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THE MARINE OBSERVER.

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WORK OF THE YEAR.

April 1st, 1930 to March 31st, 1931.

THE manner in which the British Corps of Voluntary Marine Observers have set an example in the fulfilment of international agreements in the interests of safety of life at sea this year is beyond praise. That is the outstanding feature of **The Work** of this year ending March 31st, 1931, for since May 1st, 1930, when the new organization was commenced, British Selected Ships have carried on the service of routine Wireless Meteorological reporting with perfection, for the benefit of all ships of all nations and those Meteorological Services who have provided the necessary information through the medium of THE MARINE OBSERVER of facilities for reception. By this voluntary work of her chosen Merchant Seamen, Great Britain has been enabled to be the first nation to carry out in the main her agreements regarding Article 35 of the International Convention of Safety of Life at Sea.

This record of work done during the year is a true testimony of the voluntary service of Marine Observers and as such is in itself a more eloquent tribute than any words of praise we can write.

Here are the facts:—

Collection of Data.

Meteorological Logs (4 hourly) using complete Meteorological Office instrumental equipment, kept by 100 ships of the Merchant Navy.

Of a total of 285 logs received:—

- 115 were classed Excellent.
- 170 were classed Very Good.
- 0 were classed Good.
- 0 were not classed.

285 Total.

These classifications are arrived at by a process of comparison, so that the standards are set by the Corps of Voluntary Marine Observers themselves, the classification of "Excellent" being limited to the best 40 per cent.; and that of "Very good" to all logs not reaching "Excellent," but which are entirely efficient for the purpose of extraction and computation of the data by the Hollerith system.

These classifications, in the case of "Selected Ships," take into consideration the registers, Form 138, which are in such cases regarded as companion to the log; special attention being given to the records regarding the communication of routine wireless weather reports, and evidence of the practical application of marine meteorology to the navigation of the ship.

Now that the number of meteorological log keeping ships has been reduced to 100, mainly in the North Atlantic and Pacific trades—from which oceans, data for making ocean meteorological charts are most desirable—this work which continues to be the backbone of marine meteorology, has become more important and exacting.

Great credit is due to those members of the Corps of Voluntary Marine Observers who carry out this branch of the work.

Ships' Meteorological Record, Form 911. Two to four sets of synchronized observations daily, according to number of watch keeping officers carried, kept by from 349 to 386 ships of the Merchant Navy.

2686 of these Forms were received, and they were classified as follows:—

521	Excellent.
2,157	Very Good.
3	Good.
5	Not classed.
<hr/>	
2,686	Total.

The same system of classification is used with these forms as with the meteorological log except that the work being not so exacting, the standard of "Excellent" is arrived at by limitation to a smaller percentage of the best of the forms. The wireless register, Form 138, which is also companion to Form 911 in the case of "Selected Ships," is considered in exactly the same way as with the meteorological log.

Starting this year all regular observing ships keeping Form 911, which are "Selected Ships," are eligible for "Excellent" awards for particularly fine work during the year; and their names are now given in the list which previously only included a very few, whose commanders and officers had performed exceptionally good pioneer service in the development of wireless and weather as an aid to navigation.

This has been done by the Meteorological Committee, who, recognising the national value of the work of "Selected Ships," following the International Convention of Safety of Life at Sea, wish to give greater encouragement to the merchant navy.

Cadets' Meteorological Logs, Lighthouse Registers, Coast Guard and Light Vessel Returns, Ice Reports, Form 912, and Miscellaneous Contributions.

The Officers' school ships *Conway* and *Worcester*, and Nautical College, Pangbourne, have continued the valuable work of training future officers of the merchant navy in sound and seamanlike methods of observation, and the Cadets' meteorological logs returned by all three of these establishments during the year have been of a very high standard.

The West India and Falkland Island Lighthouse Stations have continued regular observation.

A number of Coast Guard Stations and Light Vessels have continued the work commenced in 1879 of providing daily observations of air and sea temperature, wind, and weather round the British coasts.

The cross channel steamers have made regular telegraphic reports of observed conditions at mid-channel. Their records are now kept on Form 911, the classification of which is given above; thus the work of Home trade observing vessels has been brought into line with British foreign going ships.

The recording of the sighting of Ice has been satisfactory, and a large number of Ice reports on Form 912 have been received from vessels traversing ice infested regions, both in north and south latitudes.

Whereas in past years there were usually received a number of manuscript reports from Captains and Officers of ships who were not regular observers, this year there have been very few of such documents.

The Hydrographer of the Navy has forwarded a number of useful extracts from the Remark Books of H.M. Ships, mainly observations of the set and drift of current.

The use made of the Data collected.

A new Atlas of Currents on the Main Trade Routes of the North Atlantic, constructed from the charts originally published in *THE MARINE OBSERVER*, has been published during the year; and the work of compiling a similar atlas for the Indian Ocean has been commenced.

This manner of representing currents is such that the roses, arrows, and tables are capable of amendment in later years, when more data are available, so that the system will make it possible for periodical revision to take place.

The scheme of investigating and charting currents along the trade routes, section by section, and month by month, in *THE MARINE OBSERVER*, was adopted after much consideration, and after various methods had been tried, as may be seen from the backs of the monthly issues of the Ocean Meteorological Charts, published up to the end of 1923.

Year by year, as we proceed with it, this scheme proves its soundness; it is providing information which has long been needed, and which is of great value to navigation. In last year's investigation of the currents on the Perim-Fremantle, and Perim-Colombo-Fremantle tracks alone, much new knowledge was gained; and when the results of the present year's investigation of the currents on the trade routes off the South and East coasts of Africa are published, there will be a very material advance in the knowledge of the currents of the Indian Ocean.

With the information collected since 1921, and the improved knowledge of the currents in the Indian Ocean, it has been possible to revise the recommendations as regards westbound routes from the East and Colombo during the South West monsoon.

The extraction of observations from Meteorological Logs on to Hollerith Cards in preparation for the calculation of averages for ocean meteorological charts and other purposes has been continued; but as the Table below indicates, the heavy falling off between 1928 and 1930 of the number of observations so dealt with, has again occurred.

As we said last year, the calls upon the Marine Division in connection with the work of International Conferences were largely responsible for this falling off. During the past year, the additional work of organizing and maintaining the British complement of "Selected Ships," with accumulating work due to continually increasing calls upon marine meteorology, have made it necessary to tell off more assistants for work in connection with the "Selected Ships" service and the inquiry service, thus leaving fewer to handle meteorological data. Steps have been taken to fill up the section which was short-handed.

Marsden Chart No. I shows the distribution of observations extracted during the last twelve months and **Marsden Chart No. II** gives the distribution and number of observations extracted since re-organization on April 1st, 1920. The table below gives particulars of data extracted since the Hollerith system was used.

	1930-31.	1929-30.	1928-29.	1927-28.	1926-27.	1925-26.	1924-25.	1923-24.	1922-23.	June 1921-1922.
Percentage of logs received reaching the required standard completely extracted and phenomena indexed.	17	14	37	60	64	64	55	66	73	59
Number of complete sets of observations extracted and punched on cards, with currents entered in data books and phenomena indexed.	19,185	17,987	43,117	73,745	78,180	75,852	65,080	74,749	97,533	63,731
Current observations from 1910 extracted and entered in data books.	7,980	10,913	2,626	3,496	8,242	8,210	5,746	4,259	1,826	—

With observations received in Meteorological logs since 1921, and compiled into averages with the Hollerith system, wind and fog roses for each month were published for the region of S.W. approaches to the British Isles and the region of the Cape of Good Hope.

Wind roses for the region of the coast of Spain and Portugal, with average conditions of weather and visibility, have been compiled, and are being published in this year's *MARINE OBSERVER*.

Though these only provide information for certain localities, their publication is useful in that it shows the Corps of Voluntary Marine Observers what we aim at, and is a check upon the whole system of marine meteorological observation and investigation.

5,206* reports received direct through Portishead from the chosen "Selected Ships" most suitably disposed in the Eastern North Atlantic and North Sea were used by the Forecast Division in the construction of the daily weather map, and these have provided most valuable information for weather forecasting.

Thus "Selected Ships" have contributed directly to the working of the Weather Shipping Bulletin and gale warning services, also to all the services of the Meteorological Office dependent upon daily information of weather conditions prevailing in the eastern North Atlantic and North Sea.

Copies of observations made by observing ships in different parts of the world have been supplied for the purpose of investigation and litigation regarding damage or loss of ships and cargoes.

Copies of observations of current made by observing ships in the North Atlantic have been supplied to the Scottish Fishery Board, for the purpose of their investigations.

Copies of all observations of green Flash made by observing ships since 1921 were supplied for the purposes of an enquiry by the Hydrographer of the Navy.

Information of the conditions of visibility during the years 1927 to 1929 in the vicinity of certain Direction Finding Wireless Stations on the British Coast were supplied to the General Post Office.

The Supply of Data to Foreign Services.

To the International Bureau of Vulcanology reports of all submarine earthquake shocks, in 1929.

To the Dutch Meteorological Office 261 sets of observations on Hollerith Cards for 1929 in selected squares in the Atlantic, Pacific and Indian Oceans.

The work in connection with the supply of marine meteorological information to the Division for Climate for the Reseau Mondial—an international publication by means of which all nations obtain information—reported to be in arrears last year, is now up-to-date.

Observation.

Following the revision of *THE MARINE OBSERVER'S HANDBOOK*, the meteorological log, the ship's meteorological record, and all forms

* The number of coded W/T Weather reports received during the whole twelve months at the Meteorological Office, including the month of April, 1930, when the old system was still in use, was 5,648.

for recording routine observations to accord with International agreement, a clean cut change was made by British observing ships on May 1st, 1930.

There have been repeated minor changes in international scales and notations for many years. Such changes have been found to be ineffective and to cause some irritation and confusion, both at sea and ashore.

The changes made on 1st May, 1930, following as they did long consideration by the International Conference on Safety of Life at Sea, 1929, the British Empire Meteorological Conference, 1929, and the International Meteorological Conference at Copenhagen, 1929, should be lasting for many years.

Following these changes, organized routine observation in British regular observing ships has improved, both in character and geographical distribution, and synchronization of observation has been attained over all oceans.

Before the 1st May, 1930, it was the practice to lend only *complete* sets of Meteorological Office instruments to observing ships keeping meteorological logs, and North Atlantic liners making coded wireless weather reports to the Meteorological Office.

Following the recommendations of a small committee appointed by the Chamber of Shipping of the United Kingdom in 1921, and in view of the advantages to the masters and officers of ships of a good mercurial barometer, we have encouraged the use of such instruments and there has been a steady though gradual increase in the number of ships in the merchant navy which carry them as part of the ship's outfit. Every advantage has been taken by giving ships having a mercurial barometer preference in building up the observing fleet.

The maintenance of a good mercurial barometer as part of the permanent equipment of a ship costs very little. When mercurial barometers are lent by the Meteorological Office there is not only the initial cost, and the cost of maintenance, but the cost of frequent transfers from ship to ship is considerable, and is attended by risk of breakage, and a good deal of work by the Port Meteorological Officers and Merchant Navy Agents, to say nothing of necessary store accounting.

Since the 1st May, 1930, the practice of lending *part* meteorological equipment to ships which are to be detailed as "Selected Ships" has been introduced, and consequently, by doing this, and making full use of the ships' own instrumental equipment, where suitable, there is now a much greater number of observing ships who through the nature of their instruments are able to make accurate weather observations. This arrangement makes the most economical use of the Meteorological Office instruments available for observation at sea, and it gives the greatest benefit of their use to the whole shipping industry and the meteorological services.

At the present time there are no less than 163 observing ships which are using their own mercurial barometers for the voluntary service of organized marine meteorology. The shipping companies which have the largest number of regular observing ships in the fleet list, carrying their own reliable mercurial barometers, are the Peninsular and Oriental Steam Navigation Co. 28, British India Steam Navigation Co. 19, T. & J. Brocklebank 12, Harrison Line 12, Royal Mail Steam Packet Co. 9, Pacific Steam Navigation Co. 8, Houlder Line 8. There are no less than 204 ships having Meteorological Office instruments on board, whereas on the 1st April, 1930, only 154 ships had complete sets of such instruments on board.

The Sea and Swell scale which was originally drawn up by Rear-Admiral Douglas, when he was captain of H.M.S. *Mutine*, has proved satisfactory and has contributed to the improved observation since 1st May, 1930.

British Selected Ships and Routine Wireless Weather Telegraphy.

During the last eleven months greater progress has been made in this particular branch of the work than in any other marine meteorological work since reorganization after the Great War; and we can find no record of such a marked advance in the whole history of organized marine meteorology.

In order to show clearly what has been achieved, it is necessary to give here a sketch of the development.

From the time when merchant shipping was first fitted with wireless telegraphy, the masters of ships exchanged information with regard to weather, currents, ice, and derelicts.

Synoptic methods were understood by very few at sea, and no serious attempt had been made to use such methods in the merchant navy before or during the Great War, though their possibilities had probably been realized by many; and only a stimulus was needed to bring such methods into use at sea.

In 1908 a service of wireless reports from North Atlantic liners to the Meteorological Office, London, was started. This was discontinued during the Great War.

On March 27th, 1921, a limited service of wireless weather reports from North Atlantic liners to the Meteorological Office was started, and in August, 1924, this service was extended in the western North Atlantic where British North Atlantic liners also reported to the United States Weather Bureau.

On June 15th, 1921, the British Meteorological Office introduced a weather bulletin for the western seaboard of the British Isles, specially designed for the use of shipping. This bulletin* included reports of observations at five coast stations. Shortly before the commencement of this service a pamphlet entitled WEATHER FORECASTING IN THE EASTERN NORTH ATLANTIC AND HOME WATERS FOR SEAMEN was published, which gave simple guidance in observation, communication, the construction of weather charts and their use at sea.

Three months later the first weather chart on board a British ship, by a British officer, with British observations, was made, and that officer, Lieutenant C. H. WILLIAMS, R.N.R., is now responsible, amongst other things, for giving advice and guidance in this work to marine observers using the Port of London.

The communication of information regarding weather increased rapidly along the old lines. The limited service of coded reports from North Atlantic liners to Weather, London, and United States Weather Bureau continued steadily. The old method whereby weather information of a general nature was exchanged between ships by wireless continued to grow; and the number of observing ships which made a standard form of report, synchronizing with the observation time of the nearest Coast, increased; some North Atlantic liners repeating their observations to "all ships" which they had made to Weather, London.

Captain ADAMSON of S.S. *Oxfordshire*, who is now Marine Superintendent of the Bibby Line, returned the first meteorological log giving a complete record of plain language standard reports made to synchronize with the nearest coast, in June, 1924.

The communication of wireless weather intelligence between ships at sea, at times and in some regions, became congested and confused; and it was obvious that organization was necessary to produce a well-ordered service, both for the information of all ships at sea and the meteorological services ashore.

The first step was to limit in some degree the number of ships making routine reports of observations; and therefore from January, 1927, only ships in the British observing fleet list which had a mercurial barometer on board were invited to make daily routine reports. There was a good response to this invitation, but owing to the almost insurmountable difficulty of regular effective communication, the varying times of observation required to synchronize with the different coasts, and the numerous divergent requests of the meteorological services in different parts of the world, it could not be expected that all "Selected Ships" would respond, and maintain such a service.

With the mercantile tonnage distributed amongst all the maritime countries of the world, the international ramifications of wireless communication, and the lack of a generally accepted ships' meteorological code, it became clear that some measure of international agreement as to general principles and methods was essential.

The British service of organized marine meteorology being entirely voluntary, it was essential that the support of the Merchant Navy should be assured for any scheme in which Great Britain was to take part. It was highly desirable that the experience of the executive and wireless officers of the Merchant Navy should be utilized in framing a scheme. This was done. A world-wide scheme was drawn up, the main principles being:—

(1) Limitation of the number of ships to be engaged in routine weather reporting to 1,000 (in the first place), "Selected Ships" of all nations: each nation to maintain a complement of "Selected Ships" in accordance with her proportion of the world's tonnage.

(2) One international code to be used throughout this service.

(3) That instructions and advice be given to ships of the different nations by their own meteorological service only, and that complaints should only be made through the same channel.

(4) That four Greenwich Mean Times of observation be standardized for use at sea in all parts of the world. Ships with only one officer of the watch to use the two of these times which fall in daylight, according to zone.

(5) That long range C.W. ships termed "A Selected Ships" should make their reports to certain shore stations in such a manner that they can be easily intercepted by all ships; and that short range ships termed "B Selected Ships" should broadcast their routine reports to "all ships," shore stations intercepting them as desired.

In congested areas where necessary, communication of "A Selected Ships" be regulated through the shore station.

(6) That a schedule for communication be used conforming to the wireless operator watch zones, and having two periods with fixed times of commencement; and where these occur the time when one operator ships are off watch, a further period.

The scheme was examined by a Sub-Commission of the International Meteorological Committee at Paris in May, 1928. It was considered by the International Conference on Safety of Life at Sea in London in 1929, and Article 35 was in part based upon it.

It was explained to the British Empire Meteorological Conference in London in 1929; and the International Meteorological Conference at Copenhagen in 1929 adopted all the principles laid down except the schedule for communication, concerning which a special resolution was passed inviting Great Britain to carry out a trial.

The result of the first 11 months of the working of this schedule has exceeded all expectations.

The Service of British Selected Ships since 1st May, 1930.

On the 1st May, 1930, when the new scheme was commenced in all parts of the world, British "Selected Ships" responded immediately to the new instructions which had been given to them in the January MARINE OBSERVER and in the revised registers, which had been distributed in good time.

At that time there were 289 British "Selected Ships" of which 93 were "A Selected Ships."

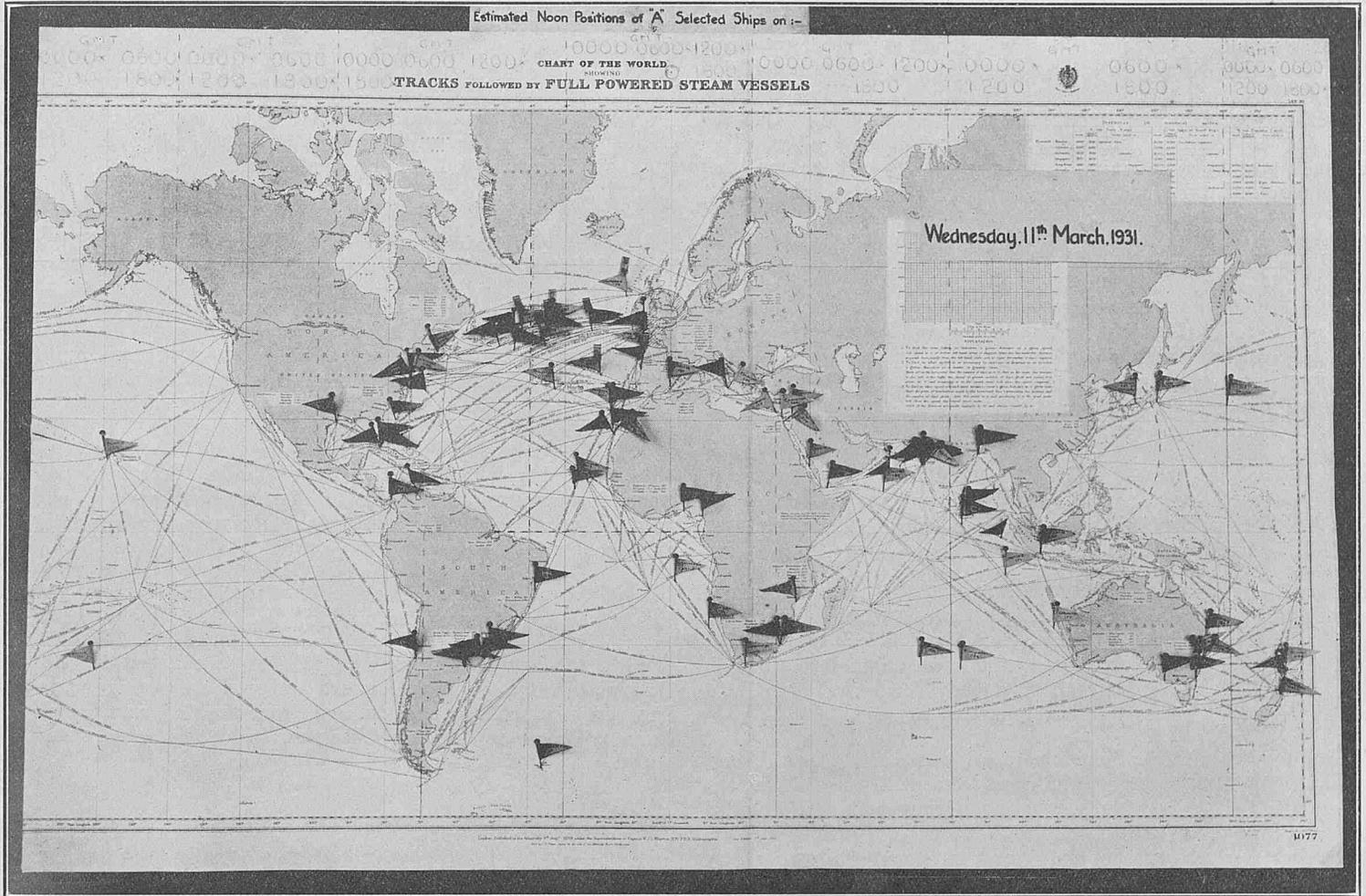
Chart III shows the position of all British "Selected Ships" at sea on June 1st, 1930, showing some improvement in distribution over the same day of the previous year.

The British complement of "Selected Ships," at present 312, was complete for the first time on 26th November, 1930, when the number of "A Selected Ships" was 111. To-day, March 31st, 1931, of 312 Selected Ships 123 are "A Selected Ships." Thus it will be seen that the capacity of wireless range of British "Selected Ships" as a whole is steadily approaching the 1,500 to 1,800 miles radius, found at present to be the most desirable.

* The Western Seaboard Bulletin was replaced by the British Weather Shipping Bulletin on 1st January, 1924.

Below is a photograph of the position chart for March 11th, 1931, and upon it the flags indicate the estimated position of "A Selected Ships," at sea, and in ports abroad. It does not show "B Selected Ships."

During the 11 months under review, the daily average number of "A Selected Ships" best disposed in the Eastern North Atlantic and North Sea on the roll call made through Portishead, was 7.3; and on an average 6.2 chosen ships made their reports.



To make an annual analysis of the communication of British "Selected Ships" in all parts of the world would involve too much work to justify obtaining such exact results that such a process would give.

In the process of examination and classification of the meteorological logs and meteorological records of "Selected Ships," the registers are also examined, and particularly with regard to the records of communication.

The registers received indicate that "Selected Ships" are making reports according to the schedule in all parts of the world, with remarkable regularity.

Of course at first, as always is the case in introducing new schemes, there were a number of mistakes made by "Selected Ships"; and minor departures from correct procedure still occur, and are bound to occur in such a service where precision is of such great importance.

The Port Meteorological Officers and Merchant Navy Agents are notified weekly of departures from procedure made by "Selected Ships" using their ports, and these officers have rendered splendid service in getting matters straightened out where necessary, by personal visit.

The following figures indicate the exact results of the working of the scheme in the Eastern North Atlantic and North Sea, which we are able to regulate from the Marine Division by means of the Position chart for "A Selected Ships" through Portishead W/T Station by roll call.

During the first month of the working of the scheme a number of "Selected Ships" not on the roll call reported, but this was very soon remedied, and by the commencement of the winter, the control had become effective, as will be seen by the following averages for November, 1930—

Daily Average Number of Ships on Roll Call	...	...	...	8.1
The Number of these ships which reported	...	...	...	7.3
Number of Selected Ships, <i>not chosen</i> which reported during period of Roll Call	...	...	...	0.2
and a number of these last were ships which had been on the previous day's roll call.				
The Average Number of reports per day received	...	...	...	17.9
Total Reports Received	...	...	...	537

Of these, 368 were 0600 and 1200 G.M.T. observations, and 326 were reported according to schedule, 42 being late, not in accordance with roll call, and therefore not easily received by all ships at sea.

The remaining 169 reports containing 0000 and 1800 G.M.T. observations were reported, in accordance with the instruction, as soon as possible after observation, the majority of them being in fact made within a similar interval after observation time and following the S.O.S. period, as the other scheduled periods.

Under the old system of coded reports from North Atlantic liners to the Meteorological Office, less than 35 per cent. of the reports were received at the Meteorological Office within one hour of observation time, and these reports could seldom be intercepted by ships at sea. Under the new scheme, the percentage of reports during February,

1931, received at the Meteorological Office within one hour of observation time has increased to 84; and by reason of the schedule and roll call, ships at sea know exactly when to listen and on what wave length.

When the system of communication by schedule was discussed at International Meteorological meetings, some meteorologists expressed doubt as to its practicability on the ground that delays caused by atmospheric conditions would in the event of a schedule being used, result in temporary failure of communication. The officer in Charge of Highbridge W/T Station (Portishead) reported that during last summer there was a period of one month of the worst atmospheric conditions that he had experienced since he had been in charge of the station. The service has never been interrupted, and reports have been received daily throughout, although, on occasion delayed by atmospheric conditions.

The schedule times given are for the commencement of periods only, and are thus effective.

After the scheme was commenced some commanders of "Selected Ships" pointed out that the scheduled times for reporting 1200 G.M.T. observations clashed with certain W/T press issues. When the schedule was drawn up, it was found impossible to fix scheduled times for all zones, which did not coincide with the issue of press reports and other routine signals.

The number of reports containing 1200 G.M.T. observations made by "A Selected Ships" and received, has been greater than those of any other observation time; and the working of the schedule at 1218 G.M.T. has proved to be the best.

Great credit is due to Mr. E. F. GREENLAND, the officer in charge of Highbridge W/T Station, his assistants, and the wireless operators of British "Selected Ships." They have proved in one of the most congested areas of marine wireless communication that the British scheme is not only workable, but a remedy for extravagant and wasteful unlimited wireless weather reporting at sea.

By carefully working the schedule in all parts of the world, and addressing their reports correctly in accordance with the instructions given them in THE MARINE OBSERVER, Commanders of British "Selected Ships" are establishing a system of routine wireless weather reports which will not only contribute materially to safety of life at sea, but which will ultimately aid air navigation.

Application.

FROM June, 1921, when a standard form of plain language wireless weather report was first recommended by the British Meteorological Office for the use of ships at sea, any ship of English-speaking nationality could understand the message. The principles of synoptic meteorology became better understood by navigators, and by 1930 the plain language routine reports broadcast in all parts of the world by British "Selected Ships" were being made use of extensively by merchant shipping.

Before the change from standard form plain language to coded report was made on 1st May, 1930, for British "Selected Ships," together with standard times of observation and scheduled communication, the DECODE FOR USE WITH THE INTERNATIONAL CODE FOR WIRELESS WEATHER MESSAGES FROM SHIPS was published in pamphlet form for the general convenience of shipping.

Although shipping and seamen were advised two months previously by Notice to Mariners of the impending changes, their full significance appears not to have been realized by many outside the Corps of Voluntary Marine Observers, who were provided with the DECODE through the medium of THE MARINE OBSERVER.

This pamphlet was placed on sale by the Stationery Office, priced 3d., in April, 1930, and from the sales recorded at the Stationery Office, there could not have been more than 700 ships supplied with it, by October, 1930.

The use and application of the information broadcast by British "Selected Ships" had thus received a temporary set-back, for they

could not understand the coded messages. Steps were then taken by circular letter to bring to the individual notice of all British shipowners, owning vessels fitted with wireless telegraphy, the facts that this pamphlet had been published for the convenience of shipping and seamen; that "Selected Ships" were provided with the necessary literature by the Meteorological Office for conducting the work, which was done voluntarily with the co-operation of shipowners, masters, and mates; and that all shipping fitted with wireless telegraphy might benefit therefrom free of cost, provided that masters and officers were supplied with the Decode.

There was an immediate response by a large number of British shipowners; all stocks of the pamphlet at the Stationery Office were sold, and a second edition was published.

The majority of British ships probably now have the Decode, and the high quality of the information broadcast by "Selected Ships" in all parts of the world is generally known.

The syllabus for the Board of Trade examinations for a certificate of competency as master of a foreign-going ship now requires a general knowledge of this system of wireless weather reports, and the ability to construct a simple weather chart; and to make deductions as to the probable changes of weather along the proposed track of his ship.

By this recognition of the Board of Trade, there is thus an additional incentive to the officers of the merchant navy to apply in a most practical way their knowledge of marine meteorology to safe and economical navigation.

It is this practical application of marine meteorology to navigation which is now most essential.

With an organization such as is now established in the British Merchant Navy, we look forward to good use being made of the knowledge which has accumulated from the 75 years' work of the Corps of Voluntary Marine Observers in all the seven seas.

Port Meteorological Offices and Merchant Navy Agencies.

On April 28th, 1930, a Port Meteorological Office was established for the Port of London. It was housed temporarily in a hut at the Royal Albert Docks, from whence it was transferred to the Port of London Authority's building on the south side of King George V Dock on March 5th, 1931.

During the year the work of the Port Meteorological Offices at Liverpool and London has been particularly heavy, for it was at these two ports, with the greatest proportion of British tonnage, where the most work was involved in connection with the reorganization of "Selected Ships," following the changes made on May 1st, 1930. The merchant navy agencies have also given great assistance in this matter. In fact it would have been impossible for the Marine Division to have performed the service required of it without the assistance of the master mariners in charge of the Port Offices and Agencies, who by personal contact and proper understanding of the ways of the merchant navy, have dealt successfully with matters which could not have been accomplished by correspondence.

Captain DUNCAN FORBES, who had been merchant navy agent at Southampton since 1888, and who as such has rendered splendid service, retired on September 30th, 1930. After a short course in the Marine Division, Mr. R. I. T. McEWAN, master mariner, was appointed in his stead.

Lieutenant-Commander R. G. H. MILLIGAN, R.N., relinquished the agency at Hong Kong in September, 1930, on leaving for England; and Lieutenant-Commander G. B. R. RUDYERD-HELPMAN, R.N., has been appointed in his stead.

Captain G. BLACK, who had been joint agent for the Forth since 1923, retired in March, 1931, and Captain D. ARCHISON was appointed in his stead.

Acknowledgment, Appreciation, and Awards.

When the Convention on Safety of Life at Sea, 1929, is ratified, the meteorological services of the world will have greater responsibility than ever before by virtue of Article 35.

It has been mainly with a view to Great Britain as the greatest maritime nation in the world, being ready to fulfil her obligations in this respect, that we have been asking the merchant navy to do the work above-mentioned.

The manner in which the merchant navy has responded has been beyond praise. We acknowledge with gratitude the facilities which many shipowners and the marine wireless companies extend, and the encouragement which marine superintendents have given in this work, done in the interests of the whole shipping community, and all ashore and in the air who are served by the Corps of British Voluntary Marine Observers.

Our greatest thanks are due and are given to the commanders and officers of regular observing ships who constitute the Corps of Voluntary Marine Observers, and to the wireless operators of "Selected Ships."

There are many members of the Corps of Voluntary Marine Observers who have returned "very good" meteorological logs and records, who have not quite achieved the "excellent" standard which has been brought to such a high pitch by the competitive work of the Corps; and some have not succeeded in maintaining the "excellent" standard for more than short periods. The "excellent" standard is a distinction which would not be of such value if it were not competitive. To those who have just failed to achieve it, special encouragement for next year.

A list of commanders and principal observing officers, with their ships, to whom the Meteorological Committee have made excellent awards in special recognition of very fine work, is appended.

MARINE SUPERINTENDENT.

London,
April 1st, 1931.

LIST OF CAPTAINS AND PRINCIPAL OBSERVING OFFICERS TO WHOM THE METEOROLOGICAL COMMITTEE HAVE MADE "EXCELLENT" AWARDS.

