodic boundary within which ice has been observed is shown and a list of phenomenal positions of ice observed in the North Atlantic during OCTOBER is given. Ice sighted between SEPTEMBER 1st and 21st, 1933 is indicated by symbol in the position reported, the figure giving the day of the month in September. Information regarding ice conditions in Greenland waters and the Gulf of St. Lawrence will be published when available. Coastal wireless stations, with their call signs, which transmit ice signals are indicated by the symbol (⊕).

Ice symbols used on the chart: — Iceberg, growler, Field or other flat ice.

LANE ROUTES IN FORCE DURING OCTOBER.

- (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) From the opening of the Straits of Belle Isle to 14th November.



PHENOMENAL POSITIONS OF ICE.

Date.	Ship or Source of Report.	Position.	Remarks.
		Lat. Long.	
Oct. 15, 1883	S.S. Elenora ...	37°00' N. 18°00' W.	Piece ice.
" 8, 1912	S.S. Putney Bridge...	35°15' N. 42°50' W.	Small berg 35 ft. long, 6 ft. high.
" 27, 1916	S.S. Montreal ...	51°17' N. 41°17' W.	Small berg.
" 4, 1918	U.S. Hyd., Bulletin	50°10' N. 40°50' W.	Large berg.
" 19, 1920	Do.	45°22' N. 40°09' W.	Berg.
" 17, 1921	S.S. Mt. Vernon ...	45°24' N. 40°07' W.	Berg.
" 6, 1922	S.S. Christian Krogh	48°28' N. 49°19' W.	Berg about 70 ft. high, 400 ft. long.
" 7, 1923	S.S. Eastern Dawn...	50°43' N. 40°42' W.	Large growler about 100 ft. square.
" 23, 1927	Trawler, Grecian Empire.	30 mls. E.S.E. of Outer Skerries, Shetland Is.	Piece of ice 100 ft. long, 6 ft. above water.

NOTICES TO MARINE OBSERVERS.

CURRENT OBSERVATION.

It is very desirable that good current data should be recorded. Spaces are provided for current experienced throughout the day and for current determined at shorter intervals in Meteorological Logs, while Form 911 provides for either or both.

Generally the difference between the *Dead Reckoning Position* at noon, reckoned from previous noon, and the *Observed Position* has been accepted as attributable to a single current for the whole 24 hours.

It is necessary to make careful distinction between *Dead Reckoning Position* and *Estimated Position* the former being the position as reckoned from the last fix by courses steered and distances run, corrected for all known errors and disturbances *except* current. When a fix cannot be obtained, an estimation for current (when one is known generally to exist) is sometimes applied to the D.R., the result may then be conveniently termed the *Estimated Position*.

If this estimated position is given in the Meteorological Log or Form 911, it should be clearly stated, otherwise it may be misleading.

Currents of varying velocity and direction may be experienced along the track made in 24 hours, therefore, when reliable fixes such as by Stellar observations at twilight are obtained, the current should be determined for the intervals, and all should be checked with the noon to noon result. Each of these currents determined at shorter intervals than 24 hours should be entered in the Meteorological Log in the appropriate column, and the time and latitude and longitude of each observation position should be given in the latitude and longitude columns. The times given on Form 911 indicate the interval. The period of short interval currents should usually not be less than say six hours. The best interval is probably from twilight to twilight.

It is desirable that whenever possible two methods of ascertaining the distance run through the water should be used, with one means of measuring the speed, the inclination is to credit the ship. When possible it is recommended that both patent log and revolutions should be used.

POSTAL ARRANGEMENTS.

The quarterly numbers of the MARINE OBSERVER are published on the last Wednesdays of December, March, June and September, while the monthly supplements are published on the last Wednesday of the intervening months.

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 or supplement with appropriate forms for observational work 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 or Supplement will be addressed to the Commanding Officer, S.S....., c/o the owners, and captains are requested to make their own arrangements for forwarding.

For working out the set and drift of current the position *from* as well as the position *to* must always be *fixes*. Some observers have used an *estimated position from*, which makes the set and drift false. The same remarks apply to course allowances for set; the latter are naturally necessary to make an *estimated course*.

It is not only records of strong or abnormal currents that are desired. Records of the state of the current, no set, small sets, moderate sets and great sets at all times when the information can be obtained with reliability are necessary for completing current charts for all oceans and providing the information desired in the sailing directions.

Selected Ships.

In making their routine wireless weather reports to all ships (C.Q.) Selected ships may give material aid to navigation by including the set and drift of current found when considered reliable. This practice of broadcasting the set and drift of current found between Stellar fixes at sunset and dawn twilight in the next routine W/T weather report also helps in our investigation of the currents in all parts of the world and may be the means of improving knowledge of the causes, variations and peculiarities of currents.

When the set and drift is included the code message may be conveniently shortened thus.

C.Q WEATHER 13167 55106 00000 16979 Current
From 15N 52E To 16N 54E.
58° one knot Dalgoma

Example taken from Selected Ships Register Form 138 of M.V. Dalgoma for March 5th, 1933. supplementary groups of code figures being omitted

DESPATCH OF INFORMATION

REQUIRED IMMEDIATELY FOR THE CONDUCT OF THE WORK AT SEA.

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

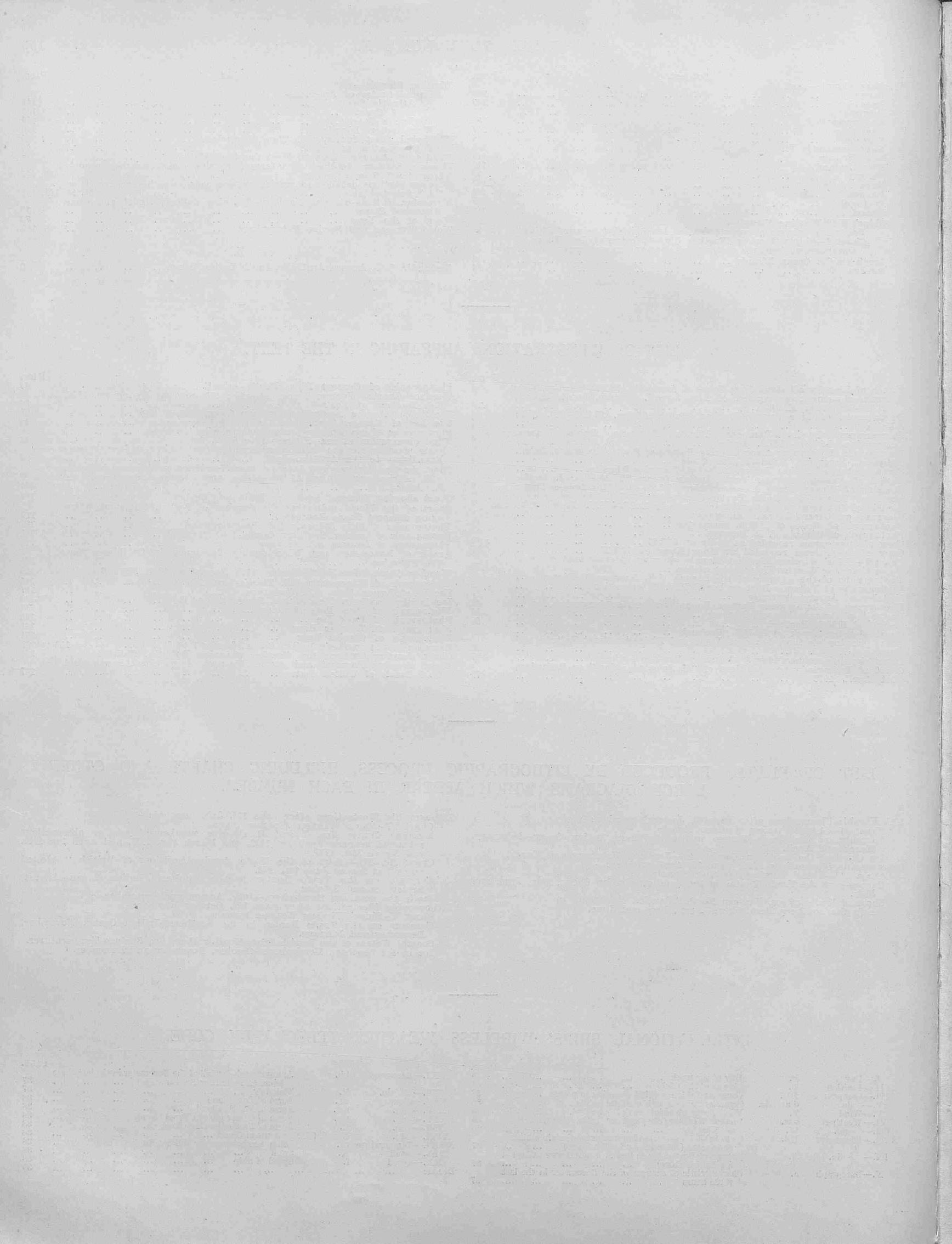
This matter addressed to the Commanders of Ships contains information which is required for the Conduct of Marine Meteorological Work at Sea and is most effective if received by the Commanders at the earliest possible date.

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

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FLEET LIST. VOLUNTARY OBSERVING SHIPS.

The following is a complete list of British observing ships regularly carrying out voluntary services of marine meteorology with the guidance of the Marine Division of the Meteorological Office.

The names of the Captains and observing officers of observing ships, and the Senior Wireless Operators of Selected Ships are given, as ascertained from the last written return received.

Meteorological Logs, Records, and W/T Weather Registers received between the dates specified at the head of the seventh column are acknowledged by Form number, with commencing and ending dates of period covered by the returns; the date when the last return was received being given in the eighth column.

The Captains of observing ships are requested to take this acknowledgment in cordial thanks and grateful recognition to them and their observing officers and wireless operators for the returns made and the voluntary service rendered in all parts of the world.

The classification of meteorological logs and Selected Ships' records and registers will be notified to the Captains by post card Form 1343. Only in exceptional cases will individual letters be sent to the Captains of observing ships.

The Port Meteorological Officers and Merchant Navy Agents at the ports are advised as necessary, and they will, as necessary, communicate such advice verbally by personal call upon the Captain.

Excellent Awards will be made at the end of the financial year. The names of the Captains and Principal Observing officers gaining these awards will be published in a special list in the Marine Observer.

It is requested that prior notification of changes of service, probable periods of lay up, transfer of Captains, or other circumstances which may prevent the continuance of voluntary meteorological service at sea, may be made to the appropriate Port Meteorological Officer or Merchant Navy Agent.

Ships not making the appropriate written returns within a reasonable period will be removed from the list, steps taken to recover any instruments lent, and the free issue of the Marine Observer discontinued.

The number of voluntary observing ships is limited to a maximum total of 366.

