

VOL. III. No. 30.

THE MARINE OBSERVER.

JUNE 1926.

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WORK OF THE YEAR.

Note to Marine Observers.

APPRECIATION of the work this year is more than ever merited by the Corps of Marine Observers, as this account of your work at sea and our efforts to co-ordinate Voluntary Marine Meteorological Service during the twelve months ended March 31st, 1926, will prove.

The continued improvement in recording observations in Meteorological Logs has raised the percentage of "Excellents" to such an extent that notwithstanding the fact that classification has been stiffened very gradually and continuously since the inception of THE MARINE OBSERVER, it becomes necessary to make a materially higher standard of classification to maintain the proper distinction of the "Excellent" Award.

In justice to all concerned due notice was given in the January Number that from April 1st, 1926, a higher standard of classification would be used.

In future years it is intended that a proportion of about 40 per cent. of the best logs and registers should be classed excellent, taking

into consideration evidence of the practical application of Meteorology to navigation such as weather charts, notation of wireless reports made to all ships, and notes of results obtained in the promotion of safety and economy in navigation, together with finished contributions to THE MARINE OBSERVER.

Thus it is intended that the classification of the work should be based more by the competitive standards set up by Marine Observers themselves, rather than the past qualifications based largely upon the office value of the records, which have become inferior to the accomplishments of present day Marine Observers.

The peak in the curve of "Excellent" awards gained has probably been reached this year and this percentage of "Excellent" Logs, 43.6, may not form a criterion for comparison in future years, though it will probably remain as a monument to testify the improvement made in observation at sea during post-war reconstruction.

In future the "Excellent" awards won by about the first 40 in

every 100 possibles will mark the real distinction of merit by comparison, which the "Excellent" award of the Meteorological Committee is intended to convey.

The steps being taken to obtain the best possible geographical distribution of observation, particularly with a view to providing data for charting the Pacific together with the frequent transfer of commanders and officers, all add to the difficulty of maintaining continuity. Nevertheless, continuity continues to improve. Many have sent the advice as to transfers, lay up, etc., asked for, in good time, and by so doing have given great assistance.

We can fairly claim that there is a fine *esprit de corps* which is slowly but surely making itself felt in the production of improved weather intelligence, not only for the Sea Services but for other matters connected with Empire communication. As the functions of this Journal, which were laid down at inception, are broadened and made more useful to seamen, so it is hoped that the spirit of ready co-operation may grow, for it is now recognised that to obtain more scientific methods at sea in meteorology, more attention must be paid to kindred sciences and arts which come within the portals of the profession of seamanship.

Collection of Data.

Meteorological Logs (4 hourly) used with Instruments lent by the Meteorological Office.

The improvement of routine observations recorded in logs during the year is without precedent, the percentage classed "Excellent" being 43·6, whereas last year it was 33·6, and the year before 31·3. "Additional Remarks" continue to improve, but here is, perhaps, where Marine Observers will be able to enhance their work most. Many more commanders have caused the Wireless Weather reports they make to "All Ships" to be entered in the space specially provided at the end of the log, thus providing a valuable record of this most desirable practice.

The following table shows the classifications of logs received this year and during the three previous years:—

Classification.	1925-1926.	1924-1925.	1923-1924.	1922-1923.
Excellent - -	115	92	80	83
Very Good - -	145	178	169	170
Good - - - -	3	3	6	11
Not classed - -	1	1	1	8
Total received -	264	274	256	272

More Marine Observers continue to correct the barometer reading and enter the absolute pressure in the column provided; if all will do so the value of the work of the Corps as a whole will be materially increased and the Marine Division will the sooner be able to produce results in the form of Ocean Meteorological Charts, for the correction of the barometer during the process of data extraction lengthens the work considerably. We shall show later how those who have done this at sea at the time of observation have helped greatly in improving the rate of extraction.

The Meteorological Log is most certainly the back-bone of the work, and all who keep it will find a guide in "The Marine Observers' Handbook," and hints from time to time in the pages of this Journal which will further assist them. Indeed, the regular reader of this Journal will keep the most efficient log for he has the advantage of the experience of the whole corps.

The number of ships keeping Meteorological Logs has been slightly reduced during the year for reasons which will be given presently.

Ships' Meteorological Reports Form 911 (twice daily) used with Ships' Instruments.

This branch of the work, which has proved a popular and inexpensive method of completing a network of observation over all oceans, continues to improve. The following table shows the classifications of Ships' Meteorological Reports received this year and last. Last year was the first when a definite classification was used for this form.

Classification.	1925-1926.	1924-1925.
Excellent - - - - -	416	393
Very Good - - - - -	1,641	1,721
Good - - - - -	32	75
Not classed - - - - -	2	0
Total received - - - - -	2,091	2,189

The decrease in the total number received may be accounted for by the delays in port a number of ships were subject to during the seamen's dispute and to a greater proportion of long voyage ships being engaged in this form of observation.

During the year the practice of indicating in the fleet list those ships which have a mercurial barometer in their own outfit has been introduced, and the commanders of these vessels have been invited both in these columns and by circular, to put into practice Wireless Weather reporting to "All Ships," for recording which report a temporary supplement to this form has been supplied them. Thus, Form 911 ships, as they are shortly termed for convenience which have a mercurial barometer may be able to do work of very great value to the whole of the Sea Services, and it is earnestly hoped that this service may become popular for upon it largely depends the success of the modern development and application of Meteorology to seamanship and airmanship from within the profession.

Ice Report Form 912.

There has been a decided improvement in the return of these reports, more especially from ships in the Trans-North Atlantic Trade to Canadian Ports. The reports received from ships in Southern Trades for recent years have enabled us to bring the northern limits of ice in far southern waters up to date, and these charts are being reproduced in our pages this year.