Captain.	Principal Observing Officer.	Ship.
*ADCOCK, F. ..	STEPHENSON, A. E....	<i>Nestor.</i>
ALLIN, C. H. C....	PIRIE, C. S. ...	<i>Moldavia.</i>
*ANDERSON, W. W. ...	TRAVIS, A. ...	<i>City of Valencia.</i>
*AYRES, R. M. ...	BAIRD, A. H. ...	<i>Nirvana.</i>
*BAIRD, S. K. ...	LEE, H. ...	<i>Khandalla.</i>
*BARLOW, F. P. ...	SAYERS, L. A. ...	<i>Pancras.</i>
BARNETT, H. ...	COCKERILL, H. K. ...	<i>Rangitiki.</i>
*BEITH, A. ...	HUTCHINGS, W. M. M.	<i>Appam.</i>
*BONE, D. W. ...	MIDDLETON, H. ...	<i>Transylvania.</i>
*BRIDGES, E. A. ...	{ PAYNE, C. A. } { PHILLIPS, J. }	<i>Nebraska.</i>
BROWN, F. G., Capt., R.N.R., R.D.	DAVIS, P. O. ...	<i>Carmania.</i>
BROWNING, J. B., Commr., R.N.R., R.D.	TURNER, R. H. ...	<i>Maloja.</i>
BULMAN, J. B. ...	—	<i>Homeric.</i>
BURTON DAVIES, J. ...	{ CLEMENT, J. F. } { REDWOOD, W. }	<i>Hertford.</i>
CAMERON, E. P., Capt., R.N.R., R.D.	MACKAY, E. M. ...	<i>Oronsay.</i>
CAMERON, J. M....	SMITH, H. C. ...	<i>Mahana.</i>
CAMPOS, V., O.B.E., Lieut.-Commr., R.N.R.	ALLEN, W. E. ...	<i>C. S. Dominia.</i>

Captain.	Principal Observing Officer.	Ship.
*CAREY, W. M., Commr., R.N.	ARDLEY, R. A. B. ...	R.R.S. <i>Discovery II.</i>
*CARTER, E. A. J. W., Commr., R.N.R., R.D.	WILD, G. A. ...	<i>Rajputana.</i>
*CARTWRIGHT, C. W., D.S.C.	WHITE, E. C. ...	<i>Comorin.</i>
*CLARET, F. H., O.B.E., Commr., R.N.R.	PENGELLY, E. ...	<i>Minnewaska.</i>
*CLARKE, P. B. ...	BELFIELD, R. A. ...	<i>Otaki.</i>
CLIFTON MOGG, W. P., Lieut.-Commr., R.N.R.	BAKER, E. T. ...	<i>Tainui.</i>
COCHRAN, G. N....	DODSON, L. F. ...	<i>Manipur.</i>
COOPER, C. P., O.B.E., Capt., R.N.R., R.D.	ARMSTRONG, D. H. F.	<i>Kalyan.</i>
*DAVIES, A. L. ...	OWEN, E. R. ...	<i>Knight Companion.</i>
DODDS, R. ...	OPPEN, F. C. ...	<i>Tantalus.</i>
DOYLE, M. ...	MEGGETT, G. ...	<i>Laconia.</i>
EDGEELL, J. A., O.B.E., Capt., R.N.	THOMAS, M. B. ...	H.M.S. <i>Endeavour.</i>
*EGERTON, J. J. ...	MORRICE, G. ...	<i>Recorder.</i>
*ELLIS, F., D.S.C.	FINDLAY, W. ...	<i>El Argentino.</i>
ENGLISH, G. L. ...	{ QUAYLE, A. D. } { JEFFRIES, E. W. }	<i>Shropshire.</i>
*EVENS, E. H. ...	WOODALL, J. O. ...	<i>Berwickshire.</i>
FERRIS, J. ...	{ ELSON, R. D. } { HOLLOWAY, R. A. }	<i>Port Denison.</i>
*FOWLER, W. H. ...	SEYBOLD, A. D. ...	<i>Hardwicke Grange.</i>
FOXWORTHY, A. W. ...	HANDLEY, R. F. ...	<i>Newfoundland.</i>
FROST, C. R. ...	FLETCHER, G. ...	<i>El Paraguayo.</i>
*FURLONG, G. H. S., Capt., R.N.R., R.D.	HALLIDAY, C. F. ...	<i>Ranpura.</i>
FURNEAUX, S. J. ...	WILSON, J. E. ...	<i>Nova Scotia.</i>
*GASKELL, J. H., Lieut.- Commr., R.N.R., R.D.	ALMOND, G. L. ...	<i>Zealandic.</i>
*GATES, T. F., C.B.E. ...	MCCARTNEY, H. E. D.	<i>Minnetonka.</i>
*GEMMELL, W. ...	SHEDDEN, D. C. ...	<i>Cameronia.</i>
*GIBB, A. W. P. ...	McMILLAN, P. ...	<i>Buteshire.</i>
*GIBBINGS, W. ...	WEEKS, R. J. ...	<i>Ingoma.</i>
*GILCHRIST, J. W. ...	ASHCROFT, W. ...	<i>Modasa.</i>
GOBLE, C. J., Commr., R.N.R., R.D.	{ DEVESON, F. S. } { FINCH, R. J. }	<i>Culebra.</i>
*GRANT, F. H. ...	BAIN, J. M. ...	<i>Lobos.</i>
*GREEN, F. V. ...	BUNN, L. A. ...	<i>Matiana.</i>
*GREEN, J. ...	SWALLOW, F. ...	<i>Darro.</i>
GREGORY, S. E. A. ...	HOWARD, E. N. ...	<i>Port Nicholson.</i>
HALL, G. S. ...	{ WALKER, H. B. } { PORTER, J. L. }	<i>Port Victor.</i>
HAMILTON, F. S. ...	ROBINSON, A. G. ...	<i>Tongariro.</i>
HANNA, R. G. ...	HOCKING, A. C. ...	<i>Macharda.</i>
*HARLEY, G. J. ...	VINCENT, M. H. ...	<i>Talma.</i>
*HARVEY, H. B. ...	WARREN, H. S. ...	<i>Llangibby Castle.</i>
HEAD, B. P. ...	HANSARD, G. P. ...	<i>Bulysses.</i>
*HENDERSON, F. M. ...	{ BLAIR, D. ... } { BEVERIDGE, W. A. }	<i>Elysia.</i>
HIGGS, W. G. ...	{ BETTESS, R. ... } { MUNDAY, P. A. }	<i>Port Sydney.</i> <i>Port Hunter.</i>
HILL, T. V. ...	{ EHLERT, L. B. } { MENLOVE, D. A. }	<i>Niagara.</i>
*HOCKING, R. W. ...	VINCENT, M. H. ...	<i>Talma.</i>
HOLLAND, E. ...	{ WILKINSON, H. F. C. } { LAWSON, H. N. }	<i>Rotorua.</i> <i>Remuera.</i>
HOMAN, C. E. ...	LAYCOCK, F. ...	<i>Glenamoy.</i>
HOWELL PRICE, J., D.S.O., D.S.C.	HOCART, G. C. ...	<i>Norfolk.</i>
HUDSON, H. T. ...	GRANT, J. W. ...	<i>Manora.</i>
HUDSON, J. J. ...	{ HOPKINS, W. B. } { ROSWELL, E. E. }	<i>Port Pirie.</i> <i>Port Sydney.</i>

* Those marked with an asterisk appear in the list of "Excellent" awards for the first time.

Captain.	Principal Observing Officer.	Ship.	Captain.	Principal Observing Officer.	Ship.
HUNTER, J. L. B. ...	CHADWICK, D. H. ...	<i>Rangitata.</i>	RATHKINS, C. E., Commr. R.N.R., R.D.	MACFADYEN, D. T. ...	<i>Parana.</i>
*IRVING, R. B., O.B.E., Capt., R.N.R., R.D.	HILL, C. W. W. ...	<i>Scythia.</i>	*REILLY, H. E. ...	MARKS, J. D. ...	<i>Westmoreland.</i>
*ISON, W. A. ...	MOORE, F. ...	<i>Maidan.</i>	REILLY, J. V. ...	MACFADYEN, R. D. ...	<i>Nardana.</i>
JACK, J. ...	ROSWELL, E. E. ...	<i>Port Nicholson.</i>	*RHODES, H. R. ...	WOOD, R. G. ...	<i>Mongolia.</i>
JOHNSON, J. W. ...	SAVILL, P. ...	<i>Maimoa.</i>	RICHARDS, J. ...	HILL, T. R. ...	<i>Astronomer.</i>
	SAINSBURY, E. ...		*ROBERTS, E. ...	HICKS, E. C. ...	<i>Orbita.</i>
*KERSHAW, R. W. ...	PAISLEY, J. R. ...	<i>Mahsud.</i>	ROBINSON, F. W. ...	LAWSON, H. N. ...	<i>Ruapehu.</i>
KERSHAW, W. A. R. ...	HILL, H. A. ...	<i>Mataroa.</i>	ROBINSON, R. H. ...	PHILLIPS, H. I. ...	
LAIRD, J. ...	WILSON, A. D. ...	<i>Piako.</i>			<i>Highland</i> <i>Chieftain.</i>
*LAMB, C. B. ...	PHILLIPS, J. G. ...	<i>Rimutaka.</i>	ROME, W. B. ...	NOBLE, J. ...	<i>Tuscania.</i>
*LING, J. T. ...	FULCHER, L. W. ...	<i>Rotorua.</i>	RUSSELL, W. TURNER ...	OSGOOD, E. H. ...	<i>Almeda Star.</i>
MCINTOSH, A. ...	STOCKLEY, E. L. ...	<i>Explorer.</i>	SAWBRIDGE, I. R. ...	McCLOUNAN, A. ...	<i>Port Darwin.</i>
McKELLAR, A. W., Capt. R.N.R., R.D.	CLARK, H. M. ...	<i>Karamea.</i>	*SHEEPWASH, J. S. ...	MOSEY, F. M. ...	<i>Barrabool.</i>
	FISHER, K. D. G. ...		SHELFORD, W. S., Lieut.- Commr. R.N.R.	MACKAY, E. M. ...	<i>Oronsay.</i>
*McNAMARA, T. ...	MARSHALL, A. W. ...	<i>Rangitane.</i>	*SHORT, C. E. ...		<i>Balranald.</i>
*McNISH, R. ...	BROWN, A. ...	<i>El Uruguayo.</i>	SMILES, R. ...	WETHERALL, J. ...	<i>Marquesa.</i>
*MACDONALD, D. ...	HAILSTONE, F. E. ...	<i>Tekoa.</i>	*SMITH, H. ELLIOTT, Lieut.- Commr., R.N.R., R.D.	ROCHE, C. B. ...	<i>Baradine.</i>
*MACLEAN, A. ...	PHILLIPS, J. G. ...	<i>Makura.</i>	SMITH, R. G. ...	FARRELL, J. ...	<i>Cedric.</i>
MACMILLAN, D. ...	CRAWFORD, S. H. ...	<i>Karapara.</i>	STAUNTON, H. G., C.B.E., Commr., R.N.R., R.D.	ROBERTS, R. W. ...	<i>Orama.</i>
MALIN, R. G., Lieut.- Commr., R.N.R.	ROSE, M. ...	<i>Karapara.</i>	STEWART, A. R. ...	COOTE, G. M. ...	<i>Wairuna.</i>
	PRING, J. ...	<i>Cumberland.</i>	STRINGER, C.B.L. ...	FOX, O. ...	<i>Kiungchow.</i>
*MALLETT, R. ...	—	<i>Samaria.</i>	SWAN, L. H. ...	THOM, J. G. ...	<i>Port Campbell.</i>
*MALTBY, T. L. ...	McGILVRAY, J. ...	<i>Mangalore.</i>	*TOFT, J. T. ...	ELLIS, R. B. ...	<i>Accra.</i>
*MAPLES, S. H. ...	UNDERWOOD, J. H. ...	<i>Otaki.</i>	TOWNLEY, J. C., Capt., R.N.R., R.D.	CLARKE, H. V. ...	<i>Lancastria.</i>
*MAPLES, S. H. ...	WOOLGAR, F. A. ...	<i>Manela.</i>	UPTON, H. L., D.S.C., Commr., R.N.R., R.D.	MILLER, R. S. ...	<i>Northumberland.</i>
*MARTIN, G. E. ...	DODD, W. J. ...	<i>Coronado.</i>	*URQUHART, D. ...	BELFIELD, R. A. ...	<i>Ruahine.</i>
*MARTIN, W. ...	WATLING, J. ...	<i>Aorangi.</i>	*VAUGHAN, P.R., D.S.C., Commr., R.N.R., R.D.	PATCHETT, F. E. ...	<i>Albertic.</i>
	KNIGHT, V. ...		*VERNON, R. ...	COLDWELL, J. A. ...	<i>Andalucia Star.</i>
*MATTHEWS, G. P. ...	DEVESON, F. S. ...	<i>Demerara.</i>	*VINCENT, E. S., Commr., R.N.R., R.D.	DALZIEL, J. ...	<i>Dunbar Castle.</i>
*MEAD, G. F. ...	CRANKSHAW, F. F. ...	<i>Norfolk.</i>	WHITFIELD, G. A., O.B.E.	DAVIS, S. B. ...	<i>Thistleghen.</i>
MILLSON, H. E. ...	SHAKESPEARE, P. L. ...	<i>Abinsi.</i>	WILLIAMS, D. T. ...	STRATFORD, J. C. ...	<i>Achilles.</i>
*MORGAN, D. R. ...	WORSLEY, G. H. ...	<i>Essequibo.</i>	WILLIAMS, R. ...	CHADWICK, D. H. ...	<i>Cambridge.</i>
MORTON BETTS, W. ...	MARSLAND, L. ...	<i>Walmer Castle.</i>	WILLIAMS, R. ...	ELGAR, F. W. ...	<i>Port Adelaide.</i>
*MULCAHY, J. J. ...	PICKERING, G. H. ...	<i>Matheran.</i>	WOODROFFE, S. Y. ...	HAND, R. H. ...	<i>Kidderpore.</i>
NORTON, A. T. ...	SLADE, S. S. ...	<i>Hauraki.</i>	*WORTHINGTON, B. ...	BALDWIN, R. W. ...	<i>Director.</i>
OWEN, W. T. ...	HARGRAVES, R. H. C. ...	<i>Auditor.</i>	WRIGHT, J. B. ...	ELLIS, R. B. ...	<i>Accra.</i>
*PENTON, P. M. ...	PERCY, D. O. ...	<i>British Empress.</i>			
	SAUNDERS, T. C. ...		Somerset.		
*PILCHER, C. R. ...	SNOWLING, T. ...	<i>Tanda.</i>			
*PILCHER, E. T., Lieut.- Commr., R.N.R.	WALTER, M. T. D. ...				
*PRIDHAM-WIPPELL, H. D., C.V.O., Capt. R.N.	—	<i>H.M.S. Enterprise.</i>			
	HAMLEY, C. W. A. G.				

* Those marked with an asterisk appear in the list of "Excellent" awards for the first time.

THE MARINE OBSERVER'S LOG.

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

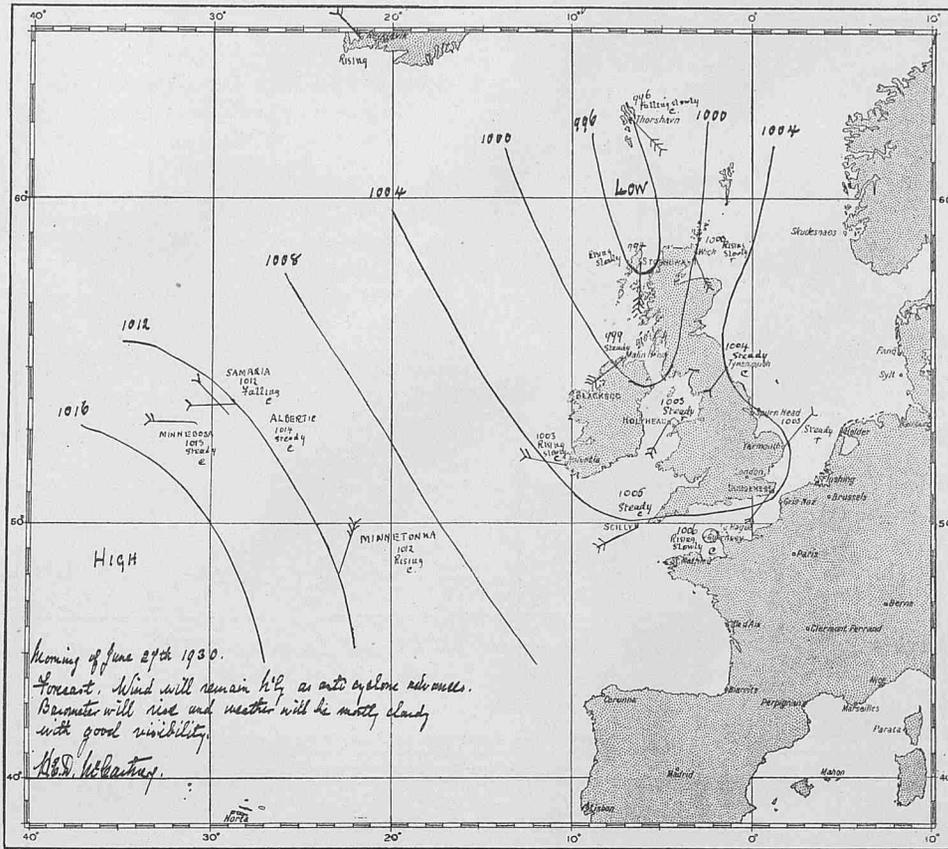
Responsibility for statements rests with the Contributor.

WEATHER CHARTS MADE AT SEA.

Eastern North Atlantic.

THE following weather chart and forecast was made on board S.S. *Minnetonka*, Captain T. F. GATES, C.B.E., by Mr. H. E. D. McCARTNEY from a selection of reports received from "Selected

Ships" on the Roll Call for the day and from coast station reports given in the British Weather Shipping Bulletin.



WEATHER CHARTS AND ECONOMICAL CONSUMPTION OF FUEL.

South China Sea.

The following remarks and accompanying weather charts were received with the Meteorological Record of S.S. *Talma*, Captain R. W. HOCKING, R.D., R.N.R., Hong Kong to Singapore. Observer, Mr. M. H. VINCENT, 3rd Officer.

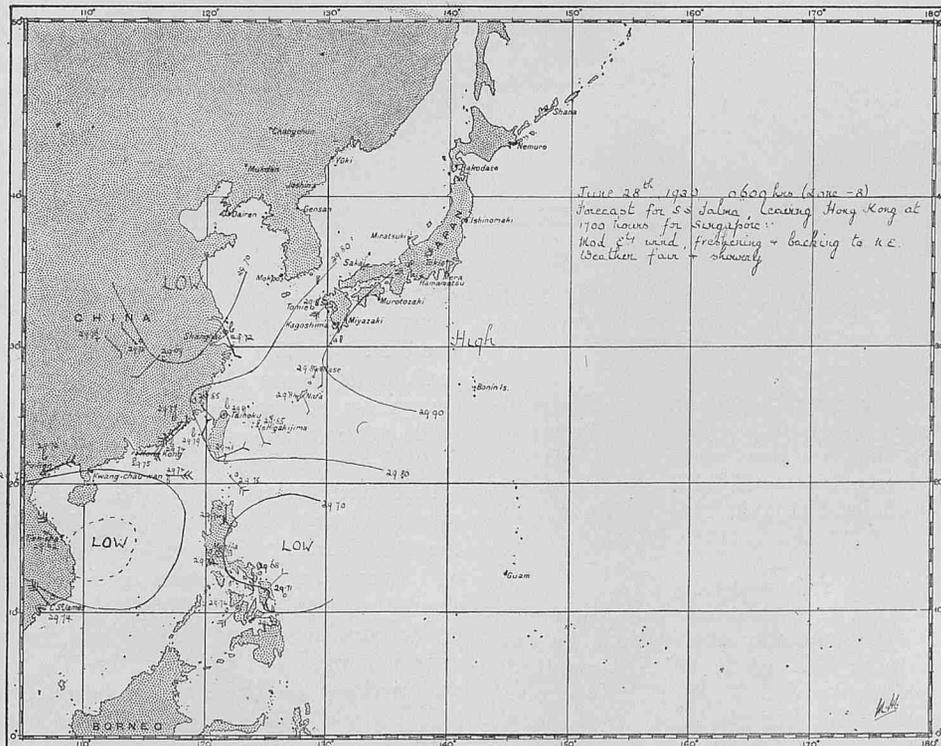
Talma left Hong Kong at 1700 hours on June 28th, 1930, and with a light monsoon could reach Singapore during the afternoon of July 4th, in time to obtain pratique. From the chart made on the 28th, it was seen that the depression over the China Sea, which had formed some days previously over Indo-China, had moved eastwards out to sea. If this movement continued, *Talma*, taking advan-

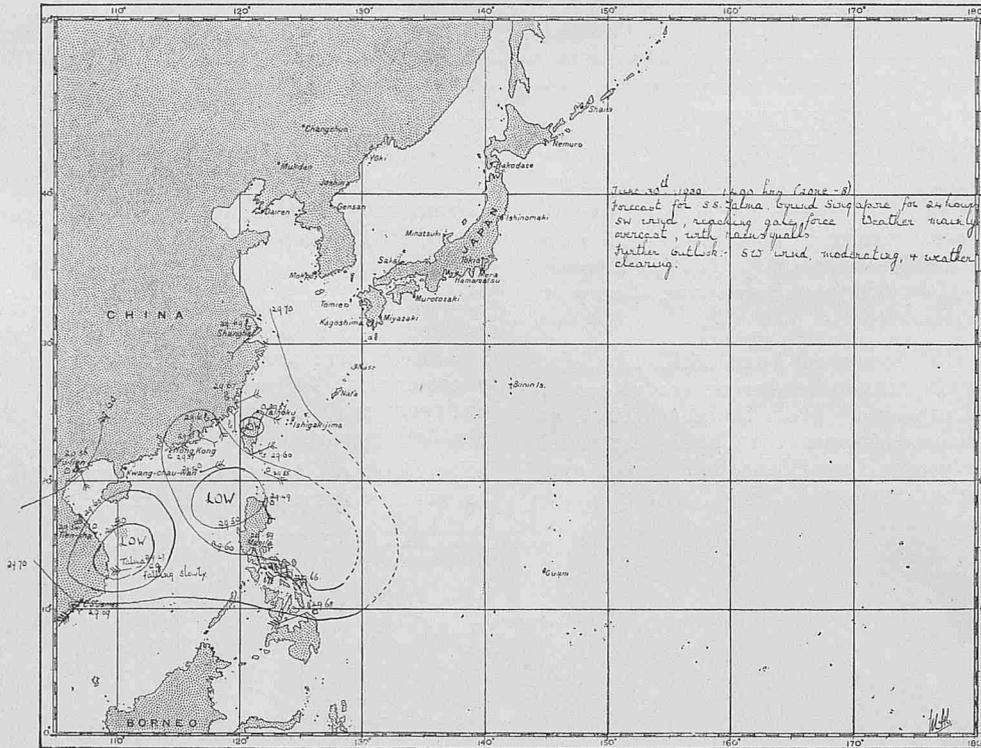
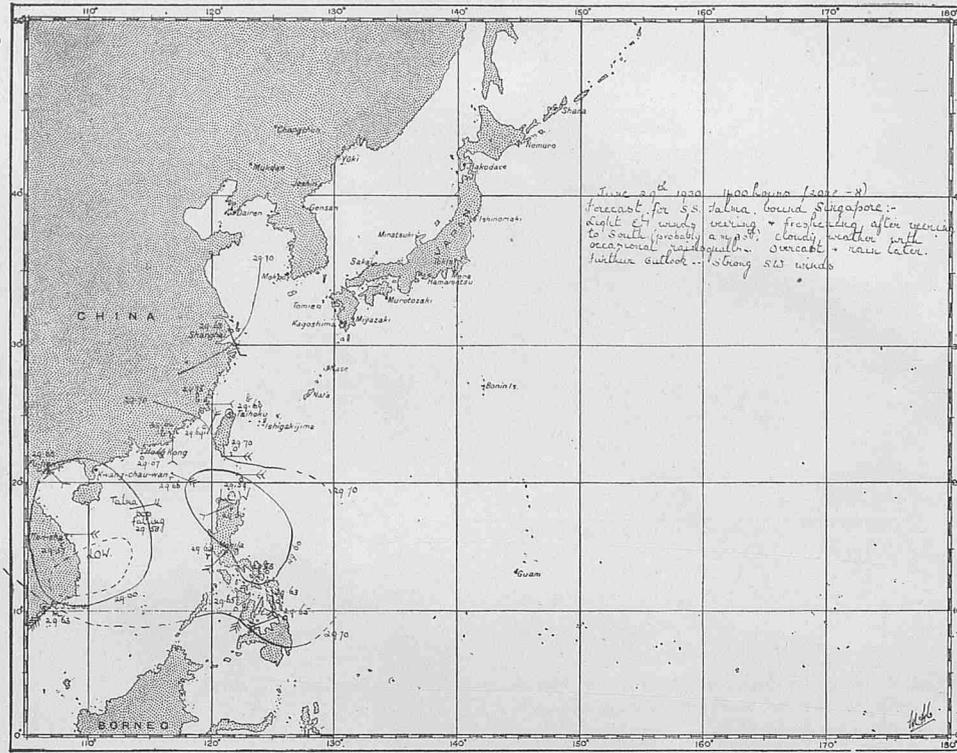
tage of the north and north-west winds on the western side of the depression, would reach Singapore at the required time. Full speed was therefore set on leaving Hong Kong.

From the chart made late on the evening of the 29th, it was seen that the depression had moved slowly westwards, and was probably deepening.

The wind veered at midnight in support of this view, and it was anticipated that the monsoon would be strong in the South China Sea over a large area; so speed was reduced on the 30th by 7 R.P.M. to economical full speed, in order that *Talma* might arrive at Singapore early on the morning of the 4th July, before the morning haze had formed.

The chart of the evening of June 30th confirmed this view, and the weather subsequently experienced was as forecasted.





STRONG CURRENT AND CONFUSED SEA IN THE REGION 100 TO 250 MILES TO THE SOUTH OF SOKOTRA.

The following are extracts from the remarks appearing in Meteorological Logs, and there are many other entries in the columns of the logs, pointing to the fact that in this region, the current frequently runs with great velocity to the E.S.E., and there are frequently confused sea and swell, and current rips within a comparatively small area.

S.S. *Rotenfels*, Captain A. TAYLOR, O.B.E.

Thursday, September 9th, 1920. Fierce monsoon with high confused sea, clear sky at 5.40 a.m., good star observations by two independent observers placed ship in Latitude 9° 29' N., Longitude 54° 17' E. Course to noon West 29°, and N. 71° W. 6'. Noon position by observations, Latitude 9° 04' N., Longitude 53° 58' E. showing set and drift in 6 hours of S. 31° E., 31'.

At 6.40 p.m. position showed by good star obs. of undoubted accuracy Latitude 9° 17' N., Longitude 53° 54' E. Course since noon N. 63° W. (T.) 40' and N. 10° E. (T.) 12', showing set and drift in 6½ hours of S. 61° E. 34'. Vessel having a full cargo of manganese ore and labouring heavily, I decided it was not justifiable to continue steaming across such confused sea, and strong current—vessel was therefore kept away to run north of Socotra Island and the attempt to make the coast was given up. It is worthy of note that the sailing directions caution against crossing the 10th parallel before making West of 53° E.—after an experience of 13 years in the Eastern trade, I consider that the 10th parallel should read 8° 30' N. This is the first time I have had to pass N. of Socotra homeward bound, and I consider the current we were experiencing, after allowing for the fact that such a strong wind and sea was on vessel's port beam, could not have been less than 5½ to 6 knots! It is evident this did not prevail over a large area as, after keeping away to N. 10° E., vessel felt hardly any.

M. V. *Somersetshire*, Captain W. L. FOSTER.

July 31st, 1926, 0.40 p.m. A.T.S., Latitude $8^{\circ} 31' N.$, Longitude $54^{\circ} 58' E.$ Sea and swell suddenly coming from west and curling. 1.00 p.m. Ran into strong whirl of current. Sea pyramidal and running from every point of compass from west through south to S.E. Vessel refused to answer helm. Course N. $80^{\circ} W.$ Ship's head fell off to W.S.W. with helm "hard a'port." 1.05. Vessel answered helm. 1.10. Sea and swell became more regular. During 24 hours 30th/31st current set $042^{\circ} 22.3$ miles and during the ensuing 24 hours 31st/1st current set $112^{\circ} 85$ miles. It appeared as if the disturbance of the sea was caused by the meeting of these currents.

NOTE.—These extracts will be of special interest in connection with the revised recommendations regarding the best track homeward from the East during the S.W. monsoon which were published in last month's MARINE OBSERVER.

CURRENTS.

Mediterranean Sea.

THE following is an extract from the Meteorological Record of S.S. *Coptic*, Captain G. WILLIAMS, Australia to London via Suez. Observer, Mr. R. E. NICHOLSON, 2nd Officer.

One of the chief considerations of the west-bound ship in the Mediterranean Sea is to avoid the usual prevailing easterly set and drift. In ships such as these where speed counts so much and which are more or less constantly on the Australian run, via Suez, it is of great importance that in order to maintain our average, we should endeavour to pick a track where the force of the current is least felt.

On one passage from Port Said to Gibraltar we made the coast of Sicily, coasted up right inshore, stood to the nor'rard and then steered west to Cape de Gata, thence to Gibraltar. A strong contrary current was experienced on the Coast of Sicily—no current from Sicily to Cape de Gata and then again a strong contrary current from de Gata to Gibraltar, despite the fact that the sailing directions state that a westerly set is to be found on the South Spanish Coast.

Another voyage we kept rigidly to sailing directions and from C. Bon to C. Tenez kept approximately 10 miles off the coast of Africa and experienced a strong easterly set the whole way of $1\frac{1}{2}$ to 2 knots.

This last voyage the Commander decided to try coasting from C. Bon along the Coast of Africa but well inshore. This proved highly satisfactory. In some of the larger bights and bays we even steered into them a little and we found mostly strong easterly sets, but only whilst rounding or passing the headland. Hence it is impossible to give any definite direction for the current. We found, however, that the favourable currents were more or less balanced by the contrary currents, and while the extra distance put on was negligible, amounting to only a few miles, the average speed of 15 knots, which is our normal cruising speed, was maintained.

CRUSTACEANS.

North Pacific Ocean.

THE following is an extract from the Meteorological Record of S.S. *Nebraska*, Captain E. A. BRIDGES, London to Los Angeles. Observer, Mr. J. M. PHILLIPS, 4th Officer.

On Sunday, June 22nd, 1930, at 06.00 a.m. A.T.S. passed through dense masses of what afterwards proved to be a species of cray-fish, which were the average size of a prawn and reddish brown in colour. A large number of sea-birds and porpoises, and a number of seals and several turtles were also in the vicinity, apparently feeding on the cray-fish. At 10.30 a.m. A.T.S., the ship was stopped on account of "condenser" trouble, when it was discovered that large numbers of these crustaceans had entered through the "main injection"

and choked the condenser tubes. A thickness of six inches was discovered in the "main injection" completely choking same. The colour of the sea over this expanse was brownish-green:—Temperature 69° . Current experienced in last 24 hours was variable. At 11 a.m. A.T.S. ship proceeded. The sea retained its brownish-green colour until evening. Ship's position—Latitude $23^{\circ} 40' N.$, Longitude $111^{\circ} 30' W.$ to Latitude $24^{\circ} 15' N.$, Longitude $112^{\circ} 10' W.$

FOGBOW.

North Atlantic Ocean.

THE following is an extract from the Meteorological Record of S.S. *Minnetonka*, Captain T. F. GATES, C.B.E., London to New York. Observer, Mr. H. E. D. McCARTNEY, 5th Officer.

June 15th, 1930. Fog set in at approximately 0200 G.M.T. Weather had been misty from sunset. Fog continued more or less dense. At times sky was clear and at other times invisible. Moon became visible at about 15° altitude and a pale fogbow formed. The spectrum was very indefinite, so much so that in trying to define the colours they would reverse their order and disappear. The secondary bow was only twice visible and then it appeared once inside and once outside of the primary for a few seconds. As the moon's altitude increased the bow disappeared and a halo formed of 22° radius, but apparently colourless. At times a corona showed when the fog was densest. All phenomena disappeared as daylight appeared at about 0800 G.M.T. Wind was W'ly., force 1 to 2 throughout, Barometer 1023 mb., Dry bulb and wet bulb both 61° , Sea 60° , Sea slight. Intermittent fog banks occurred of much density till 0334 G.M.T.

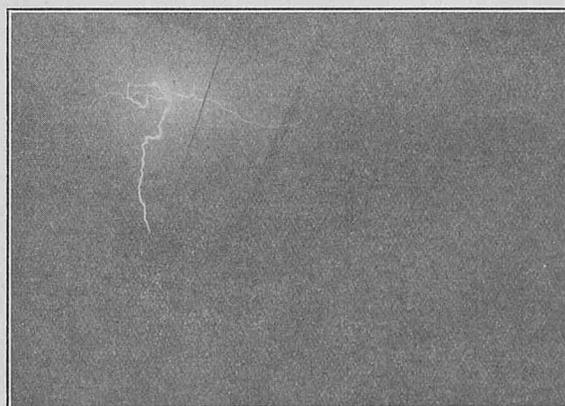
Position of ship, Latitude $41^{\circ} 00' N.$, Longitude $62^{\circ} 00' W.$

PHOTOGRAPH OF LIGHTNING.

Mediterranean Sea.

THE accompanying photograph has been received with the Meteorological Record of S.S. *Matiana*, Captain F. V. GREEN, United Kingdom to British East Africa via Suez. Observer, Mr. L. W. KERTON, 3rd Officer.

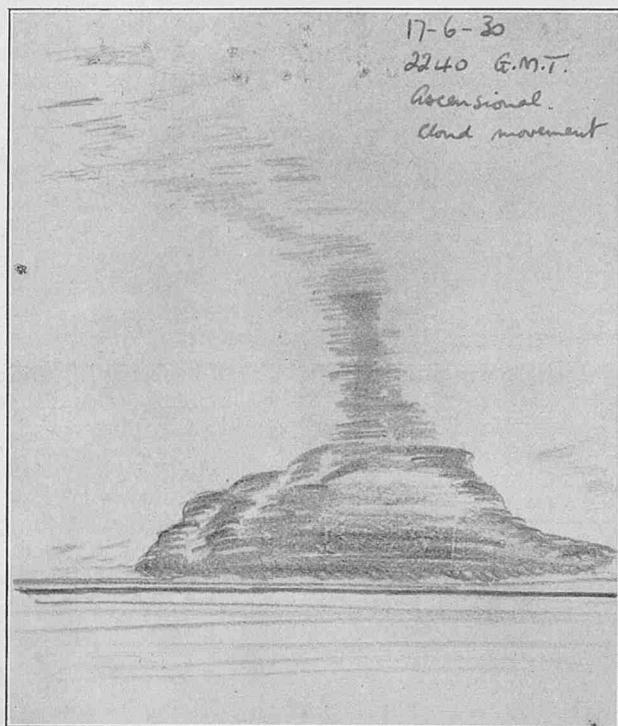
Photograph taken on June 11th, 1930, off Gibraltar. Vivid Lightning and Thunder from 2000 G.M.T., June 11th to 0300 G.M.T., June 12th, 1930.



ASCENSIONAL CLOUD MOVEMENT.

Mediterranean Sea.

THE following is an extract from the Meteorological Record of S.S. *Matiana*, Captain F. V. GREEN, United Kingdom to British East Africa via Suez. Observer, Mr. L. W. KERTON, 3rd Officer.



Thursday, June 17th, 1930, 2240-2250 G.M.T. Noted a marked ascensional movement of single Cu-Nb. cloud slightly on starboard bow. The peak of the cloud rose into a narrow shaft curving away to N.W.ward, dispersing into shreds resembling Ci. after reaching the zenith, while lower cloud spread along horizon to three points on either bow in nimbus form. The whole finally dispersed in very short space of time into wisps and shreds moving from S.E. to N.W. Half an hour later a well-defined line-squall arose from a similar direction, leaving the eastern half of the sky perfectly clear and gradually spreading over the western.

Ship's position, Latitude $35^{\circ} 28' N.$, Longitude $22^{\circ} 16' E.$, Barometer 30.017 in., Air temperature 71° , Sea 71° , Sea calm, with slight confused swell. Light variable airs.

NORTHERN LIGHTS.

North Atlantic.

THE following is an extract from the Meteorological Log of S.S. *Port Victor*, Captain G. S. HALL, Glasgow to New York. Observer, Mr. E. G. JONES, 2nd Officer.