The number of Selected Ships detailed to carry out the voluntary service provided for in Clause (C) of Article 35 of the Convention for Safety of Life at Sea, Merchant Shipping (Safety and Load Line Conventions) Act, 1932, is determined by the British proportion of the world's tonnage; and is at present 299.

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

Explanation of Abbreviations.

The number appearing before the name of an observing ship in this list is her number for the time being as a British Selected Ship.

†† indicates fitted with wireless telegraphic apparatus for long range, long wave, continuous wave transmission and reception.

*† indicates fitted with wireless telegraphic apparatus for transmission and reception; fitted for reception only of long range, long wave, continuous wave.

** indicates fitted with wireless telegraphic apparatus for transmission and reception: but not fitted for long range, long wave, continuous wave transmission or reception.

M.V. = Motor Vessel.

S.T. = Steam Trawler.

Ships having no such letters after their names are steamships.

M.L. = Equipped with a complete set of tested instruments lent by the Meteorological Office for keeping the meteorological log.

M. = Ships' own mercurial barometer, found to be sufficiently accurate and reliable for the purpose of observation for making wireless weather reports.

S. = Partly or wholly equipped with tested instruments lent by the Meteorological Office for the purpose of carrying out the duties of a Selected Ship, when detailed to do so.

A. = Ships' own aneroid.

Name of Vessel.	Captain.	Observing Officers.	Senior Wireless Operator.	Meteorological Instrument Equipment.	Line.	Logs, Registers, or Records Contributed. 8.6.33 to 6.9.33.	Date Last Return Received.
122 †† <i>Accra</i> , M.V. ...	J. C. Shooter ...	R. B. Ellis ...	G. Arrowsmith...	M.-S.	Elder Dempster	Fms. 911 & 138 3.5.33 to 20.8.33	23.8.33
055 *† <i>Actor</i> ...	T. Chapman ...	G. Penston, E. Pearce, P. Vaughan.	E. G. Dick ...	M.	Harrison ...	" " 10.4.33 to 26.6.33	30.6.33
123 †† <i>Adda</i> , M.V. ...	J. H. Lawson ...	R. V. E. Case, E. Moore, S. Baker.	A. J. L. Edwards	M.-S.	Elder Dempster	" " 18.5.33 to 19.8.33	23.8.33
273 *† <i>Adrastus</i> ...	R. Lloyd ...	S. R. Evans, J. P. Makepeace, F. E. Jackson.	J. H. Nightingale	M.L.	A. Holt ...	Fm. 915 6.10.32 to 26.2.33	1.5.33
090 *† <i>Aeneas</i> ...	J. Hatfield ...	G. H. Smith, F. H. Barley, A. V. Potter.	I. E. Jones ...	S.	" ...	Fms. 911 & 138 19.6.33 to 15.7.33	14.8.33
166 *† <i>Agamemnon</i> , M.V.	W. Beswick, D.S.C., Commr., R.N.R.	W. G. Harrison, O. Thomas, R. Fountain.	A. C. Nevin ...	"	"	" " 9.4.33 to 28.6.33	4.7.33
<i>Aidan</i> ...	F. C. P. Harris ...	H. O. Williams, L. A. Sayers, C. W. Swethurst.	" ...	M.L.	Booth ...	Fm. 915 24.11.32 to 16.7.33	28.7.33
065 †† <i>Akaroa</i> ...	W. G. Summers ...	G. H. Heywood, H. R. Dunnet, J. L. Stolls.	H. A. McGaskill	"	Shaw Savill ...	" 20.5.33 to 30.8.33	6.9.33
<i>Alban</i> ...	L. Evans ...	F. R. Holman, R. Parry, F. M. Lyons.	" ...	"	Booth ...	" 7.4.33 to 18.6.33	4.7.33
019 †† <i>Alcantara</i> ...	E. Clarke, R.D. Commr., R.N.R.	A. E. H. Randle, F. J. Swallow, W. L. Irving.	W. Smith ...	S.	Royal Mail ...	Fms. 911 & 138 24.4.33 to 27.7.33	1.8.33
178 *† <i>Alipore</i> ...	E. F. Hannan, R.D. Commr., R.N.R.	J. L. Dunkley, W. T. C. Lethbridge, K. P. Naire.	R. S. Evans ...	M.	P. & O. ...	" " 29.4.33 to 7.8.33	28.8.33
175 †† <i>Almanzora</i> ...	T. J. C. Buret ...	A. R. Osbourne, R. H. Poppleton, T. Davies.	J. Caldwell ...	S.	Royal Mail ...	" " 29.1.33 to 22.5.33	24.5.33
012 †† <i>Almeda Star</i> ...	J. Fisher ...	R. Hales, D. G. Rossell, P. Prescott.	R. N. Austin ...	M.	Blue Star ...	" " 22.5.33 to 5.7.33	10.7.33

