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EXAMINATIONS FOR MASTERS AND MATES.

THE Report of the committee appointed by the Right Honourable Sir PHILIP CUNLIFFE-LISTER, K.B.E., President of the Board of Trade on Examinations of Masters and Mates has recently been published, it is of great interest to the Merchant Navy and can be obtained from H.M. Stationery Office, price ninepence.

The committee which was representative of the Officers of the Merchant Navy, Trinity House, Shipowners, the Admiralty and Board of Trade have reported upon:—

- The History and Legal Status of the Examinations.
- Staff and Duties of Examiners.
- Grades and kinds of certificates issued.

Their recommendations deal with:—

- System of Examination including Examination Staff.
- Syllabus for each grade.
- Arrangements of examinations.
- Sea Service required of Candidates.
- Summary of Recommendations.

Two Appendices deal with Wireless for Deck Officers and Bibliography.

The committee state—

“Our aim throughout has been so to design the syllabuses that candidates shall be led to work intelligently and not as machines. Much of the substance of the examinations is not, or should not be, a matter of book knowledge, but should be acquired by the observation and commonsense of candidates of average intelligence during

their sea experience. The syllabuses are intended to be directive, so that, when placed in the hands of a prospective candidate for a certificate of competency, they may prove a useful guide as to the kind of knowledge and experience he requires in order to become efficient in his profession. In this way we feel that we can make an important contribution to the problem of training, without in any way going beyond our terms of reference.

“The syllabus for Second Mate includes a ‘Knowledge of Principles’ paper intended to test the candidates grasp of fundamental technical ideas and processes required in his work at sea.”

Those parts of the syllabus which deal with Marine Meteorology, Oceanography, etc., are of particular interest to the Corps of Marine Observers, they are as follows:—

Second Mate (Foreign-going).

Oral and Practical.

To read and understand a barometer, thermometer, hydrometer and hygrometer. (The instruments supplied by the Meteorological Office will be taken as standard.)

First Mate (Foreign-going).

Paper (written).

(a) The principles of the barometer. How to read it and reduce the readings to standard datum.

(b) How to observe the force and direction of the wind with no other instrument than the compass and use of the Beaufort scale.

(c) How to observe and log the state of sea and swell weather and visibility by the International scales for the use of seamen.

(d) The principles and use of the thermometer, dry bulb, wet bulb and sea surface.

(e) Use of the hydrometer.

(f) General knowledge of the wind and current systems of the oceans. How to deduce the set and drift of currents.

(g) The Laws of Storms. BUYS' BALLOT'S Law. Rules for handling ships in tropical revolving storms. The seasons and localities of tropical revolving storms and their precursory signs.

(h) The Visual Storm Warning signals.

(i) The seven fundamental types of weather.

(j) The elementary principles of synoptic charts, including a knowledge of how the atmospheric pressure distribution and gradient is obtained. Principal cloud types.

(k) To draft a wireless weather report and how to decode a weather report made in the International Weather Code, the tables being provided.

Master (Foreign-going).

Paper (written).

Ocean pilotage, i.e., general knowledge of winds and currents, and the selection of routes according to season. Icebergs, ice signals and ice navigation.

To be able to plot observations of ships and coast stations received by wireless, and to construct a simple weather chart.

To understand the use of the observation of the change of the barometer by single and collective observations; and to make deductions as to probable changes of weather along the proposed track of his ship.

A general knowledge of the system of wireless weather signals (*when* one International system is brought about).

Extra Master.

A paper on General Science, including Mechanics, Hydrostatics, Heat, Light and Sound.

The Navigation paper includes "Description and use of all apparatus to safeguard navigation in the open sea and coastwise."

Theory of tides, etc., there is a paper on Chart construction and Marine Surveying and another on Oceanography and Economic Geography, including:—

A fuller knowledge of meteorology and meteorological instruments than that required for Master. Winds, currents, ice limits, etc., for the globe. General characters of the sea's deeps, surface temperatures, surface densities.

Oceanic circulation. Floating ice.

The Bibliography recommends to intending candidates THE MARINE OBSERVERS HANDBOOK and WIRELESS AND WEATHER AN AID TO NAVIGATION.

Thus the Corps of Marine Observers may look forward to a greater interest throughout the British Merchant Navy in the work which they as specialists are doing in the interests of the sea service and the community as a whole.

THE OLDEST BRANCH OF THE WORK.

Its Purpose, and Possibility of Acceleration.

IN our note, The Wind Systems of the Oceans, in the MAY, 1928, number, we gave some reasons for pressing on with the Charting of the Oceans—the oldest branch of the work—and in the November, 1928, number Mr. BARLOW completed his series of articles upon the Trade Winds. These show how necessary a vast number of reliable Marine Meteorological Observations made at sea in all parts of the world and assembled in a workable manner are for the general purposes of Marine Meteorology. As Intelligence of Weather, Tides, Currents and Ice with Wireless Communication becomes more an aid to safety of life at sea and in the air over the sea, so the need for workable Marine Meteorological data is increasing.

When MAURY commenced the work of charting the oceans he soon found that it was of such a magnitude that no one nation could complete the task and the BRUSSELS INTERNATIONAL CONFERENCE of 1853 was convened at his suggestion. In 1854 Admiral FITZROY commenced the work in England and other maritime nations did likewise. The form of Meteorological Log now in use in the British and other services is based upon International agreement arrived at at early conferences; the log has gradually changed with modern development but the principles and elements remain the same. The extraction, computation and exchange between nations of Marine Meteorological data in sufficient volume has proved to be beyond the capacity of the Marine Divisions concerned because sufficient computers could not be employed.

Modern electrical engineering has now provided the means whereby the same number of computers in the Marine Divisions concerned can supply the necessary vast accumulation of workable data from the logs to complete the charts of the oceans and to meet the general requirements of Meteorology. With a view to giving all concerned information of a system which has been worked in the British Marine Division with success since 1921 and so that other Marine Divisions may, if they wish, have the benefit of our experience, Mr. H. T. SMITH wrote an article in the JANUARY, 1928, number describing the whole system, the machines and code used, the developments in the machines since the system was adopted, and how with some small modification in the code it would be possible to print the data, fixing the position of the observations so accurately that they could be used for synoptic charts.

Upon his recent visit to Europe, Professor MARVIN, of the Weather Bureau of the United States of America, was so good as to pay us the compliment of making a personal examination of this system in the Marine Division, and as he and others have expressed the wish that the changes which we find necessary should be made known early, we now publish another article entitled

"Proposed Improvements in Mechanical Extraction and Compilation of Data to overcome ambiguities in printing." We hope by publishing this article with the code which we propose to adopt on January 1st, 1930, if there are other Marine Divisions who can see their way to work such a system with the machines in use in their countries, that they may be able to adopt such a code as will make for convenience in exchanging data. It must not be forgotten that the British data cards only contain observations made with tested instruments and that no observation is punched upon a card when its accuracy is in doubt. Suggestions will be welcomed. We hope that any who may wish to make suggestions will send them along as soon as possible, so that if there are any who contemplate adopting a mechanical system we may give all possible assistance desired and have ample notice before our proposed changes are made on January 1st, 1930.

In 1921, when we adopted the system, we published its description upon the back of the August North Atlantic Chart, No. 245, and this published account was read by our friend Lieut.-Commander P. M. VAN RIEL, R.H.M., of the Dutch Meteorological Office. A little later Holland adopted a similar mechanical system, using a code not exactly identical but similar, which has made exchange between the British and Dutch Marine Divisions possible without undue clerical labour since 1922, to mutual advantage. We hope that the publication of these articles this year may be the means of multiplying the good work in which Great Britain and Holland have been partners of recent years.

This revised code now published for information has been modified in consultation with the Dutch Meteorological Office. It will not be brought into use until after consideration of opinions received up to June 1st, 1929. As it will take six months to prepare for the change, involving as it does final decision, the printing of new cards and the provision of separate stowage for the new series all who wish to have proposals considered are asked to forward them so that they will reach us by the date above-mentioned, June 1st, 1929.

By the end of 1929 there will be no ullage in the stowage provided for the present series of cards so that on January 1st, 1930, we must provide a new set of specially constructed lockers and thus that date is most convenient for any change of code. The Dutch Marine Division who had proposed making changes in code earlier have agreed to wait until that date, so that if uniformity is to be obtained the time is most opportune.

British Seamen have carried ideas to all parts of the World. Marine Observers can assist in bringing about a better understanding by bringing this matter to the notice of those who are concerned in the Dominions and in Foreign Countries with whom they come in contact.

OCEAN CURRENTS SOUTH OF AUSTRALIA.

IN this number we publish the charts for the first quarter—February to April—of currents on the trade routes to the Southward of Australia, and Commanders are reminded of our request on page 3 of the JANUARY number.

Remarks of their experience, particularly if generalised from their careful observation of currents and weather during years spent in navigating these waters, will be of great assistance to navigators in future and will help us to bring out facts which might be overlooked in compiling these charts and the usual article at the completion of all four quarters.

Charts and information skilfully compiled from a great collection of data covering 18 years give valuable information. If this is combined with the independent and carefully considered views of

those on the spot who have all the real difficulties of navigation and current estimation constantly to deal with, then this knowledge, the result of both individual practical experience and the systematic charting of collective data, together with such well considered theory as can be applied, will produce the very best information which can be obtained at the present time.

All Commanders of ships who have used these routes are invited to send in immediately their remarks and any actual observations of currents made between 1910 and 1928, for the months May to December and January which they may not have previously returned.

MARINE SUPERINTENDENT.

11th December, 1928.

THE MARINE OBSERVER'S LOG.

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

Responsibility for statements rests with the Contributor.

BROKEN SEA.

Caribbean Sea.

THE following is an extract from the Meteorological Report of S.S. *Port Melbourne*, Captain J. J. HUDSON, Colon to London, Observer, Mr. W. E. SIMPSON, 3rd Officer:—

"March 18th, 1928, at 11.20 a.m., a line of 'white horses' resembling breakers stretching from horizon to horizon E. and W. was crossed. A moderate sea was experienced, then a short tumbling sea rather rough about 100 yards across and then the moderate sea as formerly. Steering by Gyro Pilot 053°, for an hour previously had been making a degree to windward but whilst in the short sea took a yaw and then settled down to 053°—as per recorder.

"Noon Position, Latitude 13° 31' N., Longitude 74° 03' W., course 54°, speed 11.5 knots."

BROKEN WATER AND CURRENT RIP.

North Pacific.

THE following is an extract from the Meteorological Report of S.S. *Tyndareus*, Captain W. CHRISTIE, Victoria B.C., to Yokohama, Observer, Mr. T. R. PHILLIPS:—

"March 7th, 1928, 11 a.m., A.T.S., Latitude 35° 28' N., Longitude 141° 09' E. Course 236° at 12½ knots. Entered an area of very confused and troubled water. The sea running at the time, breaking off short and flying into the wind 11.15 a.m., A.T.S. Wind veered to North and vessel passed across a line of eddies and swirls. As soon as the vessel's bow was across this line she came rapidly to starboard despite the fact that the helm was almost hard-a-starboard. As soon as the stern cleared the line, vessel came back to her course rapidly. The line was clearly defined and ran in an East and West direction. Sea Temperature at 11.15 a.m. 55°. Specific Gravity 26¼."

LANES OF SHINING WATER.

North Atlantic Ocean.

THE following is an extract from the Meteorological Report of S.S. *Dominic*, Captain C. SAXTON, Lisbon to Ceara. Observer, Mr. J. A. MOON, 3rd Officer:—

"With reference to *Nardana's* remarks entitled 'Lanes of Shining Water' published in THE MARINE OBSERVER for April, 1928, Vol. V, No. 52, page 65, on the 21st March, 1928, in Latitude 17° 00' N., Longitude 26° 00' W., during the hour of 9.30 a.m. to 10.30 a.m., the same phenomenon was produced upon the surface of the water by the action of the vessel passing through it, causing the wake of the vessel to assume a smooth and shining appearance as though coated with oil, and visible for a distance of from two to three miles. This phenomenon was under observation for about an

hour, at which time it became patchy, finally dissolving altogether. There was a slight following sea and moderate swell running at the time."

CURRENT.

Red Sea.

THE following is an extract from the Meteorological Report of S.S. *Otranto*, Commander H. G. STAUNTON, C.B.E., R.D., R.N.R., Colombo to Suez. Observer, Mr. O. C. DAVIES, 3rd Officer:—

"A very strong current was experienced between 'Perim Island' and 'Abu Ail' in the Red Sea. Passing Perim at 11.09 p.m., A.T.S., on 27th March, the current set N 21° W. (T) 1.9 miles per hour to Abu Ail, the wind being S.E. force 5."

WEATHER AND CURRENTS.

Approaching Minikoi from the West during N.E. Monsoon.

THE following is an extract from the Meteorological Report of S.S. *Laomedon*, Captain W. BESWICK, D.S.C., Suez to Penang. Observer, Mr. H. A. STANDFIELD, 3rd Officer:—

"On the evening of 31st March, 1928, after the usual fine weather and clear skies of the Arabian Sea during the N.E. Monsoon, we observed lightning playing in the clouds on the Eastern horizon, the temperature of the air rose 2° F. and the sea 3° F., while the feel of the air became decidedly sultry, the wind entirely dying away.

"The morning of the 1st April brought light and scattered showers until the evening when upper clouds (A-St) began to show and the Cu-Nb clouds became much heavier, winds light and variable falling to calm with hot sultry atmosphere, although the temperature did not actually rise. The lightning after dark on 1st April, mostly sheet, was vivid all round the horizon while the rain showers became frequent and heavy. From 10 p.m. to 11 p.m. we had an extremely heavy rainsquall with thunder and lightning.

"2nd April opened with the air still sultry and rain showers all round but apparently clearing. At 8 a.m. we observed two water-spouts, one to the north, complete but weak at about three miles and one to the east at about five miles, thick set from the cloud, but we could see no joining from the sea. Rain set in again after sunset following a fine but cloudy day, winds still light and variable, air sultry. All the rain showers on 2nd April appeared to have their own winds causing quick and frequent changing while separate squalls were travelling in all directions, suggesting that this may have been the centre of the rain belt or system which we were experiencing, especially as on 3rd April the weather became quite fine with light W. to S.W. winds and a dry, clear atmosphere.

"Approaching Minikoi Island on 1st April we experienced a current setting S. 27° W. at about ¾ kt., while to the East of Minikoi the current set N. 47° E., at about ½ knot."

TROPICAL CYCLONE.

South Indian Ocean.

THE following is an extract from the Meteorological Report of S.S. *Moldavia*, Captain C. W. BURLEIGH, D.S.O., R.D., R.N.R., London to Sydney. Observer, Mr. W. L. DÖBBIN, 4th Officer:—

“At 8 p.m. on 21st March, 1928, the vessel being in Latitude D.R. 10° 11' S., Longitude D.R. 94° 36' E., the weather was overcast with frequent heavy rain squalls and an increasing S.S.W. sea and swell. Wind S.S.W. force 4-5, Barometer 29.67 in. From this time to 11 p.m. the force of the wind increased and the barometer fell, the sky becoming heavily overcast and the visibility poor with heavy rain, all the signs of an approaching cyclonic disturbance being evident. At 11.17 p.m. the course which had previously been S. 36° E. true was altered to East true, thus bringing the wind on the Starboard quarter. By midnight the wind force had increased to 7, continuous rain with frequent heavy squalls prevailed, the barometer had fallen to 29.58 in. Temperature 78°. From then, this weather continued with the addition of lightning all round the horizon accompanied by occasional peals of thunder, until 2.45 a.m. when the wind commenced to veer to the west and the barometer steadied up. By 4.0 a.m. the wind had veered to W.N.W. force 7, with the barometer at 29.40 in. the lowest point reached, Temperature 78°; after 4.0 a.m. the barometer continued to rise and the wind to veer, and the ship was gradually brought round to her original course, until at 8.0 a.m. the barometer stood 29.54 in. Temperature 82° and the wind was N.N.W. force 6, with the ship rolling easily to a rough and confused sea and swell.

“After 8 a.m. the wind force slowly decreased while the wind continued to veer and the barometer steadily rose.”

21st March.	Barometer	Temp.	Wind	force
8.0 p.m.	29.67 in.	80	S.S.W.	4-5
10.0 ”	29.57 ”	”	S.W. x W.	5-6
11.0 ”	29.57 ”	”	S.W. x W.	5-6
Midnight	29.58 ”	78	S.W.	7

22nd March.	Barometer	Temp.	Wind	force
1.0 a.m.	29.54 in.	”	S.W.	7
2.0 ”	29.48 ”	”	S.W. x W.	6-7
3.0 ”	29.42 ”	”	West	7
4.0 ”	29.40 ”	77	W.N.W.	7
5.0 ”	29.42 ”	”	N.W. x W.	7
6.0 ”	29.44 ”	”	N.W.	6-7
7.0 ”	29.50 ”	”	N.W. x N.	6
8.0 ”	29.54 ”	82	N.N.W.	6
10.0 ”	29.63 ”	84	N.N.E.	5

Position at noon March 22nd, 1928, Latitude 11° 39' N., Longitude 97° 47' E.

WEATHER AT WALVIS BAY.

February to April, 1928.

THE following is an extract from the Meteorological Log of H.M.S.A.S. *Protea*, Lieutenant-Commander J. DALGLISH, S.A.N.S., surveying South African Waters. Observer, Sub-Lieutenant A. C. MATSON, S.A.N.S.

“During the period of three months in which H.M.S.A.S. *Protea* was surveying Walvis Bay, the general observations of the weather were as follows:—

“During February and March, commencing about 0000, heavy dew, gradually becoming misty with poor visibility lasting until about 1000 to 1200, when S.S.W'ly wind commenced and mist cleared. During the latter part of the day, visibility was good.

“During April, the weather was generally clear all day and the S.S.W'ly wind was not as strong in the afternoon as in the preceding months. Also easterly winds and high temperatures were experienced during April.

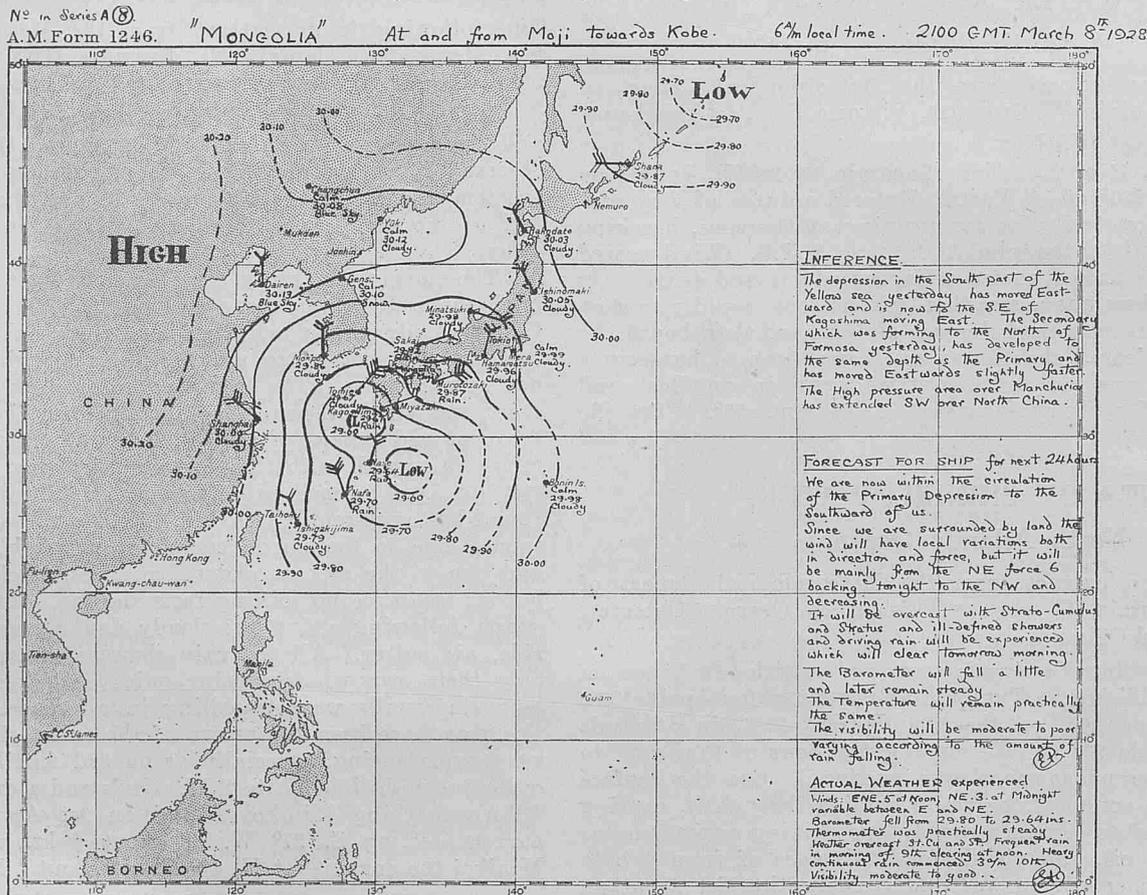
“The maximum and minimum temperatures were:—

Month.	Maximum.	Minimum.
February	75° F.	55° F.
March	71° F.	54° F.
April	97° F.	58° F.

WEATHER CHART MADE AT SEA.

Far Eastern Waters.

Weather Chart (one of a series) made on board S.S. *Mongolia*, Captain G. H. S. FURLONG, R.D., R.N.R., by Mr. E. ALLEN, Midshipman.



EXCEPTIONAL MIRAGE.

Chusan Archipelago, China Sea.

THE following is an extract from the Meteorological Log of M.V. *Glenamoy*, Captain C. E. HOMAN, Shanghai to Hong Kong. Observer, Mr. R. H. BISHOP:—

“ 1st March, 1928, at 6.30 a.m. (Standard Time), approaching Barren Island and subsequently throughout the day abnormal mirage was observed as vessel proceeded East and South of Chusan Archipelago.

“ Briefly the general effects may be enumerated as follows:—

- (1) Elevation of distant objects (especially small islands, craft, etc.) that rendered them visible at extraordinary distances.
- (2) Mirage of different forms—inverted and non-inverted—on one, two or more planes.
- (3) Distortion, *i.e.*, elongation and ‘concertina’ effects.

“ The details and sketches appended are given as typical of the extraordinary conditions obtaining from 6.30 a.m. till dusk when a dense fog reduced visibility to zero. Difficulty has been experienced in description by reason of the varied and rapid changes of the Mirage effects.

“ 10.05 a.m.

Brothers Island (20 ft.) sighted as two high pinnacle rocks S. 39° W., distant 26½ miles.

“ 10.40 a.m.

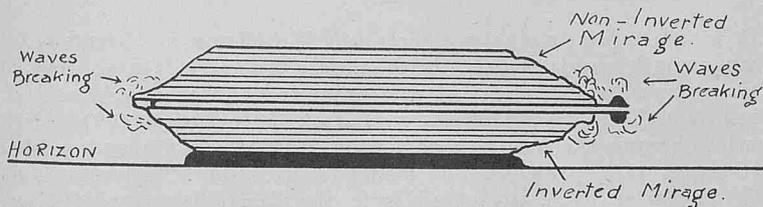
Lukon Island (313 ft.) bearing West 13 miles, upper half hidden by mist, lower half visible inverted and elevated with line of waves breaking on foreshore, also inverted. On ascending from the navigating to flying bridge, the line of waves breaking was lost sight of, half way up the ladder, at once coming into view again on descending.

“ 11.00 a.m.

Observed Tong Ting Island and Light House (180 ft.) S. 44° W., distant 43½ miles, normal in shape, not inverted, but well elevated.

“ 11.35 a.m.

Sisters Island (30 ft.) being S. 58° W., distant 15½ miles, appeared with inverted and non-inverted mirage, superimposed, as in sketch.



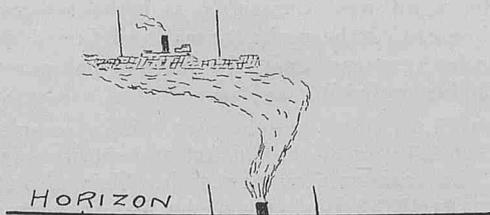
“ Noon.

Latitude 30° 14' N., Longitude 123° 04' E. Barometer 1010.7 mb. Temperature, Air 54.7° F., Sea 53° F. Clouds A-St/A-Cu., cloud amount 3. Wind S, force 1. Slight confused S.E. swell and smooth sea.

“ 1.45 p.m.

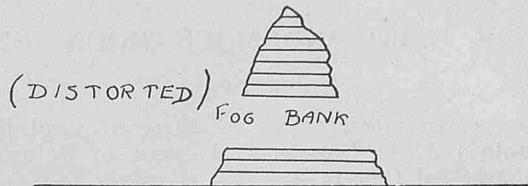
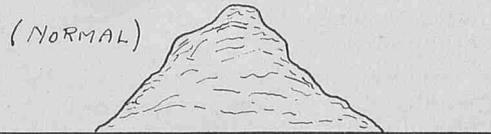
Steamer sighted on starboard bow, masts and funnel visible only.

A complete projection of ship, deck houses and hull all visible, was seen above and astern apparently carried by the smoke.



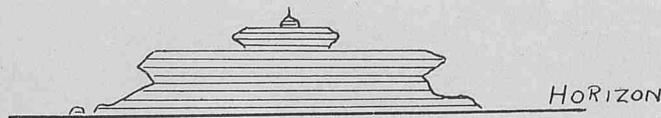
“ 2.50 p.m.

Tan Hwa (1,792 ft.). Peak bearing West 30½ miles was frequently distorted and appeared half as high again, as fog banks moved across its slopes.



“ 4.50 p.m.

Tong Ting, bearing N. 12° W., 21½ miles, appeared surmounting a mirage of itself on four planes.



“ Throughout the day, numerous and peculiar effects were witnessed and, though every endeavour was made to note the most interesting, it is considered that the previous remarks convey but little of the extent and range of the phenomena.”

MIRAGE.

West Coast of Africa.

THE following is an extract from the Meteorological Report of S.S. *Egori*, Captain P. SOLA, D.S.O., Sekondi to Avonmouth. Observer, Mr. F. J. CROFT, 3rd Officer:—

“ 8th March, 1928, from Bathurst, River Gambia, towards Dakar. Latitude 13° 27' N., Longitude 16° 34' W., at 1.00 p.m., A.T.S. Mirage observed almost completely around horizon. Over the land the mirage was most clear. The trees were seen inverted besides being visible ordinarily. Above the inverted trees there were apparently yellow patches (probably sand) and above these a thin dark line varying in thickness. The mouth of the R. Jumbas was clearly indicated by the reflection of its banks. Over the sea it appeared like a raised horizon with a light blue patch between.

