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# THE MARINE OBSERVER



Ship "Hotspur."  
Capt. H. Toynbee



Admiral R. Fitzroy CB. RN.  
• 1854 — 1865 •

Captain H. Toynbee  
• 1867 — 1888 •

Lieut. C. W. Baillie RN.  
• 1888 — 1899 •

Captain  
A. Campbell Hepworth CB. RD. RNR.  
• 1899 — 1919 •

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**OCTOBER**  
**1938**

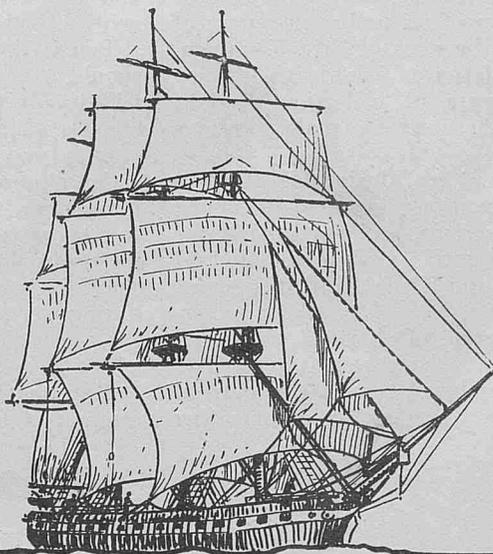
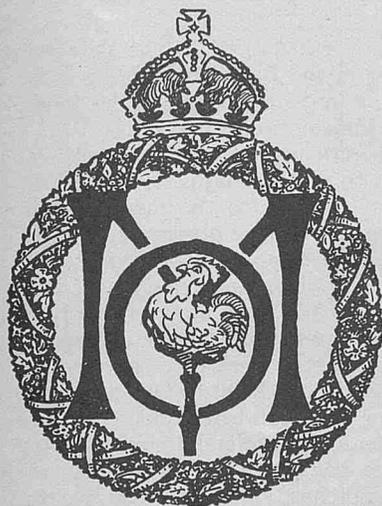
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VOL. XV, No 132.

THE MARINE OBSERVER

OCTOBER 1938.

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## FAREWELL.

In the January number it was stated:—"Upon the completion of the present volume the writing of these notes and the general selection from all the material available of what is to be published will pass to another."

It may seem unusual for an editor upon retirement to thank his contributors, but editing the MARINE OBSERVER is only one of the duties of the Marine Superintendent of the Meteorological Office; and in 84 years there have only been five of us, and each tenure of office marks some step in the progress of the work of British seamen, in the improvement of skill, and accumulation of knowledge.

During FITZROY'S eleven years the work of collection of data from the sea was started, as was also the service of gale warnings and centralized weather forecasting.

TOYNBEE, mainly by his own example at sea, during his 21 years in Office greatly improved the skill of observation of seamen, and added greatly to the information in sailing directions, and particularly for regions of contrary winds and calms traversed by clippers. He laid the foundation for the present splendid spirit of the British corps of voluntary marine observers.

During BAILLIE'S eleven years, the system of charting winds and currents was greatly improved and many atlases were produced.

In CAMPBELL HEPWORTH'S time, steam almost completely replaced sail. Wireless telegraphy came into use as a means of communicating

reports of weather observed in the North Atlantic to the Meteorological Office, for forecasting the weather in the British Isles.

The first International Conference on Safety of Life at Sea took place, and much was done to improve information of ice.

The MARINE OBSERVER is the outcome of all this work; and in these notes we have endeavoured to give encouragement, information and guidance during the last fifteen years to the merchant navy in general, and to the corps of voluntary marine observers in particular.

Before that, we wrote letters. Therefore it is appropriate that I should use these notes to thank all afloat and ashore, be they contributors to the MARINE OBSERVER or not, who have so loyally carried on this voluntary work in aid of navigation, for the furtherance of science, and to assist aviation during the past nineteen years.

An account of that work is given in the MARINE OBSERVER in these notes, year by year, in the June or July numbers; but it is impossible to adequately convey a proper idea of the splendid support which the merchant navy afloat and ashore has given the Marine Division of the Meteorological Office, its branches and Agencies, particularly during the trying years of re-organization after the War, and before the establishment of the MARINE OBSERVER with all that it brought with it.

Long may the Marine Division flourish, and good luck to my successor and the corps of voluntary marine observers.

L. A. BROOKE SMITH.

### The General Distribution of British Regular Observing Ships.

The distribution of observing ships in the fleet list to-day, 15th July, 1938, using the different trade routes and the different oceans, as ascertained from Lloyd's Daily Index and shipping advertisements, is indicated on the chart of the world and in the table below.

These figures give a fair estimation of the observing ships which at the present time are using the routes and oceans indicated, and of course include vessels in port, but not those laid up, since the published fleet list is composed entirely of British ships which are actually in commission and carrying on voluntary marine-meteorological service the world over.

In addition to these 342 regular observing ships, there are no less than 480 British Supplementary Weather Reporting Ships carrying on the Selected Ship service when and where necessary; and be it remembered that the Supplementary List was only commenced on 1st October, 1936, less than two years ago, since when the Port Meteorological Officers and Merchant Navy Agents have visited each of these ships and advised their commanders, officers and W.T. operators as to how to carry on the service.

Charts and Tables similar to these are kept by the Port Meteorological Officers, who, as desirable, advise the Merchant Navy Agents of the state of the distribution of observing ships, so that relief and recruitment may be made to the greatest advantage in maintaining the best possible spread of observation by British ships the world over, which requires constant adjustment with the ever changing fluctuations in maritime trade.

The number of observing ships using the Trans North Atlantic routes is maintained at a higher proportionate figure than in any other part of the world, since here the worst weather is encountered by shipping, the British Meteorological Office forecast service is dependent for observation in this region, and here at the present time the airman is depending much upon the merchant navy.

The publication of this chart and table year after year in the last number of each volume of the MARINE OBSERVER may seem stereotyped, but it is most desirable that all concerned with organized British voluntary marine observation should be kept aware of the constant care which is being taken to maintain at all times the best possible spread in the existing state of British maritime commerce and exploration, with the regular voluntary observing fleet which forms the nucleus and guide for organized observation in the British merchant navy.

### Oceanic Distribution of the Voluntary Observing Fleet, 15th July, 1938.

Ocean.	Form 911	M.L.	Total	Selected Ships.
North Atlantic, including Home Waters and the Baltic ... ..	144	8	152	112
South Atlantic ... ..	38	0	38	36
North Indian ... ..	50	0	50	45
South Indian ... ..	51	1	52	46
North Pacific ... ..	18	6	24	17
South Pacific ... ..	22	0	22	22
Arctic ... ..	3	0	3	0
Antarctic ... ..	0	1	1	1
Stationary Ships and Stations ... ..	0	0	5	-
Totals ... ..	326	16	342	279



### Total Merchant Tonnage Approximate (Steam and Motor) of the World.

(Vessels over 100 tons, Lloyd's Register Book, 1938-39)

### And Number of Selected Ships Required 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.	Approximate Number of Ships fitted for C.W. Long Wave Transmission (July, 1938)
	Number.	Gross Tons.			
Great Britain and Ireland.	6,843	17,675,404	27.6	276	146
Australia and New Zealand.	529	674,258	1.0	10	1
Canada (excluding Lakes).	625	807,515	1.3	13	17
Hong Kong ...	117	291,415	0.4	4	—
India and Ceylon...	179	237,450	0.4	4	—
South Africa and Other Colonies*.	606	628,936	1.0	10	2
British Empire Total	8,899	20,314,978	31.7	317	166
America (United States)(excluding Lakes).	2,436	9,047,828	14.2	142	226
Argentina ...	293	280,814	0.4	4	4
Belgium ...	206	430,624	0.7	7	10
Brazil ...	286	483,446	0.7	7	6
Chile ...	94	157,707	0.3	3	—
China ...	247	472,578	0.7	7	—
Denmark ...	694	1,129,556	1.8	18	23
Finland ...	352	542,741	0.8	8	—
France ...	1,246	2,880,783	4.5	45	14
Germany ...	2,321	4,231,657	6.6	66	35
Greece ...	638	1,889,269	2.9	29	—
Holland ...	1,473	2,852,012	4.5	45	16
Italy ...	1,156	3,258,992	5.1	51	147
Japan ...	2,187	5,006,712	7.8	78	467
Jugo-Slavia ...	178	386,187	0.6	6	—
Latvia ...	91	193,083	0.3	3	—
Norway ...	1,963	4,613,175	7.2	72	11
Panama ...	134	611,207	1.0	10	13
Portugal ...	214	249,776	0.4	4	13
Russia (Soviet Union).	680	1,272,897	2.0	20	13
Spain ...	793	947,963	1.5	15	14
Sweden ...	1,239	1,571,054	2.5	25	3
Turkey ...	185	220,636	0.3	3	—
Other Countries ...	723	952,934	1.5	15	31
Total ...	28,728	63,998,609	100.0	1,000	1,212

\* Including Dominion of Newfoundland.

### The Currents of the South Pacific.

In this number Mr. BARLOW has summarized the results of all our work of observation and charting the currents of the South Pacific.

The Atlas of the South Pacific is now receiving its finishing touches and will follow shortly.

No member of the corps of voluntary marine observers should fail to read this summary of the survey of the currents of the South Pacific, for nothing so comprehensive and complete regarding the currents of the South Pacific has ever been published before; and there is much new information in it.

During the past fifteen years the currents of the Atlantic, Indian Ocean and South Pacific have been re-charted in the MARINE OBSERVER (but for the South Atlantic) and new atlases, save for the regions not traversed by the trade routes, have been constructed. This has accumulated a great deal of information, and enhanced the skill of marine observers and the Marine Division in their respective spheres of the work.

Now in past years, one has often heard, and amongst navigators themselves, somewhat disparaging remarks on the reliability of the observation of current. Every navigator knows that at any time there may be inaccuracies due to errors which he cannot avoid or detect; his estimate of leeway may be out, or the speed through the water may be greater or less than that indicated by log and revolutions, however careful he is in estimating the slip, and so on. But constant scrutiny and comparison of returns of set and drift of current have convinced us that modern navigation is on the whole very accurate, and probably more accurate than may be generally realized.

These investigations have shown that the South Equatorial Current of the Pacific is steadier in direction than any other recharted since 1924, and as it has a clearer run than any other—saving the Southern Ocean drift, which is subject to the varying winds of the Roaring Forties—this is what we expected.

It remains to be proved when the meteorological data, which will very soon all be ready, has been charted, whether the South-East trades of the Pacific are steadier than has been believed from the meagre statistics hitherto published.

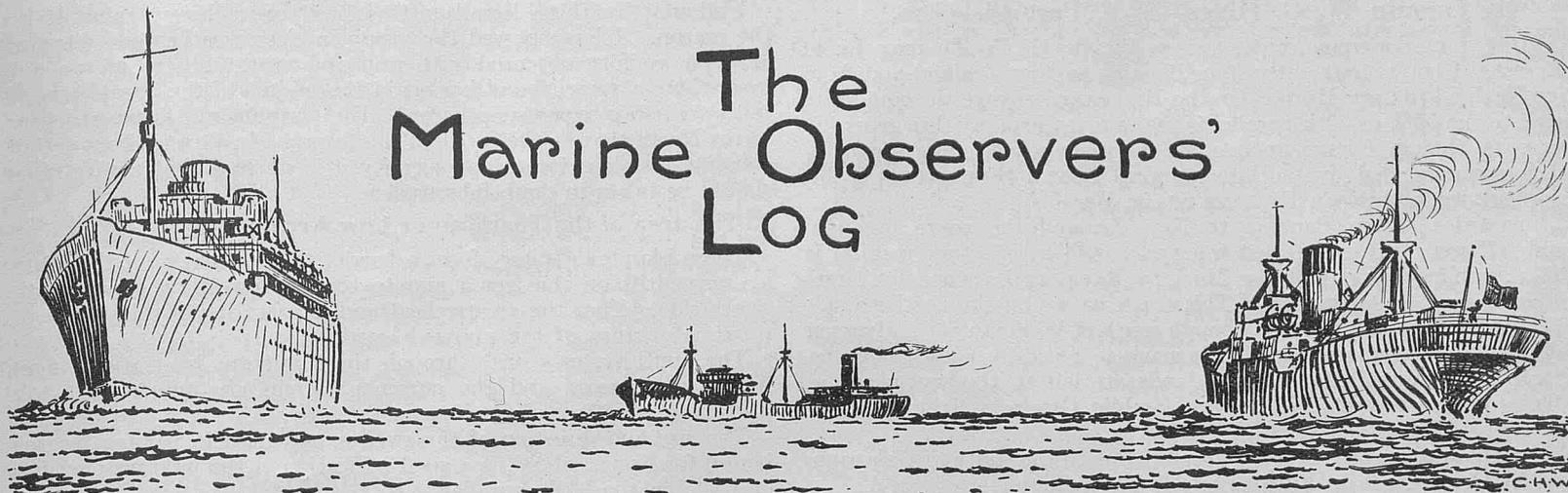
Now these current observations are made by the same ships or the same classes of ships which use the other oceans; a great number of the observations are made by ships on all round the world voyages; and if the variations in the direction of currents were due to errors of observation, the same would show in the Pacific.

The great number of observations used make for the reliability of the information now summarized.

MARINE SUPERINTENDENT.

London.  
15th July, 1938

# The Marine Observers' LOG



## 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.

### CURRENTS IN THE SOUTH PACIFIC OCEAN.

Remarks by the Captains of ships using the South Pacific received in response to the note headed "The Current Matter of Greatest Interest" which appeared in the April, 1936 MARINE OBSERVER, have been published in previous numbers appropriate to particular regions or currents.

Below are remarks dealing more generally with the currents of the South Pacific and Ocean pilotage.

#### By Captain Murray M. Johnstone—M.V. "Triaster."

It seems fairly certain that the prevailing wind has a big influence over the force and direction of the Equatorial currents in the Pacific.

In the settled Easterly season, *i.e.*, from April to October, the current in the vicinity of Ocean Island and Nauru runs to the Westward with a velocity of from one to two knots. When the wind is fresh the maximum current may be expected. When the wind is South of East the current runs slightly North of West and vice versa. Occasionally during this season, generally in July and August, the wind falls light and comes away from the Westward. When this occurs the Westerly current stops and within 24 hours is running to the Eastward reaching a maximum velocity of about  $2\frac{1}{2}$  knots after a few days of Westerly weather.

During the Westerly season, *i.e.*, from November to March, weather conditions are generally unsettled and for periods of a few days to about three weeks strong Westerly winds, at times reaching gale force, with rough seas, are experienced. During these periods the current runs to the Eastward reaching a maximum velocity of from  $2\frac{1}{2}$  to 3 knots.

A considerable amount of doldrum is experienced during this unsettled Westerly season. On these occasions the Easterly current falls away with a tendency to pick up a Westerly movement. Should the wind come away from the East, the current is soon running to the Westward.

Generally the drift to the Eastward is stronger than the drift to the Westward. This is accounted for by the greater strength developed by the Westerly winds.

Between Nauru and Santa Anna (Solomon Islands) the current

runs fairly consistently to the S.W. and W.S.W. at about  $\frac{1}{2}$  a knot. During the westerly weather the set to the Westward is less and after sustained Westerly weather the current sets South at from  $\frac{1}{4}$  to  $\frac{1}{2}$  a knot.

It would appear that the influence of the equatorial current weakens considerably South of one degree of South latitude.

Between Santa Anna and the Chesterfield Reef very little current is experienced. Occasionally a set to the N.W. at the rate of about  $\frac{1}{2}$  a knot is observed.

Between the Chesterfield Reef and a variable position from 50 to 100 miles South of Cato Island generally a Northerly set is experienced at from  $\frac{1}{2}$  to 1 knot.

I am unable to estimate just where the Australian Coastal current is picked up. At a distance of from 10 to 13 miles off the coast, the current, following the direction of the land, is found to vary considerably. The maximum experienced being 2 knots between Cape Byron and Sugarloaf and between Jervis Bay and Montague Island.

In order to avoid this coastal current when making Northbound passages, a course is shaped 70 miles off the coast and no current is experienced.

By following the coastline Northbound about two cables off the land, a set about half a knot running to the North has frequently been experienced.

In May, 1931, between Balut Island off the South end of Mindanao, Philippine Islands and Nauru a course was set keeping along the fifth parallel of North latitude in order to benefit by the equatorial counter-current. Fresh Easterly winds with moderate to rough seas were experienced and no counter-current was experienced. Making the same passage in May, 1935, and keeping on the fifth parallel of North latitude, calms to light Easterly winds with smooth seas were experienced. A set running between East and East-South-East at from  $\frac{1}{2}$  to  $1\frac{1}{2}$  knots was also experienced.

During a recent voyage round the Gilbert and Ellice Islands (Central Pacific), October, 1936, in settled South-East weather, the current ran to the West and North-West at from  $\frac{1}{2}$  to  $1\frac{1}{2}$  knots.

On a passage from Nanomea, Ellice Islands, to Ocean Island, in October, 1936, a set to the West-North-West was experienced with a velocity of 1 knot. The weather was settled S.E. with smooth seas.

### By Captain W. G. Higgs—M.V. Port Gisborne.

A few remarks upon routes across the South Pacific may be of interest. I travel frequently from Panama to New Zealand and from New Zealand to Cape Horn. On the Homeward voyage the composite track to the 56th or 57th parallel is that along which my ship generally proceeds, though I have upon occasions followed the more northerly track recommended by the late Admiral BOYLE SOMERVILLE in his excellent work, "Ocean Passages of the World."

Outwards: From Panama to New Zealand the route favoured (and followed during the past ten years with satisfactory results) is the rhumbline from off Cape Mala to Rapa, and thence by Great Circle to port of destination. This track passes on the northern side of the main Galapagos Group, though south of Wenman and Culpepper Islands. The northern side of Albemarle is generally passed close to. Pitcairn, Ducie and Henderson Islands are left to the southward at a considerable distance, while the Gambier Group is sighted also to the southward.

The advantages of this route over the one to the south of Galapagos and by Great Circle to Pitcairn are, in my opinion:—

1. The course—241°—makes a fairer wind of the South-East Trade.

2. The more westerly course also makes a fairer current of the prevailing Westerly set, which exists as far south as the Gambiers (latitude 23°S., longitude 135°W.).

3. One remains longer within the tropic zone, *i.e.*, that of settled weather.

4. One enters the zone of westerly winds, south of 30° South, at a point much further to windward and nearer one's destination.

The departure from the Great Circle route lengthens the distance from Panama to Auckland by 13 miles only—a small price to pay, it seems, for the benefits above mentioned. Homeward bound, via Panama, the direct Great Circle route is always followed passing South East of the Galapagos. The vagaries of the current south of Cape Mala are well known to the mariner and add greatly to his anxieties during times of poor visibility. The wireless beacon on that point is of great assistance.

I find that the Current Chart published by the Hydrographic Office gives sets and drifts in the open ocean in these regions very close to those actually observed by us. In this respect it is my opinion that the Chart could not be improved and is a reliable guide over the waters now being discussed. I have not noticed any material seasonal variation in these particular ocean drifts.\*

Via Cape Horn, my experience is that the easterly drift shown on the Chart South of 40 degrees is rarely found. The easterly set in these waters is not nearly so marked as that encountered in the Southern Ocean between the Cape of Good Hope and Australia. Favourable drifts between New Zealand and the Horn are uncommon. One should remember, however, that on this passage celestial observations are frequently unobtainable for days on end, particularly during the winter. I recollect a period of eight days without a glimpse of sun, moon or star; and on the eighth day we were due to pass the Horn and steer North East. Many miles were added to my passage on that occasion for one had to play for safety, as the saying goes, and keep well to the southward.

### By Captain C. R. Cox—Australind S.S. Co.

(Trinder Anderson & Co.)

#### 1. Area between the Gulf of Panama and the Galapagos Islands.

In this region one may experience continuous rains and/or overcast skies all the way till past the island group. This is most probable passing westward and north of the group. It is, therefore, advisable to pass 30 miles north of the most northern island. Indeed more favourable and truer currents will there be experienced.

Passing eastwards, bound to Panama, it is best to pass south of the group.

Undoubtedly these islands attract and cause heavy rains during the season. I have passed the group in clear weather and observed all their vicinity obscured with rain and mist. I have known of a case where a vessel found herself in the middle of the group some 40 miles from her expected position. The currents run faster and truer to the North than to the South of the Group. In view of the uncertain currents in their immediate vicinity it is obvious that a wide offing should be taken in doubtful weather.

#### 2. The area of the Tuamotu or Low Archipelago.

These islands definitely form a barrier to the passage of the South-westerly drift on the North and to the South-westerly winds on the South side. That the greater heat and evaporation of this area is the proximate cause of the above is evident.

The South-westerly drift through the Tuamotus is erratic at most, if not all, seasons and the currents therein are influenced by the prevailing wind in or bounding on the area.

The size and direction of the swell experienced in passing through, bound for New Zealand, is a good indication of the weather prevailing or past, on the 30°S. parallel.

#### 3. The South-East Trades.

The trades attain their highest velocity in the region eastward of the Tuamotu in the months July, August and September. This must be well borne in mind in a vessel bound eastwards to Panama passing south of the Galapagos. First coming from the S.E. they attain greater force from the E.S.E. as northing is made.

Two routes are recommended:—

(a) Pass along the 21°S. to 22°S. parallel in shelter of the southern-most groups till reaching the 130° or 120° or even 110°W. meridian. Then easing up to the N.E. course keeping the trades as far as possible on the beam to make (south) up to the Galapagos Islands.

(b) Reach and pass along the 27°–28°S. parallel to 160° or 150°W. meridian. Thence a great circle course passing South of Pitcairn Island to South of the Galapagos.

Bound from Northern Queensland or adjacent island groups an alternative route can be taken by passing North-eastwards to 6°N. and passing direct to Panama in Latitudes 6° to 8°N. In the strong trade periods this is possibly worth the extra distance involved instead of routes (a) and (b) above.

#### 4. The area between Palmerston Islands and Pylstaart (Ata) Island.

In the winter months the change of weather from fine Easterly winds is usually experienced in the longitude of Palmerston Islands. (Latitude 18° 4'S., Longitude 163° 10'W.).

In the summer months the change is retarded to at least the longitude of Ata island and favourable currents usually cease about the 180th meridian. This area is, of course, liable to the passage of cyclonic storms passing to the south and eastwards in the late summer months (February, etc.).

**Ata or Pylstaart Island.** (Latitude 22° 20'S., Longitude 176° 12'W.)

High in altitude with deep soundings close in, it may be passed as in like cases close on clear nights. Only on one occasion do I remember being set well to the southward when intending to pass to the northward.

#### Palmerston Islands.

The northern side is low-lying and, therefore, as in similar islands, should be given a good offing at night and in doubtful weather. Especially is this necessary as the vicinity currents are most erratic. The correct charting of the northern islets seems doubtful as during all northern passings cross bearing positions have been in considerable error. This may be due to growth or destruction of palm trees.

### CURRENT RIPS.

#### West Coast of Africa.

The following is an extract from the Meteorological Record of S.S. *Cambridge*. Captain C. R. PILCHER. Capetown to Dakar. Observer, Mr. R. J. OLSEN, 3rd Officer.

\* NOTE.—Particular attention is invited to the tables and curves on pages 143 and 149 of this number.

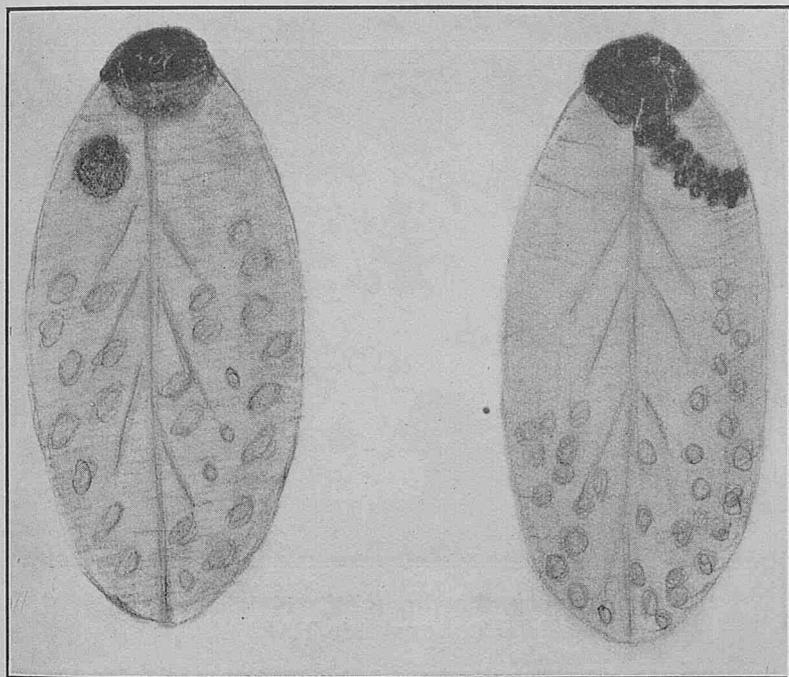
Shortly before noon on November 7th, 1937, the sea surface became agitated apparently caused by currents. At times the sea was very confused causing the vessel to sheer about very badly, these confused patches being alternated by a smooth surface. During these disturbances large quantities of tree foliage were observed, and a number of sea birds. Wind at the time was fresh to moderate N.E., sea moderate to slight and moderate northerly swell. Air Temperature 81°F. Sea surface 83°F. At 1.30 p.m. A.T.S. these rips became less intense and less frequent, but continued at intervals throughout the afternoon until 4.30 p.m. A.T.S., when the vessel again ran into a very severe rip causing her to sheer from one to two points either side of her course. After this no further rips were observed.

Position of Ship: Latitude 10°18'N., Longitude 17°04'W., steering 328°, approximately 10 miles outside 100-fathom line.

### DISCOLOURED WATER.

#### South Atlantic Ocean.

THE following is an extract from the Meteorological Record of M.S. *Clan Macdougall*. Captain L. M. REDFORD. Liverpool to Cape Town. Observer, Mr. C. GRINDLEY, 3rd Officer.



1st December, 1937. At 08.50 A.T.S. (08 10 G.M.T.) a considerable number of long wind-blown streaks of yellowish-brown discoloured water were noticed to port and starboard of the vessel.

At 09.05 A.T.S. when the ship steamed into some of this discoloured water, six samples of the sea water were obtained and emptied into a large bucket. The sea temperature was 65°F. The water was seen to contain about twenty dark specks; upon closer examination each of these specks proved to be at the top of a transparent jelly substance about 0.9 cm. long 0.4 cm. broad. Reading magnifiers and the object glasses of binoculars were made use of and a very close examination made of these masses whilst they were in the water. Each appeared to be like a transparent cocoon with a few very fine and faint spidery lines to accentuate the resemblance. The solid dark "head" would be about the size of a carroway seed, dark brown on top shading to a light brown below. Some had a jointed tail projecting downwards which moved from side to side. Others, without this "tail" had a small speck of white opaque substance a little below and to one side of the "head." All of them had an opaque vein running down the centre, from the "head" to the bottom of the

jelly substance with several barely discernible lines (veins) branching off. Numerous tiny air bubbles had become attached to the jelly substance. These creatures all tended to keep in groups of six or more with their "heads" uppermost and in the same direction, with their bodies midway between the vertical and horizontal. Most of the time they kept near the surface of the water but occasionally would sink slowly to two-thirds the depth of the bucket.

Taken out of the water with a pair of tweezers they were placed on various coloured surfaces but this method of examining them proved unsuccessful.

Out of the water the body was of firm transparent glass-like jelly. Held up to the light the vein running down the middle had a distinct mauve tint. No signs of a phosphorescent glow was seen when the bucket was taken into a darkened room, nor was there any sign after a dark heavy curtain had been draped over the bucket.

At 09.30 there was no discoloration of the water, nothing further being noted before noon.

The sketches are drawn in proportion but at least 100 times larger than the objects.

Weather, barometer 1018.5 mb., corrected, air temperature 67°F., wind S.E. by S. force 4, clouds 10/10ths stratocumulus, moderate S.E. by S. sea and swell.

Position of Ship: Latitude 20°36'S., Longitude 6°36'E. Course S. 37° E. Speed 11 knots.

### PHOSPHORESCENCE.

#### South Atlantic Ocean.

THE following is an extract from the Meteorological Log of R.R.S. *Discovery II*. Captain L. C. HILL, O.B.E. Observers, the Captain and Lieutenant, H. KIRKWOOD, R.N.R.

26th October, 1937. 20.00 G.M.T. Latitude 2°52'S., Longitude 10°02'W. Vessel passed through numerous phosphorescent streams which extended over an area of approximately four miles and trended in a N.W.-S.E.'ly direction. The phosphorescent blue-white glow was visible for about one mile, and as the vessel passed through these streams, the glow was intensified into a sparkling and flashing brilliance, due to the presence of countless small marine life disturbed by the bow wave and wash of the ship.

6th November, 1937 to 7th November, 1937. 2200 to 0030 G.M.T. Noon Position, Latitude 33°20'S. Longitude 17°43'E. During this period the ship passed through large areas of phosphorescent sea at frequent intervals. As on the previous occasion these areas presented a uniform blue-white glow when observed at a distance, but, as the vessel entered the areas the glow was intensified by the presence of myriads of small phosphorescent animals, whose sparkling glow in the disturbed water contrasted brilliantly with the uniform surrounding glow. Visibility was greatly reduced by this phenomenon and was later accentuated by thick fog encountered at 0030. Further features of the display were the luminous wakes of hundreds of large fish which kept close company with the ship.

Surface samples were obtained and an analysis by Dr. T. J. HART carried out on board. His remarks and observations are as follows:—

#### Surface samples 2300. 6th November, 1937.

Surface samples obtained at 2300 showed an extraordinary profusion of microscopic plankton organisms to be present in the surface layers. This micro-plankton was very rich in species:—many diatoms, dinoflagellates and ciliate protozoa (including the species causing red discoloration of the sea round Cape peninsula, as seen by day) were present. Five species of dinoflagellates known to have the property of emitting light were prominent, and to these the diffuse glow described by Lt. KIRKWOOD may be attributed. The local intensifications of the glow were due to multitudes of minute crustacea many of which carry luminescent organs, but which would also cause the diffuse glow of the vastly more numerous micro-organisms to be locally intensified by the mechanical stimulation of their passage through the water. This effect also accounts for the luminescence of the wakes of larger animals, and of ships, on such occasions.

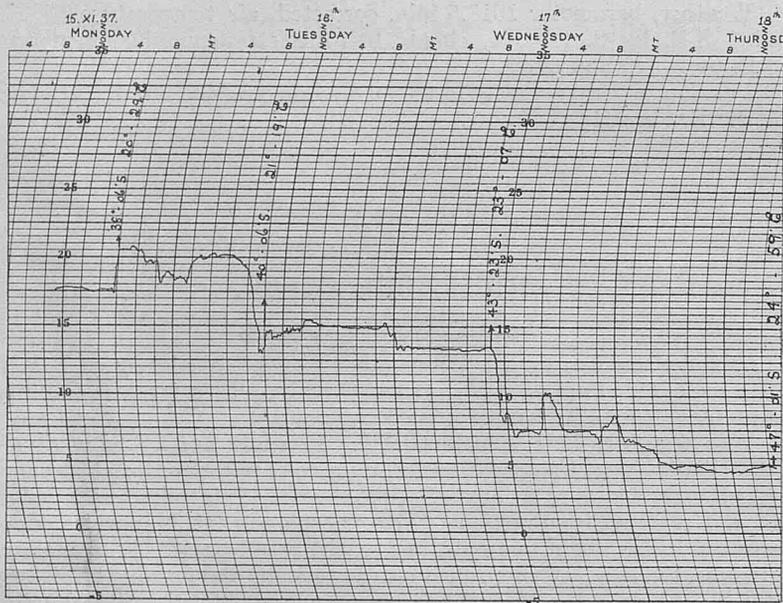
Sea water samples obtained with a bucket and preserved by the addition of a small proportion of formaldehyde solution are frequently

sufficient to enable biologists to determine the cause of such phenomena. Widespread diffuse luminescence at night, and discoloration of the water by day, are usually caused by living organisms, and have frequently been observed to follow spells of unusually fine, calm weather in many parts of the world. Further observations on this subject are badly needed.

## SEA TEMPERATURES.

### South African Waters.

THE following is an extract from the Meteorological Log of R.R.S. *Discovery II*. Captain L. C. HILL, O.B.E. Observer, Lieutenant H. KIRKWOOD, R.N.R.



15th—16th November, 1937. Latitude  $37^{\circ} 50' S$ . Longitude  $20^{\circ} 18' E$ . to Latitude  $41^{\circ} 31' S$ . Longitude  $22^{\circ} 05' E$ . The remarkable confusion of sea conditions and the rapid changes of sea temperature produced by the meeting of the Agulhas current with the Antarctic waters flowing from the S.W. were well illustrated by our experiences on the 15th and 16th November, while on passage from Cape Town to the Ice Edge.

At 1800 Ship Time (Zone -2) 15th November, a confused heavily breaking cross sea and swell developed, accompanied by a sharp rise in sea temperature. The vessel was hove to at 2000 S.T. for a scientific station, which, after an hour's ceaseless manoeuvring had to be abandoned owing to the violent movement of the ship and impossible conditions.

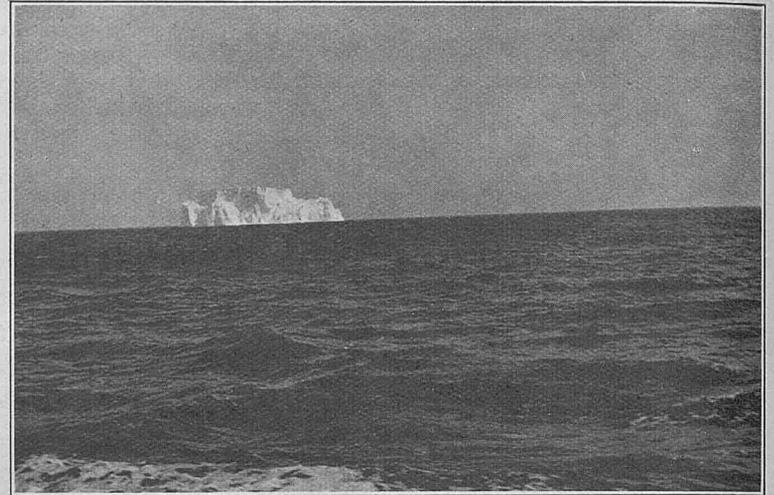
In contrast to the confusion of sea conditions the weather remained moderately good with fresh westerly breeze, partly cloudy sky, barometer falling slowly.

The confusion of sea and swell and the variable sea temperature continued throughout the next fifteen hours. At 1000 S.T. 16th November, the sea temperature dropped nearly  $12^{\circ} F$ . within an hour. This fall was accompanied by heavy rain squalls, the wind falling to light westerly airs at 1300 S.T. The wind now remained light and variable whilst the sea regained normal conditions until 2400 S.T. when the wind, freshening from W.N.W., slowly increased to gale force 7 and continued fitful in direction (N.W. - S.W. by W.) and strength (force 6-9) for the next four days.

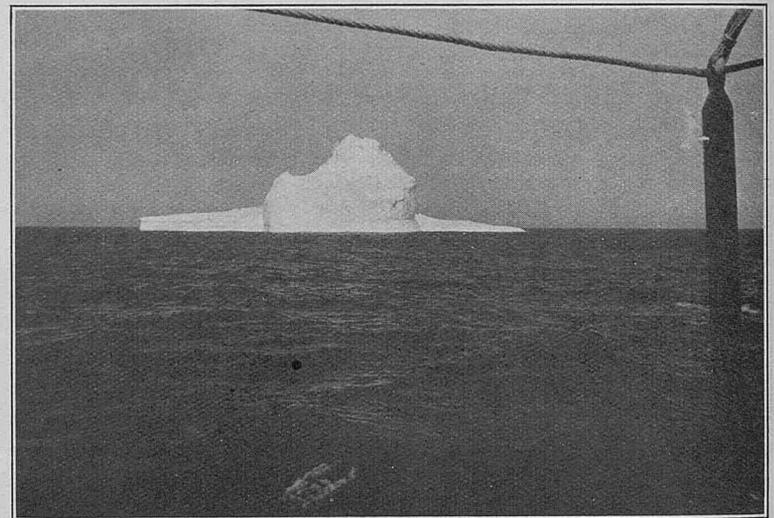
The accompanying chart, a tracing of the ship's thermograph, illustrates the extent of the changes which took place during the above period. Scale is Centigrade, times G.M.T. Ship's course  $159^{\circ}$ .

## PHOTOGRAPHS OF ICEBERGS.

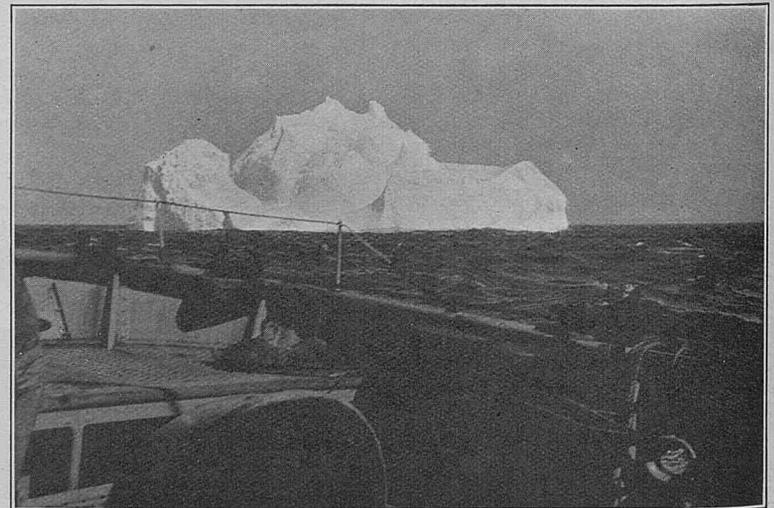
THE accompanying photographs have been received with the Meteorological Log of R.R.S. *William Scoresby*. Captain R. C. FREAKER. London to South Georgia and Southern Ocean.



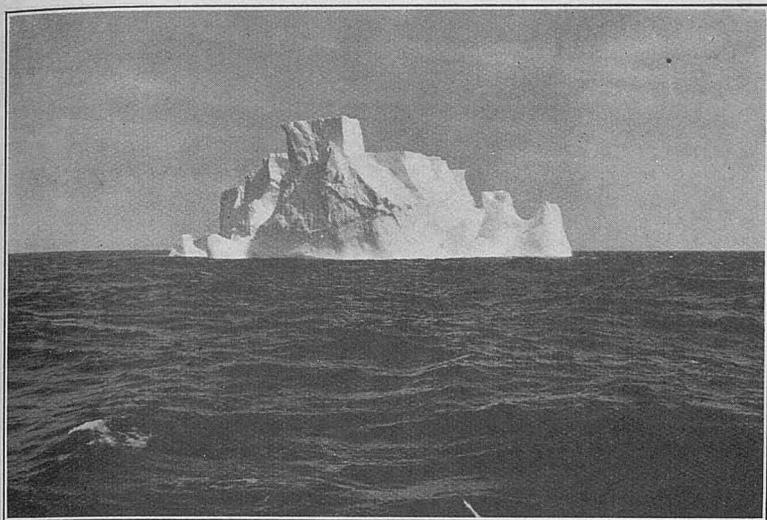
Tabular berg, height 260 feet.  
Latitude  $54^{\circ} 05' S$ ., Longitude  $32^{\circ} 52' W$ .  
14th November, 1937.



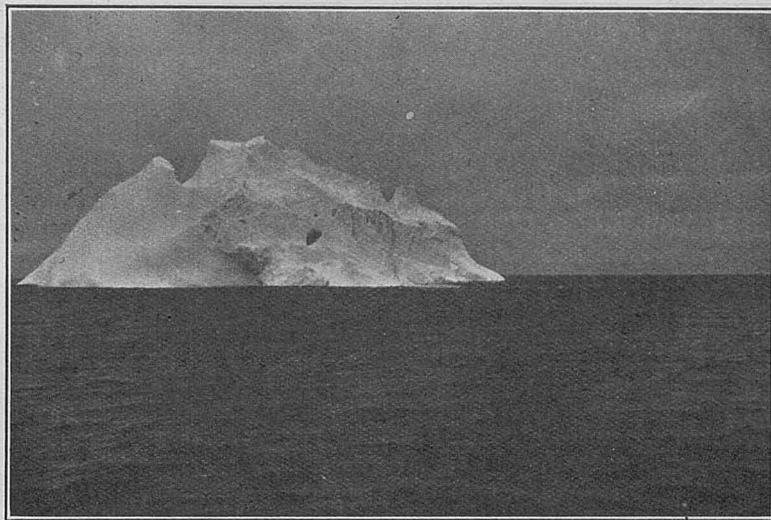
Irregular berg, showing shelf. Height 250 feet.  
Latitude  $54^{\circ} 05' S$ ., Longitude  $32^{\circ} 49' W$ .  
14th November, 1937.



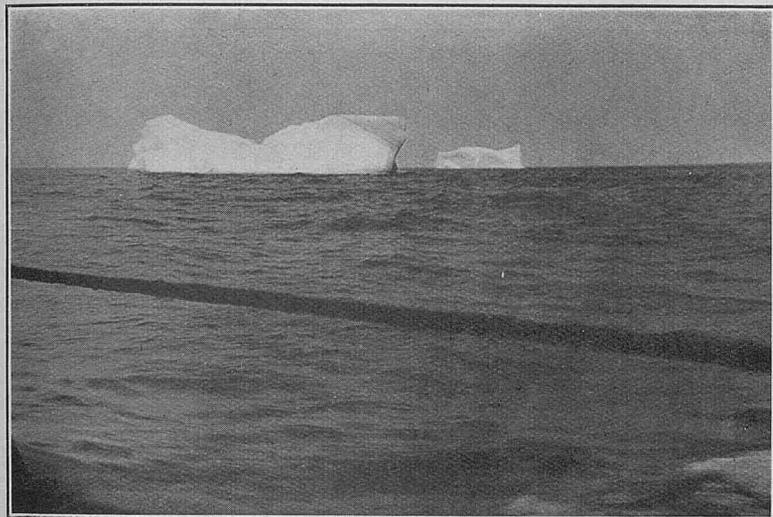
Irregular berg.  
Latitude  $54^{\circ} 56' S$ ., Longitude  $29^{\circ} 24' W$ .  
15th November, 1937.



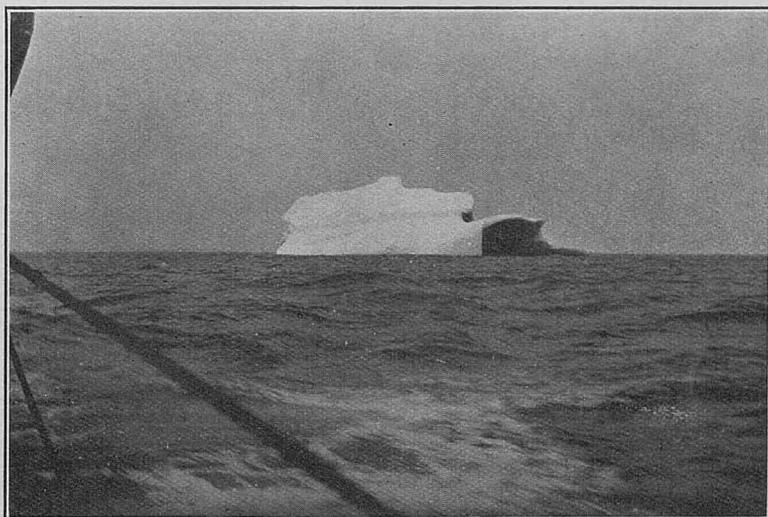
Tabular berg, weathered.  
Latitude 54° 18' S., Longitude 28° 01' W.  
16th November, 1937.



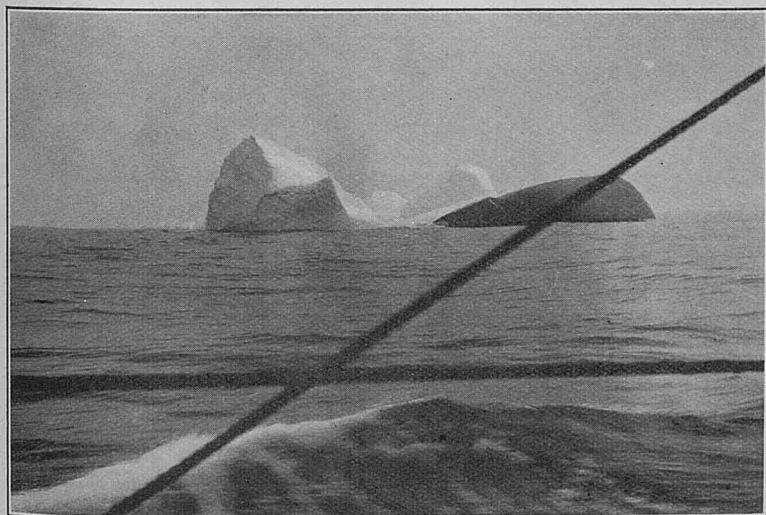
Irregular berg.  
Latitude 56° 03' S., Longitude 32° 12' W.  
30th November, 1937.



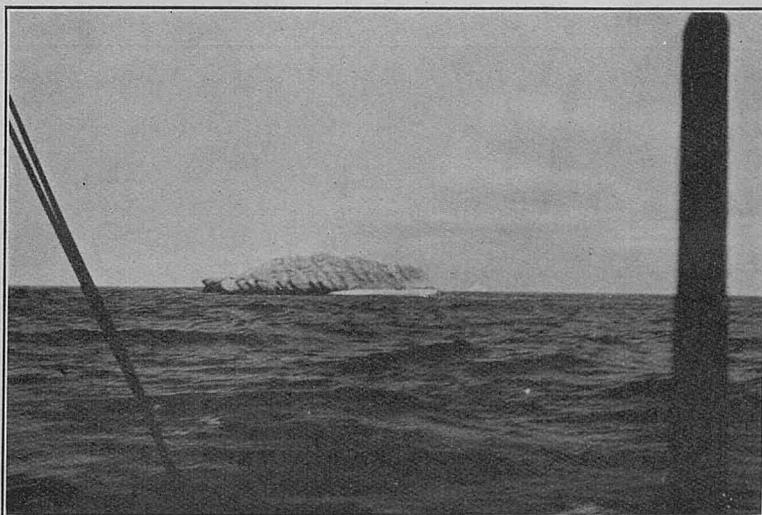
Berg, Penguins in "notch", and dark grey discoloration, top right.  
Latitude 55° 19' S., Longitude 27° 54' W.  
16th November, 1937.



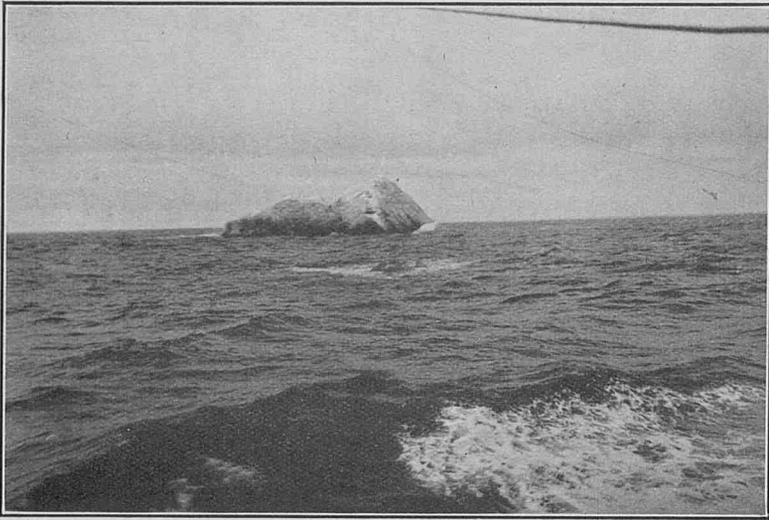
Discoloured berg, one side bottle green. Sharp division.  
Latitude 59° 29' S., Longitude 20° 32' W.  
27th December, 1937.



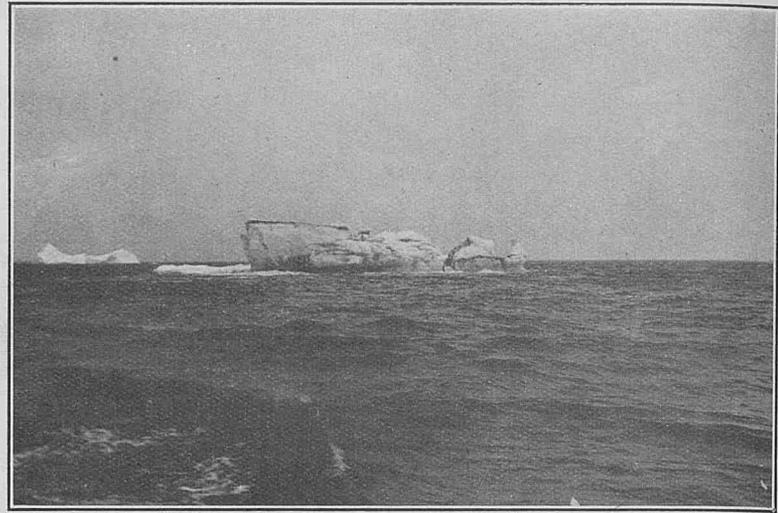
Irregular berg, black and white, sharp division. Black portion smooth and rounded.  
Latitude 57° 27' S., Longitude 22° 28' W.  
26th November, 1937.



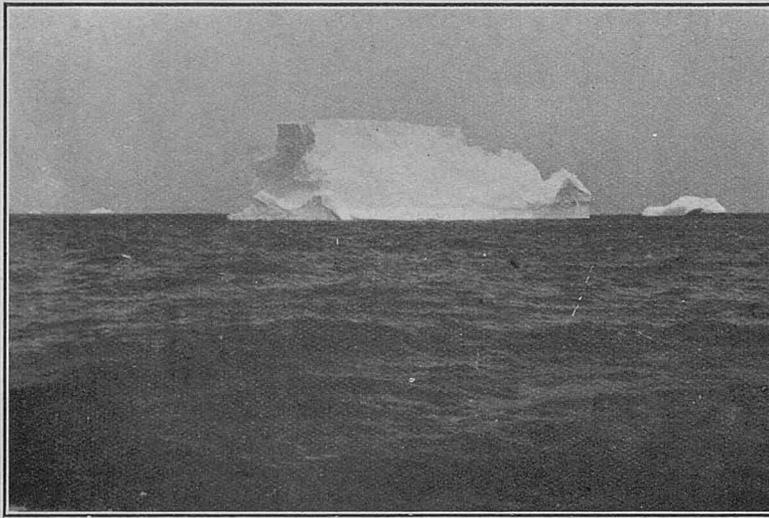
Bottle green bergy bit, apparently snow covered. A few ringed penguins.  
Latitude 59° 17' S., Longitude 20° 49' W.  
28th December, 1937.