THE MARINE OBSERVER

Name of Vessel.	Captain.	Observing Officers.	Senior Wireless Operator.	Meteorological Instrument Equipment.	Line.	Logs, Registers, or Records Contributed. 8.6.33 to 6.9.33.	Date Last Return Received.
022 † <i>Alynbank</i> ...	D. Gillies ...	S. Morris, A. Hunter, E. Binfield.	... ..	M.L.	A. Weir ...	Fm. 915 ... 26.11.32 to 22.4.33	19.6.33
103 † <i>Andalucia Star</i> ...	R. Vernon ...	G. G. McPherson, R. M. Thorne, M. B. M. Tallack.	F. E. Ash ...	M.	Blue Star ...	Fms. 911 & 138 1.5.33 to 16.8.33	22.8.33
209 † <i>Aorangi, M.V.</i> ...	J. F. Spring-Brown ...	J. W. S. Madden, G. M. Power, L. P. Bourke.	G. M. Power ...	M.L.	Canadian-Australasian.	Fm. 915 2.2.33 to 20.5.33	1.8.33
120 † <i>Apapa, M.V.</i> ...	T. Spence ...	C. V. Evans, R. Mercer ...	J. Rea ...	M.-S.	Elder Dempster	Fms. 911 & 138 1.6.33 to 7.7.33	12.7.33
029 † <i>Appam</i> ...	J. M. Draper ...	W. M. M. Hutchings, R. K. Palmer, B. C. Haigh.	R. J. Dowling ...	S.	" "	" " 14.6.33 to 23.7.33	25.7.33
017 † <i>Aquitania</i> ...	R. B. Irving, O.B.E., R.D., Capt., R.N.R.	G. Jeffries, L. R. Sharp, E. A. Divers.	A. H. Farman ...	"	Cunard ...	" " 5.6.33 to 17.8.33	19.8.33
115 † <i>Arandora Star</i> ...	R. W. Moulton ...	R. Freaker, H. F. Partridge, G. L. Erdna.	C. W. Herbert	M.-S.	Blue Star ...	" " 27.5.33 to 17.8.33	19.8.33
114 † <i>Architect</i> ...	I. Mowat ...	G. Dewar ...	... ..	M.	Harrison ...	Fm. 911 8.3.33 to 20.5.33	27.5.33
114 † <i>Ariguani</i> ...	J. H. H. Scudamore, D.S.C., R.D., Commr, R.N.R.	A. Sandham, R. S. Howlett	J. F. Clark ...	S.	Elders & Fyffes	Fms. 911 & 138 31.5.33 to 13.8.33	16.8.33
144 † <i>Arlanza</i> ...	G. F. Huff ...	G. H. Bonner, M. J. Morton, R. G. Wooley.	G. Hunt ...	"	Royal Mail ...	" " 7.5.33 to 28.8.33	22.6.33
091 † <i>Armada Castle</i> ...	H. B. Harvey ...	C. Lloyd, L. G. May, J. W. S. Brooks.	P. Haslam ...	"	Union Castle ...	" " 3.6.33 to 22.7.33	25.7.33
127 † <i>Arracan</i> ...	N. Wiles ...	J. A. C. MacCall, M. M. Ramsay, A. E. Hughes.	F. Fox ...	"	P. Henderson ...	" " 13.4.33 to 15.7.33	2.8.33
095 † <i>Arundel Castle</i> ...	G. J. Whitfield ...	G. L. Clarke, S. H. Parry ...	W. A. Brown ...	"	Union Castle ...	" " 5.2.33 to 27.5.33	30.5.33
280 † <i>Astronomer</i> ...	J. Richards ...	W. P. Baker, R. G. Williams, E. B. Stephens.	... ..	M.	Harrison ...	" " 10.1.33 to 8.4.33	22.4.33
062 † <i>Asturias, M.V.</i> ...	B. Shillitoe, R.D., Commr, R.N.R.	S. J. Hill, C. C. Prosser, T. W. Stephens.	J. T. Williams ...	S.	Royal Mail ...	" " 24.5.33 to 29.6.33	4.7.33
061 † <i>Atlantis</i> ...	A. Purvis ...	F. E. C. Cox, A. Hewitt, A. Nicholls.	V. Bradfield ...	M.-S.	" ...	" " 3.6.33 to 1.9.33	6.9.33
281 † <i>Auditor</i> ...	G. R. Windsor ...	A. H. Thompson, W. A. Pemberton.	A. Gregg ...	M.	Harrison ...	" " 23.5.33 to 25.7.33	2.8.33
212 † <i>Australia</i> ...	J. H. Galgey ...	H. Cameron, E. H. Lidstone, F. M. Jenvey.	C. Cunningham	"	British India ...	" " 15.11.32 to 24.3.33	11.4.33
124 † <i>Avila Star</i> ...	R. J. Thomas ...	F. N. Johnson, W. Hall, E. Lowndes.	B. King ...	"	Blue Star ...	" " 11.6.33 to 26.7.33	2.8.33
068 † <i>Balmoral Castle</i> ...	J. Attwood ...	A. C. G. Price, G. F. Oakley, H. Bunn.	J. Sharp ...	S.	Union Castle ...	" " 6.5.33 to 27.8.33	29.8.33
179 † <i>Balranald</i> ...	C. E. Short ...	J. C. Davies, F. W. J. Pearce, C. S. Pirie.	F. Arthurs ...	M.	P. & O. Branch	" " 13.6.33 to 7.7.33	14.8.33
248 † <i>Banffshire</i> ...	A. W. P. Gibb ...	R. F. Buckley, F. H. Petherbridge, J. O. H. Kirkwood.	W. M. Ewing ...	"	Turnbull Martin	" " 23.5.33 to 2.7.33	14.8.33
180 † <i>Baradine</i> ...	R. C. Dene ...	G. W. Wood, R. G. Wood, A. E. Clay.	J. S. Skinner ...	"	P. & O. Branch ...	" " 18.3.33 to 19.6.33	24.6.33
037 † <i>Baronesa</i> ...	R. W. Compton ...	J. R. Faulkner, L. W. Kent, J. G. Freeman.	F. Brown ...	"	Houlder ...	" " 16.4.33 to 16.6.33	20.6.33
181 † <i>Barrabool</i> ...	J. S. Sheepwash ...	J. D. Strike, A. Gething, T. Watkins.	R. Rowley ...	"	P. & O. Branch ...	" " 15.5.33 to 13.8.33	23.8.33
070 † <i>Bayano</i> ...	A. W. Legge ...	H. W. Mackey, W. P. Page	R. E. Blizzard ...	S.	Elders & Fyffes	" " 8.6.33 to 19.8.33	22.8.33
059 † <i>Belgenland</i> ...	W. A. Morehouse ...	G. Boyle, W. Wood, W. Godwin.	J. Caldwell ...	"	Red Star ...	Fm. 138 ... 25.8.33 ...	21.8.33
183 † <i>Bendigo</i> ...	F. N. Wyatt ...	H. T. Rigden, S. Hopkins ...	F. W. Rose ...	M.-S.	P. & O. Branch ...	Fms. 911 & 138 4.4.33 to 9.6.33	12.6.33
237 † <i>Berenguria</i> ...	E. T. Britten, R.D., Capt., R.N.R.	R. H. C. Crawford, E. R. Taylor, S. Tayne.	J. N. Cragg ...	S.	Cunard ...	" " 28.5.33 to 31.8.33	2.9.33
145 † <i>Berwickshire</i> ...	E. H. Evens ...	E. Coulthart, J. C. Robertson, S. R. J. Wood.	H. Southgate ...	"	Turnbull Martin ...	Fm. 912 29.7.33 to 31.8.33	2.9.33
007 † <i>Birchbank</i> ...	E. H. Skelly ...	... ..	... ..	M.L.	A. Weir ...	" " ...	... ..
007 † <i>Bradfyme</i> ...	J. O'Neill ...	P. Evans, F. W. Burn, O. E. Brown.	C. K. Castle ...	S.	Reardon Smith	Fm. 911 12.12.32 to 22.5.33	7.6.33
007 † <i>Brighton</i> ...	A. Hill ...	E. Balcombe, C. Munton, E. Hill.	S. Wood ...	"	Southern Rly. ...	Telegraphic Report 3.9.33	3.9.33
057 † <i>Britannic M.V.</i> ...	P. R. Vaughan, D.S.C., R.D., Commr, R.N.R.	A. J. Fisher, O. V. Lucas, A. E. Harvey.	J. B. Stone ...	"	White Star	Fms. 911 & 138 20.5.33 to 2.9.33	5.9.33
269 † <i>British Admiral</i> ...	F. I. Taylor ...	H. J. Were, C. Finch ...	W. Large ...	M.	British Tankers	Fm. 912 20.5.33 to 10.6.33	13.6.33
249 † <i>Buteshire</i> ...	C. A. I. Laird ...	P. McMillan, S. W. Brown, J. D. Elvish.	T. Prenton ...	S.	Turnbull Martin	Fms. 911 & 138 2.6.33 to 10.7.33	18.7.33
031 † <i>Caledonia</i> ...	A. Collie ...	J. O. Dunn, T. K. McMillan, A. C. Johnston.	W. Stewart ...	S.	Anchor ...	Fms. 911 & 138 20.5.33 to 8.7.33	11.7.33
139 † <i>California</i> ...	R. W. Smart ...	J. F. Adams, R. L. Robertson, B. Manfield.	D. Thompson ...	"	" ...	Fm. 912 20.5.33 to 11.6.33	19.6.33
190 † <i>Cambria</i> ...	T. B. Turner ...	O. W. Ll. Jones ...	... ..	"	" ...	Fms. 911 & 138 28.5.33 to 9.7.33	17.7.33
190 † <i>Cambridge</i> ...	R. Williams ...	H. Fryer, R. H. Carter, V. Canton.	P. Fleming ...	M.L.	L.M. & S. Rly. ...	Fm. 912 28.5.33 to 18.6.33	22.6.33
266 † <i>Cameronia</i> ...	W. Gemmel ...	E. Stormont, H. D. Campsie, D. Bone.	J. Fleming ...	S.	Federal ...	Fm. 915 16.1.33 to 7.5.33	5.9.33
086 † <i>Camito</i> ...	D. A. Jack ...	J. McIntyre, G. E. Hargreaves, B. R. Coe.	L. Fudge ...	"	Anchor ...	Fms. 911 & 138 14.5.33 to 3.9.33	6.9.33
117 † <i>Canonesa</i> ...	W. H. Brodie ...	E. J. L. Stone ...	J. W. Rawlin ...	M.	Elders & Fyffes ...	Fm. 912 14.5.33 to 15.6.33	4.7.33
282 † <i>Cape of Good Hope</i> ...	T. A. Jacobson ...	D. M. Taylor ...	B. Barstow ...	S.	" ...	Fms. 911 & 138 11.5.33 to 2.9.33	6.9.33
092 † <i>Carinthis</i> ...	P. A. Murchie, O.B.E., R.D., Capt., R.N.R.	J. A. Myles, G. S. Hutchinson, H. Hudson.	J. Doyle ...	"	Houlder ...	Fm. 911 5.5.33 to 31.8.33	2.9.33
155 † <i>Carnarvon Castle</i> ...	C. E. Stuart, R.D., Capt., R.N.R.	E. Clancy, H. L. Shaw, D. D. Mackenzie.	J. Hodgson ...	"	Lyle S.S. Co. ...	Fms. 911 & 138 17.3.33 to 28.6.33	4.7.33
155 † <i>Carthage</i> ...	H. M. Jack ...	H. J. Mann, C. T. O. Richardson, G. Sparks.	A. Macbeth ...	M.-S.	Cunard ...	" " 19.6.33 to 12.7.33	8.8.33
184 † <i>Cathy</i> ...	H. Elliot Smith, R.D., Lt-Commr, R.N.R.	A. J. McHattie, E. Cowell, M. G. Morris.	S. W. Sharp ...	"	Union Castle ...	" " 14.5.33 to 2.9.33	5.9.33
011 † <i>Ceramic</i> ...	W. J. Saunders ...	R. G. Roberts, J. Farrus ...	W. M. Ross ...	S.	P. & O. ...	" " 18.3.33 to 22.6.33	10.7.33
191 † <i>Chindwin</i> ...	G. Paterson ...	D. C. Frame, J. G. Aitkin, J. S. Sinclair.	A. C. Headley ...	"	" ...	" " 9.4.33 to 10.8.33	28.8.33
067 † <i>Chinese Prince</i> ...	W. Irvine ...	I. P. Ellis, J. W. Taylor, J. H. C. Torr.	M. Edwards ...	M.L.	White Star	" " 11.4.33 to 15.5.33	24.5.33
192 † <i>Chitral</i> ...	P. O. Britten ...	W. Allen, J. Last, T. Child...	E. L. Boyce ...	M.-S.	Henderson ...	" " 12.3.33 to 26.5.33	8.6.33
265 † <i>City of Auckland</i> ...	W. Rowlands ...	D. W. F. Reilly ...	... ..	S.	Furness Withy ...	Fm. 915 7.12.32 to 12.3.33	19.5.33
265 † <i>City of Barcelona</i> ...	W. Hill ...	H. G. Williams, J. L. Robertson, E. G. O'Driscoll.	P. J. Murphy ...	S.	" ...	" " ...	... ..
265 † <i>City of Baroda</i> ...	H. Percival ...	... ..	... ..	"	Ellerman ...	Fm. 911 ... 1.4.33 to 2.7.33	6.7.33
265 † <i>City of Cairo</i> ...	E. G. Hoppins ...	... ..	... ..	M.	" ...	Fms. 911 & 138 22.5.33 to 29.7.33	10.8.33