“ The trees and inverted trees appeared to be moving N. The mirage was most pronounced to the N. and E. (over land) and very slight to the S. Average height 14 feet. Barometer 29.89 in. Temperature, Air 68°, Sea 66°. Wind N. by E., force 2. Sea depth about 8 fms. Clouds Cirrus, amount 3.

Ship's Position, 10' N.W. (T), Fairway Buoy, River Gambia. Mirage cleared 2.30 p.m.”

DOUBLE SOLAR HALO.

Caribbean Sea.

THE following is an extract from the Meteorological Report of S.S. *Hertford*, Captain D. URQUHART, Panama to Southampton. Observer, Mr. J. R. RICKETTS, 3rd Officer:—

“ 27th March, 1928, at 10.40 a.m., A.T.S., in Latitude 13° 25' N., Longitude 74° 42' W. Barometer 29.92 in. Temperature 81° F. Wind E.N.E., force 4. Observed well-defined Solar Halo, showing the colours of the spectrum (inner edge red, followed by orange, yellow, greenish light blue and bright bluish white at outer edge) with a radius of 22°. Breadth of spectrum 1°. Light rectangular layers of Ci-St. appearing to travel from the South and light Cu. coming up from the E.N.E. 11.35 a.m.: Second arc of smaller brilliancy appeared below the Halo with a radius of 47°, the Halo

now having attained a great brilliancy. 11.45 a.m.: The small arc disappeared and as the Sun reached its zenith the colours of the Halo became faint and turning into white, but with a red and orange inned edge. Ci-St. clouds diminishing and Cu. becoming heavier. These conditions with well-defined Halo with faint colouring lasted until 2.30 p.m. when the Halo became obscured by Cu. clouds and disappeared."

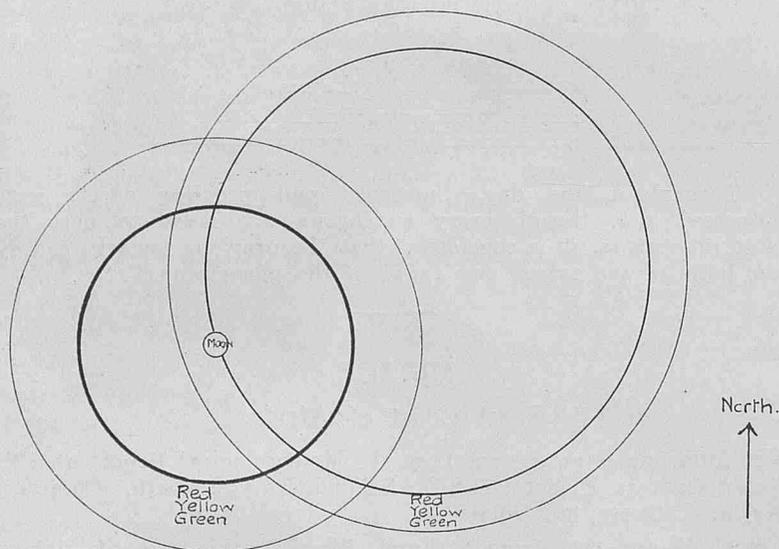
NOTE.—The complete Halo of 22° radius is the one commonly observed. The interest of this observation lies in the portion of the larger Halo of radius 47° , which is of very much rarer occurrence.

LUNAR HALO AND MOCK MOON RING.

China Sea.

THE following is an extract from the Meteorological Log of S.S. *Elpenor*, Captain A. L. GORDON, Yokohama to Dalny. Observer, Mr. J. E. CLIFF, 3rd Officer:—

"29th March, 1928, 9.30 p.m. to 10 p.m., in Latitude $38^\circ 10'$ N., Longitude $122^\circ 15'$ E. Observed well-defined double lunar halo—one



with moon as centre, other passing through moon, with its centre bearing East of moon, and its circumference parallel to horizon. Outer halo much larger than inner one. Colouring red (next to moon), yellow and green clearly visible in inner halo and faint in outer one. Weather fine and clear. Wind S'y, force 1. Temperature, Dry Bulb 39, Wet 37. Barometer 1020.1 mb. Very faint cirro-stratus, amount 1. Slight hazy appearance around horizon, but visibility exceptionally good, lights of Dalny approach appearing eight to ten miles outside range as though miraged."

NOTE.—The smaller halo observed was probably the ordinary lunar halo of radius of about 22° . The observation of the larger halo parallel to the horizon, the mock moon ring, is of great interest since outside of polar latitudes where halo phenomena are more frequent and striking, the entire ring is only occasionally seen. Even when the sun is the source of light the ring is described as colourless and as the colours shown above were seen with the moon as the source of light, the conditions must have been abnormally favourable for halo production.

BRILLIANT RAINBOW.

North Atlantic.

THE following is an extract from the Meteorological Log of S.S. *Culebra*, Commander C. E. RATHKINS, R.D., R.N.R., Cape Haitien to Havre. Observer, Mr. R. N. FLETCHER, 2nd Officer:—

"30th March, 1928, 5 p.m., A.T.S., Latitude $44^\circ 37'$ N., Longitude $18^\circ 46'$ W. Exceedingly brilliant rainbow with a supernumerary and a secondary bow passed over ship. The primary bow formed approximately five-eighths of a circle when close to and, at time of observing, had a radius of 25° showing red, yellow, green, blue and violet, red having the maximum luminosity and being the broadest. The yellow and green merged one with the other and as regards brilliancy came next to the red. The remaining colours were well defined. The supernumerary and secondary bows formed at an angular distance of approximately 8° below and above the primary bow, and both showed orange, yellow and green and a darker colour hardly discernable, these colours with the exception of the last-named were about half as brilliant as those in the primary bow and not so well defined. All three arcs were concentric and continuous one with the other.

EAST INDIANMAN SHIP "GLORIANA."

THE photograph on the opposite page was taken by Professor MUIR at the request of Captain C. BROWN of the Royal Technical College, Glasgow, where this interesting model caught my eye when attending the last of the meetings which Captain BROWN has arranged yearly for the benefit of Marine Observers and all interested in **The Work.**

Gloriana, as is well known by all readers of our journal, was commanded by Captain Henry Toynebe. His career was the subject of a memoir in the first Volume of THE MARINE OBSERVER No. 6. The model was built at Grangemouth of the wood of the *Charlotte Dundas* and the following inscription appears in the glass case in which it is preserved:—

"The first practical steamboat was the stern wheeler *Charlotte Dundas*, named after the daughter of the first Lord DUNDAS who was largely interested in the Forth and Clyde Canal. The first marine steam engine was built by SYMINGTON and fitted on board the *Charlotte Dundas* in 1801, ten years before the appearance of HENRY BELL's *Comet*. It is recorded that she attained a speed of $3\frac{1}{2}$ knots against a head wind when towing two barges of 70 tons burden. She plied for a few months on the Forth and Clyde Canal and was then laid up for many years and looked upon as a curiosity and an object of derision.

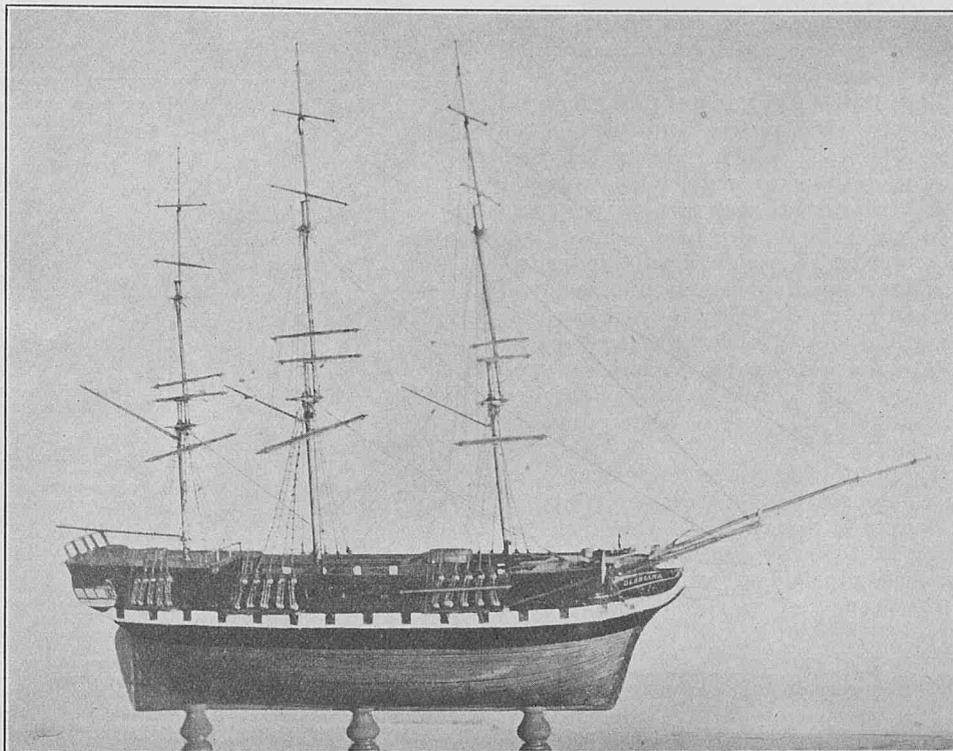
This model of the ship *Gloriana*, presented by Mr. JOHN C. HAY, Managing Director, BURNS LAIRD LINES Ltd., Glasgow, to the School of Navigation, is certified to have been made at Grangemouth of wood taken from the *Charlotte Dundas*, when she was broken up."

It was originally the property of Mr. THOMAS MORRISON of Grangemouth, and at his death passed to Mrs. GRAY, also of Grangemouth, at her death it was presented by her daughter, Mrs. GUTHRIE of Leith, to Mr. WILLIAM HARDIE of Grangemouth, at whose death it became the property of his son Mr. THOMAS HARDIE, who on 23rd June, 1913, presented the model to Mr. JOHN C. HAY, who on 11th November, 1925, presented it to the Royal Technical College, Glasgow, "hoping that it would prove acceptable to the College Authorities and serve a useful purpose."

Built and owned by T. & W. SMITH & Co., the forerunners of the present SMITHS DOCK Company, *Gloriana* was launched on the Tyne in 1843, and as ships at that time carried single topsails the model probably represents her as she was at a later date than 1856. From the following entry in her Meteorological Log in TOYNEBE's handwriting, dated 5th December, 1856, in Latitude 5° N., Longitude 87° E., it is evident that she was fitted with single topsails then.

"I began to suspect that our N.W. wind was the S.W. part of a cyclone for the wind was increasing and the sea very confused, at 3.30 p.m. close reefed the main topsail and furled the main sail; so stood on under very easy sail, the foresail being reefed and the fore-top-sail double reefed."

The ship was 1,057 tons by the Act which commenced on 1st January, 1836, or 883 tons by the old Act and she was classed 12 years A1 at LLOYDS, and registered at Newcastle. This ship still appeared in Lloyds Register 1867-8 Book when she was registered in London



still owned by SMITH & Co., and T. VARLE was her master. Her dimensions given in this book were, length 156 feet 5 inches, beam 31 feet 5 inches, depth 22 feet 5 inches.

Her deck was renewed in 1859 and her class was continued for four years from 1863.

BASIL LUBBOCK, writing of *Gloriana* and *Tudor* in Blackwall Frigates says, after remarking on *Ellenborough*, also built and named by T. & W. SMITH and commanded by TOYNBEE:—

"Improvements in design are rather hard to distinguish, they were confined chiefly to the bow and stern lines, whilst the relations

of length to beam and depth showed little alteration, shipbuilding in the forties being very conservative in this respect."

During TOYNBEE'S command of *Gloriana* from 1855 to 1859 much fine work was done on board her in the interests of Navigation, Meteorology and Oceanography, as may be seen by the Old Time Marine Observers Log and elsewhere in this journal.

She was like most of the Blackwallers (for SMITH'S ships of that time sailed from Blackwall in competition with the East Indiamen of Green and Wigram), by no means a fast sailer, but under TOYNBEE her passages were regular and usually between 100 and 110 days between London and Madras, with troops or passengers and general cargo.

L. A. B. S.

PROPOSED IMPROVEMENTS IN MECHANICAL EXTRACTION AND COMPILATION OF DATA TO OVERCOME AMBIGUITIES IN PRINTING.

PREPARED IN THE MARINE DIVISION BY H. T. SMITH, CLERICAL ASSISTANT.

In an article under the title of "The Extraction and Compilation of Marine Meteorological Data by Mechanical Methods" published in the Marine Observer, Vol. V, No. 49, it was indicated, that while any change in the system of data extraction would be avoided as far as possible, it might be necessary in the near future to make some modification.

The adoption of this method of data extraction in 1921 was the first attempt to apply such a process to Marine Meteorological Statistics and it is satisfactory to record that the only modifications now proposed are the result of developments which could not be foreseen at the time of its initiation. One is the ever increasing application of synoptic charts to marine meteorology and the other, the possibility of listing and printing observations by the Printer-Tabulator for exchange of data with other services.

It is not proposed to bring the new code into force until the beginning of 1930, which for reasons of stowage will be a convenient date for the commencement of a new series of cards. Also, this will give time for other services who use this system or contemplate using it, to consider the changes proposed before they are adopted in the British Service.*

The application of marine observations to synoptic work demands that the position of the ship at the time of the observation should be located more exactly than to sub-squares of 1° of Latitude and Longitude, as it is under the present code. When plotted in the centre of a 1° sub-square, the position of the observation may be as much as 40 miles out. Such a discrepancy on a weather chart is

quite misleading particularly when dealing with tropical revolving storms.

To overcome this difficulty it is proposed to alter the last three columns of the card, columns 43, 44 and 45. The location column (Column 45) as now used has been found of little value and the information can be made more exact. It is therefore proposed to cut this out. Columns 43 and 44 have hitherto been used to record Upper and Middle Cloud Motion to each point of the compass. These observations are seldom made and are of doubtful value and it is considered that Upper Cloud Motion recorded to four points, and utilizing only one column, will meet the requirements of the Service. This therefore leaves columns 44 and 45 available for punching the position of the ship at the time of observation to one-sixth of a degree of Latitude, and Longitude, thus providing for sufficient accuracy of position for a synoptic chart. The new card punched with a specimen set of observations in the new code is shown in FIGURE 1. Columns 44 and 45 will give the sixths of a degree of Latitude and Longitude, the columns for square and sub-square indicating the degrees as before. FIGURE 1 should be compared with FIGURES 1 and 2 on pp. 11 and 12, Vol. V, No. 49, of this Journal where the same observations coded in the present code are shown. The code at present in use is shown on pp. 10 and 11 of the same number.

With regard to the listing and printing of observations by the Printer-Tabulator, it was pointed out in the previous article that some ambiguities existed in the printed observations, owing to the fact that the machine would not print X and R, which in the present

* See "The Oldest Branch of the Work," p. 52.

code are significant units. The Printer-Tabulator as its name implies is a tabulating machine as well as a printing machine and consequently treats X and R as ciphers. To eliminate X and R as significant units has been a difficult task, but in consultation with the statistical Department of the Air Ministry and the British Tabulating Machine Co. Ltd., the code which follows has been drawn up. This code, while not differing materially from the present code, will overcome the ambiguities at present experienced when the observations are printed. The principle underlying the new code is that where "no observation" is required to be indicated, it shall be coded 0,00,000 etc., according to the number of columns covering the element, and that all observations shall be represented by a significant figure between 1 and 9 or 01 and 99 etc., as the case may be, except in the case of (1) wind force (2) sea amount (3) swell amount where 0 is used for "calm" or "no disturbance" as well as "no observation," the meaning of the 0 being determined by reference to the direction column.

To do this, two letters of the Beaufort Notation have had to be sacrificed, namely w and e in columns 31 to 33 (Weather B) and in three instances the scale has had to be compressed. It is not considered however that these losses will in any way impair the value of these observations either as individual observations for synoptic work or collectively for the computation of averages and frequencies.

On the other hand the advantages of exchanging marine meteorological data printed in code, a specimen of which is shown in FIGURE 2, are obvious to all interested in Marine Meteorology. These observations printed in code are easily used either as individual observations or collectively by the country receiving them.

Remarkable results have already been achieved in the British Marine Division during the past eight years and it is beyond doubt that if this system became general among the nations, using as uniform a card and code as possible, the resulting exchange of data would do much towards solving many of the problems of the atmosphere which now confront us.

New Code for Extraction of Marine Data by Hollerith Machine.

Column of Card.	Element.	Code.
1 & 2 ...	Year	The number of the log in which the observation is recorded is stamped on the back of the card. Last two figures. Thus 1923 = 23.
3... ..	Month	January = 1 July = 7 February = 2 August = 8 March = 3 September = 9 April = 4 October = 10 May = 5 November = 11 June = 6 December = 12
4, 5 & 6...	Marsden Square Number.	The globe is divided into ten degree squares according to the Marsden Chart, and the position of the observation is given by the Marsden square number from that chart. Thus: An observation taken between the limits of Lat. 20° 00' N. and Lat. 29° 59' N. and Long. 30° 00' W. and Long. 39° 59' W. is given the Marsden square number 076.
7 & 8 ...	Day of month ...	Thus: 25 = 25th day of the month.
9... ..	Watch	The hour at which the observation was made is coded thus:— 4 a.m. = 1 4 p.m. = 4 8 a.m. = 2 8 p.m. = 5 Noon = 3 Midnight = 6
10 & 11...	Marsden Sub-square Number.	Each Marsden square is sub-divided into 100 parts. The number of the "sub-square" is obtained by taking the last figure of the whole number of degrees of the latitude and the last figure of the whole number of degrees of longitude. Thus: An observation made in Lat. 27° 55' N., Long. 31° 28' W., would be given the Marsden square number 076 and the Marsden "sub-square" number 71.
12 & 13...	Wind Direction ...	Calm or light and variable airs = 99 N x E = 01 S x W = 17 NNE = 02 SSW = 18 NE x N = 03 SW x S = 19 NE = 04 SW = 20 NE x E = 05 SW x W = 21 ENE = 06 WSW = 22 E x N = 07 W x S = 23 E = 08 W = 24 E x S = 09 W x N = 25 ESE = 10 WNW = 26 SE x E = 11 NW x W = 27 SE = 12 NW = 28 SE x S = 13 NW x N = 29 SSE = 14 NNW = 30 S x E = 15 N x W = 31 S = 16 N = 32 No observation = 00.

Column of Card.	Element.	Code.
14 & 15...	Wind Force	By Beaufort Scale <i>vide</i> Marine Observer's Handbook (M.O. 218, 4th Edition), pp. 40-41. Calm ... = 00 Light Winds } = 01 } = 02 } = 03 } = 04 Moderate ... } = 05 } = 06 } = 07 } = 08 } = 09 Gales ... } = 10 } = 11 } = 12 No observation = 00
16 to 20...	Pressure	The pressure is given in Millibars to one place of decimals, corrected for temperature and gravity and reduced to M.S.L. Thus: 1017.6 mb = 10176 No observation = 00000
21 & 22...	Dry Bulb Temperature.	In degrees Fahr. to nearest whole degree: No observation = 00
23 & 24...	Wet Bulb Temperature.	In degrees Fahr. to nearest whole degree: No observation = 00
25 ...	Upper Cloud Type...	Cirrus = 1 Ci. and Ci-St. = 4 Ci-St. = 2 Ci. and Ci-Cu. = 5 Ci-Cu. = 3 Ci-St. and Ci-Cu. = 6 No observation = 0 No upper cloud = 9
26 ...	Middle Cloud Type...	A-Cu. = 1 A-St. = 2 A-Cu. and A-St. = 3 No observation = 0 No middle cloud = 9
27 & 28...	Lower Cloud Type...	St.-Cu. = 1 Cu-Nb. = 4 Nb. = 2 St. = 5 Cu. = 3 Scud = 6 Overcast = 88 No lower cloud = 99 No observation = 0 Example: Ci-St/Cu. = 2939 A-St. = 9299 Ci. Ci-Cu/St.-Cu. = 5919
29 ...	Proportion of Sky Clouded.	Cloud amount 0 } = 1 " " 1 } = 2 " " 2 } = 3 " " 3 } = 4 " " 4 } = 5 " " 5 } = 6 " " 6 } = 7 " " 7 } = 8 " " 8 } = 9 " " 9 } = 9 No observation = 0
30 ...	Weather (Visibility)	By Beaufort Notation (<i>vide</i> Marine Observer's Handbook, M.O. 218, 4th Edition, page 53). Ordinary Visibility = 9 V (Exceptional Visibility) = 1 Z (Haze) = 2 M (Mist) = 3 F (Fog) = 4 No observation = 0
31-33 ...	Weather	Ry Beaufort Notation (<i>vide</i> Marine Observer's Handbook, M.O. 218, 4th Edition, page 53). S (Snow) = 1 T (Thunder) = 6 Q (Squalls) = 2 H (Hail) = 7 R (Rain) = 3 L (Lightning) = 8 P (Passing showers) = 4 None of the above reported = 9 D (Drizzle) = 5 No observations = 000 Example: Snow, Squalls = 129 Rain = 399 Thunder, Hail, Lightning = 678
34 ...	Visibility	Fog and Visibility Scale. (Specification for use at Sea.) Dense fog ... Objects not visible at 50 yards ... 0 } = 1 Thick fog ... Objects visible 1 cable 1 } = 2 Fog ... " " 2 cables 2 } = 3 Moderate fog... " " 1/2 mile 3 } = 3 Mist or haze, or very poor visibility ... " " 1 " 4 } = 4 Poor visibility ... " " 2 miles 5 } = 5 Moderate visibility... " " 5 " 6 } = 6 Good visibility ... " " 10 " 7 } = 7 Very good visibility ... " " 30 " 8 } = 8 Excellent visibility... Objects visible more than 30 miles ... 9 } = 9 No observations = 0
35-36 ...	Sea direction	No disturbance = 99 Confused Sea = 50 N x E = 01 from N x E = 51 NNE = 02 " NNE = 52 NE x N = 03 " NE x N = 53 NE = 04 " NE = 54 NE x E = 05 " NE x E = 55 ENE = 06 " ENE = 56 E x N = 07 " E x N = 57 E = 08 " E = 58 E x S = 09 " E x S = 59 ESE = 10 " ESE = 60 SE x E = 11 " SE x E = 61 SE = 12 " SE = 62 SE x S = 13 " SE x S = 63 SSE = 14 " SSE = 64 S x E = 15 " S x E = 65 S = 16 " S = 66

THE MONSOONS.

I.—General and Historical.

PREPARED IN THE MARINE DIVISION BY E. W. BARLOW, SENIOR PROFESSIONAL ASSISTANT.

General.

It is proposed in the series of articles on the Monsoons to deal with these winds in a similar manner to that adopted for the series on the Trade Winds in THE MARINE OBSERVER, Volume IV. Again we shall have to collect our information from many scattered sources, ancient and modern. The present article is mainly historical; subsequently the wind and weather of the Indian Monsoon will be considered in detail, followed by an account of other monsoonal winds. Finally a brief account of the theory of the Monsoon will be given. The primary monsoon of the world is that of the Indian Ocean and associated with it as outliers are the Monsoons of the China Seas and of the Levant. It was stated in the first article on the Trade Winds that the Monsoons were originally grouped with the true Trade Winds under the name of Trades and that this usage persisted until about the middle of the nineteenth century. The fundamental distinction between the Monsoon and the Trade is that the former is definitely seasonal, the wind over the same area blowing in more or less opposite directions in different halves of the year. The Trade Wind may have slight or even considerable seasonal variation of speed, with seasonal variations in direction, but there is no complete reversal of conditions. In other words the pressure distribution which determines a Trade Wind remains fundamentally the same, with variation of detail, throughout the year, while that which determines a Monsoon is changed from one definite type to another seasonally.

When we come to explain the theory of the Monsoon we shall see that the primary cause of the Monsoon is the difference of temperature over land and sea. The outstanding place which the Indian Monsoon occupies is due to two causes:—

(i) It vitally affects the climate of an extensive land area which has been occupied from very remote times by one of the oldest of civilisations.

(ii) The area of ocean involved is the largest one influenced by monsoonal winds.

The name "Monsoon" originated as a proper name for the seasonal winds of that particular region. For a long time it has been recognised that there are other regions of the world in which seasonal winds of a similar nature are experienced on a smaller scale and meteorologists have extended and generalised the term to cover such cases. In some quarters there has been a tendency to carry this process rather too far and to use the word "monsoonal" as equivalent to "seasonal," irrespective of the cause of the seasonal fluctuations. In his "Manual of Meteorology," Volume II, SIR NAPIER SHAW deals with this question very aptly by giving the results of a wind investigation made for two regions of the North Atlantic Ocean, Latitude 50° N., Longitude 40° W. and Latitude 50° N., Longitude 25° W. The results show definite seasonal wind variation, both in speed and direction, but these winds could not by any stretch of the imagination be called monsoonal. The status of land and sea breezes should be referred to in connection with the Monsoons. Such breezes are also due to differences of temperature between land and sea. They are, however, not called Monsoons because of the differences in the scale of the phenomena. In the first place the alternations are diurnal instead of seasonal; and secondly the changes in the distribution of pressure due to the change in the relative temperature of the coast and the sea are very small and local. We shall therefore be conservative in the present series of articles, remembering always that the Indian Monsoon is the Monsoon and dealing afterwards only with those winds in other parts of the world which are known to have a similar mode of origin.

In certain respects the account of the Monsoons will differ from that of the Trades. The weather associated with the Monsoons is much more varied than that of the Trade Wind regions and so requires fuller description. On the other hand, in dealing with the theory of the Trade Winds it was necessary to describe the main features of the atmospheric circulation of the entire globe, both at the surface and in the upper air. In giving the theory of the Monsoons we have only to add to the account there given the

details of the circulation, so far as these are known, in and above the restricted Monsoon areas.