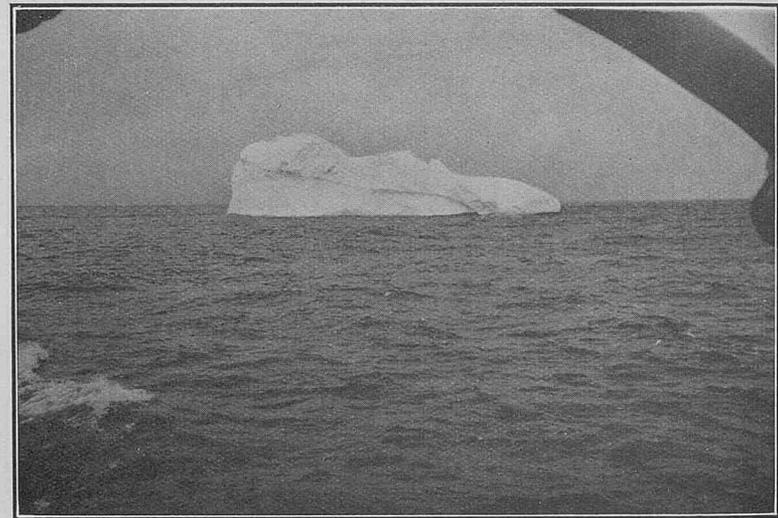
Same bergy bit as previous photograph, end on. Bottle green growler in foreground.



Bergy bit, green, snow covered.  
Latitude  $58^{\circ} 06' S.$ , Longitude  $24^{\circ} 44' W.$   
30th December, 1937.



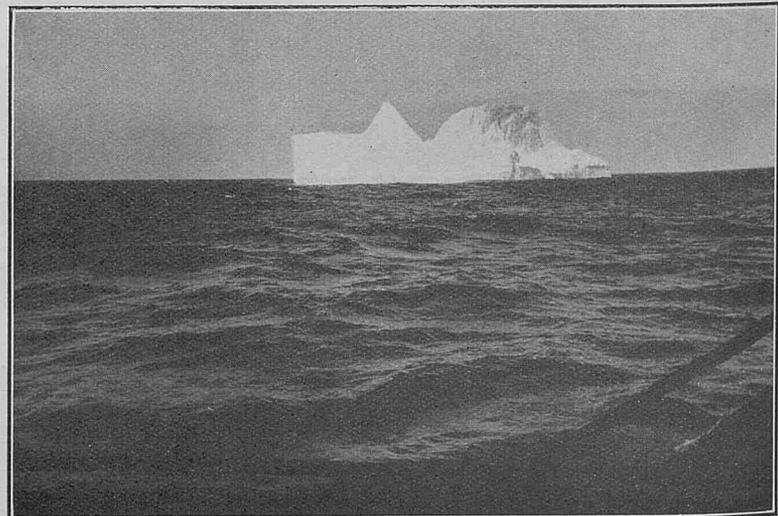
Tabular berg, discoloured bergy bit right background.  
Latitude  $58^{\circ} 06' S.$ , Longitude  $24^{\circ} 44' W.$   
30th December, 1937.



Small irregular berg.  
Latitude  $59^{\circ} 42' S.$ , Longitude  $40^{\circ} 07' W.$   
10th January, 1938.



Bergy bit, dark grey and green, snow covered.  
Latitude  $58^{\circ} 06' S.$ , Longitude  $24^{\circ} 44' W.$   
30th December, 1937.

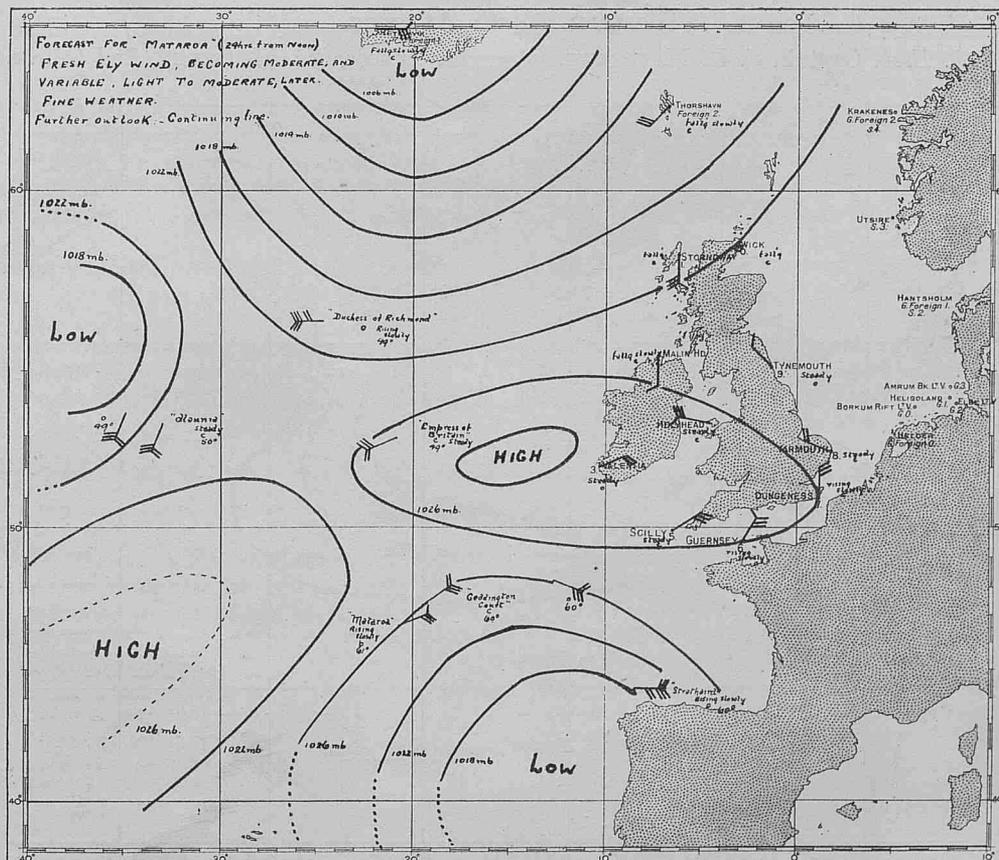
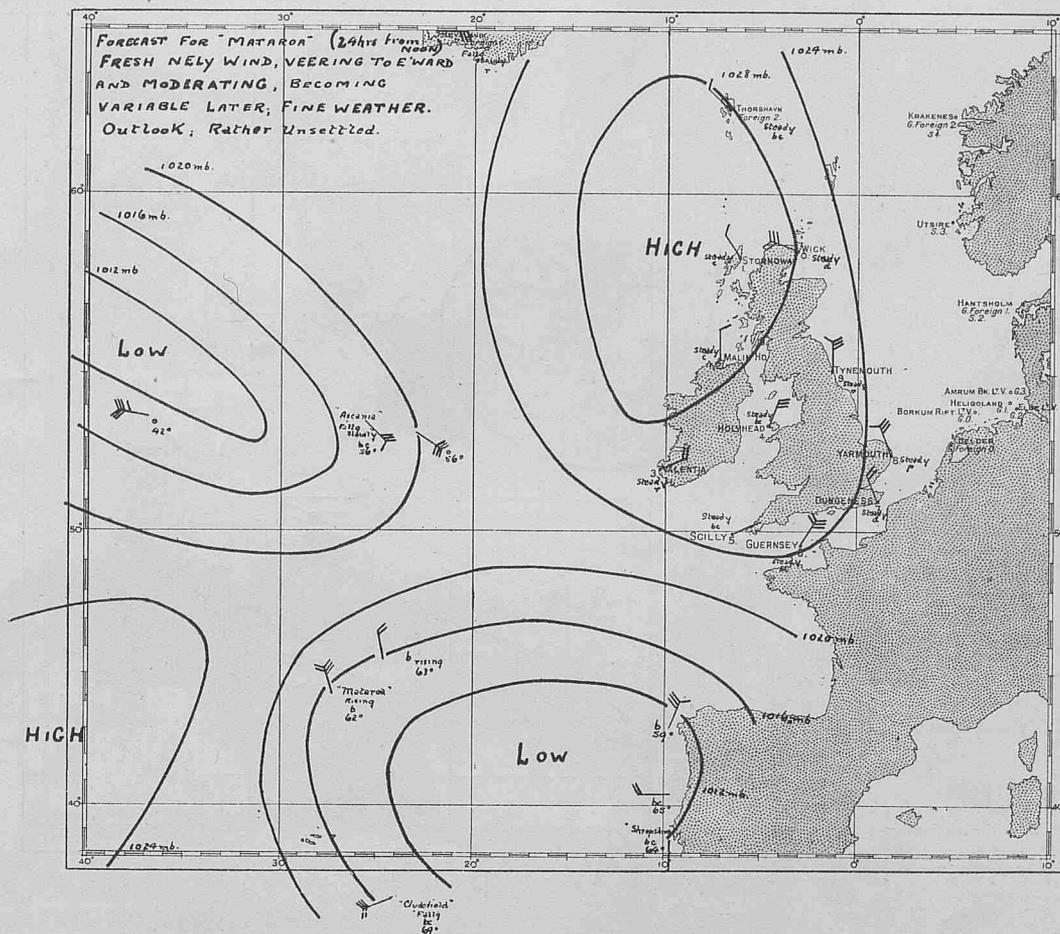


Small irregular berg.  
Bransfield Straits, Latitude  $63^{\circ} 00' S.$ , Longitude  $59^{\circ} 41' W.$   
21st February, 1938.

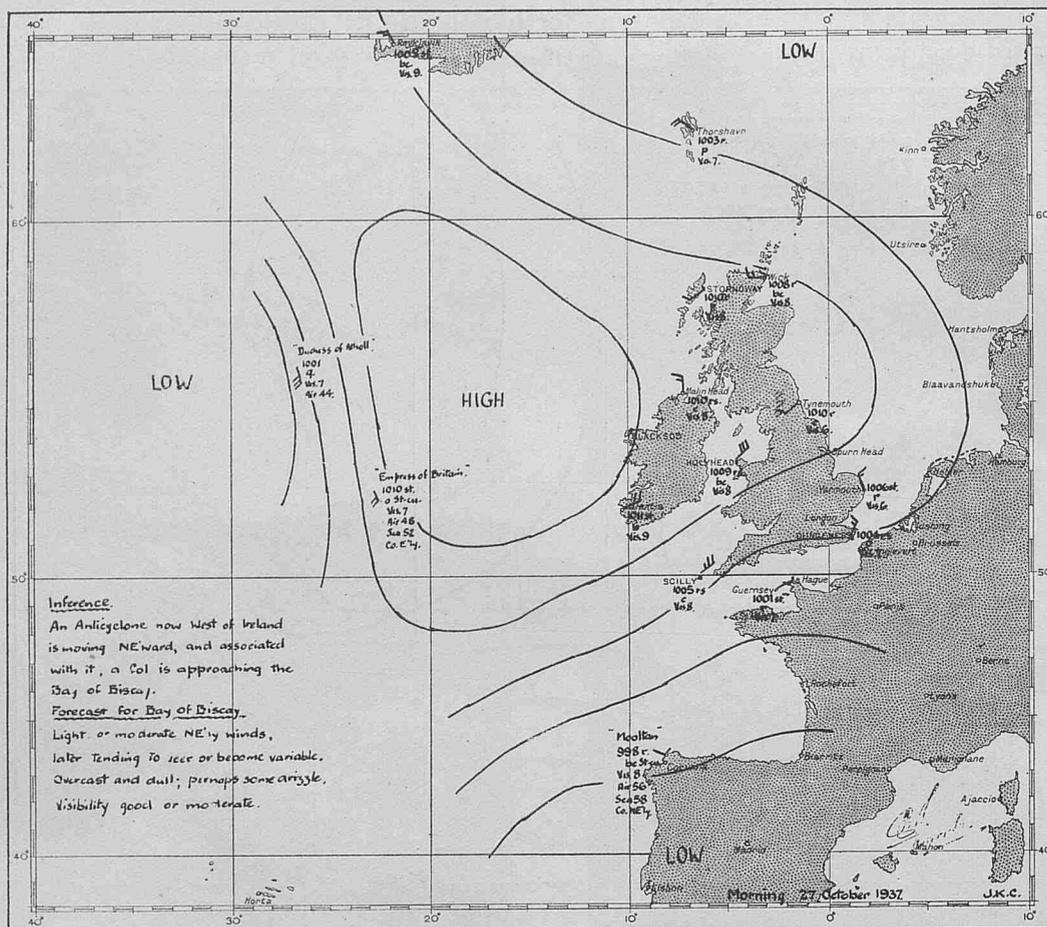
WEATHER FORECASTING AT SEA.

Eastern North Atlantic.

S.S. *Mataroa*. Captain W. H. HARTMAN. Observing Officer, Lieutenant E. B. D. Macfarren, R.N.R., 3rd Officer.

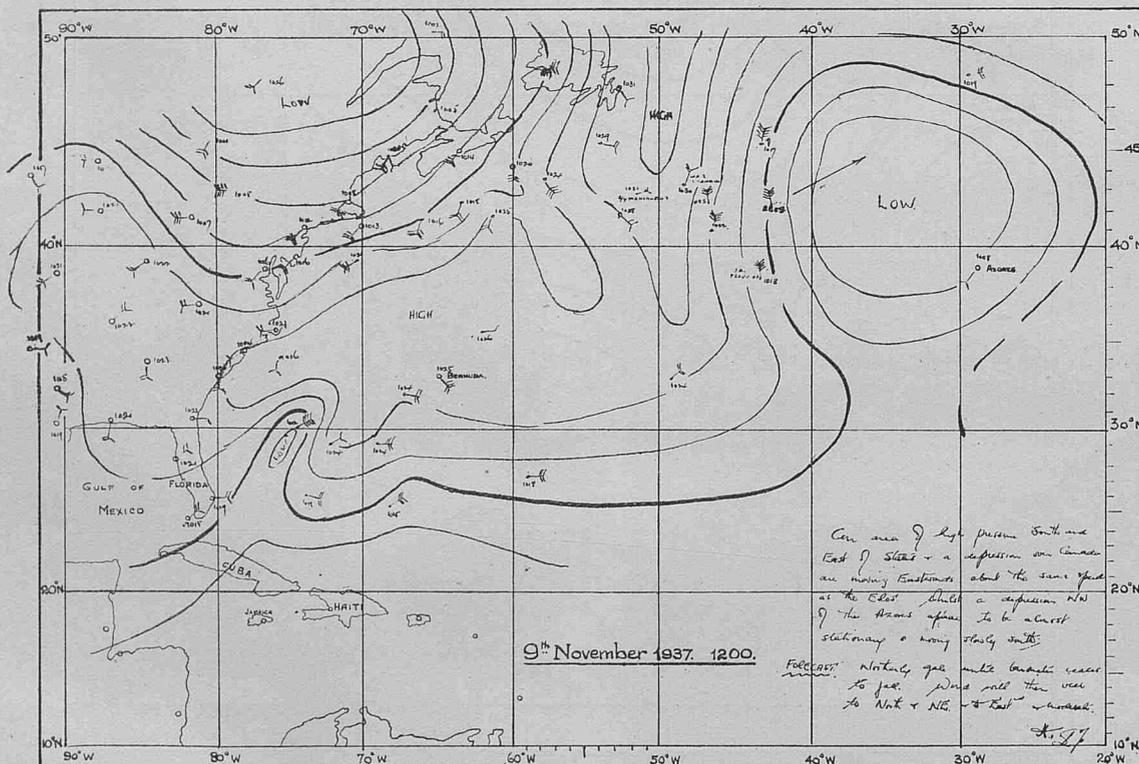


S.S. *Mooltan*. Captain C. B. ROCHE. Observing Officer, Mr. J. K. CRONE.



Western North Atlantic.

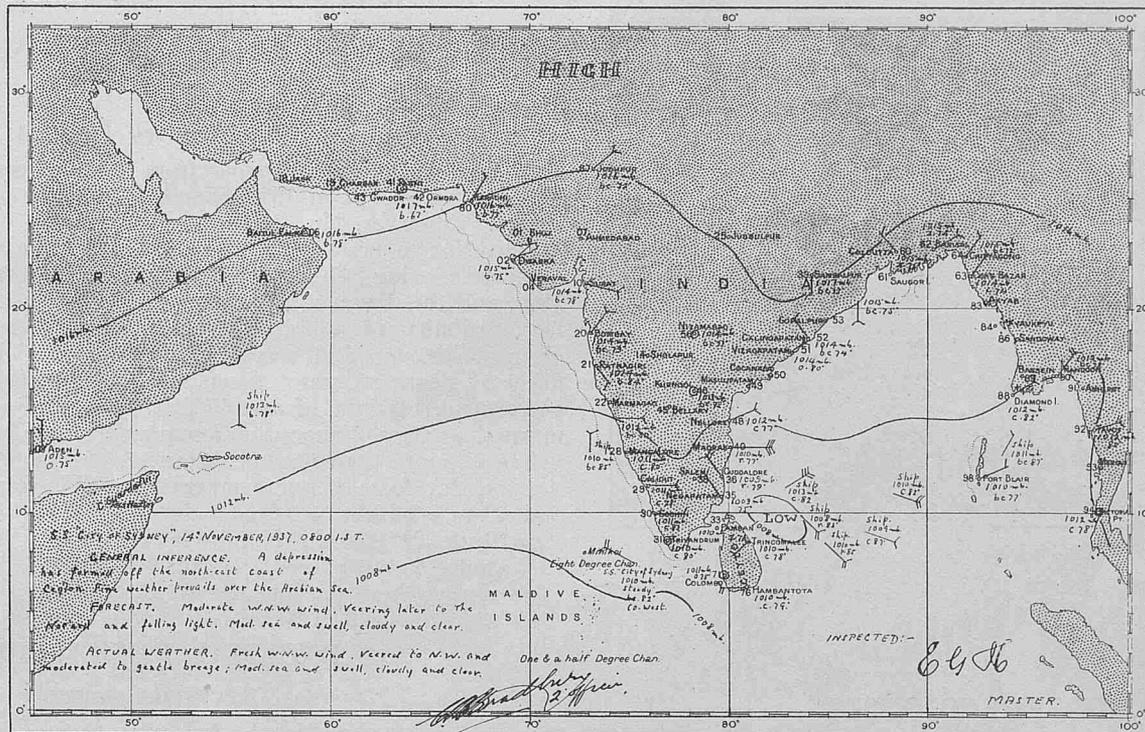
S.S. *Eros*. Captain J. R. MATTHEWS. Observing Officer, Mr. H. GREEN, 2nd Officer.



Bay of Bengal and Arabian Sea.

S.S. *City of Sydney*. Captain E. G. HOPPINS. Observing Officer, Mr. C. B. P. BRADBURY, 2nd Officer.

Form 1297.



SUBMARINE EARTHQUAKES.

North Atlantic Ocean.

THE following is an extract from the Meteorological Record of S.S. *Matra*. Captain N. P. CORNISH. Calcutta to Boston. Observer, Mr. E. L. JONES, 3rd Officer.

21st November, 1937. At 2037 G.M.T., the S.S. *Matra* being about 54 miles due south of Santa Maria Island, Azores, a distinct shock was felt underneath the vessel by all on board. It was first felt almost like a dull impact, right underneath the bridge and passed along with a vibration similar to intensified screw race, and finished with a heavy vibration underneath the engine room. The period taken was about ten seconds.

Weather at this time—Light N.N.W. breeze, slight sea, moderate, average length N.N.W. swell. Cloudy and clear. Ship rolling easily. Draft 26 feet.

All tanks and bilges remained the same, and we are unable to think of any other explanation than an earth tremor.

Position of Ship: Latitude 36° 04' N., Longitude 25° 11' W. Course 268°.

Bay of Bengal.

THE following is an extract from the Log of S.S. *Kidderpore*. Captain J. SPARKES.

30th November, 1937. At 7.30 a.m. A.T.S. in Latitude 5° 53½' N., Longitude 90° 54' E., experienced tremors for no apparent reason lasting from ten to fifteen seconds, with nothing to be seen in the vicinity.

Depth of water from chart 1,500 fathoms.

SQUALLS.

Gulf of Mannar and Bay of Bengal.

THE following is an extract from the Meteorological Record of S.S. *Matheran*. Captain W. T. KING. Liverpool to Indian Coast. Observer, Mr. A. L. AUSTIN, 3rd Officer.

On 23rd November, 1937, at 02.05 A.T.S. (2045 G.M.T.) a heavy squall commenced. Wind backed suddenly from E.S.E. to N.E. and freshened to strong breeze. About 02.10 A.T.S. the wind backed to N.N.E. and blew hurricane force with torrential rain for about two minutes, when wind fell away to calm for one minute, the rain continuing as before. The wind then hauled to E.N.E. and blew steadily from that direction, force 4., rain moderating. Vivid forked lightning and thunder accompanied the squall, which had been threatening for over two hours. Rain continued with moderate E.N.E. wind until 4.00 a.m., and during the passage of the squall the barometer pumped violently. Barometer 29.735 in. (corrected).

Position of ship, Latitude 6° 36' N., Longitude 77° 21' E. (approx.).

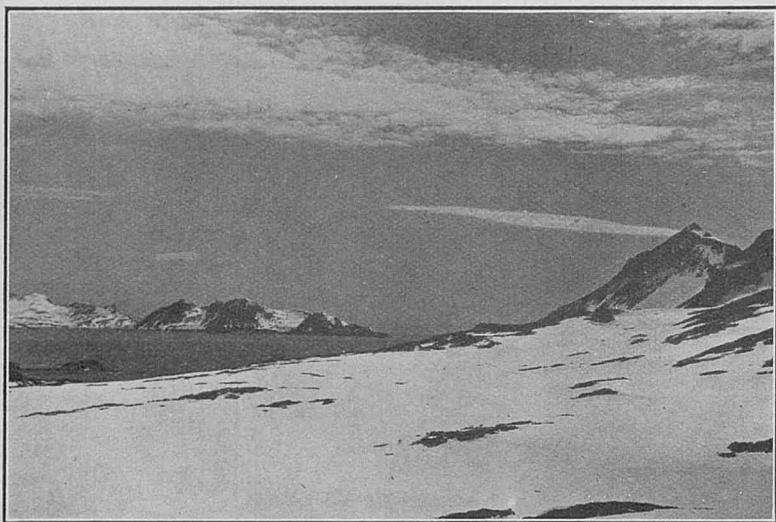
On 25th November, 1937, at 9.32 p.m. A.T.S. a violent squall commenced. Wind hauled from N.N.E. to E.N.E. and blew hurricane force, which continued to 9.44 p.m. A.T.S. During this time torrential rain fell; visibility at the very best would be 100 feet. Vivid continuous lightning and thunder accompanied the squall. At 9.44 p.m. A.T.S. the wind eased to gentle breeze, rain continuing as before. Rain suddenly ceased, wind backed to N.N.E. and blew steadily force 5. The barometer, which had been steady for the past four hours, also remained quite steady during and after the squall at 29.896 in. (corrected). Ten minutes after the squall had passed the vessel passed through a warm current of air which lasted three minutes, after which the temperature was again normal at 76°F. In the evening masses of Cum. clouds could be seen banking up in the N.E.

Position of ship, Latitude 13° 13' N., Longitude 84° 41' E. (approx.).

NOTE.—According to the Admiralty Pilots the weather in the Gulf of Mannar is very unsettled in November, with frequent heavy squalls and rain. About the middle of the month the N.E. monsoon is ushered in by lightning, thunder and heavy rain. In the Bay of Bengal in this month weather is generally fine, apart from cyclones, but squally weather may be experienced in the south part.

**CLOUD PHOTOGRAPH.**

THE accompanying photograph has been received with the Meteorological Log of R.R.S. *William Scoresby*. Captain R. C. FREAKER.



The photograph was taken at 1330 Local Time on 8th November, 1937, at Maiviken, South Georgia.

**CLOUD PHENOMENON.****Bay of Bengal.**

THE following is an extract from the Meteorological Record of S.S. *City of Sydney*. Captain E. G. HOPPINS. Calcutta to Colombo. Observer, Mr. C. B. P. BRADBURY, 2nd Officer.

9th November, 1937. At 5.10 p.m. A.T.S. a towering mass of cumulonimbus was observed bearing 350°, distance about 7 miles.

At 5.12 p.m. A.T.S. the apex of the cloud suddenly rushed up to a great height, and with the aid of binoculars rain could be seen on the eastward side of the cloud ascending as if it were borne upwards by the rising air currents. At the same time a rainbow appeared in it, the red colour being to the right and the violet to the left.

At 5.15 p.m. A.T.S. the apex of this cloud broke into small masses, the rainbow and rain disappeared and heavy rain or hail was seen descending from the base of the cumulonimbus; at the same time a very broad rainbow appeared, the colours being in the same order as in the former, at 5.19 p.m. A.T.S. the rainbow disappeared.

A weather chart constructed from the Calcutta synoptic weather report of 0800 Indian Standard Time, showed that the vessel was proceeding through an area of comparatively low pressure. During the previous five hours the wind had veered from E. to S.W. by S., with passing showers.

Barometer 1008 mb. (corrected), air temperature 82°F., wind S.W. by S. force 3.

Position of Ship: Latitude 10° 57' N., Longitude 83° 22' E.

**LUNAR RAINBOW.****North Atlantic Ocean.**

THE following is an extract from the Meteorological Record of M.S. *Clydebank*. Captain W. BROOME. Algiers to St. John, N.B. Observer Mr. C. W. HAYCRAFT, 2nd Officer.

18th October, 1937. At 1.15 a.m. A.T.S. a bright lunar rainbow was observed with a very faint secondary bow cutting it. The altitude of the vertex of the primary bow was 38°, the moon's altitude being 8°. At the time of observation half the sky was covered by cumulonimbus and stratocumulus whilst the other half remained perfectly clear, a light drizzling rain was falling.

The primary bow had a distinct orange colour and what appeared to be a faint green tint on its lower or inside edge. The secondary was very faint and white and for about 30 seconds remained as a com-

plete bow; later it was split up into fragments.

Wind E.S.E., force 2. Slight sea and moderate N.E. swell. Temperature 68°F. Barometer 29.83 in.

Position of Ship: Latitude 36° 57' N., Longitude 19° 35' W.

**REFRACTION.****Cape Blanco Light.**

THE following is an extract from the Meteorological Record of M.S. *Abosso*. Captain J. C. SHOOTER. Liverpool to Freetown, West Africa. Observer, Mr. R. INGLIS, 3rd Officer.

10th November, 1937. At 2310 G.M.T. Cape Blanco Light was observed bearing 147°, 45 miles, course was altered in that bearing to 180°, and the distance off abeam was 28 miles. Height of Light 141 feet, visibility 18 miles. This Light was observed apparently well clear of horizon, and was well-defined and plainly visible between flashes. Bearings were taken and distance frequently checked, current nil. Height of eye 55 feet. Such refraction is particularly unusual off Cape Blanco, the Commander never having seen the Light before at more than normal distance.

Wind N., force 2, air temperature 70°F., sea 68°F., cloud Acu. and Cicu. 9/10ths.

Latitude 21° 24' N., Longitude 17° 29' W., Course 198°. Speed 15.2 knots.

**ABNORMAL REFRACTION.****Arcturus rising.****North Atlantic Ocean.**

THE following is an extract from the Meteorological Log of M.S. *Silversandal*. Captain J. HARRISON-LEASK. Colombo to Dakar. Observer, Mr. A. BONIWELL, 2nd Officer.

29th November, 1937, 0600 G.M.T. Arcturus, when rising with the moon at an altitude of 5°, was observed to be changing colour very rapidly, red, white and green, and had the appearance of a double star.

Star bearing 073°.

Position of ship, Latitude 27° 26' N., 34° 35' W. D.R. (approx.).

**SOLAR HALO AND MOCK SUNS.****North Pacific Ocean.**

THE following is an extract from the Meteorological Log of S.S. *Ixion*. Captain J. O'CONNOR. Vancouver to Yokohama. Observer, Mr. E. JAQUES, 3rd Officer.

On 21st November, 1937, at 10.43 A.T.S., observed a 22° halo around sun with two mock suns, each at an angular distance of 24° from sun, in a plane parallel to the horizon. The colours, which were very bright, were (from sun outwards) red, yellow, green and blue. The sun was partially obscured at the time by Ci. and Cist., the altitude being 29½°. The whole phenomenon was visible for about thirty minutes, after which, sky clearing from westward, it disappeared.

Position of ship, Latitude 38° 29' N., Longitude 145° 07' E.

NOTE.—The mock suns were seen a little outside the solar halo. Their distance outside the halo depends on the sun's altitude. When this is 55°, the mock suns are about 36° from the sun and therefore 14° outside the halo. The mock suns are only seen on the halo when the sun is on the horizon, but will be approximately so if the sun has an altitude of only a few degrees.

**AURORA.****North Atlantic Ocean.**

THE following is an extract from the Meteorological Record of M.S. *Tynefield*. Captain M. MANTHORPE. Venezuela to Manchester. Observer, Mr. A. D. LOMBARD, 2nd Officer.

On 4th October, 1937, at 0600 G.M.T. (02.38 a.m. A.T.S.), a reddish glow appeared in sky bearing north true, between the horizon and Polaris, and only covered a small area. It gave rather a pale reddish tint, and there was no flash, just the glow, which lasted for about 10 minutes and then gradually paled until it disappeared; it was also visible at 0200 G.M.T. approximately. The sky was clear with only a very small amount of cumulus from behind which this phenomenon appeared. Air temperatures 76°F., Sea 78°F. Smooth sea, moderate N.E. swell.

Position of Ship D.R. Latitude 31° 08' N., Longitude 54° 10' W. True course 051°. Speed 9.3 knots.

NOTE.—This appears to have been an auroral glow, observed from a low latitude.

THE following is an extract from the Meteorological Record of S.S. *Cairnglen*. Captain A. W. MELLING. Leith to Montreal. Observer, Mr. A. MOLINEUX, 3rd Officer.

At 2130 G.M.T. on 7th October, 1937, auroral light was observed near the constellation of Pegasus, which spread rapidly to east and west horizons passing through Vega, in zenith, and just south of Arcturus, taking the form of four bands very close together. The bands were of a hard blue-white colour and made as much light as a full moon. At 2150 the bands became diffused, changing to purple and gradually fading. At 2200 a band again appeared as brilliant as before and at 2205 it was divided into four bands which slowly became further apart. At 2215 the bands closed together again and started to move slowly south, the eastern end turning towards the north, becoming diffused and of purple colour. This turned to the north and the diffusion travelled the whole length of the band and when nearing the western end, the whole faded at 2230 G.M.T.

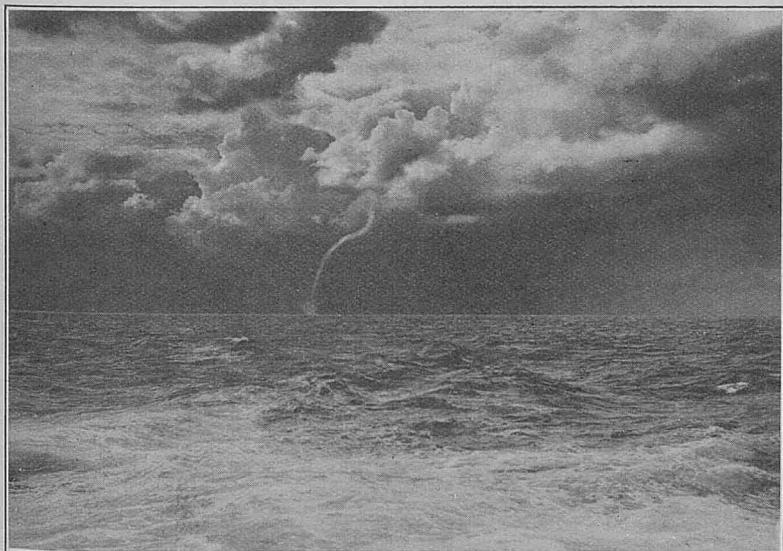
Wind N.E. force 5, air temperature 46°F., sea 47°F. Visibility excellent.

Position of Ship : Latitude 57° 17' N., Longitude 35° 38' W.

## WATERSPOUTS.

### Mediterranean Sea.

THE following is an extract from the Meteorological Record of S.S. *Lancastria*. Captain J. G. P. BISSET, R.D., R.N.R. Liverpool to Mediterranean Ports. Observer, Lieut.-Commdr. J. TREASURE JONES, R.N.R., 2nd Officer.

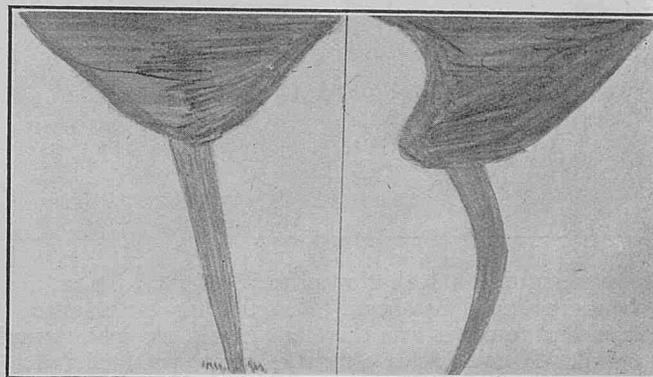
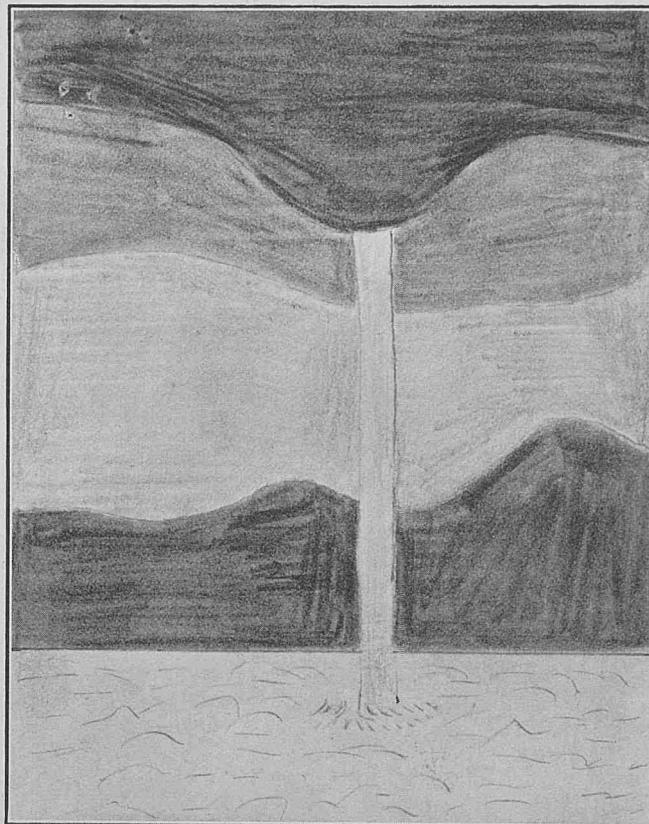


17th October, 1937. At about 4 p.m. approaching Cape Santa Maria di Leuca, on the south coast of Italy, when bound from Malta to Kotor, a waterspout formed in the distance. The weather at time was, barometer 30.18 in. rising, wind N.E., force 5. Had previously experienced strong wind and moderate N.N.E. gales.

The accompanying photograph was taken by the cruise photographer.

## North Atlantic Ocean.

THE following is an extract from the Meteorological Record of S.S. *Eros*. Captain J. MATTHEWS. Southampton to Kingston (Jamaica). Observer, Mr. J. T. VIGURS, 3rd Officer.



21st October, 1937. During the night the wind was south-westerly varying force 1 to 3, the sky overcast and showery with thunder; the weather cleared from the W.S.W. with excellent visibility in that direction. Clouds to the westward Cu., Cumb. and Ci., to the eastward Cumb. and Ast.

At 8.08 a.m. a disturbance was noticed on the port bow distant about  $\frac{1}{2}$  mile which on examination through binoculars proved to be the result of a whirlwind. The sea over an area diameter about 60 feet, was a whirling mass of spray reaching a height of about 10 or 12 feet. No sign of a waterspout or funnel cloud.

8.10 a.m. This disturbance was now abeam, distant about 400 feet, and, if moving, was doing so slowly to the E.N.E. parallel to our course. The anti-clockwise circulation was very distinct and there appeared to be a hollow in the centre.

8.11 a.m. A faint but complete spout was now observed, outlines distinct, between us and the sun. The Cumb. to which this was joined was quite a normal cloud and had no hard outline or funnel shape. A very distinct upward agitation in the spout was now noticed, as of a small and intense shower of rain reversed.

8.14 a.m. Very little change as the spout drew astern except that

the cloud became more distinct in outline and the spout became darker.

8.19 a.m. Spout still darker and bending; it was certainly not joining the cloud at its extreme point, and may have reached up to a funnel cloud behind the cloud seen. The spout now commenced to narrow at the lower end and lift off the surface, where the agitation grew much less and a minute later had disappeared.

No wind was experienced beyond that mentioned above, although it passed so close. An excellent view was obtained by the Master, 2nd Officer and myself, and the motions observed were remarkably distinct. No sextant angles were taken, but distances given, owing to their nearness, are reliable. The height of the base of the Cum. was probably not more than 1,000 feet, as the top of the spout was as distinct, or nearly so, as the base.

Position of the ship at 1142 G.M.T. (8.20 Ship's time), Latitude  $30^{\circ} 22' N.$ , Longitude  $52^{\circ} 48' W.$

(1) At 8.08. The dark clouds were not so dark as shown but there was great contrast as the sketch shows.

The spout appeared lighter than the lightest cloud and may have reached up behind the black cloud.

(2) 8.11. The spout a little darker and slightly tapering.

(3) 8.16. The spout much darker and curved.

The following is an extract from the Meteorological Record of M.S. *Athlone Castle*. Captain A. BARRON. Southampton to Capetown. Observers, Mr. E. HARVEY, 3rd Officer, Mr. S. THOMPSON, 4th Officer.

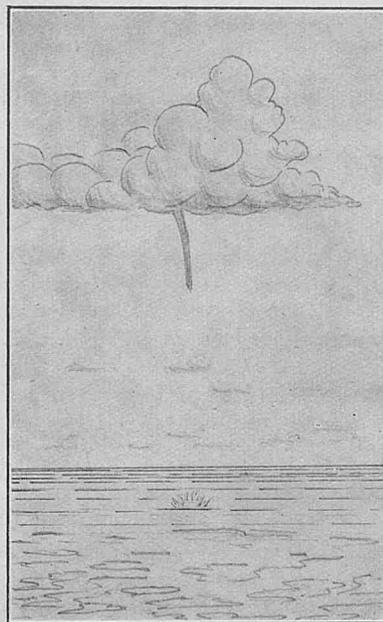


On the morning of the 19th November, 1937, at 7.5 a.m. observed a waterspout forming right ahead. Watched for five minutes to get the direction and found it was travelling S.S.E. straight towards us, at a fair speed. To avoid it we altered course to port and at 7.15 a.m. it was abeam to starboard about half a mile. Observed quite clearly vapour and sea water revolving at a good speed, also a kind of concave space in the sea. This was joined to nimbostratus clouds by a dark thick column with a white strip running through the centre, the vapour in this was revolving, and clearly defined. About four minutes later another two spouts formed quite close, one on each bow. The one to port started about  $40^{\circ}$  in the clouds and continued in a thin horizontal line for half its length, then curved down to the sea. The one to starboard, formed from nimbus clouds with an altitude of  $10^{\circ}$ . The white strip, vapour and spray, were easily distinguished as they passed about half a mile distant. All three persisted until 7.30 a.m., when they disappeared one after another astern. This phenomenon was followed by a heavy shower of rain accompanied by thunder and lightning, sky heavily overcast, cumulonimbus clouds. Barometer 1011 mb. which remained steady throughout. Wind light airs, temperature of air and sea,  $81^{\circ}F.$

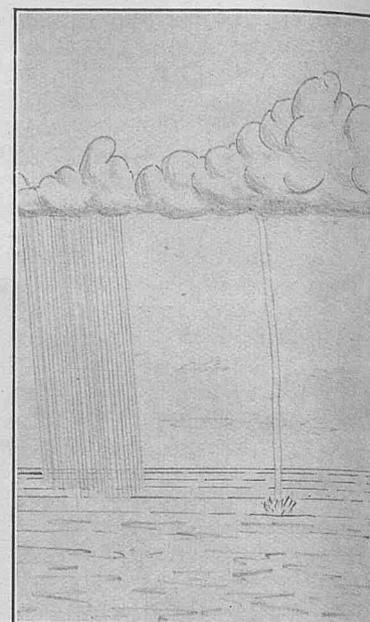
Position of Ship: Latitude  $8^{\circ} 01' N.$ , Longitude  $15^{\circ} 16' W.$

### Bay of Bengal.

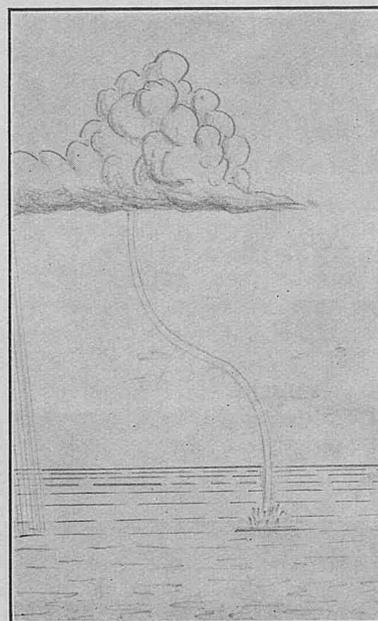
The following is an extract from the Meteorological Record of S.S. *City of Sydney*. Captain E. G. HOPPINS. Madras to Rangoon. Observer, Mr. C. B. P. BRADBURY, 2nd Officer.



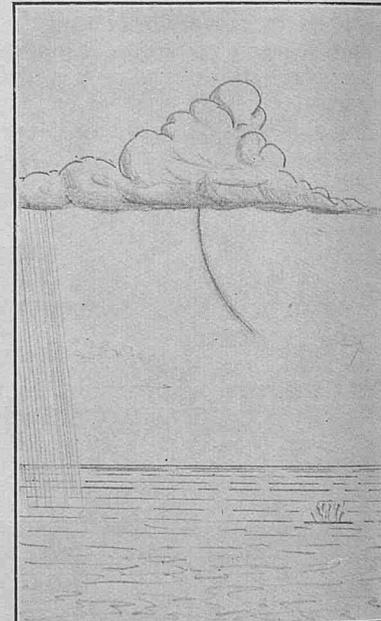
0947 G.M.T.



0951 G.M.T.



0952 G.M.T.



0954 G.M.T.

17th October, 1937, during the first part of the afternoon watch the sea was smooth with slight ripples indicating a light southerly breeze, the sky was cloudless except for a little detached fractocumulus and a bank of cumulus to the eastward. The vessel was approaching this bank at a speed of 13.2 knots on a course of  $084^{\circ}$ .

At 0940 G.M.T. the cumulus had formed into a towering mass of cumulonimbus, and was about three miles distant and  $1\frac{1}{2}$  points to the starboard bow. At this time the light breeze backed through E. to N.N.E.

At 0945 G.M.T. a patch of water below the cumulonimbus suddenly became extremely agitated, particles of water were observed rushing up into the air with a chaotic rotary motion which as far as could be judged was in an anti-clockwise direction.

At 0947 G.M.T. a thin, dark column began to descend from the base of the cumulonimbus, and at 0948 G.M.T. a complete waterspout had formed. We altered course to  $030^{\circ}$  to steer well clear of it.

The waterspout was abeam at 0951 G.M.T. and was then very large and very active. It appeared as a long white column and a curve had commenced to form, also a shower of rain of small area began to fall a little eastward of it. One minute later the waterspout had formed a great S bend with the lower part towards the westward. The whole column was pulsing throughout its length and a filmy white veil which enclosed it revolved round it rapidly in an anti-clockwise direction. As this veil was continuous from top to base

it was difficult to ascertain whether it was ascending or descending.

At 0954 G.M.T. the column contracted, became dark in colour and commenced disappearing from the sea upwards. It had completely disappeared at 0956 G.M.T. but the agitation of the water continued until 1000 G.M.T. The cumulonimbus remained intact and rain continued to fall.

During the phenomenon the wind was N.N.E. force 2, and at 1000 G.M.T. changed to N.E. force 2. There was a low southerly swell throughout.

FEATURES NOTED.—Agitation of water commenced two minutes before, and ended four minutes after the formation of the waterspout.

Cumulonimbus and upper part of the column appeared to be stationary or almost stationary, the lower part moving slowly in a westerly direction.

Rain commenced to fall in the immediate rear of the waterspout, three minutes after its formation.

Estimated diameter of column, 15 to 20 feet.

Estimated height of column as measured by sextant angle was 1,300 feet.

Estimated distance from ship, 1.25 miles.

Atmospheric pressure, temperature of the air and direction and force of wind remained steady during phenomenon.

With the exception of the mass of cumulonimbus and scattered detached fractocumulus the sky was clear.

During the previous twenty-four hours the wind was southerly and steadily decreasing in force.

Change of wind occurred just before the phenomenon and afterwards remained steady at N.E.

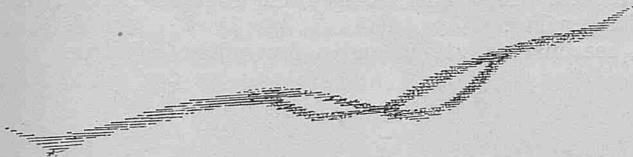
Barometer 29.82 in., air temperature 85°F., sea temperature 86°F.

Position of Ship: Latitude 13° 24' N., Longitude 84° 54' E.

### METEOR TRAIL.

#### Gulf of Oman.

THE following is an extract from the Meteorological Record of S.S. *British General*. Captain F. O. ARMSTRONG. Abadan to Suez. Observers, The Master and Mr. P. E. NORTON, 3rd Officer.



★  
POLE  
STAR

On 4th October, 1937, at 23.10 A.T.S. (1902 G.M.T.) a meteor fell, though actually not observed; the flash of light astern of the vessel attracted our attention. On observation, at an approximate altitude

of 26° 10', bearing 010°, a long serpentine line of luminous vapour remained in the sky for 6½ minutes, slowly disappearing. At first, this line had a definite double cross in it, which was the last part to fade away.

Weather fine and clear, wind S.E. force 3, air temperature 84°F.

Position of Ship: Latitude 23° 26' N., Longitude 59° 10' E. (D.R.).

### METEOR SHOWER.

#### North Pacific Ocean.

THE following is an extract from the Meteorological Log of S.S. *Adrastus*. Captain A. SHAW. Los Angeles to Manila. Observer, Mr. E. A. H. GEPP, 2nd Officer.

During the middle watch on the morning of Monday, 14th December, 1936, a feature of possible astronomical interest was observed. This was a meteoric shower, most pronounced soon after 1.00 a.m. A.T.S. (1620 G.M.T. on 13th). It was not possible to make very accurate observations as to the point of origin in the sky of the meteors, for most of them were small and did not appear until reaching an altitude of about 30° above the horizon, but prolongation of their tracks in the reverse direction to flight, led to the supposition that this point lay in the roughly rectangular area bounded by  $\alpha$  Aurigae (Capella),  $\alpha$  Canis Minoris (Procyon),  $\alpha$  Leonis (Regulus) and  $\alpha$  Ursae Majoris (Dubhe). The meteors appeared to be slightly more numerous in that portion of the rectangle, which lay nearest to  $\alpha$  Leonis.

The shower continued for three hours, and isolated meteors were visible throughout the night, but at the most pronounced period, two or three were visible every minute. The largest of these had a magnitude comparable with that of Venus, a duration of flight in a northerly direction of 1½ seconds, and left a rapidly disintegrating trail. Others varied in magnitude, but were mainly very small. At a conservative estimate, 37 meteors, were visible to the naked eye between the hours of 0100 a.m. and 0130 a.m. (A.T.S.) Sky was unobscured but for the passage of occasional small cumulus clouds, and the stars had a brilliancy normal to a clear and tropical night. Position at 0100 a.m. (A.T.S.). Latitude 15° 09' N., Longitude 131° 49' E.

NOTE.—These meteors were Geminids, so-called because the radiant point lies in the constellation of Gemini. They are seen annually between December 10th and 15th and are often bright, with a very rapid flight. They vary in number each year, like all other meteor showers, but the above interesting observation shows that for the time and locality stated the shower was richer than usual. The average frequency of these meteors is one in every three minutes on the nights of December 11th and 12th when they are usually most frequent.

## THE 1910 TO 1937 SURVEY OF THE CURRENTS OF THE SOUTH PACIFIC OCEAN.

PREPARED IN THE MARINE DIVISION BY E. W. BARLOW, B.Sc.

THE present article contains a summary of the whole of the work of charting and investigating the currents of the South Pacific Ocean, carried out in the Marine Division of the Meteorological Office between the years 1936 and 1938 inclusive. A small part of the North Pacific Ocean, from the Gulf of Panama to Longitude 108°W., was included in the charting to complete the region covered by the tracks from Panama to Australian and New Zealand ports.

**The South Pacific Ocean, Pressure and Winds.**—The South Pacific Ocean is of much wider extent than either the South Atlantic or the South Indian Ocean. As in all other oceans there is an area of permanent high barometric pressure, centred between Latitude 30° and 35°S. This is situated in the eastern half of the ocean, between Longitude 140°W. and the west coast of South America, being centred in about Longitude 100°W. throughout the year. For seven months of the year, April to October inclusive, a belt of relatively high average pressure also extends right across the ocean in middle latitudes. During the rest of the year, the north-western part of the South Pacific Ocean is a region of relatively low pressure due to the formation in the southern summer of a low-pressure area over northern and central Australia, produced by the heating of the continent. A narrow belt of relatively high pressure still remains to the southward of this, running eastward over North Island, New Zealand, the coast of New South Wales and the Tasman Sea.