FLEET LIST

Name of Vessel.	Captain.	Observing Officers.	Senior Wireless Operator.	Meteoro-logical Instrument Equip-ment.	Line.	Logs, Registers, or Records Contributed. 8.6.33 to 6.9.33.	Date Last Return Received.
013 *† City of Cambridge City of Canton ...	A. G. Melville ... H. Lloyd ...	J. T. Keith ... R. A. Poort, A. G. Potter, G. V. Conolly ...	... ..	S. M.	Ellerman... ..	Fm. 911 9.3.33 to 3.6.33 26.4.33 to 26.5.33	26.6.33 26.6.33
157 *† City of Delhi ... City of Dieppe ... City of Evansville ...	A. Hogg ... H. Cartwright ... W. Keasley ...	A. Travis, F. H. Revel ... P. C. Wilson, D. J. Inglis ... F. W. Woods ...	S. Connell	S. M.L.	" ..	Fms. 911 & 138 2.5.33 to 14.7.33 Fm. 915 9.12.32 to 11.4.33 Fm. 911 4.5.33 to 30.7.33	18.8.33 1.5.33 8.8.33
220 †† City of Exeter ...	D. M. Bremner ...	J. W. Wotherspoon, J. G. S. Fyfe, C. V. Brennan.	H. Allen ...	S.	" ..	Fms. 911 & 138 10.4.33 to 11.6.33	20.6.33
089 *† City of Hereford ... City of Lincoln ...	J. Baker ... E. Readwin ...	J. W. Nesbitt, D. Wood ... C. A. Chapman ...	R. W. Sherwood	M. S.	" ..	Fm. 911 " 10.3.33 to 30.5.33 Fms. 911 & 138 10.5.33 to 18.8.33	6.6.33 21.8.33
028 †† City of London ...	J. G. Brown ...	B. E. Hooper, E. W. Gillies, W. H. Charlton ...	L. J. Hadley ...	S.	" ..	Fms. 911 & 138 8.5.33 to 7.7.33	13.7.33
City of Perth ... 271 *† City of Roubaix ...	D. H. Metcalf ... A. J. Phillip ...	... .. B. S. Roberts, C. Collard, W. H. Dalton.	R. W. Garnham ...	M.L. M.	" ..	Fms. 911 & 138 19.5.33 to 28.6.33	8.8.33
272 *† City of Singapore	T. Cooper ...	R. Pulford, D. G. Lister ...	J. W. Carroll ...	"	" ..	" " 3.1.33 to 6.7.33	21.7.33
035 *† City of Sydney ...	F. McKay ...	J. Kirby, R. W. May, R. A. Jones.	H. T. Cain ...	"	" ..	" " 18.4.33 to 8.8.33	16.8.33
City of Tokio ... 125 *† City of Windsor ... City of Winnepeg	R. R. Spurring ... N. G. Oswald ... R. J. Ricketts ...	... .. A. E. King, E. H. Lynes, R. W. A. Johns. F. Tibbett, G. Longfield, A. W. Conquest.	W. M. R. Aspin	M.L. S.	" ..	Fms. 911 & 138 20.6.33 to 18.7.33 Fm. 911 7.5.33 to 7.8.33	8.8.33 3.8.33
050 *† Clan Macalister	F. J. Stenson, R.D., Capt., R.N.R.	G. Drake, A. Harris ...	E. Harvey ...	"	Clan ...	Fms. 911 & 138 15.5.33 to 23.7.33	31.7.33
241 *† Clan Macbeth	H. Andrews ...	W. R. Woodruffe, J. C. Scott, P. N. Colepeper.	R. E. Tritton ...	"	" ..	" " 1.11.32 to 18.2.33	23.2.33
222 *† Clan Macdougall ... 287 *† Clan Macfarlane ... 118 *† Clan Macindoe	F. Forrett ... W. J. Hughes ... H. E. G. Scott-Smith, O.B.E., R.D., Lt.- Commr., R.N.K.	G. L. Roe ... J. H. Wright, J. R. Moss ... J. C. Dunphy, D. W. Gibbon, R. Dennis.	... .. W. Findlay ... J. Morrison ...	" " "	" .. " "	Form 911 5.3.33 to 13.5.33 Fms. 911 & 138 10.5.33 to 23.7.33 " " 12.4.33 to 28.6.33	20.5.33 5.9.33 3.7.33
233 *† Clan Mackellar... Clan Macnair... 255 *† Clan Macneil ...	N. J. Haynes ... W. G. Holman... A. Low ...	J. J. Stormont ... H. W. Peletier, A. W. Daish B. A. Hardinge, H. F. Town, B. H. Magill.	E. Woolhouse ... R. F. Kirk	" " "	" .. " "	Fm. 911 5.1.33 to 30.1.33 Fms. 911 & 138 23.4.33 to 25.7.33 Fm. 911 18.6.33 to 9.7.33	13.3.33 10.8.33 1.8.33
031 *† Clan Macphee ...	H. J. Giles, R.D., Capt., R.N.R.	R. G. Bagnall, H. Hind, S. W. Easterbrook.	J. R. McCash ...	"	" ..	Fms. 911 & 138 11.4.33 to 20.6.33	23.6.33
168 *† Clan Mactaggart	W. F. West ...	G. Dunn, H. R. Crosscombe, R. D. Helme.	J. C. Scott ...	"	" ..	" " 19.4.33 to 18.7.33	21.7.33
002 *† Clan Macwhirter	C. E. O'Byrne ...	L. W. Evans, P. L. Taylor, K. Simpson.	H. F. Baker ...	"	" ..	" " 22.5.33 to 2.7.33	21.7.33
003 *† Clan Malcolm ... 283 *† Clan Morrison... 259 *† Clan Sinclair ... Clan Urquhart ...	H. Cater ... R. P. Galer, R.D., Commr., R.N.R. H. Evans ... G. Young ...	K. Banks, D. Sutton ... A. Hambley, E. Croucher, J. Brodie. R. R. Baxter, C. Millis J. Millar, N. Graham, J. Higgins.	J. Cruickshank... W. Firken ... F. P. Drysdale...	" " M.	" .. " " "	" " 12.3.33 to 30.5.33 " " 2.8.33 to 11.8.33 Fm. 911 " 26.4.33 to 16.6.33 " " 29.6.33 to 15.7.33	8.6.33 17.8.33 4.7.33 8.8.33
Colonial... .. 187 *† Comedian ...	W. E. Harraden ... O. Bostock ...	W. S. Eustace ... T. Glover, E. McGuiness, E. Whitehouse.	... .. G. Roberts ...	" "	Harrison ... " ..	" " 20.3.33 to 8.6.33 Fms. 911 & 138 28.2.33 to 8.5.33	14.6.33 12.5.33
016 †† Comliebank, M.V.	S. Currie ...	L. F. Holden, L. S. J. French, W. A. McMoreland.	B. J. Boyce ...	S.	A. Weir ...	" " 5.4.33 to 14.8.33	18.8.33
185 †† Comorin ...	C. W. Cartwright, D.S.C.	R. E. Tucker, D. Meikle, D. S. Charles.	E. Habicht ...	M.-S.	P. & O. ...	" " 21.5.33 to 23.8.33	25.8.33
198 *† Contractor ...	W. T. Owen ...	N. F. O'Neill, L. Seddon, R. Myles.	F. Matthews ...	M.	Harrison ...	" " 29.3.33 to 21.5.33	29.6.33
049 *† Coptic, M.V. ...	D. Christie ...	P. Saville, G. A. Harvey, S. Wallis.	D. M. Edwards	M.L.	Shaw, Savill & Albion.	" " 8.5.33 to 5.8.33	12.8.33
258 †† Corfu ...	E. M. Coates, Lt. Commr. R.N.R.	W. T. Sheffield, D. Fitzgerald Lombard, S. C. Cooke.	A. Macfarlane ...	M.-S.	P. & O. ...	" " 15.5.33 to 15.8.33	28.8.33
100 *† Cornwall ...	A. E. Lettington ...	G. Dibley, T. M. Devitt, N. Baddeley.	... ..	M.L.	Federal ...	Fm. 915 12.12.32 to 15.4.33	19.4.33
006 †† Coronado ...	R. A. Thorburn, R.D., Commr., R.N.R.	H. J. Perrett, G. M. Binks, W. C. Shepherd.	R. A. Oakley ...	S.	Elders & Fyfes ...	Fms. 911 & 138 25.5.33 to 5.8.33	9.8.33
214 *† Counsellor ...	J. Jackson ...	A. A. Heaton, J. Davidson, E. B. Simmons.	W. Burns ...	M.	Harrison ...	" " 15.1.33 to 30.4.33	3.5.33
036 *† Cumberland ...	T. L. Maltby ...	H. H. MacKillop, W. G. Evans, R. A. Bellfield.	J. Yorstan ...	S.	Federal ...	Fm. 912 " 9.4.33 to 17.7.33 " " 10.6.33 to 27.6.33	22.7.33 22.7.33
285 *† Custodian ...	T. O'Connor ...	W. H. Slaughter, J. L. Williams.	T. H. Martin ...	M.	Harrison ...	Fms. 911 & 138 3.4.33 to 8.7.33	2.8.33
169 *† Dalgoma ... Deebenk ...	P. H. Beeching ... J. Robertson ...	H. E. Evans, J. W. Douglas, L. H. Cornish. D. I. C. Robertson, W. Olding, S. Eperon.	E. H. Woods	M. M.L.	British India ... A. Weir ...	" " 28.5.33 to 11.8.33 Fm. 915 24.2.33 to 18.7.33	17.8.33 6.9.33
260 *† Defender ... 079 †† Deseado ...	R. Kinloch ... O. V. Schlanbusch ...	A. M. Dewar ... F. Y. Brett, F. A. C. Thacker, A. Ballardie.	I. E. Jones ... A. W. Davey ...	M. M.-S.	Harrison ... Royal Mail ...	Fms. 911 & 138 19.12.32 to 17.5.33 " " 10.4.33 to 9.8.33	22.5.33 14.8.33
Designer ... 252 *† Devon ...	W. A. Hansen ... P. B. Clarke, D.S.C.	G. J. Crispin ... G. Chaplin, G. Shepherd, R. Coen.	J. J. McCarthy...	M. "	Harrison ... Federal ...	Fm. 911 13.3.33 to 12.6.33 Fms. 911 & 138 7.5.33 to 11.6.33	23.6.33 20.6.33
Diplomat ... 284 *† Director ... Discoverer ... 290 †† Doric ...	H. A. Brown ... B. Worthington ... W. Rowberry ... W. S. Quinn ...	J. H. Roberts ... A. E. Rogers, H. W. Jones... E. P. Simmons ... R. S. Walker, R. Hawkins, R. Conway.	... .. F. P. Ganter G. H. Thomas ...	" " " S.	Harrison ... " .. " .. White Star ...	Fm. 911 30.4.33 to 3.6.33 Fms. 911 & 138 14.5.33 to 16.7.33 Fm. 911 27.5.33 to 19.7.33 Fms. 911 & 138 5.6.33 to 10.8.33	7.7.33 8.8.33 25.7.33 15.8.33
136 *† Doric Star ...	S. N. Capon ...	A. F. Day, E. P. S. Lewis, G. McIntyre.	H. Glover ...	M.	Blue Star ...	" " 5.3.33 to 18.6.33	4.7.33
275 *† Dramatist ...	A. J. Meeke ...	R. L. Bryde, W. H. Howard, C. V. Watts.	A. McMarren ...	"	Harrison ...	" " 18.6.33 to 6.7.33	8.7.33
142 †† Duchess of Atholl	D. S. McQueen ...	A. E. Shergold, C. E. Duggan, E. V. Glennie.	E. Murphy ...	M.-S.	Canadian Pacific {	Fm. 912 " 11.6.33 to 24.8.33 " " 11.6.33 to 24.8.33	26.8.33 26.8.33
152 †† Duchess of Bed- ford.	H. Sibbons ...	L. Outram, F. Stell ...	C. H. Sinclair ...	"	" " {	Fms. 911 & 138 21.5.33 to 18.7.33 Fm. 912 21.5.33 to 18.7.33	19.8.33 19.8.33
151 †† Duchess of Rich- mond.	A. Freer, R.D., Capt., R.N.R.	T. B. Hewson, W. P. P. Phillips, N. C. H. Seddon.	J. Yorstan ...	"	" " {	Fms. 911 & 138 2.7.33 to 17.8.33 Fm. 912 2.7.33 to 16.7.33	19.8.33 22.7.33