The word "monsoon" is derived from the Dutch words "monssoen" and "monsoyn" (used by LINSCHOTEN in 1596), which came from the Portuguese "monção," which in its turn is believed to have been taken from the Arabic "mausim," meaning "set time or season of the year," which was particularly applied to the time of assembly of the pilgrimage to Mecca. A similar word "moussin," meaning "season," is also found in Malay and "mousum" in Persian. All the Romanic languages have words evidently of similar origin, e.g. French "mousson," Spanish "monzon," &c. No less than 24 variations from the spelling now current have been used in English during and since the 16th century and a few of the more curious are appended:—"munson," "mousson," "month-soune," "mansound."

Historical.

Unlike the Trade Winds, the full discovery of which was not made until relatively modern times, the knowledge of the Monsoon undoubtedly dates back thousands of years amongst the inhabitants of India and China, of the shores of the Arabian Sea and of the western shores of Malaya. The Monsoon very greatly assisted communication by sea between the Mediterranean region and Southern Arabia, the Persian Gulf, India and Ceylon, for at the season of the year (from May to October) when northerly winds are prevailing over a great part of the Red Sea, the S.W. Monsoon is blowing from Eastern Africa to the coast of Malabar, while the N.E. Monsoon (from October to April) favoured the return passage, corresponding with the season of the southerly winds in the straits of Bab-el-Mandeb and the southern Red Sea. The Phoenicians had been early made acquainted with the periodic monsoonal winds by reason of their colonies on the Persian Gulf, and it is very probable that they extended their voyaging to the western shores of India. The Greeks at the time of ALEXANDER were aware of the existence of the Monsoon. NEARCHUS, the commander of the fleet on the occasion of the expedition to India in 326 B.C., materially contributed to the advance of nautical knowledge by his laborious five months' voyage from the Euphrates to the mouth of the Indus. After spending ten months in navigating the latter river he set sail from Stura, at its mouth, at the beginning of October, knowing that his return passage to the Persian Gulf would be assisted by the N.E. Monsoon. Greek navigators were subsequently emboldened to sail from Ocelis, on the Straits of Bab-el-Mandeb, across the open ocean to Muzeris, which was the great Malabar emporium of trade at that time. The distinction of having first put into practice the knowledge of the Indian Monsoon is ascribed to an otherwise unknown Greek seaman named HIPPALUS, but some doubt is attached to the age in which he lived. The S.W. Monsoon was itself called Hippalus by the Greeks and a portion of the Indian Ocean was known as the Sea of Hippalus.

The Etesian or northerly winds, experienced during the summer in Greece and the eastern Mediterranean, were, and still are, the steadiest and most persistent winds of that region. The name is derived from the Greek ἔτος, "year," and is used in the sense of annually recurrent winds. We shall see later that not only are these winds monsoonal in character, but also that they arise from the pressure distribution with which the Indian Monsoon is associated. The Etesian Winds are described by ARISTOTLE in his classification of the winds at Athens and are referred to by PLINY and other Greek authors. ARISTOTLE states that "for those who live towards the dawn," i.e. in the extreme east of the Mediterranean, the Etesian Wind is more easterly in character and that "for those who live towards the sunset," i.e. in the west central Mediterranean, the wind inclines towards the west, facts which are in accord with modern charts of the normal distribution of pressure in the region. ARISTOTLE attributed these winds to the melting of the snows in the mountains to the northward of Greece.

Passing now to the end of the sixteenth century we find in 1598 W. PHILLIP translating from the Dutch of LINSCHOTEN, "In Goa

they stayed till the Monson, or time of the windes came in to sayle for China." In Volume II of HAKLUYT'S "Voyages," published in the following year, BARRETT writes of "The times or seasonable winds called Monsons" and "The Monson from India to Portugal." In the account of the Trade Winds we saw how interest in the subject of winds seemed to be quickened towards the end of the seventeenth century. R. BOHUN'S work, "A Discourse concerning the Origine and Properties of Wind," published at Oxford in 1671, was probably the first English book in which the theories of the winds, as propounded by ARISTOTLE and still current in the seventeenth century, were compared with the actual details of the Trade Winds, Monsoons and other Winds as known at that time. The book was published 15 years before HALLEY'S well-known work and represents a real advance in knowledge of the winds, though some of the explanations are quite erroneous. BOHUN definitely rejects the melting snow theory of the origin of the Etesian Winds of Greece, to which he gives the alternative name of Anniversary Winds. The following quotation gives his account of the Monsoons, with some omissions:—

"The *Monsons* are *Anniversary* Winds in the *Indian & African Seas*, call'd by the *Dutch Moussons* . . . and by our *English Sea Captains* vulgarly* *Monsons*. They blow Easterly one half of the year; & the other part, from the contrary points. They were unknown to the Ancient world who wanting the use of the *Compass*, made no long voyages by Sea; but the industrious moderns have taught us new Theorys of Nature: they have taken as larg a circuit as the Sun, and their ambition has known no other bounds but those of the Ocean. Heretofore wee had no commerce with the *East Indies*, but by way of the *Levant*, the merchandise being brought from the *Red Sea* to *Aleppo*, and other parts of *Syria*, and so transported through the Mediterranean; till about the years 1500 the *Portugues* found out the Passage by the Cape of *Good Hope*. Yet in their first attempts they either happened to be there at the breaking up of the *Monsons*, or other crosse seasons, that scarce one ship in twenty arrived safe at *Goa*: but of late years very few of our *East India* Fleets miscarry; since the *Currents* and *Monsons* have been better understood by our *Pilots* and *Masters of Ships*."

"I have diligently compar'd the accounts wee have from *Kircher*, *Riccio*, and *Furnier*, of the Anniversary Winds in the *Indian seas*, with the *English Journals*; and find those authors generally false: Nay even *Varenius* himself, who was more conversant with *Seafaring men*, is no lesse erroneous . . . I shall insert a relation of the *Monsons* communicated to me from *Captain George Swanly*, an experienced captain, after diverse voyages he had made to the *Oriental* *Indies*; which I have set down in his own words. 'The *Munsons* or *Monsoons* are Winds which raing 5 Months of the year on one side of the *Compass*, and 5 others on the *Opposite*. There are two months in which they change, that have variable Winds; (*viz.*) most part of *March* and *September*. From *September*, on the *North* side of the *Æquator*, to the *Tropique of Cancer* and there about, in the *Indian Seas*, they blow from the *N.E.* and according to course of the Months, they veere more *Northerly*. At *Surat*, *Malabar*, *Pegu*, and that coast of *India*, is the fair season till *March*: All which time tis the fowl season with the same Winds on the other side, at *Coromandel*, *Patane*, towards *China*, and *Japan*: and all the said time, from *September* till *March*, on the *South* of the *Æquinoctiall*, the Winds are on the *N.W.* quarter of the *Compass* with rain; which there is the *Fowl-weather-Monsoon*. From *March* to *September*, the Winds are, to *Northwards* of the *Æquator*, *Westerly*, or at the *S.W.* points, with rains, at *Surat*, *Malabar* and *Pegu*; at which time it is fair on the Coasts of *Coromandel*, *Patane*, towards *China*, and in the way to *Japan*; and then in the *Tropique* of *Capricorn* the Winds are at *S.E.* and that quarter; which are in those parts the *dry Monsoons*. Yet neare all Lands between the *Tropiques* on the *Eastward* of *Cape Bon Esperance* in the fowl seasons there doe happen some fair intervalls; yet in the dry Months, seldome any rains interrupt the constant serenity of the Air. The Fair *Monsoons* are the Winds blowing partly off the shoars, and contrariwise the *Monsoons* blowing on the shoars, are the fowl and rainy seasons.'"

. . . "When one *Motion* ceases, the other does not immediately begin; but there are sometimes longer, and otherwhile shorter Intervalls between them: In which, are variable Winds and Calms that

presage dangerous Tempests: for the opposite Winds, before one resigns to another, must needs by their strugling, cause strange disorders in the *Atmosphere*. Wherefore of all seasons in the yeare, our Masters of ships ever avoid the Seas at the changing or breaking up of the *Monsons* . . . These in the *Indian Seas* are farre more certain then other *Anniversary Winds*: yet by reason of various Accidents, they come later in, and otherwhile continue longer, some years than others."

It will be noticed that Captain SWANLY describes not only the alternation of N.E. and S.W. Monsoons north of the Equator but also the alternation south of the Equator of the N.W. Monsoon, which blows between the region of the N.E. Monsoon and the S.E. Trade Wind from December to March, and the S.E. Trade Wind. It will also be noticed that he is not in accordance with modern knowledge in stating that there is bad weather throughout the N.E. Monsoon in the Bay of Bengal and fair weather with the S.W. Monsoon on the eastern coasts of India. The expression "breaking up" or "change" of the Monsoon is shown to have been in use at this time and is also found in other writers before the end of the seventeenth century. BOHUN did not give any very definite theory of the Monsoons; "Their Principall Efficient is the Sun: and though it will be difficult to explain the particular Mode, yet both the Currents and Winds are most certainly influenc'd by that *Sovereign Planet*." He believed that there was no special difficulty in explaining the easterly component of the N.E. Monsoon in the same way that he accounted for the easterly component of the Trades in the northern hemisphere, by the daily rarefaction of the air, owing to the sun's heat, in longitudes successively to the west, with a consequent inflow from the east. On the other hand he found a difficulty about the westerly component of the S.W. Monsoon.

We saw in the articles on the Trade Winds how EDMUND HALLEY'S celebrated paper in the *Philosophical Transactions* for 1686 formed the first step in our modern knowledge of the cause of the winds, containing as it does the first application of the process of convection to atmospheric circulation. The paper contains also a general description of the oceanic winds of the globe, more particularly the Trade Winds and Monsoons. The following is HALLEY'S account of the Monsoons:—"In the *Indian Ocean* the winds are partly general, as in the *Ethiopic Ocean*, and partly periodical, that is, half the year they blow one way, and the other half nearly on the opposite points, and these points and times of shifting are different in different parts of this ocean; the limits of each tract of sea subject to the same change or monsoon are certainly very hard to determine; yet the following particulars may be relied on, being the result of great care and diligence:—

1. That between the latitudes of 10° and 30° south, as between *Madagascar* and *New Holland*, the general trade wind about the south-east by east, is found to blow all the year long, after the same manner as in the same latitudes of the *Ethiopic Ocean*.

2. That the aforesaid south-east winds extend to within 2° of the equator, during the months of June, July, August, etc., to November, at which time between the south latitudes of 3° and 10°, being near the meridian of the north end of *Madagascar*, and between 2° and 12° south latitude, being near *Sumatra* and *Java*, the contrary winds from the north-west, or between the north and west, set in and blow for half the year, viz., from the beginning of December till May; and this monsoon is observed as far as the *Molucca* isles.

3. That to the northward 3° south latitude, over the whole *Arabian* or *Indian Sea*, and *Gulph of Bengal* from *Sumatra* to the coast of *Africa*, there is another monsoon, blowing from October to April, on the north-east points; but in the other half year, from April to October, on the opposite points of S.W. and W.S.W. and that with rather more force than the other, accompanied with dark, rainy weather; whereas the north-east blows clear. It is likewise to be noted that the winds are not so constant, either in strength or direction, in the *Gulph of Bengal*, as they are in the *Indian Sea*, where a certain steady gale scarcely ever fails. It is also remarkable, that the south-west winds in these seas are generally more southerly on the *African* side, and more westerly on the *Indian*.

4. There is a tract of sea to the southward of the equator, subject to the same changes of the winds, viz., near the *African* coast, between it and the island *Madagascar*, and from thence northward, as far as the line; wherein from April to October there is found a constant fresh S.S.W. wind, which, as you go more northerly, becomes still more and more westerly, so as to fall in with the

* Meaning "commonly" or "usually," not in the modern sense of the word.

W.S.W. winds mentioned before, in those months of the year to be certain to the northward of the equator.

5. That to the eastward of Sumatra and Malacca, to the northward of the line, and along the coast of Camboia and China, the monsoons blow north and south, that is, the north-east winds are much northerly, and the south-west much southerly. This constitution reaches to the eastward of the Philippine isles, and as far north as Japan. The northern monsoon setting-in in these seas in October or November, and the southern in May, blowing all the summer months. Here it is to be noted, that the points of the compass from whence the wind comes in these parts of the world, are not so fixed as in those lately described, for the southerly will frequently pass a point or two to the eastward of the south, and the northerly as much to the westward of the north; which seems occasioned by the great quantity of land interspersed in these seas.

6. That in the same meridians, but to the southward of the equator, being that tract lying between Sumatra and Java to the west, and New Guinea to the east, the same northerly and southerly monsoons are observed; but with this difference, that the inclination of the northerly is towards the north-west, and of the southerly towards the south-east. But the points from which the winds blow are not more constant here than in the former, viz., variable five or six points. Besides, the times of the change of these winds are not the same as in the Chinese seas, but about a month or 6 weeks later.

7. That these contrary winds do not shift all at once; but in some places the time of the change is attended with calms, in others with variable winds; and it is particularly remarkable, that the end of the westerly monsoon on the coast of Coromandel, and the last two months of the southerly monsoon in the seas of China, are very subject to be tempestuous; the violence of these storms is such, that they seem to be of the nature of the West India hurricanes, and render the navigation of these parts very unsafe about that time of the year. These tempests are by our seamen usually termed, the breaking up of the monsoons. By reason of the shifting of these winds, such as sail in these seas are obliged to observe the seasons proper for their voyages; of which, if they miss, and the contrary monsoon sets in, they are forced to give up the hopes of accomplishing their intended voyage till the winds become favourable."

A considerable advance in accurate and detailed knowledge of the monsoons is thus shown in HALLEY's paper. HALLEY also tells us how the Spaniards took advantage of the monsoons as well as the trade winds in their transpacific voyages. After mentioning that the outward voyage from New Spain (Mexico) to the Manillas through the trade winds occupied on the average ten weeks, which corresponds to a run of about 130 miles a day, he states that "the Spaniards, homeward bound from the Manillas, always take the advantage of the southerly monsoon, blowing there in the summer months, and they run up to the northward of that latitude as high as Japan, before they meet with variable winds, to shape their course to the eastward." HALLEY's theory of the monsoons is indicated by the two following quotations, the first of which deals with the monsoon of the Gulf of Guinea:—"If a country lying near the sun" (i.e., near the equator) "prove to be flat, sandy, low land . . . the heat occasioned by the reflection of the sunbeams, and its retention in the sand, is incredible to those who have not felt it; by which the air being exceedingly rarefied, it is necessary that the cooler and more dense air should run thither to restore the equilibrium. This I take to be the cause, why near the coast of Guinea the wind always sets in upon the land, blowing westerly instead of easterly."

The second quotation is:—"It is to be considered that to the northward of the Indian ocean there is every where land within the usual limits of the latitude of 30°, viz., Arabia, Persia, India, etc., which for the same reason as the midland parts of Africa, are subject to excessive heats when the sun is to the north, passing nearly vertical; but yet are temperate enough when the sun is removed towards the other tropic; because of a ridge of mountains at some distance within the land, said to be frequently in winter covered with snow, over which the air, as it passes, must needs be much chilled. Hence it comes to pass, that the air, coming according to the general rule out of the north-east in the Indian seas, is sometimes hotter, sometimes colder, than that which by this circulation is returned out of the south-west, and by consequence, sometimes the under

current or wind is from the north-east, sometimes from the south-west. That this has no other cause, is clear from the times when these winds set in, viz. in April, when the sun begins to warm those countries to the north, the south-west monsoon begins, and blows during the heats till October; when the sun being retired, and all things growing cooler northward, and the heat increasing to the south, the north-east winds enter, and blow all the winter till April again."

In 1699 Captain WILLIAM DAMPIER published "A Discourse of Trade-Winds, Breezes, Storms, Seasons of the Year, Tides and Currents of the Torrid Zone throughout the World" at the end of Volume II of his "Voyages and Descriptions." Chapter III of the Discourse contains an account of the Monsoons, not only of India but those of other parts of the World, under the title "Of the coasting Trade-Winds that shift," the Trade-Wind proper being distinguished in this work by the name "General Trade-Wind." His description of the Indian Monsoons is not quoted here since it is considerably shorter than that of HALLEY and his remarks on the N.W. Monsoon south of the equator are inaccurate. He points out the very great assistance of the Monsoons to Indian navigation and how voyages in his time were entirely regulated by them. At this period the fundamental principle of oceanic navigation seems to have been to go westward with the help of the Trade Winds and return in higher latitudes with the help of the westerlies, which principle was as we have seen put into practice at an early date in the Spanish navigation of the Pacific Ocean. "And this is the Benefit of an open Sea." DAMPIER points out that the Indian Ocean does not extend far enough north of the equator to have any westerlies and the S.W. Monsoon fortunately serves the same purpose, provided the voyage is made at the right season. In the charts of the winds reproduced in the first articles on the Trade Winds, MARINE OBSERVER, Volume V, No. 50, page 33, DAMPIER has indicated the Monsoons by double lines of arrows pointing opposite ways, the appropriate months being written above each line.

In the account of the Trade Winds it was shown that little advance in scientific knowledge of the winds was made during the eighteenth century, though probably seamen were accumulating a more detailed practical knowledge. We shall therefore conclude this article with a short account of the work of certain nineteenth century authors on the Monsoons. In 1801 Colonel CAPPER published a book called "Observations on the Winds and Monsoons." He seems to have been the first to draw attention to the need for a proper distinction between the Trade Winds and the Monsoons, quoting in support the definitions from Dr. JOHNSON's Dictionary:—"Trade Winds, the monsoon, the periodical wind between the tropics." "Monsoons are shifting Trade Winds in the East Indian Ocean . . ." Colonel CAPPER's book is a remarkable one for the period and gives detailed descriptions of the winds of the world on quite modern lines, dealing particularly with the Monsoons. Colonel CAPPER, in addition to collecting observations of others, had a very considerable experience of his own, having lived more than 30 years in India and various tropical regions and having crossed the equator more than 20 times. Adopting HALLEY's theory of the origin of the Monsoons, he developed it, especially in regard to the cause of the heavy rainfall during the S.W. Monsoon in India. He is correct in ascribing this to the effect of the mountains when these are met by a current of air highly charged with water-vapour, but the actual processes by which the vapour is precipitated as rain in these circumstances was not understood at that time. After quoting Dr. FRANKLIN's electrical explanation of the precipitation of rainfall by mountains, Colonel CAPPER states:—"It is evident from the geographical situation of the peninsula of India, that the clouds which are conveyed over it in both monsoons, must be saturated with moisture. In the N.E. monsoon the vapours will be raised from the sea in the Gulf of Bengal, and as they approach the land on the coast of Coromandel the clouds, in the manner above described, will be made to discharge their contents in great torrents of rain. So likewise in the S.W. monsoon, the vapours will be raised in the Gulf of Sind and the Indian Ocean, and they also, in the same manner, will discharge their contents on the Malabar coast and amongst the Ballagat mountains." It should be noted that according to more modern observations the rain-bearing qualities of the N.E. monsoon are confined to restricted coastal areas, chiefly in the south of the Indian Peninsula, during the months of November and December.

Colonel CAPPER seems to have been the first to point out that the cyclones of the Bay of Bengal are by no means confined to the times of breaking up of the Monsoons but occur during the Monsoons. His book also contains a number of abridged ship's logs on voyages to the East Indies and China via the Cape, giving positions and weather. He says "The ships bound from England to India generally sail in two different fleets, the first is usually despatched in December, or early in January, and the second in April or May." He then shows that on account of the difference in the winds and monsoons at the two periods, "ships which sail from England in November and December, or early in January, seldom perform their voyage in less than five or six months, and consequently do not arrive above a month before those which sail between two and three months after them." He therefore proposed the alteration of the times of sailing to the end of February and the end of April.

In MAURY's "Physical Geography of the Sea and its Meteorology," Twelfth Edition, 1866, a chapter is devoted to the Monsoons. This chapter is mainly descriptive, but DOVÉ's opinion, expressed in 1831, that the S.W. Monsoon was the S.E. Trade Wind rushing into the low pressure area of Southern Asia is quoted. MAURY writes as follows regarding the cause of the Monsoons:—"Monsoons are, for the most part, trade-winds deflected. When, at stated seasons of the year, a trade-wind is turned out of its regular course, as from one quadrant to another, it is regarded as a monsoon. The African monsoons of the Atlantic, the monsoons of the gulf of Mexico, and the Central American Monsoons of the Pacific are, for the most part, formed of the trade-winds which are turned back or deflected to restore the equilibrium which

the overheated plains of Africa, Utah, Texas, and New Mexico have disturbed; these winds, carrying their fuel with them in vapour, have their equilibrium still further disturbed by the heat which is liberated when that vapour is condensed. Thus, with regard to the N.W. and the S.W. monsoons of the Indian Ocean, for example: a force is exerted upon the N.E. trade-winds of that sea by the disturbance which the heat of summer creates in the atmosphere over the interior plains of Asia, which is more than sufficient to neutralize the forces which cause those winds to blow as trade-winds; it arrests them and turns them back; but, were it not for the peculiar conditions of the land about that ocean, what are now called the N.E. monsoons would blow the year round; there would be no S.W. monsoons there; and the N.E. winds, being perpetual, would become all the year what in reality for several months they are, viz., N.E. trade-winds."

We conclude this article with a short reference to FERREL'S "Popular Treatise on the Winds," published in 1889. The historical article on the theory of the Trade Winds in MARINE OBSERVER, Volume V, No. 57, also concluded with this author for the reason that he represents the last of those who attempted a simple, comprehensive theory of atmospheric circulation. The present article will have shown that there has been no change in the fundamental theory of the Monsoons since the time of HALLEY. FERREL restated it in detail and observed that "all the great monsoons . . . are found in countries and on oceans adjacent to high mountain ranges." He considered that apart from the effect of mountains in producing the rainfall associated with the S.W. Monsoon they had a considerable effect in increasing the strength of the wind.

SOUTHERN ICE REPORTS
During the Years 1917 to 1928.
March.

Year.	Day.	Position of Ice.		Description.	Remarks.	Name of Ship reporting.	
		Latitude.	Longitude.				
1917	8	51° 50' S	40° 10' W.	Many bergs and fragments of bergs ..	Stretching N.W. to S.E.	—	
	11	49° 40' S	38° 36' W.	Bergs	Extending N.W. to S.E. as far as could be seen	—	
	11	49° —' S.	38° 03' W.	Small berg .. .. .	.. .. .	—
	20	From 55° —' S.	36° —' W.	.. .. .	.. .. .	.. .. .
	to 24	to 50° —' S.	11° —' W.	19 bergs	1, 500 feet high, ¼ mile long, looked like an island, 3, 300 feet high, 1, 250 feet high, 1, 100 feet high, 3, 60 feet high, 3, 50 feet high, 1, 40 feet high, also 3 large and 3 small.	S.S. <i>Medway</i> .	
1918	30	From 58° —' S.	136° —' W.	7 bergs	Maximum height, 160 feet	4 mst. Barque <i>Elginshire</i> .	
	to 31	to 60° —' S.	130° —' W.				
1922	8	45° 55' S.	63° 18' E.	Small berg	About 20 feet high	S.S. <i>Port Stephens</i> .	
	28	53° 05' S.	68° 00' W.	Large berg	About 300 feet high	S.S. <i>Tuscanstar</i> .	
	29	58° 58' S.	54° 05' W.	3 bergs and several growlers .. .. .	.. .. .	R.Y.S. <i>Quest</i> .
	26	} Elephant Island	.. .. .	8 bergs and loose pack .. .. .	.. .. .	do.
	28		60° 46' S.	53° 41' W.	Berg and growler	do.
	24		60° 51' S.	52° 53' W.	7 bergs	Ship coated with ice	do.
	23		61° 28' S.	51° 33' W.	10 bergs, growlers and fragments	do.
	29		51° 34' S.	48° 50' W.	Icebergs	Vessel running before moderate S.S.W. gale, sighted icebergs; a few hours later ship was surrounded with ice. At one time 31 bergs were in sight, and at another 21 were counted; there were many small pieces just awash.	Barquentine, <i>Hesperian</i> .
	22	62° 02' S.	47° 37' W.	59 bergs, brash and scattered pack .. .. .	.. .. .	R.Y.S. <i>Quest</i> .
	13	64° 29½' S.	45° 43¼' W.	10 bergs. Areas of old floe. New ice, forming where open. .. .. .	.. .. .	do.
	14	64° 06' S.	45° 42' W.	4 bergs and large pieces of old floe .. .. .	.. .. .	do.
	15	63° 53' S.	45° 14' W.	Frozen in. New ice thickening .. .. .	.. .. .	do.
	16	63° 45' S.	45° 12' W.	3 bergs	Frozen in	do.	
	12	64° 38' S.	45° 00' W.	11 bergs and very heavy old floe and brash. .. .. .	.. .. .	do.
	17	63° 49' S.	44° 39' W.	25 bergs	Snow flurries	do.	
19	63° 18' S.	44° 31' W.	Ice opening around ship .. .. .	.. .. .	do.	
21	62° 59' S.	44° 01' W.	96 bergs	Through ice to open water	do.		
11	65° 12' S.	42° 31' W.	14 bergs and heavy pieces of ice and floe .. .. .	.. .. .	do.	
10	65° 45' S.	41° 02' W.	6 bergs and heavy broken floes .. .. .	.. .. .	do.	
9	66° 07' S.	38° 11' W.	3 bergs, brash and heavy lumps .. .. .	.. .. .	do.	
8	66° 40' S.	36° 24' W.	7 bergs and pieces of old floe and berg fragments. .. .. .	.. .. .	do.	
1922	7	66° 31' S.	32° 47' W.	31 bergs	Ice thickening	R.Y.S. <i>Quest</i> .	
	6	66° 48' S.	29° 30' W.	32 bergs and many fragments of ice .. .. .	.. .. .	do.
	5	65° 59' S.	24° 26' W.	8 bergs, 1 growler and small pieces of ice .. .. .	.. .. .	do.
	4	66° 09' S.	20° 29' W.	3 bergs and scattered pack	Many heavy and dangerous pieces	do.	
	3	65° 43' S.	16° 25' W.	1 berg and occasional brash and scattered lumps. .. .. .	.. .. .	do.
	2	65° 22' S.	13° 10' W.	1 berg and several growlers, close pack .. .. .	.. .. .	do.
	1	65° 22' S.	10° 17' W.	4 bergs, 2 growlers and streams of brash and old floe. .. .. .	.. .. .	do.