June 20th, 1930, Midnight A.T.S. observed brilliant aurora. This took the characteristic form of an arc about 8° in altitude with the zenith of arc bearing N.N.W. true. This arc was bright enough to obscure all stars except those of the first magnitude. A number of rays were also observed which altered very rapidly in length, giving the sky from arc to the zenith the appearance of light scud. 12.30 a.m. display faded and only resumed its original brightness at intervals, although occasional rays would be very marked. At 12.50 a.m. the moon had attained an altitude of about 10° , but this did not seem to affect strength of light. Dawn gradually caused aurora to become invisible.

Position of ship, Latitude $49^{\circ} 59' N.$, Longitude $44^{\circ} 10' W.$ (D.R.). Weather: Wind west, force 4. Temperature, 45° . Cloudless.

GREEN FLASH AT SUNSET.

Mediterranean Sea.

THE following is an extract from the Meteorological Log of H.M.S. *Endeavour*, Captain J. A. EDGELL, O.B.E., R.N. Observer, Lieutenant M. B. THOMAS, R.N.

June 23rd, 1930, at 1925, green flash appeared as sun's upper limb dipped. Flash appeared to remain for a fraction of a second after sun had dipped. The sky was clear except for a distant layer of stratus cloud just above the setting sun.

Ship's position, Latitude $36^{\circ} 36' N.$, Longitude $12^{\circ} 49' E.$ Sea calm. No wind. Temperature. Sea 72° , Air dry bulb 72° , wet bulb $68^{\circ} F.$

HALO PHENOMENA.

North Indian Ocean.

THE following is an extract from the Meteorological Record of S.S. *Pyrrhus*, Captain T. G. WILKINSON, Jeddah to Singapore.

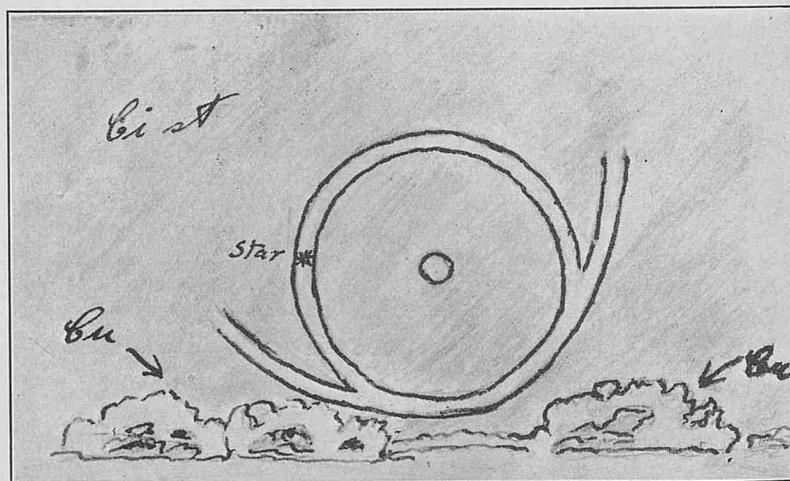
On June 4th, 1930, at 8 p.m., a very well-defined double halo was observed round the moon, the outer ring having a radius of $22\frac{1}{2}^{\circ}$ and the inner one 11° . A further arc was observed in contact with outer ring at the zenith, with its concave edge nearer the moon. This arc disappeared by 8.15 p.m. and the inner ring by 8.35 p.m. The $22\frac{1}{2}^{\circ}$ halo remained visible till midnight. The sky at the time was covered by a very thin Cirrus haze with patches and bands of a slightly denser nature. The moon's altitude at 8.15 p.m. was 68° and bearing West. All these rings appeared white. Ship's position at 8 p.m., Latitude $5^{\circ} 56' N.$, Longitude $83^{\circ} 58' E.$ Barometer 29.76 in. Wind S.W., force 5.

On June the 5th at 11 a.m. there was a clear 22° halo round the sun showing all the colours of the spectrum; with an arc, in length about 15° , of a 46° radius halo, also showing the colours of the spectrum very clearly. The diameters of the spectra were respectively 1° and $2\frac{1}{2}^{\circ}$. All conditions were similar to the night of June 4th.

LUNAR HALO.

North Atlantic.

THE following is an extract from the Meteorological Record of S.S. *Clan Kenneth*, Captain A. H. YOUNG, New York to Montevideo. Observer, Mr. H. C. CARTER, 3rd Officer.



The attached sketch represents a Lunar Halo observed on June 10th, 1930, at 10.55 p.m. A.T.S. (0248 G.M.T. of June 11th). The halo was observed immediately after a heavy rain shower had passed from a southerly direction. Radius of halo, $22\frac{1}{2}^{\circ}$, correctly measured with the aid of a star situated in the halo. Moon's altitude $37^{\circ} 20'$, true bearing, S. $15^{\circ} E.$ The horns shown in the sketch were as bright as the actual halo, but disappeared after three minutes, leaving a perfect white halo which retained its form and brilliancy for 15 minutes and then slowly became fainter and finally disappeared altogether. Ship's position Latitude $23^{\circ} 42' N.$, Longitude $57^{\circ} 51' W.$ Cloud Ci.St. Nb/Cu. Wind S., force 5. Barometer 30.22 in.

SOLAR HALO.

North Indian Ocean.

THE following is an extract from the Meteorological Log of S.S. *Tantalus*, Captain R. DODDS, Penang to Colombo. Observer, Mr. F. C. OPPEN.

On June 26th, 1930, 10.57 a.m. at ship, very brilliant and distinct arc of halo visible to northward, clouds in vicinity Ci-St. changing to Ci-Cu. Radius (sun to centre of arc of halo) $47^{\circ} 12'$, length of arc $18^{\circ} 20'$, altitude of sun $67^{\circ} 32'$; colours from centre, red, yellow, green, blue. The colours were as bright and clear as in any average rainbow. As clouds became Ci-Cu, it slowly faded till 11.04, when no sign was visible.

Remainder of sky: Ci-St/Ci-Cu 7/10, Cu.Nb. less than 1/10 (over south horizon only). Temperature: dry bulb $84^{\circ}.8$, wet bulb $78^{\circ}.0$, visibility exceptional.

Ship's position: Latitude $5^{\circ} 49' N.$, Longitude $96^{\circ} 52' E.$

NOTE.—This large halo is of much rarer occurrence than the common one of about 22° radius, and even when visible it is unusual for the colours to be so brightly visible.

METEOR.

South Atlantic.

THE following is an extract from the Meteorological Log of S.S. *Cumberland*, Captain D. MACMILLAN, Dakar to Fremantle. Observer, Mr. F. R. F. WILSON, 4th Officer.

June 18th, 1930, at 0430 G.M.T., observed three remarkable meteors following each other in rapid succession. Their track in the heavens was from about 4° W.N.W. of the constellation of Aquila between the stars α Herculis and β Ophiuchi near to α Serpentis, where they burst with a brilliant orange light. Each meteor left a trail of red which gradually became more brilliant until immediately before it burst.

Position of ship: Latitude $20^{\circ} 31' S.$, Longitude $5^{\circ} 51' E.$ Course 143° , speed 12 knots.

NOTE.—The similarity in track and appearance of these fireballs indicates that they formed a group of three small objects which were travelling together in space and which entered the earth's atmosphere at approximately the same time.

HINTS TO YOUNG OFFICERS ON THE USE OF WIRELESS WEATHER REPORTS.

II—State of the Monsoon.

If you have not yet read the hints we gave in the February number it will be well to do so right away, and when you have done so if you will also refer to "The Best Track from Colombo and the East to the Straits of Bab-el-Mandeb during the South West Monsoon," in the May number you will see that the tracks recommended are for average conditions and that the selection of the best route for the particular time and ship are matters for the master's judgment.

The information given is of mean wind and current for June to September only. Some years the S.W. Monsoon may commence and end earlier or later than others. Cyclones may occur at the change of the Monsoons and the S.W. Monsoon is always subject to variations.

The prevailing conditions at any time may be ascertained by any ship fitted with W/T by intercepting the reports of "Selected Ships" and making a simple weather chart such as the Board of Trade now requires candidates for a certificate as master to be able to make.

Here is where a young officer in a ship bound to the Westward in the vicinity of Achin Head, Colombo, or in fact anywhere in the Indian Ocean north of the equator at the time of the change of the Monsoons or during the S.W. Monsoon season can make himself particularly useful to his commander, and in doing so also improve his own knowledge and value as a navigator.

The scheme of communication for British "Selected Ships" was commenced on May 1st, 1930; the organization of the full complement of British "Selected Ships" was only completed on November 26th, 1930, but nevertheless by the time the S.W. Monsoon had set in in the Arabian sea last year, there was a much improved service of Routine Wireless Weather reports. This year it will be better still and when the Dominion, Colonial, and Foreign Meteorological services have each organized their complement of "Selected Ships" from those registered in their respective countries there will be an ample service. Then it is to be hoped a station will be detailed to regulate long range reporting in much the same way as is now done in the Eastern North Atlantic through Portishead.

Meanwhile a far better service is being maintained by British "Selected Ships" than is generally realised, and for our particular purpose the reports made at 0618 repeated where necessary at 0818 G.M.T. in the Zones Longitude 30° to 80° E. and Longitude 80° to

160° E. giving 0600 G.M.T. observations by "A Selected Ships" on 2,100 metres wave-length to C.Q. are the most desirable, for they can be received at distances up to 1,500 miles and in favourable conditions 1,800 miles. Thus a ship near the Longitude of Colombo with good receivers may receive reports from as far West as the vicinity of Cape Guardafui to as far East as the Straits of Sumatra.

With so many "Selected Ships" reporting it is desirable that these reports should be as short as they can be made without loss of necessary information. Generally in the regions of the Trade winds and Monsoons, unless there be cyclones forming, all the essential information can be given in the first four or Universal Groups of the International Ships' Wireless Weather Telegraphy Code, and the current in standard form; so "Selected Ships" when not addressing their reports to some particular Meteorological Service but to "all ships" have been advised to do this. Here is an example:—

CQ Weather 63123 59006 22603 02784. Current from 11 N. 62 E. to 12 N. 59 E. E.N.E. 1. Margha, which being decoded means:—

Friday, Latitude $12^{\circ} 18' N.$, Longitude $59^{\circ} 00' E.$ 0600 G.M.T. Wind W.S.W. true, force 6, overcast; barometer 29.59 ins.; visibility good; air temperature 84° ; current was found to have set the ship E.N.E. 1 knot between Latitude $11^{\circ} N.$, Longitude 62° E., and Latitude $12^{\circ} N.$, Longitude 59° E. *Margha*.

This was on June 20th, 1930, and *Margha* made her report on 2,100 metres C.W. at 0618 G.M.T. and repeated at 0821 G.M.T. for the convenience of one-operator ships. Here was information which by itself, coming as it does from near the region of the strongest part of the S.W. monsoon and not very far from **Route I**, was valuable to homeward bounders especially. Let us see how much can be made of reports from all "Selected Ships" north of the Equator in the Indian Ocean, Arabian Sea, and Bay of Bengal.

Let us go back to a date when the S.W. monsoon is not likely to be established, but which is near the probable time of the change of the monsoons.

Taking the necessary weather observations actually reported by "Selected Ships" and where they may not have included current, the set and drift logged which could have been reported, in just the

same way as we did on CHART I AND II, we plot the observations for position, wind, barometer and weather and draw the isobars. The current is plotted with arrows at mid-position, the arrow being identified by the initial letter of the observing ship's name and indicates set, while the velocity is indicated by the figure at the head of the arrow in *knots*. Miles should not be used, for if this is done the reports are unduly lengthened because in that case the time interval is required. Remember a knot is not a mile but a unit of speed, and a mile is a unit of distance. The actual drift in miles with the time as well as position *from* and *to* should be logged. In ocean current charts the drift for 24 hours is given; but in reporting the current by W/T it is far more convenient to all concerned if the velocity is given in knots.

An officer on board a ship in the position of *Kashgar*, Captain SUDELL, Colombo to Suez on May 22nd, 1930, with the reports actually made by W/T by "Selected Ships," could make CHART IV.

Kashgar is a steamer of 9,005 tons gross, with a speed of 14½ knots, according to Lloyds Register. She was near the longitude of Cape Comorin and on the route via the Eight Degree Channel. The revised recommendations of routes in S.W. monsoon had not then been made.

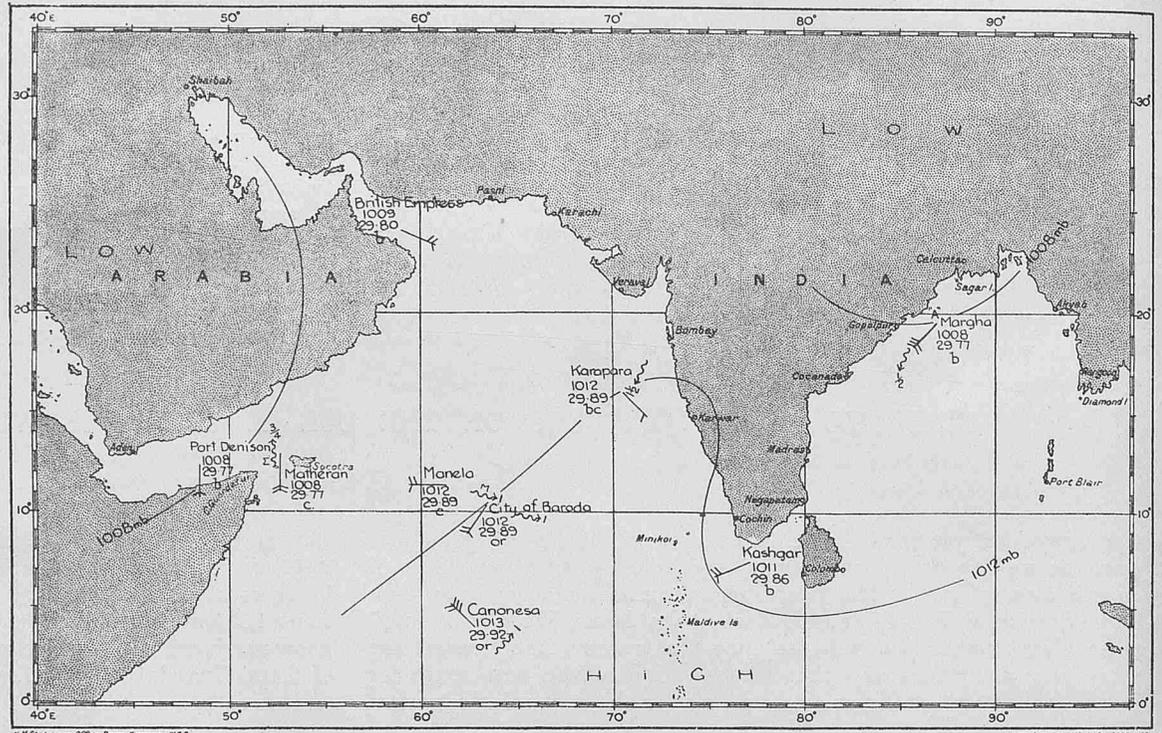
This chart shows that atmospheric pressure is above the normal when compared with the Indian Seas Meteorological Chart, even over the Arabian sea, that is the barometric gradient is slight. The wind is generally gentle in the vicinity of **Route I** from the Southward and Westward, but near *Canonesa's* position in the vicinity of **Route V** it is fresh from N.W. Over Arabia the barometer is shown to be comparatively low, indicating that the S.W. monsoon may be expected in the near future. With such a report the master of a ship would be justified in taking the usual N.E. monsoon route, for if the S.W. monsoon sets in strong, as it may, he can keep away when near the 60th meridian and pass to the Northward of Socotra. There is nothing to be gained in taking a southerly route in such conditions, for though he may have to stem the currents reported on or near **Route I**, he is likely to get less head wind than to the southward where the S.W. monsoon is probably advancing northward.

Next day CHART V indicates the advance of the S.W. monsoon to the vicinity of Cape Guardafui and a strong Westerly breeze in the vicinity of **Route V**. These two charts when compared with the quarterly current charts indicate that the current is changing from that of the N.E. monsoon to that of the S.W. monsoon season, regarding which you are referred to Mr. BARLOW's serial articles on Indian Ocean currents and the quarterly current charts in Volume VII.

Here is another example during the season when the S.W. Monsoon is generally prevailing.

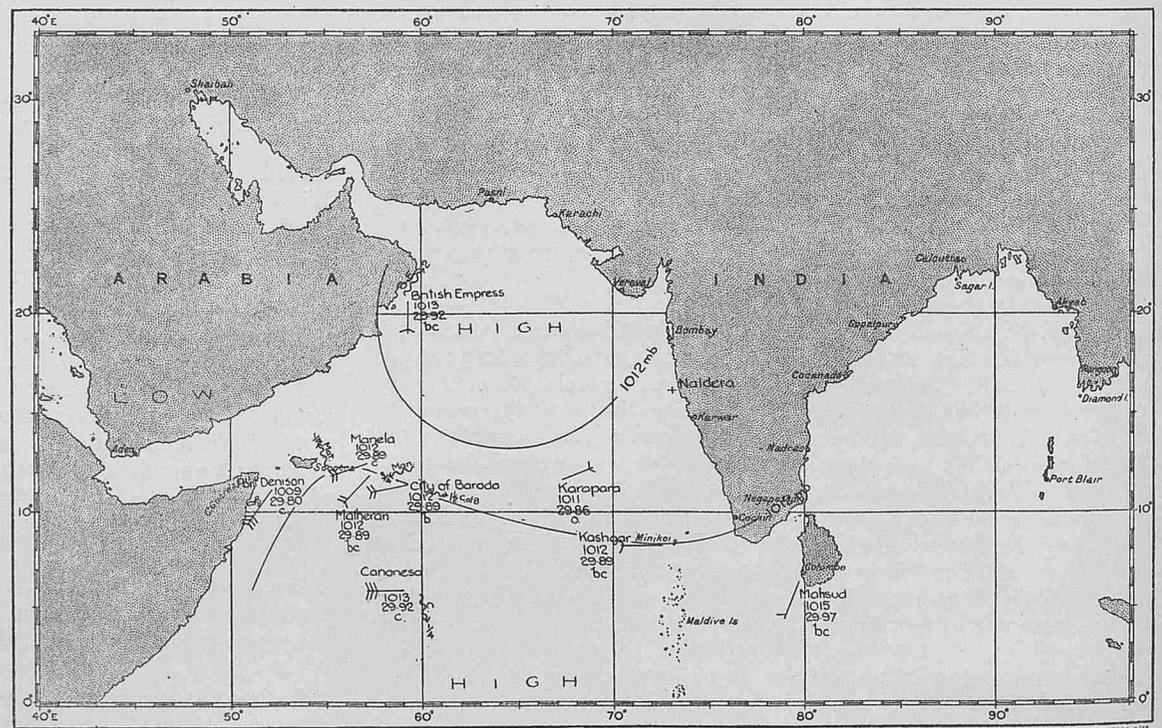
Mahsud, Captain R. W. KERSHAW, a steamer of 7,559 tons gross and 12 knots, according to Lloyds Register and in our broad classification of types of ships for the purpose of recommending routes, a slow ship, was steaming down the Bay of Bengal against the S.W. Monsoon, off the N.E. coast of Ceylon on June 19th, 1930, bound from Calcutta to London via Colombo and Suez.

Thursday.
0600 G.M.T., May 22nd, 1930.



Weather Chart No. IV.

Friday.
0600 G.M.T., May 23rd, 1930.



Weather Chart No. V.

In such a position, if the reports were received, an officer would be able to make CHART VI and so be able to provide his commander with the following information.

But first a word about the reception of routine reports. Officers and W/T operators of "Selected Ships" are doing splendid service in observing and compiling the reports and sending them, but more attention is necessary to their reception and use.

This work is being done by "Selected Ships" in accordance with Article 35 of the Convention of Safety of Life at Sea; it is voluntary, and the best way that the whole Merchant Navy can show their appreciation of the work of the Commanders, Officers, and W/T operators of "Selected Ships," is to listen in at the right times and upon the right wave lengths and use the information which is made for their benefit, to aid them in the safe and economical navigation of their ships.

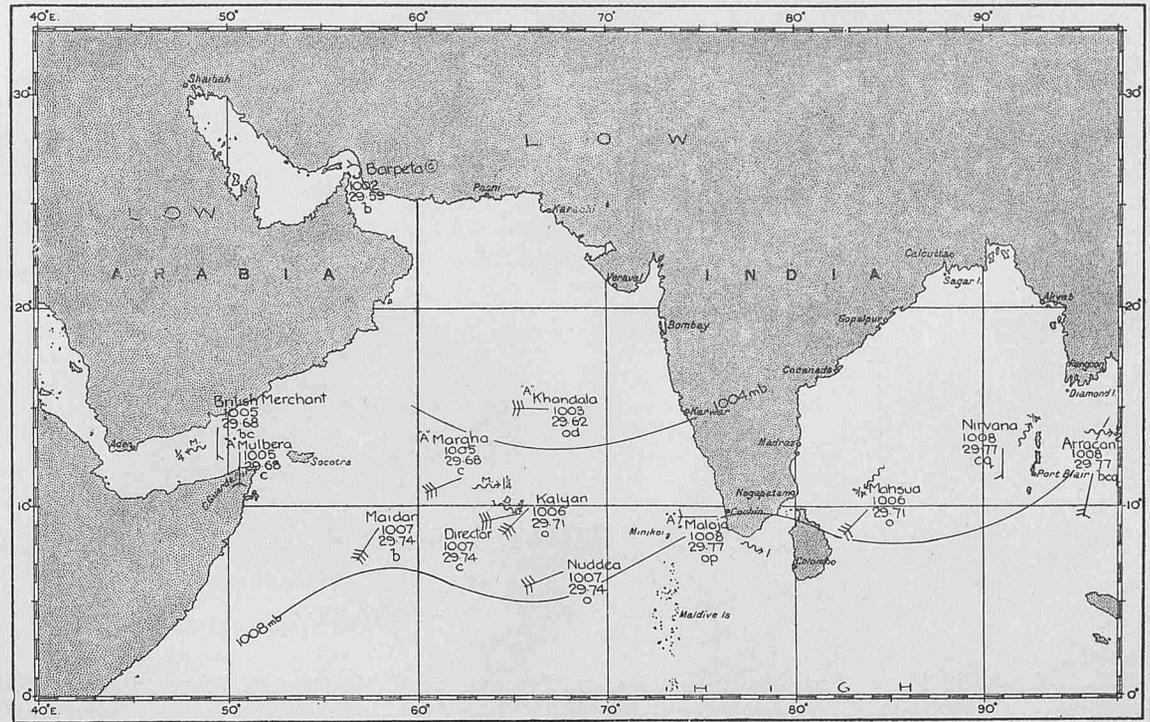
The Corps of Voluntary Marine Observers know more about this work generally than others. It is only a matter of making it generally known, and therefore Marine Observers can themselves increase the value of their work by bringing these things to the notice of their brother officers in ships which are not on the observing fleet list, and who may not receive THE MARINE OBSERVER. The pamphlet M.O. 329, DECODE FOR SHIPS INTERNATIONAL WIRELESS WEATHER REPORTS has been supplied by the owners to a great many ships so that most now are able to understand the reports.

Mahsud could and probably did receive these reports from most of the "A Selected Ships" indicated on CHART VI, and she no doubt received the reports from those "B Selected Ships" which, according to this chart, were nearest to her.

In making CHART VI reports sent by all "Selected Ships" in the regions charted have been used. It indicates that the S.W. monsoon wind and current are thoroughly established and that the monsoon is strong in the vicinity of **Routes I, II and III**, between the meridians of 60° and 70° East Longitude where on the average it is moderate in the month of June, and that the Easterly current in this vicinity is above the average.

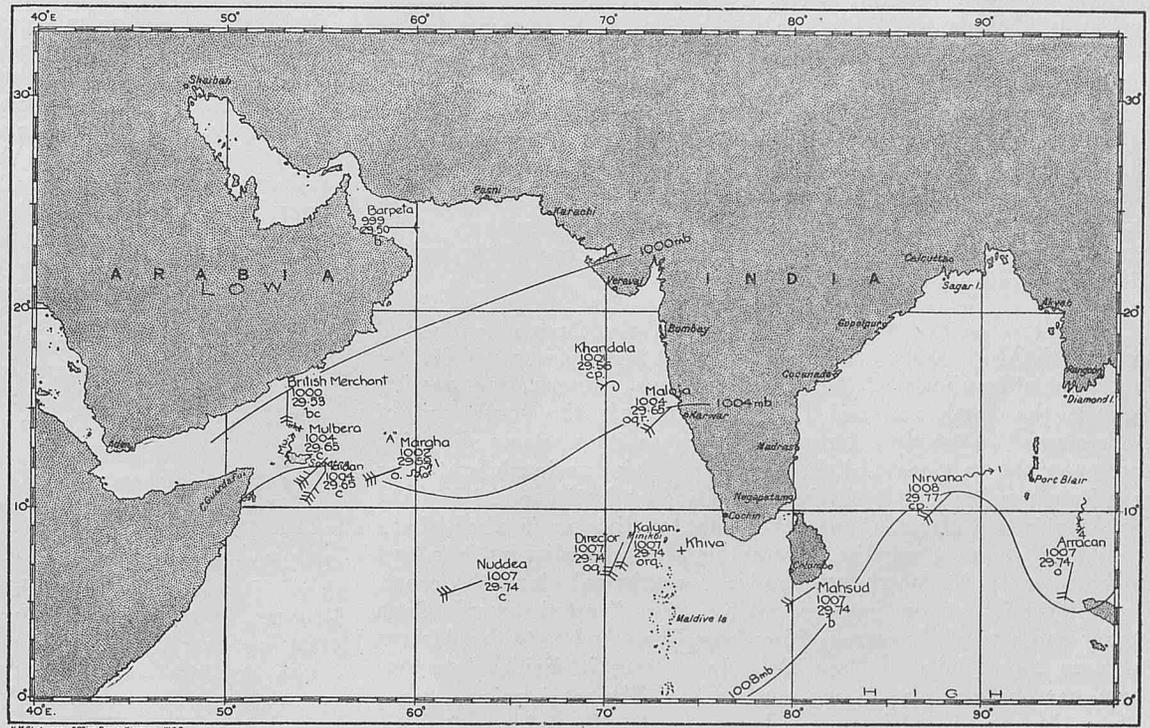
A commander receiving such a report from his observing officer based as it is upon such good information, first hand from British "Selected Ships" would no doubt decide that provided next day

Thursday.
0600 G.M.T., June 19th, 1930.



Weather Chart No. VI.

Friday.
0600 G.M.T., June 20th, 1930.



Weather Chart No. VII.

there was nothing to indicate an unusually strong monsoon to the S.W. of Colombo, he would use **Route IV or Route Va**. On Friday, June 20th, 1930, CHART VII indicates the conditions and they warrant the selection of **Route IV** provided that sailing time from Colombo can be fixed to make the entrance of the Kardiva Channel between sunrise and noon.

Comparison by means of weather chart day by day as the ship advances along her chosen route will indicate advantages she is gaining.

During the coming S.W. monsoon season, we hope that all young officers will do their utmost to assist their commanders in this matter of information of Wind and Current prevailing, and we shall be glad to receive with their Logs and forms the remarks of each commander of an observing ship engaged in running from the east, appending samples of his observing officer's charts and work, with a view to publishing the best of these in THE MARINE OBSERVER.

By making a weather chart each day in the regions of the trades and monsoon such as these, officers may be able to provide their

commanders with information which will enable them to take fuller advantages of time and fuel in steaming. The use of intelligence derived from Wireless Weather Reports goes far beyond the question of bad weather caused by cyclonic depressions; therefore the regular service of "Selected Ships" for the benefit of all shipping is necessary, not only in the regions and seasons of revolving storms and in Middle and High Latitudes where bad weather is frequent, but also to aid economical and safe navigation in all Latitudes and in all seasons.

CURRENTS IN THE WESTERN PORTION OF THE INDIAN OCEAN.

I—Introduction.

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

THE present article is the first of a series of three, dealing with the currents of the western Indian Ocean from the African coast to Longitude 56° E., and extending southwards as far as Latitude 38° S. The charts being published in the present volume of THE MARINE OBSERVER directly connect, north of the equator, with the western portion of those published in the 1930 volume. The currents in the area now under review are interesting and complex, and for this reason it seems desirable to start with a clear summary of the knowledge hitherto gained about these currents, derived from the various Sailing Directions and the older current charts and investigations. In the two subsequent articles the information derived from the new MARINE OBSERVER charts will be examined. This may or may not confirm all the statements set out in the present summary. The results of special investigations of current in portions of the region will also be given.

The western part of the warm South Equatorial Current is directed towards the east coast of the great island of Madagascar. It divides in the neighbourhood of Mauritius into two streams, one passing towards the north end and the other towards the south end of Madagascar. A portion, however, continues its westerly direction and meets the east coast of the island at a point variously stated as near Tamatave (about Latitude 18° S.) and at Latitude 22° S. On the Admiralty Current Charts the point of division is about Latitude 20° S. in most months. Here this part also divides into two currents, one going northward, and one southward along the coast. The north-going stream joins the main stream directed towards Cape Amber and a westerly current flows from Cape Amber to the African Coast in the vicinity of Cape Delgado. Here it divides into two parts, one north-going and one south-going. The south-going current follows the coast of Africa and is known as the Mozambique Current and further south as the Agulhas Current and reaches the neighbourhood of Cape Town. The north-going current extends to Cape Guardafui as the East African Coast Current during the S.W. Monsoon months, but is not a continuous current so far north during the N.E. Monsoon months. The south-going division of current on the east coast of Madagascar flows to the southern end of the island where it meets the main stream directed towards Cape St. Mary round which the combined current passes. Inclining to the south-west in the open ocean it joins the Agulhas Current to the northward of Durban.

These major currents together with the currents of the Mozambique Channel will now be referred to in greater detail.

The Agulhas Current.—This name is usually applied to the great south-going coastal current from the point where it is met by the current which has set south-westwards round the southern end of Madagascar. This point is in about Latitude 28° S. to 30° S. The name, however, is sometimes applied as far north as Cape Corrientes. The warm Agulhas Current follows the trend of the coast and thus flows in a south-westerly direction as far as Algoa Bay. From Algoa Bay to the Cape the coast trends westerly. The 100-fathom line, which lies close to the coast north of East London, gradually extends seaward in a W.S.W. direction from the neighbourhood of Algoa Bay, forming the well-known Agulhas Bank, the most southerly point of which is in Latitude $36^{\circ} 45'$ S., Longitude $20^{\circ} 45'$ E. approximately. The Agulhas Current does not follow the coast beyond East London, its main body keeping to the edge of the Agulhas Bank, as far as about Longitude 22° E. Here it trends to the S. and S.E., reaching the parallel of 40° S. and gradually recurving into the great Southern Ocean drift. The currents on the Bank are usually weak and variable, but a portion of the Agulhas Current proceeds round the western edge of the Bank and to a slight extent across its southern part, thus connecting with the Benguela Current of the South Atlantic Ocean.

The following extract is taken from FINDLAY'S "Indian Ocean and Bay of Bengal Directory," 4th edition, 1882:—"The Agulhas Current is one of the most remarkable in the world; and, after the Gulf Stream, was the first that attracted investigation by scientific data. It was owing to the hint given by Captain WAGHORN to Major RENNELL, in 1764, that this first enquiry took place. Major RENNELL'S essay appeared in the year 1777, and was the precursor of those useful treatises on ocean currents, which have proved of such service to navigation, and which in their main features have not since been contradicted." Major RENNELL published a more extended work in 1832 in which the currents of the Atlantic Ocean were also included and long extracts from this later publication, referring to the Agulhas Current, are given by FINDLAY. From 1855 onwards, the Royal Meteorological Institute of the Netherlands issued a serial publication entitled "Results of Science and Experience as regards Winds and Currents in some parts of the Ocean." This included a number of papers on the Agulhas Current and the sea temperatures and general meteorology of the region. In 1882 Captain TOYNBEE, at that time Marine Superintendent of the Marine Department of the Meteorological Office, published the "Meteorological Charts for the Ocean District adjacent to the Cape of Good Hope" with accompanying Remarks, the result of five years' work by the Marine Department.

The meeting of the warm water of the Agulhas Current with the cold water brought from the west and south-west by the Southern Ocean General Drift produces south of the Agulhas Bank a region of irregular currents, confused sea and marked changes in the sea temperature and the colour of the water. Gales, storms and thick weather are frequently experienced in this region. TOYNBEE showed that the extent and position of the meeting point of these currents varies with their relative strength and with the time of year.

The Agulhas Current attains its greatest average speed between Durban and East London where rates varying from $\frac{3}{4}$ to $4\frac{1}{2}$ knots are experienced, the greatest rate being near the 100-fathom line. The width of the current off the coast of Natal is about 100 miles. It is said not to vary greatly in strength, direction or extent during the year. From the current observations at his disposal TOYNBEE deduced that the mean speed was greater in the hot month of February, 51 miles per day, and least in the cold month of July, 46 miles per day, but maximum drifts of 108 miles were found in both months. These results were derived from 89 and 100 observations respectively. The Agulhas Current is said to be checked at times by westerly gales and to flow with increased strength afterwards; it usually attains great strength in the teeth of the gale, causing a high, dangerous sea especially off the south eastern edge of the Agulhas Bank.

Counter Currents between the Agulhas Current and the Coast.—

There is no evidence of a counter-current flowing continuously up the coast inside the 100-fathom line in opposition to the Agulhas Current but such counter-currents are undoubtedly experienced locally at times. The northern inner edge of the Agulhas Current at the edge of the Agulhas Bank has a tendency to set towards the land to the westward of Algoa Bay, particularly after S.E., W. or N.W. gales. Near the coast between Capes Hanglip and Agulhas the current sometimes sets towards the land in an E.S.E. direction at the rate of 1 knot or more. Between Cape Agulhas and Kowie River, eastward of Algoa Bay, an easterly inshore current of similar strength is frequently experienced in fine weather, extending perhaps from one to six miles from the shore. A number of counter-currents and inshore sets are shown on the Agulhas Bank in TOYNBEE'S charts but they are mainly at some distance from the coast. Occasionally, but not frequently, there is an easterly current in the neighbourhood of Great Fish River. South of Durban at Aliwal Shoal a counter-current setting to N.E. may be experienced close inshore, though currents within two miles of the shore are usually weak in this region. Over the greater part of the Shoal a weak south-westerly current is usually felt. Between Durban and Port Shepstone there is usually slack water near the coast, the Agulhas Current being deflected seaward at Durban, meeting the coast again at Port Shepstone but these conditions are subject to variation and the Agulhas Current has been known to run at 3 to 4 knots within less than a mile of the coast in this locality.