The winds of the South Pacific Ocean are the south-east trade wind in the northern part, variable winds in central latitudes and the westerly winds of the southern part. Full information of the strength and frequency of these winds is however, not yet available. As in other oceans the trade wind belt moves northward and southward during the year, following the sun's changes in declination, there being however a lag in time, so that while the sun attains its greatest north declination near the end of June, the trade wind belt does not reach its furthest position north until July and August. According to Admiral SOMERVILLE'S "Ocean Passages of the World" the northern limit of the south-east trade wind lies north of the equator throughout the year, except in the western part of the ocean during the southern summer. When the belt is most northerly it extends to Latitude

9°N. in the central longitudes of the ocean. The northern limit of the belt has a range of about 150 miles, the southern limit about 300 miles. The position of the southern limit mostly varies between Latitudes 20°S. and 25°S. but in the easterly part of the ocean reaches Latitude 30°S. in January and February. The south-east trade wind is generally speaking less constant than in other oceans. It blows with great steadiness as a moderate breeze on the Queensland Coast as far south as Latitude 22°S. in winter, and between Latitudes 15°S. and 27°S. in summer. It is strongest during July and August.

On the west coast of South America, southerly winds markedly predominate in all months of the year north of about Latitude 30°S. and in October to April extend to Latitude 40°S. South of Latitude 40°S. there is a good deal of variability, but winds between N. and S.W. predominate.

In the southern part of the ocean westerly winds begin to predominate south of Latitude 35°S. or 40°S. From the experience of navigators and such other information as is available it is known that the westerly winds of southern latitudes in the South Pacific Ocean are less steady than those of similar latitudes in the South Indian Ocean.

The north-west monsoon of the Indian Ocean extends into the north-western part of the South Pacific Ocean. It is produced by the low-pressure area over Australia during the southern summer. It extends into the ocean as far eastward as the Solomon Islands. It is met in the northern part of the Coral Sea, sometimes reaching as far south as Willis Islets (Latitude 16° 17'S., Longitude 149° 59'E.). It is also felt on the northern Queensland Coast, down to about Latitude 15°S.

**The Surface Circulation of the South Pacific Ocean.**—The general circulation of the South Pacific Ocean for the six-monthly periods November to April and May to October is shown in FIGURES 1 and 2. In these figures the arrows are drawn of different length and thickness to give an indication of the mean strength of the current, the thickest arrow only being used where the mean drift exceeds 30 miles per day.

Apart from seasonal variations and a few minor differences, the

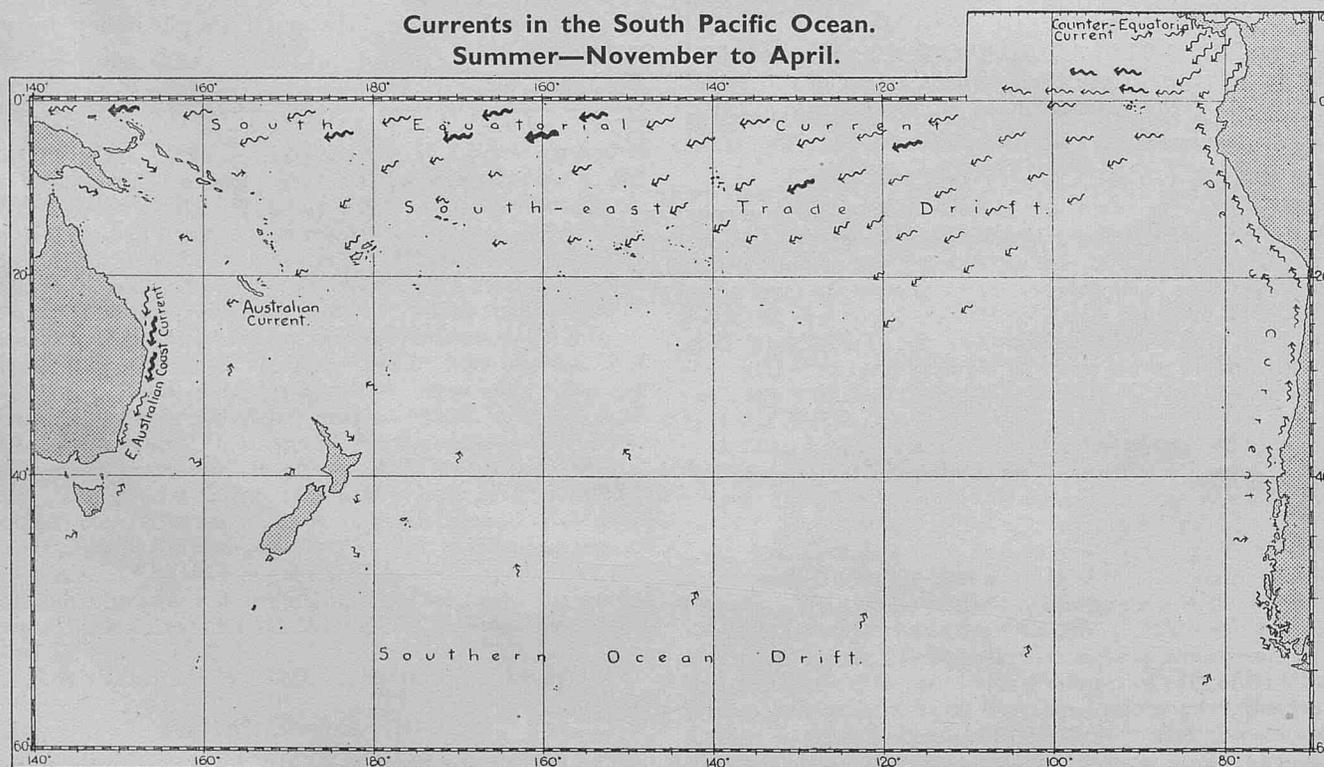


Figure 1.

general circulation remains unaltered throughout the year. There are four main currents in the South Pacific Ocean :—(i) The Southern Ocean Drift, setting in directions between N. and E. in southern latitudes, (ii) the Peru or Humboldt Current, setting northwards up the coasts of Chile and Peru, (iii) the South Equatorial Current, between the equator and latitude 6°S. and its weaker extension, the South-East Trade Drift, between Latitudes 6°S. and 20°S., setting westwards across the ocean, (iv) the East Australian Coast Current, setting southwards down the coasts of Queensland and New South Wales. The central latitudes of the ocean comprise a region of weak mean drift, with little or no predominance of set in any direction.

The amount of information gained in any current investigation is generally speaking greatest where the number of observations is considerable. Comparing the present investigation with that of the Indian Ocean, which was summarised in THE MARINE OBSERVER, Volume XII, October, 1935, pages 153 to 163, certain differences are evident. Fuller information can be given about the South Equatorial Current of the Pacific Ocean than for the Equatorial Current of the Indian Ocean. On the other hand it was possible to give fuller information about the Southern Ocean Drift in the Indian Ocean than can be given for the same current in the Pacific Ocean.

A summary of the surface circulation of the South Pacific Ocean is given below. In order to simplify this, the occurrence of reverse and variable sets in the main currents, and counter-currents outside the regions of the main currents, are described afterwards. TABLE 1 shows the mean sets and drifts in specified regions within the main current flows and in other selected areas over the ocean. The variations of mean set and drift in different quarters of the year are thus seen and indicate the seasonal variations of the currents. Fuller information about the seasonal variation of current can be obtained when monthly values of mean set and drift are given. This can only be done when sufficient observations are available. In the South Pacific Ocean monthly values have been computed for the Peru Current north of Latitude 20°S., the South Equatorial Current between Longitudes 84°W. and 164°E. and the East Australian Coast Current. The results are given in TABLES 2 and 3 and are described after the summary of the circulation.

**The Southern Ocean Drift.**—There are practically no observations west of Longitude 168°E. From this longitude to 70°W., the width of the belt covered by the steamship tracks never exceeds 8° and is only 4° in its most southerly part, westward of Cape Horn, but there are enough observations within this belt to give a general idea of the

character of the current. The mean set between South Island, New Zealand and Longitude 172°W. is south-easterly. From thence to Cape Horn it lies between N. and E., the seasonal variations of mean set being considerable. Throughout the year the current sets more to the northward than the Southern Ocean Drift in the Indian Ocean.

The current is weak, the mean drifts being for the greater part between 1 and 3 miles per day. In the eastern part, between Longitudes 112°W. and 70°W., it is somewhat stronger in the winter half-year, April to October. Drifts may be experienced up to 1 knot, but seldom exceed this strength, and the current being weak the sets are variable. The percentage of drifts observed to be less than 6 miles per day varies between 9 and 65, according to season and longitude, but is mostly between 20 and 40. The current has about the same strength as the Southern Ocean Drift in the eastern half of the Indian Ocean and is thus considerably weaker than the Southern Ocean Drift in the western half of the Indian Ocean. As stated above, however, we have no information as to the strength of the current in the most westerly part of these latitudes of the South Pacific Ocean.

**The Peru Current.**—This forms the eastern side of the circulation of the South Pacific Ocean and extends to the equator. Current observations in the period 1910 to 1936, off the coast of South America, from Latitude 20°S. to Cape Horn, are few in number but they bear out the general experience of navigators as given in the Sailing Directions. There is an easterly set on to the coast of southern Chile, which is usually most felt between Chiloe Island and the neighbourhood of the Golfo de Peñas. While easterly on-shore sets may be experienced up to Bahia Concepcion or even further north, the current north of Chiloe Island generally begins to trend towards the north, following the coast, and this is the beginning of the Peru Current. South of the Golfo de Peñas, on the other hand, the current becomes more and more south-easterly, setting down the coast and joining the more southerly part of the Southern Ocean Drift which flows round Cape Horn. There is thus a division of the easterly current when it reaches the coast of South America, one part going north, the other south.

As shown in TABLE 1 the variation in the mean set of the Peru Current throughout the year is slight and the mean drifts vary only between 5 and 8 miles per day over its whole extent, from Latitude 42°S. to 2°S. The mean sets are everywhere parallel, or nearly parallel, to the coast. Between the equator and Latitude 14°S., northerly drifts exceeding 1 knot may be experienced at any time of the year, and drifts of 2 or 2½ knots occur, but very rarely. Between Latitudes

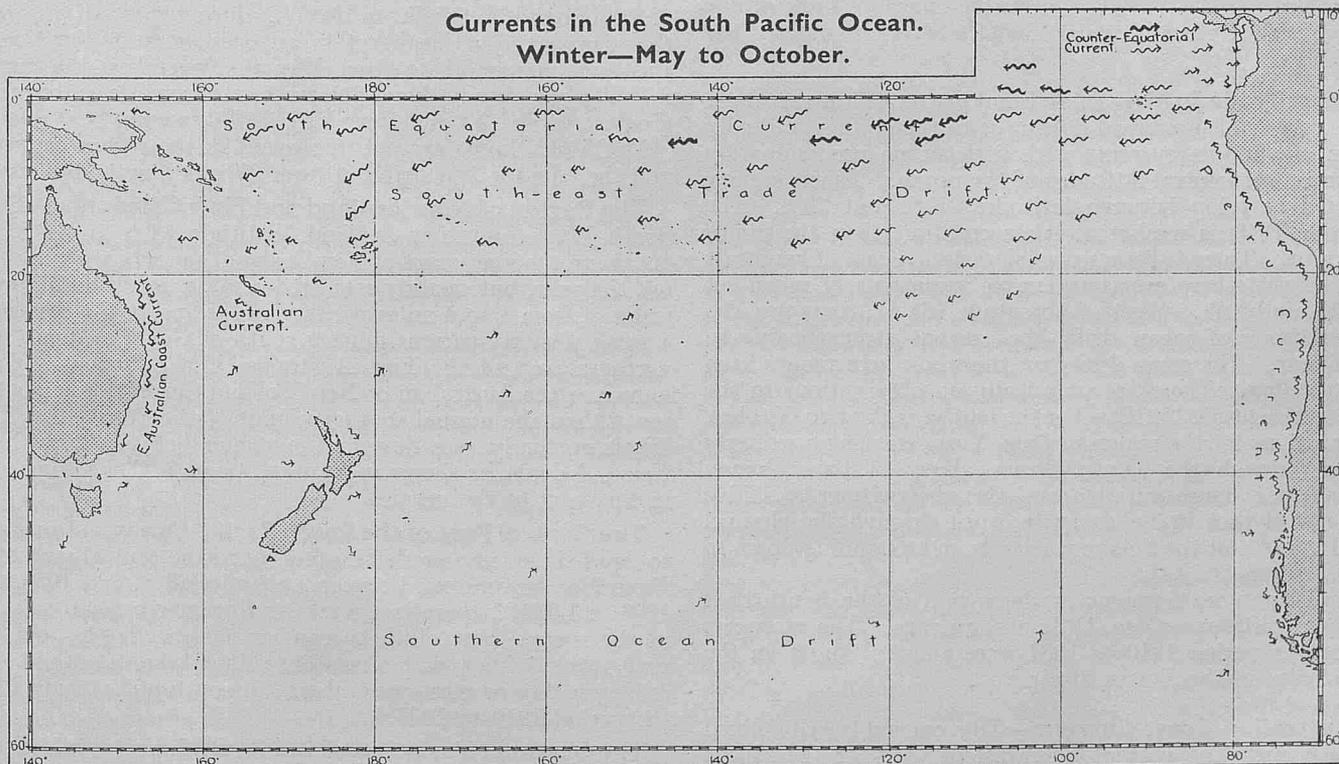


Figure 2.

14°S. and 36°S. currents exceeding 1 knot were only observed, in the period 1910 to 1936, in the months February to July. Between 10 and 30 per cent. of all observed drifts, according to latitude and season, do not exceed 6 miles per day.

In the region of the Gulf of Guayaquil the bulk of the Peru Current trends seaward and passes into the South Equatorial Current.

**The South Equatorial Current.**—The South Equatorial Current flows from about Longitude 84°W. to Longitude 164°E. as a strong and comparatively steady current throughout the year. From Longitudes 140°E. to 164°E. the number of observations is few. That part of the current which flows north of the equator is charted to Longitude 108°W. so that for the greater part of its extent the current south of the equator only has been investigated. The bulk of the current however flows south of the equator. It has no definite southern limit since the water flows westward right across the ocean between the equator and Latitude 20°S. South of Latitude 6°S. there is generally speaking a fairly well-marked decrease of mean speed and this parallel has been taken as the southern boundary of the South Equatorial Current. The weaker current between Latitudes 6°S. and 20°S. may be called the South-East Trade Drift.

The mean set of the South Equatorial Current, south of the equator, is very constant throughout the whole year and is nearly due west. The mean drifts vary between 10 and 23 miles per day. In certain areas and seasons the chart of arrows shows that the mean drift exceeds 30 miles per day. North of the equator, between Longitudes 100°W. and 108°W., the mean drifts exceed 40 miles per day during August to October. Drifts of 2 knots may be experienced in the South Equatorial Current at any time of the year and stronger drifts occasionally occur, more particularly in the eastern part of the ocean. The greatest recorded drifts in the period 1910 to 1937 were at the rate of 4 knots, east of Longitude 124°W., and at the rate of 3½ knots, west of that meridian. The percentage of weak currents, not exceeding 6 miles per day, varies, according to longitude and season, from 0 to 15, east of Longitude 124°W. and from 0 to 25, west of that meridian.

The seasonal variation of the South Equatorial Current is not the same throughout its extent. It is better seen from the monthly tables and figures and will be described later. It may be noted that while the mean drift varies seasonally, the mean set is practically constant. Exactly the reverse obtains in the Southern Ocean Drift, the seasonal variation of which occurs almost wholly in the mean set.

From Longitude 140°E. to 164°E. the South Equatorial Current does not appear, from the available observations, to extend south of Latitude 2°S. during the greater part of the year, and the mean set in May to October is W.N.W. It is probable that the bulk of the current, towards New Guinea, lies north of the equator, outside the limits of the charts.

**The South-East Trade Drift.**—This current has no definite southern boundary, the region of westward-flowing water merging gradually into the region of variable currents with little or no predominating set, which occupies the central latitudes of the ocean. The boundary may be regarded as lying between latitudes 18°S. and 25°S. The South-East Trade Drift is weaker and less constant than the South Equatorial Current. There is little seasonal variation east of longitude 120°W. West of this there are considerable variations of mean set between W.N.W. and S.W. West of Longitude 168°W. there are also appreciable variations of mean drift, the current strengthening in the winter half-year. The mean drift over the whole area ranges from 2 to 10 miles per day. There are practically no observations in the Coral Sea west of Longitude 152°E. For the half-year, May to October, there are observations for the region of Cape York, showing a westerly current flowing through the Torres Strait. West of the Solomon Islands the current is more variable and the observations available show a south-easterly set in February to April through the channel between New Ireland and the Solomon Islands and extending down to Latitude 11°S.

Drifts up to 1 knot are frequent in the region of the South-East Trade Drift, but drifts exceeding 1½ knots are rare. The strongest recorded during the period 1910 to 1937 were about 2 knots, in the open ocean and also in the Torres Strait.

**The East Australian Coast Current.**—This current is well-defined throughout the year. The current observations used for the charts indicate that a southerly current flows on the east side of Swain Reefs, from Latitude 20°S. or 22°S., according to season, no observations

being available west of Longitude 152°E. This current approaches the Queensland coast near Great Sandy Island and thence flows down the coasts of Queensland and New South Wales to the neighbourhood of Cape Howe. The East Australian Coast Current is strongest in the summer half-year and weakest in the winter. Its greatest strength is experienced between Latitudes 26°S. and 30°S. throughout the year. Between Latitudes 28°S. and 30°S., south of Brisbane, the current has a mean drift of 32 miles per day in February to April. In this region three drifts of 4 knots have been recorded in the period 1910 to 1937. South of Latitude 34°S. the current weakens considerably. Further south, from Cape Howe to Latitude 48°S., there are comparatively few observations. These indicate that off the west coast of Tasmania the mean sets are variable, being southerly only in August to October. There is no evidence of any appreciable flow from the East Australian Coast Current into the Southern Ocean Drift. The set of current through the Bass Strait is variable, but easterly sets predominate slightly, throughout the year.

Besides the main circulation of the South Pacific Ocean above described, there are two minor ones.

**The Gulf of Panama.**—While the bulk of the Peru Current passes into the South Equatorial Current, a portion continues its northerly course up the coasts of Ecuador and Colombia into the Gulf of Panama. The west coast of Colombia and the south coast of Panama form a large bay with the Gulf of Panama at its head. Water from a second source also enters this bay, the easterly-setting Counter-Equatorial Current of the North Pacific Ocean, the eastern end of which comes within the limits of the charts. An outflow from the Gulf of Panama and from the coast westward of Cape Mala is thus produced, setting in a south-westerly direction throughout the year. This current attains its greatest strength in December to April, the season of northerly winds, the mean drifts being from 10 to 17 miles per day. Apart from this outflow there is great variation of set and drift throughout the year between Panama and the equator.

In November to April the outflow from the Gulf of Panama passes into the South Equatorial Current, but during May to October it does not, the Counter-Equatorial Current then becoming stronger and extending as far as Longitude 80°W., or even nearer the Colombian coast. Some of the water of the Counter-Equatorial Current at this time joins the northward extension of the Peru Current and recurves into the Gulf of Panama.

The Counter-Equatorial Current east of Longitude 92°W. does not flow south of Latitude 6°N. in November to April. During the rest of the year, it extends to Latitude 2°N. FIGURE 3 shows how the Counter-Equatorial Current enters the region of Latitude 2°N. to 6°N., Longitude 80°W. to 92°W., during part of the year. Only the component of mean set in an east or west direction is shown. East sets preponderate from May to November, the greatest being 8.7 miles per day in June, and west sets from December to April, the greatest being 15.2 miles per day in February.

Drifts of 2 knots are not infrequent in the region between Panama and the equator, but drifts of from 2½ to 4 knots only occur rarely.

**The Region of New Zealand and New Caledonia.**—Between New South Wales and New Zealand, Latitude 34°S. to 44°S., Longitude 152°E. to the west coast of New Zealand, the sets are variable throughout the year, but easterly sets predominate, resulting in mean easterly drifts of from 1 to 4 miles per day, according to the season. There is a weak westerly current flowing south of New Caledonia towards the northern part of the East Australian Coast Current. This current, known as the Australian or New Holland Current, is somewhat further south than the normal southerly limit of the South-East Trade Drift. Weak northerly sets flow in the region between New Zealand and New Caledonia, as shown in FIGURES 1 and 2, thus giving a circulation in this part of the ocean.

**The Central Part of the South Pacific Ocean.**—During November to April there is no predominating set in the central part of the ocean. From May to October, between Latitudes 20°S. and 40°S., Longitudes 180° to 140°W., there is a weak north-easterly mean set. The drifts in the central part of the ocean are not negligible, and everywhere may reach ½ knot, sometimes exceeding 1 knot. Eight drifts of 40 miles per day or more were observed, south of Latitude 20°S., during the period 1910 to 1937.

**The Seasonal Variation of the South Equatorial Current.**—The monthly mean sets and drifts of the South Equatorial Current are shown in TABLE 2, where the current from Longitude 84°W. to 164°E.

Annual Variation in Mean Velocity of the East or West Component of Current. Latitude 2° N. to 6° N., Longitude 80° W. to 92° W.

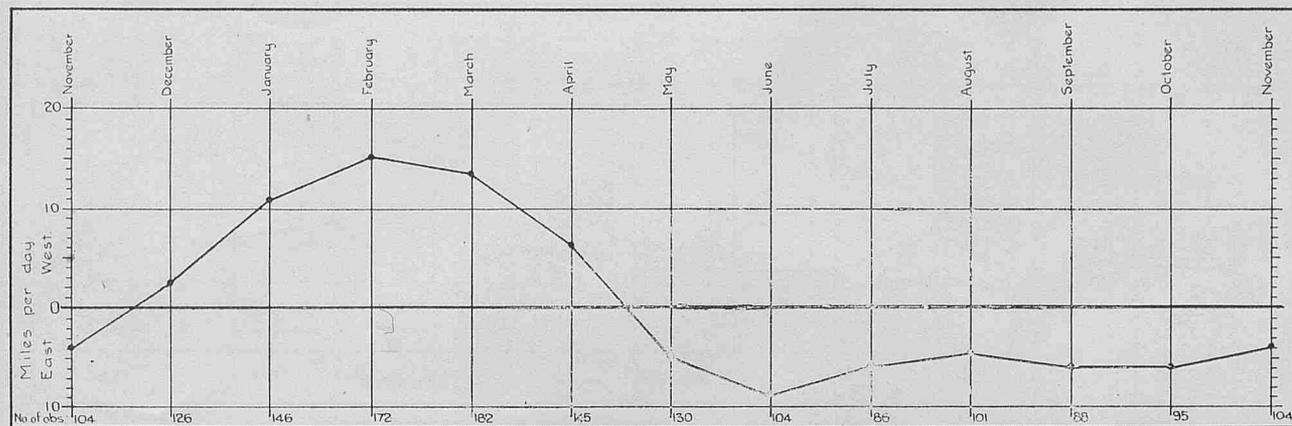


Figure 3.

is divided into five sections. This is the first time that such complete data has been published for the equatorial current of any ocean.

The constancy of the mean set in all months and longitudes is well shown. All lie between the limits of 244° and 279°, the majority being between 255° and 269°. The strength varies considerably during the year. The greatest mean drift ranges from 18 to 23 miles per day in all regions except that between longitudes 148°W. and 172°W. where it is 27 miles per day in March. The smallest mean drifts range from 6 to 10½ miles per day.

In FIGURES 4 and 5 the monthly variation of the westerly component of the South Equatorial Current is shown for each of the five sections. The number of observations on which these are based are the same as those given in TABLE 2. As would be expected the curves show irregularities, but two interesting facts are evident. The curve for each section of the current shows two maxima in the year and although the months of maximum westerly current are not exactly the same in all longitudes they fall within the same period of the year. The second point is that the relative strength of the two maxima alters with longitude. East of Longitude 124°W. the August maximum is greater than the February one. From Longitudes 124°W. to 148°W. (Figure 5) the August and February maxima are about equal, while west of Longitude 148°W. (Figure 5) the February-April maximum is stronger than the August-October one. Broadly speaking therefore, the greatest strength of the current increases towards the western side of the ocean and the time of greatest strength is earlier in the year.

#### Comparison of the South Equatorial Currents of the Oceans.—

Data is now available for comparing the strength and seasonal variations of the South Equatorial Currents in the three oceans. The variation of the westerly component of the current in the South Atlantic and Indian Oceans is shown in FIGURES 6 and 7, on the same scale as that used for the South Pacific Ocean. In the Indian Ocean there are not sufficient observations to compute the monthly variations except for the region of the Colombo to Fremantle track, which is not the strongest part of the current.

The curves for the South Atlantic and Indian Oceans also show two periods of maximum strength in each year. Apart from this there is little correspondence between the curves of the various oceans. In the Indian Ocean the current is nearly constant from August to December, during the south-west monsoon period and part of the north-east monsoon period. Its secondary maximum in April to May falls between the monsoon periods. The South Atlantic curves are the most remarkable since, broadly speaking, whenever the strength of the current on the Cape track increases, that on the Brazil track decreases. The number of monthly observations available for this figure are from 33 to 70 for the Cape track and from 21 to 61 for the Brazil track.

The South Equatorial Current of the South Pacific Ocean, taken as a whole, is the strongest of all oceans. In its only available section that of the Indian Ocean is the weakest, but it must be remembered that the Equatorial Current north of Madagascar during the south-west monsoon season is much stronger. In this comparatively small part of its course the strength of the current during the south-west

monsoon season approaches the maximum strength of the current of the South Pacific Ocean.

**Reverse Sets in the South Equatorial Current.**—Variable and even reverse sets may be experienced within the region of the most steady current and the South Equatorial Current of the South Pacific Ocean is no exception to this rule. Variable sets are more frequent near its eastern end, east of Longitude 116°W. They occur, over the current as a whole, most frequently in May to July and November to January, when the current is weakest. West of Longitude 116°W., in the months of strongest current, the frequency of variable sets is zero in many regions and small in others. The drifts of these sets rarely reach or exceed 1 knot at any time of the year. East of Longitude 116°W. variable and reverse sets up to about 2 knots may be experienced from November to July, particularly north of the equator. Taken as a whole the current is the steadiest that has yet been charted; it is much steadier than the great coastal currents, such as the Gulf Stream, the Agulhas Current and the East African Coast Current.

**Seasonal Variation and Reverse Sets, Peru Current.**—The occurrence of southerly sets in the Peru Current off the coast of northern Chile and Peru is well known. The present investigation shows them to be of frequent occurrence. Out of the 324 currents observed during the period 1910 to 1936, between latitude 20°S. and 2°S. in the region of the Peru Current, 71 had a southerly component. Two out of every nine drifts, therefore, set in some southerly direction. The average drift of these southerly sets was about half a knot. Seven had drifts of from 20 to 48 miles per day, five of which occurred in the equatorial part of the Peru Current, between 2°S. and 7°S. The greatest drifts of the southerly sets, as well as the northerly ones, thus occur in the northerly part of the Peru Current, particularly in the equatorial region. The southerly sets were experienced in all the seasons but were rather more frequent in the southern summer. The observations of current off the west coast of South America are confined to a narrow region covering ships' tracks. On the tracks the southerly sets were most frequently observed off the Gulf of Guayaquil in about Latitude 3°S. and also north of Punta Aguja, in Latitude 5°S. to 6°S. The remainder were distributed fairly evenly down to Latitude 16°S. From this position to Latitude 20°S. only a few were observed.

The monthly mean sets and drifts of the Peru Current, north of Latitude 20°S., are given in TABLE 2. This shows that the mean set is very constant in all months, while there is a considerable variation in mean drift. The variation of the northerly and southerly components of the current are shown in FIGURE 8. The variation of the southerly component is given separately because of the frequency and importance of southerly sets. In all months however the northerly component is stronger than the southerly one. In January, for example, the mean northerly component is 6 miles per day and the mean southerly component 1 mile per day. There is thus a resultant flow of water northwards at the rate of 5 miles per day during that month. In the case of the South Equatorial Current only the resultant flow westward was shown, the easterly component being too small to show separately.

The strength of the northerly flow of the Peru Current is very constant throughout the year, except for an increase in August. The

Annual Variation in Mean Velocity of the West Component of the South Equatorial Current, South Pacific Ocean.  
Latitude 0° to 6° S., Longitude 84° W. to 124° W.

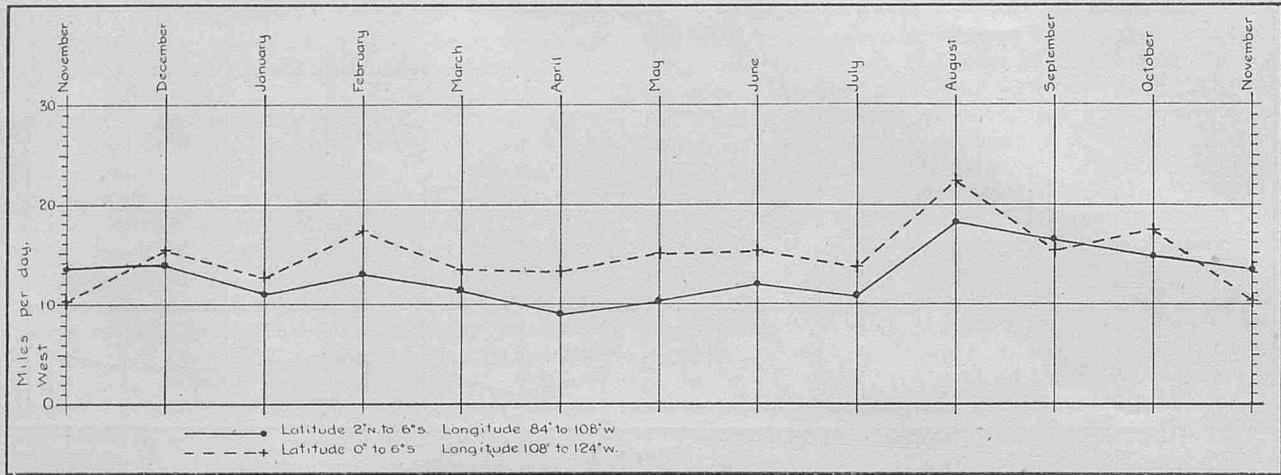


Figure 4.

Annual Variation in Mean Velocity of the West Component of the South Equatorial Current, South Pacific Ocean.  
Latitude 0° to 6° S., Longitude 124° W. to 164° E.

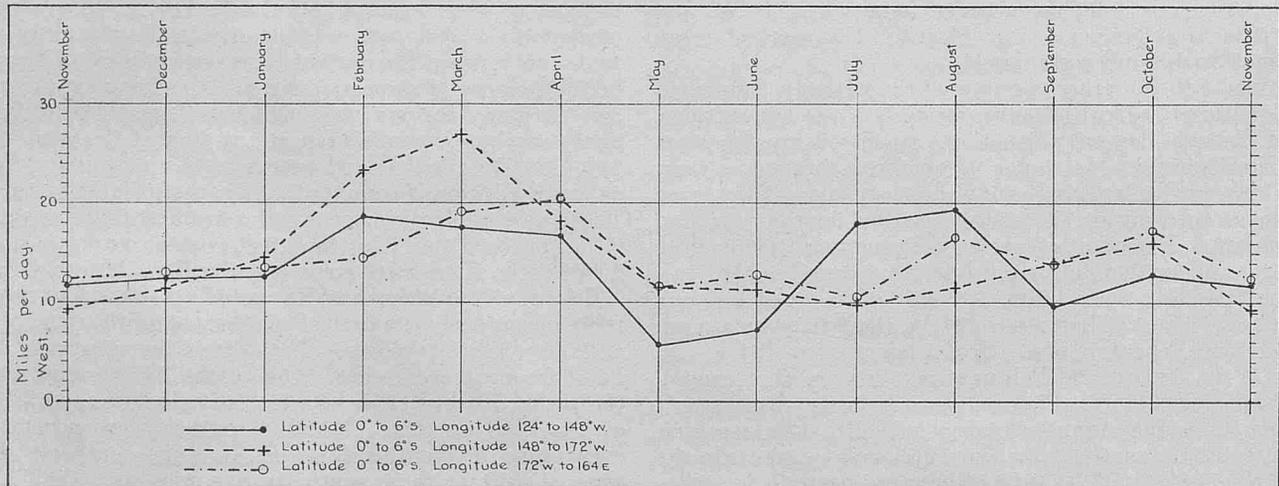


Figure 5.

reverse flow is strongest in October and December. The increase of the southerly flow in August, together with a decrease of the northerly flow, explains why the mean drift of 11 miles per day, shown in TABLE 2, is stronger than in any other month. Similarly the mean drift of only 1 mile per day in October is a result both of the weakening of the northerly flow and the strengthening of the southerly one.

**Seasonal Variation, Reverse and On-shore Sets, East Australian Coast Current.**—The monthly mean sets and drifts for this current, divided into three sections, are given in TABLE 3. There are distinct variations of set, which is usually to the west of south, but is occasionally considerably to the east of south. The number of observations is small in some months but the main features of the current in the three sections agree very well. In Latitude 26°S. to 30°S. the strength of the current increases steadily from 10 miles per day in November to a maximum of 33 miles per day in February, thence decreasing steadily to May and dropping suddenly to only 1 mile per day in June, after which the strength increases. From Latitude 30°S. to 34°S. the strength of the current also drops to 1 mile per day in June, the greatest strengths being 18 miles per day in December and 17 miles per day in February. South of Latitude 34°S. where the current is weaker generally, it reaches its greatest strength in February, 12 miles per day, and is weakest in May, 1½ miles per day. Thus the East Australian Coast Current, south of Great Sandy Island, is everywhere weakest in winter and strongest in summer or early autumn.

The frequency roses for the East Australian Coast Current show that there is in all seasons a number of drifts setting in easterly, westerly and northerly directions, so that this current is not so steady as the South Equatorial Current. The weakening of the current in winter might be due to an actual weakening of the southerly drifts, or to an increase in the strength or frequency of northerly sets, or to both causes. During the period 1910-1937, between Latitudes 26°S. and 38°S., 211 sets with a southerly component and 41 sets with a northerly component were observed in February to April, when the southerly current is strongest. In May to July, when the current is weakest, there were 81 sets with a southerly component and 53 with a northerly component. The ratio of northerly to southerly sets is thus much higher in winter. In the previous issue of THE MARINE OBSERVER, July, 1938, pages 105 to 108, the article on "Currents in the South Pacific Ocean, Western and Central Portions" contains a figure showing the monthly variation of the north and south components of each of the three sections of the East Australian Coast Current. This figure shows that the cause of the seasonal weakening of the current is twofold, a decrease in the southerly flow and an increase in the northerly flow.

The majority of the northerly drifts do not reach 1 knot, but ten were observed exceeding 1 knot in the period 1910-1937, mostly between Latitude 30°S. and 34°S., the greatest being at the rate of 2½ knots.

Annual Variation in Mean Velocity of the West Component of the South Equatorial Current, South Atlantic Ocean, Cape and Brazil Tracks, Latitude 0° to 6° S.

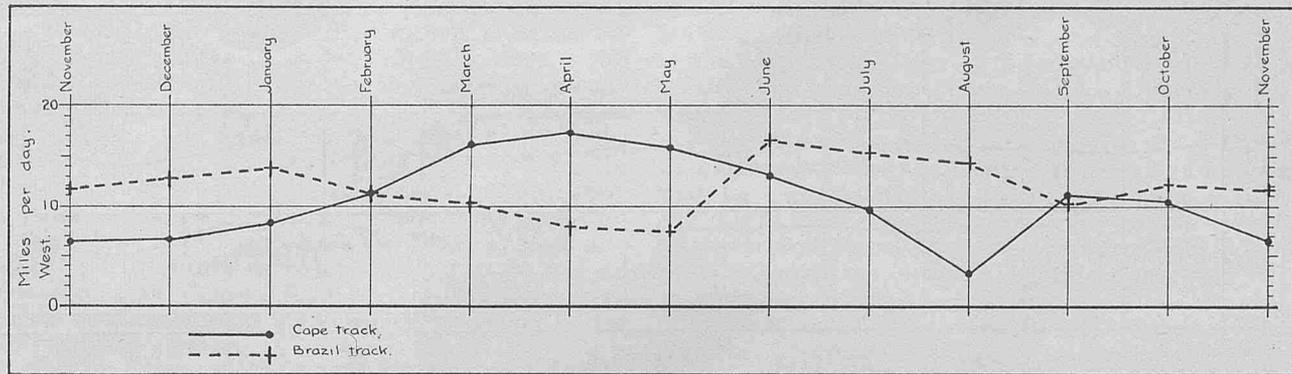


Figure 6.

Annual Variation in Mean Velocity of the West Component of the Equatorial Current, Indian Ocean, Latitude 8° S., to 16° S., Colombo to Fremantle Track.

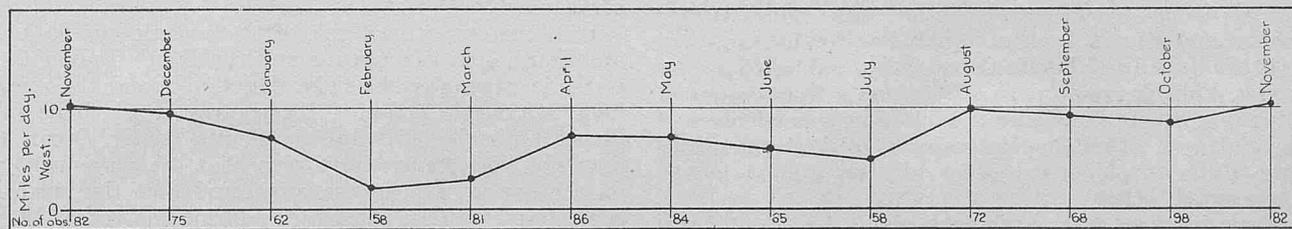


Figure 7.

The positions of the sets and drifts observed between Latitudes 26°S. and 34°S., in the East Australian Coast Current, have been examined and it is found that the southerly and the northerly sets are met with both inside and outside the 100-fathom line. The strongest southerly drifts usually occur on or near the 100-fathom line, while the strongest northerly drifts, excluding counter-current close in-shore are usually inside this line. The northerly sets are therefore true reverse sets, occurring within the region of the southerly current. The width of the East Australian Coast Current cannot be found from the observations available. Between Brisbane and Sydney southerly currents were recorded in the period 1910 to 1937 over a region at least 100 miles wide.

Sets towards or away from the land are not infrequent at all times. Fifteen drifts, setting between 240° and 300°, equalling or exceeding 1 knot, were observed during the period 1910-1937. Of these sets towards the land, six were recorded in May to July, when easterly gales are most violent, the remaining nine being equally spread over the rest of the year. Three of the drifts equalled or exceeded the rate of 2 knots.

**Coastal Counter-currents.**—Coastal counter-currents are more or less intermittent flows in opposition to the direction of a coastal current, such as the East Australian Coast Current, the counter-current being between the main current and the coast. They are thus distinct from reverse sets, which are sets flowing in the reverse direction to the normal current, met with on particular days within the region usually occupied by that current.

Generally speaking, observations of coastal counter-currents are not included amongst those available for charting. They are only obtained in cases where the shipping track runs parallel to the coastline and then only if the ship is running pretty close to the land for several hours at a stretch. Furthermore, should such an observation be available in a particular region it is very difficult to say whether it represents a true counter-current or a reverse set within the region of the main current, since we do not yet know enough about the main coastal currents to be able to define their limits. The number of observations since 1910 is not sufficient for this purpose, still less to find out whether the width or position of the main current changes in different seasons or in different years.

According to the Sailing Directions there is generally a counter-current setting northward close to the coast of New South Wales and

southern Queensland, inside the East Australian Coast Current. The drift varies from a quarter to one knot, and is found especially in the bights. It does not extend for more than about two miles from the coast.

The charts for November to April show a south-easterly current flowing along the south-eastern coast of Papua, in opposition to the main westerly set through the Coral Sea to Torres Strait.

There is a tradition that a warm southerly current flows between the coast of Peru and the Peru Current in certain years, beginning at about the time of Christmas. This current is called *Corriente del Nino*, the Holy Child Current. We have no definite information from any source that a steady southerly current flows in this position in some years. FIGURE 8 shows that in the region covered by the tracks of shipping, the southerly sets are stronger on the average in October to December than in other months. It is probable that there is a more or less intermittent counter-current close to the shore and it is locally assumed that the northerly Peru Current has swinging movements away from or towards the coast, so that sometimes the cool Peru Current is met near the shore, while at other times the warm southerly current supervenes. The Royal Research Ship *William Scoresby* in the course of her expedition to the coast of Peru, in May and June, 1931, met with southerly currents near the coast. The phenomenon of *Aguaje* is believed to be associated with the incursion of warm southerly current, whether within the region of the Peru Current or between it and the shore. The sudden rise in temperature kills the fish and other living organisms of the cool Peru Current, which decompose and discolour the water. *Aguaje* is known by the English names of "the Painter" or "the Callao Painter" because of the darkening effect the hydrogen sulphide given off has upon ships lying at anchor. The *Aguaje* has a serious effect not only on the fishing industry, but also on the guano industry, the sea birds migrating or dying of starvation.

A few observations of southerly current at a considerable distance from the shore, and therefore outside the usual track of shipping, were recorded in the period 1910-1936. The *William Scoresby* encountered similar currents, as also did the German ships *Emden* in 1927 and *Nilocritis* in 1929. There thus appears to be evidence of a southerly counter-current outside the Peru Current.

Between Latitudes 2°N. and 2°S., Longitude 84°W. to the coast of Ecuador, the mean set of the 43 currents observed during the period 1910 to 1936 was south. In May to July there is a similar set between

**Annual Variation in Mean Velocity of the North and South Components of the Peru Current,  
Latitude 2° S. to 20° S.**

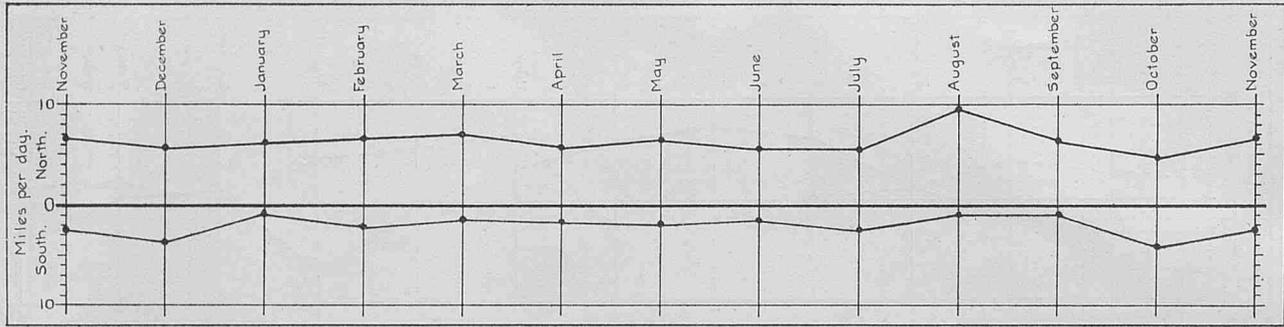


Figure 8.

Latitude 2°N. and the equator. These are the only southerly sets shown near the coast of South America on the charts of mean arrows. They are, however, north of the main body of the Peru Current.

**Drifts of Ships and Buoys in the South Pacific Ocean.**—An article, "Drifts in the Indian and Pacific Oceans," was published in THE MARINE OBSERVER, Vol. IX, 1932, page 203, giving a full account of the drift of ships, buoys, etc., and also a table giving particulars of the drifts of bottle papers. Omitting the majority of the bottle paper observations, the drifts of ships and other objects, quoted in the article, are summarized below.

The iron barque, *Ada Iredale*, was abandoned on fire about 2,000 miles east of the Marquesas Islands on October, 15th, 1876. The derelict drifted to a position nearly 2,500 miles to the westward in eight months. She was then towed into Tahiti. The iron ship *Oriflamme* was abandoned on fire about 850 miles west of Callao in June, 1881. In February, 1882, this vessel drifted ashore on the island of Raroia, in the Low Archipelago, the direction from Callao being W.S.W. The ship thus drifted not less than 2,850 miles in eight months. These cases are examples of drifts within the region of the South-East Trade Drift and both the beginning and ending positions do not differ very greatly in each case. The minimum possible mean speed for the *Ada Iredale* is about 10.5 miles per day and for the *Oriflamme* 12 miles per day. As these speeds are considerably greater than the mean speed of the current the probabilities are that the set in each case was fairly direct and that the drift was increased by the effect of the South-east trade wind on the hull of the derelict.

On March 8th, 1923, the S.S. *Mindini* was wrecked on Mellish Reef, Latitude 17° 25' S., Longitude 155° 52' E., in the Coral Sea. On May 15th, one of her life-buoys was washed ashore at Turi Turi, Latitude 9° 07' S., Longitude 143° 02' E., on the south coast of New Guinea. On June 4th a second life-buoy was washed ashore at the same place. A third was picked up in the vicinity of Cape York Peninsula. These drifts confirm the general north-westerly set of the water from the Coral Sea towards the Torres Strait.

On February 9th, 1917, a bottle dropped in Latitude 32° 45' S., Longitude 164° 30' E., from the American barquentine *Aurora* came ashore at Cape Bowling Green, North Queensland, Latitude 19° 20' S. on January 10th, 1918. This drift began at a point about midway between North Cape, New Zealand and the Australian coast. FIGURES 1 and 2 give some indication of how the bottle could drift in northerly and north-westerly directions and be finally carried to the coast by the westerly drift north of New Caledonia.

On May 4th, 1916, a bottle was dropped near Green Cape, New South Wales, in Latitude 37° 17' S., from H.M.T. *Hymettas*. This was picked up in South Bay, Palm Island, North Queensland, Latitude 18° 44' S., on August 13th, 1919.

**The Causes of the Currents of the South Pacific Ocean.**—The causes of the various types of ocean current are not yet fully understood, the subject being very complex. The difficulty of explanation is greater in the case of the South Pacific Ocean because accurate and detailed information of the winds and sea temperatures is not yet available. Data for the meteorological atlases of the oceans are now being extracted from the logs in the Marine Division and when the atlas for the South Pacific Ocean is complete we shall be better able

to discuss the formation of the currents and the reasons for the seasonal variations which they show. Some information can, however, be given now.

It is customary to think of the oceanic circulations of the North and South Atlantic Oceans and the South Indian Ocean as flows of water in a counter-clockwise direction round the areas of permanent high barometric pressure, the centres of which lie in each ocean in about Latitude 30°. In the South Pacific Ocean this conception does not hold for we have seen that the permanent anticyclone lies on the eastern side of the ocean and that the mean pressure in the central and western parts varies during the year. We can still regard the eastern part of the circulation as flowing round the region of the permanent anticyclone, but the two main currents of the open ocean, the South Equatorial Current together with the South-East Trade Drift, and the Southern Ocean Drift, really flow straight across the ocean in parallel belts of latitude. The other two main currents are coastal currents and from the configuration of the coasts flow nearly north on the eastern side of the ocean and south on the western side.

Too much insistence must not be put upon the idea of oceanic circulation. Were it possible to obtain an instantaneous view of the whole of the region of the circulation it would nearly always be found to be broken in some places, by sets which did not conform to the circulation. It is even possible that sometimes the circulation would not be in evidence over the greater part of its course. All that a current circulation implies is that on the average the sets are in a certain direction. It does not imply that the same volume of water goes all round the ocean, and still less that the same water is continuously conveyed round. It is obvious that in the South Pacific Ocean the combined South Equatorial Current and the South-East Trade Drift, flowing westward across the whole ocean, over a belt of 25° or more of latitude, must carry a much greater volume of water than is found in the rest of the surface circulation, which consists of the narrow coastal currents and the weak Southern Ocean Drift. Some water, however, flows into the South Equatorial Current from the Counter-Equatorial Current of the North Pacific Ocean. Furthermore, it cannot be said with certainty even that the average direction of circulation in the South Pacific Ocean forms a continuous circulation. There is only a weak connection between the Southern Ocean Drift and the Peru Current and while observations are insufficient to show whether there is a flow from the East Australian Coast Current into the Southern Ocean Drift, the indications are that such a connection, if it exists at all, must be a very weak one. A very similar state of affairs was found in the South Indian Ocean. A flow from the Agulhas Current into the Southern Ocean Drift was found to exist, but is weak during part of the year, while on the eastern side of the ocean the flow of current off the west coast of Australia to the Equatorial Current is very weak.

**The Southern Ocean Drift.**—This is a wind drift due to the predominance of the westerly winds south of Latitude 35° or 40°S. The fact, already stated, that the westerly winds are not so steady as those of the South Indian Ocean, accounts for the weakness of this current.

It is possible that the westerly winds are steadier and the strength of the Southern Ocean Drift greater south of the region of the shipping tracks. A series of synoptic charts for the period October 1901 to March, 1904 was drawn by international co-operation, covering the

region from 30°S. to Antarctica, right round the globe. These showed that the average paths of the centres of depressions in the South Pacific Ocean are from 3° to 7° further south, according to season, than those of the South Indian Ocean. Observations made on the *Discovery* expeditions show that south of Latitude 66°S. there is still a surface current setting eastward in the neighbourhood of Graham Land. This current is turned towards the north by the west coast of Graham Land and then sets north-eastwards through the Drake Passage, between Cape Horn and Graham Land, there joining the general body of the Southern Ocean Drift flowing south of Cape Horn.

The oceanographical work of the *Discovery* expeditions has also shown that the flow to the eastward through the Drake Passage into the South Atlantic Ocean is continuous from the surface to the bottom. Furthermore the south-easterly surface set down the coast of Southern Chile to the region of Cape Horn is accompanied by a flow in the same direction beneath the surface.

**The Peru Current.**—By the action of the southerly wind which blows over the coasts of Peru and of Chile, north of Latitude 30°S. to 40°S., water is driven away from the coast, and this is replaced by cooler water from below. Upwelling in the Peru Current is thus exactly similar to that which takes place on the south-western coast of Africa in connection with the Benguella Current. It is probable that the greater part of the volume of the Peru Current comes from this upwelling water, the surface water coming up the coast from the region of Chiloe Island playing a minor part. It is certain that the persistence of the low temperature of the Peru Current right up to equatorial regions depends mainly on upwelling of cool water from below, although the surface water when it begins its northerly passage up the coast is also relatively cold.

The explanation of the coldness of the Peru Current by upwelling was first suggested by de Tesson in 1844 and although few oceanographical observations were made on this coast until recently, the theory was generally accepted. In 1931 the Royal Research Ship *William Scoresby* carried out an oceanographical investigation on these coasts. The surface and subsurface observations, together with biological observations, up to 200 miles from land, fully confirmed the fact of upwelling. The upwelling water was shown, however, to come from a layer of water from 55 to 200 fathoms below the surface, not from greater depths. The sea surface isotherms were found to be roughly parallel to the coast, over the whole extent from Chiloe Island to the Gulf of Guayaquil, so that a gradual fall of sea temperature is experienced as the coast is approached. As an example, proceeding to San Juan from a point 200 miles out at sea, a total fall of temperature of 7°F. was found.