Year.	Day.	Position of Ice.		Description.	Remarks.	Name of Ship reporting.
		Latitude.	Longitude.			
1923	8	50° 40' S.	125° 00' W.	Ice .. .. .	.. .. .	—
	8	51° 29' S.	122° 42' W.	Ice .. .. .	.. .. .	—
	8	51° 25' S.	120° 25' W.	Berg	30 feet high, 100 feet long	S.S. <i>Otarama</i> .
	8	51° 20' S.	120° 24' W.	2 bergs	In close proximity, one, 30 feet high, by 100 feet long, other, 30 feet high 900 feet long, table topped.	do.
	8	50° 30' S.	119° 15' W.	Ice .. .. .	.. .. .	—
	6	53° 01' S.	116° 58' W.	Berg	150 feet high	S.S. <i>Port Elliot</i> .
	18	51° 55' S.	116° 41' W.	Large berg	60 feet high, 350 feet long	S.S. <i>Gallie</i> .
	18	52° 03' S.	116° 26' W.	Bergs .. .. .	.. .. .	S.S. <i>Westmorland</i> .
	8	52° 30' S.	116° 26' W.	Ice .. .. .	.. .. .	—
	18	51° 58' S.	115° 57' W.	Small berg, 7 miles, South .. .. .	.. .. .	S.S. <i>Gallie</i> .
31	52° 28' S.	112° 16' W.	Bergs .. .. .	.. .. .	S.S. <i>Armagh</i> .	
8	52° 22' S.	105° 36' W.	Ice .. .. .	.. .. .	—
8	54° 05' S.	102° 08' W.	Berg	20 feet high	S.S. <i>Port Elliot</i> .	
1924	11	53° 36' S.	130° 37' W.	Berg and several small pieces	Pieces within distance of 6 miles to eastward of berg. Average about 2 to 3 feet in height. Approximate height of berg 50 feet.	S.S. <i>Cornwall</i> .
	12	55° 06' S.	121° 16' W.	Berg	Approximate height 195 feet	do.
	12	55° 11' S.	120° 50' W.	Berg	Approximate height 150 feet	do.
	12	55° 13' S.	120° 35' W.	Berg	Approximate height 140 feet	do.
1926	7	Grytviken, S. Georgia		Small growler	Drifting alongside ship, in harbour	R.R.S. <i>Discovery</i> .
	26	53° 38' S.	33° 13' W.	Large berg	Pinnacle shaped	S.S. <i>Atness</i> .
	24	53° 00' S.	29° 10' W.	Several large bergs .. .. .	.. .. .	do.
	22	51° 30' S.	20° 50' W.	4 large flat topped bergs .. .. .	.. .. .	do.
	20	50° 29' S.	15° 10' W.	4 large pinnacled and flat topped bergs .. .. .	.. .. .	do.
	19	50° 15' S.	13° 35' W.	3 large flat topped bergs .. .. .	.. .. .	do.
	3	49° 53' S.	11° 29' W.	Numerous flat topped bergs and growlers .. .. .	.. .. .	do.
1927	6	51° 35' S.	97° 40' E.	Large pinnacled berg	285 feet high, 1,080 feet long, approximate, by measurement. A broad band of silt was clearly distinguishable about 100 feet above the waterline proving it to be of glacier origin. In view of the positions in which these bergs were sighted it seems probable that they were broken off from Shackleton's Tongue. They were all pinnacled bergs.	S.S. <i>Port Darwin</i> .
	6	From 51° 35' S. to 51° 10' S.	97° 40' E. to 102° 58' E. }	11 large bergs, numerous small bergs, bergy bits and growlers.	.. .. .	—
	4	44° 09' S.	56° 50' W.	Berg	About 300 feet long and 100 ft. high	S.S. <i>Geo. H. Jones</i> .
	4	43° 39' S.	56° 21' W.	Berg	About same size as above	do.
	9	49° 18' S.	48° 13' W.	Berg	About 300 feet high	Barque <i>C. B. Pedersen</i> .
	From 26 to 28	35 miles N.W. of Willis Island.	52° 45' S. to 43° 22' W. }	Ice islands	Encountered ice islands continuously through which there was no passage. This area of ice had its eastern end in 36° W. Bergs were calving all along its length.	S.S. <i>Strathfillan</i> .
1928	16	39° 32' S.	17° 40' E.	Berg	200 ft. high, 400 ft. long.	S.S. <i>Dalblair</i> .
	16	39° 22' S.	18° 15' E.	Berg	Mean height of 250 feet, with a peak 300 feet high, and 450 feet long. Dimensions by sextant.	do.

Reports of ice previous to March, 1917, will be found on the back of Monthly Meteorological Chart of the East Indian Seas, January 1917, No. 129.

WEATHER SIGNALS.

II.—WIRELESS WEATHER SIGNALS.

WIRELESS WEATHER BULLETINS.

The Key and Decode Tables of the International Weather Telegraphy Code will be found on pages 21 to 25 of Volume VI, No. 61. (The January, 1929 Number.)

The method of decoding station weather reports made in code was described in the British "Weather Shipping" Bulletin, on pages 45 to 47 of Volume VI, No. 62. (The February, 1929 Number.)

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

The letters given in the descriptions which follow give the key to the tables for decoding the figures.

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

SWEDEN.

North Sea and Baltic (C.W. Issues).

Karlsborg W/T station, Latitude 58° 29' N., Longitude 14° 29' E. (approx.), call sign SAJ, broadcasts weather bulletins for shipping, daily as follows:—

at 1050 G.M.T. }
and at 2200 G.M.T. } Wavelength 4,200 metres (C.W.).

The bulletins are similar in arrangement to the British "Weather Shipping" message which was explained in Vol. VI, No. 62, pp. 45-47, of this Journal. The two bulletins combined provide complete weather information in a simple form for the coasts of N.W. Europe, and on this account are strongly recommended to Mariners.

The 1050 G.M.T. bulletin is based upon observations made at

0700 G.M.T., and that broadcast at 2200 G.M.T. upon observations made at 1800 G.M.T.

The bulletins commence with the words "Weather Report."

The 1050 G.M.T. bulletin is divided into five parts and the 2200 G.M.T. bulletin into four parts:—

Part I, in code (International).

Contains observations made at nine Swedish and four Danish and Norwegian coast stations (see following List) and from ships in the North Sea.

Coast Stations' observations are broadcast in two five-figure groups for each station, represented by key letters as follows:—

1_nK'wwV_s BBDDF.

List of Observation Stations.

Index Number.	Station.	Position (approx.).	
		Latitude N.	Longitude E.
2	Bjurö klubb	64° 28'	21° 34'
3	Holmögadd	63° 35'	20° 45'
4	Bremö	62° 13'	17° 44'
5	Örskär	60° 31'	18° 22'
6	Sandhamn	59° 17'	18° 55'
7	Visby	57° 39'	18° 18'
8	Skånör	55° 24'	12° 49'
9	Kullen	56° 18'	12° 27'
0	Vinga	57° 38'	11° 36'
1	Hammeren	55° 17'	14° 47'
2	Hanstholm	57° 07'	8° 36'
3	Utsire	59° 18'	4° 53'
4	Kinn	61° 34'	4° 47'

Observations from ships in the North Sea follow the Coast Stations' reports. They are contained in four five-figure groups for each ship, represented by key letters as follows:—

PQLLL 111GG d_sK'wv BBDFF

Part II, en clair (English).

A General Inference of weather conditions in N.W. Europe and adjacent seas.

Part III, en clair (English).

Weather forecasts for 12 hours for the following areas:—

- 1 Eastern part of the North Sea (E. of Longitude 5° E.).
- 2 Sweden, West Coast (Skagerrak, Kattegat and the Sound).
- 3 Baltic (Southern Baltic; South Skane, Bleking and Oland; Northern Baltic; East Gotaland, Svealand and Gottland).
- 4 Gulf of Bothnia (Bothnia Sea; Bothnia Bay).

Part IV, en clair (English).

Gale warnings for areas 2, 3 and 4 (above) for particulars, see p. 66.

Part V.

Navigation and Ice Warnings.

NOTE.—Barometric pressure is given in whole millimetres. (To convert to mbs. and ins. see Table xxiv.)

GERMANY.

North Sea. (Spark Issues.)

Norddeich W/T station, approximate Latitude 53° 36' N. Longitude 7° 08' E., call sign DAN, broadcasts on a wavelength of 750 metres spark, at 1015 and 2130 G.M.T. weather bulletins, en clair, containing the 0700 and 1800 G.M.T. observations, respectively, of wind direction and force, state of the sea, clouds, rain, mist, fog, etc., of the following stations:—

	Latitude (approx.).	Longitude (approx.).
Borkum Riff Light vessel	53° 45' N.	6° 04' E.
Amrum Bank Light vessel	54° 33' N.	7° 53' E.
Utsire	59° 18' N.	4° 53' E.
Tynemouth	55° 01' N.	1° 25' W.

followed by information concerning atmospheric pressure, and a 12 hours' weather forecast for the North Sea.

Western and Middle Baltic. (I.C.W. Issues.)

Swinemünde W/T station, approximate Latitude 53° 55' N., Longitude 14° 16' E., call sign DAS, broadcasts on a wavelength of 715 metres, I.C.W., at 1030 and 2145 G.M.T. weather bulletins en

clair, containing the 0700 and 1800 G.M.T. observations, respectively, of wind direction and force, state of the sea, etc.—as for Norddeich, of the following stations:—

	Latitude (approx.).	Longitude (approx.).
Bülk	54° 27' N.	10° 12' E.
Adlergrund Light vessel	54° 50' N.	14° 22' E.
Skagen	57° 45' N.	10° 38' E.
Visby	57° 39' N.	18° 18' E.

followed by a general review of the weather, and a 12-hour forecast for the western and middle Baltic.

Eastern Baltic. (I.C.W. Issue.)

Pillau W/T station, approximate Latitude 54° 39' N. Longitude 19° 53' E., call sign DBP, broadcasts on a wavelength of 740 metres, I.C.W., at 1130 G.M.T., a weather bulletin, en clair, containing the 0700 G.M.T. observations of wind direction and force, state of the sea, etc., as for Norddeich, of the following stations:—

	Latitude (approx.).	Longitude (approx.).
Pillau	54° 39' N.	19° 53' E.
Brusterort	54° 56' N.	19° 56' E.
Memel	55° 42' N.	21° 10' E.
Visby	57° 39' N.	18° 18' E.

This bulletin also contains a general review of the weather, and a forecast for the eastern Baltic.

HOLLAND.

(C.W. Issues.)

De Bilt (Utrecht) W/T station, Latitude 52° 06' N., Longitude 5° 11' E. (approx.) call sign PIMP, broadcasts weather bulletins in Code, daily at 0710, 1310 and 1810 G.M.T. on a wavelength of 1,900 m. C.W.

All bulletins commence with the words "Meteo Holland."

0710 G.M.T. Bulletin.

This bulletin contains observations of 0700 G.M.T. and is divided into five parts, viz.:—

Part I contains observations from the stations in the following list in International Code as follows:—

1_n 1_n BBBDD FwwTT cbWVH followed by two groups containing observations of cloud and rainfall.

Parts II and III contain observations of upper winds and upper air temperatures respectively for stations 91 and 93.

Part IV contains observations of 0100 G.M.T. from De Bilt.

Part V contains observations from Dutch ships in International Code as follows:—

PQLLL 111GG BBDFF wwVKd TTTd_sc bbTTT

1310 G.M.T. Bulletin.

This bulletin contains observations of 1300 G.M.T. in the same form as the 0710 G.M.T. bulletin omitting Part IV.

1810 G.M.T. Bulletin.

This bulletin contains observations of 1800 G.M.T. in the same form as the 0710 G.M.T. bulletin omitting Parts IV and V.

LIST OF STATIONS.

Code Number.	Station.	Position (approx.)	
		Latitude.	Longitude.
91	Helder	52° 58' N.	4° 45' E.
92	Flushing	51° 26' N.	3° 34' E.
93	De Bilt	52° 06' N.	5° 11' E.
94	Groningen	53° 13' N.	6° 33' E.
97	Maastricht	50° 51' N.	5° 41' E.
98	Noord-Hinder Lt.-V. ...	51° 35' N.	2° 37' E.

NOTE.—Barometric pressure is given in millimetres. (To convert to mb. and in. see Table XXIV.)

Temperatures given in Centigrade. (To convert to Fahr. see Table XXV.)

SPECIAL WEATHER TELEGRAPHY TABLES, NOT INTERNATIONAL CODE.

Table XXIV.

Conversion of Millimetres into Millibars and Inches.

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

Table XXV.

Conversion of Centigrade Temperatures to Fahrenheit.

Cent.* Trans- mitted.	Fahr.	Cent. Trans- mitted.	Fahr.	Cent. Trans- mitted.	Fahr.	Cent. Trans- mitted.	Fahr.
—	—	00	32	10	50	21	70
51	30	01	34	11	52	22	72
52	28	02	36	12	54	23	73
53	27	03	37	13	55	24	75
54	25	04	39	14	57	25	77
55	23	05	41	15	59	26	79
56	21	06	43	16	61	27	81
57	19	07	45	17	63	28	82
58	18	08	46	18	64	29	84
59	16	09	48	19	66	30	86
				20	68		

* 50 is added to the amounts to indicate minus temperatures Centigrade.

WIRELESS STORM WARNINGS.

SWEDEN.

Baltic. (C.W. Issues.)

Karlsborg W/T station broadcasts warnings, *en clair*, of strong winds or gales for the following areas:—

- Sweden, West Coast (Skagerrak, Kattegat and the Sound).
- Baltic (Southern Baltic; South Skane, Bleking and Oland; Northern Baltic; East Gotaland, Svealand and Gottland).
- Gulf of Bothnia (Bothnia Sea; Bothnia Bay).

The warnings commence with the words "Gale Warnings" and are valid for the ensuing 24 hours. They form Part IV of the weather bulletins broadcast by Karlsborg W/T at 1050 and 2200 G.M.T., explained on p. 65.

GERMANY.

North Sea. (Spark Issues.)

Norddeich W/T station, call sign DAN, broadcasts storm warnings, for the North Sea, on 600 metres, spark, on receipt, twice in succession. Warnings are also broadcast on 750 metres, spark, at 0515, 1015 (after the weather bulletin), 1630 and 2130 (after the weather bulletin) unless previously cancelled. All times are G.M.T. Warnings broadcast *en clair* and preceded by the word "Funksturm."

The Warnings will contain information as to the type of disturbance, together with the direction and force of the wind.

Western and Central Baltic. (Spark and I.C.W. Issues.)

Swinemünde W/T station, call sign DAS, broadcasts storm warnings for the coast from Flensburg to Leba, preceded by the word "Funksturm" on 600 metres, spark, on receipt, three times successively. Warnings are also broadcast on 715 metres I.C.W. at 0530, 1030 (after the weather bulletin), 1650 and 2145 (after the weather bulletin) unless previously cancelled. All times are G.M.T. Warnings broadcast *en clair*.

The warnings are also broadcast on request.

Eastern Baltic. (Spark and I.C.W. Issues.)

Pillau W/T station, call sign DBP, broadcasts storm warnings for the Eastern Baltic, preceded by the words "Storm Warnungen für die östliche Ostsee" on 600 metres, spark, on receipt. Warnings are also broadcast on 740 metres, I.C.W., at 1130 G.M.T. (after the weather bulletin) and on request.

HOLLAND.

North Sea. (C.W. Issues.)

Scheveningen W/T station, call sign PCH, transmits storm warnings on receipt and following the end of the next compulsory silent period, both in Dutch and English, and also at 1230 and 2130 G.M.T. Wavelength used is 600 metres (I.C.W.). If the warning should be broadcast on Sundays and holidays it will be preceded by the letters KNMI.

The warnings are transmitted, first at the rate of 15 words per minute, and then repeated twice, quickly.

NOTE.—If the storm warning is sent on request a charge will be debited to the ship concerned.

WIRELESS ICE WARNINGS.

SWEDEN.

Swedish Ice Breaker.

(Spark and R/T Issues.)

The Swedish Government ice breaker, call sign **SEE** broadcasts information in **English** on a wavelength of 600 metres (spark), giving her position, proposed area for ice breaking and rendering assistance during the ensuing 12 hours. Important local information for mariners will also be broadcast.

The message is broadcast daily, during the time the vessel is employed on ice-breaking service, at 0800 and 1045 G.M.T. on weekdays and at 0800 and 1210 G.M.T. on Sundays.

The message will be repeated by wireless telephony on a wavelength of 600 metres R/T, in Swedish and English immediately after the transmission on spark. The repetition will be preceded by the words "Fran Statistbrytaren" (from the State ice breaker).

DENMARK.

Danish Waters. (Spark Issues.)

The following W/T stations broadcast a summary of ice conditions in Danish waters, *en clair* (English). Wavelength 600 metres, spark.

Blaavand W/T station, approximate Latitude 55° 33' N., Longitude 8° 05' E., call sign **AXB**, at 0100 and 1300 G.M.T.

Copenhagen W/T station, approximate Latitude 55° 41' N., Longitude 12° 35' E., call sign **OXA** at 1100 and 2300 G.M.T.

Ice Breakers.—The Danish Government's ice breaker *Isbjorn* (call sign **OXP**) listens continuously. No charge is made for this service.

GERMANY.

North Sea and Baltic Sea Areas. (C.W. Issues.)

Norddeich W/T station, approximate Latitude 53° 36' N., Longitude 7° 08' E., call sign **DAN**, broadcasts ice information daily during the winter at 0950 G.M.T. on a wavelength of 2,440 metres, C.W., and at 1015 G.M.T. on a wavelength of 750 metres, I.C.W., in the following code:—

	JJ'	JJ'	JJ'	JJ'	JJ'	JJ'	JJ'	JJ'	JJ'
Sub-groups	1			2			3		
Main Group	AA &c., &c.								
J = Ice Conditions.	J' = Effect on Navigation.								

Code Figure.		Code Figure.	
0	Open water ...	0	Conditions not known owing to fog, snow, &c.
1	Thin loose ice ...	1	Navigation practicable.
2	Drift ice ...	2	Navigation difficult for sailing vessels.
3	Thin covering of ice	3	Navigation difficult, but practicable for sailing vessels assisted by tugs.
4	Close pack ice ...	4	Navigation very difficult. Closed to sailing vessels.
5	Difficult drift ice ...	5	Navigation closed to sailing vessels with auxiliary motor.
6	Thick covering of ice	6	Navigation only practicable for large steamers.
7	Heavy drift ice ...	7	Navigation only practicable with the assistance of ice-breakers.
8	Heavy masses of ice	8	Navigation closed.
9	Not known ...	9	Navigation channel kept open by ice-breakers.

X Not known.

LIST OF OBSERVATION STATIONS.

Main Groups.	Sub-groups.	Area affected.
AA	1	{ Memel harbour. Pillou harbour. Königsberg sea canal to Königsberg.
	2	{ Danzig harbour. Stolpmünde harbour. Kolberg harbour.
	3	{ Swinemünde coastal waters. Swinemünde harbour. Stettiner Haff.
BB	1	{ Thiessow, East entry to the bay, up to Stralsund. Arkona, visible coastal waters. Barhöft bay.
	2	{ Warnemünde, Warnow. Fairway up to Wismar. Travemünde up to Lübeck.
	3	{ Marienleuchte, visible coastal waters. Fehmarn Sound. Bülk, Kiel creek.
CC	1	{ Friedrichsort, Kiel creek. Holtenua off the entry to the canal. Holtenua, Kaiser-Wilhelm canal up to Brunsbüttel.
	2	{ Rendburg, visible Eider area. Eckernförde. Flensburg, inner creek.
	3	{ Ellenbogen coastal waters. Husum Hever. Tönning Eider.
DD	1	{ Cuxhaven, visible Elbe area. Cuxhaven, harbour and entry. Brunsbüttelkoog, entry to canal.
	2	{ Glückstaft, Elbe area. Hamburg, Landing stages. Harburg, Elbe area.
	3	{ Hoheweg, visible Weser area. Bremerhaven. Bremen.
EE	1	{ Wangeroog, Wangeroo fairway, Outer Jade. Wilhelmshaven, Inner Jade. Wilhelmshaven, Harbour entrance.
	2	{ Borkum, Westerems. Nesserland, New sea lock. Nesserland harbour entrance.

If ice and navigation conditions are the same in one of the main groups, *i.e.* if in group AA all stations are free of ice and navigation unaffected, the following abbreviation will appear in the telegram: AA01.

If conditions are the same in several of the main groups, *e.g.* if in groups BB, CC, DD and EE free of ice, navigation unaffected, the following abbreviation will appear in the telegram: BB, CC, DD, EE 01.

LATVIA.

Wireless Telephony (R.T. Issues).

The broadcasting station at Riga, call sign **KCZ**, broadcasts in winter, on a wavelength of 526.1 metres R/T, ice reports at 0650, 1035 and 2000 G.M.T. The reports contain information concerning ice and navigation conditions for the Latvian coast. They are broadcast in the Latvian, ENGLISH and German languages.

HOLLAND.

I.C.W. Issues.

Scheveningen W/T station, call sign **PCH**, broadcasts, when necessary, data concerning ice conditions in certain Dutch harbours and approaches, daily as follows:—

at 1230 and 2130 G.M.T. after the Storm Warning (if issued).

Wavelength 600 metres (I.C.W.).

The ice report which is broadcast in code will contain the ice conditions for the following harbours:—

Delfzijl (Ems).	Helder (Zuider Zee).
Harlingen (Zuider Zee).	Rotterdam (Waterway).
Amsterdam (North Sea Canal).	Dordrecht (North).
Zaandam (Voorzaan).	Dordrecht (Mallegat).

The report commences with the words "Ijsbericht, Ice report."

The code consists of two four-figure groups.

The ice information for the harbours is always broadcast in the order given in the foregoing list.

Each code figure therefore gives by its position the navigational conditions existing in the different harbours.

Code.

Code Figure.	Navigational Conditions.
1	Navigation practicable.
2	„ difficult for sailing vessels.
4	„ closed to sailing vessels; but still possible for steamers.
6	„ closed to small steamers and motor vessels.
8	„ closed.

Example.

Ijsbericht, ice report 4611 1111

Meaning.—**Delfzijl.** Navigation closed to sailing vessels; but still possible for steamers.

Harlingen.—Navigation closed to small steamers and motor vessels. For the remaining localities navigation is practicable.

NOTE.—The broadcast of the ice reports will begin when navigation is closed to small steamers and seagoing motor vessels at any of the harbours mentioned in the list, and will cease when navigation is re-opened.

Ice reports are transmitted twice: first at the rate of 15 words per minute, and then quickly.

IV. VISUAL GALE WARNINGS.

SWEDEN.

Day Signals.	Night Signals.	Explanation.
▲	(R) (R)	Gale (Force 7 to 9) is expected between N. and W.
▼	(W) (W)	Gale (Force 7 to 9) is expected between S. and W.
▲ ▲	(R) (W)	Gale (Force 7 to 9) is expected between N. and E.
▼ ▼	(W) (R)	Gale (Force 7 to 9) is expected between S. and E.
▲ ▼	(R)	Gale of which the direction is not indicated.
● ▲	(R) (R)	Storm (Force 10 to 12) is expected between N. and W.
● ▼	(W) (W)	Storm (Force 10 to 12) is expected between S. and W.
▲ ●	(R) (W)	Storm (Force 10 to 12) is expected between N. and E.
▼ ●	(W) (R)	Storm (Force 10 to 12) is expected between S. and E.
▲ ▼	(R)	Storm of which the direction is not indicated.

R = Red. W = White.

NORWAY.

Day Signals.

Signal.	Meaning.	Signal.	Meaning.
▼	Indicates that a gale is expected, or is probable from S.W.	▲	Indicates that a gale is expected, or is probable from N.W.
▼ ▼	Indicates that a gale is expected, or is probable from S.E.	▲ ▲	Indicates that a gale is expected, or is probable from N.E.
●	"Atmospheric disturbance, be alert and look out for further information."		

One flag displayed with any of the above signals indicates that the wind may be expected to *veer* during the gale.

Two flags displayed with any of the above signals indicate that the wind may be expected to *back* during the gale.

Night Signals.

Signal.	Meaning.
Three <i>white</i> lights, triangle point up	Gale from N.W.
Three <i>white</i> lights, triangle point down	Gale from S.W.
Four <i>white</i> lights, triangle point up (one light above)	Gale from N.E.
Four <i>white</i> lights, triangle point down (one light below)	Gale from S.E.
One <i>red</i> light	"Atmospheric disturbance, be alert and look out for further information."

DENMARK.

The system of day gale warning signals in force at Danish ports is the same as that explained for Norway. By night a red light is hoisted in place of any of the day gale warning signals.

Additional Gale Signals.

When a gale is blowing at Blaavands Huk, Hanstholm, the Skaw, Fornæs, Gjedser or Hammeren, the signals below are displayed at Aalborg, Tuborg and Copenhagen. The place and force of the wind, according to the Beaufort scale, are indicated by coloured flags, as follows:—

Place.	Force of the Wind.	
	7-9.	10-12.
Blaavands Huk		
Hanstholm		
The Skaw		
Fornæs		
Gjedser		
Hammeren		

Yellow.
Red.
Black.
White.

These signals are usually made between 0900 and sunset.

GERMANY.

Day Signals.

Signal.	Meaning.
	Indicates that a gale is expected, or is probable from S.W.
	Indicates that a gale is expected, or is probable from S.E.
	Indicates that a gale is expected, or is probable from N.W.
	Indicates that a gale is expected, or is probable from N.E.
	Indicates the probability of a gale of which the direction of approach is not indicated.

One flag displayed with any of the above signals indicates that the wind may be expected to *veer* during the gale.

Two flags displayed with any of the above signals indicate that the wind may be expected to *back* during the gale.

 Displayed for the benefit of fishing vessels and small craft. It denotes that the wind is expected to increase in strength to force 6-7 (Beaufort scale).

Night Signals.

By night a *red* light is hoisted in place of any of the Day Signals; at certain stations, however, the following signals, known as amplified signals, are hoisted:—

Signal.	Meaning.
Two <i>white</i> lights vertical... ..	Gale probable from S.W'd.
Two <i>red</i> lights vertical	Gale probable from N.W'd.
A <i>white</i> light over a <i>red</i> light	Gale probable from S.E'd.
A <i>red</i> light over a <i>white</i> light	Gale probable from N.E'd.
One <i>red</i> light	Indicates the probability of a gale of which the direction of approach is not indicated.