Mozambique Current.—This strong current flows throughout the year, but is weaker during the period of the N.E. Monsoon. The average speed is from $1\frac{1}{2}$ to 3 knots during the N.E. Monsoon, but a rate of over 4 knots has been observed. During the rest of the year the average speed is from 1 to 2 knots, but during the height of the S.E. Trade Wind the actual rate may be still smaller. Off Mozambique the current has been known to set south-eastward at the rate of 4 knots, while 60 miles to the southward the current is setting north-westward at the rate of 1 to $2\frac{1}{2}$ knots. Occasionally it has almost ceased to run locally and reverse sets have even been experienced. At Cape Corrientes the rate is very steady at about 2 knots, but off Zavora Point it is weaker, the main current flowing further seaward owing to the trend of the coast.

The Mozambique Current is stronger at from 60 to 80 miles from the shore, although varying somewhat in volume. It is stated that the tide considerably affects the currents to the southward of Cape Delgado, up to a distance of about 10 miles from the shore, particularly in the vicinity of Mozambique. The stream of the rising tide sets with the current and may sometimes double its speed; the stream of the falling tide weakens and may sometimes entirely check the current.

Counter-Currents between the Mozambique Current and the Coast.

—As in the case of the Agulhas Current no continuous counter-current runs close inshore, but counter-currents or sets on to the land are experienced in places. Counter-currents and sets to and away from the land may be found in various parts of Delagoa Bay during the year on the Admiralty Current Charts. In the Bight of Sofala there is often a counter-current setting north-eastward and extending a considerable distance offshore. According to the Admiralty Charts it is most prevalent between Latitude 21° S. and 17° S., but it is said to be experienced nearly as far south as Cape Corrientes. Off Sofala in the height of the S.E. Trade Wind in May this counter-current has been known to attain a speed of $1\frac{1}{2}$ knots. From Zavora Point to Ponta da Burra the currents within a few miles of the shore appear to be much affected by wind and may set either northward or southward. From Cape Burra Falsa to Cape San Sebastian a counter-current is also sometimes experienced.

The East African Coast Current.—The point at which the Equatorial Current divides in the neighbourhood of Cape Delgado into the East African Coast Current and the Mozambique Current varies somewhat during the year, but the average position is about the latitude of the Cape ($10^{\circ} 41'$ S.). During the months of April to July it is furthest south, sometimes as far as Latitude $11^{\circ} 30'$ S. During the S.W. Monsoon the East African Coast Current follows the coast as a continuous current from Cape Delgado to Cape Guardafui at the rate of $1\frac{1}{2}$ to 4 knots. It has been observed that the current is weakest between Pemba and Formosa Bay gradually increasing with north latitude until it reaches a maximum between Brava and Warsheik, decreasing again towards Negro Bay and Ras Hafun. Between Brava and Warsheik speeds exceeding 5 knots have been observed. Currents of about 4 knots have also been observed on the equator near the coast and near Ras Hafun and Guardafui at the height of the monsoon. In the latitude of Zanzibar the current is about 100 miles in width, but further north in the region of the equator it may extend with greatly diminished strength up to about 300 miles from the land.

During the N.E. Monsoon the East African Coast Current does not form a continuous stream. It flows northward to between Lamu and Castle Point in from Latitude $1\frac{1}{2}^{\circ}$ S. to $2\frac{1}{2}^{\circ}$ S., where it meets the south-westerly set from the Arabian Sea, the two producing an offset from the land. Further from the coast the current from the Arabian Sea becomes southerly and south-easterly, passing into the Equatorial Counter-Current. The point of meeting probably varies appreciably with the month and with the strength of the N.E. Monsoon, and a southerly set has been experienced near the coast considerably to the south of Lamu. The south-westerly current does not reach Mogadishu (Latitude 2° N.) till about the second week in December and on the coast generally is stated not to continue for more than three months. The East African Coast Current has been experienced strongly up to the first week in December as far as Latitude 4° N. This current is weaker throughout the N.E. Monsoon, flowing at 1 knot or a little more on the average.

Current between the East African Coast Current and the African coast.

—No continuous counter-current flows inside the East African Coast Current, the currents observed being largely influenced by the tides and the contours of the coastline, as for example, in the Zanzibar Channel. Off Malindi (Latitude $3^{\circ} 13'$ S.), however, within the 100-fathom line a nearly constant southward current of $\frac{3}{4}$ knot has been experienced during November and December, the north-going current flowing as usual outside this line. An onshore set of 2 knots between Brava and Merka was observed by H.M.S. *Diamond* in December, 1876. The East African Coast Current itself may set somewhat towards the land; this has been frequently experienced between Kiswere and Kilwa, about Latitude 9° S., and also in the month of August off Mogadishu.

Currents of the Mozambique Channel.—A portion of the westerly current passing the southern end of Madagascar turns up the western coast of the island forming the Madagascar Current which flows at the rate of rather less than 1 knot and becomes weaker in its progress up the coast. It is fairly constant between May and August when the S.E. Trade Wind is blowing. At other times it is very variable and in the height of the opposite season, in November, neither set nor drift can be depended on to remain the same for two consecutive days. Southerly sets up to $1\frac{1}{2}$ knots have been

experienced on the western coast of Madagascar. The Madagascar Current sends off branches westward all along its course; these are gradually deflected and pass into the south-going Mozambique Current near the African Coast. A portion of the Madagascar Current however survives to reach Cape Amber. Between May and August a current apparently sets N.W. from the extreme south of Madagascar past Europa Island, extending as far westward as Longitude 40° E. It subsequently turns northward, but cannot be depended on. In the central part of the Mozambique Channel south of Latitude 18° S., a weak northerly current is frequently observed outside the strong Mozambique Current, but southerly sets are sometimes experienced in this region. The current of the Mozambique Channel may therefore be described as complex and uncertain, with the exception of the Mozambique Current on its western side.

The Equatorial Current, Cape Amber.—The current flowing up the east coast of Madagascar towards Cape Amber is steady during the months of the S.E. Trade Wind (May-October) and may then reach a speed of 3 knots. It is augmented by branches of the main Equatorial Current from the ocean to the south-east. At the cape it is joined by the Equatorial Current and the combined current passes round the cape westward towards the Comoro Islands. The rate of current here varies from $\frac{3}{4}$ to 3 knots, averaging about 2 knots. The Madagascar Current flowing northward to Cape Amber up the west coast of the island is weak and affected by tidal influences so that there are sometimes southerly sets on this coast. On the average, however, the Madagascar Current joins the westward flow past Cape Amber. Off this cape the width of the Equatorial Current is about 50 miles, but it is probably wider in the longitude of the Comoro Islands where the full force of the current is felt between Latitudes 10° S. and 12° S. The current here usually flows at from 1 to $1\frac{1}{2}$ knots, though it has been observed to attain nearly 3 knots in May. Further south, as for example in the vicinity of Mayotta Island, the current is weaker and more variable but inclines somewhat to the south-west. South of the Comoro Islands a counter-current frequently sets eastward.

Between the Comoro Islands and the outer edge of the Mozambique Current, and thence southward until past the narrow part of the Mozambique Channel (in about Latitude 16° S.) the set and drift are very variable. Current may flow 3 knots in one direction for a day and with equal speed in another direction next day.

North of the Equatorial Current in the longitude of the Comoro Islands, i.e. north of Latitude 10° S., a counter-current is stated to

flow north-eastward at times. There are also indications of a north to north-east set, north of the Equatorial Current, on a line from Cape Amber to the Farquhar Islands and the Seychelles, chiefly in the months of March and April.

The Equatorial Current, Cape St. Mary.—The south-going branch of the current on the east coast of Madagascar flows steadily at all seasons down the coast with speeds of from about $\frac{1}{2}$ to 2 knots, the higher speeds being usually met in more southerly latitudes. At the S.E. point of the island this current meets the main stream of the southern branch of the Equatorial Current from the neighbourhood of Mauritius. The combined current may reach a speed of $2\frac{1}{2}$ knots at 10 or 15 miles from the coast, but close inshore it is weak. The combined current flows westward along the southern coast of Madagascar at somewhat less speed and easterly reverse sets are occasionally experienced. It extends nearly 500 miles south of Madagascar from October to April, but is narrower during the rest of the year. The average speed is about $1\frac{1}{2}$ knots. After passing Cape St. Mary a portion of the current turns north-westward, as already stated, to form the Madagascar Current. The main part proceeds across the ocean to join the Agulhas Current near Durban. A considerable portion, however, is said to break off and set to the S.W. and then to S., during the crossing from Madagascar to South Africa. This water eventually passes into the east-going water of the Southern Ocean General Drift.

The Counter-Equatorial Current.—It has been stated that the East African Coast Current does not extend quite so far north as the Equator during the months of the N.E. Monsoon. Meeting the southerly set from the Arabian Sea in about Latitude $1\frac{1}{2}^{\circ}$ S. to $2\frac{1}{2}^{\circ}$ S. an offset from the land is produced and the easterly flow of the combined current is said to be the origin of the great Counter-Equatorial Current of the Indian Ocean. At some distance from the coast this current may attain a speed of $2\frac{1}{2}$ knots or more, but there is much variation in the currents in this area. During the S.W. Monsoon the beginning of the Counter-Equatorial Current is formed by a broad sweep northward and north-eastward along the whole of the line from the Chagos Archipelago to Zanzibar, through the Seychelles.

The present investigation is already showing that some of the above information derived from the older sources requires modification and the articles which follow will indicate where, according to modern observations, the currents differ from the description given above.

SOUTHERN ICE REPORTS.

During the Years 1929 and 1930.

June.

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

WEATHER SIGNALS.

I.—SHIPS' WIRELESS WEATHER SIGNALS.

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

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

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

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

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

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

on 2100 metres (143 kc/s) as stated on page 18 Vol. VIII, No. 85 (January, 1931, MARINE OBSERVER).

B Selected Ships broadcast their report to C.Q. on 600 m. spark, and these may be intercepted by the stations ringed in on Chart VII. In making these reports to C.Q. "B Selected Ships" should make special endeavour to ensure that the report is received at these shore stations. With a view to assisting Meteorological Services who have provided information and to ensuring that routine reports from all "Selected Ships" within range of certain coast stations may be received by those services a list of stations specially detailed to receive reports from "B Selected Ships" is also given on pages 135 and 136. The procedure given on pages 16 to 19, Vol. VIII, No. 85, should be adhered to as far as possible.

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

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

Request for Information.

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

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

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

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

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

(Continued.)

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

II.—WIRELESS WEATHER SIGNALS.
WIRELESS WEATHER BULLETINS.

ARABIA.

I.C.W. Issues.

Aden W/T Station, approximate Latitude 12° 49' N., Longitude 45° 02' E., call sign **GZQ**, broadcasts weather bulletins, *en clair*, at 0948 and 1748 G.M.T. daily, on a wavelength of 2,000 metres I.C.W. The bulletins, which refer to the weather conditions in the eastern portion of the Arabian Sea are prefixed by the words "East Arabian Sea" and give information regarding storms, stormy winds, and the absence of storms. The words "Weather Normal" are frequently used in these bulletins and they mean:—

"As far as coast observations and available ships' reports indicate, there is no reason for thinking that a storm has formed or is forming."

When either disturbed or stormy weather is anticipated an additional weather bulletin will be broadcast at 0148 G.M.T. on a wavelength of 600 metres.

A special bulletin specified as "Immediate" will be broadcast, when necessary, on 600 metres (I.C.W.) as soon as received from the Indian Meteorological Department.

The word "Normal" is sometimes used in the bulletins and may be preceded by "Bay" or "Arabian Sea" according to which is referred to. It means:—

"As far as coast observations and available ships' reports indicate, there is no reason for thinking that a storm has formed or is forming."

When either disturbed or stormy weather is anticipated an additional weather bulletin will be broadcast at 0148 G.M.T. on a wavelength of 600 metres.

A special bulletin, specified as "Immediate" will be broadcast, when necessary, on 600 metres (I.C.W.), as soon as received from the Indian Meteorological Department.

Colombo W/T Station, approximate Latitude 6° 55' N., Longitude 79° 53' E., call sign **VPB**, broadcasts brief reports, on the weather conditions near Ceylon after the time signals at 0600 G.M.T. on a wavelength of 2,300 metres C.W. and at 1700 G.M.T. on a wavelength of 600 metres I.C.W.

WIRELESS STORM WARNINGS.

ARABIA.

Aden W/T Station, *see* Aden Weather Bulletin.

BRITISH INDIA.

C.W. and Spark Issues.

Weather bulletins are broadcast twice daily, *en clair*, from stations in British India at the following times:—

Time G.M.T.	Stations.	Position (approx.).		Call Sign.	Wavelength, metres.
		Latitude.	Longitude.		
0830 and 1630	{ Karachi ...	24° 51' N.	67° 03' E.	VWK	1,550 (C.W.)†
0800 and 1600	{ Calcutta*	22° 34' N.	88° 20' E.	VWC	2,000 (C.W.)
0900 and 1700	{ Bombay ...	19° 05' N.	72° 50' E.	VWB	1,000 (spk.)
	{ Madras ...	12° 59' N.	80° 11' E.	VWM	1,000 ,,
	{ Rangoon...	16° 46' N.	96° 12' E.	VTR	1,200 ,,

* After the time signal.

† In the event of interruption on the wavelength of 1,550m. the message will be broadcast on 600m. (I.C.W.)

During disturbed or stormy weather "Extra" messages preceded by the W/T Safety Signal (TTT), will be broadcast, if necessary, on 600 metres (spark) at the following times:—

0300 G.M.T.; by Karachi, and Calcutta W/T Stations.

0100 G.M.T.; by Madras, and Rangoon W/T Stations.

0000, 0400, 1200 and 2000 G.M.T.; by Bombay W/T Station.

The foregoing messages are also supplemented when necessary by further messages under the TTT signal during stormy weather. (*See* W/T Storm Warnings.)

CEYLON.

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

Matara W/T Station, approximate Latitude 6° 01' N., Longitude 80° 36' E., call sign **GZP**, broadcasts weather bulletins, *en clair*, at 0948 and 1748 G.M.T. daily, on a wavelength of 2,000 metres I.C.W. These bulletins give information regarding weather conditions in the Bay of Bengal and Arabian Sea, being prefixed accordingly.

BRITISH INDIA.

Spark and I.C.W. Issues.

The following stations broadcast messages containing cyclone warnings immediately on receipt from the Indian Meteorological Department and at the following times. Each transmission is preceded by the W/T Safety Signal — — — (TTT).

Karachi	call sign	VWK	} at 0030, 0430, 1230 and 2030 G.M.T. Wavelength 600m. I.C.W.
Calcutta	" "	VWC	
Port Blair	" "	VTP	
(Andaman Is.)			
Bombay	call sign	VWB	} at 0000, 0400, 1200 and 2000 G.M.T. Wavelength 600m. Spk.
Madras	" "	VWM	
Rangoon	" "	VTR	} at 0100, 0500, 1300 and 2100 G.M.T. Wavelength 600m. Spk.

CEYLON.

Matara W/T Station, *see* Matara Weather Bulletin.

III.—WIRELESS TIME SIGNALS.

BRITISH INDIA and CEYLON.

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

Station.	Call Sign.	Wave length, metres.	G.M.T. of Time Signal.	System.
Calcutta. Lat. 22° 33' 31" N. Long. 88° 20' 16" E.	VWC	2,000 C.W.	0827-0830 1627-1630	} <i>See</i> FIGURE 1.
Colombo. Lat. 6° 55' 05" N. Long. 79° 52' 53" E.	VPB	2,300 C.W. 600 I.C.W.	0557-0600 1657-1700		} See FIGURE 1.

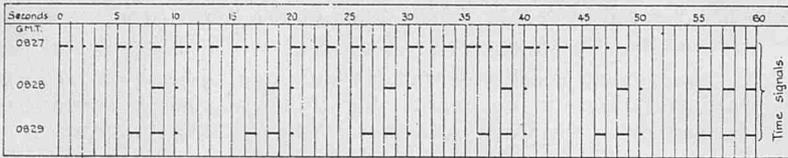


Figure 1.

NOTE.—*Calcutta*.—(1) Preliminary signals sent two minutes before transmission of Time Signal proper, the words “ Ordinary time signals,” and the signal “ Wait ” (— — — — —); all sent by hand.

(2) Signals automatically controlled from Alipore Observatory.

(3) Time Signal accurate to within 0.5 sec.

(4) Should there be any inaccuracy, the Time Signal will be followed by the “ erase ” signal and the words “ signal failed.”

Colombo.—(1) Preliminary signals sent two minutes before transmission of Time Signal proper, CQ de VPB (repeated 3 times) “ Time Signal, Wait ” (— — — — —).

(2) Actual time signals automatically controlled from Colombo Observatory (Lat. 6° 54' 18" N., Long. 79° 52' 18" E.), the remaining signals being sent by hand.

IV.—VISUAL STORM WARNINGS.

ADEN and BRITISH INDIA.

THE undermentioned storm signals known as general, general with additional signals, and brief systems have been adopted at Aden and at the various ports of British India.

Port Officers are kept informed, by the Indian Meteorological Department, of the latest information concerning all disturbances, and application can be made to them for information to supplement the storm signals.

General System.

Distant Signals.

To indicate danger to vessels after they have left the harbour :—

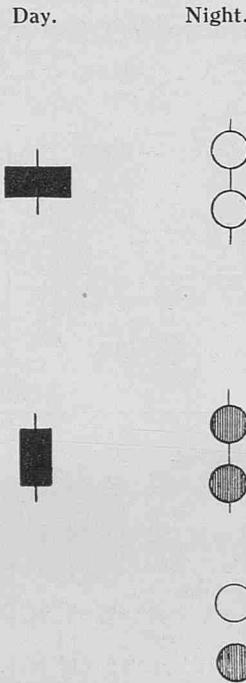
I. **Cautionary**.—There is a region of squally weather, in which a storm may be forming.

NOTE.—This signal will be hoisted at ports situated with reference to the disturbed weather such that a vessel leaving the port might run into danger during her voyage. It will also be hoisted at Arabian sea ports when a disturbance is crossing the peninsula of India which may develop into a cyclone after entering the Arabian Sea.

II. **Warning**.—A storm has formed.

NOTE.—This signal will be hoisted when there is no immediate danger of the port itself being affected, but vessels leaving the port might run into the storm.

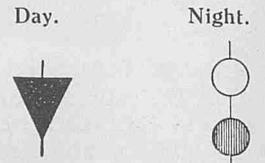
NOTE.—Night Signals { white light represented by
 { red light represented by



Local Signals.

To indicate that the port and vessels in it are threatened :—

III. **Cautionary**.—The port is threatened by squally weather.

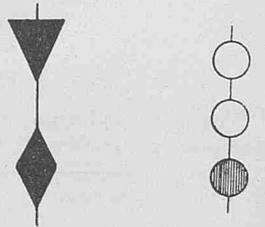


IV. **Warning**.—The port is threatened by a storm, but it does not appear that the danger is as yet sufficiently great to justify extreme measures of precaution.

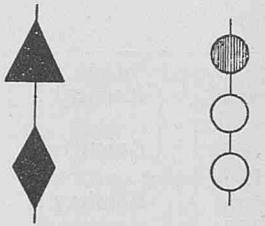
The existence of a storm can often be determined before the direction of its movement can be fixed. In this case all those ports which the storm could possibly strike will be warned by this signal.



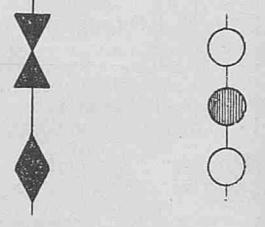
V. **Danger**.—The port will experience severe weather from a storm of slight or moderate intensity that is expected to cross the coast to the south of the port (or to the east in the case of Veraval, the Húgli ports, Diamond island, Bassein, Rangoon, and the Andamans).



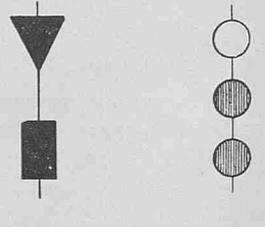
VI. **Danger**.—The port will experience severe weather from a storm of slight or moderate intensity that is expected to cross the coast to the north of the port (or to the west in the case of the Húgli ports, Chittagong, Rangoon, Moulmein, Karachi, and the Andamans).



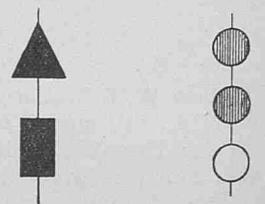
VII. **Danger**.—The port will experience severe weather from a storm of slight or moderate intensity that is expected to cross over or near to the port.



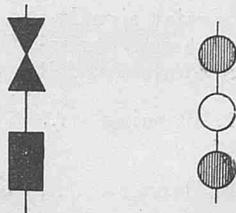
VIII. **Great Danger**.—The port will experience severe weather from a storm of great intensity that is expected to cross the coast to the south of the port (or to the east in the case of Veraval, the Húgli ports, Diamond island, Bassein, Rangoon and the Andamans).



IX. **Great Danger**.—The port will experience severe weather from a storm of great intensity that is expected to cross the coast to the north of the port (or to the west in the case of the Húgli ports, Chittagong, Rangoon, Moulmein, Karachi, and the Andamans).



X. Great Danger.—The port will experience severe weather from a storm of great intensity that is expected to cross over or near to the port.



XI. Failure of Communications.—Communication with the Meteorological headquarters has broken down and the local officer considers that there is danger of bad weather.



This system is in force at the following ports:—

Negapatam, Porto Novo, Cuddalore, Madras, Cocanada, Sagar island, Chittagong, Akyab, Bassein, Diamond island, Elephant point, Rangoon and Table island.

The signals are not exhibited at the Sandheads, but information is available for passing vessels.

These signals are also exhibited at Sabang, Pulo Weh, off the north-west end of Sumatra; the data for the signals being received from the W/T station at Port Blair. Two balls, placed vertically, denote that the latest weather report has not been received, a request can be made for the last weather report received by means of flags, Morse signals, or W/T. Reply will be made free of charge by means of long distance signals or Morse signals; if the reply is made by W/T the charge will be made through Lloyd's agents at Sabang at the usual tariff.

General System with Additional Signals, Bay of Bengal.

It is possible to locate an area of squally weather or a storm in the Bay of Bengal with some degree of certainty, even though the disturbance may be far from the coast. At ports not threatened a "Section" signal for the area affected, as shown on the chartlet, is hoisted *under* the "Distant cautionary" or "Distant warning" signals (Signals I and II of the "General system") to indicate the position of the disturbance in the Bay.

The Bay of Bengal is divided into six sections, *see* Chartlet, thus, if there is squally weather in Section 5 of the Bay the signal, be hoisted at the various ports.

Brief System.

In the brief system only the four following signals will be hoisted, but the Port officers will be kept informed of the progress of bad weather for the general information of shipping:—

Signal No. III. Cautionary	} Meaning the same as the day and night signals in the General System.
Signal No. IV. Warning	
Signal No. VII. Danger	
Signal No. X. Great Danger	

Special Signals used on the Rivers of the Ganges Delta, and River Húgli.

These signals are the same as those mentioned in the "General system," but a more detailed signification of certain of the signals is as follows:—

Signal V. indicates that a storm of slight or moderate severity will probably cross the coast to the westward of Sagar island and westward of Chittagong. Vessels may proceed to sea if the height of the barometer, state of sea, and weather, are such as to lead masters and pilots to infer that there is no danger. The wind at the mouth of the Húgli will probably haul from north-east, through north, to north-west or west

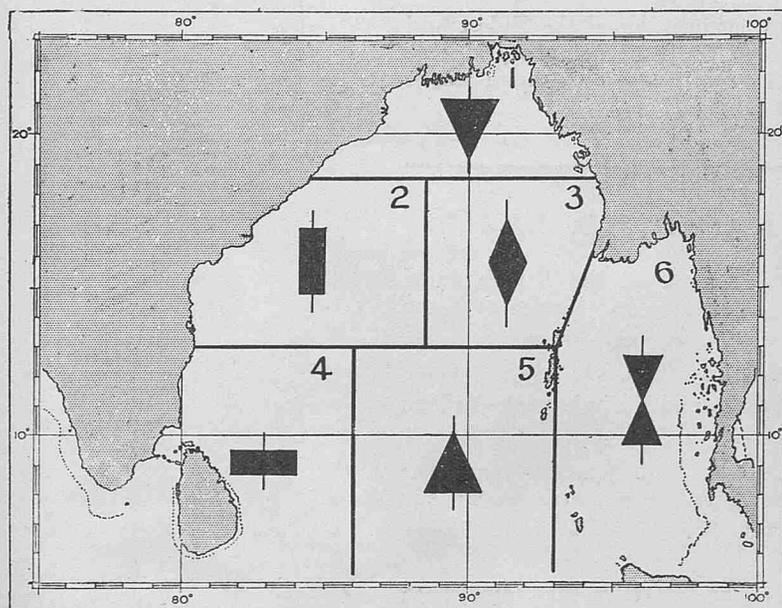
Signal VI. indicates that a storm of slight or moderate severity will probably cross the coast to the eastward of Sagar island and northward of False point. The wind at the mouth of the Húgli will probably veer from north-east, through east, to south-east or south. As these easterly winds will raise a heavy swell and produce a strong westerly set in the channel at the Sandheads, it is advisable that none but fast steamers in light trim should put to sea, and those only if the weather appearances and state of the sea are not too unfavourable.

Signal VII. indicates the approach towards Sagar roads of a storm of slight or moderate intensity. It is advisable that no vessels, except fast vessels in light trim, should put to sea until the wind direction and force, the state of weather at sea, and the rise of the barometer indicate that the storm has either broken up or passed inland. It should be remembered that cyclonic storms of small extent in the Bay of Bengal sometimes blow with hurricane force, and raise a high sea near their centres.

Signal VIII. indicates that a storm of great intensity will cross the coast to the eastward of Sagar island and westward of Chittagong. No sailing vessels, nor deep-laden, nor slow-steaming vessels should go to sea. The wind at the mouth of the Húgli will probably shift from north-east to north, north-west, etc.

Signal IX. indicates that a storm of great intensity will cross the coast to the westward of Sagar island and northward of False point. No vessel should go to sea, and masters and pilots of vessels outward bound should be guided by the appearance of the weather and height of the barometer in deciding whether it is advisable to proceed below Diamond Harbour or Mud point. The wind at the mouth of the Húgli will probably veer from north-east, through east, to south-east or south.

Chartlet showing "Section" storm signals, Bay of Bengal.



If a storm has formed in Section 2, the signal, two cylinders placed vertically one over the other, would be hoisted at all the ports which were not directly threatened. The ports threatened would hoist one or other of the local signals.

If the centre of the storm is near the boundary of a section, two locality signals will be given, the first indicating the section in which the centre is supposed to be, and the second the neighbouring section near to which it is. In the event of a storm centre being near to the angles where three sections meet, three locality signals will be hoisted. The first will give the section in which the storm is supposed to be, the second the nearest adjoining section, the third the remaining section.

If a port itself is threatened the appropriate "Local" signal of the "General system" would be hoisted.

If no disturbance exists in the Bay of Bengal a ball will be hoisted

Signal X. indicates the approach of a storm of great intensity towards the mouth of the Húgli, and Calcutta. No vessels should go to sea from Sagar island, or proceed down from Diamond Harbour, and all vessels should be properly secured.

The above signals are exhibited at Sagar island, Diamond Harbour, Calcutta (Port Commissioner's Office), Kidderpur Docks (Clock Tower), Budge Budge (Assistant Harbour Master's House).

Instructions to hoist the signals are sent by telegram from the Meteorological Department, Calcutta.

Special signals are used on the rivers of the Ganges delta at Namkhana, Barisal, Goalunda, Noakhali, Narayanganj, Chandpur and Khulna, as follows:—

- | | | | |
|-----------------|-----|---|--|
| 1. Warning | ... | { by day, black ball
by night, red light } | { "Storm may affect
you shortly." |
| 2. Danger | ... | { by day, cone point up
vertical.
by night, 2 red lights
vertical. } | { "Storm will soon strike
you." |
| 3. Great Danger | ... | { by day, cylinder ver-
tical
by night, 3 red lights
vertical. } | { "Violent storm will
soon strike you." |

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 F. H. SWAIN, commander of the Elders and Fyffes S.S. *Bayano* and a member of the Corps of Voluntary Marine Observers, which took place on board his ship at sea on April 6th, is noted with regret.

Captain W. E. Whittingham, O.B.E., R.D., R.N.R.

Captain W. E. WHITTINGHAM, Commodore of the British India Steam Navigation Fleet has retired after 36 years' service with the company.

He served his apprenticeship in Devitt and Moore's Ship *Sabraon*, after which he sailed in the Barque *Peri* and Ships *Coriolanus* and *Hesperides*, owned by John Stewart and Company of London.

Transferring to steam in 1895, Captain WHITTINGHAM joined the British India Steam Navigation Company as a fourth officer and rising through the intermediate grades was promoted to command in 1910.

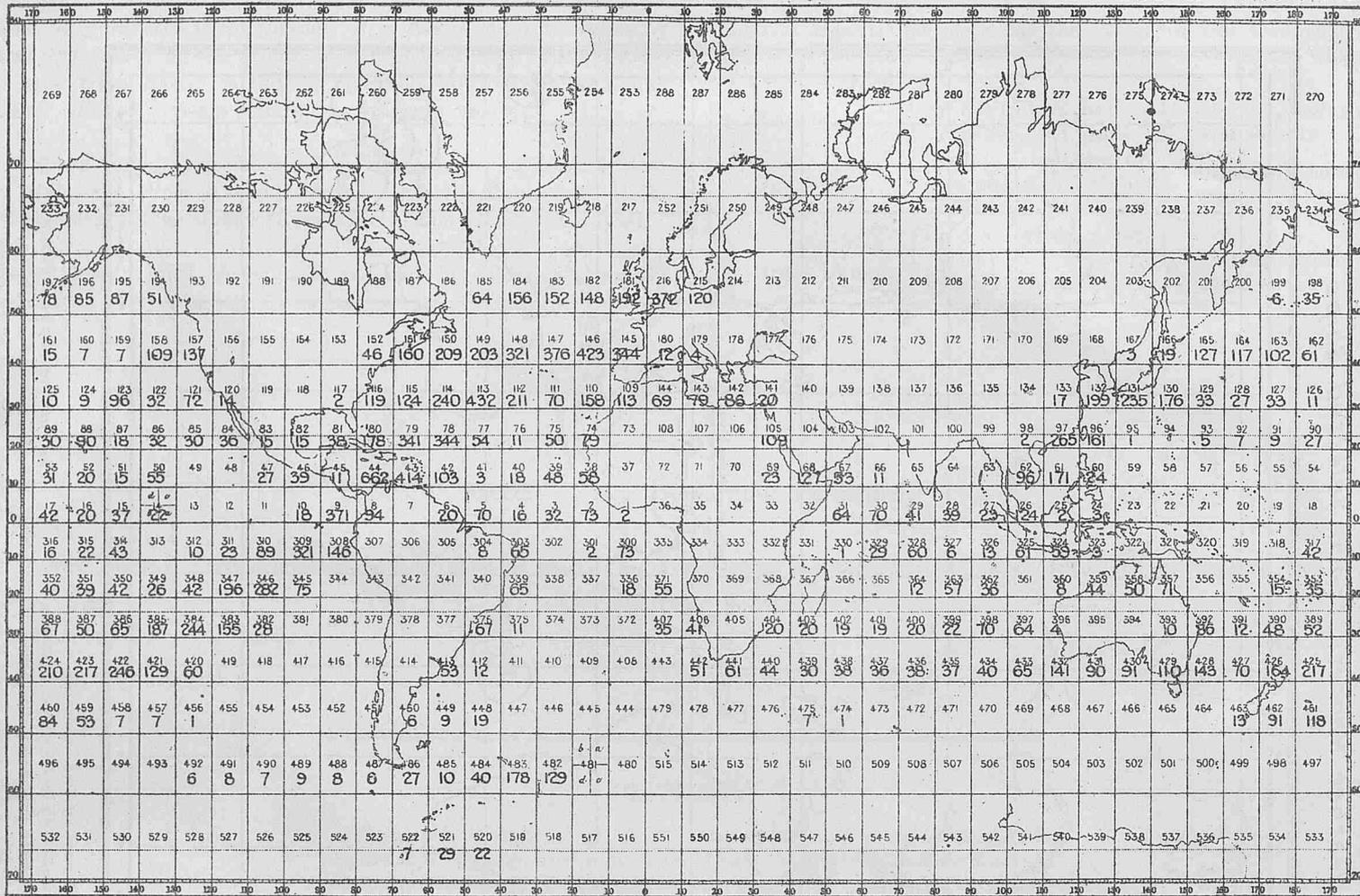
Called up for active service in 1914, he served in the Royal Navy throughout hostilities as an R.N.R. Officer, being awarded the military O.B.E. and the French Croix de Guerre with gold star for war service.

On demobilisation, he rejoined the British India Steam Navigation Company and was appointed Commodore of their Fleet in 1930.

During the time he commanded the *Domala* and *Margha* he was a member of the Corps of Voluntary Marine Observers, who join with the Marine Division in wishing him long life and happiness in his retirement.

WORK OF THE YEAR.
MARSDEN CHART I.