Name of Vessel.	Captain.	Observing Officers.	Senior Wireless Operator.	Meteorological Instrument Equipment.	Line.	Logs, Registers, or Records Contributed. 8.6.33 to 9.6.33.	Date Last Return Received.
143 †† <i>Duchess of York</i>	R. N. Stuart, V.C., D.S.O., R.D., Commr., R.N.R.	S. W. Keay, T. L. Gillett, A. E. Halbert.	W. J. Clarke ...	M.-S.	Canadian Pacific	Fms. 911 & 138 28.5.33 to 10.8.33 Fm. 912 28.5.33 to 31.8.33	12.8.33 5.9.33
098 †† <i>Dunbar Castle</i> , M.V.	W. Weller ...	L. H. Farrow, J. Trayner ...	P. P. Williams...	S.	Union Castle ...	Fms. 911 & 138 14.4.33 to 17.6.33	21.6.33
052 *† <i>Dunster Grange</i> , M.V.	R. Smiles ...	E. G. Raynor, D. Murray, R. G. Williams.	S. K. Alston ...	M.	Houlder ...	" " 19.6.33 to 24.8.33	26.8.33
102 *† <i>Duquesa</i> , M.V.	C. R. Frost ...	A. McEwan, R. F. Martin, H. W. Brammell.	H. Croker ...	"	Furness Withy ...	" " 8.5.33 to 12.7.33	19.7.33
215 *† <i>Durenda</i> , M.V.	J. Blencowe ...	T. M. Robertson, J. L. Harsland, H. Collinson.	J. B. Clewe ...	"	British India ...	" " 14.5.33 to 6.6.33	13.6.33
077 †† <i>Edinburgh Castle</i>	A. Barron ...	H. Close ...	A. Blow ...	S.	Union Castle ...	" " 21.5.33 to 9.7.33	11.7.33
107 *† <i>El Argentino</i> , M.V.	F. Ellis, D.S.C.	W. Findlay, G. Brighton, C. G. Adlard.	E. Lovelock ...	M.	Houlder ...	" " 24.4.33 to 27.6.33	1.7.33
009 *† <i>Elmworth</i> , M.V.	J. Dick ...	R. Newlands ...	K. A. Allington	"	R. S. Dalglish ...	" " 1.6.33 to 3.8.33	22.8.33
158 *† <i>Elpenor</i> , M.V.	R. J. Wilson ...	F. Stott, A. J. Peard, W. Stanger.	D. T. Perks ...	S.	A. Holt ...	" " 3.9.32 to 22.12.32	29.12.32
108 *† <i>Elstree Grange</i>	W. E. Williams ...	P. A. Hawkesworth, W. F. Heritage.	R. Tilzey ...	M.	Houlder ...	" " 22.1.33 to 18.4.33	24.5.33
109 *† <i>El Paraguayo</i>	R. Owen ...	F. Rice, R. L. Aldridge, W. E. Bleworth.	C. Donaldson ...	"	" ...	" " 7.3.33 to 8.6.33	26.6.33
110 *† <i>El Uruguayo</i>	T. McNamara ...	F. E. Hailstone ...	P. J. Vere ...	"	" ...	" " 11.6.33 to 3.8.33	8.8.33
088 *† <i>Empire Star</i>	G. Owen, R.D., Lt-Commr., R.N.R.	R. Thome, R. McIlraith, P. H. Hunt.	C. Castle ...	S.	Blue Star ...	" " 3.12.32 to 28.2.33	3.3.33
066 †† <i>Empress of Australia</i>	E. Griffith, Lt-Commr., R.N.R.	D. F. Pennington, E. Roberts, A. H. Piggott.	J. B. Butler ...	"	Canadian Pacific	" " 28.5.33 to 1.9.33 18.6.33 to 4.7.33	4.9.33 6.7.33
034 †† <i>Empress of Britain</i>	R. G. Latta ...	J. H. Tudor, N. W. Duck, D. Dunn.	L. B. Cleary ...	"	" ...	Fms. 911 & 138 4.6.33 to 28.8.33 Fm. 912 24.6.33 to 25.8.33	25.8.33 25.8.33
154 †† <i>Empress of Canada</i>	A. J. Hailey, Lt-Commr., R.N.R.	G. W. R. Graves, W. C. Halliday, F. Poole.	R. D. Thomas ...	M.L.	" ...	Fm. 915 23.9.32 to 10.3.33	19.5.33
153 †† <i>Empress of Japan</i>	L. D. Douglas, R.D., Lt-Commr., R.N.R.	A. Kennedy, A. Alltree, R. Wolfenden.	J. McClure ...	"	" ...	" " 11.12.32 to 31.5.33	10.7.33
<i>Explorer</i>	J. Allan ...	A. Stout, F. O. Sheeley ...	" ...	"	Scottish Fishery Brd.	" " 1.6.32 to 16.11.32	6.12.32
074 *† <i>Fordsdale</i>	J. Avera, Commr., R.N.R.	A. W. Simms-Reeve, H. P. H. P. Last, C. Knox.	T. Holden ...	M.	Aberdeen Commonwealth.	Fms. 911 & 138 2.12.32 to 4.3.33	24.3.33
030 †† <i>Franconia</i>	J. C. Townley, R.D., Capt., R.N.R.	P. G. Britten, W. B. Tanner, J. Ashcroft.	J. Harvey ...	S.	Cunard ...	" " 23.5.33 to 22.7.33	8.8.33
159 *† <i>Fresno City</i>	D. Davies ...	B. E. Duffield, R. E. Shilstone, F. W. P. Davies.	E. Torr ...	"	Reardon Smith ...	Fm. 915 9.12.32 to 21.4.33	2.5.33
186 †† <i>Georgic</i>	F. F. Summers, R.D., Commr., R.N.R.	J. H. Walker, J. Law, J. C. Boyce.	R. S. Reid ...	S.	White Star	Fms. 911 & 138 5.6.33 to 19.8.33 Fm. 912 3.7.33 to 19.8.33	22.8.33 22.8.33
234 *† <i>Glaucus</i>	G. Leslie ...	S. G. Ellams, F. O. Browning	J. C. Wilson ...	M.L.	A. Holt ...	Fm. 915 9.3.33 to 26.7.33	6.9.33
126 *† <i>Glengarry</i> , M.V.	J. Angier ...	R. W. Brooks, P. G. Neill, S. W. Bell.	J. R. D. Cunningham.	M.	Glen ...	Fms. 911 & 138 27.2.33 to 10.6.33	22.7.33
085 *† <i>Governor</i>	D. Flynn ...	A. Watson, J. Stanhope, H. Collins.	A. W. Sparrow...	"	Harrison ...	" " 23.5.33 to 21.8.33	25.8.33
111 *† <i>Hardwicke Grange</i>	W. H. Fowler ...	W. L. Baker, A. O. Seybold, W. E. Ellis.	C. O'Sullivan ...	M.	Houlder ...	" " 10.4.33 to 8.6.33	17.6.33
218 *† <i>Harmonides</i>	F. R. Elwell ...	C. E. Avery, C. Hare, T. G. Mitchell.	F. McCarthy ...	S.	R. P. Houston	" " 19.5.33 to 13.6.33	16.6.33
262 *† <i>Hauraki</i> , M.V.	T. L. G. Jaunay ...	L. McLeish, A. McGarry, F. L. Cockrane.	S. Stafford ...	M.L.	Union S.S. Co., N.Z.	Fm. 915 13.8.32 to 20.2.33	4.5.33
253 *† <i>Hertford</i>	J. Burton Davies ...	A. V. Pearce, W. H. Timberlake, P. A. Block.	P. Maroney ...	S.	Federal ...	" " 29.12.32 to 1.5.33	13.5.33
<i>Hibernia</i>	J. R. Bulmer ...	R. Woodall ...	" ...	"	L.M. & S. Railway	Telegraphic Report 6.9.33	6.9.33
182 †† <i>Highland Brigade</i>	F. R. Miles, R.D. Capt., R.N.R.	W. Wrake, C. Brown, F. W. Harvey.	G. Grieve ...	M.-S.	Royal Mail ...	Fms. 911 & 138 30.4.33 to 30.8.33	1.9.33
116 †† <i>Highland Chieftain</i> , M.V.	A. E. Turner ...	G. Spalding, H. Chamberlain, G. J. James.	J. Malcolm ...	"	" ...	" " 15.6.33 to 30.7.33	9.8.33
099 †† <i>Highland Monarch</i> , M.V.	R. G. Clayton, D.S.C., R.D., Commr., R.N.R.	R. N. Fletcher, E. V. Scullard, R. E. Slinn.	E. J. Atkin ...	"	" ...	" " 28.5.33 to 19.7.33	29.7.33
230 †† <i>Highland Patriot</i>	R. H. Robinson ...	G. Taggart, F. W. Collinson, W. B. Tennent.	A. S. Hilton ...	"	" ...	" " 17.5.33 to 2.7.33	10.7.33
250 †† <i>Highland Princess</i> , M.V.	D. Collings ...	W. Paine, J. H. Fitton, H. Davies.	H. Morgan ...	"	" ...	" " 29.6.33 to 13.8.33	19.8.33
075 *† <i>Hobson's Bay</i>	T. V. Roberts, R.D., Commr., R.N.R.	F. Charnley, E. B. Macfarren, H. D. Pim.	A. R. Porter ...	M.	Aberdeen Commonwealth.	" " 31.3.33 to 2.7.33	19.7.33
026 †† <i>Homeric</i>	F. A. Frank, D.S.O., R.D., Commr., R.N.R.	B. Harrison, H. Morgan, J. Walthaire.	N. C. Duret ...	S.	White Star ...	" " 4.6.33 to 25.8.33	28.8.33
261 *† <i>Huntingdon</i>	H. G. B. Field ...	C. W. Roberts, T. K. Macdonald, A. R. Rae.	A. Mugridge ...	"	Federal ...	" " 19.2.33 to 7.6.33	22.6.33
200 *† <i>Huntsman</i>	H. Russell ...	J. Richardson ...	J. D. Lovelock...	M.	Harrison ...	" " 14.11.32 to 13.3.33	18.3.33
235 *† <i>Hurunui</i>	F. C. Pretty, D.S.C.	R. Dunning, T. Farrar, J. C. Cordran.	C. Beadell ...	S.	New Zealand Shipping.	" " 4.3.33 to 26.5.33	10.6.33
289 *† <i>Inanda</i>	W. H. Gibbings ...	T. B. Littlechild, D. C. Brown, J. Haycocks.	E. J. Cook ...	M.	Harrison ...	" " 30.4.33 to 8.8.33	11.8.33
<i>Ingoma</i>	J. Ling ...	D. Douglas Kerr ...	" ...	"	" ...	Fm. 911 28.5.33 to 1.9.33	5.9.33
189 *† <i>Ionic</i>	W. H. P. Jackson ...	" ...	" ...	S.	White Star ...	" " 16.2.32 to 28.7.33	6.9.33
160 *† <i>Ixion</i>	T. B. Marsham...	F. C. Oppen, P. L. Pallot, H. E. Readshaw.	W. N. Lidgate ...	M.L.	A. Holt ...	" " 16.2.32 to 28.7.33	6.9.33
226 *† <i>Japanese Prince</i> , M.V.	J. Smith ...	W. M. Henry, V. C. Palmer, E. S. Oberdorf.	F. Compton ...	M.L.	Prince ...	" " 7.10.32 to 23.2.33	13.4.33
188 †† <i>Kaisar-i-Hind</i>	W. A. Coteching ...	J. Travis, F. M. Squire, H. Toon.	R. V. McReath ...	M.-S.	P. & O. ...	Fms. 911 & 138 14.4.33 to 19.7.33	24.7.33
041 *† <i>Karamea</i> , M.V.	W. Dawson ...	H. A. Hill, N. S. Milne, C. W. Sendall.	T. Cheevers ...	S.	Shaw, Savill & Albion.	" " 16.2.33 to 25.5.33	19.6.33
<i>Kemmendine</i>	R. B. Reid ...	J. W. Brown ...	" ...	M.	Henderson ...	Fm. 911 25.3.33 to 4.6.33	27.6.33