The *red* light also constitutes a warning to fishing vessels and small craft that the wind is expected to increase in strength to force 6-7 (Beaufort scale).

In addition to the above night signals, storm signals are made at certain stations by searchlight directed towards the sky at an

elevation of about 35°, and are repeated in various directions at two-hour intervals, commencing at the first even-numbered hour after dusk.

The day storm signals, indicated by cones, are made by long and short flashes. A short flash of about *three seconds'* duration corresponds with the point of the cone, and a long flash of about *nine seconds'* duration corresponds with the base of the cone; thus the day storm signals, indicated by cones, are made as follows:—

- One cone point down 
- Two cones points down 
- One cone point up 
- Two cones points up 
- Two cones bases towards each other 

The day storm signal, indicated by a red flag, is made by a circular movement of the beam of light on the sky in a clockwise direction.

The day storm signal, indicated by two red flags, is made by a circular movement of the beam of light on the sky in an anti-clockwise direction.

The day storm signal, indicated by a ball, is made by a circular movement of the beam of light on the sky in a direction alternately clockwise and anti-clockwise.

The cone signal is preceded and followed by the flag signal. When no flag signal is made, the cone signal is preceded and followed by the ball signal, indicating that no direction of shift of wind can be given.

The warnings hold good for a distance of about 50 miles from the vicinity of the signal station; they continue in force until the evening of the day following the day of issue.

HOLLAND.

The system of day gale warning signals in force at places on the coasts of Holland is the same as that explained for Norway. Night gale warning signals are similar to those used by Germany with the exception of the *red* light, which indicates "Atmospheric disturbance, be alert, and look out for further information."

BELGIUM.

The system of day gale warning signals in force at Belgian ports is the same as that explained for Norway.

Night Signals.

At Ostende, Nieuport, Blankenberghe and Zeebrugge, night gale warning signals are made by *red* lights as follows:—

Signal	Meaning.
A triangle of <i>red</i> lights	Gale probable from N.W.
One <i>red</i> light over a triangle of <i>red</i> lights.	Gale probable from N.E.
An inverted triangle of <i>red</i> lights	Gale probable from S.W.
One <i>red</i> light below an inverted triangle of <i>red</i> lights.	Gale probable from S.E.
One <i>red</i> light over an inverted triangle of <i>red</i> lights.	Gale probable, direction uncertain.

Special Notices regarding Personnel.

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

Obituary.

THE death of Captain MAXWELL BARCHAM SAYER, C.B.E., R.D., R.N.R., A.d.C. of the Thames Nautical Training College, H.M.S. *Worcester* which occurred at his home at Deal on 24th December, 1928, after an accident, is noted with regret.

Captain SAYER, joined H.M.S. *Worcester* as a cadet in 1887 and on completing three years in that ship served his apprenticeship in H. GREEN & Co.'s ship *Carlisle Castle* and Messrs. DEVITT & MOORE's *Macquarie*. Transferring to steam he served in the Orient Line and the Canadian Australian Line.

Completing his twelve months training in the Royal Navy, Captain SAYER subsequently served in the Nigerian Marine from which service he was invalided after taking part in the Kuno Patrol Expedition West Africa sent to avenge the murder of the District Commissioner at Forcados.

Called up for service at the commencement of the Great War, he served in the Fleet until August, 1916, when he was lent to the War Office being appointed Lieutenant Colonel, R.E., Assistant Director I.W. and D. In this connection he was responsible for the fitting out and storing of the large fleet of shallow draught vessels for service on the Tigris. Later, Captain SAYER was appointed at the War Office, Marine Superintendent of all marine depots of the I.W.T. including Richborough. For his war services he was awarded the C.B.E. and was mentioned in despatches.

In July, 1919, Captain SAYER was appointed Captain Superintendent of H.M.S. *Worcester* on the retirement of Captain Sir DAVID WILSON BARKER, Kt., R.D., R.N.R. At the request of the India Office he recently prepared a scheme for the sea training of native cadets in India which led to the establishment of the training ship *Dufferin*. He also acted in an advisory capacity to the Egyptian Government with regard to their marine service and for this the Order of the Nile (Commander) was conferred upon him by King FUAD.

In June, 1928, Captain SAYER was appointed Royal Naval Reserve aide-de-camp to His Majesty the KING. He was a younger brother of Trinity House, a member of the Court and Committee of sea training of the Honourable Company of Master Mariners.

The Corps of Marine Observers and Marine Division join in sympathy with *Worcesters* past and present in all parts of the world in the loss which the old ship has sustained by the death of her Captain Superintendent.

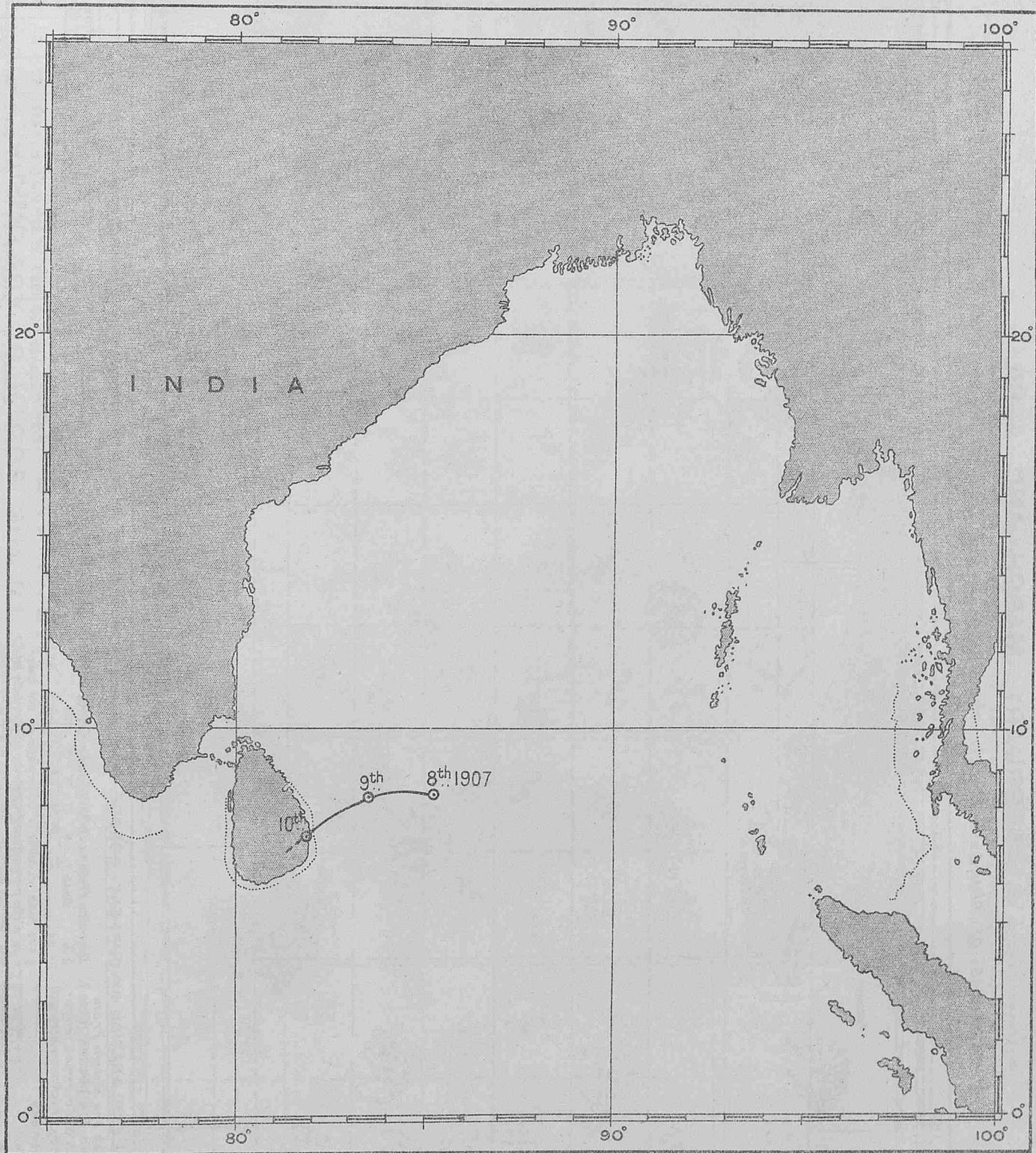
The death of Captain Sir JAMES ROBERT RAE, K.B.E., who when stepping off the pavement to cross the road was killed by a motor-bus in Saltcoats, Ayrshire, when at home on leave on 29th December, 1928, is noted with regret.

Sir JAMES was born in Glasgow in 1859 and served his apprenticeship with Messrs. P. HENDERSON & Co., of Glasgow. In 1886 he joined Messrs. GEORGE SMITH & Sons City Line as a junior officer. Passing through the various grades he was appointed to command in 1895, and has since then been entrusted with the charge of several of the ships of the City Line Fleet. In 1922 he was appointed to command the *City of Nagpur* and was still in command of her at the time of his death.

During the war he commanded the *City of Exeter* in which ship he carried thousands of troops from India and elsewhere to the various fronts. In June, 1917, the *City of Exeter* deep laden and carrying a full complement of passengers struck a mine when in the Arabian Sea, but Sir JAMES successfully navigated his ship into Bombay without assistance. He was created a Knight of the British Empire by HIS MAJESTY THE KING in 1920.

He was a member of the Corps of Voluntary Marine Observers from 1907 to 1912.

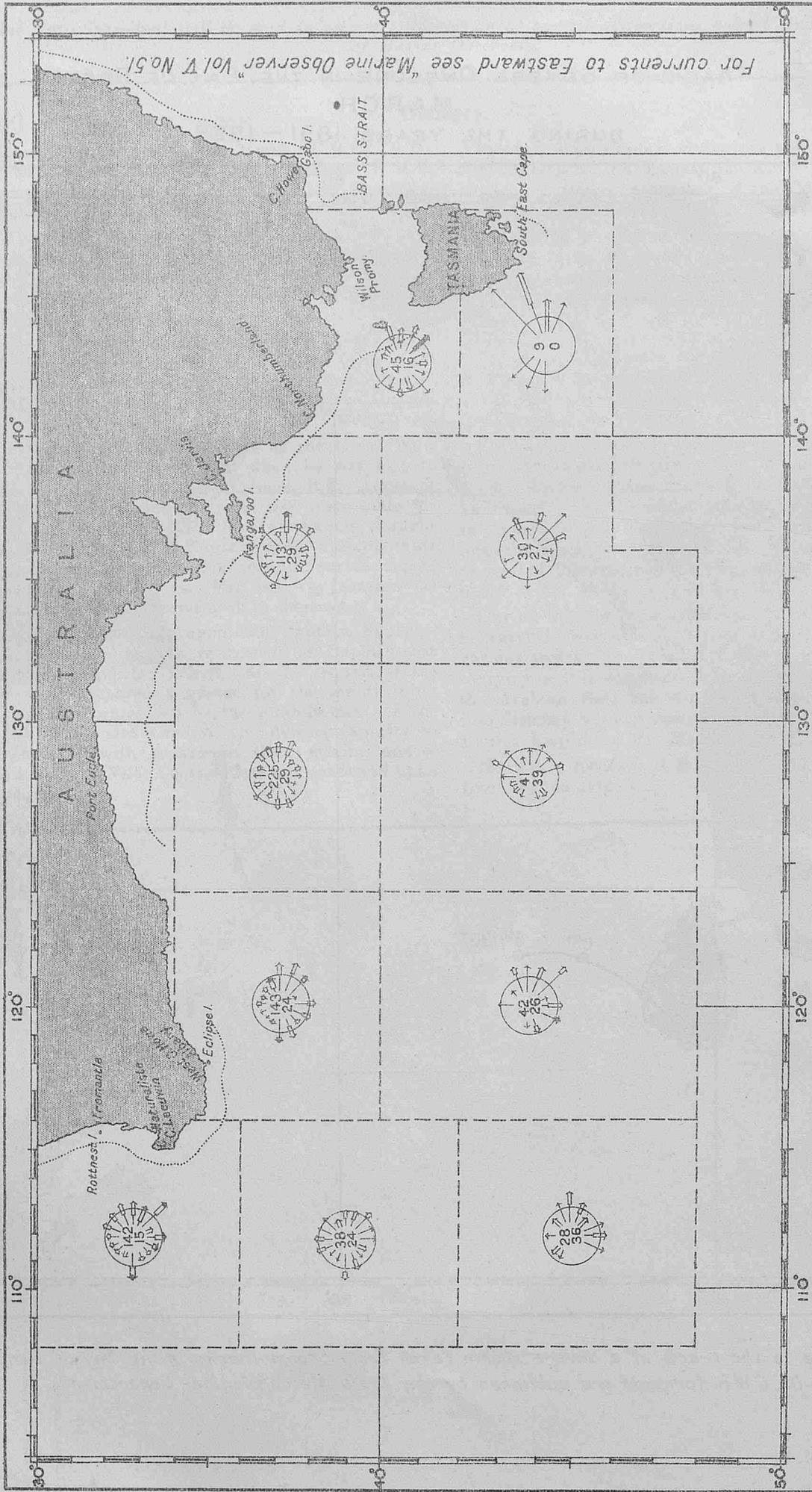
TRACK OF SEVERE CYCLONE IN THE BAY OF BENGAL
MARCH
DURING THE YEARS 1891-1923.



The above is the track of a severe storm taken from "Storm Tracks in the Bay of Bengal" compiled by Dr. C.W.B. Normand and published by the India Meteorological Department.

CURRENTS ON THE TRACKS TO THE SOUTH OF AUSTRALIA, FEBRUARY, MARCH AND APRIL.

Observations of ships regularly observing for the British Meteorological Office 1910-1927.



EXPLANATION OF CURRENT ROSES.

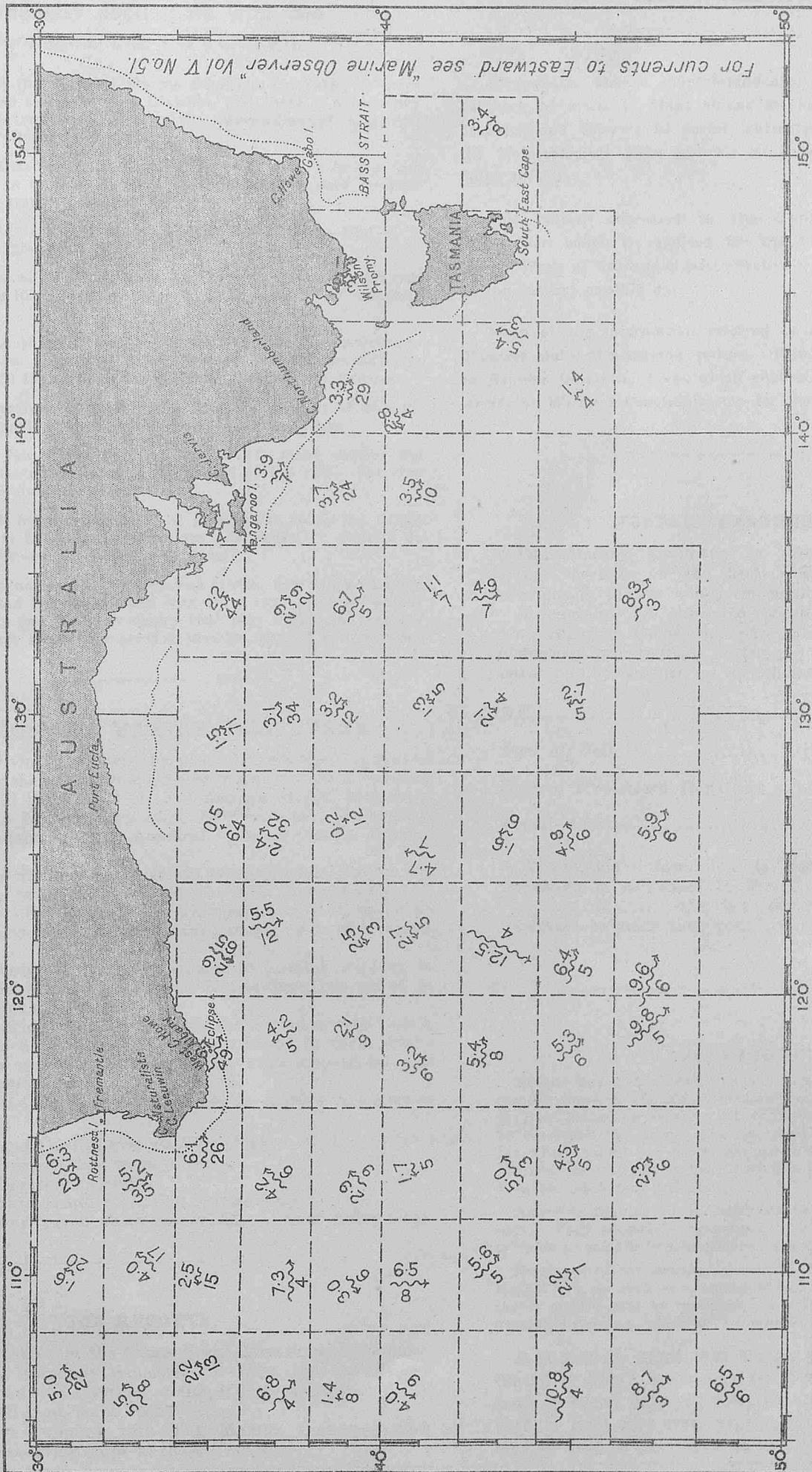
The current roses are drawn from observations within the pecked lines.
 Arrows flow with the current, length represents frequency thickness strength.
 6-12 miles per day
 13-24 " " "
 25-48 " " "
 49-72 " " "
 73 " " " and above

Distance from tail of arrow to circle represents 5%.
 Scale 10 20 30 40 50%
 The upper figure in the centres of the rose gives total number of observations, the lower figure the percentage frequency of currents less than 6 miles per day. The roses are drawn so that their centres lie within the areas to which they refer.

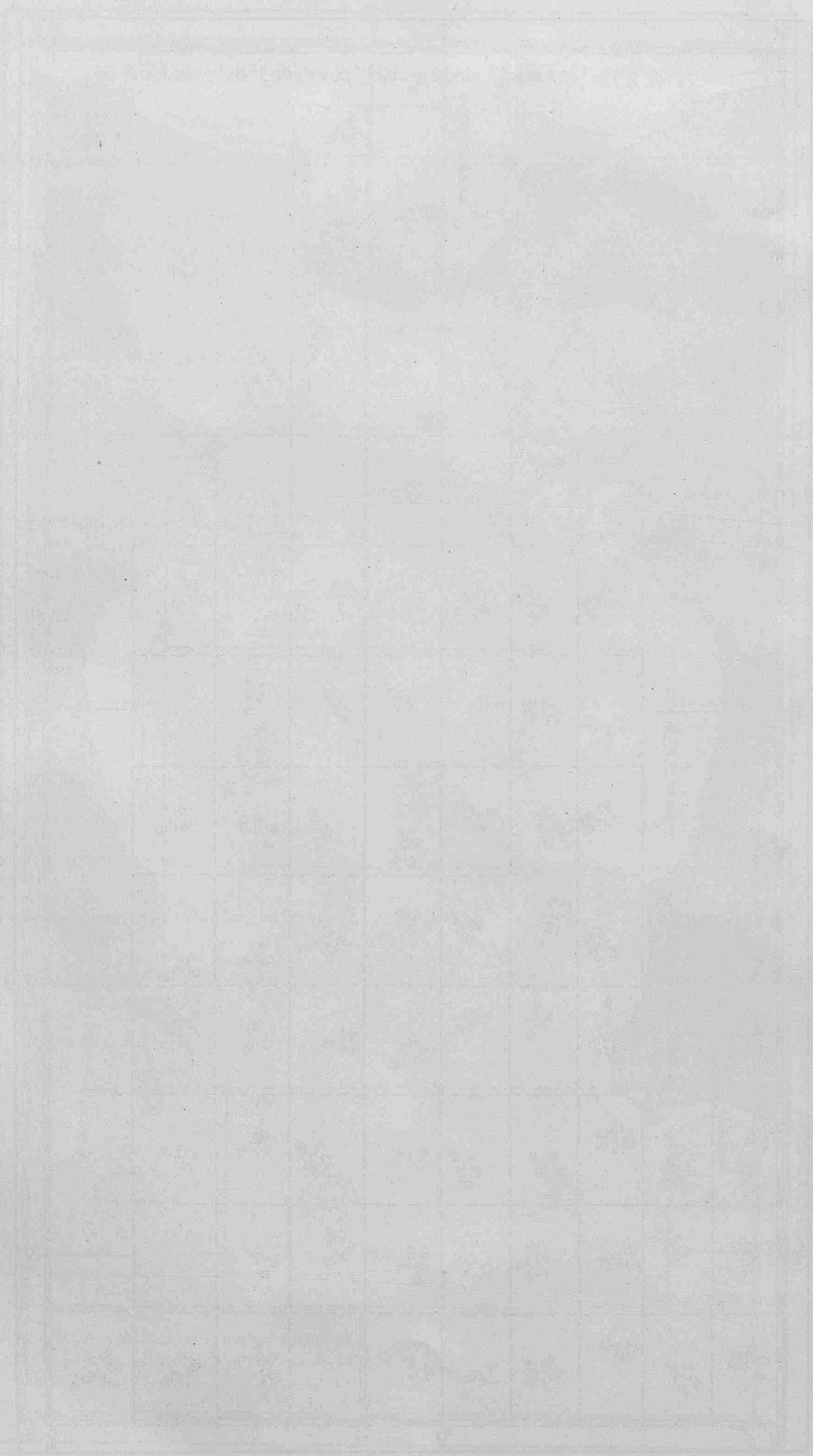
Name of Ship	Date Day Year	Middle		Current		Wind	
		Lat.	Long.	Set	Drift	Dir.	Force
Clan Macphes	26 1927	35° 22' S	119° 01' E	S 49° E	32	E	4
Port Sydney	1 1922	40° 16' S	147° 24' E	S 37° E	40	E by S	2
Orari	14 1923	42° 06' S	121° 05' E	S 33° W	39	E by E	3
Clan Macphes	21 1927	38° 22' S	138° 38' E	E	36	E by E	2
Macedonia	26 1913	35° 21' S	128° 16' E	N 74° E	37	W by S	6
Barrabool	19 1927	35° 06' S	114° 45' E	S 62° E	32	-	-

CURRENTS ON THE TRACKS TO THE SOUTH OF AUSTRALIA, FEBRUARY, MARCH AND APRIL.

Observations of ships regularly observing for the British Meteorological Office 1910-1927.



EXPLANATION OF CURRENT ARROWS.
 The arrows flow with the current and represent the resultant of currents observed within the pecked lines.
 The centre of each arrow lies in the mean position of observation. The figures above the arrows give the velocity of current in miles per day; the figures below the arrows the number of observations.



THE UNIVERSITY OF CHICAGO
LIBRARY

IMPORTANT.

**Request to return Additional Remarks and
supplementary documents with the
Meteorological Log and Form 911.**

As the interest of the Corps of Marine Observers increases, so more information is returned to the Marine Division, and there is a tendency to send in supplementary documents to the Meteorological Log and Ship's Meteorological Report Form 911.

The strength of the Marine Division is constant, that is to say, the number of assistants in the Marine Division to handle the data received remains the same whatever the amount.

To maintain or increase the output of published information it is necessary to regulate collection.

Marine Observers will greatly assist, and in so doing, help towards publication by making their Logs and Reports when returned as complete as possible.

Information or considered views in reply to the Marine Superintendent's circulars or notes of enquiry in this Journal may be conveniently written on the pages in the Log and Form 911 for "Additional Remarks."

In this space narratives of experiences in storms, accounts of unusual phenomena and abnormal currents experienced should be entered.

A selection of a few of the best weather charts made during the voyage can be appropriately attached to the fly-leaf of the Log. Sketches and photos should be similarly attached.

By forwarding all information which it is intended to return, along with the Log or Form 911, Marine Observers will make it possible to give better acknowledgment for work well done.

The remarks, weather charts, sketches and photos, now being received are greatly appreciated and it is hoped that these may increase, but if justice is to be done to them, it is necessary that they should be properly placed so that they may receive the greatest possible amount of attention.

INVITATION TO MARINE OBSERVERS.

The Marine Superintendent will be pleased to see the Captains of Observing Ships or their Observing Officers when they are in London, between 10 a.m. and 4 p.m. at Room 319, Adastral House, Kingsway, W.C.2. Telephone No., Holborn 3434, Extension 421. Telegrams, Marine Superintendent, Weather, London. (Nearest Station, Temple, District Railway.)

Personal touch is not only conducive to efficient work, but by this means we may be better able to advance upon lines which will further the practice of Meteorology in Navigation and at the same time provide the most suitable data for the general needs of Meteorological Science.

Those Marine Observers who do not come to London wishing to discuss matters connected with Marine Meteorology, are asked to consult the Agents at the Ports.

The Marine Agencies in the British Isles are visited at least once a year by the Marine Superintendent, and it is hoped by these means to further promote voluntary co-operation between ships at sea, and with the Meteorological Office.

Usually the Marine Superintendent visits the Marine Agencies as follows:—

Southampton and Cardiff, first week of March.

Belfast and Liverpool, last week of May.

Glasgow and Liverpool, October.

Leith, North Shields and Hull, mid November.

Marine Agencies are given about two weeks notice of exact dates.

ICE REPORTS.

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

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

DESPATCH OF INFORMATION

**REQUIRED IMMEDIATELY FOR THE CONDUCT OF
THE WORK AT SEA.**

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

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

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

POSTAL ARRANGEMENTS.

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

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

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

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

THE BAROMETER.

Before barometer readings are compared with the normal isobars shown on the Meteorological Ocean Charts, transmitted by W/T or plotted on Weather Charts, mercurial barometers should be corrected for height, gravity, temperature and index error, for which tables are given on pp. 84 to 92 4th edition of "The Marine Observer's Handbook," see also pp. 2 and 3 "Wireless and Weather an Aid to Navigation."

Aneroids require to be corrected for height and index error only. They should be frequently compared, as the mechanism is liable to get out of adjustment without detection.

Readings of the barometer should be entered in the Meteorological Log as read—i.e., uncorrected—and the attached thermometer should also be recorded. A column is now given for the corrected reading, which should also be entered with great care.