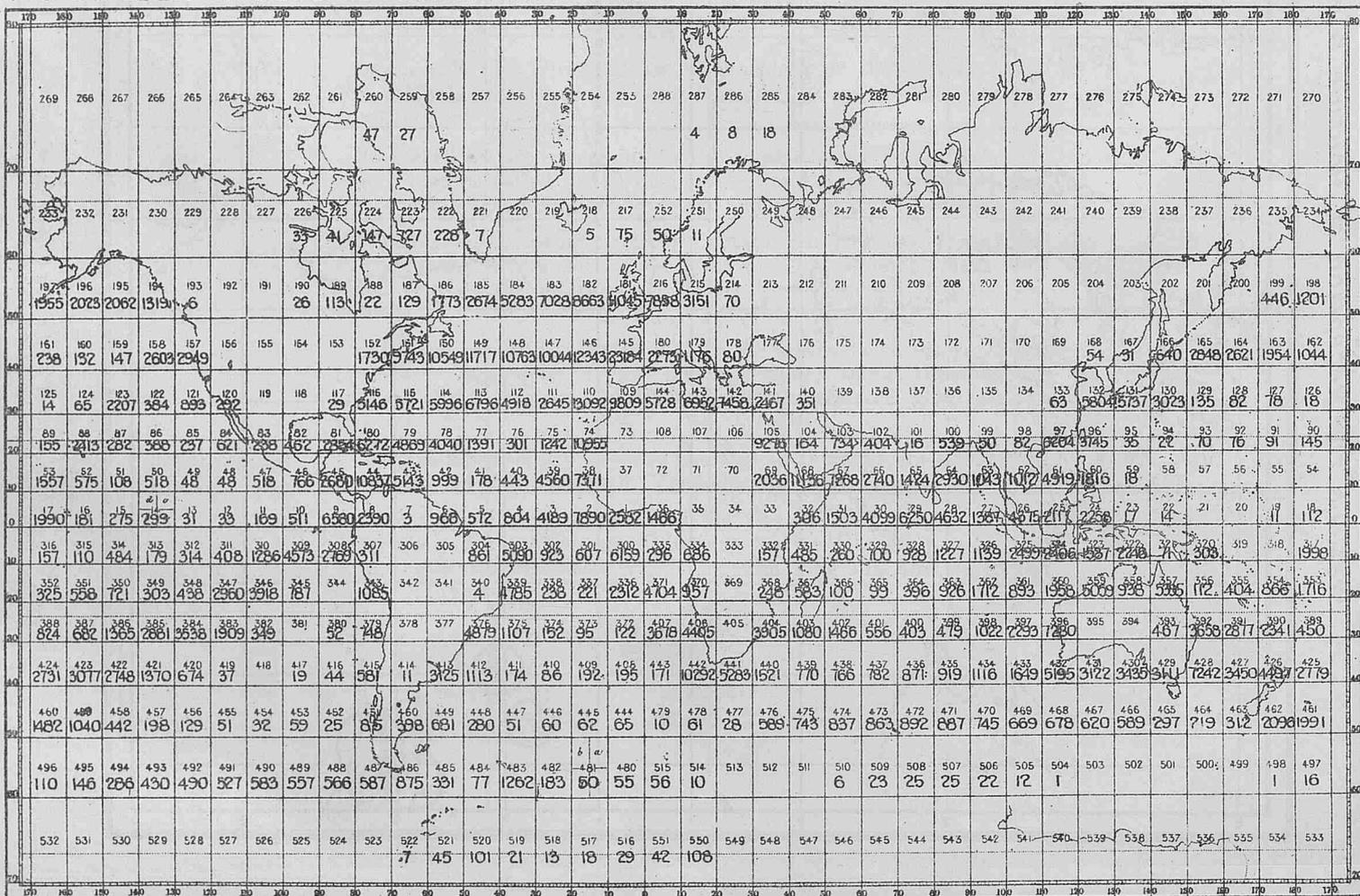
SHOWING NUMBER OF SETS OF OBSERVATIONS EXTRACTED BETWEEN APRIL 1st. 1930 & MARCH 31st. 1931.



Total Observations 19185.

MARSDEN CHART II.

SHOWING NUMBER OF SETS OF OBSERVATIONS EXTRACTED BETWEEN APRIL 1st. 1920 & MARCH 31st. 1931.

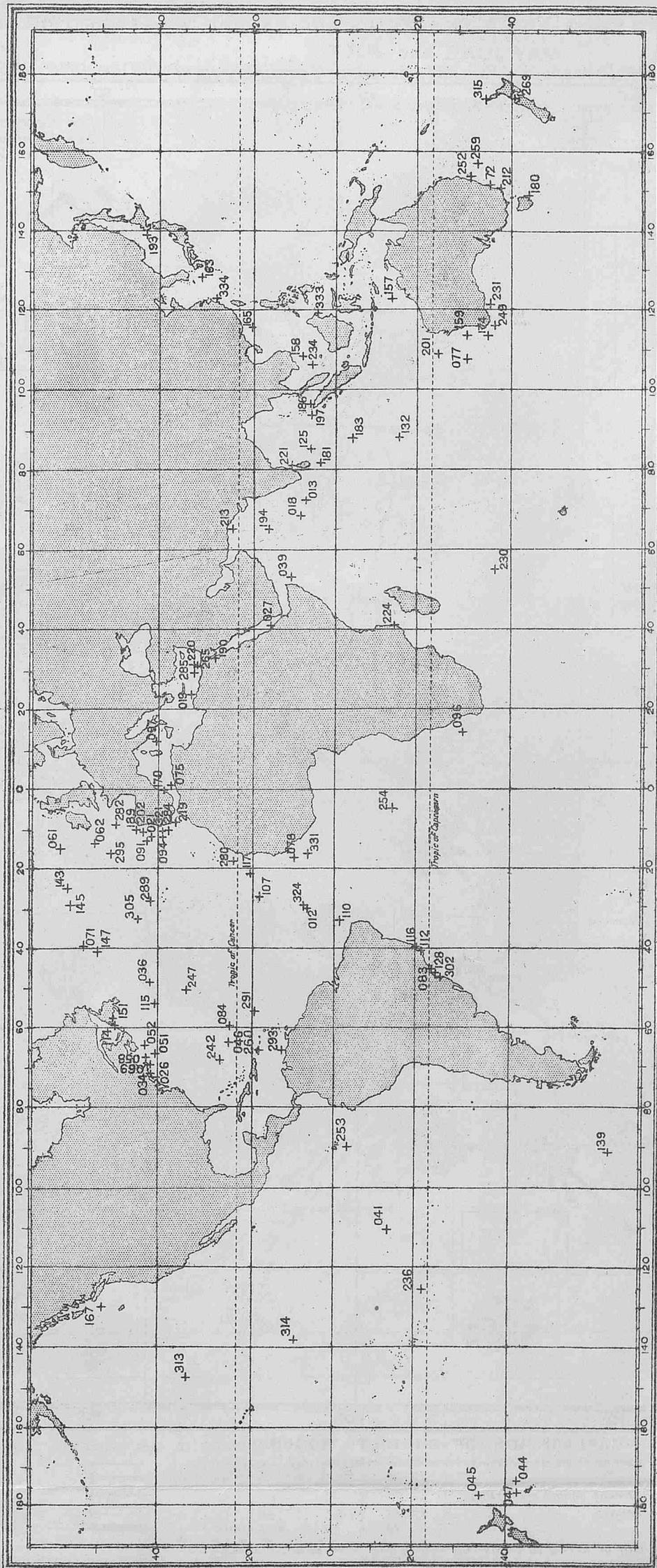


Total Observations extracted 1920 - December 31st. 1929 - 670382
Total Observations (New Code) extracted Jan. 1st. 1930 - Mar. 31st. 1931 - 22,221
Grand Total since April 1st. 1920 - 692,603.

WORK OF THE YEAR.

CHART III.

CHART OF THE WORLD SHOWING POSITION OF BRITISH SELECTED SHIPS AT SEA ON JUNE 1ST. 1930.



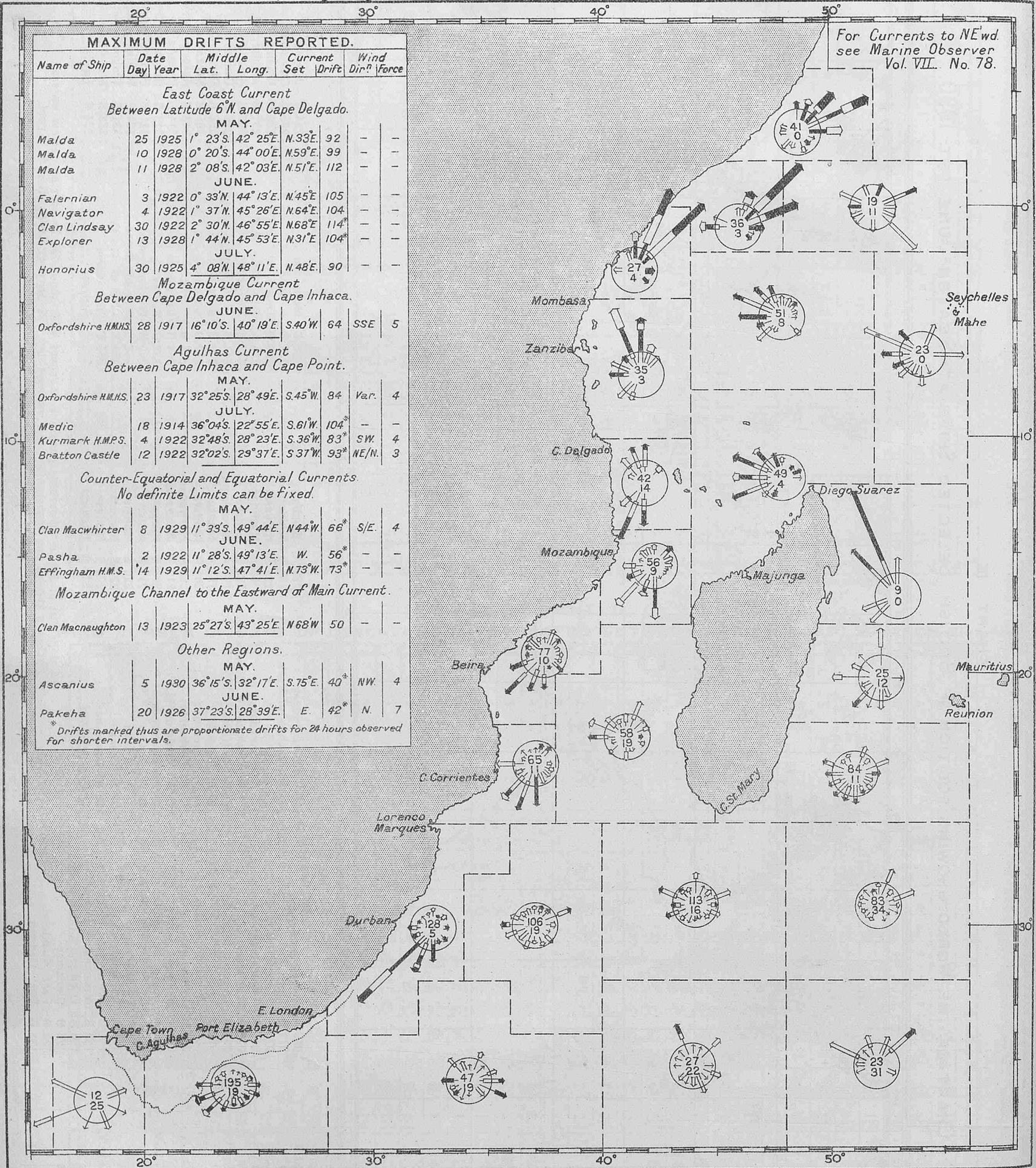
- | | | | | | | | | | | | |
|-------|--------------|-------|-------------------------|-------|---------------------|-------|------------|-------|----------------|-------|------------------|
| 012 A | Almeda Star | 069 A | Minnewaska | 139 B | Port Sydney | 183 A | Bendigo | 230 B | Nowshera | 284 B | Director |
| 013 B | Macharda | 143 A | Meltonian | 143 A | Duchess of York | 186 B | Kidderpore | 231 B | Nuddea | 285 B | Custodian |
| 018 B | Makalla | 145 A | Hobson's Bay | 145 A | Melita | 189 B | Kalyan | 234 B | Talma | 289 B | Ingoma |
| 019 B | Malakuta | 147 A | Themistocles | 147 A | Minnedosa | 190 B | Kashgar | 236 A | Rangitane M.V. | 291 B | Scholar |
| 021 B | Mangalore | 151 A | Euripides | 151 A | Duchess of Richmond | 193 B | Lahore | 242 A | Ruapehu | 293 B | Ariguaní |
| 026 A | Cameronia | 157 B | Lautaro M.V. | 157 B | Centaur M.V. | 194 A | Macedonia | 247 B | Argyllshire | 295 A | Camito |
| 027 B | Elysia | 158 B | Lobos M.V. | 158 B | Elpenor | 197 A | Mantua | 249 B | Buteshire | 302 A | Darro |
| 034 A | Caronia | 163 B | Armadale Castle | 163 B | Gascoyne | 201 A | Naldera | 252 B | Devon | 305 B | Nebraska |
| 036 A | Lancastria | 165 B | Llandoverly Castle | 165 B | Protestant | 202 A | Narkunda | 253 B | Hertford | 313 B | Aorangi M.V. |
| 039 B | Valacia | 167 B | Windsor Castle | 167 B | Tantalus M.V. | 212 B | Australia | 254 B | Limerick | 314 B | Miakura |
| 041 B | Karamea M.V. | 170 A | Liangibby Castle | 170 A | Tyndareus | 213 B | Barpeta | 259 B | Westmoreland | 315 B | Niagara |
| 044 A | Mataroa | 174 A | El Argentino M.V. | 174 A | Orama | 219 B | Malda | 260 B | City of Baroda | 321 B | British Merchant |
| 045 B | Tainui | 177 A | La Rasarina | 177 A | Orsova | 220 B | Manela | 265 B | City of Osaka | 324 A | William Scoresby |
| 046 A | Tamaroa | 180 B | Manchester Brigade | 180 B | Desna | 221 B | Manora | 269 B | City of Osaka | 331 B | Trojan Star |
| 047 B | Taranaki | 181 B | Manchester Hero | 181 B | Baradine | 224 B | Modasa | 280 B | Astronomer | 333 B | St. Albans |
| 051 A | Baltic | | Highland Chieftain M.V. | | Barrabool | 227 B | Nardana | 282 B | Author | 334 B | Tanda |
| 052 A | Cedric | | | | | | | | | | |
| 058 A | Pennland | | | | | | | | | | |
| 061 A | Doric | | | | | | | | | | |
| 062 A | Arabic | | | | | | | | | | |

104 ships out of 289 in favourable positions to report with about 185 in port or narrow waters. This is typical and represents a fair average day. 36 per cent. in position to report.

CURRENTS ON THE TRADE ROUTES OFF THE S. AND E. COASTS OF AFRICA AND WESTWARD OF MAURITIUS.

MAY JUNE. and JULY,

Observations of ships regularly observing for the British Meteorological Office 1910-1930.



MAXIMUM DRIFTS REPORTED.						
Name of Ship	Date Day Year	Middle Lat.	Long.	Current Set	Drift	Wind Dir. Force
East Coast Current						
<i>Between Latitude 6°N. and Cape Delgado.</i>						
MAY.						
Malda	25 1925	1° 23'S.	42° 25'E.	N.33°E.	92	- -
Malda	10 1928	0° 20'S.	44° 00'E.	N.59°E.	99	- -
Malda	11 1928	2° 08'S.	42° 03'E.	N.51°E.	112	- -
JUNE.						
Falernian	3 1922	0° 33'N.	44° 13'E.	N.45°E.	105	- -
Navigator	4 1922	1° 37'N.	45° 26'E.	N.64°E.	104	- -
Clan Lindsay	30 1922	2° 30'N.	46° 55'E.	N.68°E.	114*	- -
Explorer	13 1928	1° 44'N.	45° 53'E.	N.31°E.	104*	- -
JULY.						
Honorius	30 1925	4° 08'N.	48° 11'E.	N.48°E.	90	- -
Mozambique Current						
<i>Between Cape Delgado and Cape Inhaca.</i>						
JUNE.						
Oxfordshire H.M.S.	28 1917	16° 10'S.	40° 19'E.	S.40°W.	64	SSE 5
Agulhas Current						
<i>Between Cape Inhaca and Cape Point.</i>						
MAY.						
Oxfordshire H.M.S.	23 1917	32° 25'S.	28° 49'E.	S.45°W.	84	Var. 4
JULY.						
Medic	18 1914	36° 04'S.	22° 55'E.	S.61°W.	104*	- -
Kurmark H.M.P.S.	4 1922	32° 48'S.	28° 23'E.	S.36°W.	83*	SW 4
Bratton Castle	12 1922	32° 02'S.	29° 37'E.	S.37°W.	93*	NE/N. 3
Counter-Equatorial and Equatorial Currents.						
<i>No definite Limits can be fixed.</i>						
MAY.						
Clan Macwhirter	8 1929	11° 33'S.	49° 44'E.	N.44°W.	66*	S/E. 4
JUNE.						
Pasha	2 1922	11° 28'S.	49° 13'E.	W.	56*	- -
EPPingham H.M.S.	14 1929	11° 12'S.	47° 41'E.	N.73°W.	73*	- -
Mozambique Channel to the Eastward of Main Current.						
MAY.						
Clan Macnaughton	13 1923	25° 27'S.	43° 25'E.	N.68°W.	50	- -
Other Regions.						
MAY.						
Ascanius	5 1930	36° 15'S.	32° 17'E.	S.75°E.	40*	NW. 4
JUNE.						
Pakeha	20 1926	37° 23'S.	28° 39'E.	E.	42*	N. 7

* Drifts marked thus are proportionate drifts for 24 hours observed for shorter intervals.

For Currents to NE wd. see Marine Observer Vol. VII. No. 78.

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 ...

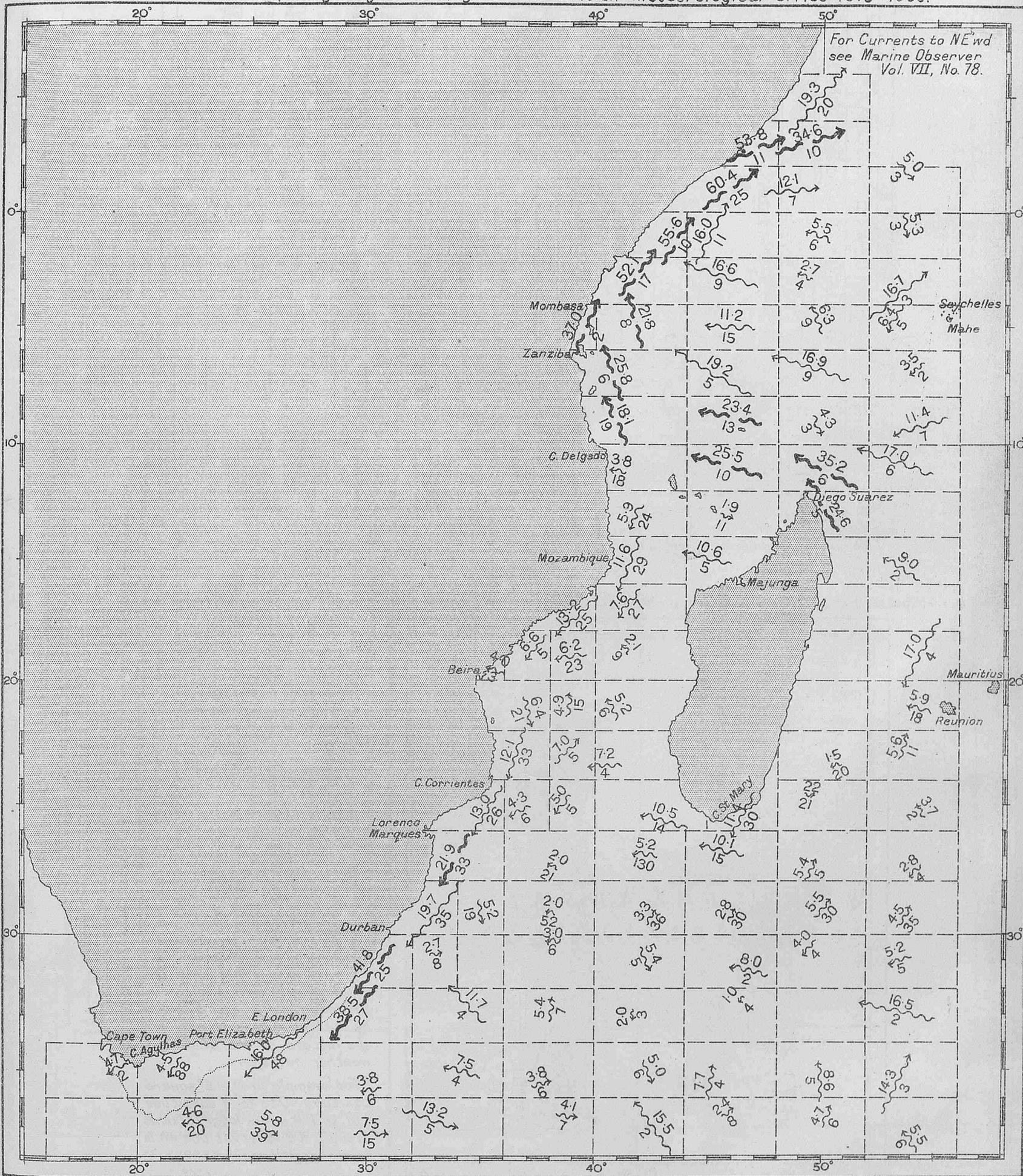
Distance from tail of arrow to circle represents 5%. Scale 0 10 20 30 40 50%

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

CURRENTS ON THE TRADE ROUTES OFF THE S. AND E. COASTS OF AFRICA AND WESTWARD OF MAURITIUS.

MAY, JUNE, and JULY,

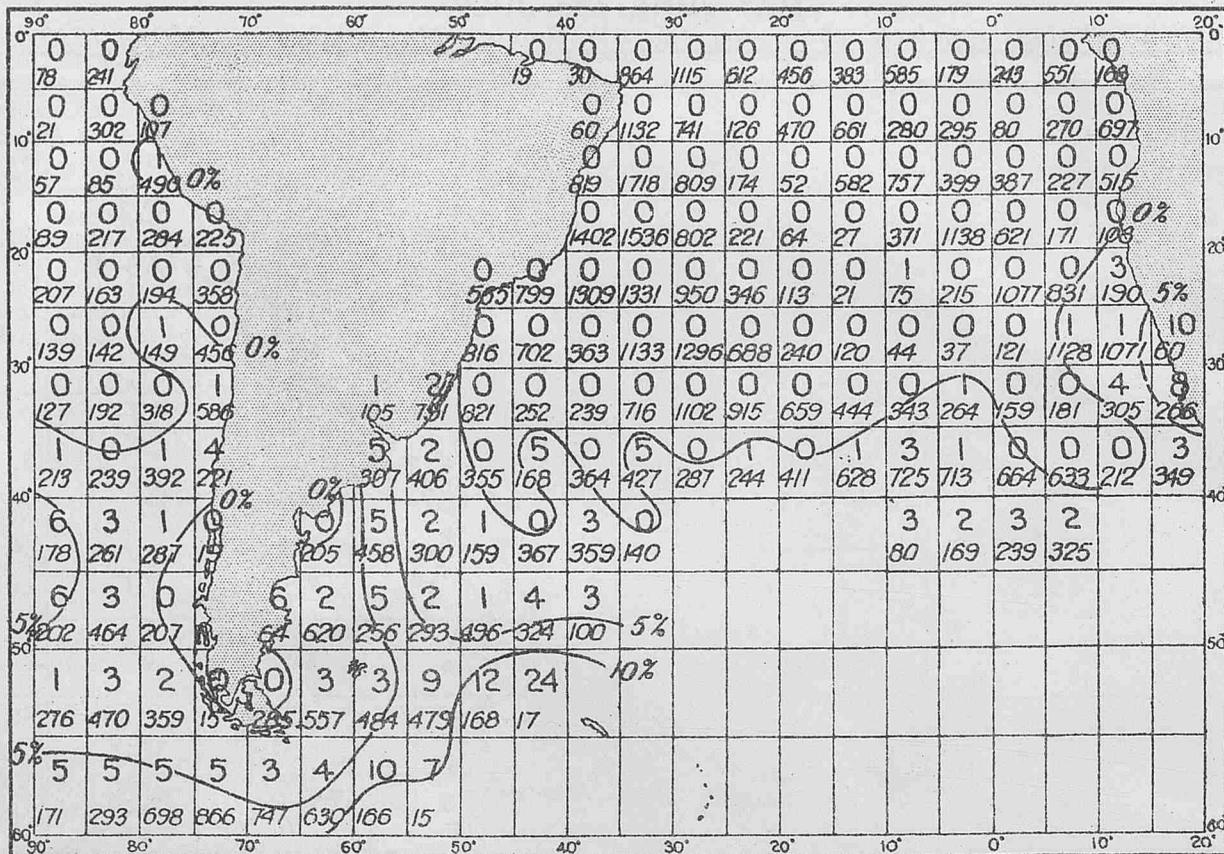
Observations of ships regularly observing for the British Meteorological Office 1910-1930.



EXPLANATION OF CURRENT ARROWS.

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

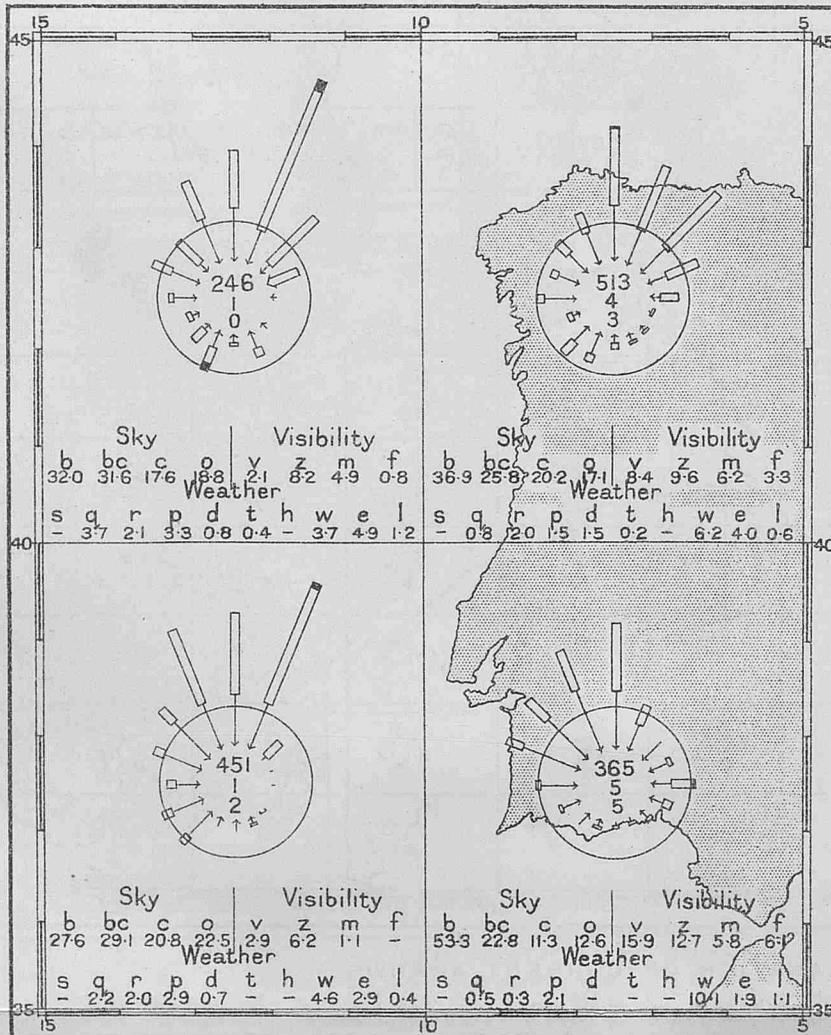
FOG IN THE SOUTH ATLANTIC AND VICINITY OF WEST COAST OF SOUTH AMERICA, PERCENTAGE FREQUENCY.



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

JUNE.

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



EXPLANATION.

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

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

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

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

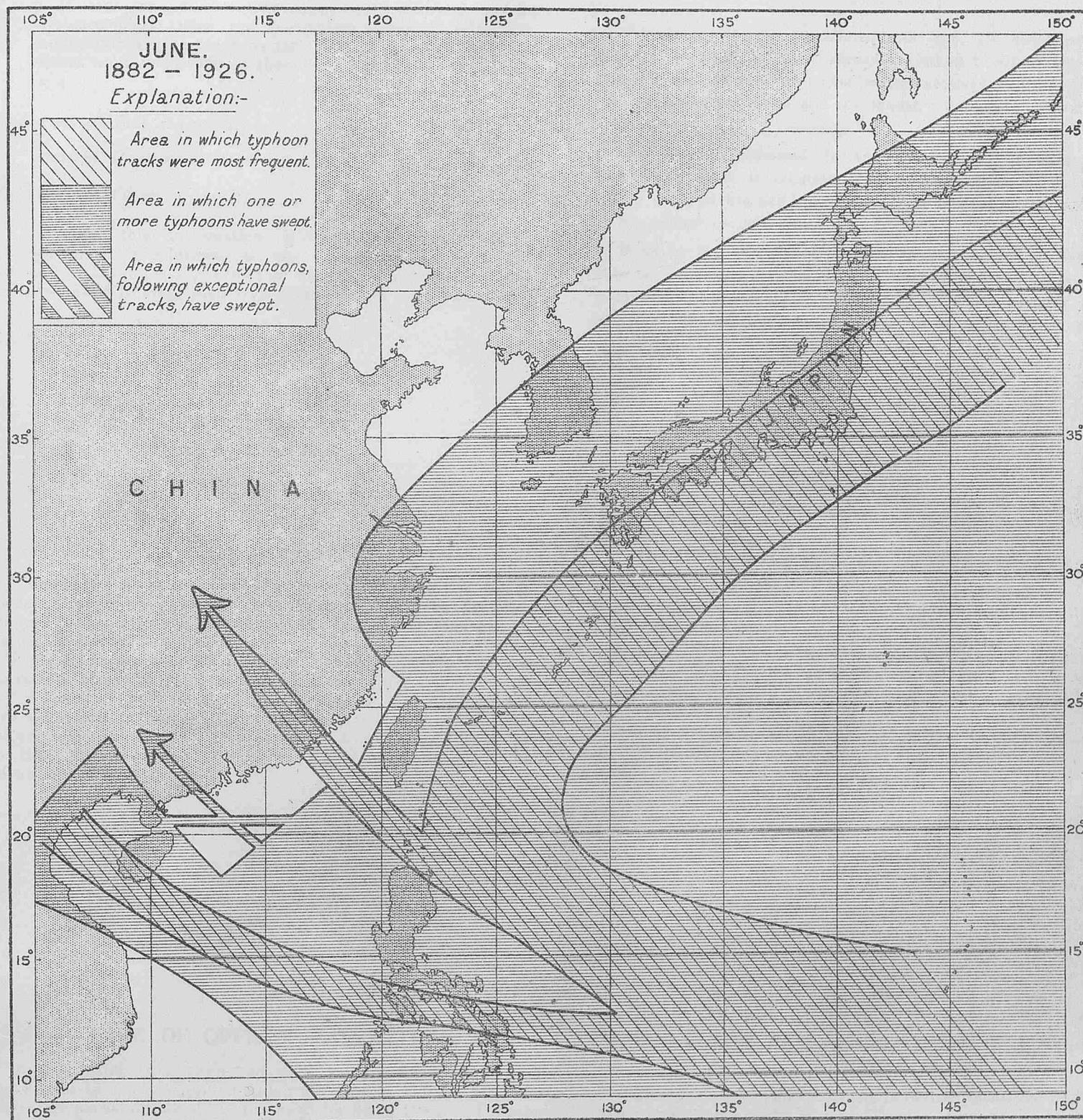
The upper figure in the centre of the rose gives total number of observations, the middle figure the percentage frequency of calms and the lower figure the percentage frequency of variable winds.

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

For example, in the 5° square Latitude 40° to 45° N. Longitude 10° to 15° W. b was logged 32 times in every 100 observations while m was logged about 5 times.

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

TYPHOONS IN THE FAR EAST DURING 45 YEARS.



JUNE— Single chart: 46 observations of Typhoons.

No typhoons along the Coast of China near Shantung, in the South of the South China Sea.

Three Principal Tracks. One with lesser frequency, from the North of Luzon to the neighbourhood of Swatow; the second lies across the Vizayas (Calamianes) islands, the centre of the South China Sea as far as the Gulf of Tonking; the third and most important passes to the E. of the island of Formosa, over the Riu-Kiu islands and the Eastern end of Kiushiu and Honshiu.

Starting Point for all tracks round Yap and S. of Guam. Depressions on the Coast of China with occasional late Monsoons from N.E. Local fog over the Saddle Islands and neighbouring coast.

POSTAL ARRANGEMENTS.

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

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

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

Port of Call.....

Date of Homeward Departure.....

Postal Address.....

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

DESPATCH OF INFORMATION

REQUIRED IMMEDIATELY FOR THE CONDUCT OF THE WORK AT SEA.

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

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

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

ICE REPORTS.

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

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

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

ILLUSTRATIONS FOR THE MARINE OBSERVER.

When making sketches, charts or plans, Marine Observers will give us great assistance if they will give consideration to reproduction in THE MARINE OBSERVER.

The size of any chart or drawing should not, if possible, exceed that of a page of The MARINE OBSERVER, and if charts and drawings of all kinds are made with Indian Ink upon white drawing paper their reproduction will be greatly facilitated.

When photographs are sent in it would give us great assistance if they are accompanied by the plate or film, which will be returned if desired.

CARE OF OFFICIAL LITERATURE.

THE MARINE OBSERVER and such ocean meteorological charts and atlases as can be supplied which are sent to Regular Observing Ships, are placed on board as equipment for doing Routine Voluntary Meteorological Work, and as some return to the Captains and Officers who do this work and the shipowners who encourage it in the ships whose names appear in the Fleet List in THE MARINE OBSERVER. This literature is official equipment and all concerned are asked to take great care of it.

The books sent annually, as Excellent Awards, to a certain number of Commanders and Officers who have done the best work, are presentations and are, of course, the personal property of the recipients.

In view of the fact that the Meteorological Office equipment in Voluntary Observing Ships is provided at the cost of Public Funds, it is essential that it should be treated with great care.

REQUESTS FOR REPLACEMENTS OF INSTRUMENTS, ETC.

The attention of Marine Observers is invited to the list of Nautical Officers and Agents of the Marine Division, overleaf.

Correspondence, delay and inconvenience may be saved if the Commanders and Officers of observing ships will kindly make their requests for replacements of instruments, logs, etc., to the appropriate Agency.

The Agents have the necessary gear, information and instruction to supply the needs of regular observing ships and to give advice upon questions of Marine Meteorology to any officers of the Merchant Navy who may desire it.

CO-OPERATION OF SHIPOWNERS, MASTERS AND MATES.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

DERELICTS AND FLOATING WRECKAGE.