Name of Vessel.	Captain.	Observing Officers.	Senior Wireless Operator.	Meteorological Instrument Equipment.	Line.	Logs, Registers, or Records Contributed. 8.6.33 to 6.9.33.	Date Last Return Received.
149 †† <i>Montclare</i> ...	J. Turnbull, C.B.E., R.D., Commodore, R.N.R.	J. Soames, A. Tibbett, J. R. Bubb.	G. M. Pott ...	M.-S.	Canadian Pacific	Fms. 911 & 138 11.6.33 to 28.8.33	1.9.33
150 †† <i>Montrose</i> ...	G. F. McCombie, R.D., R.N.R.	A. C. Harrison, K. Hutchings	S. Hewitt ...	"	"	Fm. 912 25.6.33 to 12.7.33	14.7.33
164 †† <i>Mooltan</i> ...	A. J. Morton ...	J. M. Sinclair, A. D. Dennis, N. Thompson.	J. E. Marsh ...	"	P. & O. ...	Fms. 911 & 138 27.5.33 to 31.8.33	5.9.33
196 †† <i>Mulbera</i> ...	J. W. Parkin ...	P. M. Wilson, E. J. Studart, E. Reed.	C. H. Brett ...	"	British India ...	Fm. 912 9.6.33 to 31.8.33	2.9.33
						Fms. 911 & 138 12.2.33 to 17.5.33	20.5.33
073 *† <i>Nagara</i> ...	T. E. Coombs ...	F. Crankshaw, C. V. Fletcher, H. A. Wright.	N. Hammond ...	M.	Royal Mail ...	" " 17.6.33 to 5.8.33	22.8.33
201 †† <i>Naldera</i> ...	R. C. Dene ...	E. J. R. North, R. D. W. Mackay, E. V. Lewis.	R. T. Soans ...	S.	P. & O. ...	Fms. 911 & 138 7.3.33 to 15.6.33	5.7.33
291 *† <i>Nankin</i> ...	M. B. Skinner ...	F. O. Colvin, G. C. Smith.	E. Bowel ...	M.L.	Eastern and Aus- tralian.	" " 19.4.33 to 9.8.33	1.9.33
227 *† <i>Nardana</i> ...	J. V. Reilly ...	T. Warland, H. Goater, A. Woodward.	R. Rawcliffe ...	M.	British India ...	Fm. 915 1.2.33 to 7.5.33	5.7.33
202 †† <i>Narkunda</i> ...	F. Sudeell, R. D., Commr., R.N.R.	J. W. Young, G. Randall, G. Copeland.	W. Banbery ...	M.-S.	P. & O. ...	Fms. 911 & 138 25.12.32 to 12.5.33	26.5.33
<i>Nascopie</i> ...	T. F. Smellie ...	T. O. Jost ...	"	S.	Hudson Bay Co. {	" " 15.4.33 to 31.7.33	4.9.33
286 *† <i>Natia</i> ...	S. Weller ...	G. H. Gammon, M. A. Murch, H. V. Todd.	J. Durrant ...	M.	Royal Mail ...	Fm. 911 17.6.33 to 5.8.33	22.8.33
027 *† <i>Nebraska</i> ...	B. J. Davies ...	P. R. Coocks, G. B. Medlycott, G. Shearer.	D. De Witt ...	"	"	Fm. 912 17.6.33 to 5.8.33	22.8.33
288 *† <i>Nellore</i> ...	H. A. Bright ...	"	"	M.L.	Eastern and Aus- tralian.	Fms. 911 & 138 7.5.33 to 26.6.33	30.6.33
<i>Nerbudda</i> ...	A. A. Parker ...	F. O. Copeland ...	"	M.	British India ...	" " 24.1.33 to 17.4.33	22.4.33
162 *† <i>Nestor</i> ...	F. Adcock ...	A. V. Potter, P. Elder, W. Pearse.	C. F. Townsend ...	S.	A. Holt ...	" " ...	"
210 *† <i>Niagara</i> ...	W. Martin ...	R. N. Turner, D. A. Menlove, J. Billingham.	C. F. G. Taylor ...	M.L.	Canadian- Australasian.	Fm. 911 20.3.33 to 13.7.33	17.7.33
256 *† <i>Norfolk</i> ...	R. L. H. McNish, D.S.O., Lt.-Commr., R.N.R.	H. N. Lawson, G. D. Lyver, W. E. Reeves.	B. C. Wheeler ...	"	Federal ...	Fms. 911 & 138 7.1.33 to 4.5.33	10.5.33
217 *† <i>Northumberland</i>	H. L. Upton, D.S.C., R.D., Commr., R.N.R.	A. W. Marshall, C. B. Cathie, J. Brooke Smith.	M. Savage ...	"	"	Fm. 915 1.2.33 to 16.6.33	15.8.33
231 *† <i>Nuddea</i> ...	M. Cockburn ...	H. Stewart, D. A. Jones, B. Emmerson.	A. Wells ...	M.	British India ...	" " 7.3.33 to 29.6.33	14.7.33
						Fms. 911 & 138 2.12.32 to 9.5.33	6.6.33
<i>Observer</i> ...	J. Lowe...	J. Harnden, W. J. Wearing, G. Greaves.	"	M.	Harrison ...	" " 15.4.33 to 9.8.33	14.8.33
004 †† <i>Olympic</i> ...	J. W. Binks, R.D., Lt- Commr., R.N.R.	W. Tugwell, G. Brooks, S. Anson.	N. Clarke ...	S.	White Star ...	Fms. 911 & 138 5.6.33 to 18.8.33	22.8.33
243 *† <i>Opawa, M.V.</i> ...	F. W. Robinson ...	H. D. Horwood, H. P. Williamson, R. H. Chapman.	F. W. Fowler ...	M.	New Zealand Shipping.	" " 23.1.33 to 15.5.33	20.5.33
170 †† <i>Orama</i> ...	E. P. Cameron, R.D., Capt., R.N.R.	C. H. Denton, L. Sly, W. L. Mackay.	J. Willson ...	S.	Orient ...	" " 20.2.33 to 23.5.33	31.5.33
080 *† <i>Orari</i> ...	F. Ashworth ...	M. Johnson, J. H. Underwood, C. R. Brown.	W. E. Fordham ...	M.	New Zealand Shipping.	" " 5.3.33 to 28.6.33	1.7.33
087 †† <i>Orduna</i> ...	M. Galloway ...	F. W. Hockey, W. Vickers, R. Eckford.	W. G. Sutherland ...	M.-S.	Pacific S.N. Co.	" " 13.5.33 to 23.7.33	25.7.33
171 †† <i>Orford</i> ...	A. L. Owens, R.D., Capt., R.N.R.	R. J. Galpin, K. M. Morrison, P. Sargent.	H. Cheese ...	"	Orient ...	" " 25.1.33 to 4.5.33	6.5.33
174 †† <i>Ormonde</i> ...	L. V. James, D.S.C. ...	T. L. Shurrock ...	"	S.	"	" " 21.8.32 to 14.3.33	23.3.33
172 †† <i>Oronsay</i> ...	C. G. Matheson, D.S.O., R.D., Capt., R.N.R.	C. W. Pinckney, O. C. Davies, E. M. Mackay.	B. Baxter ...	"	"	" " 5.3.33 to 6.6.33	13.6.33
173 †† <i>Orontes</i> ...	F. R. O'Sullivan ...	F. S. Gray, J. M. Swanson, W. L. Mackay.	S. G. Boons ...	M.-S.	"	" " 23.1.33 to 25.4.33	3.5.33
105 †† <i>Orsova</i> ...	R. L. F. Hubbard, R.D., Commr., R.N.R.	N. W. Smith, J. D. Birch, G. H. Hayes.	R. B. Knights ...	S.	"	" " 29.5.33 to 29.8.33	5.9.33
206 *† <i>Otira</i> ...	W. Thompson ...	D. Campbell, M. G. Stuart, A. S. Marshall.	L. W. Farnfield ...	M.	Shaw, Savill & Albion.	" " 26.4.33 to 17.8.33	22.8.33
156 †† <i>Otranto</i> ...	L. V. James, D.S.C. ...	A. Addison, J. M. Swanson, L. L. Lloyd Jones.	H. Curry ...	M.-S.	Orient ...	" " 30.4.33 to 1.8.33	8.8.33
<i>Pacific Exporter</i>	C. E. Holland, R.D., Commr., R.N.R.	W. Edmonds ...	"	S.	Furness Withy ...	" " ...	"
<i>Paris</i> ...	B. Shaw ...	E. W. Smith ...	A. H. Jones ...	"	Southern Rly. ...	Telegraphic Report ... 14.7.33	14.7.33
<i>Patrician</i> ...	J. Lowe...	S. Diamond, W. E. Williams	R. Hammond ...	M.	Harrison ...	Fm. 911 30.10.32 to 11.5.33	17.5.33
058 †† <i>Pennland</i> ...	V. L. Making ...	C. Otterson, W. A. Fletcher, J. R. Loe.	"	S.	Red Star ...	Fms. 911 & 138 4.6.33 to 19.8.33	21.8.33
<i>Pennyworth</i> ...	A. W. Gofton ...	"	"	M.L.	Dalglish... ..	Fm. 912 4.6.33 to 19.8.33	21.8.33
204 *† <i>Peshawur</i> ...	J. H. Biggs, R.D., Commr., R.N.R.	C. J. Triscott, G. V. Legas- sick, J. H. Andeson.	L. D. Waterhouse ...	M.	P. & O. ...	Fms. 911 & 138 21.4.33 to 18.8.33	22.8.33
<i>Phemius</i> ...	C. A. Lakin ...	"	"	S.	A. Holt ...	" " ...	"
238 *† <i>Piako</i> ...	E. P. C. Aslin ...	C. A. Cremin, J. F. Clement	L. H. Leggett ...	M.	New Zealand Shipping.	Fms. 911 & 138 3.1.33 to 22.4.33	3.6.33
039 *† <i>Planter</i> ...	J. T. Ling ...	J. C. Sinclair, F. R. Hill ...	P. J. Aherne ...	"	Harrison ...	Fm. 912 3.1.33 to 22.4.33	9.6.33
040 *† <i>Port Adelaide</i> ...	R. Williams ...	D. F. Morgan, R. Bettess, D. Henderson.	H. Amott ...	S.	Commonwealth & Dominion.	Fms. 911 & 138 15.5.33 to 4.8.33	8.8.33
<i>Port Alma</i> ...	S. W. Hayter ...	J. C. Goddard, W. B. Hopkins, A. L. Walton.	L. Rees ...	M.L.	"	" " 2.1.33 to 8.5.33	30.5.33
128 *† <i>Port Auckland</i> ...	C. A. Robinson ...	W. Easton, C. E. Midwinter, P. Bradnell.	S. Adams ...	S.	"	" " 5.4.33 to 19.7.33	27.7.33
268 *† <i>Port Bowen</i> ...	A. H. Brown ...	E. N. Howard ...	"	"	"	" " 9.2.33 to 21.5.33	11.7.33
130 *† <i>Port Caroline</i> ...	G. S. Hall ...	A. C. Cooper, J. S. Moate, V. N. Ford.	J. P. B. Jeffery ...	"	"	" " 18.12.32 to 6.5.33	25.5.33
131 *† <i>Port Darwin</i> ...	J. J. Hudson ...	K. D. Morgan, G. W. Horton, L. B. Philpotts.	"	"	"	" " 14.4.33 to 29.7.33	8.8.33
072 *† <i>Port Denison</i> ...	W. L. Lynd ...	E. Wheeler, H. B. Walker, A. G. Russell.	T. J. S. Manson ...	"	"	" " 25.2.33 to 23.6.33	8.7.33
133 *† <i>Port Dunedin, M.V.</i>	W. S. Mason, D.S.C. ...	G. Lovegrove, H. Duckling, C. Hodson.	T. T. Matthews...	M.L.	"	" " 14.4.33 to 12.8.33	22.8.33
						Fm. 915 4.2.33 to 20.5.33	29.5.33