It is strongly urged that Marine Observers, whether using Official or Ship's Barometers, for W/T reports, Meteorological Logs or Forms 911, will complete and send in the Blue Post Card, at least once every voyage, so that an effectual check may be kept on the index error.

ICE CHART.

WESTERN NORTH ATLANTIC.

LETTERS OF TRANSATLANTIC TRACKS INDICATE.

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

(B) From 1st February to 31st August, inclusive.

(D) From 15th February to 10th April, inclusive.

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

ROUTE NOTICES.

For latest information re Tracks see pages 3-4, Vol. V. No. 52 of this Journal.

SYMBOLS USED ON THE CHART

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

PHENOMENAL POSITIONS OF ICE.

Date.	Ship or Source of Report.	Position.		Remarks.
		Lat.	Long.	
March 24, 1913	S.S. Floride ...	48°21' N.	54°05' W.	Berg 60 ft. high, 200 ft. long.
" 20, 1915	S.S. Wanaby ...	56°55' N.	48°32' W.	Piece—supposed portion of a berg 5 ft. high, 80 ft. long.
" 21, 1920	U.S. Hyd. Bulletin ...	38°02' N.	46°38' W.	3 ft. high, 30 ft. long.
" 21, 1921	S.S. Hollandia ...	37°50' N.	47°23' W.	Berg.

No reports of Ice sighted during the month of January, 1929, have been received at the Meteorological Office.

Limit of ice reported to Meteorological Office March 1901-1928.

Co-operation of Shipowners, Masters and Mates.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

For sample weather report message see Chapter I. of "Wireless and Weather an Aid to Navigation," page 6, and page 19 of Vol. VI., No. 61.

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

LATE PRESS.

DERELICTS AND FLOATING WRECKAGE.

Date.	Position.		Description.
	Latitude.	Longitude.	
NORTH SEA.			
4.1.29	51°19'N.	1°56'E.	Black conical buoy adrift.
ENGLISH CHANNEL.			
1.1.29	49°35'N.	3°03'W.	Drifting spherical buoy, blue and white stripes.
12.1.29	50°19½'N.	2°22'W.	Whistling buoy adrift showing white double flash every half minute irregular.
MEDITERRANEAN.			
17.1.29	40°48'N.	2°20'E.	Derelict.
NORTH ATLANTIC.			
3.1.29	37°48'N.	69°57'W.	Spar projecting 10 ft. out of water and apparently attached to submerged wreckage.
6.1.29	10°—'N.	80°05'W.	Raft about 10 ft. square, consisting of several solid tiers of heavy planking awash.
7.1.29	42°52'N.	19°31'W.	Large gas and whistling buoy, red superstructure, light on buoy extinguished; dangerous to navigation.
7.1.29	47°50'N.	44°00'W.	German steamer <i>Raedelheim</i> .
9.1.29	22°02'N.	69°08'W.	Spar about 20 ins. in diameter, standing upright and extending 3 ft. out of water.
9.1.29	40°32'N.	72°37'W.	Large black can buoy adrift.
16.1.29	33°57'N.	75°—'W.	Heavy square timber about 40 ft. long and 4 ft. in diameter with several long iron bands.
22.1.29	39°10'N.	73°21'W.	Wreckage consisting of deckhouse awash, dangerous to navigation, name <i>Mary H. Keeler</i> on side.
GULF OF MEXICO.			
2.1.29	24°30'N.	82°55'W.	Log about 40 ft. long and nearly 2 ft. in diameter.
2.1.29	26°43'N.	86°14'W.	Close to what appeared to be derelict schooner or barge with house visible and no masts; obstruction showed about 3 ft. out of water.
11.1.29	25°55'N.	85°55'W.	Derelict covered steel barge, floating high and marked <i>Florida Power Corp No. 2</i> .
NORTH PACIFIC.			
5.1.29	35°02'N.	123°03'W.	Piece of wreckage about 40 ft. long, painted brown and awash; this obstruction appeared to be the deck of a small vessel.

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

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

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

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

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

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

FREMANTLE, W. Australia. Captain J. J. AIREY, Deputy Director of Naviga-
tion, Customs House.
(Telephone No.: *B 1391*).

HONG KONG,
China.

HULL ...

LEITH ...

SOUTHAMPTON

SYDNEY,
New South Wales.

TYNE ...

VANCOUVER,
British Columbia.

Agents (*contd.*).

Lieut. Commander J. H. DRUMMOND, D.S.C.,
R.N., Superintendent, Admiralty, Chart and
Chronometer Depot, H.M. Dockyard.
(Telephone No.: *108 Dockyard*).

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

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

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

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

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

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

Name of Vessel.	Captain.	Observing Officers.	Official Meteorological Equipment.	Line	Last Log, Register, or Report Contributed. Received up to 18.1.29.	Date Received.
<i>Atrous</i>	Rundle, G. G. ...	H. Nicholas	No. A.	A. Holt	Form 911 19.7.28 to 28.9.28	2.10.28
<i>Atsuta Maru</i>	Narui, N.	Y. Osada	" A.	Nippon Yusen Kaisha	" 18.5.28 to 18.9.28	24.9.28
<i>Auditor</i>	Owen, W. T.	D. O. Percy	" M.	Harrison	" 17.11.28 to 18.12.28	22.12.28
<i>Autolytus</i>	Dunlop, J. K.	"	" A.	A. Holt	" 25.10.28 to 11.11.28	28.11.28
<i>Avon</i>	Spriddell, F. G., R.D., Commr., R.N.R.	R. H. East	" M.	R.M.S.P.	" 17.2.28 to 28.3.28	29.3.28
<i>Balmoral Castle</i>	J. H. Kerbey	H. A. Deller	" A.	Union Castle	" 2.11.28 to 23.12.28	5.1.29
<i>Balranald</i>	Townshend, W. P., Capt., R.N.R.	H. Stinn, G. Owen, F. Ward,	M.L.	P. & O. Branch	Met. Log. 31.3.28 to 5.8.28	16.8.28
51 <i>Baltic</i>	Warner, G. E., R.D., Capt., R.N.R.	A. C. l'Anson, W. F. Dennison, H. Phillips.	W.T.	White Star	W.T. Reg. 27.11.28 to 17.12.28	19.12.28
<i>Bampton Castle</i>	Hutchings, A. H.	E. Hamlyn	No. A.	Union Castle	Form 911 24.12.28 to 14.1.29	16.1.29
<i>Banffshire</i>	Wynne, R. H.	W. D. E. Campbell, F. Cossar, E. S. Sprout.	" A.	Turnbull Martin	" 27.11.28 to 14.1.29	16.1.29
<i>Baradine</i>	Rollo, W.	C. B. Roche, B. H. Pollitt, P. Haworth, J. H. Anderson.	M.L.	P. & O. Branch	" 28.4.28 to 4.8.28	23.8.28
<i>Barpeta</i>	Chandler, H. V.	N. Apps	No. M.	British India	Met. Log. 19.7.28 to 20.11.28	22.11.28
<i>Barabool</i>	Rhodes, H. R.	T. G. Davies	" M.	P. & O. Branch	Form 911 31.10.28 to 28.11.28	14.1.29
<i>Baychimo</i>	Cornwall, S. A.	"	" A.	Hudson's Bay Co.	" 26.9.28 to 20.10.28	25.10.28
59 <i>Belgenland</i>	Morehouse, W. A.	F. Good, C. H. Otterson, F. Clitty.	W.T.	Red Star	W.T. Reg. 5.10.28 to 19.11.28	3.12.28
<i>Beltana</i>	Allin, C. H. C.	D. M. Stafford	No. M.	P. & O. Branch	Form 911 7.12.28 to 13.12.28	8.1.29
<i>Benalder</i>	Fairweather, J. J.	D. T. McCullum	" A.	Ben Line	" 24.6.28 to 9.8.28	13.8.28
<i>Benalla</i>	Sheepwash, J. H.	J. E. Hills	" M.	P. & O. Branch	" 10.11.28 to 28.12.28	1.1.29
<i>Benadigo</i>	Nicholl, R. N. C.	G. G. Mason	" M.	Harrison	" 2.12.28 to 14.12.28	28.12.28
<i>Benefactor</i>	Jones, C. W.	"	" M.	Harrison	" 25.10.28 to 13.12.28	20.12.28
<i>Bengloe</i>	McCorquodale, A.	G. Davidson	" A.	Ben Line	" 9.8.28 to 28.9.28	3.10.28
31 <i>Berengaria</i>	Rostron, Sir A. H., K.B.E., R.D., Capt. R.N.R.	J. A. Myles, S. A. T. Bullock	W.T.	Cunard	" 25.4.28 to 26.5.28	14.6.28
<i>Berrina</i>	Short, C. E.	G. H. Durrant	No. M.	P. & O. Branch	W.T. Reg. 11.4.28 to 21.5.28	8.6.28
<i>Brenda</i>	Lamont, A.	N. Ross	" A.	Scottish Fishery Brd.	" 6.12.28 to 20.12.28	27.12.28
<i>Brighton</i>	Hill, A.	Mr. Munton	C.C.	Southern Railway	" 28.12.28 to 12.1.29	14.1.29
<i>British Colonel</i>	Taylor, R. J.	F. W. Sherlock	No. M.	British Tankers	Form 911 13.10.28 to 26.12.28	14.1.29
<i>Bronte</i>	Crappier, J. S.	J. B. Scott	" A.	Lampport & Holt	" 25.3.28 to 26.4.28	8.6.28
<i>Bruyere</i>	Birch, A.	"	" A.	"	" 16.8.28 to 8.11.28	26.11.28
<i>Bulysses M.V.</i>	Head, B. P.	A. J. Clatworthy	" M.	Anglo-Saxon Petroleum Co	" 16.11.28 to 29.12.28	5.1.29
65 <i>Calgarie</i>	Western, W.	C. Cochrane, A. Thompson, R. H. Shaw.	W.T.	White Star	" 10.12.28 to 30.12.28	1.1.29
<i>Cambria</i>	Copland, C. P.	O. W. Ll. Jones	C.C.	L.M. & S. Rly	W.T. Reg. 10.12.28 to 31.12.28	3.1.29
<i>Cameronia</i>	Gemmill, W.	D. Chamberlain	M.L.	Anchor	Telegraphic Report 12.1.29	12.1.29
<i>Camito</i>	Forrester, W. T., O.B.E.	H. H. Dunning, W. E. Grant, G. M. Roberts.	"	Elders & Fyffes	Met. Log. 28.4.28 to 15.9.28	6.11.28
<i>Canadian Importer</i>	Forson, A.	E. Hamilton	No. A.	Canadian Gov. Mercantile Marine.	" 5.6.28 to 3.10.28	9.10.28
<i>Canadian Winner</i>	McConechy, W. G.	J. M. Lang	" M.	Furness Houlder	Form 911 6.10.28 to 31.10.28	22.11.28
<i>Canonesa</i>	Brodie, W. H.	T. Wetherall	" M.	"	" 17.9.28 to 13.10.28	27.11.28
<i>Cape of Good Hope</i>	Lamont, J. G.	W. S. Bartlett	No. A.	Lyle S.S. Co.	" 13.2.28 to 3.4.28	11.4.28
35 <i>Carmania</i>	Brown, F. G., R.D., Capt., R.N.R.	W. M. Stewart, E. R. Taylor, E. Gleave.	W.T.	Cunard	" 12.10.28 to 17.11.28	26.11.28
<i>Carnarvon Castle</i>	Stanley, W. F., R.D., Commr., R.N.R.	W. G. Smith, T. C. Goldstone, S. S. Smith.	M.L.	Union Castle	W.T. Reg. 29.10.28 to 17.11.28	20.11.28
34 <i>Caronia</i>	Hossack, W. H., R.D., Capt., R.N.R.	H. G. Hayward, T. Parry, J. Chapman.	W.T.	Cunard	Met. Log. 14.7.28 to 4.11.28	26.11.28
<i>Casanare</i>	Browne, S.	H. N. Tilley	No. A.	Elders & Fyffes	W.T. Reg. 15.10.28 to 2.11.28	7.11.28
<i>Cavina</i>	Riseley, A. D.	R. L. Stevenson	" A.	"	Form 911 15.10.28 to 2.11.28	7.11.28
52 <i>Cedric</i>	Smith, R. G.	W. Walker, S. Fieldwood, N. E. Banks.	W.T.	White Star	" 26.8.28 to 11.11.28	14.11.28
<i>Centaur</i>	Rose, A. F.	A. Bowlt, N. L. Thompson, J. Cockburn.	M.L.	A. Holt & Co.	W.T. Reg. 17.11.28 to 22.12.28	5.1.29
<i>Ceramic</i>	Musgrave, T.	H. A. R. Daman	No. A.	White Star	Form 911 4.11.28 to 25.11.28	1.12.28
<i>Change</i>	Gambrell, F. C.	J. Thomas, T. Tyer, W. Allan, D. H. O'Hulton.	M.L.	Yuill & Co.	Met. Log. 4.11.28 to 25.11.28	29.11.28
<i>Changuinola</i>	Thorburn, R. A., R.D., Commr., R.N.R.	W. G. Chanter	No. A.	Elders & Fyffes	Met. Log. 14.2.28 to 15.7.28	29.10.28
<i>Chindwin</i>	Paterson, G.	"	" A.	Henderson	Form 911 6.11.28 to 11.12.28	28.12.28
<i>Chinkiang</i>	Stringer, C. B. L.	R. J. Powerie	M.L.	China Navigation Co	Met. Log. 13.4.28 to 30.8.28	21.11.28
<i>Chitripo</i>	McCollm, F.	"	No. A.	Elders & Fyffes	Form 911 18.7.28 to 17.10.28	3.11.28
<i>City of Baroda</i>	McMillan, J.	A. Beaton, T. C. Hodgkinson.	M.L.	Elderman	Met. Log. 10.4.28 to 29.7.28	6.9.28
<i>City of Benares</i>	Anderson, W. W.	P. C. Wilson	No. A.	"	Form 911 30.9.28 to 1.11.28	22.11.28
<i>City of Bombay</i>	Brown, O. C.	"	" M.	"	Met. Log. 5.3.28 to 20.5.28	6.6.28
<i>City of Brisbane</i>	Seaborne, F. O., D.S.C.	R. Jones	" A.	"	Form 911 28.8.28 to 27.9.28	26.11.28
<i>City of Bristol</i>	Jenkins, D.	K. G. Crockett	" M.	"	Form 911 3.2.28 to 1.4.28	10.4.28
<i>City of Canterbury</i>	Bremner, D. M.	R. H. Hodgson	" A.	Ellerman	" 11.11.28 to 1.12.28	7.1.29
<i>City of Carlisle</i>	Mordue, J. A.	"	" A.	"	" 2.11.28 to 28.12.28	14.1.29
<i>City of Chester</i>	Letton, F. W.	C. C. Duncan, A. J. Barnett, R. Mowbray.	M.L.	"	" 23.10.28 to 27.11.28	14.1.29
<i>City of Edinburgh</i>	Wyper, J.	G. H. Hummell	No. M.	"	Met. Log. 4.1.28 to 27.8.28	30.8.28
<i>City of Hong Kong</i>	Walton, H. L., O.B.E., R.D., Commr., R.N.R.	H. Saunders	" A.	"	Form 911 21.10.28 to 20.11.28	7.12.28
<i>City of Khios</i>	"	"	"	"	" 10.11.28 to 20.11.28	14.1.29
<i>City of London</i>	Parker, F. W., R.D., Commr., R.N.R.	"	No. A.	"	Form 911 28.9.28 to 4.12.28	7.1.29
<i>City of Osaka</i>	Smith, W. H.	R. K. Walker	No. M.	"	" 10.8.28 to 2.9.28	10.10.28
<i>City of Rangoon</i>	Jones, P.	E. R. Wildermuth, R. H. Stewart, F. E. Broadbent.	M.L.	"	Met. Log. 28.3.28 to 9.7.28	1.8.28
<i>City of Venice</i>	Lee, A.	"	No. A.	"	Form 911 18.2.28 to 1.3.28	12.3.28
<i>City of Yokohama</i>	Singleton, J. G.	R. Willott Leese	" A.	Ellerman	" 23.8.28 to 3.10.28	9.11.28
<i>Clan Alpine</i>	Lyall, A. B.	P. Sargent	" A.	Clan	" 23.10.28 to 15.11.28	20.12.28
<i>Clan Kenneth</i>	Young, A. H., Commr. R.D., R.N.R.	"	" A.	"	" 3.11.28 to 28.11.28	1.1.29
<i>Clan Lindsay</i>	Giles, H. J., R.D., Commr., R.N.R.	J. P. Dunkley	" A.	"	" 17.11.28 to 14.12.28	7.1.29
<i>Clan MacBean</i>	Worthington, J. H.	W. A. Nicholas	" A.	"	" 6.10.28 to 31.10.28	19.11.28
<i>Clan Macbeth</i>	Hannay, L. G.	J. C. Robertson	" A.	"	" 24.11.28 to 26.12.28	14.1.29

LIST OF VOLUNTARY OBSERVING SHIPS

Name of Vessel.	Captain.	Observing Officers.	Official Meteorological Equipment.	Line.	Last Log, Register, or Report Contributed. Received up to 18.1.29.	Date Received.
<i>Clan Macfadayen</i> ...	Laird, C. ...	R. L. Smallbone ...	No. A.	Clan ...	Form 911 3.11.28 to 30.11.28 ...	23.12.28
<i>Clan Macfarlane</i> ...	Redford, L. F. ...	T. A. Pearson ...	" A.	" ...	" 4.8.28 to 3.10.28 ...	6.10.28
<i>Clan Macgillivray</i> ...	Mackinlay, A. ...	J. Garis ...	" A.	" ...	" 17.11.28 to 6.12.28 ...	17.12.28
<i>Clan Macindoe</i> ...	Holman, W. G. ...	" ...	" A.	" ...	" 17.8.28 to 19.9.28 ...	26.9.28
<i>Clan Mackellar</i> ...	Smith, W. P. ...	E. Crowther ...	" A.	" ...	" 1.12.28 to 14.12.28 ...	28.12.28
<i>Clan Macphee</i> ...	Gourlay, J. B. ...	G. Short, B. Edgar, E. Mowatt.	M.L.	" ...	Met. Log. 21.11.27 to 18.4.28 ...	17.5.28
<i>Clan Macnaughton</i> ...	Simpson, A. W. ...	A. H. Hersee ...	No. A.	" ...	Form 911 9.11.28 to 7.12.28 ...	8.12.28
<i>Clan Macquarrie</i> ...	West, W. F. ...	T. P. Cranwill ...	" A.	" ...	" 22.11.28 to 5.12.28 ...	14.1.29
<i>Clan Mactaggart</i> ...	Makepeace, F. ...	E. A. Hewson ...	" A.	" ...	" 19.10.28 to 8.1.29 ...	18.1.29
<i>Clan Macwhirter</i> ...	Waterhouse, J. ...	W. A. Robbie, E. A. Brown, S. W. Brown.	M.L.	" ...	Met. Log. 1.10.27 to 26.4.28 ...	30.4.28
<i>Clan Malcolm</i> ...	George, L. S. ...	J. Masters, R. L. Ranford, J. F. Hubbard, R. L. Martin.	"	" ...	" 7.7.28 to 21.10.28 ...	19.11.28
<i>Clan Morrison</i> ...	Porterfield, W. M. ...	H. R. Crosscombe ...	No. A.	" ...	Form 911 24.6.28 to 26.7.28 ...	25.8.28
<i>Clan Murdoch</i> ...	Calderwood, W. ...	J. B. Davies ...	" A.	" ...	" 27.9.28 to 10.1.29 ...	17.1.29
<i>Clan Ranald</i> ...	Fraser, R. K. ...	K. G. Tucker ...	" A.	" ...	" 13.10.28 to 24.12.28 ...	3.1.29
<i>Clan Ross</i> ...	Openshaw, L. G. ...	" ...	" A.	" ...	" 21.10.28 to 15.11.28 ...	26.11.28
<i>Clan Sinclair</i> ...	Taylor, P. V. ...	J. H. Dennis ...	" A.	" ...	" 22.12.28 to 5.1.29 ...	14.1.29
<i>Clan Urquhart</i> ...	Baker, E. W. ...	J. O. H. Kirkwood ...	" A.	" ...	" 9.11.28 to 22.11.28 ...	17.12.28
<i>Colonia</i> ...	Worthington, B. ...	" ...	" M.	T. & J. Harrison	" ...	"
<i>Comorin</i> ...	Borland, J. Mc.L., C.B., D.S.O., R.D., Capt., R.N.R.	E. C. White ...	" M.	P. & O. ...	" 5.9.28 to 19.10.28 ...	29.10.28
<i>Corinthic</i> ...	Freeman, C. P. ...	E. M. Burt, M. Bennett, I. A. Macnaughton.	M.L.	White Star ...	Met. Log. 21.7.28 to 2.10.28 ...	12.11.28
<i>Cornwall</i> ...	Wilde, H. J. ...	H. M. Knight ...	No. A.	Federal ...	Form 911 27.3.28 to 9.5.28 ...	15.5.28
<i>Culebra</i> ...	Goble, C. J., R.D., Commr., R.N.R.	K. Paterson, R. N. Fletcher, W. S. Thomas.	M.L.	R.M.S.P. Co. ...	Met. Log. 12.10.28 to 19.12.28 ...	2.1.29
<i>Cumberland</i> ...	Macmillan, D. ...	G. C. Saul, P. Shakespear, J. Marks.	"	Federal ...	Form 911 29.4.28 to 30.8.28 ...	24.9.28
<i>Cyclops</i> ...	Cosker, W. ...	K. A. Owens ...	No. A.	A. Holt ...	" 4.10.28 to 23.11.28 ...	13.12.28
<i>Daga</i> ...	Wiles, N. ...	A. Olding ...	No. M.	P. Henderson ...	" 16.11.28 to 9.12.28 ...	22.12.28
<i>Dakotian</i> ...	Robb, J. ...	" ...	" A.	Leyland ...	" 3.8.28 to 30.9.28 ...	8.11.28
<i>Dardamus</i> ...	Clarke, J. W. ...	" ...	" A.	A. Holt ...	" 3.9.28 to 18.9.28 ...	22.11.28
<i>Darro</i> ...	Matthews, G. P. ...	" ...	" M.	R.M.S.P. Co. ...	" 19.10.28 to 6.11.28 ...	30.11.28
<i>Delphic</i> ...	Evans, W. ...	N. Williams ...	" M.	White Star ...	" 11.12.28 to 30.12.28 ...	14.1.29
<i>Demerara</i> ...	Willan, F. G. L., R.D., Capt., R.N.R.	F. Jeyes ...	" M.	R.M.S.P. Co. ...	" 9.7.28 to 13.9.28 ...	18.9.28
<i>Demosthenes</i> ...	Ogilvy, A. ...	H. Phillips ...	" M.	Aberdeen ...	" 25.9.28 to 11.11.28 ...	14.11.28
<i>Denis</i> ...	Harris, F. C. P. ...	J. H. Stokes ...	" A.	Booth ...	" 15.10.28 to 22.11.28 ...	7.12.28
<i>Descado</i> ...	F. S. Hannam ...	V. Scott ...	" M.	R.M.S.P. Co. ...	" 28.10.28 to 21.12.28 ...	28.12.28
<i>Desna</i> ...	Green, J. ...	L. T. Peterson ...	" M.	" ...	" 3.9.28 to 24.10.28 ...	12.11.28
<i>Deucalion</i> ...	Melling, C. F. ...	R. F. Dryden ...	" A.	A. Holt ...	" 6.10.28 to 13.11.28 ...	8.12.28
<i>Devon</i> ...	Kinnell, G. ...	D. Clegg ...	" M.	Federal ...	" 8.11.28 to 29.12.28 ...	18.1.29
<i>Dieppe</i> ...	Marmery, S. ...	Mr. Parsons ...	C.C.	Southern Railway ...	Telegraphic Report 16.1.29 ...	3.1.29
<i>Dimboola</i> ...	Brotherton, R. W. ...	H. L. Price ...	No. A.	Melbourne S.S. Co. ...	Form 911 22.7.28 to 15.8.28 ...	24.9.28
<i>Domala, M.V.</i> ...	Kitson, A. G. ...	H. Robertson ...	" M.	British India ...	" 21.10.28 to 29.12.28 ...	14.1.29
<i>Dominia, C.S.</i> ...	Campos, V., O.B.E., Lt.-Commr., R.N.R.	S. A. Garnham, A. S. Muir, L. J. Hegarty, W. F. Anderson.	M.L.	Telegraph Construction & Maintenance.	Met. Log. 8.8.28 to 5.12.28 ...	27.12.28
<i>Domitic</i> ...	Saxton, C. ...	G. H. Clark ...	No. A.	Booth ...	Form 911 9.7.28 to 9.11.28 ...	12.12.28
<i>61Doric</i> ...	Jones, W. H., Commr., R.N.R.	G. T. Kavanagh ...	W.T.	White Star ...	" 21.10.28 to 10.11.28 ...	14.11.28
<i>Dortington Court</i> ...	Clarke, E. J. ...	P. Jones ...	No. A.	Halpin & Co. ...	W.T. Reg. 3.10.28 to 7.12.28 ...	15.11.28
<i>Dromore Castle</i> ...	MacMahon, J., R.D., Commr., R.N.R.	J. A. Sowden ...	" A.	Union Castle ...	Form 911 3.11.28 to 1.12.28 ...	7.1.29
<i>Dryden</i> ...	Major, T. W. ...	" ...	" M.	Lamport & Holt ...	" 3.6.28 to 7.9.28 ...	18.9.28
<i>Dunaff Head</i> ...	Butt, H. L., R.D., Lt.-Commr., R.N.R.	D. Martin ...	" A.	Ulster S.S. Co. ...	" 29.11.28 to 14.12.28 ...	17.12.28
<i>Dundrum Castle</i> ...	Goodacre, R. W., R.D., Commr., R.N.R.	A. R. J. Tilston ...	" A.	Union Castle ...	" 13.4.28 to 11.5.28 ...	21.5.28
<i>Dunluce Castle</i> ...	Morgan, A. O., R.D., Commr., R.N.R.	W. M. Mulhall ...	" A.	" ...	" 19.10.28 to 27.12.28 ...	28.12.28
<i>Dunrobin</i> ...	Ramsay, J. D. ...	C. H. Kendall ...	" A.	Glen & Co. ...	" 27.11.28 to 14.12.28 ...	31.12.28
<i>Duquesa</i> ...	Owen, R. ...	W. E. Morriss ...	" M.	Furness Withy ...	" 10.10.28 to 15.12.28 ...	28.12.28
<i>Durenda, M.V.</i> ...	Beeching, P. H. ...	F. E. Liles ...	" M.	British India ...	" 21.6.28 to 22.7.28 ...	7.8.28
<i>Edinburgh Castle</i> ...	Gardner, G. F., O.B.E., Lt.-Commr., R.N.R.	C. P. Goode ...	" A.	Union Castle ...	" 23.11.28 to 13.1.29 ...	17.1.29
<i>Egori</i> ...	Sola, P., D.S.O. ...	R. W. Pattinson ...	" A.	Elder Dempster ...	" 29.10.28 to 17.11.28 ...	30.11.28
<i>Eldon Park</i> ...	Burns, R. ...	" ...	" M.	Denholm S.S. Co. ...	" ...	"
<i>Ellora</i> ...	Baird, S. K. ...	W. M. Bain ...	" M.	British India ...	" 15.11.28 to 4.12.28 ...	28.12.28
<i>Elpenor</i> ...	Gordon, A. L. ...	C. Kavanagh, J. E. Iliff ...	M.L.	A. Holt ...	Met. Log. 7.7.28 to 2.11.28 ...	7.11.28
<i>Elysia</i> ...	Duncan, A. R. ...	D. Blair, G. S. Sinclair, W. Black.	"	Anchor ...	" 11.8.28 to 11.10.28 ...	31.10.28
<i>Empress of Asia</i> ...	Hailey, A. J., Lt.-Commr., R.N.R.	L. M. Goddard, J. F. Patrick, R. J. Hickey, E. Newell, R. K. Baker.	"	Canadian Pacific ...	" 22.6.28 to 28.9.28 ...	7.1.29
<i>Empress of France</i> ...	Griffiths, E. ...	O. F. Pennington, E. Roberts, L. Outram.	"	" ...	" 31.10.28 to 21.12.28 ...	27.12.28
<i>Empress of Russia</i> ...	Hosken, A. J. ...	R. A. Leicester, J. G. McQuarrie, A. C. Jones.	"	" ...	" 2.8.28 to 10.11.28 ...	10.12.28
<i>Endeavour</i> ...	Law, E. F. B., Commr., R.N.	C. S. E. Lansdown, P. Barlow, W. H. Dickinson.	"	His Majesty's Ship ...	" 14.3.28 to 11.7.28 ...	16.7.28
<i>Enterprise</i> ...	Pridham-Wippell, H.D., Capt., R.N.	" ...	"	" ...	" ...	"
<i>Essequibo</i> ...	Kirkwood, J. H. ...	J. H. E. Evans ...	No. M.	R.M.S.P. Co. ...	Form 911 12.7.28 to 26.9.28 ...	16.11.28
<i>Eumaeus</i> ...	Read, J. W. ...	" ...	" A.	A. Holt ...	" 17.11.28 to 26.11.28 ...	5.12.28
<i>Euryades</i> ...	Findlay, J. ...	W. K. Hole ...	No. A.	A. Holt ...	" 13.10.28 to 7.12.28 ...	13.12.28
<i>Explorer</i> ...	Ling, J. T. ...	H. W. Gostage ...	" M.	Harrison ...	" 14.10.28 to 4.1.29 ...	9.1.29
<i>Explorer</i> ...	Allan, J. ...	A. Stout, F. O. Sheehy ...	" A.	Scottish Fishery Board.	" 4.12.28 to 20.12.28 ...	28.12.28
<i>Ferndale</i> ...	Thompson, W. ...	R. S. Hartrick ...	No. M.	Aberdeen Commonwealth.	" 7.7.28 to 5.8.28 ...	23.8.28
<i>Flandria</i> ...	Maars, L. ...	S. R. Hemmes ...	" M.	Holland Lloyd ...	" 2.11.28 to 20.12.28 ...	28.12.28
<i>Fordsdale</i> ...	Richardson, A. V. ...	F. Vaughan ...	" M.	Aberdeen Commonwealth.	" 12.10.28 to 16.11.28 ...	20.11.28