Between the shipping tracks off the coasts of Peru and Chile and the tracks from Panama to Australian and New Zealand ports there is a considerable extent of ocean from which practically no observations are available. The southerly winds of the coast and coastal waters of Peru and Chile blow on the eastern side of the permanent anticyclone. North of Latitude 30°S. these winds back to S.E. with increasing distance from the coast. It is therefore probable that the uncharted space to Latitude 25°S. or 30°S. is filled with westward-moving water, forming the eastern end of the South-East Trade Drift. The older current charts bear this out, the water gradually spreading out fanwise from the Peru Current seaward in latitudes north of 30°S. Also according to the observations of H.M.S. *Ajax* in September to November, 1936, published in *THE MARINE OBSERVER*, Vol. XIV, page 134, the Peru Current sets more to the westward outside a distance of 10 miles from the coast.

**The South-East Set of the coast of Southern Chile.**—This is a wind drift of no great strength produced by the winds between N. and W. which predominate to some extent over the coast south of Latitude 40°S.

**The South Equatorial Current and the South-East Trade Drift.** The flow of this great mass of water westwards across the ocean is primarily due to the action of the trade wind, which blows in directions from S.E. to E. In addition, the current receives the water of the Peru Current and part of the water of the Counter-Equatorial Current of the North Pacific Ocean. The Counter-Equatorial Current is said to be stronger and steadier than that of other oceans, but part of its water recurves into the North Equatorial Current of the North Pacific Ocean. We cannot yet say how the water transported westwards in the South Equatorial Current is fully replaced. If the upwelling water of the Peru Current and the water transported to the eastern

side of the ocean by the Counter-Equatorial Current are insufficient in volume there must be some other form of compensation from below the surface. From the observations available the volume of westward-moving water in the equatorial region of the Indian Ocean is much less than in that of the Pacific Ocean. The Atlantic Ocean, on the other hand, probably more nearly resembles the Pacific in this respect.

Without exact knowledge of the strength of the equatorial wind in different latitudes and months we cannot explain the double maximum of strength shown in the figures for the equatorial currents of the oceans. It is probably connected with the passage of the sun in declination across the equator twice annually, the direct cause being either change in wind strength or some other effect, such as sea temperature change.

The fact that between Longitudes 84°W. and 108°W. the South Equatorial Current is strongest in August (FIGURE 4) is probably explained by the Peru Current being strongest in that month (FIGURE 8), coupled with the extension of the Counter-Equatorial Current in May to November (FIGURE 3).

**The East Australian Coast Current.**—The mass of water constituting the South-East Trade Drift moves westward towards the Torres Strait, which forms only a narrow and a shallow exit. Much of the Coral Sea is also relatively shallow. The water, therefore, banks up against the Australian continental shelf, and the East Australian Coast Current is a gradient current whereby the excess of water is removed southwards. In *THE MARINE OBSERVER*, Vol. V, 1928, wind roses for the months of March, June, September and December were published for the region covered by the Panama to Australian and New Zealand ports, derived from the observations of ships made in 1920—1926. While these roses show a good deal of northerly wind, winds from this direction never predominate near the coast between Sandy Cape and Cape Howe. In March there is some predominance of S. and S.E. winds, in June this predominance is more marked in winds between W. and S.E., in September the winds are variable and in December there is a slight predominance of southerly wind, as far south as Sydney. The current is therefore flowing in opposition to the prevailing wind during most of the year. This accounts for the frequency of northerly, easterly and westerly sets found in the region of the current. When the southerly winds are strongest, in the southern winter, the current is weakest, the southerly sets weakening and the northerly sets strengthening, as previously shown. In its southern part, between Latitudes 34°S. and 38°S., the chart of arrows for November to January shows south-easterly flows on the seaward side of the coast current, so that water from the current passes into the general easterly set between New South Wales and New Zealand.

**North-West Monsoon Drifts.**—The south-easterly set along the southern coast of Papua in November to April and the southerly and south-easterly sets on the western side of the Solomon Islands in February to April are probably the result of the north-west monsoon in these regions.

**The Experiences of Navigators.**—Remarks by the Captains of ships using the South Pacific Ocean, dealing more generally with the currents of the ocean and ocean pilotage, will be found in *THE MARINE OBSERVER'S LOG* of the present number. In the July number of this volume a number of accounts by Captains and Pilots were published dealing with the tidal streams and currents inside and outside the Great Barrier Reef and the East Australian Coast Current. In Vol. XIV, July, page 91, and in the present volume, January, page 3, accounts of the currents in the region of the Gilbert and Ellice Islands, by Captain J. HOPE EVANS of the Auxiliary Schooner *John Williams V*, will be found. The article on "Currents in the South Pacific Ocean, Eastern Portion, during the Southern Winter and General Summary," published in Vol. XIV, 1937, page 151, contains descriptions of the coastal currents of Peru and Chile by Captain A. RIDYARD, R.M.S. *Orduna*, and Captain G. H. LARGE, M.V. *Lobos*. In Vol. II, 1925, page 191, an account is given of currents in the close vicinity of Chatham and Hood Islands, Galapagos Group, experienced by S.S. *Dorsét*.

With reference to the place of origin of the East Australian Coast Current, Captain I. J. BURCH, Deputy Director of Navigation at Brisbane, writes:—"It is generally considered that the East Australian Current originates in the Coral Sea, moves west-south-westerly towards

the Australian coast, meeting the coast at approximately the region between Townsville and the Whitsunday Islands and then branching to the north and south inside the Barrier Reef." The East Australian Coast Current thus appears to be observed inside the Barrier Reef south of about Latitude 20°S., but the various accounts published in the July number are not consistent in this respect, probably owing to the complexity of the tidal streams.

Captain W. MICHIE, in his account published in the July number of the present volume, states that a southerly set of at least 1 knot is always experienced from Lihou Reef, in the Coral Sea, to Great Sandy Island and also that he has no doubt that this is the same current that sets S. to S.S.E. outside the Barrier Reef. There is thus definite evidence of the flow of the East Australian Coast Current in the Coral Sea outside the Barrier Reef from about Latitude 17°S. Captain MICHIE always experiences a set to S. or S.S.E. between Osprey Reef and the Barrier, in about Latitude 14°S., so that the real origin of the current may be still further north.

On the most northerly part of the Queensland coast, inside the Barrier, the set is to S.E. from October to April, during the north-

west monsoon season and to N.W. during the south-east trade wind season. The currents inside the Barrier are shown, by the various accounts published, to be much influenced by tidal streams.

Captain S. ROTHERY states that there is a current running S.E. along the Papuan coast during the south-east season against the wind at approximately 1 knot, during the north-west season (January to end of March) up to 2½ knots. This information confirms the influence, suggested above, of the north-west monsoon on the current in these waters.

The South Equatorial Current and the South-East Trade Drift flow through a great number of islands and archipelagoes and thus over greatly varying ocean depths. The bulk of the observations used for the charts are deep sea observations and there are bound to be many local variations of current in the close vicinity of islands and reefs, which the current charts do not show. A great deal of information of this character will be found in the Sailing Directions and some, for example, for the region of the Gilbert and Ellice Islands in THE MARINE OBSERVER.

**Table 1.**  
**Seasonal Mean Set and Drift (in miles per day) in the South Pacific Ocean.**

Region.	November to January.		February to April.		May to July.		August to October.	
	Mean Set and Drift.	No. of observations.	Mean Set and Drift.	No. of observations.	Mean Set and Drift.	No. of observations.	Mean Set and Drift.	No. of observations.
South Equatorial Current, Latitude 2° N. to 2° S., Longitude 84° W. to 108° W. ... ..	278° 12	385	267° 13	502	288° 10	388	277° 18	388
South Equatorial Current, Latitude 2° S. to 6° S., Longitude 84° W. to 108° W. ... ..	266° 13	446	251° 10	487	261° 13	416	265° 15	373
South Equatorial Current, Latitude 0° S. to 6° S., Longitude 108° W. to 124° W. ... ..	261° 12	96	260° 15	93	253° 15	83	261° 19	145
South Equatorial Current, Latitude 0° to 6° S., Longitude 124° W. to 148° W. ... ..	257° 13	86	264° 18	83	257° 12	50	267° 14	85
South Equatorial Current, Latitude 0° to 6° S., Longitude 148° W. to 172° W. ... ..	263° 12	107	267° 23	103	265° 11	113	262° 14	128
South Equatorial Current, Latitude 0° to 6° S., Longitude 172° W. to 164° E. ... ..	259° 13	103	264° 18	139	263° 11·5	78	263° 16	119
South Equatorial Current, Latitude 0° to 2° S., Longitude 140° E. to 164° E. ... ..	265° 29	24	269° 12	17	284° 20	8	293° 3	10
South-East Trade Drift, Latitude 6° S. to 18° S., Longitude 96° W. to 108° W. ... ..	260° 6	773	256° 6	926	270° 6	748	264° 6	598
South-East Trade Drift, Latitude 6° S. to 18° S., Longitude 108° W. to 120° W. ... ..	251° 5	426	264° 6	491	267° 5·5	457	258° 6	403
South-East Trade Drift, Latitude 18° S. to 26° S., Longitude 104° W. to 124° W. ... ..	239° 3	579	249° 3	694	284° 2	510	252° 3	438
South-East Trade Drift, Latitude 6° S. to 18° S., Longitude 124° W. to 132° W. ... ..	246° 6	94	270° 8	102	270° 7	96	273° 8	126
South-East Trade Drift, Latitude 6° S. to 18° S., Longitude 132° W. to 152° W. (Region of Marquesas Islands, Low Archipelago and Tahiti) ... ..	240° 5	221	262° 6	288	277° 6	217	270° 6·5	291
South-East Trade Drift, Latitude 6° S. to 14° S., Longitude 168° W. to 176° E. (Region of Samoa and Ellice Islands) ... ..	266° 3	156	204° 2	168	255° 6	186	255° 6·5	217
South-East Trade Drift, Latitude 14° S. to 22° S., Longitude 176° W. to 172° E. (Region of Fiji) ... ..	296° 3	109	222° 2	145	268° 3	144	282° 4	161
South-East Trade Drift, Latitude 12° S. to 20° S., Longitude 152° E. to 164° E. ... ..	283° 4·5	33	290° 4	62	276° 10	58	264° 6	52
Latitude 2° S. to 12° S., Longitude 152° E. to 156° E. and Latitude 8° S. to 12° S., Longitude 156° E. to 160° E. (Region West of Solomon Islands) ... ..	219° 2	11	123° 5	20	290° 8	14	233° 11	10
Counter-Equatorial Current, Latitude 6° N. to 8° N., Longitude 84° W. to 92° W. ... ..	66° 12	13	91° 7	17	71° 4·5	15	73° 15	13
Counter-Equatorial Current, Latitude 4° N. to 6° N., Longitude 84° W. to 92° W. ... ..	358° 1	43	283° 7	48	90° 8	36	88° 8	46
Peru Current, South American Coast, Latitude 42° S. to 20° S. ... ..	355° 5	34	348° 7	28	345° 6	18	8° 8	9
Peru Current, South American Coast, Latitude 20° S. to 2° S. ... ..	318° 5	110	320° 6	75	303° 7	66	322° 6	73
Latitude 2° S. to 2° N., Longitude 84° W. to South American Coast ... ..	287° 2	42	284° 5	60	243° 1	48	175° 4	43
Region of Panama, Latitude 4° N. to 8° N., Longitude 84° W. to South American Coast ... ..	217° 9	327	230° 14	403	139° 1	269	149° 4	277
Australian or New Holland Current, Latitude 20° S. to 26° S., Longitude 156° E. to 172° E. ... ..	270° 3	122	252° 3	151	296° 3	136	284° 2	178
Latitude 26° S. to 34° S., Longitude 172° W. to 172° E. ... ..	270° 0*	235	320° 1	224	12° 3	224	51° 2·5	194
Latitude 26° S. to 34° S., Longitude 156° E. to 172° E. ... ..	341° 1	288	16° 4	277	27° 3	235	46° 1	248
Latitude 34° S. to 44° S., Longitude 152° E. to 164° E. ... ..	108° 4	214	148° 1	230	90° 2	180	83° 3	161
Latitude 34° S. to 44° S., Longitude 164° E. to west coast of New Zealand ... ..	63° 2	166	58° 2	173	95° 2	170	84° 2	136
Latitude 34° S. to 38° S., east coast of New Zealand, to Longitude 180° ... ..	103° 3	52	234° 1·5	64	142° 1	38	98° 0*	47
Latitude 38° S. to 44° S., east coast of New Zealand, to Longitude 180° ... ..	197° 2·5	59	196° 0·5	99	69° 2	64	72° 1	52
Latitude 34° S. to 44° S., Longitude 180° W. to 160° W. ... ..	62° 1	589	343° 1	742	48° 1	519	16° 1	497
Latitude 34° S. to 44° S., Longitude 160° W. to 140° W. ... ..	311° 1	284	333° 1	376	25° 2	236	29° 1	202

\* Less than 0·5 miles per day.

Table 1 (continued).

Region.	November to January.		February to April.		May to July.		August to October.	
	Mean Set and Drift.	No. of observations.	Mean Set and Drift.	No. of observations.	Mean Set and Drift.	No. of observations.	Mean Set and Drift.	No. of observations.
East Australian Coast Current, Latitude 20° S. to 26° S., Longitude 152° E. to 156° E. ... ..	180° 7	13	188° 12	24	204° 13	13	148° 9	23
East Australian Coast Current, Latitude 26° S. to 30° S., coast to Longitude 156° E. ... ..	183° 19	77	190° 28	80	181° 10	31	177° 15	30
East Australian Coast Current, Latitude 30° S. to 34° S., coast to Longitude 156° E. ... ..	191° 13	125	193° 13	148	162° 2.5	88	180° 5	83
East Australian Coast Current, Latitude 34° S. to 38° S., coast to Longitude 152° E. ... ..	206° 8.5	37	194° 6	77	190° 4	30	207° 4	25
Latitude 38° S. to 44° S., Longitude 148° E. to 152° E. (east of Tasmania) ... ..	320° 2	35	60° 3.5	37	49° 2	21	61° 2.5	31
Latitude 42° S. to 48° S., Longitude 140° E. to 148° E. (west and south of Tasmania) ... ..	119° 2	11	61° 4	12	263° 0*	8	192° 1	7
Southern Ocean Drift, Latitude 44° S. to 60° S., Longitude 168° E. to 172° W. ... ..	168° 1	65	136° 1.5	84	148° 1.5	89	143° 1	34
Southern Ocean Drift, Latitude 44° S. to 60° S., Longitude 172° W. to 152° W. ... ..	324° 2	96	4° 3	129	32° 3	151	89° 2	102
Southern Ocean Drift, Latitude 44° S. to 60° S., Longitude 152° W. to 132° W. ... ..	34° 2	65	19° 2	124	69° 2	100	56° 3	77
Southern Ocean Drift, Latitude 46° S. to 60° S., Longitude 132° W. to 112° W. ... ..	3° 2	49	51° 1	112	144° 1	91	47° 1	57
Southern Ocean Drift, Latitude 46° S. to 60° S., Longitude 112° W. to 92° W. ... ..	22° 2	42	15° 2	106	22° 3	92	5° 5.5	49
Southern Ocean Drift, Latitude 46° S. to 60° S., Longitude 92° W. to 70° W. ... ..	46° 2	49	30° 2.5	111	65° 4	87	54° 3	57

Table 2.  
Annual Variation of the Peru Current and of the South Equatorial Current.  
Monthly Mean Set and Drift (in miles per day).

Month.	Peru Current.		South Equatorial Current.									
	Latitude 2° S. to 20° S.		Latitude 2° N. to 6° S. Longitude 84° W. to 108° W.		Latitude 0 to 6° S. Longitude 108° W. to 124° W.		Latitude 0 to 6° S. Longitude 124° W. to 148° W.		Latitude 0 to 6° S. Longitude 148° W. to 172° W.		Latitude 0 to 6° S. Longitude 172° W. to 164° E.	
	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.	Mean Set and Drift.	Number of observations.	Mean Set and Drift.	Number of observations.
November ... ..	327° 5	37	268° 13	280	261° 10	41	263° 12	27	256° 10	36	266° 12	42
December ... ..	327° 3	28	266° 14	259	255° 16	15	264° 12	22	271° 11	40	252° 14	33
January ... ..	324° 6	41	269° 11	292	262° 13	40	250° 13	37	259° 15	31	257° 14	28
February ... ..	332° 5	18	260° 13	350	264° 18	38	265° 19	28	267° 23	37	264° 14.5	35
March ... ..	319° 8	39	253° 12	309	260° 14	31	262° 18	25	269° 27	36	258° 19.5	54
April ... ..	313° 6	18	269° 9	330	254° 14	24	259° 17	30	261° 18	30	270° 20	50
May ... ..	329° 8.5	32	273° 10	311	258° 15	16	247° 6	16	270° 12	38	278° 11.5	21
June ... ..	317° 5	20	267° 12	282	257° 16	38	274° 8	13	261° 11	43	260° 13	30
July ... ..	337° 7.5	14	279° 11	211	244° 15	29	255° 19	21	262° 10	32	266° 10.5	27
August ... ..	322° 11	32	273° 18	271	261° 23	61	272° 19	29	262° 11.5	46	256° 17	34
September ... ..	325° 7	14	271° 17	272	258° 15.5	48	257° 10	24	258° 15	39	260° 14	39
October ... ..	322° 1	27	269° 15	217	262° 18	36	265° 13	32	266° 16	43	268° 17	46

TABLE 3.  
Annual Variation of the East Australian Coast Current.  
Monthly Mean Set and Drift (in miles per day).

Month.	Latitude 26° S. to 30° S.		Latitude 30° S. to 34° S.		Latitude 34° S. to 38° S.	
	Mean Set and Drift.	No. of observations.	Mean Set and Drift.	No. of observations.	Mean Set and Drift.	No. of observations.
November ... ..	168° 10	23	180° 9	39	196° 9	7
December ... ..	184° 21	33	203° 18	48	208° 12	13
January ... ..	189° 26	21	189° 13	39	212° 5	16
February ... ..	184° 33	21	193° 17	45	203° 9	11
March ... ..	195° 27	30	186° 12	55	185° 8	23
April ... ..	190° 25	29	200° 10	48	187° 2	16
May ... ..	199° 13.5	6	138° 4	28	127° 1.5	11
June ... ..	211° 1	11	210° 1	38	200° 9	5
July ... ..	173° 15	14	173° 4.5	22	200° 4	13
August ... ..	183° 8	8	211° 3	24	255° 3	8
September ... ..	191° 14.5	11	139° 5.5	31	189° 3	8
October ... ..	165° 21	11	203° 7	28	176° 9	6

## ATMOSPHERIC OBSCURITY IN APPROACHES TO THE HUMBER AND WASH.

BY COMMANDER J. HENNESSY, R.N.R.

THE following graphs show the mean monthly percentage of hours of Atmospheric Obscurity experienced at Lighthouses on the coast and at Light Vessels in the vicinity of the approaches to the Humber and The Wash.

The graphs are constructed from records supplied to the Meteorological Office by the Elder Brethren of Trinity House and cover the nineteen years 1919 to 1937, excepting the Inner Dowsing, Outer Dowsing and East Dudgeon Light Vessels, from which records were not obtainable during 1919 from January to July, and in the case of Smiths Knoll Light Vessel from January to August of that year.

When examining the graphs it must be understood that they do not represent the percentage frequency of actual fog and mist experienced at the stations, but indicate percentage periods during which fog signals were in operation at each respective station. The fog signal is operated at the discretion of the Keeper of a Lighthouse or the Master of a Light Vessel, when it is considered that the warning will prove of assistance to safe navigation during periods of poor visibility which may be occasioned by fog, mist, haze, falling snow, heavy rain or other causes, at the station itself or within sight of it.

The position of the stations for which graphs are given are shown in FIGURE 1.

In general the graphs show that at all stations within the area, the percentage frequency of atmospheric obscurity attains a maximum during the months of December and January, after which it steadily

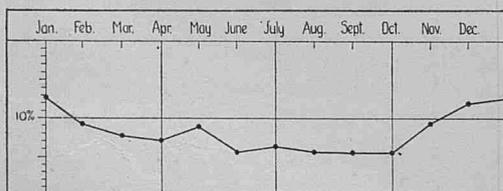
decreases to a minimum in July and increases from July to December. The percentage frequency in July is only half that recorded in the mid winter months. At the three coast stations the steady decrease during the spring is checked by a slight increase in May and though not so pronounced a similar tendency is recorded at most of the Light Vessels.

Land and sea fogs are both experienced in this region. Sea fog is usually greatest during the summer months. The increase of atmospheric obscurity during the winter months is largely due to the then comparatively high prevalence of land fog which forms on cold, still, clear nights and drifts for some distance seawards.

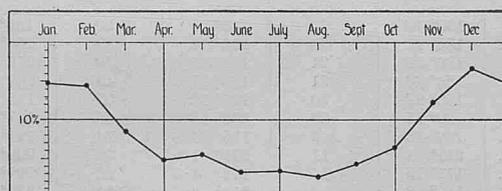
Atmospheric obscurity recorded at the coast stations is only about one-quarter of that recorded at the Light Vessels whose frequencies show a slight increase from the inner to the outer stations.

Such a large difference is to some extent due to the fact that Light Vessels are small craft positioned to mark dangerous banks and shoals lying close to the fairway. They are not at times so easily discernible as a Lighthouse which can generally be given a good offing by passing ships. Though the atmospheric obscurity may not be so great as to necessitate the reduction of a ship's speed for safe and cautious navigation, occasions arise when a Light Vessel's sound signal may be heard at a greater distance than the vessel herself can be seen, or than her light can be picked up, and thus give a welcome indication of her bearing to approaching shipping.

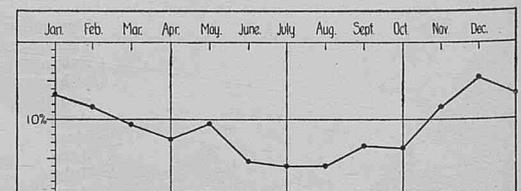
### LIGHTHOUSES



Flamborough Head

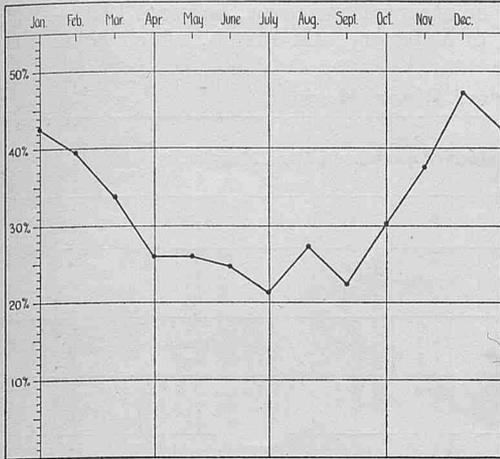


Spurn Head

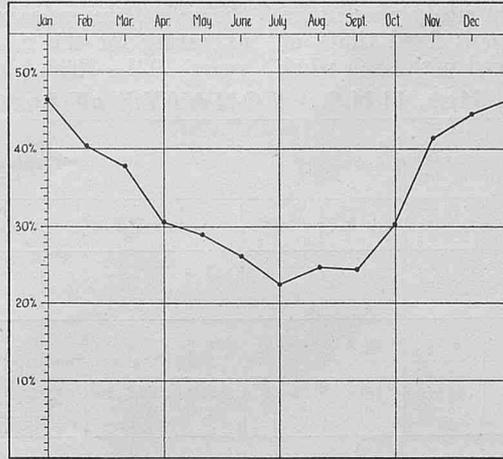


Cromer

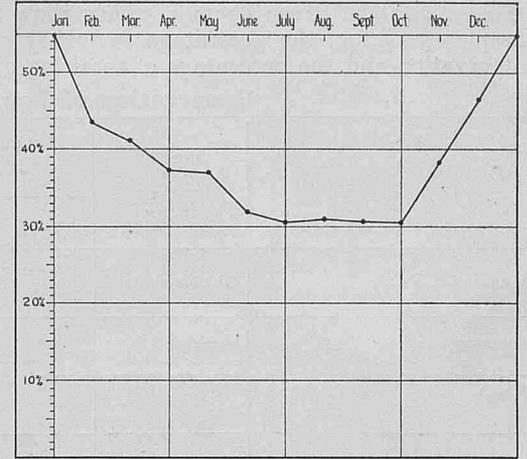
LIGHT VESSELS



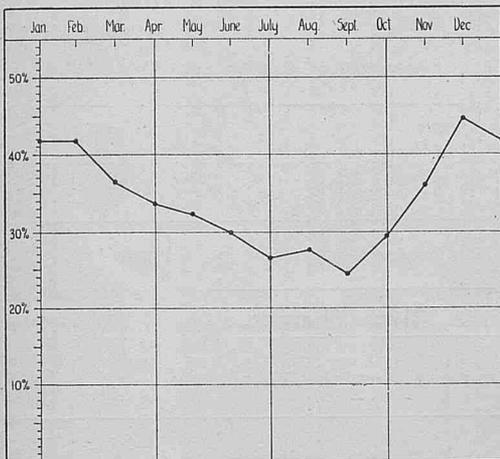
Humber



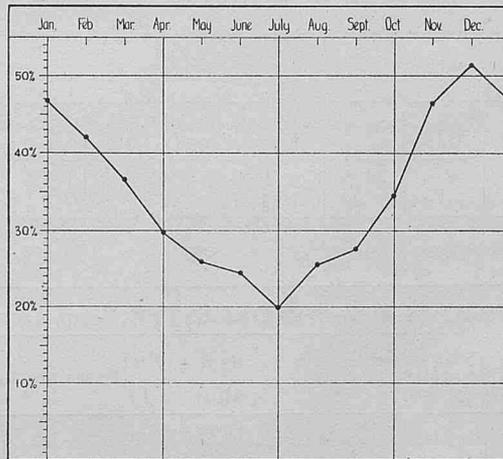
Inner Dowsing



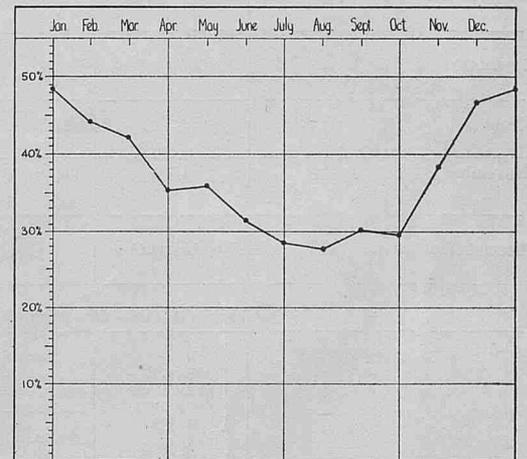
Outer Dowsing



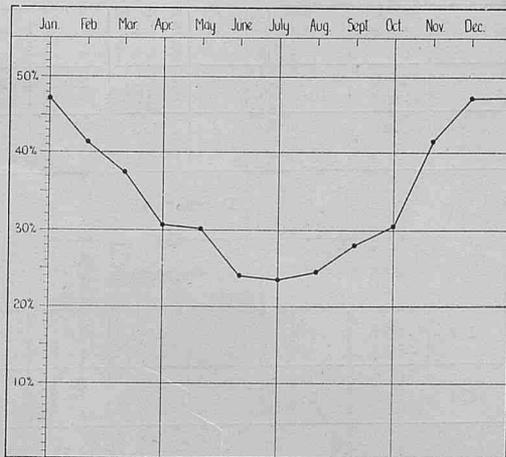
East Dudgeon



Lynn Well



Smiths Knoll



Newarp

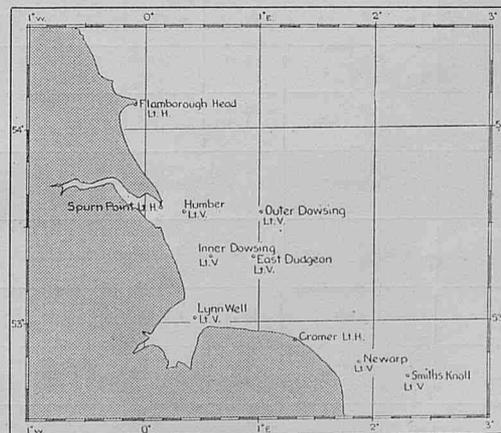


Figure 1

The following tables are compiled from the Cadets' Meteorological Logs kept on board H.M.S. *Conway* in the River Mersey and H.M.S. *Worcester* in the River Thames. They show the monthly percentage frequency of fog, the percentage frequency of fog at fixed times of observation and the percentage of total fog observed with each wind

direction. No observations are available for January, April, August, September and December during which months, or parts thereof, the cadets are on leave. The observations cover the years 1920—1937 excepting for the months of February and March, which cover the years 1921—1938.

**Observation of Fog and Mist, H.M.S. "CONWAY," off Rock Ferry, River Mersey.**

	Monthly percentage frequency of fog.	Percentage frequency of fog at times of observations throughout the day.				Percentage of total fog observed according to Wind Direction.										
		8 a.m.	Noon.	4 p.m.	8 p.m.	Force.	N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.	Calm.	Vble.
January ... ..	No observations	No observations				No observations										
February ... ..	30.2	36.1	27.0	24.0	12.8	1—3 4—7	10.9 2.3	6.9 1.4	10.3 2.6	17.6 5.2	11.1 1.4	4.8 0.5	5.9 0.7	13.0 4.0	1.2	0.2
March ... ..	27.9	40.5	23.4	21.1	15.0	1—3 4—7	8.2 1.8	7.2 1.1	11.5 2.5	21.6 4.9	11.6 2.0	6.8 0.9	4.7 1.3	9.0 2.5	2.4	
April ... ..	No observations	No observations				No observations										
May ... ..	19.0	36.3	21.3	19.0	23.4	1—3 4—7	12.0 1.6	7.9 0.5	13.9 1.6	18.2 2.7	6.5 1.9	4.2 0.3	5.7 1.1	17.5 3.0	1.4	
June ... ..	10.6	42.1	22.0	15.5	20.4	1—3 4—7	11.0 2.7	4.4 0.4	10.6 1.3	19.1 4.4	17.7 1.8	5.3 1.8	3.2 0.9	11.4 3.2	0.8	
July ... ..	7.4	40.6	23.9	15.7	19.8	1—3 4—7	8.3 3.3	2.5 0.8	11.6	11.5 0.8	10.8 0.8	5.0	6.6 2.5	21.5 12.4	0.8	0.8
August ... ..	No observations	No observations				No observations										
September ... ..	No observations	No observations				No observations										
October ... ..	26.4	33.3	21.2	22.4	14.1	1—3 4—7	6.5 3.0	5.9 1.2	6.8 2.0	19.6 5.2	12.5 4.3	6.7 1.2	6.2 2.2	10.2 2.9	3.6	
November... ..	41.2	32.0	26.3	27.7	14.0	1—3 4—7	8.3 1.9	8.6 1.5	6.2 0.6	20.3 4.9	14.5 3.1	7.5 1.0	6.4 0.8	9.3 1.9	3.0	0.1 0.1
December ... ..	No observations	No observations				No observations										

**Observation of Fog and Mist, H.M.S. "WORCESTER," off Greenhithe, River Thames.**

	Monthly percentage frequency of fog.	Percentage frequency of fog at times of observation throughout the day.				Percentage of total fog observed according to Wind Direction.										
		8 a.m.	Noon.	4 p.m.	8 p.m.	Force.	N.	N.E.	E.	S.E.	S.	S.W.	W.	N.W.	Calm.	Vble.
January ... ..	No observations	No observations				No observations										
February ... ..	7.1	42.4	22.9	19.4	15.3	1—3 4—7	8.4	5.6	8.3	8.4	4.9	11.0	22.1 0.7	10.5	12.4	7.7
March ... ..	3.1	69.2	13.2	4.4	13.2	1—3 4—7	5.8	8.7	8.7 3.0	8.7	5.8	8.2	5.7 1.5	14.7	20.5	8.7
April ... ..	No observations	No observations				No observations										
May ... ..	0.7	100	—	—	—	1—3 4—7			21.4	14.4		14.3		21.4	28.5	
June ... ..	0.9	55.0	10.0	15.0	20.0	1—3 4—7	30.0	5.0	15.0	10.0	5.0		10.0	10.0 5.0	10.0	
July ... ..	0.9	76.4	11.8	—	11.8	1—3 4—7	17.6		5.9		11.8 5.9	11.8	5.9	17.6	17.6	5.9
August ... ..	No observations	No observations				No observations										
September ... ..	No observations	No observations				No observations										
October ... ..	4.3	73.5	13.9	4.2	8.4	1—3 4—7	4.2	1.1	13.9 1.1	9.6	8.5	5.4	11.7 2.2	8.5	28.5	5.3
November... ..	11.9	35.9	23.1	23.1	17.9	1—3 4—7	4.4 1.2	5.9 0.4	10.9 0.8	6.2 0.8	3.5	10.1	23.4 0.4	7.8 0.8	23.4	
December ... ..	No observations	No observations				No observations										

SOUTHERN ICE REPORTS.

During the year 1937.

October.

No reports.

November.

Year.	Day.	Position of Ice.		Description.	Remarks.	Name of Ship reporting.	
		Latitude.	Longitude.				
1937	20	51° 41' S.	27° 32' E.	1 small irregular berg ... ..	...	R.R.S. <i>Discovery II</i> .	
	21	52° 32' S.	27° 57' E.	1 large irregular berg ... ..	...	do.	
		52° 40' S.	28° 00' E.	1 large tabular berg ... ..	Approximately 1 mile long, 200 feet high ... ..	do.	
		52° 58' S.	28° 10' E.	1 growler ... ..	...	do.	
	22	53° 31' S.	28° 24' E.	1 small irregular berg ... ..	Weather-worn ... ..	do.	
		53° 00' S.	29° 24' E.	1 medium tabular berg ... ..	...	do.	
	23	From 53° 51' S.	29° 51' E.	Numerous small bergs and growlers ... ..	...	...	do.
		To 56° 09' S.	30° 02' E.				
	23	From 56° 09' S.	30° 02' E.	3 irregular bergs and 4 tabular bergs ... ..	Irregular bergs medium size—tabular bergs small, all old and weather-worn.	...	do.
		To 57° 01' S.	30° 45' E.				
23	From 57° 01' S.	30° 45' E.	Vessel skirting edge of pack ice ... ..	Vessel navigating to the eastward, passed through numerous streams of loose pack and drift ice, many small bergs and bergy bits.	...	do.	
	To 56° 43' S.	31° 44' E.					
24	From 56° 43' S.	31° 44' E.	Vessel skirting edge of pack ice. 8 bergs ... ..	Vessel navigating through numerous streams of loose pack and drift ice, 4 medium size tabulars, 4 small irregular, numerous growlers and bergy bits.	...	do.	
	To 56° 04' S.	32° 38' E.					
24	From 56° 04' S.	32° 39' E.	12 bergs, numerous growlers ... ..	5 large irregular, 7 medium size tabular ... ..	...	do.	
	To 56° 01' S.	33° 41' E.					
25	56° 02' S.	33° 57' E.	1 berg ... ..	Small tabular ... ..	...	do.	
	56° 09' S.	37° 08' E.	1 berg ... ..	Medium size tabular ... ..	...	do.	
	56° 19' S.	37° 28' E.	1 berg ... ..	Large irregular ... ..	...	do.	
	56° 36' S.	38° 00' E.	1 berg ... ..	Small irregular ... ..	...	do.	
	From 56° 43' S.	38° 11' E.	5 bergs ... ..	2 tabular, 3 irregular ... ..	...	do.	
To 57° 22' S.	39° 09' E.						
26	57° 24' S.	39° 11' E.	1 berg ... ..	Large irregular ... ..	...	do.	
	From 57° 49' S.	39° 57' E.	1 berg, numerous growlers, navigating through loose pack and drift ice.	Vessel navigating to the eastward skirting pack ice edge ... ..	...	do.	
27	To 57° 57' S.	40° 55' E.	4 bergs, numerous streams of loose pack and drift ice.	Medium size irregular. Vessel skirting pack ice edge ... ..	...	do.	
	From 57° 57' S.	40° 55' E.					
30	57° 30' S.	41° 43' E.	1 berg ... ..	Large irregular, 172 feet high ... ..	...	do.	
	57° 29' S.	41° 46' E.	1 berg ... ..	Large tabular ... ..	...	do.	
6	54° 54' S.	47° 09' E.	1 berg ... ..	Low tabular ... ..	...	do.	
	59° 12' S.	59° 42' E.	1 berg ... ..	Small irregular ... ..	...	do.	
13	59° 32' S.	60° 45' E.	2 bergs ... ..	Small irregular ... ..	...	do.	
	51° 55' S.	35° 41' W.	Berg ... ..	100 feet high, estimated ... ..	...	R.R.S. <i>William Scoresby</i> .	
14	52° 00' S.	35° 46' W.	Growler ... ..	Small ... ..	...	do.	
	52° 46' S.	36° 15' W.	Berg ... ..	Small ... ..	...	do.	
15	52° 51' S.	36° 18' W.	Berg ... ..	Small ... ..	...	do.	
	52° 54' S.	36° 20' W.	Growler ... ..	Small ... ..	...	do.	
16	52° 59' S.	36° 23' W.	Growler ... ..	Small ... ..	...	do.	
	54° 23' S.	35° 21' W.	Berg ... ..	Small ... ..	...	do.	
17	54° 19' S.	35° 32' W.	Berg ... ..	Large. Approximately 40 feet high, estimated ... ..	...	do.	
	54° 14' S.	35° 36' W.	Numerous growlers	Small irregular ... ..	...	do.	
18	53° 55' S.	35° 27' W.	Berg ... ..	Small irregular ... ..	...	do.	
	53° 53' S.	35° 31' W.	3 bergs ... ..	Small irregular ... ..	...	do.	
19	53° 49' S.	35° 40' W.	Berg ... ..	Small irregular ... ..	...	do.	
	53° 46' S.	35° 37' W.	Bergy bit	Small irregular ... ..	...	do.	
20	53° 44' S.	35° 35' W.	2 bergs ... ..	Medium and small irregular ... ..	...	do.	
	53° 41' S.	35° 36' W.	2 bergs ... ..	Medium and small irregular ... ..	...	do.	
21	53° 37' S.	35° 37' W.	2 bergs ... ..	Small tabular. Small irregular ... ..	...	do.	
	53° 41' S.	35° 28' W.	Berg ... ..	Large irregular ... ..	...	do.	
22	53° 47' S.	35° 20' W.	3 bergs ... ..	Small irregular ... ..	...	do.	
	53° 48' S.	35° 02' W.	1 berg ... ..	Height about 300 feet, estimated ... ..	...	do.	
23	53° 43' S.	34° 49' W.	2 bergs ... ..	Small ... ..	...	do.	
	53° 47' S.	34° 43' W.	1 berg ... ..	Tabular, 150-200 feet high, estimated ... ..	...	do.	
24	53° 47' S.	34° 29' W.	2 bergs ... ..	Small irregular ... ..	...	do.	
	53° 56' S.	34° 29' W.	2 bergs ... ..	Small irregular ... ..	...	do.	
25	53° 56' S.	34° 22' W.	2 bergs ... ..	Medium ... ..	...	do.	
	53° 59' S.	34° 01' W.	Berg ... ..	Small irregular ... ..	...	do.	
26	54° 02' S.	33° 47' W.	Berg ... ..	Small irregular and several growlers ... ..	...	do.	
	53° 52' S.	33° 46' W.	Berg ... ..	Large irregular ... ..	...	do.	
27	53° 55' S.	33° 35' W.	Berg ... ..	Medium, irregular ... ..	...	do.	
	54° 01' S.	33° 09' W.	2 bergs ... ..	Small irregular ... ..	...	do.	
28	54° 02' S.	33° 02' W.	Many growlers—bergy bits	Small irregular ... ..	...	do.	
	54° 04' S.	32° 57' W.	Berg ... ..	Wedge-shaped. Distance off by 4 point bearing 1.5 miles. Height by sextant angle, 280 feet.	...	do.	
29	54° 05' S.	32° 52' W.	Berg ... ..	Tabular, much weathered on east side. Distance by 4 point bearing 0.7'. Height by sextant angle, 260 feet.	...	do.	
	54° 05' S.	32° 49' W.	Berg ... ..	Pinnacle much weathered. Distance by 4 point bearing, 0.3'. Height by sextant angle, 250 feet.	...	do.	
30	54° 11' S.	32° 21' W.	Berg ... ..	Low flat ... ..	...	do.	
	54° 13' S.	32° 14' W.	Bergy bit	Small ... ..	...	do.	
31	54° 14' S.	32° 10' W.	Berg ... ..	White top, becoming green and dark at water line. Caverns on west side. Crevassed on east side.	...	do.	
	54° 20' S.	32° 10' W.	2 bergs ... ..	Medium ... ..	...	do.	
1	54° 21' S.	31° 53' W.	Berg ... ..	Small tabular irregular ... ..	...	do.	
	54° 25' S.	31° 54' W.	Berg ... ..	Small tabular irregular ... ..	...	do.	
2	54° 28' S.	31° 56' W.	Berg ... ..	Medium tabular ... ..	...	do.	
	54° 17' S.	31° 53' W.	Bergy bit	Much weathered pale green ... ..	...	do.	
3	54° 17' S.	31° 49' W.	Berg ... ..	Irregular ... ..	...	do.	
	54° 27' S.	31° 15' W.	Berg ... ..	Tabular ... ..	...	do.	
4	54° 29' S.	30° 58' W.	Berg ... ..	Irregular ... ..	...	do.	
	54° 34' S.	30° 45' W.	Berg ... ..	Small ... ..	...	do.	
5	54° 37' S.	30° 16' W.	Bergy bit	Small ... ..	...	do.	
	54° 48' S.	30° 10' W.	Berg ... ..	Small ... ..	...	do.	
6	55° 00' S.	29° 21' W.	3 bergs ... ..	Small with bergy bits and growlers within a radius of 4 miles ... ..	...	do.	
	54° 56' S.	29° 24' W.	Berg ... ..	Small irregular. Distance off by 4 point bearing, 1.3 miles. Height by sextant angle, 160 feet.	...	do.	
7	54° 51½' S.	29° 26' W.	Berg ... ..	Small ... ..	...	do.	
	54° 53' S.	29° 18' W.	Growler and bergy bit	Low irregular ... ..	...	do.	
8	54° 57' S.	29° 25' W.	Berg and growler	Medium ... ..	...	do.	
	55° 02' S.	29° 15' W.	Berg ... ..	Large ... ..	...	do.	
9	55° 07' S.	29° 15' W.	Berg ... ..	Small irregular. Distance off by 4 point bearing, 1.1 miles. Height by sextant angle 160 feet.	...	do.	
	55° 02½' S.	29° 09' W.	Berg ... ..	Very weathered, small tabular, irregular ... ..	...	do.	
10	55° 01' S.	29° 06' W.	2 bergs ... ..	Small tabular weathered ... ..	...	do.	
	55° 07' S.	29° 06' W.	Berg ... ..	Rock and earth deposits on one face. Probably old tabular capsized after being aground.	...	do.	
11	55° 02' S.	29° 00' W.	Berg ... ..	Small irregular. Much weathered on one side ... ..	...	do.	
	55° 04' S.	28° 59' W.	Berg ... ..	Medium tabular seen dimly in fog distant 1.5 cables ... ..	...	do.	
12	55° 08' S.	28° 42' W.	Berg ... ..	Very weathered with growlers and brash ... ..	...	do.	
	55° 09' S.	28° 40' W.	Berg ... ..	Small ... ..	...	do.	
13	55° 13' S.	28° 10' W.	Berg ... ..	About 15 feet high. Dark bottle green with white projections under water.	...	do.	
	55° 15' S.	28° 08' W.	Bergy bit	...	...	do.	

SOUTHERN ICE REPORTS—continued.

Year.	Day.	Position of Ice.		Description.	Remarks.	Name of Ship reporting.
		Latitude.	Longitude.			
1937	16	55° 11' S.	28° 08' W.	Berg ... ..	Medium...	R.R.S. <i>William Scoresby</i> .
		55° 18' S.	28° 01' W.	Berg ... ..	Tabular, very weathered	do.
		55° 19' S.	27° 54' W.	10 bergs ... ..	One large tabular, 4 medium, and 5 small. 4 with discoloured portions.	do.
		Within 5 miles radius.		Many growlers and bergy bits	do.	do.
		55° 11' S.	27° 51' W.	Berg ... ..	Medium irregular	do.
		55° 16' S.	27° 51' W.	Berg ... ..	Small low flat	do.
		55° 23' S.	27° 19' W.	Berg ... ..	Small low flat	do.
		55° 19' S.	27° 05' W.	Several growlers	do.	do.
		55° 21' S.	26° 58' W.	Berg ... ..	Small tabular	do.
		55° 28' S.	26° 32' W.	Berg ... ..	Small irregular	do.
17		55° 35' S.	25° 59' W.	Berg ... ..	Medium irregular, very weathered on one side	do.
		55° 37' S.	25° 52' W.	Berg ... ..	Small weathered	do.
		55° 50' S.	25° 09' W.	Several growlers	do.	do.
		55° 50' S.	25° 12' W.	Berg ... ..	Tabular weathered	do.
		55° 53' S.	25° 06' W.	3 bergs ... ..	Small ... ..	do.
		55° 57' S.	24° 50' W.	Berg ... ..	Small tabular weathered	do.
		56° 03' S.	24° 22' W.	Berg ... ..	Small discoloured	do.
		55° 59' S.	24° 22' W.	Berg ... ..	do.	do.
		56° 06' S.	24° 00' W.	Berg ... ..	do.	do.
		56° 14' S.	23° 45' W.	2 bergs ... ..	1 medium tabular, 1 small irregular	do.
18		56° 15' S.	23° 38' W.	2 bergy bits and several growlers	Within 4 miles East	do.
		Within a radius of 4 miles.		2 bergs ... ..	Small, low discoloured portions	do.
				3 bergs ... ..	do.	do.
				5 bergy bits	1 medium tabular, 2 small irregular	do.
		56° 21' S.	23° 18' W.	Berg, many growlers	Medium irregular	do.
		56° 25' S.	23° 14' W.	Berg ... ..	Tabular	do.
		56° 22' S.	23° 14' W.	Bergy bit, several growlers	Bottle green	do.
		56° 24' S.	22° 58' W.	Bergy bit	Small	do.
		56° 29' S.	22° 47' W.	7 bergs ... ..	All small, 2 tabular, 5 irregular, 2 discoloured	do.
		Within a radius of 7 miles.		Brash ... ..	Line of small fragments in E-W direction about 1.0 mile long...	do.
19		56° 32' S.	22° 23' W.	2 bergs ... ..	Small irregular	do.
		56° 34' S.	22° 17' W.	8 bergs ... ..	1 medium, 7 small irregular. 4 with bottle-green portions	do.
		56° 45' S.	21° 50' W.	do.	do.	do.
		Within a radius of 6 miles.		Berg ... ..	Low tabular	do.
		56° 47' S.	21° 51' W.	Berg ... ..	Very weathered tabular	do.
		56° 50' S.	21° 46' W.	Berg ... ..	Small conical	do.
		56° 49' S.	21° 30' W.	Berg ... ..	Irregular about 200 feet high	do.
		56° 56' S.	21° 15' W.	Berg ... ..	Irregular	do.
		56° 59' S.	21° 10' W.	Berg ... ..	Medium irregular	do.
		56° 56' S.	21° 09' W.	Berg ... ..	Irregular	do.
20		57° 03' S.	21° 07' W.	Berg ... ..	Irregular	do.
		56° 55' S.	21° 07' W.	Berg ... ..	do.	do.
		57° 05' S.	21° 06' W.	2 bergs ... ..	Small	do.
		57° 06' S.	20° 52' W.	Berg and bergy bit	do.	do.
		57° 16' S.	20° 16' W.	8 bergs and bergy bit	Within 12 miles radius. 1 large arched estimated 250 feet high. 1 very weathered.	do.
		57° 03' S.	19° 42' W.	4 bergs, several bergy bits. Many growlers	2 low rounded medium, 3 small irregular	do.
		Within 4 miles radius.		3 medium, 1 small low, 2 discoloured	do.	do.
		57° 01' S.	19° 43' W.	Berg ... ..	Very small, streaked with bottle green, brown, black and several shades of blue.	do.
		57° 01' S.	19° 38' W.	Berg ... ..	Small low	do.
		57° 05' S.	19° 15' W.	7 bergs, several bergy bits and growlers	Within 4 miles, 1 medium, 5 small irregular and 1 with discoloured portions.	do.
21		57° 09' S.	19° 12' W.	5 bergs ... ..	3 medium, 2 small irregular	do.
		57° 09' S.	18° 48' W.	2 bergs ... ..	Small	do.
		57° 09' S.	18° 32' W.	Bergy bit	Bottle green	do.
		57° 10' S.	18° 28' W.	5 bergs. Several growlers	Within 3 miles. Small irregular	do.
		57° 20' S.	18° 17' W.	Berg ... ..	Medium irregular	do.
		57° 13' S.	18° 10' W.	Bergy bit	Irregular, intense translucent blue	do.
		57° 15' S.	18° 03' W.	Berg ... ..	Medium irregular	do.
		57° 09' S.	17° 52' W.	Bergy bit	do.	do.
		57° 03' S.	17° 41' W.	Berg ... ..	Medium irregular	do.
		56° 45' S.	16° 30' W.	2 bergs ... ..	Distant about 10 miles. Small portions visible above horizon	do.
22		56° 50' S.	16° 17' W.	Growler ... ..	Small portion about 5 feet high above water	do.
		56° 44' S.	16° 14' W.	Berg ... ..	Small low flat	do.
		56° 38' S.	16° 07' W.	2 bergs ... ..	One pinnacle, one medium irregular	do.
		56° 28' S.	15° 46' W.	Berg ... ..	Small tabular	do.
		56° 19' S.	15° 16' W.	3 bergs ... ..	Small irregular	do.
		56° 15' S.	15° 45' W.	Berg ... ..	Weathered tabular, estimated 1,000 feet long	do.
		56° 15' S.	15° 41' W.	Berg ... ..	Small irregular	do.
		56° 26' S.	16° 12' W.	Berg ... ..	Small	do.
		56° 30' S.	16° 20' W.	2 bergs ... ..	Small	do.
		56° 30' S.	17° 00' W.	Berg ... ..	Small irregular	do.
23		56° 34' S.	17° 23' W.	Berg. Many small growlers	Small irregular. Portion discoloured, very black	do.
		56° 50' S.	18° 10' W.	Berg ... ..	Medium irregular, deep blue portions	do.
		From 56° 51' S. To 56° 50' S.	18° 16' W. } 18° 36' W. }	6 bergs ... ..	Mainly on horizon to Southward	do.
		56° 51' S.	18° 46' W.	Berg, many growlers	Small irregular, very weathered	do.
		56° 48' S.	18° 53' W.	Berg, many growlers	Small irregular almost all black	do.
		56° 48' S.	19° 06' W.	Berg, many growlers	Small low flat	do.
		From 56° 48' S. To 56° 52' S.	19° 11' W. } 20° 03' W. }	Growlers	A few small	do.
		56° 52' S.	20° 16' W.	Berg ... ..	Medium irregular, discoloured portions	do.
		57° 07' S.	20° 04' W.	2 bergs ... ..	Small irregular	do.
		57° 12' S.	20° 05' W.	1 berg ... ..	Small	do.
24		57° 28' S.	20° 31' W.	2 bergs ... ..	Small, seen indistinctly in fog	do.
		57° 30' S.	20° 59' W.	Bergy bit	Small	do.
		57° 33' S.	21° 08' W.	Berg ... ..	Medium tabular	do.
		57° 35' S.	21° 40' W.	2 bergs ... ..	Small tabular	do.
		57° 29' S.	21° 38' W.	Growler ... ..	Small	do.
		57° 29' S.	21° 46' W.	2 bergs ... ..	Small irregular	do.
		57° 31' S.	22° 03' W.	Berg ... ..	Small irregular	do.
		57° 28' S.	22° 01' W.	Berg. 2 growlers	Small low	do.
		57° 28' S.	22° 06' W.	3 growlers	do.	do.
		57° 27' S.	22° 25' W.	Berg ... ..	Small low tabular	do.
25		57° 27' S.	22° 28' W.	3 bergs. Many growlers	2 small low, 1 small irregular. Portion black, smooth and rounded, less weathered and apparently harder. Clear cut division.	do.
		57° 21' S.	23° 50' W.	2 bergs ... ..	Small tabular. One with discoloured portions	do.
		57° 21' S.	23° 53' W.	Berg. 4 growlers	Irregular	do.
		57° 21' S.	24° 06' W.	3 bergs ... ..	Small irregular, one with discoloured portions	do.
		57° 22' S.	24° 14' W.	Bergy bit	Large	do.
		57° 21' S.	24° 00' W.	10 bergs, bergy bits	Small irregular bergs	do.
		57° 21' S.	24° 15' W.	2 bergs, 2 bergy bits	Bergy bits discoloured	do.
		57° 24' S.	24° 26' W.	2 bergs, 6 bergy bits—2 growlers	do.	do.
		57° 24' S.	24° 31' W.	Berg, many growlers	Discoloured	do.
		57° 24' S.	24° 36' W.	2 bergs. 2 bergy bits	One high medium irregular. One low flat medium	do.
26		57° 24' S.	24° 41' W.	2 bergs ... ..	Small irregular weathered	do.
		57° 24' S.	24° 49' W.	Drift ice ... ..	Streams of very broken weathered heavy pack with growlers and small bergy bits extending for at least 9 miles to S.S.E. Vessel rounding northern extremity.	do.
		57° 21' S.	24° 55' W.	2 bergs ... ..	Medium irregular. One surrounded by broken pack	do.
		57° 18' S.	25° 00' W.	2 bergs ... ..	Small irregular	do.
		57° 18' S.	25° 09' W.	Drift ice ... ..	Stream of heavy fragments of old pack and bergy bits packed by wind in line N.S about 500 yards wide. Northern extremity in position given.	do.
		57° 21' S.	24° 55' W.	2 bergs ... ..	do.	do.
		57° 18' S.	25° 00' W.	2 bergs ... ..	do.	do.
		57° 18' S.	25° 09' W.	Drift ice ... ..	do.	do.
		57° 21' S.	24° 55' W.	2 bergs ... ..	do.	do.
		57° 18' S.	25° 00' W.	2 bergs ... ..	do.	do.