Date.	Position.		Description.
	Latitude.	Longitude.	
NORTH SEA.			
14.4.31	52°25'N.	2°56'E.	Large spar upright, apparently attached to wreckage, dangerous to navigation.
20.4.31	5 m. S.S.E. of Humber Light Vessel.		30 ship's hatches on the port side and about 12 on the starboard side, drifting S.S.E.
ENGLISH CHANNEL.			
6.4.31	50°41'N.	0°24'E.	Beam floating vertically, apparently attached to wreckage.
12.4.31	50°21'N.	1°36'W.	Drifting red conical buoy marked BRUDC.
17.4.31	7 m. S.E. x S. Magnetic Anvil Point.		Small spherical buoy adrift.
IRISH SEA.			
10.4.31	53°08'N.	5°36'W.	Floating object, apparently a black buoy.
BAY OF BISCAY.			
13.4.31	47°07'N.	4°07'W.	Wreckage drifting: mast 10 metres long.
MEDITERRANEAN.			
1.4.31	35°47'N.	15°27'E.	Cage buoy with triangle top mark adrift.
11.4.31	36°33'N.	16°48'E.	Iron buoy with mooring shackle adrift.
12.4.31	43°25'N.	7°41'E.	Boat, entirely submerged.
NORTH ATLANTIC.			
3.4.31	49°56'N.	15°27'W.	Pontoon—about 40 ft. above water, rust red.
3.4.31	30°30'N.	49°55'W.	Large conical buoy painted white and badly rusted.
4.4.31	33°52'N.	75°39'W.	10 ft. flat bottom skiff awash.
5.4.31	42°50'N.	66°30'W.	Partly submerged obstruction about 20 ft. square, consisting of heavy timbers and projecting about 4 ft. out of water.
6.4.31	35°56'N.	75°03'W.	Three small logs lashed together.
6.4.31	32°35'N.	74°04'W.	Large steel drum, floating high.
9.4.31	40°49'N.	9°31'W.	Portuguese sailing vessel <i>Nuna Alvarez D. Laveiro</i> (? <i>NUN ALVARES of Aveiro</i>), abandoned with fire on board. Vessel dangerous to navigation.
9.4.31	33°18'N.	77°50'W.	Large square raft awash.
9.4.31	28°20'N.	51°55'W.	Abandoned and sinking schooner.
10.4.31	40°32'N.	63°46'W.	Heavy log.
12.4.31	40°54'N.	62°12'W.	Partly submerged wreckage with a charred mast showing 6 ft. out of water.
13.4.31	36°16'N.	75°33'W.	Wreckage about 50 ft. long and showing 4 ft. out of water.
14.4.31	42°25'N.	58°19'W.	Large conical red whistle buoy.
23.4.31	49°40'N.	9°40'W.	Red conical buoy adrift.
25.4.31	50.23'N.	18°14'W.	Log 25 ft. long, dangerous to navigation.
CARIBBEAN SEA.			
4.4.31	15°24'N.	81°21'W.	Old bell buoy with bell gone and no marks.
GULF OF MEXICO.			
7.4.31	26°19'N.	89°20'W.	Log about 40 ft. long and 5 ft. in diameter.
NORTH PACIFIC.			
4.4.31	32°22'N.	125°10'W.	Large partly submerged timber.
8.8.31	40°21'N.	124°29'W.	Wreckage about 100 ft. long, consisting of the bottom of a wooden hull, bottom up and awash: bow was out of water and stern submerged. An emergency raft was fast alongside.

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LIST OF VOLUNTARY OBSERVING SHIPS

FLEET LIST.

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

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

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

Only in special cases will individual letters be sent.

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

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

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

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

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

Explanation of Abbreviations.

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

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

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

No. = No Meteorological Office instrumental equipment on board.

M = Ship's barometer *mercurial*.

A = Ship's barometer *aneroid*.

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

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

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

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

** = Short range transmission and reception.

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

Selected Ships.

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

Name of Vessel.	Captain.	Observing Officers.	Meteoro-logical Equipment.	Line.	Last Log, Register, or Record Contributed. Received up to 174.31.	Date Received.
233 †† <i>Aba</i> , M.V. ...	Williams, T. E. ...	J. D. Townson, R. A. Cherry	W.T	Elder Dempster ...	Forms 911 & 138 19.12.30 to 19.1.31	23.1.31
121 †† <i>Abinsi</i> ...	Sola, P. ...	B. White, J. J. Smith. ...	"	" " ...	" " 19.2.31 to 27.3.31	31.3.31
122 †† <i>Accra</i> , M.V. ...	Toft, J. T. ...	R. B. Ellis ...	W.T.-M.	" " ...	" " 28.1.31 to 3.3.31	7.3.31
155 *† <i>Achilles</i> ...	Cosker, W. ...	C. Broad, R. E. Agar, J. S. Stratford.	M.L.	A. Holt ...	Form 915 4.10.30 to 13.2.31 ...	19.2.31
055 *† <i>Actor</i> ...	Whyte, D. L. ...	G. Penston, E. Pearce, G. Howard.	No. M.	Harrison ...	Forms 911 & 138 14.11.30 to 24.1.31	28.1.31
123 †† <i>Adda</i> , M.V. ...	Shooter, J. C. ...	J. Boyd, F. C. Langton ...	W.T.-M.	Elder Dempster ...	" " 12.2.31 to 16.3.31	18.3.31
050 †† <i>Adriatic</i> ...	Binks, J. ...	O. V. Lucas, N. Fisher, G. T. Kavanagh.	W.T.	White Star ...	" " 2.2.31 to 23.2.31	25.2.31
<i>Aeneas</i> ...	Wallace, W. K. ...	A. McL. Pilcher ...	No. A.	A. Holt ...	Form 911 2.3.31 to 12.3.31 ...	19.3.31
166 *† <i>Agamemnon</i> ...	Beswick, W., D.S.C., Commr. R.N.R.	W. K. Hale ...	W.T.	" ...	Forms 911 7.3.31 to 17.3.31 ...	25.3.31
<i>Aidan</i> ...	Reynolds, W. H. B. ...	A. A. Gerrard ...	No. A.	Booth ...	" 13.2.31 to 28.3.31 ...	16.3.31
<i>Alaunia</i> ...	Prothero, M. ...	T. O. Ellis ...	" A.	Cunard ...	" 16.11.30 to 6.12.30 ...	8.12.30
<i>Alban</i> ...	Evans, L. ...	J. G. Tippet ...	" A.	Booth ...	" 16.8.30 to 7.10.30 ...	27.10.30
310 †† <i>Alcantara</i> , M.V. ...	Wakeman, E. C. ...	R. H. Tepper ...	W.T.	R.M.S.P. ...	" 21.2.31 to 8.4.31 ...	14.4.31
178 *† <i>Alipore</i> ...	Lyndon, E. P. ...	J. P. McArthur ...	No. M.	P. & O. ...	" 27.1.31 to 22.3.31 ...	13.4.31
175 †† <i>Almanzora</i> ...	Hannam, F. S. ...	W. W. Lowe ...	W.T.	R.M.S.P. ...	" 14.2.31 to 28.3.31 ...	1.4.31
012 †† <i>Almeda Star</i> ...	Turner Russell, W. ...	E. K. Watkins, H. Metcalf, C. Potts, E. Russell.	No. M.	Blue Star ...	Forms 911 & 138 31.1.30 to 17.3.31	21.3.31
<i>Alondra</i> ...	Scott, L. S. ...	G. Hamilton ...	" A.	Yeoward ...	Form 911 15.3.31 to 5.4.31 ...	9.4.31
<i>Alynbank</i> ...	Robertson, J. ...	G. E. Beaton ...	" A.	A. Weir & Co. ...	" 5.1.31 to 5.2.31 ...	10.2.31
103 †† <i>Andalucia Star</i> ...	Vernon, R. ...	W. Cumming, G. Clarke, J. Bradshaw.	" M.	Blue Star ...	Forms 911 & 138 22.2.31 to 5.4.31	13.4.31
<i>Anchises</i> ...	Dunlop, J. K. ...	E. N. Sandon, E. G. Coombe	" A.	A. Holt ...	Form 911 24.2.30 to 5.4.30... ..	10.6.30
<i>Antiochus</i> ...	Dougall, W. T. ...	C. F. Lock ...	" A.	" ...	" 15.2.31 to 15.3.31 ...	18.3.31
209 †† <i>Aorangi</i> , M.V. ...	Martin, W. ...	E. Anderson, J. Watling, R.N. Turner, D.H. Richards, H. Webster.	M.L.	Canadian-Australasian	Form 915 1.5.30 to 15.8.30... ..	11.12.30
120 †† <i>Apapa</i> , M.V. ...	Beith, A. ...	J. R. Sergiades, V. Feeney.	W.T.-M.	Elder Dempster ...	Forms 911 & 138 26.2.31 to 30.3.31... ..	2.4.31
129 †† <i>Appam</i> ...	Draper, J. M. ...	W. M. M. Hutchings, C. V. Evans, H. O. Forster.	W.T.	" ...	" " 21.1.31 to 28.2.31	3.3.31
<i>Araby</i> ...	Lee, J. ...	H. Haigh ...	No. A.	MacIver ...	Form 911 8.12.30 to 26.2.31 ...	9.3.31
115 †† <i>Arandora Star</i> ...	Moulton, E. W. ...	" ...	" M.	Blue Star ...	" 21.12.30 to 6.1.31 ...	15.1.31
278 *† <i>Architect</i> ...	Mowat, I. ...	A. C. Banister ...	" M.	Harrison ...	Forms 911 & 138 1.1.31 to 18.3.31	22.3.31
293 *† <i>Ariguani</i> ...	Scudamore, J. H. H. D.S.C., R.D., Commr. R.N.R.	G. McKee, W. Ireland, M. H. Thomson, J. S. Bell.	M.L.	Elders & Fyffes ...	Form 915 9.8.30 to 7.12.30 ...	24.12.30
<i>Ariosto</i> ...	Biggins, R. L. ...	N. F. Hewetson, R. W. Holdsworth.	No. A.	Ellerman Wilson ...	Form 911 22.9.30 to 27.12.30 ...	6.1.31
144 †† <i>Arlanza</i> ...	Clarke, E., R.D., Commr. R.N.R.	W. Dorrell, H. V. Todd, F. T. Brett.	W.T.	R.M.S.P. ...	Forms 911 & 138 17.1.31 to 3.3.31... ..	5.3.31
091 †† <i>Armada Castle</i> ...	Whitfield, G. J. ...	W. Pace, C. Lloyd, A. H. Parry, E. T. Day.	M.L.	Union Castle ...	Form 915 1.8.30 to 23.11.30 ...	26.11.30
296 *† <i>Arracan</i> ...	Thomson, S. ...	K. Currie, B. Bain, T. B. Wilkins.	M.L.	P. Henderson ...	Form 915 26.3.30 to 5.11.30 ...	11.11.30
<i>Arundel</i> ...	Shaw, B. ...	E. Hill ...	C.C.	Southern Rly. ...	Telegraphic Report 5.4.31 ...	5.4.31
095 †† <i>Arundel Castle</i> ...	Morton Betts, W. ...	G. L. Clarke, O. Pitts, E. McKinley.	M.L.	Union Castle ...	Form 911 8.8.30 to 28.12.30 ...	2.1.31
156 *† <i>Ascanius</i> ...	Wilson, C. A. ...	R. Robinson, E. Radford, R. Holdstock.	"	A. Holt ...	Form 915 14.9.30 to 15.1.31 ...	23.1.31
280 *† <i>Astronomer</i> ...	Richards, J. ...	T. R. Hill ...	No. M.	Harrison ...	Forms 911 & 138 4.11.30 to 30.11.30	4.12.30

Name of Vessel.	Captain.	Observing Officers.	Meteoro-logical Equipment.	Line.	Last Log, Register, or Record Contributed. Received up to 17.4.31.	Date Received.
065 † <i>Asturias</i> M.V. ...	LeBrecht, H. A. ...	H. G. Whittle, S. J. Hill, T. W. Stevens, L. H. Smith.	W.T.	R.M.S.P. Co. ...	Form 138 11.2.31 to 12.3.31 ...	14.3.31
<i>Atlantian</i> ...	Masters, W. ...	... ..	No. A	Leyland ...	Form 911 6.2.31 to 15.2.31 ...	25.2.31
<i>Atrous</i> ...	Wilcox, J. H. ...	E. A. H. Gepp ...	" A.	A. Holt ...	" 25.12.30 to 12.4.31 ...	17.4.31
281 † <i>Auditor</i> ...	Owen, W. T. ...	L. Richardson ...	" M.	Harrison ...	Forms 911 & 138 31.8.30 to 15.11.30	25.11.30
<i>Ausonia</i> ...	Murchie, P. A., R.D., Capt., R.N.R.	E. R. Taylor ...	" A.	Cunard ...	Form 911 15.11.30 to 7.12.30 ...	15.12.30
212 † <i>Australia</i> ...	Parkin, J. W. ...	H. Falkiner, E. H. Lidstone, A. G. Brooks.	M.L.	British India ...	Form 915 27.9.30 to 10.2.31 ...	23.2.31
010 † <i>Avelona Star</i> ...	Thomas, R. J. ...	F. N. Johnson, A. Malcou- ronne, L. Parsons.	No. M.	Blue Star ...	Forms 911 & 138 3.1.31 to 19.2.31	25.2.31
124 † <i>Avila Star</i> ...	Hopper, G.E. ...	W. J. Stratton, C. Barratt, R. C. Freaker, D. Marshall.	" M.	" ...	" " 17.1.31 to 3.3.31	10.3.31
179 † <i>Balranald</i> ...	Short, C. E. ...	E. R. Physick, H. P. Mallet, G. E. Owen.	" M.	P. & O. Branch ...	Forms 911 & 138 1.2.31 to 1.3.31...	13.4.31
051 † <i>Baltic</i> ...	Davies, E. ...	J. Law, F. W. Laws, N. E. Banks.	W.T.	White Star ...	" " 16.3.31 to 5.4.31	8.4.31
<i>Bampton Castle</i> ...	James, J. S., D.S.C. ...	H. R. Graham ...	No. A.	Union Castle ...	Form 911 15.10.30 to 29.11.30 ...	20.12.30
248 † <i>Banffshire</i> ...	Page, W. J. ...	A. Banks, N. Stewart ...	" M.	Turnbull Martin ...	Forms 911 & 138 30.12.30 to 6.2.31	16.3.31
180 † <i>Baradine</i> ...	Elliot Smith, H. ...	C. B. Roche, A. G. Jenkins, L. A. Hill, C. F. Halliday, G. L. Farnfield.	M.L.	P. & O. Branch ...	Form 915 21.11.30 to 27.2.31 ...	3.3.31
037 † <i>Baronesa</i> ...	Compton, R. W. ...	H. N. Sherwell, F. W. Kent, J. G. Freeman.	No. M.	Houlder ...	Forms 911 & 138 9.2.31 to 4.4.31	7.4.31
<i>Baron Forbes</i> ...	Cairns, W. ...	J. Maclean ...	" A.	H. Hogarth & Sons... British India ...	Form 911 4.2.31 to 26.2.31 ... Forms 911 & 138 11.2.31 to 11.3.31	9.3.31 13.4.31
213 † <i>Barpeta</i> ...	Partridge, H. ...	J. H. Kerr, R. H. A. Bond, H. Cray.	" M.	" ...	" " 22.9.30 to 1.1.31	9.1.31
181 † <i>Barrabool</i> ...	Sheepwash, J. S. ...	F. N. Mosey ...	" M.	P. & O. Branch ...	" " 22.9.30 to 1.1.31	9.1.31
294 † <i>Barranca</i> ...	Edwards, A. C. ...	" ...	M.L.	Elders & Fyffes ...	" " 23.1.31 to 25.2.31	2.3.31
070 † <i>Bayano</i> ...	Swain, F. H. ...	F. Leach, A. Sandham, W. Hannak.	W.T.	" ...	" " 23.1.31 to 25.2.31	2.3.31
<i>Baychimo</i> ...	Cornwell, S. A. ...	" ...	No. A.	Hudson Bay Co ...	Form 911 8.7.30 to 29.9.30 ...	6.11.30
059 † <i>Belgenland</i> ...	Morehouse, W. A. ...	J. R. Loe, J. H. A. Mackie, F. Good.	W.T.	Red Star ...	Forms 911 & 138 16.12.30 to 6.4.31	16.4.31
<i>Benalder</i> ...	Fairweather, J. J. ...	E. D. Copeman ...	No. A.	Ben Line ...	Form 911 10.3.30 to 18.4.30 ...	24.4.30
183 † <i>Bendigo</i> ...	Wyatt, F. N. ...	J. K. Krone, H. Morgan, R. S. Frost.	" M.	P. & O. Branch ...	Forms 911 & 138 8.12.30 to 12.2.31	2.3.31
<i>Bengore Head</i> ...	Milligan, J. ...	C. J. Rea ...	" A.	Ulster S.S. Co. ...	Form 911 28.2.31 to 6.3.31 ...	10.3.31
233 † <i>Berwickshire</i> ...	Evens, E. H. ...	J. O. Woodall, R. Frankish, C. Allister.	W.T.	Turnbull Martin ...	Forms 911 & 138 15.2.31 to 5.3.31...	13.4.31
<i>Brenda</i> ...	Wright, J. ...	N. Ross ...	No. A.	Scottish Fishery Brd. White Star ...	Form 911 3.3.31 to 30.3.31 ... Forms 911 26.2.31 to 11.4.31 ...	2.4.31 13.4.31
057 † <i>Britannic</i> ...	Summers, F. F., R.D., Commr., R.N.R.	J. W. Peters, D. Chamberlain, F. E. Patchett.	W.T.	" ...	" " 26.3.31 to 23.3.31	14.4.31
269 † <i>British Consul</i> ...	Putt, R. O. ...	C. Galley ...	No. M.	British Tankers ...	" " 13.10.30 to 21.1.31	26.1.31
311 † <i>British Dominion</i> ...	Taylor, R. J. ...	J. E. Jones, C. A. James ...	" M.	" ...	Forms 911 & 138 2.7.30 to 10.9.30	22.9.30
308 † <i>Bulysse</i> M.V. ...	Head, B. P. ...	G. P. Hansard ...	" M.	Anglo-Saxon Petroleum Co. Turnbull Martin ...	Form 915 20.4.30 to 24.8.30 ...	12.9.30
249 † <i>Buteshire</i> ...	Gibb, A. W. P. ...	P. McMillan, S. W. Brown, F. C. Doyle.	M.L.	" ...	" ...	" ...
031 † <i>Caledonia</i> ...	Collie, A. ...	W. Harvey, R. Leiper, J. McMillan.	W.T.	Anchor... ...	Forms 911 & 138 8.3.31 to 28.3.31	8.4.31
<i>Calgaric</i> ...	Jackson, W. ...	J. W. Paine ...	"	White Star ...	Form 911 2.2.31 to 10.3.31 ...	12.3.31
139 † <i>California</i> ...	Frank, F. A., D.S.O., R.D., Commr., R.N.R.	Smart, R. W. ...	"	Anchor... ...	Forms 911 & 138 15.3.31 to 5.4.31...	9.4.31
<i>Cambria</i> ...	Copland, C. P. ...	G. M. Mackellar, D. Morrison, A. C. Johnson.	"	" ...	" ...	" ...
250 † <i>Cambridge</i> ...	Williams, R. ...	O. W. LL Jones ...	C.C.	L.M. & S. Rly ...	Telegraphic Report 17.4.31 ...	17.4.31
<i>Cameronia</i> ...	Gemmell, W. ...	H. C. Fryer, F. Pover, D. H. Chadwick, H. Mackillican.	M.L.	Federal ...	Form 915 1.5.30 to 9.8.30 ...	12.8.30
026 † <i>Cameronia</i> ...	Forrester, W. T., O.B.E.	D. C. Shedden ...	W.T.	Anchor ...	Forms 911 & 138 1.3.31 to 23.3.31	24.3.31
295 † <i>Camito</i> ...	" ...	H. H. Dunning, G. M. Roberts, E. F. Witchell, A. H. Peacock, W. A. C. Wood, H. J. Perrett.	M.L.	Elders & Fyffes ...	Form 915 6.10.30 to 11.2.31 ...	21.2.31
101 † <i>Canonesa</i> ...	Brodie, W. H. ...	F. E. Flint ...	No. M.	Furness Houlder ...	Forms 911 & 138 1.3.31 to 22.3.31	13.4.31
<i>Cape of Good Hope</i> ...	Jacobson, T. A. ...	W. R. G. Carling ...	" A.	Lyle S.S. Co. ...	Form 911 15.2.31 to 10.3.31 ...	7.4.31
282 † <i>Carinthia</i> ...	Hawkes, W. A., R.D., Commr., R.N.R.	P. O. Davis, A. B. Fasting, G. S. Hutchinson.	W.T.	Cunard ...	Forms 911 & 138 15.12.31 to 8.2.31	1.4.31
035 † <i>Carmania</i> ...	Townley, J. C. ...	J. McKie, E. R. B. Freeman, N. Kingscote.	"	" ...	" " 15.3.31 to 22.3.31	26.3.31
092 † <i>Carmarvon Castle</i> M.V.	Chave, Sir B., K.B.E.	L. H. Farrow, E. Clancy ...	"	Union Castle ...	" " 14.2.31 to 4.4.31	7.4.31
034 † <i>Caronia</i> ...	Brown, F. G., R.D., Capt., R.N.R.	W. B. Tanner, D. S. Kite, R. D. McCallum.	"	Cunard ...	" " 23.3.31 to 28.3.31	31.3.31
<i>Casanave</i> ...	Browne, S. ...	" ...	No. A.	Elders & Fyffes ...	Form 911 11.2.31 to 13.3.31 ...	23.3.31
184 † <i>Cathay</i> ...	Niven, J. D. ...	A. M. Askin ...	" M.	P. & O ...	Forms 911 & 138 5.10.30 to 1.1.31	3.1.31
<i>Cavina</i> ...	Riseley, A. D. ...	B. R. Coe ...	" A.	Elders & Fyffes ...	Form 911 11.3.31 to 13.4.31 ...	17.4.31
052 † <i>Cedric</i> ...	Freeman, C. P., R.D., Commr., R.N.R.	R. Hawkins, J. Farrell, H. R. Wilkinson.	W.T.	White Star ...	Forms 911 & 138 2.3.31 to 23.3.31	25.3.31
157 † <i>Centaur</i> M.V. ...	Ward Hughes, J. ...	J. Cockburn, B. L. Brind, D. M. McAdam.	M.L.	A. Holt & Co. ...	Met. Log. 19.2.30 to 21.7.30 ...	7.10.30
056 † <i>Ceramic</i> ...	Lloyd, W. ...	R. H. Shaw, W. F. Denison ...	W.T.	White Star ...	Forms 911 & 138 25.1.31 to 25.2.31	7.4.31
<i>Cerinthus</i> M.V. ...	Hammond, M. J. ...	E. Allen ...	M.L.	Hadley Shipping ...	" ...	" ...
<i>Changuinola</i> ...	Thorburn, R. A., R.D., Commr., R.N.R.	H. K. Houghton ...	No. A.	Elders & Fyffes ...	Form 911 20.10.30 to 22.11.30 ...	28.11.30
<i>Chindwin</i> ...	Paterson, G. ...	C. R. Roy ...	" A.	Henderson ...	" 18.1.31 to 1.4.31	8.4.31
<i>Chitripo</i> ...	Sapsworth, S. A. ...	S. Waddington ...	" A.	Elders & Fyffes ...	" 25.7.30 to 10.10.30 ...	16.10.30
192 † <i>Chitral</i> ...	Holland, R. ...	T. D. Forbes, N. H. Thomp- son, N. S. Gerrans.	" M.	P. & O. ...	" 21.2.31 to 13.3.31...	7.4.31
265 † <i>City of Bavoda</i> ...	McMillan, J. ...	H. G. Williams, J. E. Jenkins, R. W. Leese, A. G. Daniels.	M.L.	Ellerman ...	Form 915 16.3.30 to 2.1.31 ...	3.3.31
<i>City of Benares</i> ...	Wyper, J. ...	R. W. Kellie ...	No. A.	" ...	Form 911 5.3.30 to 15.8.30 ...	1.9.30
<i>City of Cambridge</i> ...	Wilson, E. G. ...	H. H. Asher ...	" A.	" ...	" 2.12.30 to 11.1.31 ...	23.2.31
<i>City of Carlisle</i> ...	Mordue, J. A. ...	" ...	" A.	" ...	" 24.11.30 to 28.12.30 ...	1.1.31
268 † <i>City of Chester</i> ...	Letton, F. W. ...	P. R. Winship, C. W. Nelson, W. V. Highton.	M.L.	" ...	Form 915 5.5.30 to 19.9.30 ...	11.12.30
266 † <i>City of Exeter</i> ...	Nicholl, L. ...	H. Burns ...	W.T.	" ...	Forms 911 & 138 20.10.30 to 29.10.30	15.12.30
<i>City of Harvard</i> ...	MacMillan, J. ...	E. Brook-Williams ...	No. A.	" ...	Form 911 11.2.31 to 1.4.31 ...	13.4.31
<i>City of Hong Kong</i> ...	Walton, H. L., O.B.E., R.D., Commr., R.N.R.	H. Saunders ...	" A.	Ellerman ...	Forms 911 & 138 3.3.31 to 3.4.31 ...	9.4.31
286 † <i>City of London</i> ...	Brown, J. G. ...	A. J. Barrett, E. Gillies, W. H. Matheson.	W.T.	" ...	Forms 911 & 138 3.2.31 to 24.3.31...	14.4.31
267 † <i>City of Paris</i> ...	MacMillan, J. ...	E. A. Davidson ...	" M.	" ...	" " 15.10.30 to 5.11.30	1.1.31
271 † <i>City of Roubaix</i> ...	Radcliffe, A. V., R.D., Lt.-Com., R.N.R.	J. A. Williams, J. L. Robertson, A. N. G. Jones.	No. M.	" ...	Forms 911 & 138 14.10.30 to 3.11.30	15.12.30

LIST OF VOLUNTARY OBSERVING SHIPS

iii

Name of Vessel.	Captain.	Observing Officers.	Meteoro-logical Equipment.	Line.	Last Log, Register, or Record Contributed. Received up to 17.4.31.	Date Received.
272 *† City of Singapore	Kendall, J. W.	F. Wrigley	No. M.	Ellerman	Forms 911 & 138 27.2.31 to 22.3.31	13.4.31
273 *† City of Valencia	Ewing, W.	A. Travis, C. C. Duncan, C. B. P. Bradbury.	" M.	"	" " 3.2.30 to 5.3.31	14.3.31
City of Yokohama	Singleton, J. G.	J. Kinley, N. Dawson, H. Nish	" A.	"	Form 911 29.10.30 to 20.11.30	25.11.30
Clan Alpine	Young, A. H., R.D., Commr., R.N.R.	S. S. Stammwitz	" A.	Clan	" 17.11.30 to 5.12.30	17.12.30
Clan Kenneth	Stenson, F. J., A.D.C., R.D., Capt., R.N.R.	T. A. Pearson	" A.	"	" 17.12.30 to 22.1.31	2.2.31
Clan Macalister	Boag, J.	T. M. Rees Davis	" A.	"	" 21.1.31 to 17.2.31	24.2.31
Clan MacBean	Worthington, C. D.	G. W. Spiller	" A.	"	" 5.12.30 to 15.12.30	22.12.30
Clan Macbeth	Laird, C.	W. R. Woodruffe, I. Cape	" A.	"	" 22.12.30 to 21.3.31	27.3.31
Clan Macfadyn	Redford, L.F., Lieut-Commr., R.N.R.	W. C. Dazell	" A.	"	" 14.12.30 to 6.1.31	9.2.31
Clan Macfarlane	Mackinlay, A.	W. H. Simpson, W. Wright, H. F. Town, J. R. Moss.	" A.	"	" 20.12.30 to 5.4.30	14.4.30
Clan Macgillivray	Scott-Smith, H. E. G.	S. R. J. Woods	" A.	"	" 20.1.31 to 5.3.31	7.4.31
Clan Macindoe	Lyall, A. B.	J. C. Dunphy	" A.	"	" 9.2.31 to 17.3.31	13.4.31
Clan Mackellar	Gourlay, J. B.	A. V. Howard	" A.	"	" 23.1.31 to 7.2.31	7.3.31
001 *† Clan Macphee	Holman, W. G.	E. H. Stone, T. Cornelius, A. Pollock.	M.L.	"	Form 915 6.7.30 to 3.10.30	8.11.30
004 *† Clan MacNair	Clark, J.	F. H. Petheridge, A. Woodrow, J. Napier.	W.T.	"	Forms 911 & 138 30.8.30 to 16.1.31	10.2.31
Clan Macnaughton	West, W. F.	R. C. Steel	No. A.	"	Form 911 18.5.30 to 19.6.30	28.6.30
Clan Macquarrie	Low, A.	J. H. Thorpe	" A.	"	" 13.10.30 to 22.11.30	1.12.30
002 *† Clan Macwhirter	George, L. S.	T. G. Mitchell, M. J. Lewis, L. Grant.	M.L.	"	Form 915 10.6.30 to 2.9.30	11.12.30
003 *† Clan Malcolm	Porterfield, W. M. Lt-Commr., R.N.R.	A. Lynch, J. W. Innes, B. Hind, R. F. Carter.	"	"	" 19.12.30 to 21.3.31	10.4.31
Clan Morrison	Wynne, R. H.	R. J. Brittain	No. A.	"	Form 911 18.1.31 to 9.2.31	13.3.31
Clan Murdoch	Douglas, R. A.	P. S. Evans	" A.	"	" 5.1.31 to 7.2.31	25.2.31
Clan Ranald	Neill, G. A.	J. W. Rennie	" A.	"	" 7.8.30 to 30.8.30	13.10.30
Clan Ross	Cater, H.	R. H. McElligott	" A.	"	" 28.12.30 to 20.1.31	23.1.31
Clan Sinclair	Baird, G.	L. Thomson	" A.	"	" 4.9.30 to 10.12.30	17.12.30
017 *† Colonial	Cadogan, A.	F. M. Eales	No. M.	Harrison	" " " " " "	"
298 *† Comedian	Cartwright, C.W., D.S.C.	E. J. R. North	" M.	"	" " " " " "	"
185 † Comorin	Williams, G.	R. E. Nicholson, T. H. Davies, W. Burt.	W.T.	P. & O.	Forms 911 & 138 17.2.31 to 5.3.31	17.3.31
049 *† Coptic, M.V.	Bowan, H.	R. Orange, W. Nicholl, E. Burt	"	Shaw, Savill & Albion	" " 4.3.31 to 6.4.31	9.4.31
040 † Corinthic	Almond, J. G.	W. H. G. Timberlake	No. A.	White Star	" " 9.11.30 to 24.2.31	26.2.31
Cornwall	Legge, A. W.	W. J. Dodd, B. E. Druce, A. Orchard.	W.T.	New Zealand S.S.	Form 911 12.2.31 to 7.3.31	10.4.31
006 † Coronado	Rathkings, E. C., Commr., R.N.R.	H. D. Hooper, H. E. Sang, R. J. Finch.	M.L.	Elders & Fyffes	Forms 911 & 138 6.2.31 to 11.3.31	13.3.31
301 *† Culebra	Macmillan, D.	A. Taylor, J. Pring, J. K. Macdonald, F. R. F. Wilson.	"	R.M.S.P. Co.	Form 915 19.11.30 to 3.11.31	13.2.31
251 *† Cumberland	O'Connor, T.	J. Johnson, W. Rennie, W. F. O'Neill.	No. M.	Federal	" 1.6.30 to 18.10.30	24.10.30
285 *† Custodian	Glossop, S.	R. A. Hanney	" A.	Harrison	Forms 911 & 138 25.11.30 to 4.3.31	11.3.31
Cyclops	Atkinson, W. H.	R. J. S. Pope	" A.	A. Holt	Form 911 8.12.30 to 5.2.31	13.2.31
Dakotian	Christie, W.	J. S. Ogilvie	" A.	"	" 10.11.30 to 17.12.30	24.12.30
Dardanus	Hannaford, W.	A. S. Holland	" A.	"	" 27.2.31 to 12.3.31	23.3.31
Darlan	Green, J.	G. B. Medleycott, H. Chamberlain, W. H. Roberts.	W.T.-M.	Leyland	" 27.9.30 to 8.10.30	14.10.30
302 † Darro	Trickey, J.	P. M. Ralston	No. A.	R.M.S.P. Co.	Forms 911 & 138 27.11.30 to 14.1.31	2.2.31
Davistan	Matthews, G. P.	H. H. Trewweeks, E. N. Gillet, F. Crankshaw.	W.T.-M.	Leyland	Form 911 29.8.30 to 22.10.30	28.10.30
303 † Demerara	W. S. Quinn	H. G. Williams, J. D. Mason, J. Atkin, D. M. Blair.	"	R.M.S.P. Co.	Forms 911 & 138 27.10.30 to 17.12.30	22.12.30
073 † Demosthenes	Jackson, T. H.	A. W. Hanchett	W.T.	Aberdeen Commonwealth.	" " 8.2.31 to 27.2.31	24.3.31
008 *† Denis	Buret, J.	H. Fraser, F. Collinson	W.T.-M.	Booth	" " 9.1.31 to 26.2.31	3.3.31
304 *† Desado	Huff, G.	G. L. Elliott, E. G. Woolley	"	R.M.S.P. Co.	" " 14.2.31 to 9.4.31	13.4.31
117 † Desna	Kinnell, G.	G. Chaplin, G. Landfield, M. Willmott.	No. M.	"	" " 23.12.30 to 11.2.31	9.3.31
252 *† Devon	Lidbetter, W.	E. A. Biles	C.C.	Federal	" " 4.1.31 to 13.2.31	26.2.31
Dieppe	Worthington, B.	R. W. Baldwin	No. M.	Southern Railway	Telegraphic Report 18.4.31	18.4.31
284 *† Director	MacKenzie, K. N.	W. R. Colbeck	M.L.	Harrison	Forms 911 & 138 29.5.30 to 29.8.30	9.9.30
080 *† Discovery, Auxy. Barque.	Carey, W. M. Commr. R. N.	A. L. Nelson, R. A. B. Ardley, F. E. C. Davies.	"	Douglas Mawson Expedition.	" " " " " "	"
081 † Discovery II, R.R.S.	Kitson, A. G.	A. Earl, G. Henderson, D. Cowley.	No. M.	Falkland Islands Government.	Form 915 10.5.30 to 3.12.30	14.2.31
214 *† Domala, M.V.	Campos, V., O.B.E., Lt-Commr., R.N.R.	W. E. Allen, A. S. Muir, W. F. Anderson.	M.L.	British India	Forms 911 & 138 12.2.31 to 6.3.31	13.4.31
Dominta, C.S.	Griffith, W.	F. W. Boden	No. A.	Telegraph Construction & Maintenance.	Form 915 5.9.30 to 24.11.30	6.12.30
Domitic	Hugan, C.	F. R. Hicken	" A.	Booth	Form 911 14.2.31 to 10.3.31	13.3.31
Dorelian	Meeke, A. J.	I. W. Page	" M.	Leyland	" 11.1.31 to 22.1.31	11.2.31
275 *† Dramatist	Heanly, T. W.	P. Swan	" A.	Harrison	Form 911 18.1.30 to 3.7.30	9.9.30
Dromore Castle	McQueen, D. S.	G. Mowatt, E. V. Glennie	W.T.-M.	Union Castle	Forms 911 & 138 30.1.31 to 9.4.31	13.4.31
142 † Duchess of Atholl	Sibbons, H.	A. Mawsey	"	Canadian Pacific	Forms 911 & 138 15.3.31 to 21.3.31	25.3.31
152 † Duchess of Bedford	Freer, A., R.N.R.	F. H. Stell	"	"	Forms 911 & 138 15.3.31 to 2.4.31	7.4.31
151 † Duchess of Richmond.	Stuart, R. N., V.C., D.S.O., Commr., R.N.R.	N. Scallon, D. Parsons	"	"	" " 18.1.31 to 12.3.31	23.3.31
143 † Duchess of York	Vincent, E. S., R.D., Commr., R.N.R.	J. Daziel, G. D. Pennick, P. G. Maelver.	W.T.	Union Castle	" " 10.3.31 to 29.3.31	31.3.31
098 † Dunbar Castle, M.V.	Hutchings, A. H.	A. C. M. Black	No. A.	"	Form 911 5.9.30 to 13.11.30	19.11.30
Dunluce Castle	Ramsay, J. D.	W. R. Holt, J. R. Butt	" A.	Glen & Co.	" 24.1.31 to 15.2.31	23.3.31
Dunrobin	Williams, W. E.	F. D. Jones	" M.	Furness Withy	Forms 911 & 138 3.11.30 to 7.1.31	12.1.31
102 *† Duquesa	Parkes, C. E.	J. E. Miles	" M.	British India	Form 911 2.2.30 to 10.3.30	28.4.30
215 *† Durenda, M.V.	Gilbert, E. F.	C. Harvey, R. Longman, E. F. Day.	W.T.	"	" 18.10.30 to 7.12.30	9.12.30
077 † Edinburgh Castle	Nelson, J. A.	J. T. Townson, R. A. Cherry	No. A.	Elder Dempster	" 16.9.30 to 3.10.30	6.10.30
Egori	Ellis, F., D.S.C.	W. Findlay, J. Burch, C. G. Adlard.	" M.	Houlder	Forms 911 & 138 9.12.30 to 28.1.31	19.2.31
107 *† El Argentino, M.V.	Burns, R.	J. Macrae, W. Walker, H. L. Roberts.	No. M.	Denholme S.S. Co.	Forms 911 & 138 10.10.30 to 25.12.30	13.2.31
090 *† Eldon Park	Wilson, T. P.	J. M. Whyte	" M.	R. S. Dalgleish	" " 26.2.31 to 23.3.31	8.4.31
009 *† Elmworth, M.V.	Wilson, R. J.	E. Roberts, H. Skinnis, J. F. Browning.	M.L.	A. Holt	Form 915 1.5.30 to 6.2.31	13.2.31
158 *† Elpenor	Owen, R.	P. A. Hawkesworth	No. M.	"	Forms 911 & 138 9.9.30 to 24.11.30	13.12.30
108 *† Elstree Grange	Frost, C. R.	G. Fletcher, F. J. G. Rice, R. L. Aldridge.	" M.	Houlder	" " 30.11.30 to 7.2.31	18.2.31
109 *† El Paraguayo	McNamara, T.	F. E. Hailstone	" M.	"	" " 11.1.31 to 12.3.31	24.3.31
110 *† El Uruguayo						