LIST OF VOLUNTARY OBSERVING SHIPS

Name of Vessel.	Captain.	Observing Officers.	Official Meteorological Equipment.	Line.	Last Log. Register, or Report Contributed. Received up to 18.1.29.	Date Received.
Largs Bay ...	Clifford, —	...	No. M.	Aberdeen Commonwealth.	...	...
64 Laurentic ...	Trant, E. L., R.D., Commr. R.N.R.	J. W. Peters, R. Hawkyns ...	"	White Star ...	W.T. Reg. 11.11.28 to 30.11.28 ... Form 911 11.11.28 to 1.12.28 ...	5.12.28 4.12.28
Lautaro, M.V. ...	Leyne, R. W. ...	J. T. Denley ...	No. M.	Pacific S.N. Co. ...	11.10.28 to 28.10.28 ...	27.11.28
Leicestershire ...	de Legh, P. ...	R. S. Evans, H. G. Walton, C. F. Hicks, A. Thomson.	M.L.	Bibby ...	Met. Log. 14.7.28 to 22.9.28 ...	26.9.28
Leighton, M.V. ...	Lindesay, J. M. ...	...	No. A.	Lampport & Holt ...	Form 911 1.5.28 to 20.5.28 ...	19.6.28
Leitrim ...	Robertson, A. ...	S. J. Woodhouse ...	" A.	Dowie, J., & Co. ...	" 2.12.28 to 12.12.28 ...	20.12.28
Limerick ...	Molyneux, P. L. ...	H. F. C. Wilkinson ...	" M.	Federal ...	" 25.10.28 to 26.11.28 ...	17.12.28
Llandaff Castle ...	Gilbert, E. F. ...	R. Bayer ...	" A.	Union Castle ...	" 19.4.28 to 8.5.28 ...	9.6.28
Llandoverly Castle ...	Stuart, C. E., Capt. R.N.R.	C. H. Williams, G. Moon, P. Clissold.	M.L.	"	Met. Log. 26.7.28 to 4.10.28 ...	6.10.28
Lobos, M.V. ...	Pape, E. R. ...	S. E. Aylard ...	No. M.	Pacific S.N. Co. ...	Form 911 17.12.28 to 5.1.29 ...	15.1.29
Loch Katrine ...	Schlanbusch, O. V. ...	D. A. Mallinson ...	No. A.	R.M.S.P. Co. ...	" 8.10.28 to 4.1.29 ...	9.1.29
Logician ...	Gibbings, W. ...	A. G. S. Madrell ...	No. M.	Harrison ...	" 22.6.28 to 15.10.28 ...	19.10.28
London Importer ...	Fowler, W. H. ...	E. F. Feint, J. H. Metcalfe, J. G. Freeman.	M.L.	Furness Withy ...	Met. Log. 8.1.28 to 31.3.28 ...	14.4.28
Lord Antrim ...	Jarvis, F. E. ...	...	No. A.	Ulster S.S. Co. ...	Form 911 5.12.28 to 22.12.28 ...	7.1.29
Loriga, M.V. ...	Clapham, E. C. ...	D. P. Morgan ...	" A.	Pacific S.N. Co. ...	" 20.11.28 to 14.12.28 ...	3.1.29
Losada, M.V. ...	Ross, J. ...	D. Beamer ...	" M.	"	" 1.11.28 to 20.11.28 ...	27.11.28
Macedonia ...	Harrison, R. ...	C. J. L. Hayward ...	" M.	P. & O. ...	" 20.9.28 to 9.1.29 ...	17.1.29
Macharda ...	Hanna, R. G. ...	T. Johnston, H. M. Russell ...	" M.	Brocklebank ...	" 23.9.28 to 18.10.28 ...	19.11.28
Mahrona ...	Addy, M. J. ...	J. Kettlewell ...	No. M.	"	" 4.10.28 to 14.12.28 ...	17.12.28
Maihar ...	Charlton, W. L. ...	J. W. B. Robertson, C. Cadwallader, S. S. Slade.	M.L.	"	Met. Log. 27.1.28 to 21.4.28 ...	7.6.28
Maimoa ...	Johnson, J. W. ...	...	No. A.	Shaw, Savill & Albion	Form 911 ...	...
Maimyo ...	Smith, G. C. ...	H. M. Drummond ...	"	Brocklebank ...	Form 911 18.8.28 to 14.11.28 ...	29.11.28
58 Majestic ...	Marshall, W. C.B., D. S. O., R. D., Commr. R.N.R.	W. W. Pearson, J. Clarke, W. T. Fitz Gerald, A. H. Young.	W.T.	White Star ...	W.T. Reg. 27.11.28 to 13.12.28 ... " 20.12.28 to 3.1.29 ...	17.12.28 5.1.29
Makalla ...	Maugham, J. W. ...	J. B. Newman ...	No. M.	Brocklebank ...	Form 911 22.11.28 to 22.12.28 ...	28.12.28
Makambo ...	Williams, D. J. ...	R. Perry, R. A. Williams S. Sandison.	M.L.	Burns Philp ...	Met. Log. 30.6.28 to 20.11.28 ...	4.1.29
Makura ...	Martin, W. ...	J. Hood, J. Billingham, G. Edwards.	"	Canadian-Australasian	" 17.5.28 to 27.9.28 ...	2.1.29
Malabar, M.V. ...	Donaldson, A. ...	L. Millar ...	No. M.	Burns, Philp & Co. ...	Form 911 5.5.28 to 14.10.28 ...	2.1.29
Malakuta ...	Adamson, F. L. ...	N. Grayson ...	" M.	Brocklebank ...	" 18.9.28 to 28.11.28 ...	6.12.28
Malancha ...	Whitham, F. ...	...	" M.	"	" 4.8.28 to 14.10.28 ...	3.12.28
Maida ...	Gray, T. N. ...	S. G. James ...	" M.	British India ...	" 2.9.28 to 21.11.28 ...	29.11.28
Maloja ...	Browning, J. B., R.D., Commr. R.N.R.	A. D. Dennis ...	" M.	P. & O. ...	" 22.11.28 to 11.12.28 ...	28.12.28
Malwa ...	Norman, W. A. ...	G. C. Case ...	" M.	"	" 21.7.28 to 13.9.28 ...	21.9.28
Manchester Brigade ...	Stott, C. H. ...	W. S. Eustace, E. E. Bonnaud, W. R. Cullen.	M.L.	Manchester Liners ...	Met. Log. 3.3.28 to 14.8.28 ...	29.8.28
Manchester Corporation ...	Makin, T. ...	...	No. A.	"	Form 911 9.11.28 to 20.12.28 ...	28.12.28
Manchester Hero ...	Riley, J. E. ... Barclay, J. ...	H. Anderton, J. H. Emmett, H. Dobson, A. Ricketts, A. Grant.	M.L.	"	Met. Log. 24.3.28 to 12.10.28 ...	19.10.28
Manchester Producer ...	Struss, F. D. ...	J. W. Moss ...	No. A.	"	Form 911 9.12.28 to 10.1.29 ...	18.1.29
Manchester Regiment ...	Foale, J. R. ...	P. D. Barr ...	" A.	"	" 4.2.28 to 9.3.28 ...	14.3.28
Manipur ...	Cochran, G. N. ...	R. Penston, G. B. Falconer ...	No. M.	Brocklebank ...	" 9.9.28 to 5.10.28 ...	5.11.28
Manistee ...	Pengelly, J. ...	...	No.	Elders & Fyffes ...	" ...	...
Manora ...	Hudson, H. T., R.D., Commr. R.N.R.	...	No. M.	British India ...	Form 911 26.8.28 to 22.11.28 ...	17.1.29
Mantua ...	Davis, H. C., D.S.C., Commr. R.N.R.	...	" M.	P. & O. ...	" 5.8.28 to 26.9.28 ...	6.10.28
Marella ...	Mortimer, S. ...	A. G. Hill, C. Edmonds, A. G. Thomas.	M.L.	Burns Philp ...	Met. Log. 3.2.28 to 2.6.28 ...	5.10.28
Marengo ...	Curle, J. ...	H. Bryan, J. Ford, F. Barnard, S. Butcher.	"	Ellerman Wilson ...	" 27.3.28 to 30.6.28 ...	6.7.28
Maresfield ...	Berry, V. ...	T. Connolly ...	No. A.	Woods, Tyler & Brown	Form 911 3.5.28 to 19.5.28 ...	9.6.28
Margha ...	Hughes, C. G. ...	P. Wright, B. Ludgate ...	M.L.	British India ...	Met. Log. 15.7.28 to 5.10.28 ...	12.10.28
Marquesa ...	Smiles, R. S. ...	L. Owen ...	No. M.	Furness Houlder ...	Form 911 15.10.28 to 22.12.28 ...	28.12.28
Marsina ...	Williams, G. E. ...	J. C. Reid ...	No. A.	Burns' Philp & Co. ...	" 14.8.28 to 10.9.28 ...	15.10.28
Matakana ...	Thurston, H. P. ...	J. J. Finn, J. Dickson, C. E. Maver.	M.L.	Shaw, Savill & Albion	Met. Log. 31.3.28 to 7.8.28 ...	10.8.28
Mataram ...	Vay, W. ...	R. M. Blunt ...	No. A.	Burns, Philp & Co. ...	Form 911 31.10.28 to 1.12.28 ...	7.1.29
Mataroa ...	Kershaw, W. A. R. ...	F. Eadon, J. J. Nicoll, C. Meyer.	M.L.	Shaw, Savill, & Albion	Met. Log. 28.9.28 to 4.1.29 ...	7.1.29
Matheran ...	Ison, W. A. ...	J. Richardson ...	No. M.	Brocklebank ...	Form 911 6.11.28 to 18.11.28 ...	23.11.28
Matiana ...	Green, F. V. ...	W. McInnes ...	" M.	British India ...	" 4.8.28 to 23.10.28 ...	29.10.28
Matra ...	Cornish, N. P. ...	W. Gibson, Hodgson, G. G. ...	" M.	Brocklebank ...	" 23.10.28 to 3.11.28 ...	13.12.28
Maungani ...	Aldwell, B. M. ...	...	" M.	Union S.S. Co. of N.Z.	" 1.11.28 to 23.11.28 ...	5.1.29
32 Mauretania ...	Prothero, W. ...	R. H. C. Crawford, C. B. Osborne B. J. P. Tuck.	W.T.	Cunard ...	W.T. Reg. 28.10.28 to 12.11.28 ...	16.11.28
66 Megantic ...	Kearney, J. ...	F. E. Patchett ...	W.T.	White Star ...	Form 911 16.7.28 to 2.8.28 ...	13.8.28
22 Melita ...	Stewart, A. ...	T. Gillette, J. Shearer ...	W.T.	Canadian Pacific ...	W.T. Reg. 1.12.28 to 20.12.28 ...	28.12.28
Memnon ...	Watson, C. J. ...	J. A. C. McGregor ...	No. A.	A. Holt ...	Form 911 4.12.28 to 17.12.28 ...	16.1.29
21 Metagama ...	Rothwell, A. ...	C. L. de H. Bell, J. Stewart, A. W. Patrick.	W.T.	Canadian Pacific	W.T. Reg. 20.11.28 to 14.12.28 ...	18.12.28
Middlesex ...	Wilde, H. ...	D. J. Murray ...	No. M.	Federal ...	Form 911 21.10.28 to 27.11.28 ...	18.12.28
Minna ...	Mackenzie, G. G. ...	A. M. Campbell ...	" A.	Scottish Fishery Brd.	" 8.12.28 to 27.12.28 ...	14.1.29
23 Minnedosa ...	McQueen, D. S. ...	F. E. Williams, C. D. Watt, W. J. P. Roberts.	W.T.	Canadian Pacific	W. T. Reg. 17.12.28 to 3.1.29 ...	9.1.29
Minnesota ...	Finch, E. R. D., Commr. R.N.R.	...	No. M.	Atlantic Transport ...	Form 911 27.11.28 to 16.12.28 ...	28.12.28
Minnetonka ...	Gates, T. F., C.B.E. ...	H. E. D. McCartney ...	" M.	"	" 4.11.28 to 11.11.28 ...	27.11.28
Minnevaska ...	Claret, F. H., C.B.E., Commr. R.N.R.	F. J. Mummery ...	" M.	"	" 17.12.28 to 5.1.29 ...	10.1.29
Mirror, C.S. ...	Jones, T., M.B.E. ...	J. G. West ...	" M.	Eastern Tel. Co. ...	" 13.2.28 to 18.3.28 ...	10.4.28
Mississippi ...	Wylie, J. T. J. ...	W. M. Shoemith ...	No. A.	Atlantic Transport ...	" 19.12.28 to 29.12.28 ...	3.1.29
Mosasa ...	Gilchrist, J. W. ...	A. E. Baker, E. Crozier ...	" M.	British India ...	" 10.6.28 to 28.8.28 ...	18.9.28
Moeraki ...	Day, P. H. ...	F. E. Lucas ...	No. A.	Union S.S. Co. of N.Z.	" 19.10.28 to 26.11.28 ...	7.1.29
Moldavia ...	Burleigh, C. W., D.S.O., R.D., Capt., R.N.R.	C. B. Holmes ...	No. M.	P. & O. ...	" 12.11.28 to 29.11.28 ...	7.1.29
Mongolia ...	Furlong, G. H. S., R.D., Capt., R.N.R.	A. H. Cole ...	" M.	"	" 26.10.28 to 11.1.29 ...	15.1.29

Name of Vessel.	Captain.	Observing Officers.	Official Meteorological Equipment.	Line.	Last Log, Register, or Report Contributed. Received up to 18.1.29.	Date Received.
24 <i>Montcalm</i> ...	Landy, E. ...	F. H. Steel, M. Williams, L. Thornton.	W.T.	Canadian Pacific ...	W.T. Reg. 11.11.28 to 29.11.28 ...	4.12.28
25 <i>Montclare</i> ...	Griffiths, J. N. ...	A. Mansey, C. Draper, T. Sargent.	"	" " ...	" 27.11.28 to 14.12.28 ...	18.12.28
<i>Montoro</i> ...	Williams, D. J. ...	D. J. L. Pemberton, R. M. Blunt, J. Campbell.	M.L.	Burns, Philp & Co. ...	Form 911 15.3.28 to 12.7.28 ...	15.1.29 3.1.29
26 <i>Montrose</i> ...	Dott, J. F. ...	W. P. Haines ...	W.T.	Canadian Pacific ...	W.T. Reg. 15.11.28 to 28.11.28 ...	3.12.28
20 <i>Montroyal</i> ...	Freer, A. R.D., Capt., R.N.R.	C. E. Duggan ...	"	" " ...	8.12.28 to 27.12.28... Form 911 8.12.28 to 27.12.28... Met. Log. 17.4.28 to 14.8.28 ...	3.1.29 3.1.29 12.10.28
<i>Moresby</i> ...	Henderson, D. A., Commr., R.N.R.	S. F. Bolton, G. A. Gould ...	M.L.	His Majesty's Australian Ship.		
<i>Morvada</i> ...	Mills, T. L., O.B.E., R.D., Commr., R.N.R.	A. J. Norris, H. Maguire ...	No. M.	British India ...	Form 911 29.7.28 to 29.10.28...	31.10.28
<i>Mulbera</i> ...	Caffyn, F. ...	J. Rose ...	" M.	" ...	" 28.10.28 to 30.11.28 ...	7.12.28
<i>Nagara</i> ...	Miles, F. R., R.D., Capt. R.N.R.	G. Elliott ...	" M.	R.M.S.P. Co. ...	" 26.7.28 to 20.9.28 ...	25.9.28
<i>Nagoya</i> ...	Bedwell, L. A. ...	S. Gerrans ...	" M.	P. & O. ...	" 26.5.28 to 19.8.28 ...	23.8.28
<i>Naldera</i> ...	Randell, G. G. ...	C. H. Hand, D. Meikle, M. F. Saute.	M.L.	" ...	Met. Log. 14.7.28 to 3.10.28 ...	9.10.28
<i>Nardana</i> ...	Moth, F. L. ...	F. G. Sharps ...	No. M.	British India ...	Form 911 8.10.28 to 13.11.28...	3.12.28
<i>Narkunda</i> ...	Collyer, R. M. M., R.D., Commr., R.N.R.	M. Boyd ...	" M.	P & O ...	" 17.11.28 to 8.12.28...	1.1.29
<i>Nellore</i> ...	Hignett, A. H., R.D., Lt.-Commr., R.N.R.	A. J. Brown ...	" M.	P. & O. ...	" 25.11.28 to 14.12.28 ...	14.1.29
<i>Nerbudda</i> ...	Williams, B. N. ...	G. A. Farley, S. Henderson...	" M.	British India ...	" 15.10.28 to 1.11.28...	17.12.28
<i>Nestor</i> ...	Houghton, G. K. ...	A. Caird, N. Anderson, R. T. Dryden.	M.L.	A. Holt ...	Met. Log. 8.1.28 to 13.5.28 ...	24.5.28
<i>Newby Hall</i> ...	Zeal, R. C. ...	E. M. Robertson, F. Wrigley, G. W. Sitwell, W. S. Smith.	"	Ellerman ...	" 22.3.28 to 16.8.28 ...	10.12.28
<i>Newfoundland</i> ...	Foxworthy, A. W. ...	R. F. Handley, E. Saintry, D. Hetherington.	"	Furness Withy ...	" 31.7.28 to 10.12.28...	22.12.28
<i>Niagara</i> ...	Brown, J. F. S. ...	R. N. Turner, V. Knight, G. Webb.	"	Canadian-Australasian	" 25.7.28 to 10.12.28...	11.12.28
<i>Ningchow</i> ...	Beale, H. E. ...	M. H. Vincent ...	No. A.	A. Holt... ..	Form 911 25.8.28 to 26.10.28...	31.10.28
<i>Nirvana</i> ...	Ayres, R. M. ...	" ...	" M.	British India ...	" ...	"
<i>Norfolk</i> ...	Mead, G. F. ...	A. Hoeken ...	" A.	Federal ...	" 17.7.28 to 23.8.28 ...	25.8.28
<i>Norna</i> ...	Wright, J. W. ...	T. R. Ness ...	" A.	Scottish Fishery Brd.	" 13.11.28 to 27.12.28 ...	31.12.28
<i>Norseman, C.S.</i> ...	Davis, E. R. ...	R. W. Greenfield ...	" M.	Western Tel. Co. ...	" 10.11.28 to 14.11.28 ...	8.12.28
<i>Northumberland</i> ...	Upton, H. L., D.S.C., R.D., Lt.-Commr., R.N.R.	A. J. Robertson, W. J. Glassborow, J. F. Clements.	M.L.	Federal ...	Met. Log. 12.5.28 to 13.10.28...	17.10.28
<i>Nova Scotia</i> ...	Furieux, S. ...	" ...	No. A.	Furness Withy ...	Form 911 31.10.28 to 6.11.28...	20.11.28
<i>Nowshera</i> ...	Rowe, S. N. ...	W. Ashcroft, W. Adamson ...	" M.	British India ...	" 6.10.28 to 6.1.29 ...	17.1.29
<i>Nudea</i> ...	Morrison, W. C. ...	" ...	" M.	British India... ..	" 19.11.28 to 4.12.28...	14.1.29
<i>Oaklands Grange</i> ...	St. Clair, C., D.S.C. ...	C. F. Foxwell ...	" A.	Houlder Bros. ...	Form 911 12.10.28 to 6.11.28...	29.11.28
57 <i>Olympic</i> ...	Parker, W. H., C.B.E., R.D., Capt. R.N.R.	A. E. Harvey, A. J. Fisher, A. E. Weller.	W.T.	White Star ...	W.T. Reg. 13.12.28 to 27.12.28 ... Form 911 13.12.28 to 27.12.28 ...	7.1.29 5.1.29
<i>Orama</i> ...	Matheson, C. G., D.S.O., R.D., Capt., R.N.R.	J. M. M. Swanson.	M.L.	Orient ...	Met. Log. 22.7.28 to 23.10.28...	31.10.28
<i>Oranian</i> ...	Bolton, W. ...	" ...	No. A.	Leyland ...	Form 911 2.9.28 to 17.9.28 ...	3.10.28
<i>Orbita</i> ...	Dominy, R. H., C.B.E., Commr., R.N.R.	J. R. Bubb ...	" M.	R.M.S.P. Co. ...	" 7.8.28 to 14.10.28 ...	25.10.28
<i>Orcoma</i> ...	Mander, T. ...	T. J. Waylor, R. H. Sissons, J. W. Fraser, J. Allan.	M.L.	Pacific S.N. Co. ...	Met. Log. 31.5.28 to 14.8.28 ...	30.8.28
<i>Orduna</i> ...	Daniel, T. ...	R. D. Eckford ...	No. M.	" Holt... ..	Form 911 7.10.28 to 20.12.28...	28.12.28
<i>Orestes</i> ...	Flynn, G. A. ...	R. Martin... ..	" A.	A. Holt... ..	" 28.7.28 to 8.9.28 ...	26.11.28
<i>Orford</i> ...	Owens, A. L., Commr., R.D., R.N.R.	" ...	" M.	Orient ...	" ...	"
<i>Orita</i> ...	Barkley, E. ...	D. W. Hutchinson, G. W. Irvine, L. L. Hunter.	M.L.	Pacific S.N. Co. ...	Met. Log. 18.6.28 to 27.11.28 ...	4.12.28
<i>Ormonde</i> ...	Rice, W. V., D.S.O., D.S.C., Commr., R.N.R.	H. P. Price ...	"	His Majesty's Ship ...	" 9.8.28 to 2.11.28 ...	8.1.29
<i>Oronsay</i> ...	Shelford, W. S., Lt.-Commr., R.N.R.	" ...	M.L.	Orient ...	" 5.2.28 to 8.5.28 ...	12.5.28
<i>Oroya</i> ...	Ridyard, A. ...	P. H. Ray ...	No. M.	Pacific S.N. Co. ...	Form 911 21.8.28 to 29.10.28...	10.11.28
<i>Orsova</i> ...	Cameron, E. P., R.D., Commr., R.N.R.	L. J. Vestry, A. Addison, N. W. Smith. ...	M.L.	Orient ...	Met. Log. 19.8.28 to 21.11.28...	23.11.28
<i>Orvieto</i> ...	O'Sullivan, F. R. ...	J. G. Goldsworthy, G. L. Carter, H. A. Whittle, C. D. Lane	"	" ...	" 2.9.28 to 4.12.28 ...	7.12.28
<i>Osterley</i> ...	Sarson, M. J. ...	A. F. C. Gray ...	No. A.	" ...	Form 911 24.6.28 to 25.9.28 ...	5.10.28
<i>Otaki</i> ...	McNish, R. ...	G. Dibley ...	" A.	New Zealand S.S. Co.	" 8.11.28 to 24.11.28...	31.12.28
<i>Otira</i> ...	Wood, C., D.S.C. ...	S. Winton ...	" M.	Shaw, Savill & Albion	" 22.3.28 to 28.4.28 ...	8.5.28
<i>Otranto</i> ...	Staunton, H. G., C.B.E., R.D., Commr., R.N.R.	O. C. Davies ...	" M.	Orient ...	" 29.1.28 to 30.3.28 ...	14.4.28
<i>Oxfordshire</i> ...	Foster, W. L. ...	E. A. Insley ...	" A.	Bibby Bros. ...	" 8.9.28 to 18.11.28 ...	26.11.28
<i>Pacific Shipper, M.V.</i> ...	Goodwin, J. ...	" ...	" A.	Furness Withy ...	" 5.9.28 to 4.12.28 ...	28.12.28
<i>Pacnare</i> ...	Edwards, A. O. ...	" ...	M.L.	Elders & Fyffes ...	" ...	"
<i>Pakeha</i> ...	W. P. Clifton Mogg, Lt.-Commr., R.N.R.	H. C. Smith, G. Almond, W. Canner ...	M.L.	Shaw, Savill & Albion	Met. Log. 23.6.28 to 10.11.28...	15.11.28
<i>Paneras</i> ...	Reynolds, H. B. W. ...	W. Griffiths, C. C. Veal, J. Nichales.	M.L.	Booth ...	" 13.12.27 to 14.6.28...	25.7.28
<i>Parora</i> ...	Evans, J. O. ...	J. Greenaway ...	No. A.	Hain S.S. Co. ...	Form 911 7.8.28 to 7.9.28 ...	19.11.28
<i>Paris</i> ...	Cook, C. L. ...	Mr. Biles ...	C.C.	Southern Ry. ...	Telegraphic Report. 31.7.27 ...	31.7.27
<i>Pattia</i> ...	Makepeace, S. ...	J. Green ...	No. A.	Elders & Fyffes ...	Form 911 18.8.28 to 22.9.28 ...	25.9.28
<i>Petsander</i> ...	Slater, H. N. ...	H. E. Readslaw ...	" A.	A. Holt... ..	" 4.11.28 to 24.11.28...	28.12.28
<i>Pennland</i> ...	Making, V. ...	" ...	" A.	Red Star ...	" 16.12.28 to 3.1.29 ...	7.1.29
<i>Peshawur</i> ...	Wilding, H. G. ...	K. A. H. Cummins, S. H. Baldwin, A. M. Tollfree.	M.L.	P. & O. ...	Met. Log. 20.5.28 to 17.10.28...	22.10.28