FLEET LIST

Name of Vessel.	Captain.	Observing Officers.	Senior Wireless Operator.	Meteorological Instrument Equipment.	Line.	Logs, Registers, or Records Contributed. 8.6.33 to 6.9.33.	Date Last Return Received.
010 *† <i>Port Fremantle</i> , M.V.	W. Gilling	G. Langford, A. Brown, C. J. Gorley.	H. West	M.L.	Commonwealth and Dominion	Fm. 915 25.2.33 to 10.6.33	19.6.33
176 *† <i>Port Gisborne</i> , M.V.	W. G. Higgs	R. B. Linklater, N. Muzzell, D. Watson.	H. Olding	S.	" " "	" 7.1.33 to 30.4.33	2.5.33
135 *† <i>Port Hunter</i>	R. S. Durham, D.S.C.	G. T. C. Harris, C. R. Townshend, P. A. Mundy.	W. A. Bassom	M.L.	" " "	" 26.3.33 to 8.7.33	12.7.33
129 *† <i>Port Wellington</i>	R. Needham	A. J. Knell, E. Rogerson, R. E. Garner.	A. Clark	S.	" " "	Fms. 911 & 138 5.5.33 to 21.8.32	26.8.33
106 *† <i>Princesa</i>	A. B. Friend	E. Loughheed, O. S. Sheard, F. Poulson.	R. Shackleton	M.	Houlder	" " 25.6.33 to 13.8.33	22.8.33
163 *† <i>Protesilaus</i>	J. G. Reynard	J. A. Russel, H. C. Shinnis, A. S. Brotherton.	N. F. Brierley	M.L.	A. Holt	Fm. 915 3.11.32 to 5.7.33	10.8.33
205 †† <i>Rajputana</i>	P. C. Headlam, R.D., Commr., R.N.R.	B. N. Nankivell, D. C. Swabey, K. W. Richardson.	A. F. Edwards	M.-S.	P. & O.	Fms. 911 & 138 28.12.32 to 25.5.33	29.5.33
063 *† <i>Rancher</i>	J. McCullum	D. Bryant, G. Harvey, A. O. Lewis.	R. C. Law	M.	Harrison	" " 20.2.33 to 9.5.33	12.5.33
228 †† <i>Ranchi</i>	A. H. Hignett, R.D., Commr., R.N.R.	R. S. Kerridge, J. P. McArthur, C. B. Holmes.	H. S. Horn	M.-S.	P. & O.	" " 31.5.33 to 25.7.33	28.8.33
224 †† <i>Rangitane</i>	A. W. Mackellar, R.D., Capt., R.N.R.	R. C. Aldridge, C. J. Guille, S. R. Leggett.	W. Smith	"	New Zealand Shipping	" " 11.2.33 to 15.5.33	20.5.33
257 †† <i>Rangitata</i> , M.V.	J. L. B. Hunter	R. L. Warren, J. Clarke, A. Brown.	C. E. Terry	"	" " "	" " 10.3.33 to 13.6.33	20.6.33
240 †† <i>Rangitiki</i> , M.V.	H. Barnett	L. F. Malcouronne, T. E. Davies, F. S. Marchington.	L. V. Horn	"	" " "	" " 15.1.33 to 16.4.33	25.4.33
207 †† <i>Ranpura</i>	S. H. French	G. Maclean, G. F. O'Brien, J. C. Taylor.	G. W. Bailey	"	P. & O.	" " 28.5.33 to 30.8.33	5.9.33
071 †† <i>Rawalpindi</i>	R. H. Stringer, O.B.E., R.D., Commr., R.N.R.	L. Porter, R. A. Perry, E. G. May.	J. D. Roll	"	" " "	" " 14.5.33 to 15.8.33	22.8.33
247 *† <i>Recorder</i>	J. J. Egerton	A. S. Milne, S. Fraser, J. Cowell.	J. Walker	M.	Harrison	" " 25.4.33 to 18.7.33	26.7.33
132 *† <i>Reina del Pacifico</i> , M.V.	J. Ross	W. A. Hearle, E. C. Hicks, R. Bridson, J. K. Campbell.	S. W. Mitchell	"	Pacific S.N. Co.	" " 18.4.33 to 17.8.33	22.8.33
239 *† <i>Remuera</i>	E. A. Holland	H. Hill, D. H. Clegg, R. C. Robinson.	H. Dedman	M.L.	New Zealand Shipping	Fm. 915 8.4.33 to 16.7.33	21.7.33
<i>Rhezenor</i>	W. R. F. Holden	G. Edge	...	"	A. Holt	Fm. 911 23.12.32 to 8.3.33	8.5.33
<i>Rother</i>	T. H. Woodhead	H. Robinson, L. Joy, A. E. Willmott.	P. Hornby	"	Goole Steam Shipping	Fms. 911 & 138 27.5.33 to 12.8.33	15.8.33
053 *† <i>Rotorua</i>	C. B. Lamb	W. J. Glassborow, N. Baddeley, H. V. Hastings.	E. Lawrence	"	New Zealand Shipping	Fm. 915 6.5.33 to 14.8.33	23.8.33
246 *† <i>Ruahine</i>	G. Kinnell	F. R. F. Wilson, A. Hocken, D. S. R. Martin.	F. G. Bedford	"	" " "	" 18.3.33 to 9.7.33	18.7.33
<i>St. Helier</i>	R. Pitman	H. D. Freeman	...	S.	G.W. Railway	Telegraphic Report 5.9.33	5.9.33
<i>St. Julien</i>	L. Richardson	T. D. Thomas, T. E. Martin	...	"	" " "	" 31.8.33	31.8.33
<i>St. Minver</i> , S.T.	A. Hatton	...	...	A.	Bunch Steam Fishing Co.	Fm. 911 4.12.32 to 13.12.32	16.12.32
<i>St. Patrick</i>	C. W. Sanderson	T. D. Thomas	...	S.	G.W. Railway	Telegraphic Report 6.9.33	6.9.33
038 †† <i>Samaria</i>	R. G. Malin, Lt-Commr., R.N.R.	E. Gleave, F. P. Collins, J. F. Drake.	T. F. Wyatt	"	Cunard	Fms. 911 & 138 11.6.33 to 29.8.33	31.8.33
<i>Scotia</i>	W. Hughes	W. H. Hughes	...	"	L.M. & S. Railway	Telegraphic Report 1.9.33	1.9.33
<i>Scythia</i>	B. B. Oram, R.D., Commr., R.N.R.	W. M. Stewart, A. Bridgewater, F. G. Watts.	F. H. Williams	"	Cunard	Fms. 911 & 138 15.5.33 to 26.8.33	30.8.33
211 *† <i>Shropshire</i> , M.V.	H. B. Peate	D. Hetherington, J. K. Gemmel, C. A. Harris.	G. Talbot	"	Bibby	Fm. 912 25.5.33 to 27.6.33	6.7.33
121 *† <i>Siamese Prince</i> , M.V.	E. E. Jones	J. P. Wedgwood, R. A. Brock	Jack Hanlon	M.L.	Prince	Fms. 911 & 138 11.6.33 to 9.8.33	23.8.33
141 *† <i>Somerset</i>	C. R. Pilcher	J. P. Wedgwood, R. A. Brock	Jack Hanlon	M.L.	Prince	Fm. 915 25.1.33 to 8.7.33	14.8.33
277 *† <i>Spero</i>	H. Montgomery	D. Higgs, H. M. Knight, J. N. A. Low.	A. E. Howard	S.	Federal	" 17.2.33 to 29.5.33	7.6.33
020 *† <i>Stirlingshire</i>	F. T. Mee	H. D. Vickers, A. Kirk	H. V. Chamberlain.	M.L.	Ellerman Wilson	" 14.1.33 to 24.6.33	1.7.33
<i>Stephen</i>	W. C. H. Jones, R.D., Commr., R.N.R.	A. Allan, R.D. Thomas, J. H. Stoker.	...	S.	Turnbull Martin	...	...
270 †† <i>Strathaird</i>	W. P. Townshend, R.D., Capt., R.N.R.	R. H. Hand, H. Fitzmarshall, L. T. Brown.	F. W. Helm	M.-S.	Booth	Fm. 915 16.9.32 to 5.2.33	3.3.33
044 *† <i>Tacoma City</i>	H. Paul	T. J. Paull, J. M. Hughes, J. L. Barry.	A. R. Magridge	M.L.	Reardon Smith	Fm. 915 8.1.33 to 9.6.33	19.6.33
<i>Tacoma Star</i>	T. Williams	J. O. W. Davies, C. L. Williamson, L. N. Mates.	...	S.	Blue Star	Fm. 911 12.4.33 to 6.7.33	14.7.33
229 *† <i>Tactician</i>	F. Trinick, O.B.E.	A. Frew, S. Leyland, L. G. Shorman.	J. Bumbury	M.	Harrison	Fms. 911 & 138 27.1.33 to 18.6.33	21.6.33
045 †† <i>Tainui</i>	A. McIntosh	P. Campbell, H. Winyard, D. Pickersgill.	A. Bloxham	M.L.	Shaw, Savill & Albion	Fm. 915 28.1.33 to 15.5.33	23.5.33
081 *† <i>Tairoa</i>	S. Oswald	W. Thowless, L. B. Miller, G. Sangwin.	L. Arnold	S.	" " "	Fms. 911 & 138 22.4.33 to 25.8.33	5.9.33
046 †† <i>Tamaroa</i>	G. Williams	A. S. Masters, J. G. Allen, D. A. Emik.	A. Lund	M.-S.	" " "	" " 23.4.33 to 26.7.33	1.8.33
264 *† <i>Tanda</i>	E. T. Pilcher, Lt-Commr., R.N.R.	H. E. Nuzum	...	M.L.	E. & A. S.S. Co.	Fm. 915 13.12.32 to 2.5.33	15.8.33
165 *† <i>Tantalus</i> , M.V.	C. F. Melling	J. H. Brawn, E. Saville, L. A. Munday.	J. Clarkson	S.	A. Holt	Fms. 911 & 138 24.4.33 to 26.6.33	21.7.33
047 *† <i>Taranaki</i> , M.V.	J. H. Johnson	T. B. Marsdon, B. M. Norris, C. Stewart.	A. A. Grundy	"	Shaw, Savill & Albion	" " 26.3.33 to 26.6.33	30.6.33
069 *† <i>Tekoa</i>	J. Howell Price, D.S.O., D.S.C.	H. F. C. Wilkinson, C. W. Fulcher, A. B. Goord.	F. Gardiner	M.	New Zealand Shipping	Fms. 911 & 138 19.1.33 to 6.5.33	9.6.33
048 †† <i>Themistocles</i>	C. Wood, D.S.C.	J. G. Allen, L. J. Hopkins, G. Sangwin.	W. G. Sutherland	M.-S.	Aberdeen Commonwealth	" " 27.11.32 to 23.3.33	28.3.33