SOUTHERN ICE REPORTS—continued.

Year.	Day.	Position of Ice.		Description.	Remarks.	Name of Ship reporting.								
		Latitude.	Longitude.											
1937	27	57° 20' S.	25° 14' W.	2 bergs, several bergy bits and growlers	High medium	R.R.S. <i>William Scoresby</i> .								
		From 57° 20' S.	25° 14' W.	7 bergs	Small irregular, 3 with discoloured portions	do.								
		To 57° 32' S.	25° 44' W.											
	28	From 57° 36' S.	26° 00' W.	9 bergs, 22 bergy bits, numerous growlers	1 high tabular. Remainder irregular some with discoloured portions.	do.								
		To 57° 38' S.	26° 08' W.											
		To 57° 40' S.	26° 17' W.											
	1937	28	Approaching Cordelia Bay, Saunders Island.		30-40 bergs. Bergy bits	Irregular and tabular bergs, bergy bits, very weathered heavy open pack, growlers and brash. 20-25 bergs and bergy bits apparently aground on reefs of N.E. end of island. Bay comparatively clear except for small fragments of drift ice and brash.	do.							
			Cordelia Bay, Saunders Island. Off south end of Saunders Island.		Brash	Many discoloured fragments and bottle green pieces drifting out of Bay.	do.							
			From 57° 50' S.		26° 24' W.	20 bergs	Cleared streams of pack and drift ice	do.						
		To 57° 48' S.	26° 37' W.											
		To 57° 48' S.	26° 46' W.											
		1937	29	57° 43' S.	26° 56' W.	6 bergs	Medium and small irregular	do.						
				To 57° 41' S.	26° 56' W.	3 bergs	Small irregular	do.						
				57° 37' S.	26° 59' W.	2 bergs	1 tabular, 1 small conical	do.						
			1937	29	57° 32' S.	27° 09' W.	4 bergs	Very weathered tabular and 3 medium irregular	do.					
					57° 31' S.	27° 12' W.	3 bergs	Irregular	do.					
					57° 40' S.	27° 22' W.	2 bergy bits	Estimated 1 mile long. Distant	do.					
				1937	29	57° 38' S.	27° 26' W.	1 large tabular berg	Low flat	do.				
						57° 36' S.	27° 30' W.	Berg, many growlers and brash	Medium irregular, portion discoloured	do.				
						57° 33' S.	27° 39' W.	Berg	Small irregular	do.				
					1937	30	57° 27' S.	27° 56' W.	2 bergs, 8 bergy bits, several growlers	Belt of bergy bits about 4 miles long	Growlers and brash at intervals.			
							57° 27' S.	27° 56' W.	70 bergy bits	Small irregular, 1 discoloured				
							57° 12' S.	28° 41' W.	2 bergs	Small irregular, 1 discoloured	do.			
						1937	30	57° 01' S.	29° 25' W.	Berg	Medium irregular	do.		
								56° 54' S.	29° 41' W.	Berg	Small irregular, half bottle green other half large dark stains	do.		
								56° 40' S.	30° 45' W.	Berg	Small irregular	do.		
							1937	30	56° 34' S.	31° 01' W.	Berg	Small tabular	do.	
56° 30' S.									31° 09' W.	Growler	Large bottle green	do.		
56° 25' S.									31° 29' W.	Berg	Large tabular estimated 2-3 miles long. Distant	do.		
1937								30	56° 13' S.	31° 52' W.	Berg	Small irregular	do.	
									56° 03' S.	32° 12' W.	Berg	Small irregular	do.	
									55° 50' S.	32° 50' W.	Growler	Large bottle green	do.	
								1937	30	55° 47' S.	32° 58' W.	2 bergs	1 small low, 1 high irregular (small)	do.
	55° 44' S.									33° 05' W.	2 bergs	Small tabular	do.	
	55° 42' S.									33° 13' W.	Growler	Large bottle green	do.	
	1937								30	55° 12' S.	34° 33' W.	3 bergs	Small	do.
										55° 00' S.	35° 05' W.	Growler	Small bottle green	do.
										26 bergs—bergy bits	4 discoloured, 5 tabular. All small except 2, and very weathered.	do.		

December.

1937	1	From 60° 25' S.	63° 19' E.	1 berg, streams of brash and drift ice	Large irregular. Vessel navigating to eastward parallel to pack ice edge which was visible approximately 5 miles to the southward.	R.R.S. <i>Discovery II</i> .											
		To 60° 18' S.	63° 35' E.														
		60° 05' S.	66° 40' E.				2 bergs	Irregular	do.								
	1937	4	From 60° 05' S.	66° 40' E.	Streams of heavy loose pack ice	Skirting pack ice edge. Numerous fragments of old and hummocked floes.	do.										
			To 59° 48' S.	68° 05' E.													
			To 57° 06' S.	78° 29' E.				1 berg	Small irregular	do.							
		1937	6	From 57° 25' S.	79° 10' E.	4 bergs. Streams of loose pack and drift ice	3 large tabular, hummocked and weathered and 1 small irregular. Vessel navigating eastward, skirting belt of loose hummocky pack ice.	do.									
				To 57° 09' S.	80° 16' E.												
				55° 33' S.	86° 09' E.				2 bergs	Small tabular within 5 miles of track	do.						
			1937	7	55° 55' S.	86° 52' E.	2 bergs	1 small irregular, 1 large tabular	do.								
					56° 13' S.	87° 24' E.	2 bergs	1 small irregular, 1 medium size tabular	do.								
					57° 12' S.	89° 08' E.	4 bergs	1 small irregular, 2 medium tabular, 1 large tabular, all old and weathered.	do.								
				1937	7	From 57° 42' S.	90° 00' E.	6 bergs. Several growlers	4 large irregular, 1 pinnacle, 1 large tabular, all old and weathered.	do.							
						To 57° 42' S.	90° 00' E.										
						To 58° 19' S.	91° 08' E.										
					1937	8	From 58° 36' S.	91° 40' E.	11 bergs, numerous growlers and bergy bits	5 large tabular, 6 small irregular, all within 7 miles of track, majority old and weathered but 1 tabular remarkable for its new and clear cut appearance.	do.						
							To 59° 08' S.	92° 07' E.									
							To 59° 25' S.	92° 21' E.									
						1937	8	From 59° 25' S.	92° 21' E.	16 bergs, pack ice, numerous growlers and bergy bits.	9 tabular (6 large, 3 medium size) all hummocked and much weathered. 7 irregular. Extensively heavy pack ice visible approximately 4 miles south of this last position trending E.S.E. and W.N.W. Numerous bergs and growlers at its northern edge.	do.					
								To 59° 25' S.	93° 04' E.								
								To 58° 48' S.	93° 21' E.								
							1937	3	From 58° 48' S.	93° 21' E.	3 bergs	2 large tabular, 1 large irregular	do.				
									To 58° 12' S.	93° 40' E.							
									To 58° 48' S.	93° 21' E.							
								1937	3	From 54° 15' S.	35° 45' W.	12 bergs, numerous growlers and bergy bits	2 large tabular (one 1,860 yards long, 154 feet high by Sextant Angle) 2 medium tabular, 3 large irregular, remainder small irregular. All within four miles of track.	do.			
										To 54° 20' S.	35° 11' W.						
										To 54° 20' S.	35° 11' W.						
1937									4	From 54° 26' S.	34° 38' W.	8 bergs	2 large tabular, 4 small tabular, 2 small irregular	do.			
										To 54° 33' S.	32° 46' W.						
										54° 37' S.	32° 12' W.				27 bergs—bergy bits	Bergs small irregular	R.R.S. <i>William Scoresby</i> .
	1937								4	54° 45' S.	32° 01' W.	23 bergs—bergy bits	Bergs small irregular	do.			
										54° 55' S.	31° 58' W.				33 bergs	Within a radius of 8 miles. 2 tabular, remainder irregular. All small.	do.
										55° 03' S.	31° 38' W.				18 bergs—bergy bits	Within a radius of 8 miles. Small, irregular	do.
		1937							5	55° 10' S.	31° 17' W.	4 bergs, 6 bergy bits. Several growlers	Small irregular, one grey white, blue white and bottle green, clear cut boundaries. Within a radius of 4 miles.	do.			
										55° 13' S.	30° 40' W.	6 bergs	Within a radius of 7 miles. 3 very weathered tabular, remainder small irregular discoloured.	do.			
										55° 13' S.	30° 40' W.	5 bergs	Within a radius of 4 miles. Small irregular	do.			
			1937						5	55° 17' S.	30° 34' W.	3 bergs	Within a radius of 5 miles. Small irregular	do.			
										55° 18' S.	30° 27' W.	2 bergs, 1 bergy bit	1 weathered tabular	do.			
										55° 21' S.	29° 36' W.	5 bergy bits	Large irregular. One low flat	do.			
				1937					5	55° 25' S.	29° 26' W.	4 bergs	1 small tabular. 3 small irregular	do.			
										55° 30' S.	28° 12' W.	5 bergy bits	Small tabular, bergy bit discoloured	do.			
										55° 34' S.	28° 02' W.	2 bergs, 1 bergy bit	1 tabular, 2 irregular, 1 discoloured	do.			
					1937				5	55° 31' S.	27° 40' W.	3 bergs	Small	do.			
										55° 31' S.	27° 40' W.	Bergy bit	2 small tabular, 1 irregular	do.			
										55° 32' S.	27° 25' W.	3 bergs, 2 bergy bits, several growlers	Stream of small growlers and brash about 1 miles long	do.			
						1937			6	55° 31' S.	27° 28' W.	1 berg	Small irregular	do.			
										55° 31' S.	27° 20' W.	2 bergs	Small irregular, 1 discoloured	do.			
										55° 34' S.	25° 58' W.	Growler	Large discoloured	do.			
							1937		6	55° 31' S.	27° 20' W.	Growler	Large	do.			
										55° 34' S.	25° 58' W.	2 bergs	Small irregular	do.			

SOUTHERN ICE REPORTS—continued.

Year.	Day.	Position of Ice.		Description.	Remarks.	Name of Ship reporting.
		Latitude.	Longitude.			
1937	6	55° 34' S.	25° 42' W.	2 bergs ...	Small irregular ...	R.R.S. <i>William Scoresby</i> .
		55° 35' S.	25° 26' W.	3 bergy bits ...	Small ...	do.
		55° 35' S.	25° 22' W.	2 bergs, 1 bergy bit, one growler	Small irregular, discoloured	do.
		55° 37' S.	24° 45' W.	4 bergs ...	Small irregular. One bottle green with white top, one black and white.	do.
		55° 37' S.	24° 15' W.	3 bergs ...	Small, 2 tabular, 1 irregular	do.
		55° 31' S.	23° 57' W.	6 bergs ...	Small, 1 tabular	do.
		55° 31' S.	23° 43' W.	3 bergy bits ...	Small low ...	do.
		55° 26' S.	23° 48' W.	1 berg ...	Small low ...	do.
		55° 25' S.	23° 37' W.	2 bergs ...	High irregular. Large tabular. 2 growlers and some brash	do.
		55° 25' S.	23° 37' W.	9 bergy bits ...	One bottle green conical. 8 irregular	do.
		55° 22' S.	23° 20' W.	4 bergs ...	Small ...	do.
		55° 18' S.	22° 24' W.	3 bergy bits ...	Small ...	do.
		55° 21' S.	22° 13' W.	2 bergs ...	Small ...	do.
		55° 21' S.	22° 13' W.	4 bergy bits ...	1 small irregular. Medium weathered	do.
		55° 21' S.	22° 00' W.	3 bergs ...	Small irregular. 1 low flat, black portions. 1 with hollow centre and thin sheer wall estimated 60 feet long, 100 feet high.	do.
		55° 21' S.	21° 57' W.	2 growlers	A wash. Bottle green rounded ice with small white portions...	do.
		55° 21' S.	21° 44' W.	4 bergs	Small irregular	do.
		55° 18' S.	21° 35' W.	3 bergs	Small, 1 tabular, 1 bottle green top. White bottom. Clear cut division.	do.
		55° 07' S.	21° 00' W.	1 berg	Small conical	do.
		55° 14' S.	19° 03' W.	Berg	Small flat, discoloured	do.
		55° 16' S.	18° 25' W.	Berg	Small irregular, dark bottle green, dark grey and white. Clear cut divisions	do.
		55° 18' S.	17° 36' W.	Berg	Small irregular	do.
		55° 19' S.	17° 12' W.	Berg	Medium tabular	do.
		55° 19' S.	17° 12' W.	Bergy bit	Small irregular, all dark bottle green	do.
		56° 10' S.	13° 00' W.	Berg	Small irregular	do.
		56° 13' S.	12° 54' W.	3 bergs, 1 bergy bit	Small irregular	do.
		56° 24' S.	12° 40' W.	1 bergy bit	Discoloured	do.
		56° 41' S.	12° 04' W.	2 bergy bits	Small irregular	do.
		56° 50' S.	11° 49' W.	Berg	Small irregular	do.
		56° 53' S.	11° 43' W.	2 growlers	Large	do.
		56° 59' S.	11° 33' W.	Berg	Small irregular	do.
		57° 25' S.	10° 47' W.	Drift ice	Growlers and scattered fragments of old pack about 3 to 4 miles in extent.	do.
		57° 27' S.	10° 41' W.	Berg	Small tabular	do.
		57° 23' S.	10° 45' W.	5 growlers	Small in patch of old pack—brash	do.
		57° 25' S.	10° 39' W.	Berg	Medium tabular 100 feet by 1,000 feet, estimated	do.
		57° 25' S.	10° 16' W.	Brash	Large quantity	do.
		57° 25' S.	10° 13' W.	Berg and drift ice	Irregular. Very broken medium pack in stream S.S.E.—N.N.W. Steaming S.E. in fairly open water.	do.
		57° 28' S.	10° 04' W.	Pack	Pack, close and fairly heavy to eastward	do.
		57° 29 1/2' S.	10° 06' W.	Berg	High tabular	do.
		From 57° 25' S. To 57° 23' S.	10° 09' W. to 10° 02' W.	Drift ice	Passed through stream of very broken pack, with quantities of brash on northern edge. Clear water to northward.	do.
		57° 23' S.	10° 02' W.	Drift ice	Maintaining position to northward of loose pack	do.
		57° 21' S.	9° 37' W.	Brash	Cleared streams of drift ice	do.
		57° 16' S.	9° 26' W.	Brash	Many scattered fragments	do.
		57° 16' S.	9° 00' W.	Brash—drift ice	Quantities of brash and some patches of drift ice	do.
		57° 16' S.	8° 46' W.	Berg	Small high	do.
		57° 16' S.	8° 30' W.	Drift ice	Streams of brash and growlers with considerable open pack to eastward.	do.
		From 57° 12' S. To 57° 08' S.	8° 20' W. to 8° 31' W.	Berg	Large irregular low	Working through streams of weathered medium pack, some heavy fragments.
		57° 06' S.	8° 39' W.	...	Small	
		56° 43' S.	8° 19' W.	Pack	Cleared pack	do.
		56° 39' S.	8° 17' W.	Berg	Brash and drift ice to eastward	do.
		56° 33' S.	8° 19' W.	Pack	Large tabular	do.
		56° 26' S.	8° 06' W.	Bergy bit	Streams of brash and small patches of drift ice with close pack to eastward.	do.
		56° 23' S.	8° 06' W.	2 growlers	Small. Brash throughout	do.
		56° 14' S.	7° 26' W.	Bergy bit	Small irregular	do.
		55° 50' S.	6° 44' W.	Berg	Small irregular, discoloured	do.
		55° 42' S.	6° 30' W.	Berg	Small irregular, weathered	do.
		55° 52' S.	4° 38' W.	Growler	Small irregular	do.
		55° 48' S.	4° 54' W.	2 growlers	Small tabular	do.
		56° 00' S.	4° 50' W.	Berg	Small tabular	do.
		56° 03' S.	4° 49' W.	2 bergy bits	Small tabular	do.
		56° 06' S.	4° 48' W.	Bergy bit	Small tabular	do.
		56° 16' S.	4° 42' W.	Bergy bit	Small tabular	do.
		56° 19' S.	4° 38' W.	3 bergs	Small irregular	do.
		56° 22' S.	4° 35' W.	2 bergs	Small irregular	do.
		56° 29' S.	4° 30' W.	Drift ice	Old open pack, very broken. Steaming to eastward along edge of pack.	do.
		56° 27' S.	4° 22' W.	10 bergs	In pack, small irregular, very weathered	do.
		56° 23' S.	4° 16' W.	Drift ice	Proceeding through streams of very broken ice in lines up and down wind.	do.
		56° 17' S.	3° 54' W.	1 berg, 18 bergy bits, growlers	1 tabular berg, remainder irregular, all in pack and very weathered.	do.
		56° 09' S.	3° 44' W.	2 bergs, 5 bergy bits	1 bottle green bergy bit, remainder irregular, all in pack to eastward.	do.
		56° 06' S.	3° 37' W.	4 bergs	Irregular, in pack	do.
		From 56° 06' S. To 56° 06' S.	3° 31' W. to 3° 27' W.	3 bergs	All small...Steaming close to edge of heavy close pack	do.
		55° 55' S.	2° 53' W.	1 berg, 1 bergy bit	Berg, small weathered	do.
		55° 55' S.	2° 45' W.	Berg—growler	Small irregular, slightly discoloured	do.
		55° 55' S.	2° 41' W.	Growlers	Many small growlers, same colour as the sea and very difficult to discern.	do.
		55° 55' S.	2° 36' W.	Berg	Small irregular, discoloured. Stream of growlers and brash in line N.—S.	do.
		55° 55' S.	2° 32' W.	2 bergs	Small, one discoloured, dark green, clear cut division	do.
		55° 55' S.	2° 29' W.	2 bergs	1 medium tabular, 1 irregular	do.
		55° 56' S.	2° 26' W.	Bergy bit	Streams of loose drift and brash	do.
		55° 58' S.	2° 23' W.	Bergy bit. Drift ice	Small irregular, one low flat. Entered pack, streams of very broken heavy floes	do.
		56° 02' S.	2° 20' W.	6 bergy bits, 4 bergs. Pack	Small irregular. Much drift ice with extensive leads of open water to south and west.	do.
		56° 07' S.	2° 17' W.	4 bergs	Small irregular. Much drift ice with extensive leads of open water to south and west.	do.
		From 56° 12' S. To 56° 13' S.	2° 16' W. to 2° 14' W.	Pack	Narrow streams of old heavy pack from west to N.E.	do.
		From 56° 24' S. To 56° 24' S.	2° 24' W. to 2° 24' W.	5 bergs and many bergy bits in pack	Within a radius of 4 miles	do.
		From 56° 24' S. To 56° 24' S.	2° 24' W. to 2° 13' W.	10 bergs	Working through extensive open leads	do.
		56° 24' S.	2° 03' W.	Heavy pack	One large tabular approximately 100 feet high by 1/2 mile long (estimated). One very high pinnacle berg. Remainder irregular. Numerous growlers.	do.
		From 56° 26' S. To 56° 19' S.	1° 48' W. to 1° 36' W.	8 bergs	Working through open leads in old heavy pack	do.
		From 56° 19' S. To 56° 07' S.	1° 36' W. to 1° 37' W.	14 bergs, about 20 bergy bits	In old heavy pack, working through extensive open leads	do.
		From 56° 07' S. To 55° 53' S.	1° 37' W. to 1° 46' W.	A few distant bergs and many bergy bits	Cleared pack	do.

SOUTHERN ICE REPORTS—continued.

Year.	Day.	Position of Ice.		Description.	Remarks.	Name of Ship reporting.
		Latitude.	Longitude.			
1937	16	55° 42' S.	1° 52' W.	4 bergs ...	Small irregular ...	R.R.S. <i>William Scoresby</i> .
	17	55° 48' S.	1° 41' W.	Berg ...	Small weathered ...	
		55° 42' S.	1° 30' W.	Berg ...	Small weathered ...	
		55° 32' S.	0° 58' W.	3 growlers ...	Small ...	
		55° 41' S.	0° 42' W.	1 growler ...	...	
		55° 42' S.	0° 40' W.	Berg ...	Small irregular weathered, discoloured ...	
		55° 47' S.	0° 31' W.	Berg ...	Small irregular ...	
		55° 50' S.	0° 27' W.	Growler ...	...	
		55° 37' S.	0° 07' W.	3 bergs ...	Small irregular ...	
		From 55° 29' S.	0° 00' W.	} 3 growlers	...	
		To 55° 19' S.	0° 17' E.		...	
		From 55° 19' S.	0° 17' E.		3 bergs, 1 bergy bit, 5 growlers	
		To 55° 24' S.	0° 30' E.			
	18	55° 27' S.	1° 05' E.	Berg ...	Large tabular approximately 1/2 mile long	
		55° 19' S.	1° 19' E.	Berg. Growler ...	Small ...	
	20	54° 41' S.	0° 06' E.	Berg ...	Small irregular ...	
	21	54° 58' S.	2° 07' W.	2 bergy bits ...	Irregular ...	
		55° 04' S.	2° 24' W.	Bergy bit ...	Irregular, green discoloration ...	
	22	55° 34' S.	4° 14' W.	Growler ...	Small ...	
		55° 54' S.	5° 13' W.	Berg ...	Large tabular ...	
		56° 09' S.	5° 28' W.	Berg ...	Small irregular ...	
		56° 33' S.	6° 25' W.	Berg ...	Small irregular ...	
		56° 36' S.	6° 47' W.	Bergy bit ...	...	
	23	56° 41' S.	7° 04' W.	Bergy bit ...	Small ...	
		56° 32' S.	7° 10' W.	Berg ...	Small ...	
		56° 35' S.	7° 17' W.	3 growlers ...	...	
		56° 39' S.	7° 32' W.	Berg ...	High peaked ...	
		57° 03' S.	8° 51' W.	Growler ...	Very weathered ...	
		57° 27' S.	10° 11' W.	Growler ...	...	
		57° 30' S.	10° 31' W.	Berg ...	Small tabular ...	
		57° 34' S.	10° 34' W.	Berg ...	Small irregular ...	
	24	57° 44' S.	10° 58' W.	2 bergy bits ...	...	
		57° 44' S.	11° 17' W.	2 bergs, 1 bergy bit ...	One irregular, one tabular ...	
		57° 46' S.	11° 46' W.	3 bergs ...	Small irregular ...	
		57° 49' S.	12° 12' W.	3 bergs ...	Small irregular ...	
		57° 54' S.	12° 18' W.	Berg ...	Small tabular ...	
		57° 57' S.	12° 18' W.	2 bergs ...	Small tabular ...	
		57° 52' S.	12° 29' W.	Berg ...	Small tabular ...	
		58° 02' S.	13° 01' W.	Berg ...	...	
		58° 08' S.	13° 21' W.	2 bergs ...	Small irregular ...	
		58° 16' S.	13° 51' W.	2 bergs ...	One small, one medium, irregular ...	
		58° 19' S.	14° 10' W.	6 bergs ...	3 tabular, 3 irregular, one discoloured grey-green ...	
		58° 19' S.	14° 19' W.	3 bergs ...	Small irregular ...	
		58° 21' S.	14° 34' W.	4 bergs. Growler ...	One tabular, 3 small irregular ...	
	26	From 58° 21' S.	14° 41' W.	} 5 bergs, 3 bergy bits	Small irregular ...	
		To 58° 30' S.	14° 48' W.		3 bergs ...	
		From 58° 38' S.	14° 55' W.	} Berg	Small irregular ...	
		To 58° 45' S.	15° 01' W.		Pack ...	
		From 58° 46' S.	15° 11' W.	} Berg	Very large irregular in pack	
		To 59° 00' S.	15° 20' W.		8 bergs ...	
		59° 05' S.	15° 28' W.	Berg ...	Small irregular. Close pack to West and South	
		59° 05' S.	15° 36' W.	Berg ...	Medium tabular ...	
		59° 07' S.	16° 12' W.	Berg ...	Small irregular ...	
		59° 08' S.	16° 48' W.	5 bergs ...	Small irregular ...	
		59° 06' S.	17° 13' W.	Berg ...	Small low ...	
		59° 09' S.	17° 18' W.	Berg ...	Small irregular ...	
	27	From 59° 24' S.	18° 20' W.	} Berg	Small irregular ...	
		To 59° 26' S.	18° 50' W.		4 bergs, 2 bergy bits, numerous growlers and brash.	
		59° 26' S.	18° 47' W.	Berg ...	Long low tabular ...	
		59° 28' S.	18° 52' W.	Berg—bergy bit ...	Berg small irregular. Bergy bit large black and white	
		59° 27' S.	19° 08' W.	4 bergy bits ...	One bottle green ...	
		59° 27' S.	19° 16' W.	Bergy bit ...	Discoloured ...	
		59° 28' S.	20° 20' W.	2 growlers ...	...	
		59° 29' S.	20° 32' W.	4 bergs ...	One very dark green portion. One discoloured irregularly.	
		59° 29' S.	20° 25' W.	4 bergs ...	One low.	
	28	59° 31' S.	20° 16' W.	3 bergs, 1 bergy bit ...	Small, one discoloured ...	
		59° 22' S.	20° 39' W.	8 bergs, 1 bergy bit ...	Small irregular bergs ...	
		59° 17' S.	20° 49' W.	12 bergs, 3 growlers ...	One discoloured. Bergy bit, bottle green one side	
		59° 12' S.	21° 02' W.	10 bergs, 2 growlers ...	One low tabular. One discoloured, apparently bottle green with vertical gulleys filled with snow	
		From 59° 12' S.	21° 02' W.	} 22 bergy bits	One low tabular, 4 discoloured, all bottle green	
		To 59° 02' S.	21° 11' W.		7 bergs, 18 bergy bits	
		To 58° 56' S.	21° 24' W.	8 bergs ...	3 bottle green, 6 discoloured	
		To 58° 51' S.	21° 35' W.	8 bergs ...	7 tabular bergs, 3 low. Numerous growlers	
		58° 42' S.	21° 47' W.	5 bergs ...	Small irregular, nearly all discoloured. One white under-water, bottle green with grey-white streaked top.	
		58° 40' S.	21° 48' W.	4 bergs, 5 bergy bits ...	One medium tabular, remainder small irregular	
		58° 38' S.	21° 53' W.	2 bergs ...	Small irregular bergs, one discoloured	
		58° 35' S.	21° 46' W.	12 bergs, 6 bergy bits ...	Small irregular, dark green discoloration	
		58° 29' S.	21° 48' W.	3 bergs, 13 bergy bits ...	Many discoloured	
	29	From 58° 28' S.	21° 27' W.	} 12 bergy bits	Irregular ...	
		To 58° 26' S.	21° 33' W.		3 bergs, 8 bergy bits	
		58° 22' S.	21° 48' W.	10 bergs ...	Small. One low tabular, two discoloured	
		58° 18' S.	21° 56' W.	3 bergs ...	1 tabular, 1 discoloured bottle green portion	
		From 58° 18' S.	21° 56' W.	} 3 bergy bits	Small irregular. 1 blue and white	
		To 57° 59' S.	22° 31' W.		21 bergs ...	
		To 57° 57' S.	22° 19' W.	3 bergs ...	Small irregular ...	
		To 57° 55' S.	22° 23' W.	Bergy bit ...	Small irregular ...	
		From 57° 53' S.	22° 27' W.	} Berg	Small low. Dark green discoloration under water	
		To 57° 49' S.	22° 48' W.		2 bergs, 1 bergy bit	
		From 57° 52' S.	23° 00' W.	} 12 bergs ...	Small irregular, very weathered	
		To 58° 00' S.	23° 20' W.		8 bergy bits ...	
		From 58° 04' S.	24° 17' W.	} 5 bergs, 4 growlers	Small irregular bergs	
		To 58° 05' S.	24° 29' W.		Approximately 100 bergs and bergy bits, numerous growlers and brash	
		58° 03' S.	23° 03' W.	10 bergs ...	Small. One medium tabular	
		58° 01' S.	25° 19' W.	10 bergs, 4 bergy bits ...	Small irregular. Three discoloured	
		58° 05' S.	26° 00' W.	22 bergs, 14 bergy bits, several growlers	Small irregular, weathered	
	31	From 58° 05' S.	26° 29' W.	} 7 bergs, many growlers	Two tabular, 5 irregular bergs	
		To 58° 01' S.	26° 53' W.		3 bergs, 1 bergy bit, growlers and brash	
		From 58° 16' S.	27° 22' W.	} 5 bergs, 4 bergy bits	Small irregular ...	
	14	To 58° 52' S.	139° 22' W.		Large tabular berg	
		58° 53' S.	136° 21' W.	Large tabular berg	...	
15	60° 06' S.	125° 47' W.	Large pinnacled berg	...		

Reports of Ice previous to October, November and December 1937, will be found in the "Marine Observer," Volume XIV, No. 128, pp. 155-157.

WIRELESS WEATHER SIGNALS.

1.—SHIPS' WIRELESS WEATHER SIGNALS.

A full description of the world-wide system of voluntary "Selected Ships" routine weather reports with instructions was given on pp. 27-40 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 receive reports

from "B Selected Ships" also in accordance with those instructions.

To decode these reports, and for 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 pp. 30 and 31, paragraphs (27) and (34) of the January 1938 number of THE MARINE OBSERVER.

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

Request for Information.

THE ATTENTION OF METEOROLOGICAL SERVICES IS DIRECTED TO THE INVITATION GIVEN ON PAGE 27 OF VOL. XV, NO. 129, JANUARY, 1938.

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.				
Column No. 1.	No. 2.	No. 3.	No. 4.	No. 5.	No. 6.	No. 7.	No. 8.	No. 9.	No. 10.
North Atlantic and North Sea.	Portishead.	Lat. 51° 28' 41" N. Long. 2° 47' 30" W.	<b>GKU</b>	149 kc/s. (2013 metres) and 121 kc/s. (2479 metres) simultaneously	143 kc/s. (2100 metres).	North Sea and Eastern North Atlantic East of Longitude 40° W. but not within 300 miles of station. (see Chart of the World.)	Weather London.	Weather only, up to seven groups, preferably No. 3 Supplementary Groups.	"Selected Ships" chosen to report in given order notified by station daily at 2300, 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. and observations for 0000 and 1800 G.M.T. as convenient.
North Atlantic and Mediterranean.	Gibraltar.	Lat. 36° 08' 32" N. Long. 5° 20' 29" W.	<b>GYW</b>	125 kc/s. (2400 metres).	143 kc/s. (2100 metres).	Eastern North Atlantic, South of Lat. 37° N. and Mediterranean Sea.	Meteor Gibraltar.	Weather only. No. 3 Supplementary Groups.	All British "A Selected Ships" within area should report in accordance with Schedule.
North Atlantic.	Horta, Azores.	Lat. 38° 32' N. Long. 28° 38' W.	<b>CTG</b>	125 kc/s. (2400 metres).	125 kc/s. (2400 metres).	Those "A Selected Ships" not in the Roll Call for reporting to Weather London through Portishead, in the Eastern North Atlantic, east of Long. 40° W should report to this station.	Radio Horta.	Weather only, up to seven groups, preferably No. 3 Supplementary Groups.	"A Selected Ships" in the Eastern North Atlantic not on the roll call made through Portishead (described in these notes for Portishead) should report to Horta in accordance with schedule given in the instructions for British "A Selected Ships."
	Lagos.	Lat. 6° 26' 45" N. Long. 3° 21' 34" E.	<b>ZDN</b>	8840 kc/s. (33·94 metres).	443 kc/s. (2100 metres).	Between Lat. 20° N. and 10° S. and from the coast to Long. 20° W.	Meteo Lagos.	Weather only. Four universal groups and first two of No. 3 Supplementary Groups.	0600 G.M.T. observations only required.
	Louisburg.	Lat. 46° 09' 16" N. Long. 59° 56' 48" W.	<b>VAS</b>	143 kc/s. (2100 metres).	143 kc/s. (2100 metres).	North Atlantic West of Longitude 40° W.	Weather Toronto.	Weather only, preferably No. 3 Supplementary Groups.	All British "A Selected Ships" within area when bound to or from Newfoundland and Canadian ports or ports to the northward to report through VAS at schedule times and observations for 0000 and 0600 G.M.T. as convenient.
Chatham Mass. Amagansett (Montauk). Thomaston. Jupiter. Lake Worth.	Lat. 41° 43' N. Long. 70° 47' W. Lat. 41° 00' N. Long. 72° 03' W. Lat. 44° 01' N. Long. 69° 13' W. Lat. 26° 56' N. Long. 80° 06' W. Lat. 26° 38' N. Long. 80° 03' W.	<b>WCC</b> <b>WSL</b> <b>WAG</b> <b>WMR</b> <b>WOE</b>	}	142·9kc/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.	}	All British "A Selected Ships" within area when bound to or from United States ports or ports to the southward 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.

WIRELESS STATIONS DETAILED TO RECEIVE ROUTINE CODED WEATHER REPORTS FROM

**"A SELECTED SHIPS."**

(Continued.)

Ocean.	Station.	Position.	Call Sign.	Frequency and Wavelength.		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.				
Column No. 1.	No. 2.	No. 3.	No. 4.	No. 5.	No. 6.	No. 7.	No. 8.	No. 9.	No. 10.
South Atlantic.	Slangkop (Cape Town)	Lat. 34° 08' 46" S. Long. 18° 19' 18" E.	<b>ZSC</b>	—	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.	Only 0600 G.M.T. observations required. All British "A Selected Ships" within area should report, commencing at 0618 G.M.T.
	General Pacheco (Buenos Aires)	Lat. 34° 27' 33" S. Long. 58° 37' 35" W.	<b>LPD</b>	—	143 kc/s. (2100 metres).	Within a range of about 1,300 miles of station.	Meteoro Baires	Weather only. No. 6 Supplementary Groups.	
Red Sea and Indian Ocean.	Port Sudan.	Lat. 19° 36' 35" N. Long. 37° 13' 28" E.	<b>STP</b>	—	143 kc/s.† (2100 metres).	From Suez to Ras Fartak, Ras Hafun, and western limit of Colombo area.	Weather Khartoum.	Weather only. Four universal groups.	All British "A Selected Ships" within area should report in accordance with Schedule. † Alternatively see particulars on p. 161 and use wavelength and times for "B Selected Ships."
Indian Ocean.	Jacobs (Durban).	Lat. 29° 55' 40" S. Long. 30° 58' 50" E.	<b>ZSD</b>	—	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.	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.	<b>VWB</b>	—	143 kc/s. (2100 metres).	Arabian Sea N. of line C. Comorin to Ras Fartak.	Weather.	Weather only. No. 9 Supplementary Groups.	See Section (35), p. 31 of the January 1938 number.
	Madras.	Lat. 12° 59' 17" N. Long. 80° 10' 56" E.	<b>VWM</b>	—	143 kc/s. (2100 metres).	Bay of Bengal N. of line C. Comorin to Achin Head.	Weather.	Weather only. No. 9 Supplementary Groups.	
	Colombo.	Lat. 6° 55' 14" N. Long. 79° 52' 46" E.	<b>VPB</b>	143 kc/s. (2100 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.	Weather.	Weather only. No. 6 Supplementary Groups preferred.	All British "A Selected Ships" within area should report in accordance with Schedule.
	Mombasa.	Lat. 4° 03' 11" S. Long. 39° 39' 49" E.	<b>VPQ</b>	—	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.	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.	<b>VIP</b>	125 kc/s. (2400 metres).	143 kc/s. (2100 metres).	Indian Ocean and Southern Ocean between Long. 90° and 135° E.; but not within 100 miles of the coast.	Weather Melbourne and Weather Perth.	Weather only. No. 9 Supplementary Groups.	All British "A Selected Ships" within area should report in accordance with Schedule. Reports not required for observation times not starred on Chart p. 29, of the January 1938 number.
North Pacific and China Sea.	Cape d'Aguilar, Hong Kong.	Lat. 22° 12' 39" N. Long. 114° 15' 11" E.	<b>VPS</b>	8330 kc/s. (36 metres) or 500 kc/s. (600 metres).	143 kc/s.* (2100 metres).	China Sea and North Pacific to about 1,500 miles from station.	Royal Observatory	Weather only. No. 9 Supplementary Groups.	All British "A Selected Ships" within area should report in accordance with Schedule. *Alternatively see particulars on p. 162 and use wavelength and times for "B Selected Ships."
South Pacific.	Sydney.	Lat. 33° 46' 00" S. Long. 151° 03' 09" E.	<b>VIS</b>	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 Melbourne and Weather Sydney.	Weather only. No. 9 Supplementary Groups.	All British "A Selected Ships" within area should report in accordance with Schedule. Reports not required for observation times not starred on Chart, p. 29, of the January 1938 number.

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

Ocean.	Station.	Position.	Call Sign.	Telegraphic address of Meteorological Centre desiring information.	Information desired.	Notes.
<i>Column No. 1.</i>	<i>No. 2.</i>	<i>No. 3.</i>	<i>No. 4.</i>	<i>No. 5.</i>	<i>No. 6.</i>	<i>No. 7.</i>
Norwegian Sea.	Wick.	Lat. 58° 26' 16" N. Long. 3° 05' 53" W.	<b>GKR</b>	Weather London.	Weather in four universal groups.	No roll call. British "B Selected Ships" should report at routine times when North of Lat. 60° N. and eastward of Long. 7° W., and when more than 20 miles from the coasts.
North Sea.	Humber.	Lat. 53° 19' 43" N. Long. 0° 16' 34" E.	<b>GKZ</b>	Weather London.	Weather in four universal groups, optional No. 3 Supplementary Groups.	No roll call. British "B Selected Ships" should report at routine times when more than 20 miles from the coasts.
North Atlantic.	Malin Head.	Lat. 55° 21' 45" N. Long. 7° 20' 30" W.	<b>GMH</b>	Weather London.	Weather in four universal groups, optional No. 3 Supplementary Groups.	Station will indicate at 0805 G.M.T. and when additional reports of 2100 G.M.T. observations are desired, at 2005 G.M.T., with ordinary traffic calls, the names of British "B Selected Ships" and other British ships within range and North of Lat. 54° N., and West of Long. 7° W. who are desired to report weather at routine times. Thus:—Call signs of ships to report weather through G.M.H. See Section (35), p. 31 of the January 1938 number.
	Valentia.	Lat. 51° 55' 48" N. Long. 10° 20' 54" W.	<b>GCK</b>	Weather London.	Weather in four universal groups, optional No. 3 Supplementary Groups.	Station will indicate at 0825 G.M.T. and when additional reports of 2100 G.M.T. observations are desired, at 2025 G.M.T., with ordinary traffic calls, the names of British "B Selected Ships" and other British ships within range, South of Lat. 54° N., and to southward of Ireland West of Long. 7° W., who are desired to report weather at routine times. Thus:—Call signs of ships to report weather through G.C.K. See Section (35), p. 31 of the January 1938 number.
	Lagos	Lat. 6° 26' 45" N. Long. 3° 21' 34" E.	<b>ZJW</b>	Meteo Lagos	Weather only, four universal groups and first two of No. 3 Supplementary Groups.	0600 G.M.T. observations only required. [Reports will be acknowledged on 333 kc/s (900 metres)]
	Point Amour*	Lat. 51° 27' 28" N. Long. 56° 51' 31" W.	<b>VCL</b>	Weather Toronto	Weather only, (No. 3 Supplementary Group when convenient).	*For use during the season when Belle Isle route is open to navigation.
	St. John's N.F.	Lat. 47° 34' 09" N. Long. 52° 41' 04" W.	<b>VON</b>	Weather Toronto.	Weather only, (No. 3 Supplementary Groups when convenient).	
	Cape Race.	Lat. 46° 39' 25" N. Long. 53° 04' 15" W.	<b>VCE</b>	Weather Toronto	Weather only, (No. 3 Supplementary Groups when convenient).	
North Atlantic and Mediterranean.	Gibraltar.	Lat. 36° 08' 32" N. Long. 5° 20' 29" W.	<b>GYW</b>	Meteor Gibraltar.	Weather in four universal groups only.	
Mediterranean.	Alexandria.	Lat. 31° 11' 53" N. Long. 29° 51' 46" E.	<b>SUH</b>	Meteor Heliopolis	Weather in four universal groups, optional Supplementary Groups.	
South Atlantic.	Salinas.	Lat. 0° 37' 00" S. Long. 47° 23' 00" W.	<b>PPL</b>	Meteoro Rio.	Weather only, including Supplementary Groups.	
	S. Luiz.	Lat. 2° 31' 28" S. Long. 44° 16' 30" W.	<b>PXM</b>			
	Fortaleza.	Lat. 3° 42' 49" S. Long. 38° 30' 56" W.	<b>PPC</b>			
	Natal.	Lat. 5° 45' 27" S. Long. 35° 11' 42" W.	<b>PXN</b>			
	Olinda.	Lat. 8° 00' 55" S. Long. 34° 50' 40" W.	<b>PPO</b>			

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

(Continued.)

Ocean.	Station.	Position.	Call Sign.	Telegraphic address of Meteorological Centre desiring information.	Information desired.	Notes.
Column No. 1.	No. 2.	No. 3.	No. 4.	No. 5.	No. 6.	No. 7.
South Atlantic (continued).	Amaralina.	Lat. 13° 00' 50" S. Long. 38° 28' 27" W.	<b>PPA</b>	} Meteorological Centre Baires.	Weather only, including supplementary groups.	
	Abrolhos.	Lat. 17° 57' 35" S. Long. 38° 42' 00" W.	<b>PXH</b>			
	Victoria.	Lat. 20° 18' 52" S. Long. 40° 19' 06" W.	<b>PPT</b>			
	Rio.	Lat. 22° 59' 19" S. Long. 43° 11' 26" W.	<b>PPR</b>			
	Santos.	Lat. 23° 59' 22" S. Long. 46° 18' 18" W.	<b>PPS</b>			
	Florianopolis.	Lat. 27° 35' 22" S. Long. 48° 34' 17" W.	<b>PPF</b>			
	Junçao.	Lat. 32° 03' 22" S. Long. 52° 08' 13" W.	<b>PPJ</b>			
	General Pacheco (Buenos Aires). Comodoro Rivadavia.	Lat. 34° 27' 33" S. Long. 58° 37' 35" W.  Lat. 45° 50' 38" S. Long. 67° 28' 17" W.	<b>LPD</b>  <b>LOX</b>			
Red Sea and Indian Ocean.	Port Sudan.	Lat. 19° 36' 35" N. Long. 37° 13' 28" E.	<b>STP</b>	Weather Khartoum.	Weather only, 4 universal groups.	
Persian Gulf.	Basra.	Lat. 30° 32' 39" N. Long. 47° 47' 04" E.	<b>YIB</b>	Meteor. Basrah.	Weather only, 4 universal groups.	
Indian Ocean.	Jacobs (Durban).	Lat. 29° 55' 40" S. Long. 30° 58' 50" E.	<b>ZSD</b>	Met.	Weather only, 4 universal groups and first group of No. 6 Supplementary Groups.	See Section (35), p. 31, of the January 1938 number. See Section (35), p. 31 of the January 1938 number.  When east of Long. 90° E., but not within 10 miles of the coast.
	Algoa Bay (Port Elizabeth).	Lat. 33° 57' 16" S. Long. 25° 35' 30" E.	<b>ZSQ</b>	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.	<b>VWC</b>	Weather.	Weather only, preferably No. 9 Supplementary Groups.	
	Rangoon.	Lat. 16° 45' 57" N. Long. 96° 11' 51" E.	<b>VTR</b>	Weather.	Weather only, preferably No. 9 Supplementary Groups.	
	Madras.	Lat. 12° 59' 17" N. Long. 80° 10' 56" E.	<b>VWM</b>	Weather.	Weather only, preferably No. 9 Supplementary Groups.	
	Bombay.	Lat. 19° 04' 55" N. Long. 72° 49' 54" E.	<b>VWB</b>	Weather.	Weather only, preferably No. 9 Supplementary Groups.	
	Karachi.	Lat. 24° 51' 05" N. Long. 67° 02' 32" E.	<b>VWK</b>	Weather.	Weather only, preferably No. 9 Supplementary Groups.	
	Matara.	Lat. 6° 01' 07" N. Long. 80° 35' 39" E.	<b>GZP</b>	Weather.		
	Mombasa.	Lat. 4° 03' 11" S. Long. 39° 39' 49" E.	<b>VPQ</b>	Weather Nairobi.		
	Dar-es-Salaam.	Lat. 6° 50' 38" S. Long. 39° 17' 24" E.	<b>ZBZ</b>	Weather Nairobi.		
	Mauritius.	Lat. 20° 23' 41" S. Long. 57° 35' 25" E.	<b>VRS</b>	Observatory Mauritius.	Weather only, 4 universal groups and first of No. 6 Supplementary Groups.	
	Geraldton.	Lat. 28° 47' 15" S. Long. 114° 36' 24" E.	<b>VIN</b>	Weather Melbourne and	Weather only, preferably No. 9 Supplementary Groups.	
	Esperance.	Lat. 33° 52' 40" S. Long. 121° 53' 34" E.	<b>VIE</b>	Weather Perth		

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

(Continued.)