Name of Vessel.	Captain.	Observing Officers.	Meteoro-logical Equipment.	Line.	Last Log, Register, or Record Contributed. Received up to 17.4.31.	Date Received.
027 *† <i>Elysia</i> ...	Henderson, F. M. ...	C. Mitchell, J. Herbert, W. A. Beveridge.	M.L.	Anchor ...	Form 915 13.9.30 to 4.1.31 ...	26.1.31
088 *† <i>Empire Star</i> ...	Owen, G., R.D., Lieut.-Commr., R.N.R.	...	"	Blue Star ...	...	...
066 †† <i>Empress of Australia</i> ...	Griffiths, E., Lieut.-Commr., R.N.R.	A. Tippet ...	W.T.	Canadian Pacific ...	Form 911 24.1.31 to 3.3.31 ...	14.4.31
154 †† <i>Empress of Canada</i> ...	Hailey, A. J., Lieut.-Commr., R.N.R.	C. W. G. Patterson, G. M. Fawcett, A. M. Barff, A. C. Jones.	M.L.	" " ...	Form 915 7.8.30 to 14.11.30 ...	24.12.30
061 †† <i>Empress of France</i> ...	Stuart, R. N., V.C., D.S.O., Commr., R.N.R.	...	W.T.	" " ...	...	...
153 †† <i>Empress of Japan</i> ...	Robinson, S., C.B.E., R.N.R.	R. Goss, R. Wolfenden, A. Le Maistre.	M.L.	" " ...	Form 915 7.8.30 to 13.1.31 ...	16.2.31
<i>Eumaeus</i> ...	Hodgson, R. N. ...	W. G. Coxshall ...	No. A.	A. Holt ...	Form 911 20.1.31 to 12.2.31 ...	30.3.31
078 †† <i>Euripides</i> ...	Cole, N. ...	C. C. Beal, J. Colling, A. Sheridan, R. Morrison, J. Smallwood.	W.T.-M.	Aberdeen Commonwealth	Forms 911 & 138 23.5.30 to 24.9.30	7.10.30
<i>Euryades</i> ...	Ewan, W. B. ...	D. S. Bruce ...	No. A.	A. Holt ...	Form 911 21.1.31 to 26.1.31 ...	17.2.31
<i>Explorer</i> ...	Allan, J. ...	A. Stout ...	" A.	Scottish Fishery Brd.	" 3.3.31 to 21.3.31 ..	7.4.31
067 *† <i>Ferndale</i> ...	Beighton, J. N. ...	...	" M.	Aberdeen Commonwealth.	...	...
074 *† <i>Fordsdale</i> ...	Thompson, W. J. ...	F. Vaughan, M. Harries, M. Newton.	" M.	Aberdeen Commonwealth	Forms 911 & 138 26.12.30 to 21.1.31	10.3.31
<i>Francisco</i> ...	Scales, H. ...	B. Scholefield ...	" A.	Ellerman Wilson ...	Form 911 27.4.30 to 3.6.30 ...	11.6.30
030 †† <i>Franconia</i> ...	Irving, R. B. ...	W. M. Stewart, J. H. Kenworthy, R. Pollitt.	W.T.	Cunard ...	" 11.1.31 to 20.1.31 ...	23.1.31
<i>Freya</i> ...	Lamont, A. ...	W. Pirrie ...	No. A.	Scottish Fishery Brd.	" 3.3.31 to 31.3.31 ...	7.4.31
159 ** <i>Gascoyne</i> ...	Johnson, L. ...	J. S. Macbryde, C. O. Melson, W. Uttley,	M.L.	A. Holt & Co... ..	Form 915 2.5.30 to 22.9.30 ...	13.1.31
307 *† <i>Glamorganshire</i> ...	Miles, F. R., R.D., Commr., R.N.R.	T. W. Boleard ...	No. M.	R.M.S.P. Co. ...	Forms 911 & 138 14.12.30 to 6.1.31	13.1.31
125 *† <i>Glenamoy, M.V.</i> ...	Homan, C. E. ...	F. Laycock, G. Morgan, N. B. Jones.	M.L.	Glen Line ...	Form 915 5.5.30 to 5.11.30 ...	18.11.30
<i>Glenbeg, M.V.</i> ...	Newing, L. ...	G. A. C. Barnard ...	No. A.	" ...	Form 911 20.1.31 to 1.3.31 ...	7.4.31
126 *† <i>Glengarry, M.V.</i> ...	Angier, J. ...	J. Tyler, J. W. Leslie, S. W. Bell.	" M.	" ...	Forms 911 & 138 29.3.31 to 10.4.31	14.4.31
<i>Gleniffer</i> ...	Baker, W. H. ...	A. H. D. Shaw ...	" A.	" ...	Form 911 15.3.31 to 26.3.31 ...	7.4.31
<i>Glenluce, M.V.</i> ...	Kennett, W. H. ...	J. A. Evans ...	" A.	" ...	" 31.8.30 to 24.12.30 ...	30.12.30
<i>Glenshane</i> ...	Martin, V. F. ...	S. Merrick ...	" A.	" ...	" 27.10.30 to 17.2.31 ...	24.2.31
<i>Glentworth</i> ...	Aitchison, D.M. ...	A. Bone ...	" A.	R. S. Dalgleish ...	" 21.12.30 to 8.4.31 ...	15.4.31
<i>Gloucester Castle</i> ...	MacMahon, J. ...	J. L. Goatley ...	" A.	Union Castle ...	" 1.11.30 to 1.1.31 ...	3.1.31
<i>Governor</i> ...	Windsor, G. R. ...	...	" M.	Harrison ...	...	...
<i>Guildford Castle</i> ...	Schalefield, H. L. ...	E. Hamlyn ...	" A.	Union Castle ...	Form 911 22.4.30 to 10.5.30 ...	10.6.30
<i>Halesius</i> ...	Hawley, F. J. ...	A. S. P. May ...	" A.	R. P. Houston ...	" 1.9.30 to 25.11.30 ...	28.11.30
111 *† <i>Hardwicke Grange</i> ...	Fowler, W. H. ...	W. L. Baker, A. D. Seybold, W. B. Ellis.	" M.	Houlder ...	Forms 911 & 138 15.2.31 to 7.4.31...	14.4.31
<i>Harmonides</i> ...	Elwell, F. R. ...	L. Pogson, J. C. Wilson, E. McLachlan.	" A.	R. P. Houston ...	Form 911 2.2.31 to 23.2.31 ...	1.4.31
262 ** <i>Hawaki, M.V.</i> ...	Norton, A. T. ...	D. McLeish, A. W. Rabbitts, R. Kendall.	M.L.	Union S.S. Co., N.Z. ...	Form 915 15.8.29 to 31.10.30 ...	8.1.31
<i>Hermintus</i> ...	Roberts, T. V., R.D., Lieut.-Commr., R.N.R.	F. W. Gilroy ...	No. A.	Aberdeen Commonwealth.	Form 911 22.12.30 to 30.1.31 ...	16.3.31
<i>Herschel</i> ...	Watson, W. W. ...	S. Ranson ...	" A.	Lampart & Holt ...	" 9.1.31 to 18.3.31 ...	20.3.31
253 *† <i>Hertford</i> ...	Burton Davies, J. ...	W. Redwood, G. D. Baldwin, E. Hopkins, P. Shakespeare P. Block.	M.L.	Federal ...	Form 915 16.8.30 to 27.12.30 ...	31.12.30
<i>Hesione</i> ...	McComish, A. B. ...	W. H. Ball ...	No. A.	R. P. Houston ...	Form 911 15.4.30 to 11.5.30 ...	10.6.30
<i>Hibernia</i> ...	Dudgeon, L. T. ...	A. Marsh ...	C.C.	L.M. & S. Railway ...	Telegraphic Report 1.4.31 ...	1.4.31
182 †† <i>Highland Brigade</i> ...	Lloyd, H. ...	W. Stephen, N. Hersee, C. Morgan.	No. M.	Nelson ...	Forms 911 & 138 14.1.31 to 3.3.31	23.3.31
116 †† <i>Highland Chieftain, M.V.</i> ...	Robinson, R. H. ...	W. J. Presland ...	" M.	" ...	" " 18.12.30 to 4.2.31	9.2.31
099 †† <i>Highland Monarch, M.V.</i> ...	Ashby Graves, F. ...	R. Polden ...	" M.	" ...	" " 9.2.31 to 1.4.31	7.4.31
079 *† <i>Hildebrand</i> ...	Buck, R. H., R.D., Capt., R.N.R.	W. H. Cross ...	W.T.	Booth ...	" " 18.1.30 to 23.2.31	2.3.31
075 *† <i>Hobson's Bay</i> ...	Kydd, O. J. ...	J. Worrall, B. F. Moffatt, C. Carroll, C. Campbell, C. C. Good.	M.L.	Aberdeen Commonwealth.	Form 915 28.5.30 to 9.1.31 ...	5.2.31
<i>Holbein</i> ...	Gough, W. A. ...	F. Delaney ...	No. A.	Lampart & Holt ...	Form 911 9.12.30 to 8.1.31... ..	7.1.31
054 †† <i>Homeric</i> ...	Bulman, J. B. ...	H. G. Morgan, M. Bennett, W. Poustie.	W.T.	White Star ...	Forms 911 & 138 15.1.31 to 31.1.31	9.2.31
<i>Hubert</i> ...	Briscoe, W. ...	T. E. Williams ...	M.L.	Booth ...	Form 911 4.2.31 to 1.4.31 ...	14.4.31
261 *† <i>Huntingdon</i> ...	Field, H. G. B. ...	M. J. Broadhead, P. S. Calcutt, J. H. Strand Jones, H. F. Wilkinson.	W.T.	Federal... ..	" & 138 17.11.30 to 3.3.31	14.3.31
289 *† <i>Ingoma</i> ...	Gibbings, W. ...	S. M. Smith, D. Douglas Kerr, R. Sutcliffe.	No. M.	Harrison ...	Forms 911 & 138 1.2.31 to 12.3.31	19.3.31
160 *† <i>Ixion</i> ...	Dougall, W. T. ...	G. L. Oldrich, W. H. Deans, D. Trail.	M.L.	A. Holt ...	Form 915 19.4.30 to 18.9.30 ...	26.11.30
<i>Jamaica Merchant</i> ...	Bach, L. G., R.D., Lieut.-Commr., R.N.R.	B. W. Smith ...	"	Jamaica Direct Fruit	Form 911 21.11.30 to 27.12.30 ...	13.1.31
072 ** <i>Jamaica Planter</i> ...	Towell, W. C. ...	J. Quick ...	W.T.	" " ...	Forms 911 & 138 13.2.31 to 20.3.31	2.4.31
<i>Jamaica Producer</i> ...	Gallop, J. W. ...	C. E. Edney ...	No. A.	" " ...	Form 911 4.12.30 to 15.12.30 ...	5.1.31
<i>Javanese Prince, M.V.</i> ...	Smith, J. ...	A. G. Edwards ...	" A.	Prince ...	" 11.2.31 to 15.3.31 ...	7.4.31
187 *† <i>Jeypore</i> ...	Harris, W. L. ...	...	" M.	P. & O. ...	Forms 911 & 138 29.11.30 to 23.2.31	2.3.31
188 †† <i>Kaisar-i-Hind</i> ...	Headlam, P. C., R.D., Commr., R.N.R.	T. T. Ferguson, H. Flint, S. Hopkins.	" M.	" ...	" " 1.2.31 to 25.3.31	31.3.31
189 *† <i>Kalyan</i> ...	Cooper, C. P., O.B.E., R.D., Capt., R.N.R.	M. G. Morris ...	" M.	" ...	" " 9.12.30 to 25.1.31	27.1.31
041 *† <i>Karama, M.V.</i> ...	McIntosh, A. ...	K. D. Fisher, N. S. Milne, C. Sendall, A. S. White.	M.L.	Shaw, Savill & Albion	Form 915 15.10.30 to 8.2.31 ...	17.2.31
217 *† <i>Karapara</i> ...	Maclean, A. ...	B. Paul, J. B. Walker... ..	No. M.	British India... ..	Forms 911 & 138 14.1.31 to 27.2.31	23.3.31
190 *† <i>Kashgar</i> ...	Sudell, F., R.D., Commr., R.N.R.	R. P. Eddy, C. H. Long ...	" M.	P. & O. ...	" " 14.12.30 to 8.3.31	24.3.31
191 *† <i>Kashmir</i> ...	Mallalue, R., Lt.-Commr., R.N.R.	H. M. Webb, F. C. Fairburne	No. M.	P. & O. ...	Forms 911 & 138 19.12.30 to 22.2.31	26.2.31
114 †† <i>Kenya</i> ...	Grant, W. E. ...	L. Y. Ken, R. Lord, A. Ralph	" M.	British India ...	" " 25.1.31 to 10.2.31	2.3.31
218 *† <i>Khandalla</i> ...	Baird, S. K. ...	W. Gordon Jones ...	" M.	" ...	" " 1.1.31 to 13.2.31...	10.3.31
283 *† <i>Khiva</i> ...	Dawson, E. E. N. ...	E. V. Lewis ...	" M.	P. & O. ...	...	...
186 *† <i>Kidderpore</i> ...	Woodroffe, S. Y. ...	R. H. Hand, G. S. B. Coleard	" M.	" ...	Forms 911 & 138 18.12.30 to 25.2.31	16.3.31
169 ** <i>Kwangchow</i> ...	Stringer, C. B. L. ...	O. Fox ...	M.L.	China Nav. Co. ...	Form 915 1.5.30 to 1.11.30 ...	6.1.31

LIST OF VOLUNTARY OBSERVING SHIPS

Name of Vessel.	Captain.	Observing Officers.	Meteorological Equipment.	Line.	Last Log, Register, or Record Contributed. Received up to 17.4.31.	Date Received.
147 † <i>Laconia</i> ...	Doyle, M. ...	... ..	W.T.	Cunard... ..	... ..	...
193 *† <i>Laguna</i> , M.V. ...	Dunn, R.E., O.B.E. ...	W. Billington	No. A.	Pacific S.N. Co. ...	Form 911 24.2.31 to 12.3.31 ...	7.4.31
193 *† <i>Lahore</i> ...	Hollow, T. H. ...	J. G. K. Gregory, F. Hull, S. R. Ewa. ...	" M.	P & O.	Forms 911 & 138 21.9.30 to 11.2.31 ...	17.2.31
<i>Lalande</i> ...	Symons, P. ...	C. Legg	" A.	Lampport & Holt ...	Form 911 30.1.30 to 24.2.31 ...	4.3.31
<i>Lancashire</i> ...	Fountain, C. ...	W. H. Campe	" A.	Bibby	" 13.3.30 to 9.4.30... ..	22.4.30
036 † <i>Lancastria</i> ...	Oram, B. B., R.D., Commr., R.N.R.	H. V. Clarke, J. S. Glendenning, F. Drake. ...	W.T.	Cunard	Forms 911 & 138 23.2.31 to 14.3.31 ...	18.3.31
<i>Laomedon</i> ...	Watson, C. J. ...	A. E. Martin	No. A.	A. Holt	Form 911 31.1.31 to 23.3.31 ...	30.3.31
<i>La Paz</i> , M.V. ...	Morgan, D. R. ...	R. W. Hanson, J. Sutherland, G. Pattison. ...	" M.	Pacific S.N. Co. ...	Forms 911 & 138 15.3.31 to 13.4.31 ...	16.4.31
<i>Laplace</i> ...	Hickman, V. G. ...	R. H. Sneddon	" A.	Lampport & Holt ...	Form 911 21.9.30 to 31.12.30 ...	28.1.31
134 † <i>Lapland</i> ...	Harvey, H. ...	... ..	W.T.	Red Star ... ..	... ..	...
076 *† <i>Largs Bay</i> ...	Jermyn, W. M. ...	F. B. Marsden	No. M.	Aberdeen Commonwealth. ...	Forms 911 & 138 11.10.29 to 3.11.30 ...	29.12.30
112 *† <i>La Rosarina</i> ...	Webb, C. ...	W. S. Hamblin... ..	" M.	Houlder	" 25.12.30 to 21.2.31 ...	27.2.31
<i>Lassell</i> ...	Leicester, F. S. ...	W. H. Chapman	" A.	Lampport & Holt ...	Form 911 7.9.30 to 21.11.30 ...	21.12.30
064 † <i>Laurentic</i> ...	Hume, R. ...	C. Cochrane, —, Hawkins, R. Conway. ...	W.T.	White Star	Forms 911 & 138 19.1.31 to 8.2.31 ...	11.2.31
083 *† <i>Lautaro</i> , M.V. ...	Leyne, R. W. ...	G. A. Thexton	No. M.	Pacific S.N. Co. ...	" 4.11.30 to 22.2.31 ...	2.3.31
254 *† <i>Limerick</i> ...	Molyneux, P. L. ...	A. M. Downman, N. A. Thomas ...	" M.	Federal... ..	" 22.2.31 to 3.4.31 ...	8.4.31
093 *† <i>Llandaf Castle</i> ...	Attwood, J. ...	J. E. Revittford... ..	W.T.	Union Castle	Form 911 2.1.31 to 9.3.31 ...	17.3.31
097 † <i>Llangibby Castle</i> , M.V. ...	Harvey, H. B. ...	H. S. Warren	"	"	Forms 911 & 138 31.1.31 to 3.4.31 ...	15.4.31
094 *† <i>Llanoverly Castle</i> ...	Morgan, A. O., R.D., Commr., R.N.R.	L. H. Farrow, T. C. Goldstone, F. R. Pope. ...	M.L.	"	Form 915 20.9.30 to 24.11.30 ...	3.12.30
216 *† <i>Llanstephan Castle</i> ...	Bickford, C. N. ...	T. Campbell, H. Bunn, I. Duncan. ...	W.T.	"	Form 911 15.11.30 to 18.1.31 ...	22.1.31
084 *† <i>Lobos</i> , M.V. ...	Grant, F. H. ...	R. W. Gill	No. M.	Pacific S.N. Co. ...	Forms 911 & 138 27.12.30 to 16.2.31 ...	21.2.31
<i>Loch Katrine</i> ...	Cocks, A. ...	J. E. Pardoe Matthews ...	" A.	R.M.S.P. Co.	Form 911 24.12.30 to 21.3.31 ...	27.3.31
<i>Lochmonar</i> , M.V. ...	Schlaunbusch, O. ...	F. G. Dawson, A. Yeatman, E. Smith. ...	" A.	"	" 2.10.30 to 22.12.30 ...	22.1.31
<i>London Exchange</i> ...	Griffiths, J. ...	C. T. V. Rixham	" A.	Furness Withy	" 28.2.31 to 4.4.31 ...	7.4.31
<i>Lord Antrim</i> ...	Jarvis, F. E. ...	C. A. Milligan	" A.	Ulster S.S. Co.	" 21.9.30 to 4.10.30 ...	7.10.30
<i>Loriga</i> , M.V. ...	Large, E. H., R. D., Commr., R.N.R.	J. W. Gordon	" A.	Pacific S.N. Co. ...	" 16.10.30 to 10.1.31 ...	13.1.31
194 † <i>Macedonia</i> ...	Dickenson, C. C. ...	R. A. B. Kempton	W.T.-M.	P. & O.	Forms 911 & 138 13.2.31 to 26.3.31 ...	7.4.31
013 *† <i>Macharda</i> ...	Hanna, R. G. ...	C. Lindsay Miller, C. Parry, G. A. Jackson, R. J. Mayne. ...	No. M.	Brocklebank	" 2.2.31 to 2.3.31 ...	30.3.31
232 *† <i>Madura</i> ...	Parker, A. A. ...	A. Usher, D. S. Hutton, F. C. Conolly. ...	" M.	British India... ..	" 9.1.31 to 14.3.31 ...	17.3.31
048 *† <i>Mahana</i> ...	Cameron, J. M. ...	H. C. Smith, A. E. Masters, M. G. Stuart. ...	M.L.	Shaw, Savill & Albion	Form 915 13.9.30 to 5.1.31 ...	8.1.31
141 *† <i>Mahia</i> ...	Andrews, C. M. ...	G. Sangwin, M. P. Congdon, J. Jackson. ...	W.T.	"	Forms 911 & 138 17.9.30 to 18.1.31 ...	26.1.31
014 *† <i>Mahronda</i> ...	Sharpe, G. ...	A. Melville, H. Willington, W. Le Brocq. ...	No. M.	Brocklebank	" 28.11.30 to 12.12.30 ...	29.12.30
015 *† <i>Mahsud</i> ...	Kershaw, R. W. ...	S. Richardson, E. Walker, J. R. Paisley. ...	" M.	"	" 18.8.30 to 7.11.30 ...	11.11.30
016 *† <i>Maidan</i> ...	Ison, W. A. ...	F. Moore, F. L. Attwood, L. E. Jeans. ...	" M.	"	" 16.1.31 to 9.2.31 ...	2.3.31
<i>Maihar</i> ...	Charlton, W. L. ...	C. Cadwallar, H. Gillespie, A. D. Spring. ...	" A.	"	Form 915 6.7.30 to 25.9.30... ..	4.11.30
042 *† <i>Maimoa</i> ...	Johnson, J. W. ...	J. W. Hart, A. Winton, E. Sainsbury, J. F. H. Stroud ...	M.L.	Shaw, Savill & Albion	" 22.9.30 to 8.12.30 ...	30.12.30
<i>Maimyo</i> ...	Smith, G. C. ...	J. L. Rodgers	No. A.	Brocklebank	Form 911 13.1.31 to 15.2.31 ...	10.3.31
018 *† <i>Makalla</i> ...	Maughan, J. W. ...	E. Williams	" M.	"	Forms 911 & 138 4.1.31 to 1.4.31 ...	7.4.31
225 *† <i>Makura</i> ...	MacDonald, D. ...	J. W. S. Madden, A. P. Cousin, S. H. Crawford, M. V. Langdale, R. B. Denniston. ...	M.L.	Canadian-Australasian	Form 915 4.9.30 to 20.12.30 ...	19.2.31
019 *† <i>Malakuta</i> ...	Adamson, F. L. ...	H. Simpson	No. M.	Brocklebank	Forms 911 & 138 26.11.30 to 4.3.31 ...	1.4.31
020 *† <i>Malancha</i> ...	Whitham, F. ...	R. Humble, H. B. Kelly, M. Mackenzie. ...	" M.	"	" 10.1.31 to 10.4.31 ...	15.4.31
219 *† <i>Malda</i> ...	Denne, G. H. A. ...	D. B. Lattin, G. W. P. King, E. B. Outlack. ...	" M.	British India	Form 138 25.10.30 to 15.1.31 ...	29.1.31
195 † <i>Maloja</i> ...	Browning, J. B., R.D., Commr. R.N.R.	R. H. Turner, C. H. Hand, R. E. Baldwin-Wiseman. ...	" M.	P. & O.	Forms 911 & 138 27.1.31 to 7.2.31 ...	21.3.31
196 † <i>Malwa</i> ...	Britten, P. O. ...	P. J. Lawrence	" M.	"	" 1.1.31 to 2.4.31 ...	8.4.31
<i>Mamilius</i> ...	Cole, N. ...	G. A. Knox	" A.	White Star	Form 911 12.1.31 to 29.1.31 ...	16.3.31
053 *† <i>Manaar</i> ...	Thowless, E. ...	A. L. Harrop	" M.	Brocklebank	Forms 911 & 138 23.3.31 to 1.4.31 ...	9.4.31
<i>Manchester Brigade</i> ...	Stott, C. H. ...	J. H. Round, E. E. Bonnaud, J. Gregory. ...	M.L.	Manchester Liners ...	Form 915 10.5.30 to 25.11.30 ...	5.12.30
<i>Manchester Hero</i> ...	Mitchell, G. M. ...	R. O. Jones	No. A.	"	Form 911 11.11.30 to 16.12.30 ...	1.1.31
<i>Manchester Producer</i> ...	Struss, F. D. ...	T. J. Boyd	" A.	"	" 1.6.30 to 3.7.30 ...	23.7.30
028 † <i>Mandala</i> ...	Whittingham, A. G., R.D., Capt. R.N.R.	W. E. F. Powell	" M.	British India... ..	Forms 911 & 138 17.11.30 to 6.2.31 ...	14.3.31
146 *† <i>Mandator</i> ...	Richardson, T. ...	F. C. Madden, T. S. Cullen, J. Alexander. ...	" M.	Brocklebank	" 18.12.30 to 1.3.31 ...	10.3.31
220 *† <i>Manela</i> ...	Maples, S. H. ...	T. M. Robertson, L. W. Kerton, C. R. Polinghorne. ...	" M.	British India	" 30.12.30 to 22.2.31 ...	26.2.31
022 *† <i>Manipur</i> ...	Cochran, G. N. ...	L. F. Dodson, R. Penston, A. Hill. ...	" M.	Brocklebank	" 16.2.31 to 18.3.31 ...	13.4.31
221 *† <i>Manora</i> ...	Hudson, H. T., R.D., Commr., R.N.R.	W. Brawp, A. Pyatt, S. A. Richards. ...	" M.	British India... ..	" 2.3.31 to 3.4.31 ...	8.4.31
197 † <i>Mantua</i> ...	Hignett, R.D., Commr. R.N.R.	F. R. N. Greasley, C. Hayward, H. J. Cholerton. ...	W.T.-M.	P. & O.	" 3.1.31 to 25.2.31 ...	2.3.31
299 *† <i>Marella</i> ...	Donaldson, A. ...	M. Pemberton, G. W. Thomas, H. Bryan, G. W. Revell. ...	M.L.	Burns Philp	Form 915 2.9.30 to 21.12.30 ...	19.2.31
<i>Marengo</i> ...	Aspinall, A. E. ...	W. L. Hepson, F. Brown, C. Newton, J. E. Dobson. ...	"	Ellerman Wilson ...	" 21.10.30 to 16.3.31 ...	19.3.31
222 † <i>Margha</i> ...	Hemmings, W. H. ...	P. Wright, H. Watkins ...	"	British India... ..	" 28.12.30 to 21.3.31 ...	26.3.31
104 *† <i>Marquesa</i> ...	Smiles, R. S. ...	J. Wetherall	No. M.	Furness Houlder ...	Forms 911 & 138 15.12.30 to 13.2.31 ...	17.2.31
021 *† <i>Masula</i> ...	Fitt, W. A. ...	E. B. Outlack	" M.	British India ... ..	... ..	...
044 † <i>Matarao</i> ...	Kershaw, W. A. R. ...	F. Eadon, H. A. Hill, F. C. Charnley, L. B. Miller. ...	M.L.	Shaw, Savill & Albion	Form 915 15.8.30 to 23.11.30 ...	27.11.30
023 *† <i>Matheran</i> ...	Mulcahy, J. J. ...	S. S. Slade, J. F. Butterworth, W. Cowrie. ...	No. M.	Brocklebank	Forms 911 & 138 16.3.31 to 27.3.31 ...	2.4.31
223 *† <i>Mattana</i> ...	Green, F. V. ...	L. A. Burn, P. M. Wilson, J. W. F. Daly. ...	" M.	British India... ..	" 10.2.31 to 9.4.31 ...	13.4.31
024 *† <i>Matra</i> ...	Cornish, N. P. ...	C. Shaw, W. Robertson, O. Jones, J. Campbell. ...	" M.	Brocklebank	" 29.1.31 to 20.2.31 ...	27.2.31
032 † <i>Mauretania</i> ...	McNeil, S. G. S., R.D., Capt., R.N.R.	W. C. A. Robson, J. Wiseman, W. L. Cox. ...	W.T.	Cunard	" 26.2.31 to 13.4.31 ...	16.4.31
287 † <i>Mella</i> ...	Stewart, A. ...	L. N. Outram, S. W. Keay ...	No. A.	Canadian Pacific ...	" 22.2.31 to 13.3.31 ...	16.3.31
<i>Melmore Head</i> ...	Moore, J. R. ...	... ..	" A.	Ulster S.S. Co. ... ..	... ..	...
<i>Mercian</i> ...	Hughan, C. ...	... ..	" A.	Leyland	Form 911 28.7.30 to 30.9.30 ...	8.10.30
<i>Mertones</i> ...	Hanney, T. W. ...	J. G. Jones	" A.	A. Holt	" 21.2.31 to 20.3.31 ...	13.4.31