Name of Vessel.	Captain.	Observing Officers.	Senior Wireless Operator.	Meteorological Instrument Equipment.	Line.	Logs, Registers, or Records Contributed. 8.6.33 to 6.9.33.	Date Last Return Received.
161 *† <i>Titan</i> ...	G. G. Rundle ...	G. Roberts, G. Alder, C. B. L. Wren.	J. H. Nightingale	S.	A. Holt ...	Fms. 911 & 138 26.6.33 to 19.7.33	21.8.33
244 *† <i>Tongariro</i> ...	F. S. Hamilton ...	G. W. Pring, N. A. Thomas, H. Dawson.	E. G. Stride ...	"	New Zealand Shipping.	" " 11.4.33 to 29.7.33	10.8.33
025 †† <i>Transylvania</i> ...	D. W. Bone ...	J. O. Dunn, J. A. Lefevre, A. Middleton.	J. McDonald ...	"	Anchor ...	" " 4.6.33 to 6.7.33	18.7.33
119 *† <i>Trojan Star</i> ...	D. H. Mills ...	T. Gilchrist, E. R. Pearce, G. Wooller.	R. L. Baker ...	M.	Blue Star ...	Fms. 911 & 138 15.4.33 to 1.6.33	13.6.33
245 *† <i>Turakina</i> ...	J. Laird ...	C. Edgcombe, H. G. Letts, J. Reeve.	N. Hallett ...	"	New Zealand Shipping.	" " 20.5.33 to 29.8.33	1.9.33
276 †† <i>Tuscania</i> ...	W. B. Rome ...	D. Morrison, D. Barr, J. McIntosh.	J. Reid ...	S.	Anchor ...	" " 30.7.33 to 26.8.33	31.8.33
113 *† <i>Upwey Grange, M.V.</i>	H. P. Goodrick ...	A. Bradbury, G. T. Hurst, P. J. Walker.	H. Shaw ...	M.	Houlder ...	Fms. 911 & 138 23.5.33 to 25.7.33	31.7.33
274 †† <i>Vandyck</i> ...	P. Symons ...	J. A. Baragwanath ...	J. Carey ...	S.	Lampport & Holt	Fms. 911 & 138 2.7.33 to 24.8.33	29.8.33
292 †† <i>Viceroy of India</i>	E. J. Thornton, R.D., Capt., R.N.R.	F. E. Cox, R. H. Turner, M. F. Shute.	V. A. K. Smith	M.-S.	P. & O. ...	" " 17.5.33 to 22.6.33	26.6.33
101 †† <i>Voltaire</i> ...	W. S. Heasley ...	F. J. Durrant ...	W. Burnett ...	S.	Lampport & Holt	" " 25.6.33 to 30.8.33	4.9.33
263 *† <i>Wairuna</i> ...	R. L. Davies ...	J. Warwick, D. McKenzie, A. H. Dunning.	E. P. Nichell ...	M.L.	Union S.S. Co. of N.Z.	Fm. 915 14.10.32 to 21.1.33	12.4.33
005 †† <i>Warwick Castle</i>	W. M. Betts ...	P. Clissold, W. D. Roach, J. H. Wilson.	C. Pitt ...	S.	Union Castle ...	Fms. 911 & 138 29.4.33 to 20.8.33	23.8.33
060 †† <i>Westernland</i> ...	J. H. Doughty ...	J. Wade, J. L. McLaren, J. H. A. Mackie.	J. C. R. Eustice	"	Red Star	" " 22.5.33 to 2.9.33	4.9.33
056 *† <i>Westmoreland</i> ...	J. H. Wilde ...	F. T. Renny, J. Trotter, H. Forster.	R. Glover ...	"	New Zealand Shipping.	Fms. 911 & 138 17.5.33 to 23.6.33	3.7.33
208 †† <i>Winchester Castle, M.V.</i>	J. H. Kerbey ...	G. F. Moon, R. F. Pembry ...	W. A. Smith ...	"	Union Castle ...	" " 27.5.33 to 16.7.33	18.7.33
096 †† <i>Windsor Castle Working</i>	E. F. Gilbert ... W. Lidbetter ...	W. S. Byles, F. A. G. Hunter H. L. Smith, E. Hill ...	G. Seurr ... C. Kelley ...	"	" " Southern Railway	" " 22.4.33 to 13.8.33	19.8.33
<i>Yoma</i> ...	D. A. Meek ...	J. Crawford, P. D. Barr ...	" " " "	M.	Henderson ...	Fm. 911 3.6.33 to 16.8.33	19.8.33
043 *† <i>Zealandic, M.V.</i>	H. R. Gordon ...	C. A. Meyers, T. Chapman ...	E. T. Whibley ...	S.	Shaw, Savill & Albion.	Fms. 911 & 138 2.10.32 to 12.5.33	23.5.33
<i>Conway, H.M.S.</i>	F. A. Richardson, D.S.C., Commr., R.N.	The Senior Cadets ...	" " " "	Cadets M.L.	" " " "	Cadets' Met. Log. 7.5.33 to 25.7.33	31.7.33
<i>Pangbourne Nautical College, Worcester, H.M.S.</i>	A. F. G. Tracy, Commr., R.N. G. C. Steele, V.C., Commr., R.N.	" " " "	" " " "	"	" " " "	" " 27.4.33 to 25.7.33	3.8.33
		" " " "	" " " "	"	" " " "	" " 5.5.33 to 26.7.33	28.7.33
<i>Watling Island</i>	" " " "	The Keepers ...	" " " "	Lighthouse Register	" " " "	Lighthouse Register 1.1.32 to 30.6.32	4.8.32
<i>Cape Pembroke... (Falkland Is.)</i>	" " " "	" " " "	" " " "	"	" " " "	Lighthouse Register 1.1.33 to 30.6.33	4.8.33

SHIPS WATER SAMPLING THE NORTH ATLANTIC. FISHERIES LABORATORY, LOWESTOFT.

Name of Vessel.	Captain.	Observing Officer.	Line.	Received at Government Chemist, London.
<i>Dakarlan</i> ...	W. Hannaford ...	A. A. Johnson ...	Leyland ...	30 Water Samples, 8.6.33.
<i>Davisian</i> ...	R. Thomas ...	A. F. Wood ...	" " " "	30 " " 26.6.33.
<i>Desado</i> ...	O. V. Schlanbusch ...	Q. Ballardie ...	Royal Mail ...	30 " " 8.6.33.
<i>Dorelian</i> ...	C. Hughan ...	W. Parry ...	Leyland ...	30 " " 17.7.33.
<i>Hilary</i> ...	W. C. H. Jones, R.D., Commr., R.N.R.	G. E. Freeman ...	Booth ...	60 " " 31.5.33.

SHIPS WATER SAMPLING THE ARABIAN SEA, JOHN MURRAY EXPEDITION.

Name of Vessel.	Captain.	Observing Officer.	Line.	Received at Port Office, Port Said.
<i>Carnarvonshire</i> ...	W. J. Ings ...	I. A. Evans ...	Glen ...	" " " "
<i>Clan Ogilvy</i> ...	T. Brocklebank ...	T. B. Fairweather ...	Clan ...	" " " "
<i>Glennearm</i> ...	H. T. Evans ...	F. Meneight ...	Glen ...	" " " "
<i>Maidan</i> ...	W. Robertson ...	L. Jeans ...	Brocklebank ...	" " " "
<i>Mundra</i> ...	A. E. Wilkinson ...	C. D. Murray ...	British India ...	" " " "

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ATLANTIC (NORTH AND SOUTH):—

Monthly Current Charts for the Atlantic Ocean, from information collated and prepared in the Meteorological Office. (No. 132, 1897) (22½ × 18 in.) (Published by the Admiralty.)

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

ATLANTIC (NORTH):—

Atlas of Currents on the Main Trade Routes of the North Atlantic. (No. 323, 1930. 6s. 6d.) (29½ × 19½ in.)

Meteorological Charts of the North Atlantic for each month of the year, giving normals of Pressure, Air and Sea Surface Temperature and Ocean Currents, with Frequencies of Winds, also Ice Limits. (No. 149A, 1923.) 1s. each (35 × 22½ in.). Sold by J. D. Potter, 145, Minories, E.1.

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

Charts of Meteorological Data for Square 3, Lat. 0°-10° N., Long. 20°-30° W. (20 × 13½ in.) and Remarks to accompany the Monthly Charts, which show the Best Routes across the Equator for each Month, &c. (17 × 16½ in.) (No. 20, 1874). 20s.

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

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Wind Charts for the Coastal Regions of South America, from information collated and prepared in the Meteorological Office. (No. 159, 1902.) (27 × 20½ in.) (Published by the Admiralty.)

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

BAFFIN BAY AND DAVIS STRAIT:—

Monthly Meteorological Charts of Baffin Bay and Davis Strait. (No. 221, 1917.) 8s. (30 × 25½ in.)

CHARTS:—*continued.*

INDIAN OCEAN:—

Meteorological Charts of the East Indian Seas for each month of the year, giving Normals of Pressure, Air and Sea Temperatures and Ocean Currents, with Frequencies of Winds. (No. 181A, 1923.) 1s. each. (35 × 22½ in.) Sold by J. D. Potter, 145, Minories, E.1.

Monthly Current Charts for the Indian Ocean, from information collated and prepared in the Meteorological Office. (No. 124, 1896.) (20 × 24½ in.) (Published by the Admiralty.)

PACIFIC OCEAN:—

Quarterly Current Charts for the Pacific Ocean, from information collated and prepared in the Meteorological Office. (No. 134, 1897.) (26½ × 28½ in.) (Published by the Admiralty.)

Wind Charts for the Coastal Regions of South America, from information collated and prepared in the Meteorological Office. (No. 159, 1902.) (27 × 20½ in.) (Published by the Admiralty.)

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