Ocean.	Station.	Position.	Call Sign.	Telegraphic address of Meteorological Centre desiring information.	Information desired.	Notes.
<i>Column No. 1.</i>	<i>No. 2.</i>	<i>No. 3.</i>	<i>No. 4.</i>	<i>No. 5.</i>	<i>No. 6.</i>	<i>No. 7.</i>
Indian Ocean and China Sea.	Penaga (Penang). Paya Lebar (Singapore).	Lat. 5° 32' 02" N. Long. 100° 22' 51" E. Lat. 1° 20' 26" N. Long. 103° 53' 20" E.	<b>VPX</b> <b>VPW</b>	Obs. Weather Singapore.	Weather only, preferably No. 9 Supplementary Groups.	
North Pacific and China Sea.	Cape d'Aguilar, Hong Kong.	Lat. 22° 12' 39" N. Long. 114° 15' 11" E.	<b>VPS</b>	Royal Observatory.	Weather only, preferably No. 9 Supplementary Groups.	
South Pacific.	Auckland.	Lat. 36° 50' 37" S. Long. 174° 46' 08" E.	<b>ZLD</b>	Weather Wellington.	Weather only, preferably No. 9 Supplementary Groups.	
	Wellington.	Lat. 41° 16' 26" S. Long. 174° 45' 55" E.	<b>ZLW</b>	Weather Wellington.	Weather only, preferably No. 9 Supplementary Groups.	
	Awarua.	Lat. 46° 30' 27" S. Long. 168° 22' 21" E.	<b>ZLB</b>	Weather Wellington.	Weather only, preferably No. 9 Supplementary Groups.	
	Chatham Island.	Lat. 43° 57' 28" S. Long. 176° 34' 25" W.	<b>ZLC</b>	Weather Wellington.	Weather only, preferably No. 9 Supplementary Groups.	
	Rarotonga.	Lat. 21° 11' 52" S. Long. 159° 48' 52" W.	<b>ZKR</b>	Weather Wellington.	Weather only, preferably No. 9 Supplementary Groups.	
	Apia.	Lat. 13° 49' 46" S. Long. 171° 45' 20" W.	<b>ZMA</b>	Weather Wellington.	Weather only, preferably No. 9 Supplementary Groups.	
	Suva.	Lat. 18° 08' 43" S. Long. 178° 27' 48" E.	<b>VRP</b>	Weather Suva.	Weather in four universal groups, optional supplementary groups.	See Section (35), p. 31 of the January 1938 number.
	Thursday I.	Lat. 10° 35' 14" S. Long. 142° 12' 37" E.	<b>VII</b>	Weather Melbourne and	Weather only, preferably No. 9 Supplementary Groups	When west of Long. 160° E., but not within 100 miles of the coast.
	Townsville.	Lat. 19° 16' 09" S. Long. 146° 49' 47" E.	<b>VIT</b>	Weather Brisbane	Weather only, preferably No. 9 Supplementary Groups.	
	Brisbane.	Lat. 27° 25' 34" S. Long. 153° 07' 19" E.	<b>VIB</b>		Weather only, preferably No. 9 Supplementary Groups.	When between Long. 90° E. and 160° E., but not within 100 miles of the coast.
	Melbourne.	Lat. 37° 46' 56" S. Long. 144° 52' 09" E.	<b>VIM</b>	Weather Melbourne	Weather only, preferably No. 9 Supplementary Groups.	
	Adelaide.	Lat. 34° 51' 14" S. Long. 138° 31' 55" E.	<b>VIA</b>	Weather Melbourne and Weather Adelaide	Weather only, preferably No. 9 Supplementary Groups.	

**CHILE.**

**II.—Weather Shipping Bulletins.**

**Santiago Central W/T Station**, approximate position Latitude 33° 27' S., Longitude 70° 42' W.

Call sign **C C S**.

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

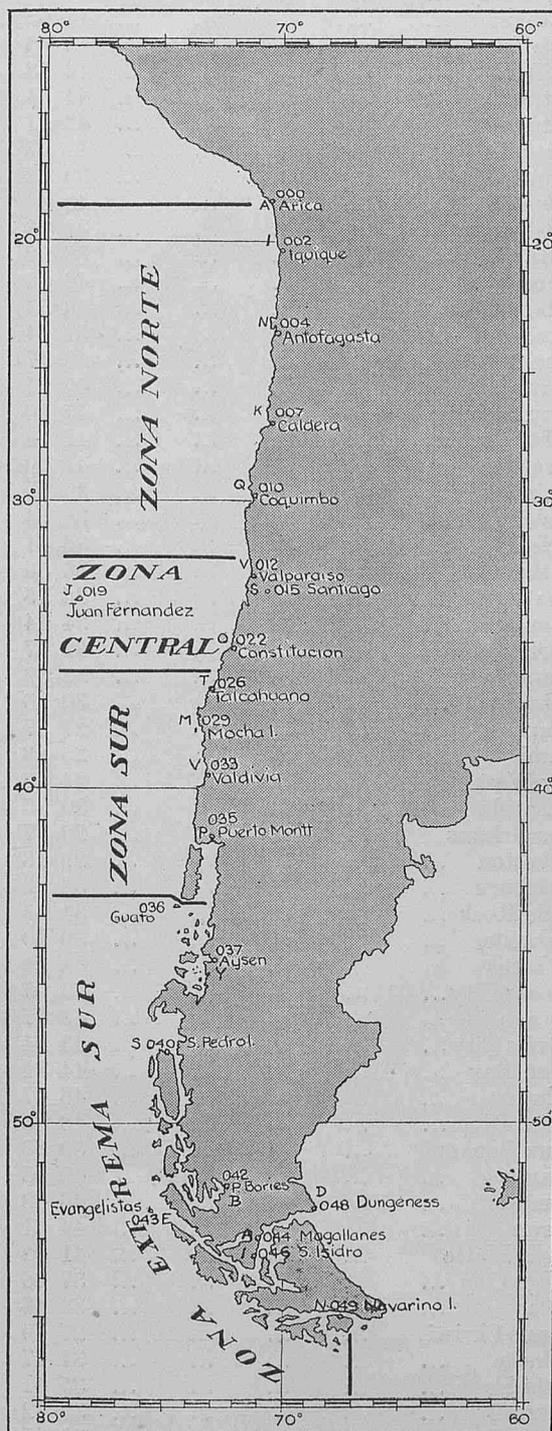
Times of transmission 0130, 1400 and 2000 G.M.T.

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 Bulletins for coast of Chile.**



The sea areas for forecasts are indicated on the chart from information supplied by a British Selected Ship.

**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 sets of five, the distinguishing figures of the stations, which are shown alongside each station, on the chart, forming the initial groups of each set of five stations.

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. 44 of the January, 1937, number and in M.O. 329.

Key letters used for station reports—DDFww PPVTT.

**Wireless Storm Warnings.**

**Valparaiso W/T Station**, approximate position Latitude 33° 01' S. Longitude 71° 39' W., call sign **CCE**, broadcasts storm warnings when necessary, on a wavelength of 600 metres (I.C.W.).

**III.—Wireless Time Signals.**

W/T Station.	Call Sign.	Wavelength (Metres).	G.M.T. of Time Signal.
<b>Valparaiso</b> Lat. 32° 59' 50" S. Long. 71° 33' 40" W.	<b>CCL</b>	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° 51' S.	67° 28' W.	<b>LOX</b>	G.M.T. 2000	600 metres C.W.
Buenos Aires —Darsena Norte.	34° 36' S.	58° 22' W.	<b>LOL</b>	0203	1053 " "
Buenos Aires —General Pacheco.	34° 28' S.	58° 38' W.	<b>LPD</b>	1700	600 " I.C.W.
Parana ...	31° 44' S.	60° 27' W.	<b>LPE</b>	1830	600 " C.W.
Formosa ...	26° 14' S.	58° 07' W.	<b>LOC</b>	1530	600 " I.C.W.

**BRAZIL.**

**II.—Wireless Weather Bulletins.**

The Brazilian W/T coast stations given in the list below transmit, every four hours, except those stations marked \*, the state of weather and sea, and force and direction of the wind. The observations are made at the W/T Stations. They are sent in Portuguese *en clair*, on a wavelength of 600 metres.

W/T Station.	Position (approx.).		Call Sign.	Times of Sending. G.M.T.
	Latitude.	Longitude.		
Salinas ... ..	0° 37' S.	47° 23' W.	<b>PPL</b>	0350, 0750, etc., etc.
S. Luiz do Maranhão	2° 31' S.	44° 17' W.	<b>PXM</b>	*0500, 0900, 1300, 1700
Fernando de Noronha	3° 51' S.	32° 26' W.	<b>PSO</b>	*0900, 1300, 1700,
Natal Norte... ..	5° 47' S.	35° 16' W.	<b>PWN</b>	*1130, 1530, 1930, 2330
Olinda (Pernambuco)	8° 01' S.	34° 51' W.	<b>PPO</b>	0200, 0600, etc., etc.
Amaralina (Bahia) ...	13° 01' S.	38° 28' W.	<b>PPA</b>	0120, 0520, etc., etc.
Abrolhos ... ..	17° 58' S.	38° 42' W.	<b>PWH</b>	0120, 0520, etc., etc.
Santos ... ..	23° 59' S.	46° 18' W.	<b>PPS</b>	0005, 0405, etc., etc.
Florianopolis ... ..	27° 35' S.	48° 34' W.	<b>PPF</b>	0120, 0520, etc., etc.
Junçãõ (Rio Grande do Sul) ... ..	32° 03' S.	52° 08' W.	<b>PPJ</b>	0150, 0550, etc., etc.

**III.—Wireless Time Signals.**

W/T Station.	Call Sign.	Wavelength (Metres).	G.M.T. of Time Signal.
<b>Rio de Janeiro—</b> Lat. 22° 59' 19" S. Long. 43° 11' 26" W.	<b>PPR</b>	1,000 (I.C.W.)	h m s 00 00 00 and 14 00 00

The Time Signals are relayed from Rio de Janeiro Observatory in accordance with the New United States system of W/T Time Signals, see figure, p. 166.

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

NOTE.—Sent daily except Sundays and public holidays.

**UNITED STATES OF AMERICA, ATLANTIC COAST, AND BERMUDA.**

**II.—Wireless Weather Bulletins.**

**Washington—Arlington W/T Station**, approximate position Latitude 38° 52' N., Longitude 77° 05' W., call sign NAA.

**Washington—Annapolis W/T Station**, approximate position Latitude 38° 59' N., Longitude 76° 27' W. Call sign NSS.

Times of Transmission—0300 and 1500 G.M.T.

The messages are based upon observations taken at 0100 and 1300 G.M.T. respectively, with a few exceptions as shown in the list of stations. Ship observations taken at 0000 and 1200 G.M.T.

Wavelengths—2653 m. and 4690 metres C.W. simultaneously.

The bulletins are divided into four parts and begin with the words, "The Marine-Angot Bulletin."

PART I.—Weather reports in code from ships in the North Atlantic.

PART II.—Weather reports in code, giving actual observations at stations shown in the list below.

PART III.—Weather reports in code from ships in the North Pacific.

PART IV.—General summary of weather conditions, forecasts and storm warnings for the areas shown on the chart, p. 165, which commences at 0330 and 1530 G.M.T. respectively.

The station observations are sent in sets of five, the distinguishing letters of the stations forming the initial groups of each eleven groups.

The reports are made in the International Ships Wireless Weather

Telegraphy Code, with the exception of V, for land stations, which is made in a special United States code.

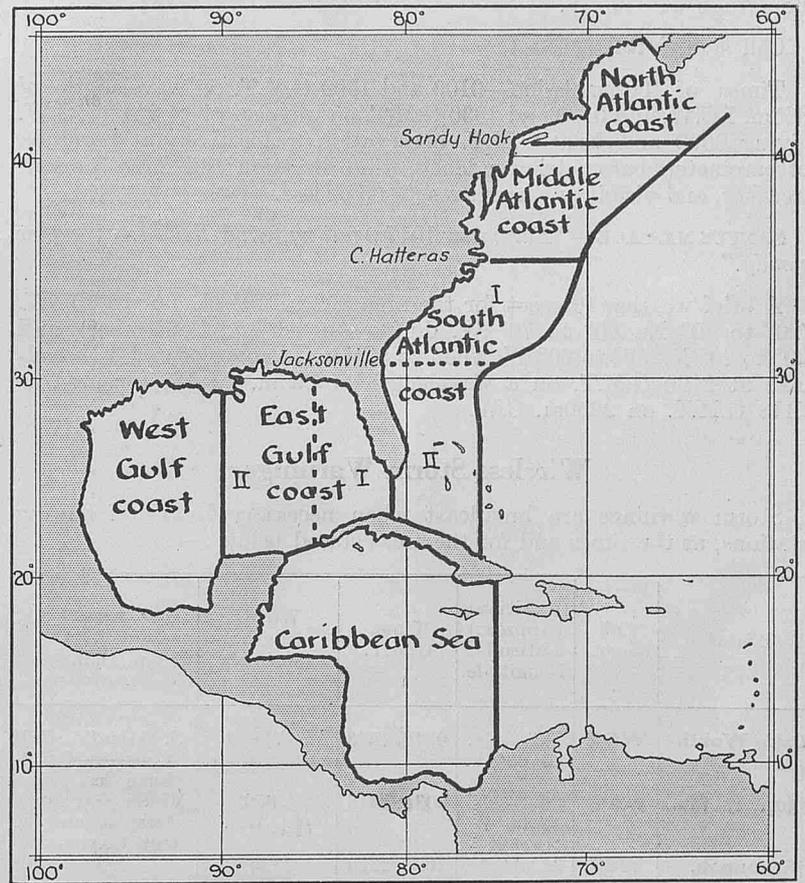
To decode these reports the tables given in the Decode M.O. 329 are required. The Key letters are fully described on p. 44 of the January, 1937, number and in M.O. 329.

Key letters used for { station reports—DDFww PPVTT.  
                                  { ships' reports—YQLLL III GG DDFww PPVTT.

Distin- guishing letter.	Name of station.	Latitude north.	Longitude west.
B	Belle Isle ... ..	51 55	55 20
G	St. George's (Nfld.) ... ..	48 28	58 25
R	St. John's (Nfld.) ... ..	47 34	52 42
Y	Clarke City ... ..	50 10	66 25
C	Chatham ... ..	47 03	65 29
S	Sable Island ... ..	43 56	60 00
H	Halifax ... ..	44 38	63 35
M	Eastport ... ..	44 54	66 59
B	Boston ... ..	42 21	71 04
N	Nantucket ... ..	41 17	70 06
A	Atlantic City ... ..	39 22	74 25
Y	New York ... ..	40 43	74 00
Z	St. Georges (Bermuda) ... ..	32 18	64 42
H	Horta ... ..	38 32	28 29
Q	Quebec ... ..	46 48	71 13
M	Chibougamau ... ..	49 53	74 23
U	Moosonee ... ..	51 14	80 30
D	Doucet ... ..	48 17	76 40
T	Ottawa ... ..	45 24	75 43
P	Parry Sound ... ..	45 20	80 01
B	Buffalo ... ..	42 53	78 53
C	Cleveland ... ..	41 30	81 42
O	Cincinnati ... ..	39 09	84 31
W	Washington ... ..	38 54	77 03
N	Norfolk ... ..	36 51	76 17
V	Wytheville ... ..	36 56	81 05
H	Cape Hatteras ... ..	35 15	75 40
Q	Wilmington ... ..	34 14	77 57
S	Charleston ... ..	32 47	79 56
A	Atlanta ... ..	33 39	84 26
J	Jacksonville ... ..	30 20	81 39
T	Tampa ... ..	27 57	82 27
M	Miami ... ..	25 48	80 12
K	Key West ... ..	24 33	81 48
P	Pensacola ... ..	30 25	87 13
N	New Orleans ... ..	29 57	90 04
G	Galveston ... ..	29 18	94 50
V	Vicksburg ... ..	32 22	90 53
L	Little Rock ... ..	34 45	92 16
T	Nashville ... ..	36 10	86 47
S	St. Louis ... ..	38 38	90 12
K	Kansas City ... ..	39 05	94 37
C	Chicago ... ..	41 47	87 35
I	Charles City ... ..	43 04	92 38
G	Green Bay ... ..	44 31	88 00
D	Duluth ... ..	46 47	92 06
R	White River ... ..	48 35	85 16
L	Sioux Lookout ... ..	50 08	91 52
W	Winnipeg ... ..	49 55	97 10
B	Bismarck ... ..	46 48	100 48
H	Huron ... ..	44 21	98 14
N	North Platte ... ..	41 08	100 45
K	Dodge City ... ..	37 45	100 00
T	Dallas ... ..	32 46	96 47
C	Corpus Christi ... ..	27 49	97 25
P	El Paso ... ..	31 47	106 30
S	Santa Fe ... ..	35 41	105 57
F	Flagstaff ... ..	35 12	111 37
D	Denver ... ..	39 45	105 00
U	Salt Lake City ... ..	40 46	111 54
L	Lander ... ..	42 50	108 45

Distin- guishing letter.	Name of station.	Latitude north.	Longitude west.
R	Rapid City ... ..	44 04	103 12
M	Miles City ... ..	46 25	105 49
H	Helena ... ..	46 34	112 04
T	Tatoosh ... ..	48 23	124 44
O	Roseburg ... ..	43 13	123 20
B	Boise ... ..	43 37	116 13
N	Tonopah ... ..	38 09	117 11
S	San Francisco ... ..	37 48	122 26
C	San Diego ... ..	32 43	117 10
H	Honolulu ... ..	21 19	157 52
M	Midway (a) ... ..	28 12	177 22
K	Ketchikan ... ..	55 20	131 37
J	Juneau ... ..	58 18	134 24
C	Cordova ... ..	60 32	145 42
F	Fairbanks ... ..	64 51	147 39
N	Nome ... ..	64 30	165 24
B	Barrow ... ..	71 21	156 30
A	Atka ... ..	52 10	174 12
P	St. Paul ... ..	57 15	170 10
Y	Aklavik ... ..	68 14	134 50
M	Coppermine ... ..	67 50	115 45
S	Ft. Simpson ... ..	61 52	121 35
F	Ft. Smith ... ..	60 00	111 56
W	Fairview ... ..	56 04	118 23
K	Kamloops ... ..	50 41	120 29
D	Edmonton ... ..	53 33	113 30
H	Medicine Hat ... ..	50 01	110 37
P	Prince Albert ... ..	53 10	105 38
G	God's Lake ... ..	54 50	94 50
C	Churchill ... ..	58 51	94 11
I	Chesterfield Inlet ... ..	63 16	91 46
N	Nottingham Island (b) ... ..	63 20	78 00
A	Hopes Advance ... ..	61 02	69 30
R	Resolution Island ... ..	61 18	64 53
W	Cartwright ... ..	53 30	57 30
J	Julianehaab ... ..	60 43	46 03
G	Godthaab ... ..	64 10	51 45
K	Godhavn ... ..	69 14	53 45
M	Angmagsalik ... ..	65 36	37 34
S	Coco Solo ... ..	9 22	79 53
B	*Belize (e) ... ..	17 30	88 12
C	*Guane ... ..	22 08	84 03
H	*Habana ... ..	23 06	82 30
T	*Cienfuegos (g) ... ..	22 11	80 33
U	*Tela ... ..	15 45	87 28
N	*Bluefields ... ..	12 00	83 45
K	*Kingston ... ..	17 58	76 48
B	*Nassau (e) ... ..	25 05	77 22
N	*Turks Island (f) ... ..	21 30	71 02
P	*Port au Prince (d) ... ..	18 31	72 19
J	*San Juan (f) ... ..	18 29	66 07
W	*Willemstad (c) ... ..	12 06	69 00
S	*Port of Spain (c) ... ..	10 38	61 30
B	*Bridgetown (c) ... ..	13 04	59 37
K	*St. Kitts (c) ... ..	17 18	62 43

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.		
<b>Tuckerton, N.J.</b>	<b>WSC</b>	39° 33' N.	74° 23' W.	1400, 2200	649 (I.C.W. and C.W.)
<b>Chatham, Mass.</b>	<b>WCC</b>	41° 43' N.	70° 46' W.	1400, 2200	738, 2325 (C.W.)
<b>Thomaston, Me.</b>	<b>WAG</b>	44° 09' N.	69° 13' W.	1400, 2200	718 } (I.C.W. and C.W.)

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

W/T. Station.	Position.		Call Sign.	Times of Transmission, G.M.T.	Wave-length.	Area affected (see chart, above).
	Latitude.	Longitude.				
<b>Lake Worth</b>	26° 38' N.	80° 03' W.	WOE	{ 0348 } { 1548 }	761 m.	S. Atlantic Coast, E. Gulf and Caribbean Sea.
<b>Jupiter</b>	26° 57' N.	80° 05' W.	NAQ	1648	2653 m.	S. Atlantic Coast, II.
<b>Savannah</b>	32° 04' N.	81° 07' W.	WSV	1600	735 m.	S. Atlantic Coast.
<b>Charleston</b>	32° 52' N.	79° 58' W.	NAO	{ 1710 } { 2300 }	2653 m.	S. Atlantic Coast, I.
<b>Norfolk</b>	36° 50' N.	76° 18' W.	NAM	{ 0500 } { 1630 }	2653 m.	Mid Atlantic Coast.

(a) One observation a day taken at 1200 G.M.T.

(b) Observations taken at 1150 and 2350 G.M.T.

(c) " " " 1200 " 2200 G.M.T.

(d) " " " 1200 " 2230 G.M.T.

(e) " " " 1200 " 2300 G.M.T.

(f) " " " 1300 " 2300 G.M.T.

(g) " " " 1300 " 2310 G.M.T.

\* Stations are sent only during the period 1st July to 31st October, inclusive, each year.

**Bilboa (Darlen) W/T Station**, approximate position Latitude 9° 07' N., Longitude 79° 46' W., call sign, NBA, rebroadcasts the bulletin from Washington, explained above, on 2653, 6518 and 12490 metres C.W. at 0430 and 1630 G.M.T.

**BERMUDA.**

**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, present weather, and visibility when it reaches 5 or less.

SAMPLE MESSAGE—"Barometer 1017.0 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.

**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 p. 165).
Lake Worth	<b>WOE</b>	26° 38' N. 80° 03' W.	0348, 1548	761	S. Atlantic, Gulf Coast and Caribbean Sea.
†Jupiter, Fla.	<b>NAQ</b>	26° 57' N. 80° 05' W.	0030, 1648	2653 (I.C.W.).	Middle and South Atlantic and E. Gulf Coasts.
†Savannah, Ga.	<b>WSV</b>	32° 04' N. 81° 07' W.	1600, 2330	735 (C.W.).	Do.
†Charleston, S.C.	<b>NAO</b>	32° 52' N. 79° 58' W.	1710, 2300	2653 (C.W.).	Do.
†Norfolk	<b>NAM</b>	36° 50' N. 76° 18' W.	1630	2653 (C.W.).	Middle Atlantic Coast.
Baltimore	<b>WMH</b>	39° 17' N. 76° 36' W.	1530	720 (C.W. and I.C.W.).	Do.
†Washington (Arlington)	<b>NAA</b>	38° 52' N. 77° 05' W.	0330* 1530*	2653, 4690 C.W. simultaneously.	N. Atlantic and Gulf Coasts.
†New York	<b>NAH</b>	40° 28' N. 74° 00' W.	1648, 2130	2653 (C.W.).	New York.
†Boston, Mass.	<b>NAD</b>	42° 21' N. 70° 57' W.	0530, 1610	2653 (C.W.).	N. Atlantic Coast.

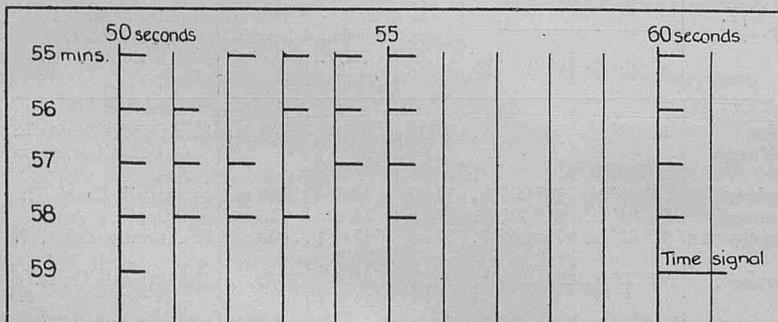
\* In Part IV of the Weather Bulletin.

† Transmit Urgent Hurricane warnings on receipt and at the first silent period on 600 m. These are repeated hourly for 12 hours, unless previously cancelled, the wavelength being indicated in commencement of signal.

The messages are preceded by the Safety Signal TTT.

**III.—Wireless Time Signals.**

Time Signals are broadcast according to the United States New System (See Diagram).



**Washington—Arlington**, Latitude 38° 52' 04" N., Longitude 77° 04' 47" W., call signs **NAA**, and **NSS** on a wavelength of 2653 metres, at 00h. 00m. 00s., G.M.T., and each subsequent hour except 0200, 0400, 1400 and 1600 G.M.T., and on wavelengths of 4687 and 16840 metres at 0300 and 1500 G.M.T.

The time signals are broadcast daily and are controlled by the Naval Observatory, Washington.

The error of the time signal is generally less than 0.02 second.

A dash (—) is transmitted at every second except the 29th second and also between the 50th and 60th seconds of each minute, as shown in the above diagram.

In every case the beginning of the dash is the beginning of the second. The time signal proper is a much longer dash of 1.3 seconds duration.

**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**, transmit 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 1000 and 2200 G.M.T. on a wavelength of 706m. I.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 ...	<b>NAA</b>	0300, 1500	2653, 4685 C.W.
Boston ...	<b>NAD</b>	0530, 1610, 2200	2653 C.W.
New York ...	<b>NAH</b>	1648, 2130	2653 C.W.
Norfolk ...	<b>NAM</b>	0500, 1630	2653 C.W.

**CARIBBEAN SEA, GULF COAST AND WEST INDIAN ISLANDS.**

**II.—Wireless Weather Bulletins.**

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

W/T Station.	Position.		Call Sign.	Times of Transmission. G.M.T.	Wave-length.	Area affected (see chart, p. 165).
	Latitude.	Longitude.				
Limon	10° 00' N.	83° 03' W.	<b>TIM</b>	1630	750 m.	Gulf, Caribbean Sea.
Galveston	29° 20' N.	94° 45' W.	<b>NKB</b>	0530	2653 m.	S. Atlantic II., Gulf, Caribbean Sea.
New Orleans	30° 00' N.	90° 06' W.	<b>WFB</b>	0430, 1630	3331 m. C.W.	Gulf, Caribbean Sea.
Pensacola	30° 21' N.	87° 16' W.	<b>NAS</b>	1630	2653 m.	E. Gulf I.
Key West	24° 33' N.	81° 48' W.	<b>NAR</b>	0400, 1610	2653 m. C.W.	S. Atlantic II., E. Gulf I., Caribbean Sea.

**Barbados 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. 165.

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. 165).
Galveston, Tex.	<b>WGV</b>	29° 18' N. 94° 48' W.	720 (C.W.)	When issued.	West Gulf Coast.
* " "	<b>NKB</b>	29° 20' N. 94° 45' W.	2653 (I.C.W.)	0100, 0530, 1700	Gulf and Caribbean Sea.
Port Arthur...	<b>WPA</b>	29° 52' N. 93° 56' W.	720 (C.W.)	When issued.	Gulf Coasts. Caribbean Sea. S. Atlantic Coast of U.S.A.
*New Orleans	<b>WFB</b>	30° 00' N. 90° 06' W.	3331 (C.W.)	0000, 1330, 0430, 1630	Gulf Coasts.
*Pensacola ...	<b>NAS</b>	30° 21' N. 87° 16' W.	2653 (C.W.)	0000, 1630	E. Gulf Coast I.
*Key West ...	<b>NAR</b>	24° 33' N. 81° 48' W.	2828 (C.W.)	0400, 1610	S. Atlantic Coast II, E. Gulf Coast I, Caribbean Sea.
*Guantanamo (Cuba)	<b>NAW</b>	19° 55' N. 75° 09' W.	600 (I.C.W.)	When issued.	—
*San Juan ...	<b>NAU</b>	18° 07' N. 66° 10' W.	2653	0200 (1 July to 15 Nov.).	E. Caribbean Sea.
Ensenada (Porto Rico)	<b>WPR</b>	17° 58' N. 66° 56' W.	600	When issued, repeated every 4 hours.	—

\* Transmits urgent Hurricane warnings on receipt and at the first silent period, on 600 metres. These are repeated hourly for 12 hours, unless previously cancelled, on the working wavelength shown above.  
The messages are preceded by the Safety Signal TTT.

**III.—Wireless Time Signals.**

**Panama.**

**Balboa (Darien) W/T Station**, position Latitude 9° 07' 12" N., Longitude 79° 45' 24" W. Call sign **NBA** relays the Washington-Arlington time signals sent out at 0300 and 1700 G.M.T. on a wavelength of 6518 metres 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).	Yarmouth ...	VAU	43° 46'	66° 07'	0430, 1630	720 m.
	Camperdown ...	VCS	44° 30'	63° 31'	0440, 1640	750 m.
	Canso ...	VAX	45° 19'	60° 58'	—	600 m.
	North Sydney	VCO	46° 13'	60° 15'	—	600 m.
	Louisburg ...	VAS	46° 09'	59° 57'	0400, 1600	2804 m.
Canada ...	*Grindstone ...	VCN	47° 23'	61° 54'	—	600 m.
	Island					
	*Fame Point, Que.	VCG	49° 07'	64° 36'	0430, 1630	660 m.
	*Father Point, Que.	VCF	48° 31'	68° 28'	0420, 1620	600 m.
	*Quebec ...	VCC	46° 48'	71° 12'	0410, 1610	600 m.
Canada (New Brunswick).	*Montreal ...	VCA	45° 34'	73° 38'	0400, 1600	600 m.
	St. John ...	VAR	45° 14'	66° 03'	0400, 1600	650 m.
Newfoundland and Labrador.	St. John's ...	VON	47° 34'	52° 41'	0400, 1600	600 m.
	*Belle Isle ...	VCM	51° 53'	55° 22'	0440, 1640	720 m.
	Cape Race ...	VCE	46° 39'	53° 04'	0420, 1620	660 m.
	*Point Amour ...	VCL	51° 27'	56° 50'	—	600 m.
	†*Port Churchill	VAP	58° 47'	94° 09'	1500	600 m.
Hudson Bay and Strait.	†*Cape Hopes	VAY	61° 05'	69° 33'	—	600 m.
	Advance					
	†*Nottingham Is.	VCB	63° 06'	77° 56'	—	600 m.
	†*Resolution Is.	VAW	61° 20'	64° 50'	1620	600 m.
	†*Chesterfield Inlet	VBZ	63° 20'	90° 43'	—	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...	CHSJ	45° 14'	66° 03'	1000, 1200	268 m.
Canada (Nova Scotia).	Sambro Outer Bank Lt.-V.	VGX	44° 22'	63° 26'	1210, 1740	435 m.
	Louisburg ...	VAS	46° 09'	59° 57'	0400, 1700	441 m.

**Wireless Storm Warnings.**

Storm warnings are broadcast by the following W/T stations on receipt, on 600 metres and repeated in the Weather Bulletins shown above.

- |                               |                 |
|-------------------------------|-----------------|
| Yarmouth VAU.                 | Montreal VCA.   |
| Sambro Outer Bank Lt.-V. VGX. | Belle Isle VCM. |
| Canso VAX.                    | Camperdown VCS. |
| North Sydney VCO.             | Fame Point VCG. |
| Louisburg VAS.                | Quebec VCC.     |
| Grindstone Island VCN.        | St. John VAR.   |
| Father Point VCF.             | Cape Race VCE.  |

Gulf of St. Lawrence Ice Patrol (repeated in ice report, see below).

**III.—Wireless Time Signals.**

**Camperdown W/T Station**, Latitude 44° 31' 13" N., Longitude 63° 32' 30" W., call sign **VCS** 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.	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 Camperdown W/T 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'	VGA	600 (Spk.)	On request.
*Camperdown ...	44° 30'	63° 31'	VCS	750 (I.C.W.)	"
*North Sydney ...	46° 13'	60° 15'	VCO	600 (Spk.)	"
*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 (I.C.W.)	0420, 1620.
St. John's ...	47° 34'	52° 41'	VON	600	0400, 1600.
Pt. Amour ...	51° 27'	56° 52'	VCL	600 (Spk.)	On request.
Belle Isle ...	51° 53'	55° 22'	VCM	720 (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.
Chesterfield Inlet	63° 20'	90° 43'	VBZ	600	"

\* 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 1621 m. (I.C.W.) preceded by the general call CQ on a wavelength of 600 m.

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—0218 G.M.T. and 1418 G.M.T.

Wavelengths—7009 and 2778 metres (C.W.) simultaneously.

The messages are based upon observations taken at 0100 and 1300 G.M.T. respectively, with a few exceptions as shown in the list of stations. Ship observations taken at 0000 and 1200 G.M.T.

The bulletins commence with "The Marine Bulletin issued by the United States Weather Bureau will now follow" and are in three parts.

PART I.—Weather reports in code from ships in the N. Pacific.

PART II.—Weather reports in code giving actual observations at stations shown in the list below.

PART III.—General summary of weather conditions, forecasts and storm warnings for the off-shore areas—N. of Cape Blanco; between Cape Blanco and Point Conception; and S. of Point Conception.

The reports are made in the International Ships Wireless Weather Telegraphy Code, with the exception of V for land stations, which is in a special United States code.

To decode these reports the tables given in the Decode M.O. 329 are required. The Key letters are fully described on p. 44 of the January, 1937, number and in M.O. 329.

Key letters used for { station reports—DDFww PPVTT.  
ships' reports—YQLLL lllGG DDFww PPVTT.

Distin- guishing letter.	Name of station.	Latitude north.	Longitude west.
D	San Diego ... ..	32 43	117 10
I	San Nicholas Island ... ..	33 15	119 28
P	San Pedro (b) ... ..	33 44	118 16
A	Los Angeles ... ..	34 03	118 15
C	Point Arguello ... ..	34 35	120 39
F	S. E. Farallon Island ... ..	37 40	123 00
S	San Francisco ... ..	37 48	122 26
N	Eureka ... ..	40 48	124 11
M	Marshfield ... ..	43 25	124 13
H	North Head ... ..	46 16	124 04
T	Tatoosh ... ..	48 23	124 44
W	Seattle ... ..	47 38	122 20
V	Victoria ... ..	48 24	123 19
C	Vancouver ... ..	49 17	123 05
B	Estevan ... ..	49 22	126 32
R	Prince Rupert ... ..	54 18	130 18
K	Ketchikan ... ..	55 20	131 37
J	Juneau ... ..	58 18	134 24
A	Cordova ... ..	60 32	145 42
O	Kodiak ... ..	57 47	152 22
D	Dutch Harbor ... ..	53 55	166 30
P	St. Paul ... ..	57 15	170 10
C	Atka, Alaska ... ..	52 10	174 12
B	Bethel ... ..	60 45	161 47
N	Nome ... ..	64 30	165 24
Q	Barrow ... ..	71 21	156 30
H	Honolulu ... ..	21 19	157 52
M	Midway (a) ... ..	28 12	177 22
			East
I	Manila (a) ... ..	14 35	120 59
W	Wake Island (a) ... ..	19 18	166 36
G	Guam (a) ... ..	13 27	144 45

(a) Observations taken at 1130 and 2330 G.M.T.

(b) One observation a day taken at 1300 G.M.T.

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

W/T Station.	Call Sign.	Position (Approx.) Latitude, Longitude.	Time G.M.T.	Wave-length. (Metres).	Area.
Puget Sound	NPC	47° 42' N. 122° 37' W.	0030, 0330, 0430, 1248, 1800, 2100.	2653	N. of C. Blanco.
Tatoosh Is.	NPD	48° 23' N. 124° 44' W.	0130, 0330, 1300, 1700, 2100.	833	do.
Astoria ...	NPE	46° 09' N. 123° 50' W.	0048, 1530, 1730.	2653	do.
Hillsboro ...	KEK	45° 29' N. 122° 57' W.	0418, 1618.	717	N. of C. Blanco, C. Blanco to Pt. Conception, S. of Pt. Conception.
Eureka ...	NPW	40° 41' N. 124° 16' W.	0018, 0500, 0818, 1218, 1700, 2018.	2653	C. Blanco to Pt. Conception.
Palo Alto ...	KFS	37° 27' N. 122° 16' W.	0400, 1600.	2438 717	N. of C. Blanco, C. Blanco to Pt. Conception, S. of Pt. Conception.
Clearwater	KOK	33° 53' N. 118° 10' W.	0448, 1648.	717	do.
San Diego...	NPL	32° 42' N. 117° 15' W.	1600	2653	S. of Pt. Conception.

**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.

III.—Wireless Time Signals.

For method of transmission of the undermentioned Time Signals, see diagram, p. 166.

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	2653 (C.W.)	0030, 0330 0430, 1248 1800, 2100	Puget Sound and Strait of Juan de Fuca.
†Tatoosh Island ... Lat. 48° 28' N. Long. 124° 44' W.	NPD	833	0130, 0330 1300, 1700 2100	
†Astoria ... Lat. 46° 09' N. Long. 123° 50' W.	NPE	2653 (C.W.)	0048, 1530 1730, 2130	do.
*Hillsboro ...	KEK	717	0418, 1618	Oregon, Washington, and California Coasts.
*Clearwater ...	KOK	717	0448, 1648	do.
†Eureka, Calif. ... Lat. 40° 42' N. Long. 124° 16' W.	NPW	2653 (C.W.)	0018, 0500 0818, 1218 1700, 2018	N. Coast of California, Washington and Oregon Coasts.
†San Francisco, Calif. Lat. 38° 06' N. Long. 122° 17' W.	NPG	2653 7000 (C.W.)	0300, 1500	After weather bulletin.
” ”		2653 (C.W.)	0000, 0600 0800, 1200 1630, 2000	N. California Coast.
†San Diego, Calif. Lat. 32° 42' N. Long. 117° 15' W.	NPL	2653	1600, 0000 0530, 1200 2200	S. California Coast.

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	2,653 and 7,005 (C.W.)	<table border="0"> <tr> <td></td> <td>h. m. s.</td> <td>h. m. s.</td> </tr> <tr> <td>*</td> <td>23 55 00</td> <td>0 00 00</td> </tr> <tr> <td></td> <td>2 55 00</td> <td>3 00 00</td> </tr> <tr> <td>*</td> <td>7 55 00</td> <td>8 00 00</td> </tr> <tr> <td></td> <td>14 55 00</td> <td>15 00 00</td> </tr> <tr> <td>*</td> <td>16 55 00</td> <td>17 00 00</td> </tr> <tr> <td></td> <td>19 55 00</td> <td>20 00 00</td> </tr> <tr> <td></td> <td>20 55 00</td> <td>21 00 00</td> </tr> </table>		h. m. s.	h. m. s.	*	23 55 00	0 00 00		2 55 00	3 00 00	*	7 55 00	8 00 00		14 55 00	15 00 00	*	16 55 00	17 00 00		19 55 00	20 00 00		20 55 00	21 00 00	Sent daily.
	h. m. s.	h. m. s.																										
*	23 55 00	0 00 00																										
	2 55 00	3 00 00																										
*	7 55 00	8 00 00																										
	14 55 00	15 00 00																										
*	16 55 00	17 00 00																										
	19 55 00	20 00 00																										
	20 55 00	21 00 00																										

\* On 7005 m. only.

\* Transmit Storm Warnings on receipt and on the half hour at hourly intervals.

† Transmit Urgent Hurricane warnings on receipt and at the first silent period on 600 metres. These are repeated hourly for 12 hours, unless previously cancelled on the working wavelength shown above.

PERSONNEL.

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

RETIREMENT.

**Commodore Sir Charles G. Matheson, Kt., D.S.O., R.D., R.N.R.**, retired from the service of the Orient Line in August this year.

CHARLES GEORGE MATHESON went to sea in 1891 at the age of 15 as apprentice in the Barque *Jupiter*, owned by Messrs. Steel and Son of Liverpool. He remained in that ship for six years, four years as apprentice and then as third mate and as second mate. Leaving sail for steam, he joined the service of Messrs. Strick and Co. of the Anglo-Persian Line and traded to the Persian Gulf for about a year.

During the Boer War he joined the S.S. *Mohawk* of the Atlantic Transport Line, engaged in trooping to the Cape. While in South Africa he was lent for service under Captain KING HALL, Royal Navy. Remaining with the Atlantic Transport Line until 1906, he then joined the Orient Line as a junior officer, serving in R.M.S. *Ormuz*, *Orontes* and *Omrah*.

In 1907 he performed a year's training in the Royal Navy, as a Lieutenant, R.N.R., in H.M.S. *Bedford*, on the China Station, and returned to the Orient Line in 1908. He served in a number of the company's ships, and in 1910 was promoted Chief Officer of the *Omrah*.

On mobilisation at the outbreak of the Great War in 1914 he was called up for service in the Royal Navy and was present at the first bombardment of Nieuport, under Admiral HOOD. After service in command of auxiliary patrols in the North Sea and English Channel he was mentioned in despatches. From 1917 until the end of the war he served in "Q" ships, during which time he received the D.S.O. for his successful action with the enemy submarine "U 85."

After the end of the war Captain MATHESON was appointed to the command of R.M.S. *Orontes*, and embarked the first thousand Australian soldiers to return to Australia. He later commanded the *Orvieto*, *Orsova*, *Orama*, *Otranto* and *Oronsay*, being senior captain in the company from 1933. For many years the ships under his command appeared in the Voluntary Observing Fleet List.

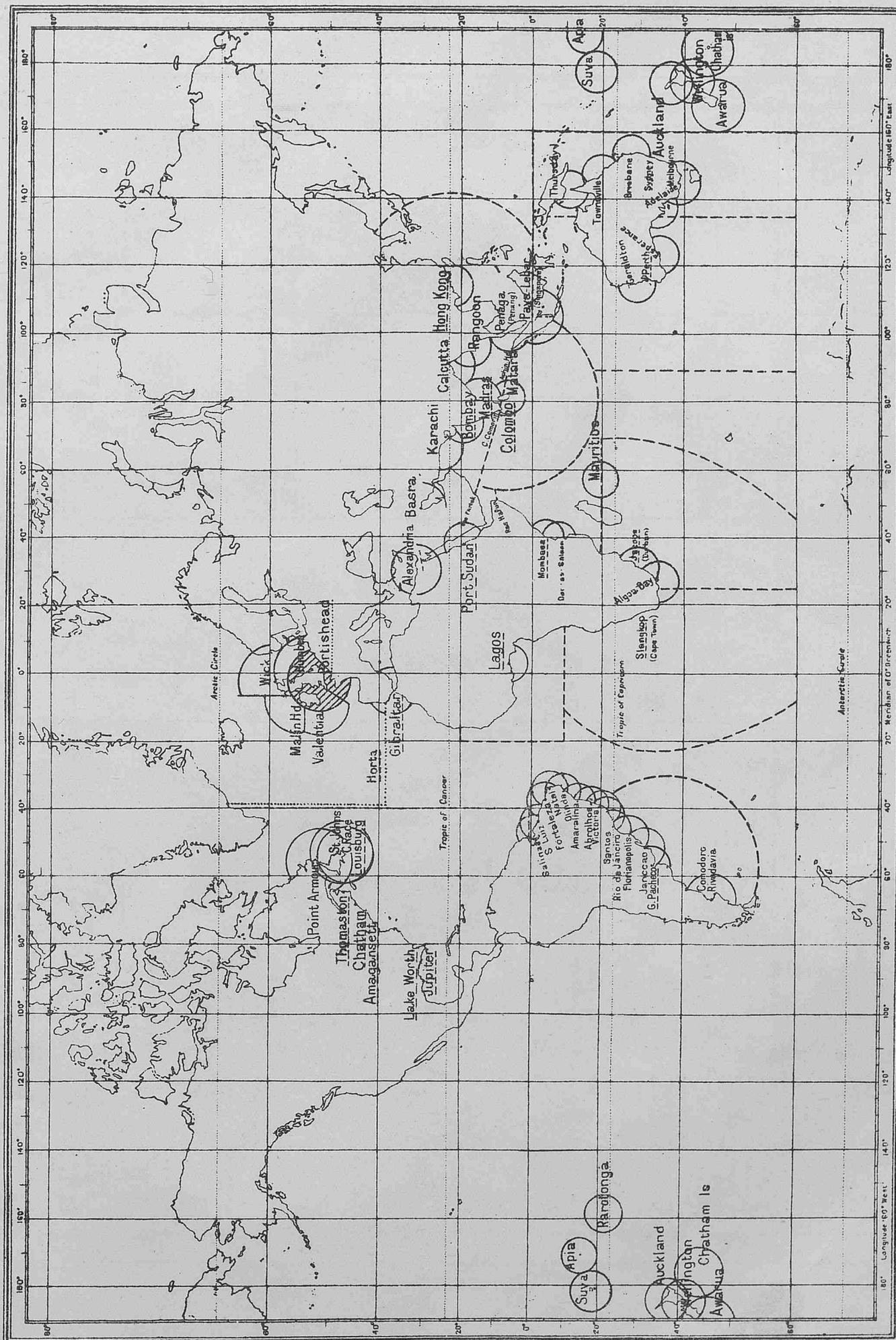
Captain MATHESON served on the Advisory Committee of the Royal Naval Reserve, was A.D.C. to KING GEORGE V in 1931, and was promoted Commodore R.N.R. in 1933. He was knighted in the Coronation Honours in 1937.

C. H. W.



# SHIPS' WIRELESS WEATHER SIGNALS. CHART OF THE WORLD.

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



The dotted line indicates the area in which British & Selected Ships report under control to Fortishead

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



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



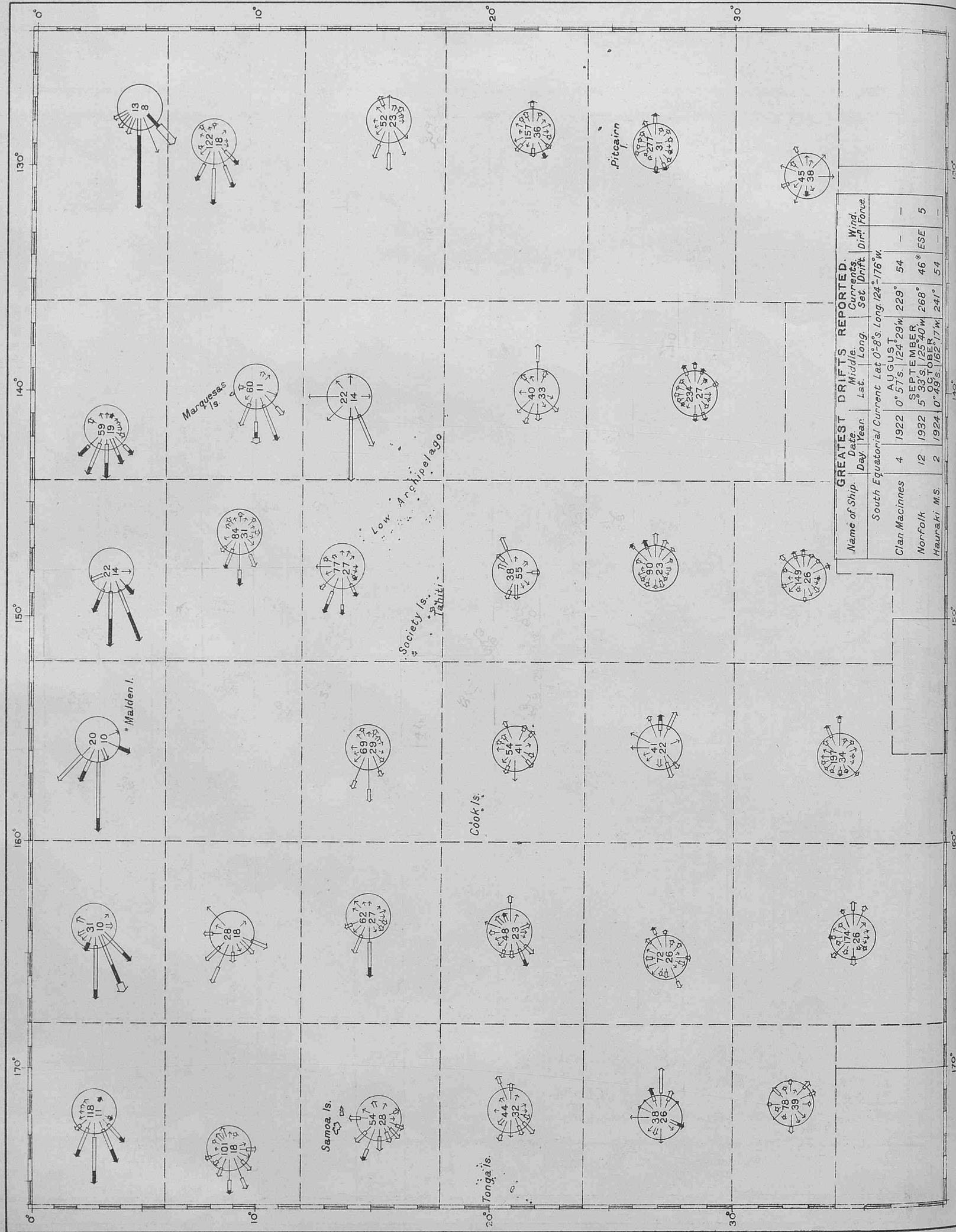
The full circles indicate the areas round islands and coast stations which are detailed to intercept "B" Selected Ships' reports made to C.Q. on 600 metres.





CURRENTS IN THE CENTRAL PORTION OF THE SOUTH PACIFIC. North of Latitude 34° S.

AUGUST SEPTEMBER and OCTOBER Observations of ships regularly observing for the British Meteorological Office, 1910-1937.



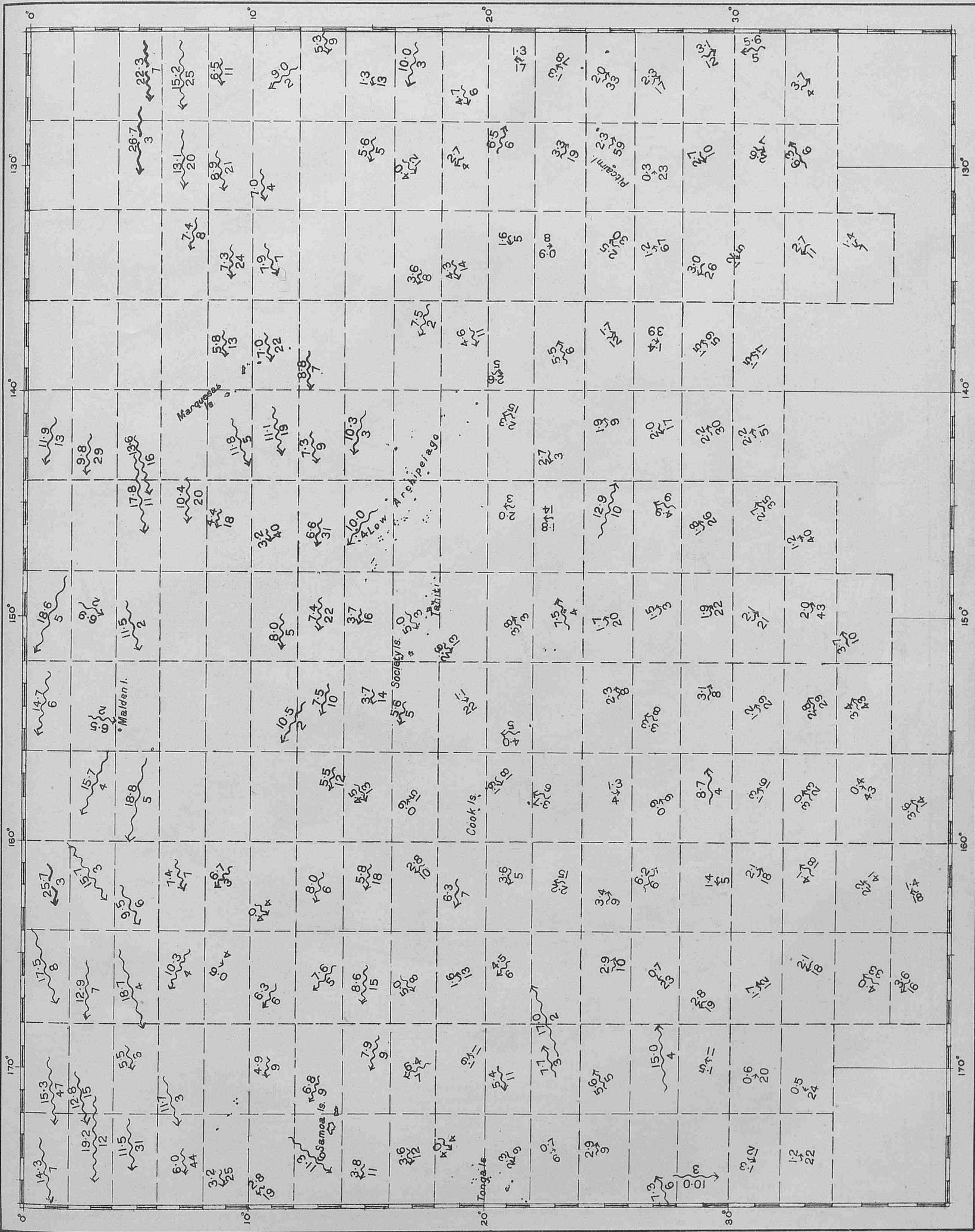
**GREATEST DRIFTS REPORTED.**

Name of Ship.	Date.	Year.	Lat.	Long.	Currents.	Drift.	Wind.
Clan Macinnes	4	1922	0° 57' S.	124° 29' W.	229°	54	-
Norfolk	12	1932	5° 33' S.	125° 40' W.	268°	46*	ESE
Hauraki M.S.	2	1924	10° 49' S.	162° 17' W.	241°	54	-

South Equatorial Current Lat 0° S. Long. 124°-176° W.