LIST OF VOLUNTARY OBSERVING SHIPS

Name of Vessel.	Captain.	Observing Officers.	Official Meteorological Equipment.	Line.	Last Log, Register, or Report Contributed. Received up to 18.1.29.	Date Received.
<i>Polycarp</i> ...	Jackson, T. H. ...	H. W. Taggart ...	No. A.	Booth ...	Form 911 9.11.28 to 23.11.28...	13.12.28
<i>Port Adelaide</i> ...	Swan, L. H. ...	R. B. Linklater, C. J. Gorley, F. J. Lavers.	M.L.	Commonwealth & Dominion.	Met. Log. 20.7.28 to 14.12.28...	28.12.28
" <i>Albany</i> ...	Needham, R. ...	" " " " " " " "	"	" " " "	" 22.1.28 to 4.7.28 ...	11.7.28
" <i>Auckland</i> ...	Durham, R. S., D.S.C.	C. F. Post, E. R. Rowlands, H. E. Braine.	"	" " " "	" 16.3.28 to 27.7.28 ...	7.8.28
" <i>Bowen</i> ...	Hearn, G. W. ...	S. Ray ...	No. A.	" " " "	Form 911 9.9.28 to 17.9.28 ...	26.10.28
" <i>Campbell</i> ...	Needham, R. ...	J. G. Thom ...	"	" " " "	" 15.8.28 to 6.1.29 ...	14.1.29
" <i>Caroline</i> ...	Brown, A. H. ...	J. B. Bradley, L. M. Bayly, R. Forrest, J. Stannard.	M.L.	" " " "	Met. Log. 27.4.28 to 24.9.28 ...	9.10.28
" <i>Darwin</i> ...	Sawbridge, I. R. ...	H. Pinkney, E. M. Fenton, S. Moate.	"	" " " "	" 2.9.28 to 3.1.29 ...	7.1.29
" <i>Denison</i> ...	Ferris, J. ...	E. T. N. Lawrey, L. W. Cady, A. A. Cooper, J. Rowland-Hill.	"	" " " "	" 8.3.28 to 5.9.28 ...	11.9.28
" <i>Dunedin, M.V.</i> ...	Farmar, F. ...	E. G. Jones, H. M. Post, N. M. Muzzell.	"	" " " "	" 10.8.28 to 17.11.28 ...	21.11.28
" <i>Fremantle, M.V.</i> ...	Kearney, F. J. ...	A. G. Rhind ...	No. A.	" " " "	Form 911 5.5.28 to 8.6.28 ...	15.6.28
" <i>Gisborne, M.V.</i> ...	Hayter, S. W. ...	H. Boys-Smith ...	" A.	" " " "	" 8.7.28 to 10.11.28 ...	15.11.28
" <i>Hobart, M.V.</i> ...	Cottell, S. C. ...	R. Carter, L. Copeland, G. G. Langford, C. L. Webb.	M.L.	" " " "	Met. Log. 8.6.28 to 4.10.28 ...	9.10.28
" <i>Hunter</i> ...	Robinson, C. A. ...	R. B. Stannard, A. McClouan, J. T. Weldin.	"	" " " "	" 1.8.28 to 23.12.28 ...	31.12.28
" <i>Huon</i> ...	Compton, J. E. ...	J. E. Fairbairn ...	No. A.	" " " "	Form 911 30.8.28 to 18.10.28 ...	29.10.28
" <i>Melbourne</i> ...	Kippins, T. ...	A. R. Martin, F. W. Elgar, W. E. Simpson.	M.L.	" " " "	Met. Log. 12.5.28 to 8.10.28 ...	22.10.28
" <i>Nicholson</i> ...	Jack, J. ...	J. G. Lewis, G. L. H. Dean, A. G. Newbury, W. B. Hopkins.	M.L.	" " " "	Met. Log. 19.2.28 to 28.7.28 ...	17.8.28
" <i>Pirie</i> ...	Hudson, J. J. ...	W. G. Jones, J. F. Martin, A. Brown.	"	" " " "	" 26.5.28 to 24.10.28 ...	10.11.28
" <i>Sydney</i> ...	Higgs, W. G. ...	T. L. Kidwell, E. E. Roswell, K. D. Morgan.	"	" " " "	" 30.3.28 to 16.8.28 ...	22.8.28
" <i>Victor</i> ...	Williams, R. ...	R. Stannard, W. B. Craig, C. E. Midwinter.	"	" " " "	" 3.2.28 to 9.6.28 ...	27.6.28
" <i>Wellington</i> ...	Jones, C. ...	D. F. Morgan ...	No. A.	" " " "	Form 911 18.4.28 to 23.5.28 ...	23.7.28
<i>President Jackson</i> ...	Griffith, J. ...	J. A. Cartwright ...	" A.	Pacific Mail S.S. Co...	" 9.10.28 to 28.10.28 ...	17.12.28
<i>President Jefferson</i> ...	Nichols, F. R. ...	C. H. Moen, S. Hansson ...	" A.	Admiral Oriental Line	" 5.1.28 to 29.1.28 ...	20.2.28
<i>Protea, H.M.S.A.S.</i> ...	Dalglish, J., Lt-Commr., S.A.N.S.	A. C. Matson ...	M.L.	South African Naval Service.	Met. Log. 1.2.28 to 10.5.28 ...	12.6.28
<i>Protesilau</i> ...	Quirk, T. W. ...	J. Milhench, A. C. Abbott, A. E. Martin, E. A. H. Gopp.	"	A. Holt ...	" 5.6.28 to 1.11.28 ...	10.12.28
<i>Pyrrhus</i> ...	Elford, W. J. ...	R. Singleton ...	No. A.	" " " "	Form 911 22.9.28 to 24.12.28 ...	14.1.29
<i>Quilca</i> ...	Cave, S. ...	" " " " " " " "	No. M.	British India...	" " " " " " " "	"
<i>Rajputana</i> ...	Cadiz F. G., D.S.C.	R. E. Tucker ...	" M.	P. & O. ...	" 6.10.28 to 21.11.28 ...	27.11.28
<i>Ranpura</i> ...	King, A. M., D.S.C.	E. J. Spurling ...	No. M.	P. & O. ...	" 1.12.28 to 19.12.28 ...	22.12.28
<i>Rawalpindi</i> ...	Thornton, E. J. ...	A. G. Stansfield ...	" M.	" " " "	" " " " " " " "	"
<i>60 Regina</i> ...	Davies, E. ...	R. S. Walker, E. A. A. Crowley.	W.T.	White Star - Dominion	" 2.12.28 to 21.12.28 ...	28.12.28
<i>Reindeer</i> ...	Pitman, R. R. ...	" " " " " " " "	C.C.	G.W. Railway ...	Telegraphic Report 23.2.28 ...	23.2.28
<i>Remuera</i> ...	Cameron, J. J. ...	H. Harwood ...	M.L.	New Zealand S.S. Co.	Form 911 6.7.28 to 19.10.28 ...	8.11.28
<i>Rhexenor</i> ...	Davies, J. ...	A. Yarwood ...	No. A.	A. Holt ...	" 18.10.28 to 3.11.28 ...	10.12.28
<i>Rhodesian Transport.</i> ...	Bullock, F. W. H. ...	J. G. Freeman ...	" A.	Houlder Bros. ...	" 6.9.28 to 24.12.28 ...	28.12.28
<i>Rimutaka</i> ...	Holland, E. ...	F. Pretty, H. S. Cashmore, F. Cooke, E. Foster.	M.L.	New Zealand S.S. Co.	Met. Log. 31.8.28 to 3.1.29 ...	7.1.29
<i>Ripley Castle</i> ...	Aylen, C. E. H. ...	R. A. D. Cambridge ...	No. A.	Union Castle ...	Form 911 14.11.28 to 12.12.28 ...	17.12.28
<i>Rother</i> ...	Woodhead, T. H. ...	N. Thompson ...	" A.	Goole Steam Shipping	" 3.11.28 to 17.12.28 ...	28.12.28
<i>Rotorua</i> ...	Hunter, J. L. B. ...	A. D. Landles, L. Griffiths, T. M. Devitt.	M.L.	New Zealand S.S. Co.	Met. Log. 8.6.28 to 21.9.28 ...	3.10.28
<i>Royal Transport</i> ...	Oliver, R. C. ...	R. Hughes ...	No. A.	Houlder Bros. ...	Form 911 17.8.28 to 15.9.28 ...	21.9.28
<i>Ruapehu</i> ...	McKellar, A. W., R.D., Capt., R.N.R.	S. Butler, L. F. Malcouronne, H. N. Lawson.	M.L.	New Zealand S.S. Co.	Met. Log. 29.6.28 to 15.10.28 ...	17.10.28
<i>St. Albans</i> ...	Diamond, S. L. ...	R. L. Harry, J. Moodie Heddle, J. D. Kavanagh, F. O. Colvin, R. Millington.	"	Eastern and Australian.	" 3.8.28 to 3.12.28 ...	8.1.29
<i>St. Helier</i> ...	" " " " " " " "	C. Bell ...	C.C.	G.W. Railway ...	Telegraphic Report 5.1.29 ...	5.1.29
<i>St. Julien</i> ...	Richardson, L. ...	C. W. Sanderson ...	"	" " " "	" 17.1.29 ...	17.1.29
<i>St. Andrew</i> ...	Bearpark, E. W. ...	J. Meade ...	No. A.	Rankin Gilmour ...	Form 911 7.10.28 to 15.12.28 ...	28.12.28
<i>38 Samaria</i> ...	Malin, R. G., Lieut-Commr., R.N.R.	F. D. Thomas, W. B. Tanner, P. G. Britten.	W.T.	Cunard ...	" 29.7.28 to 18.8.28 ...	22.8.28
<i>Sardinian Prince</i> ...	Brown, J. F. ...	G. A. Davies ...	No. A.	Prince ...	W.T. Reg. 18.11.28 to 13.12.28 ...	7.1.29
<i>Saxon</i> ...	Shilston, P. G., R.D., Capt., R.N.R.	R. May ...	" A.	Union Castle ...	Form 911 29.10.28 to 29.11.28 ...	10.12.28
<i>Scholar</i> ...	Peterkin, A. G. ...	G. Baker ...	" M.	Harrison ...	" 15.11.28 to 3.12.28 ...	7.12.28
<i>Scotia</i> ...	Prichard, S. D., M.B.E.	W. L. Hughes ...	C.C.	L.M. & S. Railway ...	Telegraphic Report 18.1.29 ...	18.1.29
<i>33 Seythi</i> ...	Irving, R. B., O.B.E., R.D., Capt., R.N.R.	R. Sell, G. H. Morris, J. G. Bradley.	W.T.	Cunard ...	W.T. Reg. 29.10.28 to 18.11.28 ...	22.11.28
<i>Sheaf Mount</i> ...	Groves, C. V. ...	A. Macarthur ...	No. A.	W. A. Souter ...	Form 911 28.10.28 to 19.11.28 ...	22.11.28
<i>Sheaf Spear</i> ...	Whitfield, G. A., O.B.E.	S. J. Dring, H. Pike ...	M.L.	" " " "	" 3.11.28 to 24.11.28 ...	7.12.28
<i>Shropshire, M.V.</i> ...	Adamson, B. W. ...	W. L. Whiteside, R. Cuming, W. H. Brittain.	"	Bibby ...	Met. Log. 19.10.27 to 9.2.28 ...	18.10.28
<i>Socrates</i> ...	Taylor, F. C. ...	W. E. Jordan ...	No. A.	Lampert & Holt ...	" 3.11.28 to 11.1.29 ...	15.1.29
<i>Somerset</i> ...	Howell Price, J. ...	W. Redwood ...	" A.	Federal ...	Form 911 1.10.27 to 21.12.27 ...	27.1.28
<i>Spero</i> ...	Montgomery, H. ...	H. W. Vickers ...	M.L.	Ellerman Wilson ...	" 14.10.28 to 23.11.28 ...	5.1.29
<i>Statesman</i> ...	Mowat, J. ...	T. R. R. Letten ...	No. M.	Harrison ...	Met. Log. 6.1.28 to 1.7.28 ...	6.7.28
<i>Stephen</i> ...	Evans, L. G. ...	N. Caris ...	No. A.	Booth ...	Form 911 27.10.28 to 5.1.29 ...	7.1.29
<i>Stockwell</i> ...	Smith, W. ...	F. Moore ...	" A.	Brocklebank ...	" 2.9.28 to 26.10.28 ...	16.11.28
<i>Surrey</i> ...	Lamb, C. B. ...	" " " " " " " "	" A.	Federal ...	" 26.10.28 to 22.11.28 ...	28.12.28
<i>Suwa Mari</i> ...	Gotoh, M. ...	" " " " " " " "	" A.	Nippon Yusen Kaisha	" 1.4.28 to 3.5.28 ...	19.9.28
<i>Sylvafield, M.V.</i> ...	Biddick, E. ...	A. A. Tully ...	" A.	Hunting & Son ...	" 28.9.28 to 29.10.28 ...	2.11.28
<i>Taimi</i> ...	Elford, H. E. ...	L. J. Hopkins ...	" A.	Shaw, Savill & Albion	" 10.11.28 to 16.12.28 ...	1.1.29
<i>Tahiti</i> ...	Aldwell, B. M. ...	C. R. Carlyon ...	" A.	Union S.S. Co. of N.Z.	" 12.10.28 to 18.12.28 ...	5.1.29
<i>Taiping</i> ...	Frame, A. M. ...	F. Stratford, A. C. Kennedy, R. Bargent.	M.L.	Yuill & Co. ...	Met. Log. 12.4.28 to 7.9.28 ...	21.2.28
<i>Takada</i> ...	Lindon, J. ...	" " " " " " " "	No. M.	British India ...	" " " " " " " "	"
<i>Talma</i> ...	" " " " " " " "	" " " " " " " "	" M.	" " " "	" " " " " " " "	"
<i>Talthebius</i> ...	Wilson, R. J. ...	" " " " " " " "	" A.	A. Holt ...	Form 911 12.12.28 to 29.12.28 ...	17.1.29
<i>Tamaroa</i> ...	Hartman, W. H. ...	F. W. Lutyens ...	" M.	Shaw, Savill & Albion	" 9.6.28 to 15.7.28 ...	19.7.28

Name of Vessel.	Captain.	Observing Officers.	Official Meteorological Equipment.	Line.	Last Log, Register, or Report Contributed. Received up to 18.1.29.	Date Received.
<i>Tanda</i>	Pilcher, E. T., Lieut.-Commr., R.N.R.	G. C. Smith, H. Munday, H. Nuzum.	M.L.	E. & A. S.S. Co. ...	Met. Log 3.7.28 to 11.10.28 ...	7.1.29
<i>Taranaki, M.V.</i>	Wood, C.	J. W. Hart, G. Campbell, P. Savill.	"	Shaw, Savill & Albion	" 20.5.28 to 19.9.28 ...	27.9.28
<i>Tarantia</i>	Munro, D., R.D., Commr. R.N.R.	"	No. A.	Anchor	Form 911 10.11.28 to 5.12.28... ..	20.12.28
<i>Tetrestias</i>	Wilkinson, W. H. ...	C. B. P. Anderson	" A.	A. Holt & Co.	" 22.9.28 to 25.10.28... ..	29.10.28
<i>Tekoa</i>	Robinson, F. W. ...	"	" M.	New Zealand S.S. Co.	" 4.11.28 to 18.11.28... ..	3.12.28
<i>Telamon</i>	Willcox, J. H.	F. A. Brown	" A.	A. Holt	" 15.9.28 to 8.12.28	17.12.28
<i>Tetela</i>	Brice, E. H.	E. Swale	" A.	Elders & Fyffes	" 27.10.28 to 2.12.28... ..	10.12.28
<i>Teucer</i>	Beswick, W., D.S.C., Lt.-Commr., R.N.R.	H. D. Rudd	" A.	A. Holt	" 5.11.28 to 18.11.28... ..	3.12.28
<i>Themistocles</i>	Young, A. D.	H. C. Howe	" M.	Aberdeen	" 4.2.28 to 22.2.28	16.4.28
<i>Theseus</i>	Jones, E.	W. A. Fyffe	" A.	A. Holt	" 10.8.28 to 7.10.28	18.10.28
<i>Tilawa</i>	Rowe, P. W.	E. A. Rabey	" M.	British India... ..	" 4.11.28 to 14.12.28... ..	7.1.29
<i>Tinhow</i>	Andoe, G.	J. S. King... ..	" M.	A. Weir & Co.	"	"
<i>Titan</i>	Power, J. J.	P. Cross, R. A. Shennan, C. F. Bailey.	M.L.	A. Holt	Met. Log. 19.8.28 to 3.1.29	14.1.29
<i>Tongatiro</i>	Burton Davies, J. ...	E. A. Burton, A. E. Williams, H. Wilkinson, D. Baldwin.	"	New Zealand S.S. Co.	Met. Log. 12.8.28 to 7.1.29	18.1.29
<i>Transylvania</i>	Erskine, R.	P. Middleton	No. A	Anchor	Form 911 23.9.28 to 10.11.28... ..	20.11.28
<i>Trefusis</i>	Hunt, D.	R. H. Silley	" A.	Hain S.S. Co.	" 12.11.28 to 11.12.28... ..	17.12.28
<i>Trematon</i>	Evans, B.	J. Jenkyn, C. M. Quick, R. Stitson.	M.L.	Hain S.S. Co.	Met. Log. 18.5.28 to 24.12.28... ..	7.1.29
<i>Turakina</i>	Field, H. G. B.	J. D. B. Fisher	No. M.	New Zealand S.S. Co.	Form 911 1.12.28 to 28.12.28... ..	14.1.29
<i>11 Tuscania</i>	Rome, W. B.	J. Noble	W.T.	Anchor	W.T. Reg. 26.11.28 to 16.12.28	22.12.28
<i>1yndareus</i>	Christie, W.	A. F. Barclay, T. R. Phillips, F. V. Smith, D. S. Bruce.	M.L.	A. Holt	Form 911 24.11.28 to 17.12.28	20.12.28
<i>Ulimaroa</i>	Wylie, W. J.	W. Finch	No. M.	Huddart Parker, Ltd.	Met. Log. 15.5.28 to 7.10.28	20.11.28
<i>Ulysses</i>	Owen, R. D., O.B.E. ...	C. W. Jones	" A.	A. Holt	Form 911 26.10.28 to 19.11.28	7.1.29
<i>Umovolosi</i>	Barnes, E. W.	R. Dyns	" A.	Bullard King	" 24.11.28 to 6.1.29	9.1.29
<i>Valacia</i>	Inch, F.	"	" M.	Cunard	" 10.11.28 to 17.12.28	7.1.29
<i>Vardulia</i>	Fear, E. T. C.	W. H. Barker	" A.	"	" 26.3.28 to 13.5.28	17.5.28
<i>Vigilant</i>	Simpson, E. S. S.	J. Nicoll	" A.	Scottish Fishery Board.	" 1.12.28 to 31.12.28... ..	3.1.29
<i>Waiotapu</i>	Todd, D.	F. H. G. Clark	" M.	Canadian - Australasian.	" 3.11.28 to 26.11.28... ..	28.12.28
<i>Wairuna</i>	Ryan J.	J. E. Broughton, H. W. Jones, J. Ritchie.	M.L.	Union S.S. Co. of N.Z.	Met. Log. 12.6.28 to 15.9.28	23.11.28
<i>Walmer Castle</i>	Morton Betts, W. ...	G. H. Pickering... ..	No. A.	Union Castle	Form 911 13.10.28 to 2.12.28... ..	4.12.28
<i>Wangaratta</i>	Scutt, W.	T. W. Wordingham, S. R. Millard, A. G. Brooks, M. Harvey.	M.L.	British India	Met. Log. 22.4.28 to 1.10.28	6.10.28
<i>Warfield</i>	Steel, R.	"	No. A.	"	Form 911 4.11.28 to 17.11.28... ..	26.11.28
<i>War Nizam</i>	Moncrieff, T.	F. J. Marshall	" M.	British Tankers	" 5.5.28 to 11.6.28	26.6.28
<i>Westmoreland</i>	Gardner, H. W.	G. A. Shepherd, K. S. Phillips, R. L. Warren.	M.L.	Federal	Met. Log. 3.3.28 to 22.11.28	29.11.28
<i>William Scoresby, R.S.S.</i>	De la Motte, J. B. B., Lieut., R.N.	"	"	Falkland Islands Government.	"	"
<i>Windsor Castle</i>	Morton-Betts, W. (Chave, Sir B., K.B.E.)	A. J. Tweddell, C. Gorringe, R. Tyser.	"	Union Castle	" 17.2.28 to 12.8.28	11.9.28
<i>Winifredian</i>	Trant, A. W. V., O.B.E.	"	No. M.	Leyland	Form 911 30.12.28 to 8.1.29	14.1.29
<i>Wonganella</i>	Suffern, H.	G. F. Phillips	" M.	W. Crossby & Sons	" 16.10.28 to 17.11.28	28.12.28
<i>Woodarra</i>	Reilly, J. V.	H. Goater, L. J. C. Simpson, G. F. Alexander J. McPhail.	M.L.	British India... ..	Met. Log. 15.7.28 to 31.12.28... ..	4.1.29
<i>Zent</i>	Roberts, H.	"	No. A.	Elders & Fyffes	Form 911 15.10.28 to 16.11.28	26.11.28
<i>Conway, H.M.S.</i>	Richardson, F. A., D.S.C., Commr., R.N.	The Senior Cadets	Cadets' M.L.	"	Cadets' Met. Log. 23.9.28 to 15.12.28	19.12.28
<i>Pangbourne Nautical College</i>	Tracy, A. F. G., Commr., R.N.	"	"	"	Cadets' Met. Log. 24.9.28 to 14.12.28	31.12.28
<i>Worcester, H.M.S.</i>	"	"	"	"	Cadets' Met. Log. 21.9.28 to 19.12.28	21.12.28
<i>Abaco</i>	"	The Keepers	Lighthouse Register.	"	Lighthouse Register 1.1.28 to 30.6.28	14.9.28
<i>Cay Lobos</i>	"	"	"	"	Lighthouse Register 1.1.27 to 11.7.27	29.9.27
<i>Double Headed Shot</i>	"	"	"	"	Lighthouse Register 4.9.27 to 29.2.28	24.4.28
<i>Inagua</i>	"	"	"	"	Lighthouse Register 14.1.28 to 19.7.28	14.9.28
<i>Sombrero</i>	"	"	"	"	Lighthouse Register 1.1.28 to 30.6.28	17.8.28
<i>Watling Island</i>	"	"	"	"	Lighthouse Register 1.1.28 to 30.6.28	14.9.28
<i>Cape Pembroke (Falkland Is.)</i>	"	"	"	"	Lighthouse Register 1.1.28 to 30.6.28	22.8.28

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Name of Vessel.	Captain.	Observing Officer.	Line.	Last Case of Water Samples, Reports, etc., received up to 31.12.28.	Date Received
<i>Antillian</i>	Hannaford, W.	J. L. Crighton	Leyland	Water Samples	2.11.28
<i>Dakota</i>	Robb, J.	W. F. Sloan	"	"	2.11.28
<i>Darro</i>	Matthews, G. P.	J. Clark	R.M.S.P. Co.	"	5.10.28
<i>Desado</i>	Hannan, F. S.	J. G. Scott	"	"	18.10.28
<i>Hildebrand</i>	Peregrine, D.	E. Jones	Booth	"	9.11.28
<i>Orantian</i>	Hoskins, W.	T. J. Jones	Leyland	"	13.12.28

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