Name of Vessel.	Captain.	Observing Officers.	Meteoro-logical Equipment.	Line.	Last Log, Register, or Record Contributed Received up to 17.4.31.	Date Received.
255 *† Middlesex ...	Clarke, P. B. ...	J. Lunnon, J. Ricketts, R. Stephens, J. Halliday.	No. M.	Federal... ..	Forms 911 & 138 8.7.30 to 12.8.30	20.11.30
312 *† Minderoo ...	Macphedran ...	E. Lancaster	" M.	Western Australian S.N. Co.	" " " " " " " "	"
068 † Minna ...	Mackenzie, G. G. ...	A. M. Campbell	" A.	Scottish Fishery Brd.	Form 911 5.3.31 to 10.4.31	13.4.31
† Minnetonka ...	Gates, T. F., C.B.E. ...	H. E. D. McCartney, R. Everard, J. W. Grier.	" M.	Atlantic Transport ...	Forms 911 & 138 27.10.30 to 13.12.30	16.12.30
069 † Minnewaska ...	Claret, F. H., C.B.E. ...	E. Pengelly, D. Davies, F. Mummery.	W.T.-M.	" " " "	" " 9.12.30 to 28.12.30	31.12.30
Mississippi, M.V. ...	Finch, E. ...	A. C. Clay	No. A.	" " " "	Form 911 10.2.31 to 26.3.31	2.4.31
224 *† Modasa ...	Gilchrist, J. W. ...	W. Ascroft, H. C. Pearson, B. H. Pollitt.	" M.	British India ...	Forms 911 & 138 8.1.31 to 13.2.31...	19.2.31
198 † Moldavia ...	Allin, C. H. C. ...	C. S. Pirie	" M.	P. & O. ...	" " 14.3.30 to 26.3.31	13.4.31
199 † Mongolia ...	Rhodes, H. R. ...	M. R. Wood, G. K. Fox, W. N. Eade.	" M.	" " " "	" " 28.12.30 to 1.4.31	8.4.31
148 † Montcalm ...	Toten, A. T. ...	T. L. Gillette, A. Mackie, A. Vaughan.	M.L.	Union S.S. of N.Z.	Forms 911 & 138 15.2.31 to 7.3.31...	11.3.31
149 † Montclare ...	McCombie, J. ...	A. Watt, J. Sharples, J. Soames.	"	" " " "	" " 1.3.31 to 21.3.31	27.3.31
150 † Montrose ...	Dott, J. F. ...	K. Hutchings, J. M. Roche, C. L. De H. Bell.	W.T.-M.	" " " "	" " 8.3.31 to 13.3.31 ...	1.4.31
164 † Mooltan ...	Morton, A. J. ...	R. M. Richardson	No. M.	P. & O. ...	" " " " " "	"
226 † Mulbera ...	Caffyn, F. ...	G. F. Bartley	" M.	British India ...	Forms 911 & 138 9.2.31 to 8.3.31...	7.4.31
200 *† Nagoya ...	Cooper, C. P., O.B.E., R.D., Capt. R.N.R.	F. D. Shaw	" M.	P. & O. ...	Form 911 21.2.30 to 23.4.30	25.4.30
201 † Naldera ...	Harrison, R., D.S.O., R.D., Capt. R.N.R.	J. O. Divers, C. W. Mayne, M. F. Shute, H. J. Mann.	M.L.	" " " "	Form 915 13.12.30 to 18.3.31 ...	26.3.31
227 *† Nardana ...	Reilly, J. V. ...	H. Goater, H. Grace, A. Woodward, R. D. Macfadyen.	"	British India ...	" " 1.11.30 to 1.3.31 ...	4.3.31
118 ** Narenta ...	Falconer, A. C. ...	G. S. Grant, G. D. Bonner, M. A. Murch.	No. M.	R.M.S.P. Co. ...	Forms 911 & 138 3.1.31 to 26.3.31	2.4.31
202 † Narkunda ...	Parker, J. J. W., R.D., Commr. R.N.R.	C. H. Moulton, J. K. King ..	" M.	P. & O. ...	" " 1.2.31 to 15.4.31	17.4.31
136 *† Navigator ...	Curphey, E. B. ...	T. R. Hill	W.T.	Harrison ...	Forms 911 & 138 1.2.31 to 6.4.31	9.4.31
305 *† Nebraska ...	Bridges, E. A. ...	A. Frogbrook, W. S. Thomas, P. R. Cocks.	No. M.	R.M.S.P. Co. ...	" " 20.2.31 to 23.3.31	7.4.31
203 † Nellore ...	Gordon, A. S. ...	L. J. Dixon, J. F. M. Heddle, H. E. Nuzum, J. Kavanagh.	M.L.	E. & A. S.S. Co. ...	Form 915 31.10.30 to 28.1.31 ...	28.2.31
162 *† Nestor ...	Adcock, F. ...	W. L. Harris, A. E. Stephenson, P. Elder.	"	A. Holt ...	" " 6.7.30 to 10.11.30 ...	15.11.30
Nevisian ...	McCormick, J. ...	" " " " " " " "	No. A.	Leyland ...	Form 911 4.4.30 to 5.7.30 ...	10.7.30
Newfoundland ...	Foxworthy, A. W. ...	R. F. Handley, E. Sainty, J. L. Macklin.	M.L.	Furness Withy ...	Form 915 18.9.30 to 1.2.31 ...	14.2.31
210 ** Niagara ...	(Hill, T. V. ...	G. H. Kime, D. A. Menlove, S. P. Bourke.	"	Canadian-Australasian	" " 20.8.30 to 8.11.30 ...	8.1.31
Ningchow ...	Beale, H. E. ...	E. Butler	No. A.	A. Holt ...	Form 911 5.1.31 to 16.1.31 ...	23.1.31
229 *† Nirvana ...	Ayres, R. M. ...	S. H. Kinson, J. B. Hore, A. H. Baird.	" M.	British India ...	Forms 911 & 138 17.6.30 to 6.7.30	29.7.30
256 *† Norfolk ...	Howell - Price, J., D.S.O., D.S.C.	G. C. Hocart, K. M. Lloyd Jones, L. Hanley.	M.L.	Federal ...	Form 915 3.7.30 to 8.8.30 ...	16.8.30
270 *† Norman Star ...	Sinclair, J. ...	R. J. Wills	No. M.	Blue Star ...	" " " " " " " "	"
Norna ...	Angus, W. ...	T. R. Ness	No. A.	Scottish Fishery Brd	Form 911 13.3.31 to 27.3.31 ...	31.3.31
100 *† Norseman, C.S. ...	Hammond, S. M. ...	R. Moss	" M.	Western Tel. Co. ...	" " 13.7.30 to 6.8.30 ...	28.8.30
297 *† Northumberland ...	Upton, H. L., D.S.C., R.D., Commr. R.N.R.	" " " " " " " "	" M.	Federal... ..	" " " " " " " "	"
Nova Scotia ...	Furneau, S. J. ...	J. E. Wilson, A. Hender, N. Forsythe, F. H. Jones.	M.L.	Furness Withy ...	Form 915 8.10.30 to 12.3.31 ...	20.3.31
230 *† Nowshera ...	Longhurst, J. H. ...	R. Burch, B. H. Bentall, S. J. Gillett.	No. M.	British India ...	Forms 911 & 138 21.9.30 to 19.11.30	16.3.31
231 *† Nuddea ...	Beeching, P. H. ...	D. A. Jones, W. Monk, W. G. Pitcher.	" M.	" " " "	" " 4.2.31 to 15.2.31 ...	23.2.31
Oaklands Grange ...	Phillips, A. G. M. ...	J. C. Thomas	" A.	Houlder Bros. ...	Form 911 30.5.30 to 18.9.30 ...	4.10.30
170 † Orama ...	Staunton, H. G., C. B. E., R. D., Commr. R.N.R.	W. Eliot, K. Morrison, R. W. Roberts.	W.T.	Orient ...	Form 915 13.10.30 to 13.1.31 ...	21.1.31
Oranlian ...	Gitings, R. P. ...	H. O. Quinn	No. A.	Leyland ...	Form 911 26.11.30 to 17.1.31 ...	29.1.31
309 † Orbita ...	Roberts, E. ...	E. C. Hicks, C. C. Gibson, J. E. Smithson.	W.T.-M.	Pacific S.N. Co. ...	Forms 911 & 138 4.11.30 to 12.1.31	19.1.31
086 † Orcoma ...	Harvey, J. G. ...	W. J. Rutter, G. H. Pilling, W. Pearce.	"	" " " "	" " 2.12.30 to 9.2.31...	19.2.31
087 † Orduna ...	Ridyard, A., O.B.E. ...	T. J. Naylor, R. F. A. Cox, E. B. James.	"	" " " "	" " 10.1.31 to 23.3.31	2.4.31
171 † Orford ...	Owens, A. L., Commr R.D., R.N.R.	S. C. K. Dowding	No. M.	Orient ...	" " 11.11.30 to 27.1.31	2.2.31
174 † Ormonde ...	James, L. V., D.S.C.	T. L. Shurrock, N. Smith, C. Blake.	W.T.	" " " "	" " 8.12.30 to 10.3.31	1.4.31
172 † Cronsay ...	Cameron, E. P., R.D., Commr. R.N.R.	E. M. Mackay	"	" " " "	" " 28.9.30 to 31.12.30	8.1.31
173 † Orontes ...	O'Sullivan, F. R. ...	J. M. N. Swanson, S. Burnand, W. McKay.	No. M.	" " " "	" " 5.10.30 to 17.12.30	22.12.30
089 *† Oroya ...	Galloway, M. ...	J. M. Forsyth, J. Ayland, E. S. Jones.	" M.	Pacific S.N. Co. ...	" " 20.8.30 to 28.10.30	1.11.30
105 † Orsova ...	Thorne, G. G., R.D., Commr. R.N.R.	R. B. Stannard	W.T.	Orient ...	" " 22.12.30 to 24.3.31	8.4.31
290 *† Otaio ...	Mead, G. F. ...	" " " " " " " "	No. M.	New Zealand S.S. Co.	" " " " " " " "	"
237 *† Otaki ...	Maltby, T. L. ...	A. V. Pearce, N. Baddeley, J. H. Underwood.	M.L.	" " " "	Form 915 31.8.30 to 6.2.31 ...	17.2.31
177 † Otranto ...	Matheson, C. G., D.S.O., R.D., Capt. R.N.R.	A. E. Coles, G. R. Grandase	W.T.	Orient ...	Forms 911 & 138 1.3.31 to 20.3.31...	13.4.31
Pacific Enterprise, M.V. ...	Newman, G. W. A. ...	" " " " " " " "	No. A.	Furness Withy ...	" " " " " " " "	"
279 † Pacific Exporter ...	Nuttall, E. L. ...	A. Knapp	W.T.	" " " "	" " 17.11.30 to 11.2.31	16.2.31
Pacific Shipper, M.V. ...	Goodwin, J. ...	S. Porter	No. A.	" " " "	Form 911 1.11.30 to 2.2.31 ...	6.2.31
176 *† Pakeha ...	Elford, H. C. ...	A. J. Tillott	M.L.	Shaw, Savill & Albion	Forms 911 & 138 2.2.31 to 13.3.31...	17.3.31
Pancras ...	Barlow, F. P. ...	L. A. Sayers, S. Adams ...	"	Booth ...	Form 915 13.12.30 to 2.2.31	13.2.31
Pareora ...	Evans, J. O. ...	C. Parry	No. A.	" P " Steamers, Ltd.	Form 911 15.7.30 to 6.8.30...	23.9.30
Paris ...	Cook, C. L. ...	Mr. Biles	C.C.	Southern Rly.	Telegraphic Report. 17.4.31	17.4.31
Patia ...	Sapsworth, S. A. ...	R. O. Laycock, R. S. Sutherland, R. S. Howlett.	No. A.	Elders & Fyffes ...	Form 911 17.2.31 to 22.3.31 ...	25.3.31
Peisander ...	Read, J. W. ...	C. T. Morgan	" A.	A. Holt... ..	" " 1.9.30 to 23.11.30	16.12.30
058 † Pennland ...	Making, V. L. ...	- Jenkins, - Otterson, - Cross.	W.T.	Red Star ...	Forms 911 & 138 9.3.31 to 28.3.31	31.3.31
204 *† Peshawur ...	McBryde, A. M. ...	D. Meikle, J. T. Sheffield, T. E. Wrigley, M. P. Fyrth, G. A. Nixon.	M.L.	P. & O. ...	Form 915 1.8.30 to 5.12.30 ...	9.12.30
238 *† Piako ...	Aslin, E. P. C. ...	A. D. Wilson, A. W. Marshall, R. H. Carter.	No. M.	New Zealand Co. ...	Forms 911 & 138 6.12.30 to 24.1.31	7.2.31

LIST OF VOLUNTARY OBSERVING SHIPS

Name of Vessel.	Captain.	Observing Officers.	Meteoro-logical Equipment.	Line.	Last Log. Register, or Record Contributed. Received up to 17.4.31.	Date Received.
039 *† <i>Planter</i> ...	Packe, M. G. ...	— Eustance ...	No. M.	Harrison ...	Form 911 16.2.31 to 26.3.31 ...	13.4.31
127 *† <i>Polycarp</i> ...	Furner, F. S. ...	A. S. Richardson ...	" A.	Booth ...	Form 915 9.9.30 to 1.1.31 ...	20.1.31
128 *† <i>Port Adelaide</i> ...	Williams, R. ...	J. G. A. Dunn, F. W. Elgar, D. Morgan, E. N. Lawrey.	M.L.	Commonwealth & Dominion.	" 31.7.30 to 4.12.30 ...	13.1.31
129 *† <i>Port Auckland</i> ...	Durham, R. S., D.S.C.	W. Craig, A. Brown, E. Mickleburgh.	"	" " "	Form 911 24.6.30 to 19.11.30 ...	2.12.30
129 *† <i>Bowen</i> ...	Hearn, G. W. ...	F. R. Gorman ...	No. A.	" " "	Form 915 7.10.30 to 25.1.31 ...	31.1.31
136 *† <i>Campbell</i> ...	Gregory, S. ...	J. C. Goddard, N. M. Muzzell, C. Midwinter.	M.L.	" " "	" 4.7.30 to 19.11.30 ...	25.11.30
136 *† <i>Caroline</i> ...	Brown, A. H. ...	V. G. Battle, E. W. R. Young, R. E. Garner.	"	" " "	" 19.10.30 to 22.3.31 ...	1.4.31
131 *† <i>Darwin</i> ...	Lewis, J. G. ...	K. D. Morgan, W. R. Johnson, A. J. Knell, L. C. Asser.	"	" " "	" 4.11.30 to 10.3.31 ...	1.4.31
132 *† <i>Denison</i> ...	Hall, G. S. ...	A. G. Newbury, R. A. Holloway, H. Duckling.	"	" " "	" 7.12.30 to 30.3.31 ...	9.4.31
133 *† <i>Dunedin, M.V.</i>	Mason, W. S., D.S.C.	H. M. Post, C. A. Hodson, R. W. Chamberlain.	"	" " "	Form 911 20.11.30 to 5.2.31 ...	12.3.31
133 *† <i>Fairy</i> ...	Farmar, F. ...	J. Stannard, W. G. Jones, P. J. Howe.	No. A.	" " "	" 3.12.30 to 5.1.31 ...	10.3.31
133 *† <i>Fremantle, M.V.</i>	Gilling, W. ...	A. Naismith ...	" A.	" " "	" 6.9.30 to 10.10.30 ...	17.10.30
133 *† <i>Gisborne, M.V.</i>	Hayter, S. W. ...	L. J. Skailies ...	" A.	" " "	Form 915 15.7.30 to 2.11.30 ...	26.11.30
133 *† <i>Hobart, M.V.</i>	Cottell, S. C. ...	E. R. Rowlands, G. Jinman, L. Copeland.	M.L.	" " "	" 7.10.30 to 29.1.31 ...	5.2.31
135 *† <i>Hunter</i> ...	Higgs, W. G. ...	G. T. C. Harris, C. R. Townshend, W. M. Clough, P. A. Manday.	"	" " "	" 7.9.30 to 8.1.31 ...	15.1.31
137 *† <i>Nicholson</i> ...	Gregory, S. E. A. ...	E. N. Rogerson, R. D. Elson, E. N. Howard, S. Ward.	"	" " "	" 27.9.30 to 1.11.30 ...	7.11.30
138 *† <i>Pirie</i> ...	Jack, J. ...	G. W. Horton, H. E. Braine, R. C. H. Webb.	"	" " "	" 14.6.30 to 28.10.30 ...	7.11.30
140 *† <i>Victor</i> ...	Hall, G. S. ...	E. G. L. Jones, J. L. Porter, R. C. Pocock.	"	" " "	Form 911 24.10.30 to 12.2.31 ...	16.2.31
106 *† <i>Wellington</i> ...	Jones, C. N. ...	W. B. Hopkins ...	No. A.	Houlder ...	Forms 911 & 138 25.2.31 to 19.3.31 ...	24.3.31
163 *† <i>Princesa</i> ...	Friend, A. B. ...	E. Lougheed, A. M. Tilsley ...	" M.	A. Holt ...	Form 915 17.5.30 to 30.11.30 ...	2.2.31
163 *† <i>Protesilaus</i> ...	Holden, W. R. F. ...	J. Cooper, J. Holden, H. N. Hardie.	M.L.	" " "	Form 911 23.1.31 to 19.2.31 ...	24.2.31
205 †† <i>Pyrhus</i> ...	Wilkinson, T. G. ...	J. C. Podmore ...	No. A.	" " "	Forms 911 & 138 7.12.30 to 29.1.31 ...	2.2.31
063 *† <i>Rajputana</i> ...	Cadiz, F. G., D.S.C. ...	G. A. Wild, D. Hockley, D. B. Beeckley.	" M.	P. & O. ...	" " 27.11.30 to 17.2.31 ...	21.2.31
228 †† <i>Ranchi</i> ...	Brooks, C., D.S.O., R.D. Capt. R.N.R.	G. Harvey, C. F. Minshull, A. L. Lewis.	" M.	Harrison ...	" " 2.11.30 to 4.2.31 ...	7.2.31
236 †† <i>Rangitane M.V.</i>	McKellar, A. W., R.D. Capt. R.N.R.	T. A. Sergeant, R. J. F. Paice	" M.	P. & O. ...	Form 915 26.9.30 to 9.1.31 ...	15.1.31
237 †† <i>Rangitata M.V.</i>	Hunter, J. L. B. ...	J. J. Youngs, A. Brown, C. Edgecombe.	M.L.	New Zealand S.S. Co.	Forms 911 & 138 30.8.30 to 10.12.30 ...	1.1.31
240 †† <i>Rangitiki M.V.</i>	Barnett, H. ...	J. Oxnard, L. Griffiths, D. Chadwick, W. Jarvis.	W.T.-M.	" " "	" " 22.11.30 to 3.3.31 ...	14.3.31
207 †† <i>Ranpura</i> ...	Furlong, G. H. S. ...	L. F. Malcouronne, H. K. Cockerill, C. Cruttenden.	"	" " "	" " 28.2.31 to 9.4.31 ...	13.4.31
247 *† <i>Recorder</i> ...	Egerton, J. J. ...	J. Strike, R. A. Perry, D. S. Charks.	No. M.	P. & O. ...	" " 12.10.30 to 2.1.31 ...	8.1.31
306 *† <i>Reina del Pacifico, M.V.</i>	Roberts, E. ...	G. Morrice ...	"	Harrison ...	" " ... ..	...
239 *† <i>Remuera</i> ...	Holland, E. A. ...	A. J. Angell, A. T. H. Weatherall, J. R. Vincent, H. N. Lawson.	M.L.	Pacific S.N. Co. ...	Form 915 24.10.30 to 8.2.31 ...	14.2.31
241 *† <i>Rhexenor</i> ...	Stout, G. L. ...	C. Anderson ...	No. A.	New Zealand S.S. Co.	Form 911 4.2.31 to 16.3.31 ...	19.3.31
241 *† <i>Rhodesian Transport</i>	Bowen, A. C. ...	H. S. Butler ...	" A.	A. Holt... ..	Form 911 17.10.30 to 1.2.31 ...	17.2.31
241 *† <i>Ripley Castle</i>	Goodacre, R. W. ...	J. A. Ferguson ...	" A.	Houlder Bros. ...	" " 10.3.31 to 31.3.31 ...	8.4.31
241 *† <i>Rother</i>	Woodhead, T. H. ...	A. E. Willmott... ..	" A.	Goole Steam Shipping	" " 21.2.31 to 15.3.31 ...	31.3.31
241 *† <i>Rotorna</i> ...	Lamb, C. B. ...	G. C. Saul, L. W. Fulcher, H. Hill, A. I. Robertson.	M.L.	New Zealand S.S. Co.	Form 915 4.10.30 to 14.2.31 ...	19.2.31
062 *† <i>Royal Star</i> ...	Walsh, W. ...	A. P. Day, J. Hoggin ...	No. M.	Blue Star ...	Forms 911 & 138 16.12.30 to 10.3.31 ...	18.3.31
246 *† <i>Ruahine</i> ...	Urquhart, D. ...	A. Hocken, R. Warren, R. Hamilton.	W.T.	New Zealand S.S. Co.	" " 20.12.30 to 6.4.31 ...	9.4.31
300 ** <i>St. Albans</i> ...	Diamond, S. L. ...	F. O. Colvin, C. Stratford, H. Nuzum.	M.L.	Eastern and Australian.	Met. Log 4.4.30 to 8.6.30 ...	21.8.30
300 ** <i>St. Helier</i> ...	Skinner, M. B. ...	J. Goodchild, J. Braye	C.C.	G.W. Railway ...	Telegraphic Report 9.4.31 ...	9.4.31
300 ** <i>St. Julien</i> ...	Pitman, R. ...	E. A. Hawkyard, H. D. Freeman.	"	" " "	" " 17.4.31 ...	17.4.31
038 †† <i>Samaria</i> ...	Malin, R. G., Lieut.-Commr. R.N.R.	F. E. Martin ...	W.T.	Cunard ...	Forms 911 & 138 10.9.30 ...	10.9.30
291 *† <i>Sangate Castle</i>	Aylen, C. E. H. ...	A. MacKellar, F. G. Watts, J. A. Myles.	"	" " "	Form 915 3.3.31 to 7.4.31 ...	14.4.31
291 *† <i>Sardinian Prince</i>	Pearson, F. T. ...	H. P. Clegg ...	No. A.	Union Castle ...	Form 911 17.3.31 to 1.4.31 ...	15.4.31
291 *† <i>Saxon</i> ...	Jackson, C. R. ...	C. G. Cuthbertson ...	" A.	Prince ...	" " 3.1.31 to 22.2.31 ...	24.2.31
033 †† <i>Scholar</i> ...	Peterkin, A. G. ...	J. Richardson ...	" M.	Union Castle ...	Forms 911 & 138 12.2.30 to 20.2.31 ...	27.2.31
033 †† <i>Scotia</i> ...	O'Neill, J. ...	W. H. Hughes ...	" G.C.	Harrison ...	Telegraphic Report 10.4.31 ...	10.4.31
033 †† <i>Seythia</i> ...	Gibbons, G., R.D., R.N.R.	C. W. W. Hill, F. P. Collins, A. Bridgewater.	W.T.	L.M. & S. Railway	Forms 911 & 138 9.3.31 to 30.3.31 ...	2.4.31
211 *† <i>Sea Victory</i>	Gammon, G. H. ...	P. Curley... ..	No. A.	Cunard ...	" " ... ..	...
211 *† <i>Shropshire, M.V.</i>	English, G. L. ...	R. Cumming, C. F. Hicks, E. W. Jefferies, D. Hetherington.	M.L.	Dover Navigation ...	Form 915 10.1.31 to 19.3.31 ...	21.3.31
258 *† <i>Silksworth</i>	Blacklock, G. ...	F. J. Muttitt ...	No. A.	Bibby ...	Form 911 7.2.31 to 13.3.31 ...	8.4.31
277 *† <i>Spero</i> ...	Montgomery, H. ...	D. Hughes, H. M. Knight, M. I. D. Walters, T. E. Davies.	M.L.	Federal... ..	Form 915 19.7.30 to 23.11.30 ...	28.11.30
277 *† <i>Stephen</i> ...	Jones, W. C. H., R.D., Commr. R.N.R.	H. W. Vickers, A. Kirk	"	Ellerman Wilson ...	Form 911 17.10.30 to 12.12.30 ...	29.12.30
259 *† <i>Surrey</i> ...	Almond, J. G. ...	J. Whayman, D. H. Daniels	"	Booth ...	Form 915 2.5.30 to 9.9.30 ...	26.9.30
045 †† <i>Sutherland Grange</i>	Matthews, S. ...	R. Rees, D. J. Murray, C. A. Cremin, W. Coates.	"	Federal... ..	Form 911 22.2.31 to 26.3.31 ...	30.3.31
045 †† <i>Sylvafield, M.V.</i>	MacDonald, W. ...	J. Johnson ...	No. A.	Houlder Bros. ...	" " ... ..	...
234 *† <i>Tainui</i> ...	Clifton Mogg, W. P., Lieut.-Commr. R.N.R.	G. A. Harvey, E. Baker, A. G. Collins.	M.L.	Hunting & Son ...	Form 915 13.9.30 to 26.12.30 ...	30.12.30
046 †† <i>Talma</i> ...	Harley, G. ...	M. H. Vincent ...	No. M.	Shaw, Savill & Albion	Forms 911 & 138 19.10.30 to 14.12.30 ...	12.1.31
264 ** <i>Tanda</i> ...	Pilcher, E. T., Lieut.-Commr. R.N.R.	L. R. Bull, F. Altwood, R. R. Roseman, B. D. Atkin, H. M. Sanders, R. Lloyd-Harry, B. M. Dun, G. Chadwick-Smith.	W.T.-M.	British India ...	" " 11.10.30 to 18.1.31 ...	20.1.31
165 *† <i>Tantalus, M.V.</i>	Dodds, R. ...	F. C. Oppen, R. M. Gray, W. J. Ryan.	M.L.	Shaw, Savill & Albion	Form 915 5.9.30 to 2.12.30 ...	4.3.31
			"	E. & A. S.S. Co. ...	" 6.9.30 to 8.1.31 ...	16.1.31

Name of Vessel.	Captain.	Observing Officers.	Meteoro-logical Equipment.	Line.	Last Log, Register, or Record Contributed. Received up to 17.4.31.	Date Received.
047 *† Taranaki, M.V. ...	Wood, C., D.S.C. ...	G. Cope, R. Reed, K. A. Gordon, S. P. Wallis.	M.L.	Shaw, Savill & Albion	Form 915 10.1.31 to 19.3.31 ...	24.3.31
Tarantia ...	Caithness, J. B. ...	J. M. Cherry ...	No. A.	Anchor ...	Form 911 15.2.31 to 3.4.31 ...	9.4.31
Tasmania ...	Williams, J. V. ...	... ..	" A.	New Zealand S.S. Co	... ..	...
Tetresias ...	Wilkinson, W. H. ...	... ..	" A.	A. Holt & Co. ...	Form 911 9.10.30 to 26.12.30 ...	31.12.30
243 *† Tekoa ...	McNish, R., D.S.O., Lieut.-Commr., R.N.R.	J. G. Phillips, R. Aldridge, E. Mason.	" M.	New Zealand S.S. Co	Forms 911 & 138 26.1.31 to 7.2.31	4.3.31
Telamon ...	Brown, R. ...	G. Edge ...	" A.	A. Holt ...	Form 911 26.10.30 to 23.11.30	10.12.30
Tetela ...	Brice, E. H. ...	F. P. Inch, G. Roberts, J. W. T'one.	" A.	Elders & Fyffes ...	" 17.2.31 to 22.3.31	24.3.31
Teucer ...	Davies, J. ...	C. C. L'Estrange ...	" A.	A. Holt ...	" 4.2.31 to 6.3.31	13.4.31
Theseus ...	Carnon, C. G. ...	P. Dunsire ...	" A.	A. Holt ...	Form 911 14.1.31 to 16.2.31	18.2.31
007 *† Thistleglen ...	Whitfield, G.A., O.B.I.	W. H. Gould, S. B. Davis, E. W. Kent.	M.L.	Allan Black & Co. ...	Form 915 26.4.30 to 29.9.30 ...	2.10.30
235 *† Tilawa ...	Coleborn, E. ...	F. R. Kent Langdon ...	No. M.	British India...	Form 911 5.2.31 to 25.2.31	30.3.31
168 *† Tinhow ...	Chicken, W. E. ...	G. W. Seth, P. Aydon, E. Smith.	"	A. Weir & Co. ...	Forms 911 & 138 26.11.30 to 10.2.31	21.3.31
161 *† Titan ...	Elford, W. J. ...	F. B. Smith, A. K. Sanderson, J. Gould.	M.L.	A. Holt ...	Form 915 27.10.30 to 24.3.31 ...	2.4.31
244 *† Tongariro ...	Hamilton, F. S. ...	F. S. Cashmore, G. Dibley, W. Redwood, D. Baldwin, E. G. Williams.	"	New Zealand S.S. Co.	" 27.9.30 to 29.1.31 ...	5.2.31
025 †† Transylvania ...	Bone, D. W. ...	A. Middleton, J. A. Leferre, D. I. Chamberlain.	W.T.	Anchor ...	Forms 911 & 138 1.12.30 to 21.12.30	29.12.30
288 *† Traveller ...	Barrow, W. T. C. ...	A. D. Morison ...	No. M.	Harrison ...	Form 911 14.11.30 to 14.1.31 ...	19.1.31
Treacrell ...	Hunt, D. ...	W. E. McEwan, G. A. Solly	" A.	Hain S.S. Co. ...	" 4.2.31 to 6.3.31 ...	13.3.31
242 *† Trematon ...	Mill, C. R. ...	J. Jenkyn, C. M. Quick, R. Stitson, W. B. Paul, T. M. Meakin, R. S. Davies.	M.L.	" "	Met. Log. 16.9.29 to 8.3.30...	25.3.30
119 *† Trojan Star ...	Griffin, G. A. ...	A. Emerson, L. S. Hassell ...	No. M.	Blue Star ...	Forms 911 & 138 12.8.30 to 13.12.30	6.1.31
245 *† Turakina ...	Laird, J. ...	A. E. Bainforth, H. Smith, J. Gould.	" M.	New Zealand S.S. Co.	" " 12.10.30 to 7.2.31	12.2.31
276 †† Tuscania ...	Rome, W. B. ...	D. Blair, G. Noble, H. Campsie.	W.T.	Anchor...	" " 11.2.31 to 30.3.31	1.4.31
167 *† Tyndareus...	Findlay, J ...	J. R. C. Evans, M. J. Case, W. F. Lochead, E. B. Sandon.	M.L.	A. Holt ...	Form 915 24.6.30 to 2.12.30...	3.2.31
Uffington Court ...	Clarke, E. J. ...	T. Glover ...	No. A.	Haldin & Co. ...	Form 911 16.12.31 to 15.3.31 ...	13.4.31
113 *† Upwey Grange ...	Goodrick, H. P. ...	A. Bradbury, G. T. Hurst ...	" M.	Houlder ...	Forms 911 & 138 22.12.30 to 26.2.31	2.3.31
292 †† Viceroy of India ...	Thornton, E. J. R.D., Capt., R.N.R.	W. R. B. Noall, C. S. Cooke, L. F. Kingston.	" M.	P. & O. ...	Form 911 31.1.31 to 11.3.31 ...	23.3.31
Vigilant ...	Simpson, E. S. S. ...	J. Wilson ...	" A.	Scottish Fishery Brd.	" 1.3.31 to 31.3.31 ...	2.4.31
206 ** Waiotapu ...	Hender, W. H. ...	... ..	" M.	Union S.S. Co. of N.Z.	" 16.11.30 to 10.12.30 ...	28.1.31
263 ** Wairuna ...	Stewart, A. R. ...	J. E. Warwick, C. T. Robb, G. M. Coote.	M.L.	" "	Form 915 4.7.30 to 6.10.30 ...	28.11.30
Warfield ...	Steele, R. ...	J. Gunning ...	No. A.	" "	Form 911 23.2.31 to 7.3.31 ...	16.3.31
011 *† War Nizam ...	Penton, P. M. ...	D. P. E. Jones ...	" M.	British Tankers ...	... ..	...
005 †† Warwick Castle ...	Owens, G. ...	... ..	W.T.	Union Castle ...	... ..	...
060 †† Westernland ...	Trant, A. W., O.B.E.,	W. L. Wood, R. Fairme, J. McLaren.	W.T.	Red Star ...	Forms 911 & 138 22.2.31 to 11.4.31	13.4.31
280 *† Westmoreland ...	Reilly, H. E. ...	J. D. Marks, D. Clegg, J. Reeve.	M.L.	Federal... ..	Form 915 21.9.30 to 30.1.31 ...	6.2.31
William Scoresby, R.R.S.	Irving, J. J. C., Lieut. Commr., R.N.	... ..	"	Falkland Islands Government.	... ..	...
208 †† Winchester Castle M.V.	Gardner, G. F., O.B.E., Lieut.-Commr., R.N.R.	... ..	W.T.	Union Castle ...	... ..	...
096 †† Windsor Castle ...	Chave, Sir B., K.B.E.	E. H. Dixey, J. L. Goatley, J. Trayner, D. P. H. Klasen.	M.L.	" "	Form 915 1.5.30 to 7.9.30 ...	10.9.30
Worthing ...	... ..	... ..	C.C.	Southern Railway ...	Telegraphic Report 13.4.31 ...	13.4.31
043 ** Zealandic ...	Gaskell, J. H., R. D., Lieut. Commr. R.N.I.	P. Horwood, J. Thompson, B. Morris.	W.T.	Shaw, Savill & Albion	Forms 911 & 138 20.2.31 to 27.3.31	30.3.31
Zent ...	Bower, H. C. ...	W. A. Phillips, R. J. Holt Hobson.	No. A.	Elders & Fyffes ...	Form 911 7.1.31 to 9.2.31 ...	16.2.31
Conway, H.M.S. ...	Richardson, F. A., D.S.C., Commr., R.N.	The Senior Cadets ...	Cadets' M.L.	... ..	Cadets' Met. Log. 18.1.31 to 28.3.31	2.4.31
Pangbourne Nauti- cal College	Tracy, A. F. G., Commr., R.N.	" "	"	... ..	Cadets' Met. Log. 19.1.31 to 24.3.31	2.4.31
Worcester, H.M.S.	Steele, G. C., V.C., Lieut.-Commr., R.N.	" "	"	... ..	Cadets' Met. Log. 26.9.30 to 17.12.30	19.12.30
Abaco ...	... ..	The Keepers ...	Lighthouse Register.	... ..	Lighthouse Register 1.7.29 to 31.12.29	24.3.30
Cay Lobos ...	... ..	" "	"	... ..	Lighthouse Register 13.11.29 to 23.5.30	26.1.31
Double Headed Shot	... ..	" "	"	... ..	Lighthouse Register 1.1.30 to 30.6.30	26.1.31
Inagua ...	... ..	" "	"	... ..	Lighthouse Register 4.2.30 to 14.3.30	26.1.31
Sombrero ...	... ..	" "	"	... ..	Lighthouse Register 1.7.30 to 31.12.30	28.1.31
Watling Island ...	... ..	" "	"	... ..	Lighthouse Register 1.1.30 to 30.6.30	26.1.31
Cape Pembroke (Falkland Is.)	... ..	" "	"	... ..	Lighthouse Register 1.7.30 to 31.12.30	19.2.31

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

Name of Vessel.	Captain.	Observing Officer.	Line.	Last Case of Water Samples, Reports, etc., received up to 31.3.31.	Date Received.
Darian ...	Hannaford, W. ...	D. G. Longmuir ...	Leyland ...	Water Samples ...	16.1.31
Darro ...	Green, J. ...	G. B. Medleycott ...	R.M.S.P. Co. ...	" " ...	23.1.31
Davistan ...	Trickey, J. ...	J. Holman ...	Leyland ...	" " ...	16.1.31
Dorellan ...	Hugan, C. ...	F. R. Hicken ...	" " ...	" " ...	16.3.31
Hildebrand...	Buck, R. H., R.D. Capt. R.N.R.	W. H. Cross ...	Booth ...	" " ...	5.3.31
Mercian ...	Hughan, C. ...	W. Parry ...	Leyland ...	" " ...	7.10.30
Nevisian ...	McCormick, J. ...	T. J. Jones ...	" " ...	Water Samples ...	24.11.30