AUGUST  
 SEPTEMBER  
 OCTOBER

AUGUST SEPTEMBER and OCTOBER Observations of ships regularly observing for the British Meteorological Office, 1910-1937.





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# 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 regularly 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 360 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.

The Organization of Voluntary Meteorological Observation at sea is described in Chapter VII of THE MARINE OBSERVER'S HANDBOOK, sixth edition.

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 the wireless operators. The Captains of observing ships are also supplied on request with charts, and atlases, according to trade, if available, as meteorological equipment.

To ensure the accuracy of data collected for the purpose of research and for weather forecasting, ashore and afloat, and to provide a pattern which may be copied with advantage to all concerned for general use in merchant ships, sufficient tested instruments are lent by the Meteorological Office to the Captains of observing ships.

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 instruments in Meteorological log ships half-yearly, and in other observing ships quarterly, when possible; and they will replace as necessary any gear lent by the Meteorological Office. These officers will also check the accuracy of barometers, etc., 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.

The masters of all British ships fitted with wireless telegraphy are asked to assist in this service in aid of navigation by making routine wireless weather reports in accordance with the Selected Ship scheme where and when there are not Selected Ships carrying out the service.

With a view to stimulating this supplementary service of making weather reports in the Selected Ship service when and where there are not Selected Ships, a supplementary list of British Weather Reporting Ships is being made.

Only British ships suitably fitted with wireless telegraphy, and who have been visited by the Merchant Navy Agents to the Meteorological Office, and whose masters have then undertaken to perform this service, are included in this list, which is not published, but which is sent for information to stations working a roll call.

The masters of all British ships are advised to procure the pamphlet M.O.329, DECODE FOR USE WITH THE INTERNATIONAL CODE FOR WIRELESS WEATHER MESSAGES FROM SHIPS, published and sold by H.M. Stationery Office, through any bookseller, price 6d.

M.O. 379, a HANDBOOK OF WEATHER, CURRENTS, AND ICE FOR SEAMEN, gives guidance in weather forecasting, also published by H.M. Stationery Office, price 4s. 0d.

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### DERELICTS AND FLOATING WRECKAGE.

Date.	Position.		Description.	Date.	Position.		Description.
	Latitude.	Longitude.			Latitude.	Longitude.	
<b>NORTH SEA</b>				<b>NORTH ATLANTIC</b>			
1.9.38	55°43'N.	4°30'E.	Drifting timber, dangerous to navigation.	6.9.38	37°48'N.	63°08'W.	Rusty can buoy.
<b>ENGLISH CHANNEL</b>				10.9.38	24 miles 210° off		Burned wreckage of steamer Italian Prince.
4.9.38	49°02'N.	4°32'W.	Black floating buoy, with triangular topmark.	19.9.38	48°25'N.	7°11'W.	Wreck.
5.9.38	48°58'N.	4°30'W.	Black cylindrical gas buoy, lantern missing.	<b>NORTH PACIFIC</b>			
15.9.38	49°12'N.	4°03'W.	Seven large buoys, one with topmark.	1.9.38	31°55'N.	127°50'W.	Log 15 ft. long 3 ft. diameter.

# CHART OF THE WESTERN NORTH ATLANTIC.

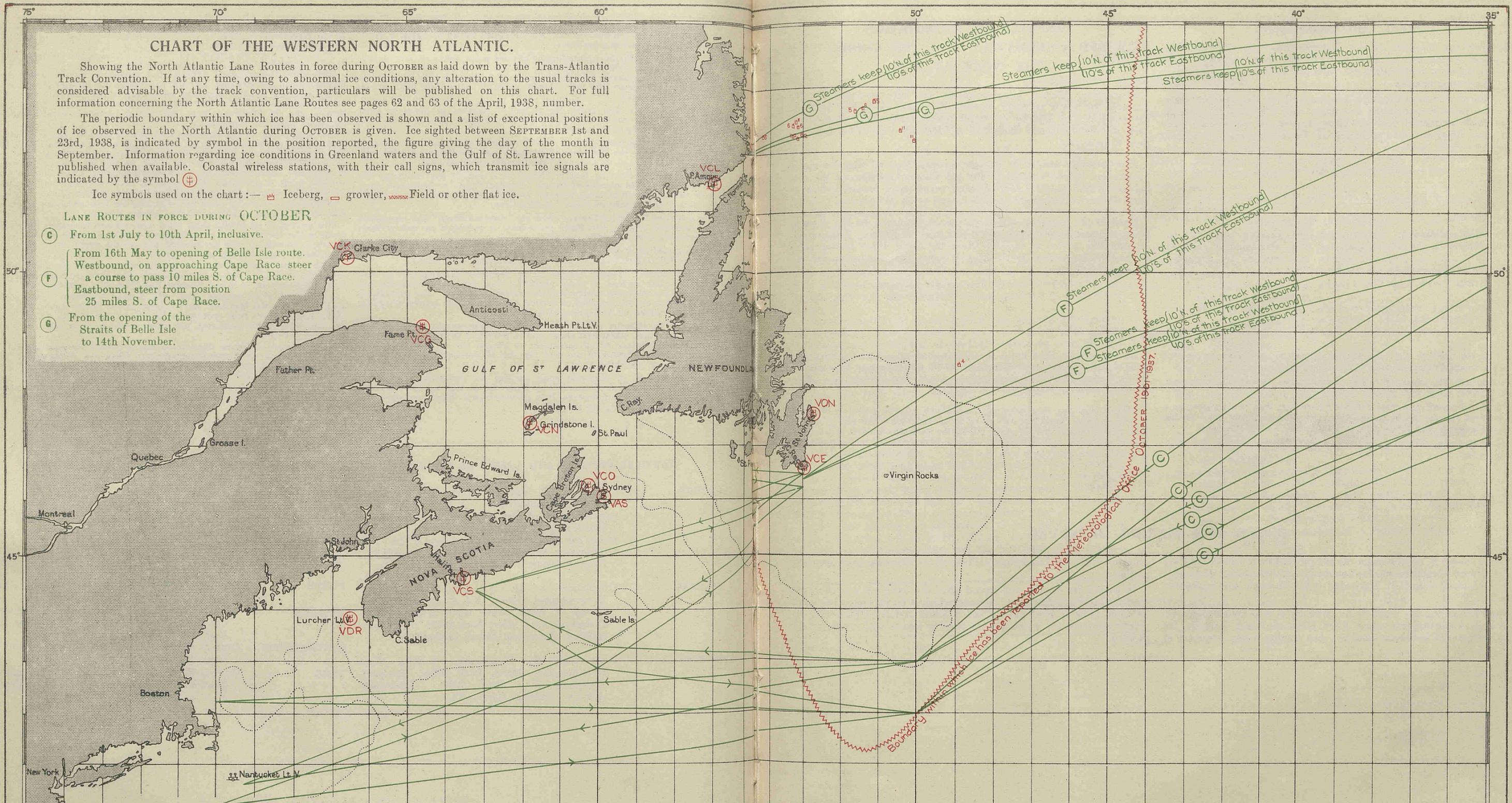
Showing the North Atlantic Lane Routes in force during OCTOBER as laid down by the Trans-Atlantic Track Convention. If at any time, owing to abnormal ice conditions, any alteration to the usual tracks is considered advisable by the track convention, particulars will be published on this chart. For full information concerning the North Atlantic Lane Routes see pages 62 and 63 of the April, 1938, number.

The periodic boundary within which ice has been observed is shown and a list of exceptional positions of ice observed in the North Atlantic during OCTOBER is given. Ice sighted between SEPTEMBER 1st and 23rd, 1938, 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  $\oplus$ .

Ice symbols used on the chart:  $\square$  Iceberg,  $\square$  growler,  $\text{~~~~~}$  Field or other flat ice.

## LANE ROUTES IN FORCE DURING OCTOBER

- (C) From 1st July to 10th April, inclusive.
  - From 16th May to opening of Belle Isle route. Westbound, on approaching Cape Race steer a course to pass 10 miles S. of Cape Race.
  - Eastbound, steer from position 25 miles S. of Cape Race.
- (F) From the opening of the Straits of Belle Isle to 14th November.



## EXCEPTIONAL POSITIONS OF ICE.

Date.	Ship or Source of Report.	Position.		Remarks.
		Lat.	Long.	
15, 1883	S.S. Elenora ...	37°00' N.	18°00' W.	Piece ice.
8, 1912	S.S. Putney Bridge ...	35°15' N.	44°50' W.	Small berg 35 ft. long, 6 ft. high.
27, 1916	S.S. Montreal ...	51°17' N.	41°17' W.	Small berg.
2, 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°23' N.	42°19' W.	Berg about 70 ft. high, 400 ft. long.
7, 1923	S.S. Eastern Dawn...	50°43' N.	40°42' W.	Berg 60 ft. high.
23, 1927	Trawler Grecian Empire.	40°46' N.	65°54' W.	Large growler about 100 ft. square.
4, 1934	S.S. Imperial Valley	30 mis. E.S.E. of Outer Skerries, Shetland Is.	29°26' W.	Piece of ice 100 ft. long, 6 ft. above water.
		36°16' N.	29°26' W.	Growler, approx. 15 ft. by 3 ft.

# NOTICES TO MARINE OBSERVERS.

## 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.

## 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.

## ICE OBSERVATION.

Drifting ice, derelicts, and other floating dangers to navigation are reported by all the means of communication at the disposal of the master.

See Appendix III, pages 106 to 108 of the *MARINE OBSERVER'S HANDBOOK*, Sixth Edition.

It is also desirable that more detailed information than can be given in a TTT wireless message should be available to the Meteorological Office for the purpose of research, and for the Admiralty Charts and Sailing Directions.

Marine observers will greatly assist by noting the conditions of ice, either drifting or fast.

For this purpose Form 912 is supplied direct to all regular observing ships using regions where ice may be encountered and this Form may be supplied to the Captain of any British ship on application to the Port Meteorological Officers and Merchant Navy Agents.

Regular observing ships using the Trans-North Atlantic tracks are requested to send in these Forms, not only when ice is encountered, but also when they have passed through the ice region during the ice season without encountering ice, in which case a "nil" report; since it is desirable as far as possible to determine when tracks have been clear of ice.

## COVER FOR MARINE OBSERVER.

Marine observers, regular recipients and subscribers to this Journal are informed that a binding cover for Volume XV of "The Marine Observer" may be obtained from H.M. Stationery Office, through any bookseller, price 2s.

When assembling the numbers for binding, it is recommended that the Cover, Advertisement pages, Fleet List and North Atlantic Ice Chart be removed from each number; thus leaving pages numbered in

sequence with the Lithographic Illustrations following each quarterly section.

It should be clearly understood that this cover is not the cover used for binding "Excellent" awards, which is far superior: but it will be found to be of good quality and a useful means of preserving the yearly numbers, for which a title page is issued with each October number.

**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, 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 360.

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 276.

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.

M.S. = Motor Ship.

(t-e) = Turbo-electric.

S.T. = Steam Trawler.

(tank) = Tanker.

Ships having no such letters after their names are steamships.

*Abbreviations in Equipment Column.*

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.	Owners.	Logs, Registers, or Records Contributed. 8.6.38 to 6.9.38	Date Last Return Received.
275 †† <i>Abosso</i> , M.S.	J. C. Shooter	R. Inglis, R. E. Woods	G. Arrowsmith	M.-S.	Elder Dempster Lines, Ltd.	Fms. 911 & 138 2.6.38 to 8.7.38	12.7.38
122 †† <i>Acra</i> , M.S.	A. H. Crapper	H. C. Allen, T. H. Poll, W. Atkinson.	R. J. Dowling	"	" "	" " 29.4.38 to 23.7.38	28.7.38
123 †† <i>Adda</i> , M.S.	C. C. Cave	L. Morrison, P. Kitchen	A. J. H. Edwards	"	" "	" " 6.5.38 to 22.6.38	2.7.38
090 *† <i>Aeneas</i>	J. Hatfield	W. Eusking, R. Masters, C. Lock.	H. C. Nuttall	S.	A. Holt & Co.	" " 24.1.38 to 12.5.38	14.5.38
166 *† <i>Agamemnon</i> , M.S.	J. O'Connor	J. H. Finch	A. C. Nevin	"	" "	" " 26.6.38 to 1.8.38	3.9.38
065 †† <i>Akaroa</i>	W. G. Summers	H. H. Falkiner, A. G. Mackenzie, R. A. N. Cox.	R. E. Hammond	"	Shaw, Savill & Albion Co., Ltd.	" " 15.5.38 to 21.8.38	30.8.38
245 †† <i>Alaunia</i>	J. Foyster	A. Mackeller, W. F. Dennison, H. J. Chaloner.	C. G. Wood	"	Cunard White Star Ltd.	{ " " 6.6.38 to 10.8.38 Fm. 912 9.5.38 to 27.5.38	24.8.38 1.6.38
*† <i>Albion Star</i>	H. Palmer	" "	" "	M.	Blue Star Line, Ltd.	" " " "	" "
129 †† <i>Alcantara</i>	T. J. C. Buret, D.S.C.	S. T. Whiteside, F. W. Fletcher, E. A. Littlewood.	W. Smith	M.-S.	Royal Mail Lines, Ltd.	Fms. 911 & 138 15.6.38 to 16.7.38	19.7.38
175 †† <i>Almanzora</i>	F. R. Miles, R.D., Capt., R.N.R.	G. M. Fletcher, K. M. Drake, H. D. Bowker.	J. Caldwell	S.	" "	" " 2.5.38 to 5.8.38	10.8.38
086 †† <i>Almeda Star</i>	H. C. Howard	J. L. Anson, R. Hampton, W. A. C. Hunt.	P. Norwood	M.-S.	Blue Star Line, Ltd.	" " 15.5.38 to 5.7.38	8.7.38
022 *† <i>Alynbank</i> , M.S.	D. Gillies	L. Armitage, J. Murray, J. Henderson.	W. G. Houghton	S.	A. Weir & Co.	" " 21.4.38 to 8.7.38	10.8.38
160 *† <i>Amarapoora</i>	S. Sinclair-Duncan	R. Treasurer, J. J. Steward, P. F. Carmochan.	A. M. Douglas	"	P. Henderson & Co.	" " 6.3.38 to 16.5.38	21.5.38
*† <i>Amsterdam</i>	A. P. Sutton	F. B. Allen, E. J. Gould	D. T. Wright	"	L. & N. E. Rly...	" " 1.3.38 to 31.5.38	1.6.38
006 †† <i>Andalucia Star</i>	R. Vernon	G. Aldridge, A. G. Honnor, N. Duell.	R. V. Gregory	M.-S.	Blue Star Line, Ltd.	" " 24.4.38 to 23.8.38	26.8.38
113 *† <i>Andania</i>	H. R. Oulsnam, R.D., Commr., R.N.R.	A. B. Tasting, S. A. Jones, E. W. Kent.	T. Wyatt	S.	Cunard White Star, Ltd.	{ " " 5.6.38 to 19.8.38 Fm. 912 5.6.38 to 19.8.38	22.8.38 22.8.38
040 *† <i>Anselm</i>	F. C. P. Harris	A. Allan, L. A. Sayers, F. Good.	J. O'Sullivan	"	Booth S.S. Co., Ltd.	Fms. 911 & 138 12.7.38 to 22.5.38	30.8.38
259 *† <i>Antonia</i>	J. Evans	H. G. Hayward, J. Law, J. E. Woolfenden.	R. F. Watson	"	Cunard White Star Ltd.	{ " " 6.6.38 to 2.9.38 Fm. 912 6.6.38 to 5.8.38	6.9.38 9.8.38

Name of Vessel.	Captain.	Observing Officers.	Senior Wireless Operator.	Meteorological Instrument Equipment.	Owners.	Logs, Registers, or Records Contributed. 8.6.38 to 6.9.38.	Date Last Return Received.
120 †† <i>Apapa</i> , M.S.	E. Vaughan Davies	L. Collings, R. M. Longstaff, T. Stedman.	J. Rea	M.-S.	Elder Dempster Lines, Ltd.	Fms. 911 & 138 20.5.38 to 19.8.38	23.8.38
017 †† <i>Aquilania</i>	J. C. Townley, R.D., Capt., R.N.R.	R. W. Pickersgill, W. T. Fitzgerald, J. Tone.	J. N. Cragg	S.	Cunard White Star, Ltd.	Fm. 912 26.5.38 to 22.8.38 Fms. 911 & 138 26.5.38 to 22.8.38	24.8.38 25.8.38
201 †† <i>Arandora Star</i>	E. W. Moulton	J. A. Elliott, W. H. Evans	S. T. Williams	M.-S.	Blue Star Line, Ltd.	Fms. 911 & 138 4.6.38 to 22.7.38	2.8.38
248 *† <i>Arawa</i>	T. V. Roberts, R.D., Capt., R.N.R.	D. Hewett, J. Farrow, W. Dickson.	G. W. Bailey	M.	Shaw, Savill & Albion Co., Ltd.	Fms. 911 & 138 22.5.38 to 22.6.38	25.6.38
114 *† <i>Ariguani</i>	R. A. Thorburn, R.D., Commr., R.N.R.	C. R. Hodder, B. R. Coe, J. Hughes.	B. M. Evans	S.	Elders & Fyffes, Ltd.	Fms. 911 & 138 7.6.38 to 6.8.38	9.8.38
092 †† <i>Arundel Castle</i>	C. E. Aylen, R.D., Commr., R.N.R.	N. K. Boyd	W. A. Brown	"	Union-Castle Mail S.S. Co., Ltd.	" " 8.5.38 to 17.6.38	25.6.38
233 †† <i>Ascania</i>	G. E. Barton, R.D., Lt. Commr. R.N.R.	H. Morgan, J. A. S. Halcrow, H. L. Pryse.	J. W. Haynes	"	Cunard White Star, Ltd.	" " 23.5.38 to 2.9.38	6.9.38
013 †† <i>Asturias</i>	A. Purvis	R. Finch, C. Webster, R. Tedman.	T. Bradfield	"	Royal Mail Lines, Ltd.	" " 18.5.38 to 11.8.38	16.8.38
091 †† <i>Athenia</i>	W. Rennie	A. M. Mackinnon, L. Napier, J. R. Henderson.	D. Don	"	Donaldson Atlantic Line.	" " 11.7.37 to 24.9.37	26.11.37
028 †† <i>Athlone Castle</i> , M.S.	E. S. Vincent, R.D., Commr. R.N.R.	S. Thompson	J. Hodgson	"	Union-Castle Mail S.S. Co., Ltd.	" " 19.6.38 to 3.8.38	8.8.38
199 †† <i>Atlantis</i>	H. D. Womersley	A. J. G. Barff, E. Card, W. P. Magee.	W. H. Chick	M.-S.	Royal Mail Lines, Ltd.	" " 12.6.38 to 23.8.38	30.8.38
208 *† <i>Aurania</i>	R. J. Finlow, R.D., Capt. R.N.R.	W. S. Tanner, J. H. Kenworthy, S. W. Howell.	S. K. Alston	S.	Cunard White Star, Ltd.	Fm. 912 16.5.38 to 26.8.38 Fms. 911 & 138 16.5.38 to 26.8.38	29.8.38 29.8.38
103 *† <i>Ausonia</i>	C. H. Bate, R.D., Capt. R.N.R.	A. H. Young, J. D. Armstrong, W. D. Smith.	S. A. Arnold	"	"	Fm. 912 29.5.38 to 12.8.38	16.8.38
046 *† <i>Australia Star</i> , M.S.	J. Fisher	J. Davis, C. Munday, J. Gallienne.	J. St. C. Smart	M.-S.	Blue Star Line, Ltd.	Fms. 911 & 138 6.6.38 to 13.7.38	29.8.38
133 †† <i>Avelona Star</i>	G. E. Hopper	P. Clark, C. J. Gross, L. S. Warren.	A. Shippam	"	"	" " 14.6.38 to 31.7.38	20.8.38
045 †† <i>Avila Star</i>	R. J. Thomas	S. Ranson, S. Wickers, G. Nedden.	H. Varley	"	"	" " 5.6.38 to 26.7.38	28.7.38
068 †† <i>Balmoral Castle</i>	W. S. Colbourne, O.B.E., R.D., Lieut. R.N.R.	M. A. Bulley, J. F. Oakley	J. Summers	S.	Union-Castle Mail S.S. Co., Ltd.	" " 9.6.38 to 17.7.38	26.7.38
110 *† <i>Balmoralwood</i>	O. Stoker - Johnson, D.S.C.	K. D. Castling, R. L. Lidgate, R. Coates.	W. B. Charlton	"	Constantine Steamships, Ltd.	Fm. 912 5.6.38 to 14.7.38 Fms. 911 & 138 25.4.38 to 21.6.38	18.7.38 17.7.38
037 *† <i>Baronesa</i>	R. W. Compton	J. R. Faulkner, A. McEwan, A. Brightwell.	L. G. Hosking	M.	Furness Lines, Ltd.	" " 28.5.38 to 28.8.38	1.9.38
209 *† <i>Bassano</i>	A. H. Best	J. E. Stott, S. G. Poskitt, H. K. Tadman.	C. G. O'Keeffe	S.	Ellerman's Wilson Line, Ltd.	Fms. 911 & 138 28.5.38 to 28.8.38 Fm. 912 28.5.38 to 26.8.38	1.9.38 2.9.38
180 *† <i>Beaverbrae</i>	E. J. Jones	S. P. Berna, A. Mackey, E. H. Smith.	T. A. Evans	M.-S.	Canadian Pacific Steamships, Ltd.	Fm. 912 28.5.38 to 26.8.38 Fms. 911 & 138 11.6.38 to 6.8.38	2.9.38 19.8.38
130 *† <i>Beaverburn</i>	A. S. Phillips	D. E. T. Newell, L. Thornton, G. N. Ball.	S. J. Taylor	"	"	Fm. 912 14.6.38 to 21.7.38	19.8.38
138 *† <i>Beaverdale</i>	A. Rothwell	B. R. Russell, R. J. Barlow, J. Shearer.	J. Ormiston	"	"	Fms. 911 & 138 11.5.38 to 13.8.38 Fm. 912 18.6.38 to 13.8.38	17.8.38 17.8.38
232 *† <i>Beaverford</i>	H. Pettigrew	R. Walgate, F. W. Roberts, E. M. Moir.	J. J. Fraser	"	"	Fms. 911 & 138 21.5.38 to 19.8.38 Fm. 912 21.5.38 to 19.8.38	23.8.38 23.8.38
*† <i>Benarty</i>	J. Watt	A. Ramsay, F. Tait, N. Crowe	R. W. Lucan	M.	W. Thomson & Co.	Fm. 911 30.4.38 to 10.8.38	17.8.38
*† <i>Benmohr</i>	J. C. Sinclair	A. Griffiths, G. W. Patterson, J. Brown.	"	M.L.	"	Fm. 915 28.3.38 to 7.8.38	15.8.38
111 *† <i>Benuyvis</i>	H. J. Small	W. M. Marshall, W. P. Gollan, N. Fraser.	R. H. V. Gillibrand	M.	"	Fms. 911 & 138 22.5.38 to 23.6.38	21.7.38
145 *† <i>Berwickshire</i>	W. R. Roberts	H. W. Chadd, G. Stronach, C. Harrison.	W. G. Peddie	S.	Turnbull, Martin & Co., Ltd.	" " 22.5.38 to 14.8.38	3.9.38
007 *† <i>Bradfyne</i>	M. O'Neill	H. F. Thomas, P. Evans, S. Hewitt.	J. N. Collins	"	Sir Wm. Reardon Smith & Partners, Ltd.	" " 24.12.37 to 18.8.38	6.9.38
*† <i>Brighton</i>	B. Shaw	H. Smith	A. Jones	"	Southern Rly.	" " 1.6.38 to 31.7.38	3.8.38
*† <i>Brisbane Star</i> , M.S.	F. N. Riley	"	"	M.-S.	Blue Star Line	" " " " " "	"
189 †† <i>Britannic</i> , M.S.	G. Gibbons, R.D., Capt., R.N.R.	J. F. Drake, J. C. Dawson, F. J. Owen.	F. Clarke	S.	Cunard White Star, Ltd.	Fms. 911 & 138 30.5.38 to 12.8.38 Fm. 912 30.5.38 to 12.8.38	17.8.38 17.8.38
106 *† <i>British Colonel</i> (tank)	E. H. Fulcher	R. H. Mowbray, S. Rennels, R. Thompson.	A. K. Evans	M.	British Tanker Co., Ltd.	Fms. 911 & 138 18.2.38 to 24.4.38	30.4.38
038 *† <i>British Corporal</i> (tank)	J. Cunningham	W. G. Philpin, C. T. Forster	H. D. Smythe	"	"	" " 21.5.38 to 5.8.38	13.8.38
153 *† <i>British Endurance</i> , M.S. (tank)	R. O. Putt	J. D. Johnston, M. Hutchinson.	R. B. Reid	"	"	" " 20.6.38 to 28.7.38	5.9.38
054 *† <i>British General</i> (tank)	G. W. E. Oxley	P. E. Norton, R. C. Flamstead, D. M. Walker.	R. G. Davies	"	"	" " 16.5.38 to 29.7.38	9.8.38
*† <i>British Grenadier</i> (tank)	J. A. Ferrier	E. J. Simpson, D. L. O. Smith, C. H. Humphries.	T. Gledhill	"	"	" " 2.3.38 to 28.5.38	2.6.38
*† <i>British Gunner</i> (tank)	C. W. G. Stook	"	"	"	"	Fm. 911 30.7.38 to 9.8.38	17.8.38
257 *† <i>British Hussar</i> (tank)	F. O. Armstrong	G. R. Mackillican, R. L. Campbell, B. W. Hope.	R. Mortimer	"	"	Fms. 911 & 138 26.5.38 to 20.8.38	29.8.38
076 *† <i>British Officer</i> (tank)	D. E. Ward	R. M. Anderson, D. C. Barton, K. Johnson.	A. S. Broadbent	"	"	" " 20.7.38 to 29.7.38	10.8.38
*† <i>British Power</i> (tank)	E. G. Dobson	"	"	"	"	" " " " " "	"
*† <i>British Premier</i> (tank)	B. M. Naylor	W. H. Sharp, C. Uridge, D. L. Smith.	F. J. Park	"	"	Fms. 911 & 138 17.5.38 to 11.8.38	23.8.38
*† <i>British Resolution</i> , M.S. (tank)	R. H. Farrington	W. Graham, S. Wilkinson, H. Were.	L. G. Sparks	"	"	Fm. 911 16.4.38 to 5.6.38	17.6.38
225 *† <i>British Statesman</i> (tank)	J. H. Sloan	J. V. Robinson, N. Walton, B. Samuel.	J.H.S. Macdonald	"	"	Fms. 911 & 138 26.5.38 to 9.8.38	16.8.38
273 *† <i>British Strength</i> , M.S. (tank)	J. C. Leybourne	J. M. Templeton, S. A. Caws, F. McMillan.	L. A. Jones	"	"	Fm. 911 5.4.38 to 11.7.38	19.7.38
*† <i>British Workman</i> (tank)	S. D. Bumstead	R. T. Hedley	S. P. Williamson	"	"	Fms. 911 & 138 3.7.38 to 11.8.38	18.8.38
219 *† <i>Buteshire</i>	S. Y. Strange	W. J. Jones, F. J. Meyrick, R. McAdam.	W. W. Whewell	S.	Houston Line	Fms. 911 & 138 30.1.38 to 3.8.38	24.8.38
200 *† <i>Cairnesk</i>	E. A. Organ	S. W. Parks, R. Preston, A. L. Swapp.	F. A. Munday	"	Cairns, Noble & Co., Ltd.	Fms. 911 & 138 11.6.38 to 20.8.38 Fm. 912 11.6.38 to 20.8.38	26.8.38 26.8.38
241 *† <i>Cairnglen</i>	A. W. Melling	F. W. Fairley	"	"	"	Fms. 911 & 138 28.5.38 to 7.8.38 Fm. 912 28.5.38 to 7.8.38	9.8.38 9.8.38
*† <i>Cairnross</i>	L. Halcrow	A. J. Dunn, D. Eason, T. Sutherland.	H. Jardine	"	"	Fms. 911 & 138 16.5.38 to 27.8.38 Fm. 912 16.5.38 to 27.8.38	5.9.38 5.9.38
075 *† <i>Cairnvalona</i>	T. J. Baker	E. Cairns, A. Molinoux, R. Armstrong.	J. Sargent	"	"	Fms. 911 & 138 23.5.38 to 20.7.38 Fm. 912 23.5.38 to 20.7.38	3.8.38 3.8.38
031 †† <i>Caledonia</i>	A. Collie	H. L. P. King, J. Simpson, P. Young.	J. F. Reid	"	Anchor Line, Ltd.	Fms. 911 & 138 5.6.38 to 17.8.38 Fm. 912 5.6.38 to 23.6.38	24.8.38 29.6.38

FLEET LIST

Name of Vessel.	Captain	Observing Officers.	Senior Wireless Operator.	Meteorological Instrument Equipment.	Owners.	Logs, Registers, or Records Contributed. 8.6.38 to 6.9.38	Date Last Return Received.
139 †† <i>California</i> ...	R. W. Smart ...	H. D. Campsie, D. Barclay, G. Ramage.	D. Thompson ...	S.	Anchor Line, Ltd.	Fms. 911 & 138 29.5.38 to 11.8.38	15.8.38
*† <i>Cambria</i> ...	E. B. Turner ...	F. E. Williams ...	J. Pritchard ...	"	L.M. & S. Rly. ...	Fm. 912 29.5.38 to 14.7.38	18.7.38
223 *† <i>Cambridge</i> ...	A. Angell ...	G. E. Mason, T. Norris, J. Lodge.	P. McCormach ...	"	Federal S.N. Co., Ltd.	Fms. 911 & 138 3.1.38 to 24.5.38	27.7.38
042 †† <i>Cameronia</i> ...	G. B. Kelly ...	J. L. Gibson, J. D. Mackenzie, R. F. Caldwell.	W. C. M. Ness ...	"	Anchor Line, Ltd.	" " 22.5.38 to 31.8.38	3.9.38
252 *† <i>Camito</i> ...	R. J. Bostock ...	R. Philpott, D. M. Baker, R. Cruikshank.	R. E. Blizzard ...	"	Elders & Fyffes, Ltd.	Fms. 911 & 138 1.6.38 to 30.7.38	6.8.38
117 *† <i>Cape of Good Hope</i> M.S.	A. T. McGlashan ...	R. J. Carnochan, P.A. Wallace J. B. Hill.	G. W. Pragnell...	"	Lyle Shipping Co., Ltd.	" " 1.1.38 to 16.3.38	22.4.38
188 †† <i>Capetown Castle</i> , M.S.	A. Barron ...	F. Marriot, A. O. Wilkins ...	H. Oliver ...	"	Union Castle Mail S.S. Co. Ltd.	" " 30.4.38 to 18.8.38	23.8.38
256 †† <i>Carinthia</i> ...	A. C. Greig, O.B.E., R.D., Capt., R.N.R....	W. E. Warwick, J. C. Boyce, W. L. Cox.	R. M. Shore ...	"	Cunard White Star, Ltd.	Fms. 911 & 138 23.5.38 to 26.7.38	11.8.38
264 †† <i>Carnarvon Castle</i> , M.S.	A. H. Blackman ...	N. K. Boyd ...	J. Gilbert ...	"	Union Castle Mail S.S. Co., Ltd.	Fms. 911 & 138 9.7.38 to 24.8.38	29.8.38
155 †† <i>Carthage</i> ...	H. Williams ...	P. M. Jones, A. E. Clay, A. A. Terry.	F. Rose ...	M.-S.	P. & O. S.N. Co.	" " 10.4.38 to 13.7.38	18.7.38
184 †† <i>Cathay</i> ...	H. R. Rhodes ...	M. A. Trenfield, T. A. Sergeant, E. G. Hopkins.	E. L. Boyce ...	"	" " "	" " 2.4.38 to 29.6.38	4.7.38
127 *† <i>Cavina</i> ...	W. T. Forrester, O.B.E.	W. E. A. Duff ...	A. N. Taylor ...	S.	Elders & Fyffes, Ltd.	" " 17.5.38 to 1.7.38	3.8.38
*† <i>Celtic Monarch</i> ...	G. C. Winchester ...	J. C. ...	W. M. Ross ...	M.L.	Monarch S.S. Co. Ltd.	" " " " " "	" " " "
011 †† <i>Ceramic</i> ...	H. C. Elford ...	G. F. Cresswell, W. J. Stranger J. W. Paine.	W. M. Ross ...	S.	Shaw, Savill & Albion Co., Ltd.	Fms. 911 & 138 17.1.38 to 4.5.38	9.5.38
029 *† <i>Cheshire</i> , M.S. ...	C. Fountain ...	J. B. Quinn, A. N. Williamson, A. D. Quayle.	F. W. Greaves ...	"	Bibby Bros. & Co.	" " 19.6.38 to 27.8.38	30.8.38
067 *† <i>Chinese Prince</i> , M.S.	W. Finch, W. Irvine ...	A. H. Kent, E. J. Roberts, D. G. P. Tait.	D. T. de Witt ...	M.L.	Furness Lines Ltd.	Fm. 915 13.4.38 to 20.7.38	5.9.38
192 †† <i>Chitral</i> ...	W. E. L. S. Pocock ...	C. E. Lord, R. H. Turner, A. C. Halliday.	W. B. Goodsell	M.-S.	P. & O. S.N. Co.	Fms. 911 & 138 6.12.37 to 9.3.38	19.3.38
051 *† <i>City of Auckland</i>	H. G. Jenkins, O.B.E.	D. C. Hamilton, B. M. Postlethwaite.	P. Shine ...	S.	Ellerman Lines, Ltd.	" " 11.5.38 to 8.8.38	12.8.38
135 *† <i>City of Barcelona</i>	W. Hill ...	R. A. Jones, H. G. Williams, J. M. Walker	J. Houghney ...	M.	" " "	" " 17.3.38 to 13.5.38	16.5.38
265 *† <i>City of Baroda</i>	G. P. M. O'Halloran ...	R. S. Steel, W. L. Smith	W. Gainer ...	S.	" " "	" " 22.5.38 to 12.8.38	22.8.38
057 †† <i>City of Benares</i> ...	A. Lee ...	H. H. Asher, R. Clark, S. J. Findlay.	A Fairweather	M.-S.	" " "	" " 3.6.38 to 9.8.38	20.8.38
*† <i>City of Bombay</i> ...	O. Cheverton Brown	...	...	M.	Ellerman Hall Line	" " " " " "	" " " "
158 *† <i>City of Cairo</i> ...	J. McMillan ...	F. Nuttall, H. N. Jones, J. Arwyl.	G. S. Creighton ...	"	Ellerman Lines, Ltd.	Fms. 911 & 138 20.6.38 to 24.8.38	29.8.38
215 *† <i>City of Canberra</i>	H. R. Jackson ...	A. Travis, H. Ward, J. Sapp	C. Kerrage ...	"	" " "	" " 12.4.38 to 15.8.38	1.9.38
033 *† <i>City of Canton</i> ...	E. Scrymgeour...	R. W. Tyrrell, W. E. Fletcher, E. Routledge.	G. Beswick ...	"	" " "	" " 19.5.38 to 29.5.38	13.7.38
157 *† <i>City of Delhi</i> ...	F. W. Penberthy ...	W. Nimmo, T. Lovell, J. Wotherspoon.	T. A. Walker ...	S.	" " "	" " 4.5.38 to 8.6.38	23.6.38
030 *† <i>City of Dieppe</i>	W. J. Merchant ...	J. Mitchell, E. A. Chapman, S. Brown.	L. J. Long ...	"	" " "	" " 2.7.38 to 1.8.38	18.8.38
*† <i>City of Edinburgh</i>	H. Cartwright ...	...	...	M.	" " "	" " " " " "	" " " "
049 *† <i>City of Evansville</i>	F. McKay ...	T. G. Mathias, R. H. Broadbent, R. Kelk.	J. A. Angove ...	"	" " "	Fms. 911 & 138 25.6.38 to 8.8.38	27.8.38
220 †† <i>City of Exeter</i> ...	D. L. Lloyd ...	P. C. Wilson, R. S. Webber, V. H. Lewis.	L. Hugo ...	S.	" " "	" " 2.5.38 to 10.7.38	20.8.38
089 *† <i>City of Hereford</i>	R. A. Grove ...	N. Williams, I. M. McBeath, W. R. Carr.	G. Goodman ...	M.	" " "	" " 17.6.38 to 3.7.38	20.7.38
237 †† <i>City of London</i> ...	F. Nicoll ...	W. G. McCulloch, C. N. Stewart, A. K. Gillespie.	O. A. Read ...	S.	" " "	" " 27.6.38 to 26.8.38	30.8.38
256 *† <i>City of Lyons</i> ...	T. Cooper ...	J. W. Cubbar, G. Roberts, W. E. James.	W. R. Beynon ...	M.	" " "	" " 7.7.38 to 7.8.38	13.8.38
066 †† <i>City of Nagpur</i> ...	N. McNeil, O.B.E.	N. Groundwater, R. Browne, J. Walker.	A. E. Dowe ...	S.	" " "	" " 19.6.38 to 1.9.38	3.9.38
074 †† <i>City of Paris</i> ...	L. Nicol ...	W. G. Stubbs, A. J. Barnett, C. Clark.	G. Fenton ...	"	" " "	" " 14.12.37 to 13.2.38	21.2.38
271 *† <i>City of Roubaix</i>	H. Spencer, D.S.C.	S. G. Hyder, A. H. G. Jones P. R. Winship.	V. H. Davis ...	M.	" " "	" " 6.6.38 to 10.7.38	14.7.38
272 *† <i>City of Singapore</i>	T. R. Watkins ...	L. E. Brook, T. V. Selley, E. E. Mason.	L. J. Delany ...	"	" " "	" " 17.4.38 to 8.6.38	23.6.38
035 *† <i>City of Sydney</i> ...	E. G. Hoppins ...	W. V. Highton, E. M. Robertson, R. M. Hall.	M. M. Burke ...	"	" " "	" " 12.7.38 to 28.7.38	20.8.38
167 *† <i>City of Tokio</i> ...	G. Burton ...	J. H. Aldridge, M. L. Hernan, R. K. Walker.	C. L. Laurence...	S.	" " "	" " 12.5.38 to 16.7.38	19.8.38
136 *† <i>City of Winchester</i>	W. S. Coughlan ...	H. Laird, W. Scott-Craig, H. Lewis.	J. O. Brien ...	"	" " "	" " 24.5.38 to 20.7.38	4.8.38
125 *† <i>City of Windsor</i>	E. E. Bulkeley ...	G. D. B. Davies, N. Bradley, L. E. Smith.	S. J. Harris ...	"	" " "	" " 28.5.38 to 24.7.38	2.8.38
027 *† <i>Clan Farquhar</i> ...	H. G. Pengelly...	J. Browne, J. H. Holman, J. S. Caldo.	J. S. Macpherson	M.	Clan Line Steamers, Ltd.	" " 15.5.38 to 20.8.38	31.8.38
050 *† <i>Clan Macalister</i>	R. W. Mackie...	M. Bruce, J. Hubbard, S. M. Wexley-Easterbrook.	C. J. Andrews ...	S.	" " "	" " 13.5.38 to 2.6.38	8.6.38
222 *† <i>Clan Macdougall</i> , M.S.	C. C. Parfitt ...	B. Grindley, E. R. Cooper, G. Mathieson.	H. A. Croft ...	"	" " "	" " 9.5.38 to 17.7.38	23.7.38
101 *† <i>Clan Macfarlane</i>	H. Andrews ...	F. H. Leigh, R. L. Smallbone, C. Rodgers.	...	"	" " "	" " 24.5.38 to 10.8.38	16.8.38
118 *† <i>Clan Macindoe</i> ...	A. G. Macpherson	W. L. Thomas, A. T. May ...	E. G. Kitt ...	"	" " "	" " 9.5.38 to 22.7.38	27.7.38
082 *† <i>Clan Macnair</i> ...	R. J. W. Bennett ...	T. O. Marr, R. W. Crawford, J. M. Reynolds.	R. F. W. Bafton	"	" " "	" " 26.4.38 to 4.8.38	27.8.38
255 *† <i>Clan Macneil</i> ...	H. E. G. Scott Smith, O.B.E., R.D., Lieut-Commr, R.N.R.	D. Devall, F. Coultas, G. C. Matheson.	W. Hayes ...	"	" " "	" " 7.4.38 to 26.5.38	11.6.38
001 *† <i>Clan Macphee</i> ...	H. C. Simpson ...	R. C. Steel, T. Gillies ...	W. Scott ...	"	" " "	" " 8.5.38 to 21.8.38	25.8.38
168 *† <i>Clan Mactaggart</i>	C. C. Parfitt ...	N. F. Stewart, J. de Garis, T. Gillies.	J. G. Wood ...	"	" " "	" " 6.2.38 to 26.2.38	3.3.38
261 *† <i>Clan MacTavish</i>	R. P. Galer ...	S. R. Woods, J. E. Clayton, A. Clark.	A. M. Forbes ...	"	" " "	" " 5.7.38 to 24.7.38	6.8.38
002 *† <i>Clan Macwhirter</i>	E. E. Arthur ...	A. Woodall, W. P. Creak, R. G. Bagnell.	J. Marshall ...	"	" " "	" " 10.6.38 to 23.8.38	1.9.38
109 *† <i>Clan Morrison</i> ...	B. A. Hardinge ...	M. J. Lewis, K. W. Davies, F. B. Fairweather.	C. Ashcroft ...	"	" " "	" " 25.6.38 to 27.7.38	15.8.38
214 *† <i>Clement</i> ...	R. B. Furneaux ...	T. E. Williams, C. Smethurst	W. H. Rathmell	"	Booth S.S. Co., Ltd.	" " 16.5.38 to 27.7.38	18.8.38

Name of Vessel.	Captain.	Observing Officers.	Senior Wireless Operator.	Meteorological Instrumental Equipment.	Owners.	Logs, Registers, or Records Contributed. 8.6.38 to 6.9.38	Date Last Return Received.
041 *† Clydebank, M.S.	W. Broome ...	C. W. Haycraft ...	...	S.	A. Weir & Co. ...	Fms. 911 & 138 16.4.38 to 18.7.38	2.9.38
084 *† Clydefield, M.S. (tank)	D. A. Law ...	H. Humphries, M. H. Hooker S. H. Platt.	W. J. Fergusson	"	Hunting & Son, Ld.	" " 29.5.38 to 7.8.38	20.8.38
016 *† Comliebank, M.S.	V. Harper ...	H. S. Brown, F. W. Moore, J. S. Soutar.	C. R. H. Jarmy	"	A. Weir & Co. ...	" " 8.3.38 to 21.7.38	6.8.38
Como ...	E. S. Green ...	...	...	M.L.	Ellerman's Wilson Line	...	...
185 †† Comorin ...	C. W. Cartwright, D.S.C.	P. C. Reid, N. H. Thompson, E. J. Spurling.	E. Howard ...	M.-S.	P. & O. S.N. Co.	Fms. 911 & 138 17.4.38 to 20.7.38	25.7.38
*† Consuelo ...	J. L. Sibree, R.D., Capt., R.N.R.	H. Bryan, J. B. Dunkley, G. K. Brooke.	J. Greer ...	S.	Ellerman's Wilson Line, Ld.	{ Fm. 911 6.5.38 to 10.8.38 Fm. 912 15.6.38 to 10.8.38	15.8.38 15.8.38
198 *† Contractor ...	H. Collins ...	R. H. Platts, W. H. Allen, R. Ledger.	E. W. Robson ...	M.	T. & J. Harrison	Fms. 911 & 138 25.3.38 to 20.5.38	27.5.38
258 †† Corfu ...	J. K. Chaplin, R.D., Capt., R.N.R.	J. S. Sutherland, W. T. C. Lethbridge, H. V. Williamson.	R. V. McCreath	M.-S.	P. & O. S.N. Co.	" " 13.3.38 to 15.6.38	27.6.38
191 *† Crispin ...	O. J. P. Lee, R.D., Capt., R.N.R.	W. H. Cross, A. A. Gerrard, S. Pollock.	C. H. Rowe ...	S.	Booth S.S. Co., Ld.	" " 1.4.38 to 11.8.38	20.8.38
*† Culebra ...	P. Cooper ...	...	...	"	Royal Mail Lines, Ld.	...	...
036 *† Cumberland ...	E. A. Burton ...	D. C. M. Campbell, D. H. Chadwick, L. G. Hollis.	E. D. Slater ...	"	Federal S.N. Co., Ld.	Fms. 911 & 138 10.4.38 to 21.8.38	27.8.38
274 *† Custodian ...	D. A. McCallum ...	...	D. J. Murphy ...	M.	T. & J. Harrison	" " 17.1.38 to 31.3.38	5.4.38
*† Dalrym ...	D. J. Jones ...	...	...	S.	Campbell Bros & Co.	...	...
219 *† Dearne ...	T. H. Woodhead ...	C. E. Allen, H. W. Crabtree, C. E. Macarthur.	R. D. Akers ...	"	L.M. & S. Rly. ...	Fms. 911 & 138 4.6.38 to 6.8.38	10.8.38
194 *† Deebank ...	A. S. Reed ...	E. J. Normoyle ...	...	"	A. Weir & Co. ...	" " 12.4.38 to 25.6.38	15.8.38
204 †† Derbyshire, M.S.	G. L. English ...	A. Beharrel, G. Mordaunt, R. Jameson.	D. McLellan ...	"	Bibby Bros. & Co.	" " 10.4.38 to 18.6.38	21.6.38
*† Deucalion, M.S.	W. Beswick, D.S.C., Commr., R.N.R.	A. B. Guppy, Hartley, Holden.	N. F. Brearley ...	"	A. Holt & Co. ...	Fm. 911 25.7.38 to 15.8.38	5.9.38
061 *† Devon ...	J. Blencowe ...	H. C. Turner, H. Watkins, D. Bunn.	C. Lewis ...	M.	British India S.N. Co., Ld.	Fms. 911 & 138 27.1.38 to 22.5.38	6.6.38
*† Diplomat ...	J. J. Egerton ...	J. H. Lowe ...	G. J. W. Williams	"	T. & J. Harrison	" " 16.5.38 to 17.8.38	27.8.38
072 *† Director ...	M. G. O'Brien ...	J. Tooth ...	W. Costelloe ...	"	"	" " 15.5.38 to 10.7.38	5.8.38
115 *† Discovery II., R.R.S.	L. C. Hill, O.B.E., Lieut., R.N.R.	H. Kirkwood, D. D. Bone, M. G. Mackendrick.	A. E. Morris ...	M.L.	Discovery Committee.	Fm. 915 8.2.38 to 4.5.38 Fm. 912 8.2.38 to 4.5.38	8.6.38 8.6.38
096 *† Don ...	C. E. Tree ...	L. A. White ...	J. Orifill ...	S.	Associated Humber Lines.	Fms. 911 & 138 30.10.37 to 18.12.37	23.12.37
058 *† Dorset, M.S. ...	E. R. Kemp ...	T. M. Devitt, D. H. Farmer, J. Cree.	A. Stenning ...	M.	Federal S.N. Co., Ld.	" " 22.3.38 to 10.7.38	14.7.38
142 †† Duchess of Atholl	W. B. Coyle, R.D., Commr., R.N.R.	A. D. Morrison, C. Atkinson, W. R. Thorburn.	E. Murphy ...	M.-S.	Canadian Pacific Steamships, Ld.	{ " " 12.6.38 to 1.9.38 Fm. 912 12.6.38 to 29.8.38	6.9.38 6.9.38
152 †† Duchess of Bedford.	A. R. Meikle, R.D., Capt., R.N.R.	E. J. Oatridge, E. Roberts, L. Davies.	A. O'Sullivan ...	"	"	{ Fms. 911 & 138 5.6.38 to 16.8.38 Fm. 912 5.6.38 to 17.8.38	19.8.38 19.8.38
151 †† Duchess of Richmond.	H. A. Moore, R.D., Capt., R.N.R.	C. H. Belton, R. W. Johns ...	I. F. Yorston ...	S.	"	{ Fms. 911 & 138 28.5.38 to 31.8.38 Fm. 912 29.5.38 to 31.8.38	2.9.38 2.9.38
143 †† Duchess of York	C. Richardson ...	T. E. Sargent, R. Burns, W. Aseroff.	J. W. Potts ...	M.-S.	"	{ Fms. 911 & 138 4.6.38 to 19.6.38 Fm. 912 22.5.38 to 14.7.38	27.8.38 18.7.38
*† Duke of Argyll ...	J. W. Richmond ...	W. Bleakley, S. Goreen ...	...	S.	L.M. & S. Rly. ...	Fms. 911 & 138 27.5.38 to 18.8.38	22.8.38
*† Duke of Lancaster	E. B. Sergeant ...	W. N. Greenwood, E. H. Ashton.	J. M. Davis ...	"	"	" " 6.6.38 to 3.7.38	6.8.38
*† Duke of Rothesay	H. Clarke ...	A. E. Willmott, J. Abram.	G. Pilling ...	"	"	" " 2.6.38 to 31.7.38	5.8.38
098 †† Dunbar Castle, M.S.	A. E. Castle ...	G. W. Laursen, W. F. Smuts, R. H. Payne.	P. P. Williams ...	"	Union-Castle Mail S.S. Co., Ld.	" " 22.5.38 to 25.7.38	28.7.38
*† Dunedin Star, M.S.	G. Owen, R.D., Commr., R.N.R.	P. H. Hunt, J. J. Miller, K. M. Watling.	R. W. D. Benbow	M.	Blue Star Line, Ld.	Fm. 911 4.5.38 to 29.7.38	6.8.38
193 †† Dunnottar Castle, M.S.	R. W. Goodacre, R.D., Commr., R.N.R.	G. E. Stephenson, J. F. Coleman.	O. Blan ...	S.	Union-Castle Mail S.S. Co. Ld.	Fms. 911 & 138 23.4.38 to 14.8.38	18.8.38
043 †† Dunvegan Castle, M.S.	J. C. Simpson ...	C. W. Armstrong ...	A. E. Hunter ...	"	"	" " 14.5.38 to 15.8.38	3.9.38
064 *† Durham, M.S. ...	C. R. Pilcher ...	J. A. Knott, J. F. Clement, E. Porter.	F. Shaw ...	M.	Federal S.N. Co., Ld.	{ Fm. 912 21.12.37 to 16.4.38 Fm. 915 19.3.38 to 16.4.38	4.5.38 4.5.38
*† Eastern Coast ...	W. Quirk ...	R. E. Holt, P. A. Johnson ...	...	M.L.	Coast Lines, Ld.	Fm. 915 1.1.37 to 26.7.37	30.9.37
077 †† Edinburgh Castle	E. H. Thornton, R.D., Capt., R.N.R.	W. F. Palmer, D. Robertson	R. Brew ...	S.	Union-Castle Mail S.S. Co., Ld.	Fms. 911 & 138 11.6.38 to 31.7.38	2.8.38
107 *† El Argentino, M.S.	F. Ellis, D.S.C.	R. Rushton, H. Neale Sherwell, J. A. Everett.	J. Hynes ...	M.	Furness Lines ...	" " 27.6.38 to 15.8.38	19.8.38
183 †† Empress of Australia	C. H. Sapsworth ...	R. Newsam, J. B. Saunders, A. C. Harrison.	J. B. Butler ...	S.	Canadian Pacific Steamships, Ld.	{ Fm. 912 2.5.38 to 3.6.38 Fms. 911 & 138 8.6.38 to 24.8.38	7.6.38 7.8.38
034 †† Empress of Britain.	W. G. Busk-Wood, R.D., Commr., R.N.R.	W. A. Stanley, W. S. Main, E. F. Aikman.	G. Potts ...	"	"	{ Fms. 911 & 138 5.6.38 to 31.8.38 Fm. 912 5.6.38 to 27.8.38	5.9.38 5.9.38
119 †† Erin ...	J. R. Matthews ...	R. De Gruchy, M. N. Faichney, V. Hill.	G. Duncan ...	"	Erin S.S. Co., Ld.	Fms. 911 & 138 29.5.38 to 5.8.38	9.8.38
010 *† Eros (t-e) ...	R. N. Shore ...	J. T. C. Vigurs, H. T. Green, H. E. Lascelles.	W. J. Burnett ...	"	"	" " 12.5.38 to 3.9.38	6.9.38
169 *† Essex, M.S. ...	F. N. Wyatt ...	J. R. Griffiths, R. J. Olsen, N. N. Lawson.	F. W. Ward ...	M.	Federal S.N. Co., Ld.	" " 23.12.37 to 28.3.38	6.5.38
*† Ethrickbank ...	T. Watkins ...	D. Campbell ...	...	S.	A. Weir & Co., Ld.	Fm. 911 22.4.38 to 7.7.38	23.7.38
*† Explorer ...	D. C. Sandison ...	T. R. Ness, J. Craig	...	M.L.	Scottish Fishery Board	Fm. 915 3.3.38 to 9.7.38	20.7.38
*† Fordsdale ...	D. Christie ...	E. Warren ...	...	M.	Shaw, Savill & Albion	...	...
239 *† Foylebank, M.S.	H. J. Smith ...	T. Donaldson, E. E. Thomas, J. Hart.	T. F. Lees ...	S.	A. Weir & Co. ...	Fms. 911 & 138 10.5.38 to 23.6.38	25.7.38
173 †† Franconia ...	G. R. Dolphin, R.D., Commr., R.N.R.	D. W. Austin, J. H. Walker, F. G. Watts.	J. Harvey ...	"	Cunard White Star, Ld.	{ Fm. 912 6.6.38 to 12.6.38 Fms. 911 & 138 4.6.37 to 28.8.37	15.6.38 2.9.37
*† Geddington Court	G. Blacklock ...	W. Newman ...	...	"	United British S.S. Co., Ld.	{ Fms. 911 & 138 8.7.38 to 19.8.38 Fm. 912 8.7.38 to 13.8.38	29.8.38 27.8.38
186 †† Georgic, M.S. ...	E. Edkin, O.B.E., R.D., Capt., R.N.R.	N. Kingscote, R. V. Youd, R. O. Price.	A. Schofield ...	"	"	{ Fms. 911 & 138 16.5.38 to 26.8.38 Fm. 912 15.5.38 to 27.8.38	31.8.38 31.8.38
*† Gilano ...	D. H. Casson ...	...	...	"	Ellerman's Wilson Line.	...	...
234 *† Glaucus ...	B. T. Batho, J. P. Phillips	E. Greenwood, A. Letty, J. Thomas, W. Alderton.	J. F. Denson ...	"	A. Holt & Co. ...	{ Fm. 915 20.12.37 to 17.4.38 Fms. 911 & 138 1.6.38 to 11.7.38	9.6.38 18.8.38
026 *† Glenbank, M.S.	J. Macdonald ...	W. J. H. Pearce, D. S. Morrison, T. M. Williamson.	A. C. Chamberlain	"	A. Weir & Co. ...	" " 26.3.38 to 28.5.38	10.6.38
†† Gretafield (tank)	E. Derricks ...	...	...	S.	Hunting & Son ...	...	...
218 *† Harmonides ...	H. Evans ...	J. K. Gorrie, L. Scott, J. L. Jones.	N. Brewer ...	"	Houston Line, Ld.	Fms. 911 & 138 8.6.38 to 4.8.38	15.8.38
171 *† Hertford ...	T. J. C. Tuckett ...	R. W. Corn, R. T. Birkin, R. G. Hollingdale.	E. Saunders ...	"	Federal S.N. Co., Ld.	" " 20.5.38 to 27.6.38	1.7.38
*† Hibernia ...	J. R. Bulmer, M.B.E., R.D., Capt., R.N.R.	W. E. Meade ...	D. T. Rockey ...	"	L.M. & S. Railway	" " 14.2.38 to 2.7.38	12.7.38
182 †† Highland Brigade, M.S.	R. G. Clayton, D.S.C., R.D., Capt., R.N.R.	J. F. F. J. Swallow, T. Fraser, I. Shearer, T. Hobb.	E. A. Reynolds...	M.-S.	Royal Mail Lines, Ld.	" " 10.5.38 to 27.6.38	1.7.38

FLEET LIST

Name of Vessel.	Captain.	Observing Officers.	Senior Wireless Operator.	Meteorological Instrument Equipment.	Owners.	Logs, Registers, or Records Contributed. 8.6.38 to 6.9.38.	Date Last Return Received.
116 †† <i>Highland Chieftain</i> , M.S.	J. A. Hodges, R.D., Comdr. R.N.R.	D. H. New, Q. Ballardee, F. A. Attenbrow.	T. Desboro ...	M.-S.	Royal Mail Lines, Ltd.	Fms. 911 & 138 20.6.38 to 9.8.38	12.8.38
099 †† <i>Highland Monarch</i> , M.S.	S. Weller ...	W. B. Avison, J. James, J. Shillitoe.	E. F. Weatherhead.	"	" " "	" " 8.6.38 to 22.7.38	27.7.38
230 †† <i>Highland Patriot</i> , M.S.	R. H. Robinson ...	G. E. Leech, J. Green, J. Springall.	M. Carpenter ...	"	" " "	" " 26.5.38 to 11.7.38	15.7.38
250 †† <i>Highland Princess</i> , M.S.	A. R. Murley ...	S. S. Grant, J. A. Weekes, J. Jones.	L. P. Thayne ...	"	" " "	" " 27.4.38 to 20.8.38	30.8.38
*† <i>Hopecrown</i> , M.S.	R. W. D. Gilbertson ...	W. A. Hall, J. Aylwin, W. Georgeson.	" " "	S.	A. Stott & Co., Ltd.	Fm. 911 20.7.38 to 13.7.38	2.8.38
*† <i>Hopepeak</i> , M.S.	J. Hardy ...	R. Atkinson, J. Marshall, E. G. Painter.	W. L. Cowan ...	"	" " "	" " 13.5.38 to 15.7.38	12.8.38
*† <i>Hopestar</i> ...	J. Steward ...	W. A. Watson ...	" " "	"	" " "	" " 4.6.38 to 3.8.38	16.8.38
178 *† <i>Imperial Star</i> M.S.	D. R. Macfarlane ...	H. H. Arton ...	" " "	M.	Blue Star Line, Ltd.	" " 27.12.37 to 19.4.38	13.5.38
260 *† <i>Inanda</i> ...	J. T. Ling ...	E. P. Simmons, J. Bean, B. H. Band.	E. J. Cook ...	"	T. & J. Harrison	Fms. 911 & 138 19.6.38 to 25.7.38	30.7.38
*† <i>Inkosi</i> ...	W. H. Gibbings ...	F. G. La Hive, D. Kerr, V. Harrison	T. Fleetwood ...	M.-S.	" " "	" " 22.5.38 to 25.8.38	31.8.38
144 *† <i>Inverbank</i> , M.S.	A. C. Loads ...	F. H. Cummings, L. C. Smith, J. W. Beveridge.	J. T. Jupp ...	S.	A. Weir & Co. ...	" " 17.2.38 to 26.3.38	25.4.38
*† <i>Isle of Guernsey</i>	F. W. Hodges, R.D., Comdr. R.N.R.	A. Light, G. Pearce ...	T. Stubbs ...	"	Southern Rly. ...	" " 1.4.38 to 3.6.38	6.6.38
*† <i>Isle of Jersey</i> ...	" " "	W. F. Mason, H. Howe ...	T. D. Baron ...	"	" " "	" " 29.4.38 to 11.7.38	12.7.38
*† <i>Isle of Sark</i> ...	R. J. Large ...	H. F. Bremely ...	A. Weselby ...	"	" " "	" " 8.6.38 to 26.8.38	27.8.38
269 *† <i>Ixion</i> ...	R. C. Sturroek ...	E. Jaques, H. S. Clark, J. G. Sibley.	F. Wall ...	M.L.	A. Holt & Co. ...	Fm. 915 14.3.38 to 29.5.38	26.7.38
226 *† <i>Javanese Prince</i> , M.S.	C. S. Smith ...	J. T. Gray, C. J. P. Martin, N. Gale.	J. A. Campbell	"	Furness Lines ...	" " 11.12.37 to 25.3.38	13.5.38
206 *† <i>Karamea</i> , M.S....	E. T. Grayston, D.S.C., R.D., Comdr., R.N.R.	W. Hill, R. L. M. Owen, Dunnett, A. Chandler.	J. M. Tuck ...	S.	Shaw Savill & Albion Co., Ltd.	Fms. 911 & 138 29.1.38 to 16.5.38	23.5.38
262 *† <i>Kemmendine</i> ...	W. C. C. Plage ...	P. McCabe, W. D. Tulloch, J. S. Grassick.	W. Clark ...	M.	P. Henderson & Co., Ltd.	" " 12.6.38 to 24.8.38	31.8.38
190 *† <i>Kenbane Head</i> ...	J. R. Moore ...	W. J. Leinster, J. Green, W. A. Haddock.	A. McCartney ...	S.	G. Heyn & Sons	" " 8.6.38 to 22.8.38	29.8.38
*† <i>Kingston Cyanite</i> S.T.	A. R. Cornish ...	" " "	H. McNamara ...	"	Kingston Steam Trawling Co. Ltd.	" " 8.6.38 to 17.6.38	19.7.38
147 †† <i>Laconia</i> ...	W. C. Battle, D.S.C., R.D., Capt., R.N.R.	R. Conway, J. G. Bradley, L. G. Toone.	W. M. McArdley	"	Cunard White Star, Ltd.	" " 21.7.38 to 25.8.38	30.8.38
240 †† <i>Lancastria</i> ...	C. G. Illingworth, R.D., Capt., R.N.R.	J. T. Jones, O. V. Lucas, G. T. Kavanagh.	S. W. Brown ...	"	" " "	Fms. 911 & 138 29.5.38 to 3.9.38	6.9.38
267 *† <i>Lassell</i> , M.S. ...	G. Scott ...	T. J. Sweeney, J. B. Kennedy, C. E. Legg.	T. T. Allen ...	"	Lampport & Holt Line, Ltd.	Fm. 912 29.5.38 to 10.7.38	20.7.38
083 *† <i>Lautaro</i> , M.S. ...	R. C. Skellorn ...	S. Armitage ...	V. Jones ...	M.	Pacific S.N. Co....	Fms. 911 & 138 1.8.38 to 14.8.38	16.8.38
251 *† <i>Levernbank</i> , M.S.	H. A. Jones ...	D. Robertson ...	P. L. O'Byrne ...	S.	A. Weir & Co. ...	Fm. 912 3.4.38 to 30.5.38	7.6.38
093 *† <i>Llandaff Castle</i> ...	S. F. Newdigate, R.D., Capt. R.N.R.	S. J. Clutterbuck, J. A. Sowdon, W. Anson.	E. H. Pitt ...	"	Union-Castle Mail S.S. Co., Ltd.	Fms. 911 & 138 16.4.38 to 21.6.38	4.7.38
094 *† <i>Llandoverly Castle</i>	F. A. Smyth, R.D., Lt.-Comdr., R.N.R.	J. Tait ...	A. E. Hunter ...	"	" " "	" " 4.7.38 to 31.8.38	5.9.38
097 †† <i>Llangibby Castle</i> , M.S.	E. Spradbrow ...	W. V. L. Burne ...	R. Batchelor ...	"	" " "	" " 12.6.38 to 17.8.38	20.8.38
216 *† <i>Llanstephan Castle</i>	R. Harris ...	R. S. Davies ...	E. A. Shaw ...	"	" " "	" " 30.3.38 to 13.6.38	17.6.38
137 *† <i>Logician</i> ...	W. Jones ...	W. S. Eustance, G. H. Howard, D. V. Jones.	E. G. Carver ...	M.	T. & J. Harrison	" " 27.3.38 to 28.4.38	8.5.38
268 *† <i>Loriga</i> M.S. ...	A. C. Taylor ...	A. Ecclestone, D. W. Hutchinson, A. G. Muir.	F. T. Adams ...	"	Pacific S.N. Co. Ltd.	" " 7.6.38 to 22.6.38	21.7.38
008 *† <i>Losada</i> , M.S. ...	J. V. Langford...	J. H. Allenby...	W. J. Nolan ...	"	" Co., Ltd. " "	" " 3.3.38 to 6.7.38	26.7.38
062 *† <i>Mahia</i> ...	W. T. Thompson ...	D. Ashley, J. Jackson, A. E. Smith.	T. Murphy ...	S.	Shaw, Savill & Albion Co., Ltd.	" " 17.1.38 to 8.4.38	30.4.38
140 *† <i>Mahratta</i> ...	W. Hill ...	G. J. Nuttall, A. G. Gorham	B. Smith ...	M.	T. & J. Brocklebank, Ltd.	" " 19.4.38 to 2.7.38	8.7.38
014 *† <i>Mahronda</i> ...	A. Anderson ...	W. F. Harris, J. B. Newman, V. H. Fraebel.	W. H. Ritch ...	"	" " "	" " 21.5.38 to 13.8.38	20.8.38
015 *† <i>Mahsud</i> ...	D. Ison ...	P. D. McKenzie, H. Simpson, M. R. Melville.	R. Burton ...	"	" " "	" " 17.5.38 to 5.8.38	8.8.38
018 *† <i>Makalla</i> ...	J. Greenall ...	H. Gillespie, P. Bathurst, H. Atherton.	J. S. Wilson ...	"	" " "	" " 26.3.38 to 23.6.38	23.8.38
236 *† <i>Malayan Prince</i> , M.S.	J. Smith ...	J. A. Reeves, J. Baird, J. A. Taylor.	J. S. Sharpe ...	M.L.	Furness Lines ...	Fm. 915 1.5.38 to 3.8.38	11.8.38
195 †† <i>Maloja</i> ...	R. C. Dene ...	J. Simms, L. J. Brown, A. G. Stansfield.	A. Macbeth ...	M.-S.	P. & O. S.N. Co.	" " 29.5.38 to 5.6.38	19.7.38
009 *† <i>Manchester Brigade</i>	J. Barclay ...	T. Downing, G. S. Jones, W. Gough.	J. W. Snowdon	S.	Manchester Liners Ltd.	" " 28.5.38 to 6.8.38	11.8.38
060 *† <i>Manchester Citizen</i>	G. M. Mitchell ...	W. E. Quirek, W. E. Todd, A. A. Meyer.	L. Hooper ...	"	" " "	Fm. 912 25.6.38 to 23.7.38	28.7.38
179 *† <i>Manchester Commerce</i>	J. E. Riley ...	W. H. Downing ...	" " "	"	" " "	Fm. 912 12.8.38 to 28.8.38	7.9.38
187 *† <i>Manchester Division</i>	E. E. Bonmand ...	A. Starmer, M. E. Bewley, W. W. King.	L. Green ...	"	" " "	Fms. 911 & 138 29.4.38 to 19.8.38	31.8.38
253 *† <i>Manchester Producer</i>	G. S. Ronald ...	W. Hine, L. A. Muir, J. L. McLaren.	J. Doyle ...	"	" " "	" " 24.6.38 to 12.8.38	24.8.38
197 *† <i>Manchester Regiment</i>	E. W. Raper ...	G. B. Harrington, R. D. Venn, E. W. Espley.	J. Snowdon ...	"	" " "	Fm. 912 4.6.38 to 1.7.38	15.7.38
146 *† <i>Mandasor</i> ...	A. G. Dixon, R.D., Capt. R.N.R.	W. Robertson, J. B. Leigh, D. M. Edwards.	J. Duffy ...	M.	T. & J. Brocklebank, Ltd.	Fms. 911 & 138 25.3.38 to 27.7.38	12.8.38
213 †† <i>Mashobra</i> ...	P. Taylor ...	L. E. Shiller, D. W. Shaw, H. J. Wright.	H. H. Ridgeway	M.-S.	British India S.N. Co., Ltd.	" " 1.3.38 to 19.5.38	26.5.38
235 †† <i>Mataroa</i> ...	W. H. Hartman ...	R. Grant, F. J. Patterson, Robertson.	J. P. Carey ...	S.	Shaw, Savill & Albion Co., Ltd.	" " 16.4.38 to 21.7.38	25.7.38

Name of Vessel.	Captain.	Observing Officers.	Senior Wireless Operator.	Meteorological Instrument Equipment.	Owners.	Logs, Registers, or Records Contributed. 8.6.38 to 6.9.38	Date Last Return Received
023 *† <i>Matheran</i> ...	W. T. King ...	A. L. Austin, R. Penston, W. Couling.	J. D. Jones ...	M.	T. & J. Brocklebank, Ltd.	Fms. 911 & 138 7.3.38 to 3.6.38	10.6.38
024 *† <i>Matra</i> ...	N. P. Cornish ...	E. L. Jones, F. Moore, G. H. Ellison.	E. R. Capps ...	"	" "	" " 29.6.38 to 23.7.38	22.8.38
126 *† <i>Melmore Head</i> ...	W. Baird ...	R. J. Kidd, E. G. Davey ...	P. C. Catkill ...	S.	G. Heyn & Son ...	{ Fm. 912 " 9.5.38 to 2.8.38	11.8.38
124 *† <i>Middlesex</i> ...	J. Styren ...	E. Gott, S. W. Andrews, G. Sinclair.	S. H. Jones ...	"	Federal S.N. Co., Ltd.	Fms. 911 & 138 10.2.38 to 20.5.38	24.6.38
069 †† <i>Montcalm</i> ...	D. Pert ...	J. Roche ...	S. Biggins ...	"	Canadian Pacific Steamships, Ltd.	{ Fm. 912 " 19.6.38 to 28.7.38	30.7.38
149 †† <i>Montclare</i> ...	W. S. Brown ...	W. J. Roberts, F. Granger, M. L. Lindsay.	H. A. Bowman	"	" "	{ Fms. 911 & 138 26.5.38 to 24.8.38	3.9.38
150 †† <i>Montrose</i> ...	H. J. Ferguson, D.S.C.	D. G. Barr, R. McKillop, A. Richardson.	H. G. Warren ...	"	" "	{ Fm. 912 26.5.38 to 30.7.38	2.8.38
164 †† <i>Mooltan</i> ...	C. M. Roche ...	J. D. Strike, W. H. C. Wood-Roe, R. Bullock-Welsley.	H. Williamson	M.-S.	P. & O. S.N. Co.	{ Fms. 911 & 138 7.8.38 to 23.8.38	27.8.38
196 *† <i>Mulbera</i> ...	W. A. Grant-Pyves ...	J. L. Richardson ...	J. Lovelock ...	"	British India S.N. Co., Ltd.	" " 15.5.38 to 15.6.38	21.6.38
078 *† <i>Myrtlebank</i> , M.S.	C. S. Holbrook ...	C. R. Eaddy, T. H. Welton, L. Wise.	A. W. Mosley ...	S.	A. Weir & Co. ...	" " 18.1.38 to 14.4.38	20.4.38
203 †† <i>Naldera</i> ...	E. P. Parfit ...	H. Cholerton, M. H. D'alith, O. D. Seabrook.	R. T. Soans ...	M.-S.	P. & O. S.N. Co.	" " 22.5.38 to 11.6.38	11.7.38
227 *† <i>Nardana</i> ...	C. E. Dorkin-White ...	T. Braidwood, W. Brown, L. Osborne.	S. V. Knight ...	M.	British India S.N. Co., Ltd.	" " 8.4.38 to 20.6.38	20.8.38
202 †† <i>Narkunda</i> ...	W. D. C. Smith ...	G. L. F. Melville, E. R. Physick, G. A. Wild.	C. W. Herbert ...	M.-S.	P. & O. S.N. Co.	" " 29.5.38 to 31.8.38	6.9.38
†† <i>Nascopie</i> ...	T. F. Smellie ...	T. N. Stanley ...	" ...	S.	Hudson's Bay Co.	Fm. 911 11.7.37 to 27.9.37	16.10.37
162 *† <i>Nestor</i> ...	J. J. Power ...	J. F. Fuller ...	" ...	S.	A. Holt & Co. ...	Fms. 911 & 138 7.6.38 to 24.6.38	6.7.38
154 *† <i>Newfoundland</i> ...	J. W. Murphy ...	C. H. Kenyon, R. Crangle, J. E. Wilson.	J. O'Regan ...	"	Furness Lines ...	{ Fm. " " 29.6.38 to 24.8.38	26.8.38
102 *† <i>New Zealand Star</i> , M.S.	J. B. Hall ...	J. H. Mortimer, G. R. Whitelaw, J. Budge.	J. A. Bradley ...	M.	Blue Star Line, Ltd.	Fms. 911 & 138 20.4.38 to 20.7.38	28.7.38
*† <i>Northern Coast</i> ...	H. Cameron ...	L. Williams, N. Johnston ...	" ...	M.L.	Coast Lines, Ltd.	Fm. 915 8.4.38 to 29.8.38	6.9.38
181 *† <i>Nova Scotia</i> ...	T. Webber ...	W. Lutyens, J. Warren, V. V. Davies.	W. Brock ...	S.	Furness Lines ...	{ Fms. 911 & 138 11.6.38 to 7.8.38	9.8.38
243 *† <i>Opawa</i> , M.S.	F. S. Hamilton ...	T. B. S. Moncrief, F. E. Mitchell, N. A. Thomas.	H. W. Jackson	M.	New Zealand Shipping Co., Ltd.	{ Fm. 912 " 11.6.38 to 24.7.38	9.8.38
172 †† <i>Orama</i> ...	H. J. Sarson ...	W. H. Barker, P. G. A. King, R. S. Mortimer.	M. W. Helman ...	S.	Orient S.N. Co., Ltd.	Fms. 911 & 138 26.1.38 to 12.5.38	1.6.38
080 *† <i>Orari</i> , M.S.	J. G. Almond ...	F. W. Newman, I. P. Pozgate, H. H. Mackillop.	A. J. King ...	M.	New Zealand Shipping Co., Ltd.	" " 3.5.38 to 31.8.38	5.9.38
246 *† <i>Orbita</i> ...	E. H. Large, O.B.E., R.D., Commr., R.N.R.	J. Williams, W. H. Bowen, G. E. Hogarth.	D. H. Sinclair ...	M.-S.	Pacific S.N. Co.	" " 25.4.38 to 30.6.38	14.7.38
087 *† <i>Orduna</i> ...	H. B. Reece, R.D., Capt., R.N.R.	E. C. Hicks, T. J. Naylor, B. Morgan.	W. G. Sutherland	"	" "	" " 14.5.38 to 21.8.38	24.8.38
081 †† <i>Orcades</i> ...	F. R. O'Sullivan ...	J. C. Stratford, R. J. Brittain, S. B. Hickman.	T. Edwards ...	"	Orient S.N. Co. ...	" " 1.5.38 to 3.6.38	10.6.38
148 †† <i>Orford</i> ...	E. P. Cameron, R.D., Capt., R.N.R.	R. J. Craddock ...	J. Macdonald ...	"	" "	" " 3.7.38 to 25.8.38	1.9.38
019 †† <i>Orion</i> ...	A. L. Owens, R.D., Capt. R.N.R.	F. R. F. Wilson, F. K. Manley, E. W. Tucker.	N. A. Boon ...	"	" "	" " 18.4.38 to 12.6.38	15.6.38
174 †† <i>Ormonde</i> ...	A. E. Nicholls ...	T. S. Hardy, L. Sly, E. Charlton.	C. F. Seaton ...	S.	" "	" " 28.3.38 to 23.6.38	8.7.38
055 †† <i>Oronsay</i> ...	Sir C. G. Matheson, D.S.O., R.D., Commadore, R.N.R.	E. N. Mackay, H. Fowler, E. Wathen.	P. T. Darby ...	"	" "	" " 24.4.38 to 28.7.38	2.8.38
085 †† <i>Orontes</i> ...	G. G. Thorne, R.D., Capt., R.N.R.	R. W. Roberts, E. B. Rhead, E. G. Riddelsdell.	M. J. Murphy ...	M.-S.	" "	" " 23.5.38 to 21.8.38	25.8.38
095 *† <i>Oropesa</i> ...	R. E. Dunn, O.B.E. ...	H. Cardley ...	G. Penketh ...	"	Pacific S.N. Co.	" " 31.5.38 to 4.8.38	15.8.38
*† <i>Otaio</i> , M.S.	H. J. Wilde ...	J. Paterson ...	" ...	M.	New Zealand Shipping Co., Ltd.	" " " " " "	"
156 †† <i>Otranto</i> ...	L. V. James, D.S.C. ...	J. D. Kirkwood, W. J. Rice, J. N. Hulse.	J. L. Curry ...	M.-S.	Orient S.N. Co. ...	Fms. 911 & 138 14.3.38 to 14.6.38	23.6.38
070 *† <i>Oxfordshire</i> ...	P. S. Cooper ...	G. W. Dobson, A. Thomson, P. Brennan.	E. Bardy ...	S.	Bibby Bros. & Co.	" " 22.5.38 to 30.7.38	4.8.38
044 *† <i>Pacific Exporter</i> , M.S.	J. Williamson ...	W. Edmonds, R. Holland, G. Killiek.	A. W. Hearnden	"	Furness Lines ...	" " 1.3.38 to 24.5.38	2.7.38
*† <i>Paris</i> ...	E. A. Biles ...	V. G. English ...	C. Kelley ...	"	Southern Rly. ...	" " 13.6.38 to 10.7.38	12.7.38
*† <i>Pentland Firth</i> , S.T.	W. E. Nightingale ...	" ...	" ...	"	Firth Steam Trawling Co. Ltd.	" " " " " "	"
128 *† <i>Port Auckland</i>	R. Williams ...	T. A. Sutton, J. G. Thorn, R. Owen.	N. A. Rutter ...	"	Port Line, Ltd. ...	{ Fms. 911 & 138 30.5.38 to 9.7.38	15.7.38
131 *† <i>Port Darwin</i> ...	T. H. Rigden ...	F. Taylor, H. Knell, J. Peak	A. S. Bassi ...	"	" " " "	{ Fm. 912 25.1.38 to 12.2.38	28.3.38
*† <i>Port Dunedin</i> ...	A. H. Brown ...	" ...	" ...	"	" " " "	{ Fms. 911 & 138 29.4.38 to 3.6.38	18.7.38
163 *† <i>Port Gisborne</i> , M.S.	W. G. Higgs ...	T. B. Milburn, H. Clinch, D. A. Pascoe.	E. Mooney ...	"	" " " "	" " " " " "	"
*† <i>Port Jackson</i> , M.S.	W. Gilling ...	E. W. Dingle, H. Pealing, H. C. Dalziel.	G. Syer ...	M.L.	" " " "	{ Fm. 912 17.3.38 to 30.6.38	6.7.38
*† <i>Port Townsville</i> ...	S. C. Cottell ...	" ...	" ...	S.	" " " "	{ Fms. 911 & 138 10.4.38 to 20.7.38	26.7.38
						{ Fm. 915 " " " "	"

FLEET LIST

Name of Vessel.	Captain.	Observing Officers.	Senior Wireless Operator.	Meteorological Instrument Equipment.	Owners.	Logs, Registers, or Records Contributed. 8.6.38 to 6.9.38.	Date Last Return Received.
177 *† Port Wellington	H. Jeffrey ...	K. D. Morgan, R. G. Russell, R. A. Wight.	R. D. Waterhouse	S.	Port Line Ld. ...	Fms. 911 & 138 4.3.38 to 1.7.38	16.8.38
003 *† Port Wyndham, M.S.	W. J. Enright, R.D., Capt., R.N.R.	L. B. Philpott, L. J. Brice, P. Stansbury.	R. Colbourne ...	"	" " "	{ " " " 10.5.38 to 2.8.38 Fm. 912 1.7.38 to 30.8.38	9.8.38 6.9.38
*† Prague ...	C. Baxter ...	F. Woods, R. H. Wright ...	A. C. Potter ...	"	L. & N.E. Rly. ...	Fms. 911 & 138 2.7.38 to 31.7.38	2.8.38
063 *† Queen City ...	J. C. Cornwell ...	D. Williams, K. Germany, C. S. Whitticombe.	F. Constable ...	"	Sir Wm. Reardon Smith & Partners, Ld.	" " 11.5.38 to 18.6.38	11.7.38
263 †† Queen Mary ...	R. B. Irving, O.B.E., R.D., Capt., R.N.R.	H. Clarke, E. A. Divers, G. T. Marr.	R. L. Thorp ...	"	Cunard White Star, Ld.	{ " " " 3.6.38 to 28.8.38 Fm. 912 16.6.38 to 24.7.38	30.8.38 25.7.38
165 *† Radnorshire, M.S.	T. G. Nivison ...	T. R. Walker, J. Fry, D. D. McIntosh.	I. T. Davies ...	"	A. Holt & Co. ...	Fms. 911 & 138 19.5.38 to 31.7.38	4.8.38
205 †† Rajputana ...	W. A. Cotching ...	M. F. Shute, J. P. McArthur	J. A. Skinner ...	M.-S.	P. & O. S.N. Co.	" " 27.4.38 to 26.7.38	29.7.38
228 †† Ranchi ...	J. A. Smith ...	H. Toon, R. S. Kerridge, D. S. Charles.	W. Stevenson ...	"	" " "	" " 8.5.38 to 10.8.38	15.8.38
224 †† Rangitane, M.S.	H. L. Upton ...	H. J. Brownings, J. R. Vincent, C. D. Pool.	N. J. Hallet ...	"	New Zealand Shipping Co., Ld.	" " 7.3.38 to 12.6.38	30.6.38
217 †† Rangitata, M.S.	E. Holland ...	A. Kirk, R. S. Miller, D. M. Hannah.	H. R. Dedman	"	" " "	" " 6.2.38 to 8.5.38	14.6.38
105 †† Rangitiki, M.S.	H. Barnett ...	I. B. Rose, L. W. Fulcher, J. D. Bennett.	L. Horn ...	"	" " "	" " 29.5.38 to 29.8.38	6.9.38
207 †† Ranpura ...	L. J. Edwards, R.D., Commr., R.N.R.	E. T. Griffith.	J. R. C. Johnson	"	P. & O. S.N. Co.	" " 5.6.38 to 23.8.38	27.8.38
071 †† Rawalpindi ...	J. Elliot ...	L. A. Hill, A. P. Godfrey, W. B. Vickers.	S. W. Sharp ...	"	" " "	" " 19.6.38 to 28.8.38	5.9.38
247 *† Recorder ...	W. Baird ...	L. Seddon, G. H. Jolly, J. Downing.	A. H. Williams	M.	T. & J. Harrison	" " 24.5.38 to 25.7.38	2.8.38
132 *† Reina del Pacifico, M.S.	A. Ridyard, O.B.E. ...	H. Matthews, G. H. Rice J. P. Edwards.	J. B. Stone ...	"	Pacific S.N. Co. ...	" " 12.4.38 to 11.8.38	16.8.38
276 †† Remuera ...	E. B. Lamb ...	R. S. Warren, F. J. Jones, J. P. Fyfe.	J. B. Stockman	S.	New Zealand Shipping Co., Ld.	" " 29.4.38 to 9.8.38	18.8.38
*† Robert F. Hand (tank).	J. A. Collie ...	F. J. Hewitt, ...	... ..	"	Anglo - American Oil Co., Ld.	" " 21.4.38 to 21.7.38	28.7.38
032 *† Rotorua ...	A. E. Lettington, D.S.C.	R. H. Chapman, C. A. T. Shallock, A. P. Allingham.	E. G. Stride ...	M.	New Zealand Shipping Co., Ld.	Fm. 911 30.4.38 to 24.7.38	28.7.38
*† Royal Sceptre ...	J. L. Williams ...	C. P. Bridgewood, M. Dodds	R. Waylett ...	S.	Hall Bros. ...	" " 24.4.38 to 1.7.38	23.7.38
231 *† Ruahine ...	F. W. Robinson ...	E. J. Ormsby, C. W. Roberts, J. A. Matthews.	W. Fordham ...	"	New Zealand Shipping Co., Ld.	Fm. 911 1.3.38 to 16.6.38	30.7.38
*† St. Cathan, S.T.	J. H. Ellis ...	J. H. Ellis ...	M. E. Sandell ...	"	Thos. Hamling & Co. Ld.	{ Fms. 911 & 138 23.5.38 to 27.6.38 Fm. 912 23.5.38 to 27.5.38	30.6.38 30.6.38
*† St. Helier ...	R. Pitman ...	G. Cartwright ...	R. Littell ...	"	G.W. Railway ...	Fms. 911 & 138 7.6.38 to 20.8.38	2.9.38
*† St. Julien ...	L. Richardson ...	T. D. Thomas ...	E. Trapnell ...	"	" " "	" " 2.6.38 to 30.8.38	2.9.38
*† St. Patrick ...	H. C. Bond ...	E. Hawkyard, B. E. Williams	H. B. Dyer ...	"	" " "	" " 23.7.38 to 11.8.38	3.9.38
100 †† Samaria ...	J. McRostie ...	A. Thompson, K. Nicholson, T. T. Sheehan.	R. A. J. Owlett	"	Cunard White Star, Ld.	{ " " " 6.6.38 to 20.8.38 Fm. 912 6.6.38 to 12.6.38	22.8.38 29.6.38
*† San Adolfo, M.S. (tank)	R. Johnston ...	A. Skinner ...	A. Julius ...	M.-S.	Eagle Oil & Shipping Co., Ld.	Fm. 911 27.5.38 to 18.8.38	24.8.38
108 *† San Alberto, M.S. (tank)	C. Vidot ...	W. Goebel, H. Shotton, J. Shaw.	R. S. Evans ...	M.	" " "	Fms. 911 & 138 9.5.38 to 16.7.38	27.7.38
*† San Alvaro, M.S. (tank)	F. A. Kennett ...	H. Harrington, R. M. Atkinson.	D. Brodie ...	M.-S.	" " "	Fm. 911 28.4.38 to 11.6.38	16.6.38
073 *† San Arcadio, M.S. (tank)	S. Perry ...	M. A. Connell, J. S. Burgess, A. P. Shaw.	W. R. Cameron	M.	" " "	Fms. 911 & 138 17.5.38 to 13.8.38	18.8.38
159 *† San Casimiro M.S. (tank)	H. Paterson ...	C. H. Emmerson, E. A. Holloway.	J. E. Jeanes ...	"	" " "	" " 4.6.38 to 30.8.38	3.9.38
*† San Cirilo ...	A. Riddel, R.D., Capt., R.N.R.	E. Dellow ...	... ..	M.-S.	" " "	Fm. 911 9.5.38 to 2.7.38	5.7.38
*† Scotia ...	A. W. Bateman ...	A. C. Borthwick ...	J. H. Rockey ...	S.	L.M. & S. Railway	Fms. 911 & 138 25.4.38 to 28.5.38	16.6.38
170 †† Scythia ...	J. G. Bisset, R.D., Commr., R.N.R.	P. A. Read, R. E. Patchett, R. G. Roberts.	A. F. Porter ...	"	Cunard White Star, Ld.	{ " " " 11.7.38 to 27.8.38 Fm. 912 12.6.38 to 27.8.38	30.8.38 30.8.38
211 *† Shropshire, M.S.	R. S. Evans, O.B.E. ...	A. E. Young, A. E. Evans, G. Washington.	G. C. Talbot ...	"	Bibby Bros. & Co.	Fms. 911 & 138 24.4.38 to 2.7.38	6.7.38
121 *† Siamese Prince, M.S.	E. Hardecastle ...	R. Jones, B. A. Parfitt, C. Blakey, G. Lindsay.	A. Frazer ...	M.L.	Furness Lines ...	Fm. 915 14.3.38 to 22.4.38	9.6.38
*† Silversandal ...	J. Harrison Leask ...	R. W. Cherry, A. Boniwell, T. H. Whiston, R. Fielding.	... ..	"	S. & J. Thompson, Ld.	" " 29.3.38 to 5.7.38	3.9.38
*† Silverwalnut, M.S.	J. Smith ...	H. J. Pursey, J. Eccleston, C. U. S. Butlers.	D. H. Walker	"	" " "	Fm. 915 23.8.37 to 14.12.37	7.2.38
141 *† Somerset ...	N. Rice ...	H. Hill, C. C. Wilson, O. Thomas.	A. G. Peeling ...	S.	Federal S.N. Co., Ld.	Fms. 911 & 138 27.12.37 to 22.4.38	16.5.38
052 *† Spero ...	W. A. Dossor ...	W. S. Hepton, J. R. Atkinson.	B. R. Davy ...	"	Ellerman's Wilson Line, Ld.	" " 11.6.38 to 27.8.38	30.8.38
176 *† Staffordshire, M.S.	W. Logan Foster ...	A. A. Mackenzie, H. J. Inman, C. R. Lovell.	F. G. Blinco ...	"	Bibby Bros. & Co.	" " 9.5.38 to 16.7.38	19.7.38
134 †† Stirling Castle, M.S.	H. R. Northwood ...	E. Triggs ...	G. Scurr ...	"	Union-Castle Mail S.S. Co., Ld.	" " 21.5.38 to 6.7.38	12.7.38
020 *† Stirlingshire, M.S.	A. Mackinlay ...	H. Lockyer, A. M. Kennedy, A. J. Thompson.	W. D. Gooderidge	"	Turnbull, Martin & Co., Ld.	" " 14.6.38 to 4.7.38	16.7.38
047 *† Stockport ...	H. S. Brown ...	M. Dobbs ...	G. Hawkins ...	"	L. & N.E. Rly ...	" " 12.5.38 to 4.8.38	9.8.38
270 †† Strathaird (t-e)...	J. M. M. Tickell ...	G. R. Peters, M. Kent, C. J. Roden.	A. Morris ...	"	P. & O. S.N. Co.	" " 11.6.38 to 25.6.38	27.6.38
210 †† Strathallan ...	J. H. Biggs, R.D., Commr., R.N.R.	A. McHattie, R. H. Danger, R. E. Tucker, J. C. Langdon.	W. Banbury ...	M.-S.	" " "	" " 19.3.38 to 3.9.38	6.9.38
238 †† Stratheden ...	R. Harrison, D.S.O., R.D., Capt., R.N.R.	F. E. French, J. O. Briggs, E. A. Hamilton.	H. S. Horne ...	"	" " "	Fms. 911 & 138 29.5.38 to 19.8.38	22.8.38
039 †† Strathmore ...	E. H. Starling ...	K. S. Kerridge, S. O. Divers, R. A. Perry.	S. W. Mitchell ...	"	" " "	" " 22.1.38 to 28.5.38	31.5.38
059 †† Strathnaver (t-e)	E. P. Lyndon, R.D., Lt.-Commr., R.N.R.	S. E. Edmundson, N. W. Leach, E. R. Rose.	P. R. Hobbs ...	"	" " "	" " 14.5.38 to 18.8.38	20.8.38
229 *† Tactician ...	A. L. Peterkin ...	L. Harriman, R. Myles, R. H. Morris.	W. Harrison ...	M.	T. & J. Harrison	" " 12.6.38 to 20.7.38	27.7.38
*† Talithybius ...	B. R. Stewart ...	... ..	... ..	M.L.	A. Holt & Co. ...	... ..	...
021 †† Tamaroa ...	W. Dawson ...	G. A. Simmers, G. Hawley, O. Moseley.	P. Maloney ...	M.-S.	Shaw Savill & Albion Co., Ld.	Fms. 911 & 138 19.2.38 to 30.5.38	3.6.38

Name of Vessel.	Captain.	Observing Officers.	Senior Wireless Operator.	Meteorological Instrument Equipment.	Owners.	Logs, Registers, or Records Contributed. 8.6.38 to 6.9.38.	Date Last Return Received.
*† <i>Temple Moat</i> ...	A. W. Clinton ...	...	...	S.	Lambert Bros., Ld.	...	...
048 †† <i>Themistocles</i> ...	C. Wood, D.S.C. ...	R. F. Hamilton, J. H. Lindhardt, J. K. Downs.	V. Murphy ...	M.-S.	Shaw, Savill & Albion Co., Ld.	Fms. 911 & 138 9.5.38 to 1.9.38	5.9.38
*† <i>Thistleleglen</i> ...	G. A. Whitfield, O.B.E.	L. H. Williams, G. Dobson, R. S. Collins.	W. A. C. Churchman.	M.	Allan, Black & Co.	Fm. 911 23.4.38 to 11.8.38	2.9.38
161 *† <i>Titan</i> ...	P. J. Pycraft ...	A. Pope, R. H. Carruthers, R. Brown.	H. James ...	S.	A. Holt & Co. ...	Fms. 911 & 138 11.6.38 to 18.7.38	22.8.38
242 *† <i>Tongariro</i> ...	P. B. Clarke, D.S.C. ...	J. S. Hough, P. A. Block, R. A. C. Henderson.	J. F. McNeill ...	"	New Zealand Shipping Co., Ld.	" " 8.3.38 to 1.7.38	5.7.38
<i>Torcello</i> ...	A. Hinchliff ...	H. Grunnill ...	...	M.L.	Ellerman's Wilson Line, Ld.	Fm. 915 1.1.38 to 12.7.38	26.7.38
*† <i>Torr Head</i> ...	D. M. Heddles ...	...	...	S.	Ulster S.S. Co. ...	...	...
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*† <i>Tyndareus</i> ...	D. Hey ...	...	...	M.L.	A. Holt Co., Ld.	...	...
221 †† <i>Tynefield, M.S. (tank)</i>	L. B. Carr ...	E. A. Drummond, L. C. Radford, T. Mallom.	G. Binch ...	S.	Hunting & Son, Ld.	Fms. 911 & 138 21.6.38 to 10.8.38	16.8.38
*† <i>Umtali</i> ...	W. Edwards ...	...	...	"	Bullard King Co.	...	...
088 *† <i>Vandyck</i> ...	P. Symons ...	D. L. Woods, G. E. R. Rawsthorne.	...	"	Lampport & Holt, Ld.	Fms. 911 & 138 5.6.38 to 10.8.38	29.8.38
079 †† <i>Viceroy of India (t-e)</i>	E. A. J. W. Carter, R.D., Capt. R.N.R.	W. H. Waghorn, H. Tee, F. J. Horton.	J. R. S. Kidson	M.-S.	P. & O. S.N. Co.	" " 19.2.38 to 29.5.38	31.5.38
*† <i>Vienna</i> ...	H. Pickering ...	E. A. Tyrrel, R. Greenfield ...	F. Messenger ...	S.	L. & N.E. Rly. ...	" " 10.6.38 to 28.7.38	6.8.38
112 *† <i>Voltaire</i> ...	V. E. Gore-Hickman ...	E. W. Hardie, W. R. Bevin, N. L. Knight.	W. Burnett ...	"	Lampport & Holt	" " 6.6.38 to 20.6.38	23.6.38
004 †† <i>Waipawa, M.S.</i>	J. W. Johnson ...	R. A. Bams, G. Connolly, G. Houchen.	B. A. Long ...	"	Shaw, Savill & Albion Co., Ld.	" " 5.5.38 to 4.6.38	10.6.38
254 †† <i>Wairangi, M.S.</i>	H. R. Gordon ...	I. Collins, E. Sainsbury, C. Beck.	J. P. B. Jeffery ...	"	" " "	" " 26.3.38 to 1.7.38	5.7.38
212 †† <i>Waiwera, M.S.</i>	W. C. Meek, R.D., Lt.-Commr. R.N.R.	M. S. Newton, R. G. James, A. M. Whiteford.	P. Rowley ...	"	" " "	" " 8.5.38 to 8.8.38	12.8.38
056 *† <i>Westmoreland</i> ...	J. H. Oxnard ...	J. M. Taylor, R. C. Robinson, B. H. C. Crowhurst.	J. G. C. T. Barry-Cowerow.	"	New Zealand Shipping Co., Ld.	" " 18.5.38 to 22.6.38	29.6.38
005 †† <i>Windsor Castle</i> ...	Basil Ray ...	H. C. Ford, G. Wooller ...	G. S. Lewis ...	"	Union-Castle Mail S.S. Co., Ld.	" " 4.6.38 to 21.7.38	23.7.38
053 *† <i>Worcestershire, M.S.</i>	J. E. Cullen ...	T. H. Lowe, H. Kerbyson, R. B. McAusland.	R. Brown ...	"	Bibby Bros. & Co.	" " 5.6.38 to 13.8.38	19.8.38
*† <i>Worthing</i> ...	C. G. G. Manton ...	E. W. Smith ...	A. G. Sheppard	"	Southern Railway	" " 1.6.38 to 30.8.38	3.9.38
244 *† <i>Yoma</i> ...	W. Lusk ...	G. D. Barr, J. E. Bury, S. Jackson.	R. W. Wilson ...	M.	P. Henderson & Co.	" " 30.4.38 to 15.7.38	2.8.38
012 *† <i>Yorkshire</i> ...	V. C. P. Smalley ...	H. Davies, G. Neggit, C. H. Sheldrake.	R. C. Wilde ...	S.	Bibby Bros. & Co.	" " 28.3.38 to 1.6.38	7.6.38
<i>Conway, H.M.S.</i>	T. M. Goddard, Commr., R.N.R.	The Senior Cadets ...	...	Cadets M.L.	...	Cadets Met. Log. 24.4.38 to 17.7.38	21.7.38
<i>Pangbourne Nautical College.</i>	A. B. Greig, O.B.E., D.S.C., Capt., R.N.	" " ...	...	"	...	" " 1.5.38 to 25.7.38	28.7.38
<i>Worcester, H.M.S.</i>	G. C. Steele, V.C., Commr., R.N.	" " ...	...	"	...	" " 7.5.38 to 28.7.38	3.8.38
<i>Watling Island</i>	...	The Keepers ...	...	Lighthouse Register	...	Lighthouse Regist'r 11.7.37 to 29.7.38	22.8.38
<i>Cape Pembroke... (Falkland Is.)</i>	...	" " ...	...	"	...	" " 1.1.38 to 30.6.38	10.8.38

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

Name of Vessel.	Captain.	Observing Officer.	Owners.	Received at Government Chemist, London.
<i>Atlantian</i> ...	E. W. Jones ...	A. E. Rogers ...	T. & J. Harrison ...	30 Water Samples, 23.7.38
<i>Dakarian</i> ...	A. D. Erown ...	W. P. Baker ...	" " ...	30 " " 28.7.38
<i>Darian</i> ...	W. Rowberry ...	R. F. Hart ...	" " ...	30 " " 19.5.38
<i>Daytonian</i> ...	J. M. Crowley ...	S. Richardson ...	" " ...	30 " " 20.6.38
<i>Hilary</i> ...	L. Evans ...	H. Sapsworth ...	Booth S.S. Co. Ld. ...	60 " " 2.6.38

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MEMORANDUM

NO. 100

1917

MEMORANDUM FOR THE RECORD

DATE: 1917

TO: THE METEOROLOGICAL COMMISSION

FROM: [Name]

SUBJECT: [Subject]

[The following text is extremely faint and largely illegible. It appears to be a memorandum detailing a report or findings related to meteorology, possibly concerning a specific event or data set. The text is organized into paragraphs and includes some numerical data points.]

1917

The following is a summary of the results of the investigation...

[The text continues with a detailed summary of findings, including observations and conclusions. The handwriting is very light, making it difficult to read specific details.]

Approved: \_\_\_\_\_

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Approved: \_\_\_\_\_

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