Report of Tropical Revolving Storms, Form 905.

A number of these reports have been received both from regular Marine Observers and ships not on our list.

Marine Observers can render valuable service by persuading ships who do not regularly observe, who encounter these storms, to complete these Forms and send them in. Form 905 is reproduced from time to time on the reverse side of the North Atlantic Ice Chart, and blanks may be obtained from the Marine Agents. In order to investigate a Tropical Revolving Storm, and therefore to contribute knowledge which may lead to improvement of the "Laws of Storms," it is necessary to have observations from a large number of ships in and around the storm field. These Forms ensure that the observations and information required are set out in the correct manner. As an example of their utility reference may be made to the "Report on West Indian Hurricanes, August and September 1924," which appeared in the September 1925 Number.

North Atlantic Wireless Telegraphy Weather Report Registers, used with instruments lent by the Meteorological Office. Ship's Coded Reports.

The high standard of these registers has been maintained.

Classification.	1925-1926.	1924-1925.	1923-1924.	1922-1923.
Excellent - - - - -	157	162	155	73
Very Good - - - - -	143	100	90	150
Good - - - - -	0	0	5	3
Not classed - - - - -	0	2	0	2
Total received - - - - -	300	264	250	228

Cross Channel Steamers' Telegraphic Reports.

Ten Packet Steamers on the Newhaven-Dieppe, Guernsey-Weymouth, and Holyhead-Dublin Services have made these reports of observations taken at mid-Channel.

During the year 767 reports were received which have given valuable information of conditions observed within the "Weather Shipping" Bulletin Home Waters Forecast areas, and thus contributing to the information broadcast by Wireless Telegraphy for the information of seamen from the Air Ministry and Coast W/T Stations, also by Wireless Telephony by the British Broadcasting Company's station.

Sea Water Samples.

Eleven ships in the South American, West Indian, and North Atlantic trades have collected water samples for which work the Director of the Fisheries Laboratory desires us to make acknowledgment on behalf of the Ministry of Agriculture and Fisheries. The Marine Biological Association of Plymouth and the Salt Union of Runcorn have also benefited by this work which is arranged by the Port Meteorological Officer, Liverpool, to ensure that there shall not be duplication of effort.

Miscellaneous Contributions.

As well as the regular forms returning observations a large number of interesting and valuable papers, manuscripts, weather charts, sketches, and photographs, have been received with the logs, forms, and registers, and independently of them, which are of the greatest assistance and value in the production of THE MARINE OBSERVER. It is hoped that in future even more may come to hand, particularly from those in active service afloat. As far as possible these have been acknowledged by letter at the time, but we wish to express most grateful acknowledgment in print to those to whom we have written and to those, should there be any, whom we may appear to have overlooked.

General.

Generally the record of observation for collection purposes has improved in the direction which was most necessary, for the ultimate production of published results. The Corps of Marine Observers have as a whole undoubtedly taken more trouble in setting down their observations in the manner prescribed. All will realise that observations can be handled with far greater ease and quickness by the computers when they are recorded in a uniform manner, and so it is necessary that the regular plan adopted from long experience should be adhered to in all cases for routine observation. Marine Observers are at liberty always to supplement this information by remarks, and in these there is much scope for originality of method.

The Use made of the Data collected.

Bearing in mind the conclusion set out in the Report of the Committee appointed by the Board of Trade after the death of Admiral FITZROY which was laid before Parliament:

"That knowledge which is obtained through the medium of the observation of sailors and what is capable of being utilised for their benefit, should be so utilised as soon as possible, and that they should feel a confidence that it is so utilised."

As well as returning in THE MARINE OBSERVER recently received useful information along with sections of route current charts, southern ice, and other statistical information graphically, we have continued with the utmost despatch the extraction from logs received and, as stated in my note in the April Number, have made a very thorough examination of the available data and worked out a scheme for the construction of Meteorological Charts upon a uniform scale; following a plan based upon the suggestions of many experienced seamen, which will be familiar to those who have visited the Marine Division. It is well to repeat that during the present need for stringent economy this work cannot be set in full motion. To produce these charts will take a long time, and it should be remembered that we have a duty to those who come after us in seeing to it that the work is so handled that the data are left so that they can be readily used again and again. Past experience proves that ambition to produce charts quickly may have to be paid for by a later generation.

We hope that the present system of data extraction and compilation, with the scheme drawn up for the construction of charts for all oceans, will repay this generation of Marine Observers for their work, as well as leaving a sound basis for extension to the next; for that would prove that we had done our duty to the profession of seamanship along with the rest. Hence your improvement in Meteorological Logs and the accelerated rate of data extraction should give encouragement to all concerned.

Data Extraction, Compilation and Research.

During the year 75,852 sets of observations were extracted from logs received and punched on Hollerith cards, and 8,210 sets of additional current observations dating back to 1910 for the North Atlantic routes have been extracted. Due partly to the improvement at sea in the manner of recording routine observations in the Meteorological Log, including the correction of the barometer and partly to improved organisation in the Marine Division and to more efficient work with experience gained by the computers, the rate of extraction has averaged the very creditable figure of 81 observations per man per day, including Sundays and holidays in the time expended.

69 per cent. of the logs received reaching the required standard "Very good" or above, during the year have been prepared for extraction. Hence the number of ships keeping full logs was more than sufficient and that number, about 120, is now reduced to 115. In addition there are 9 of H.M. Survey vessels which provide observations, mainly in with the land.

MARSDEN CHART No. I shows the distribution and number of sets of observations extracted from logs during the past twelve months, and MARSDEN CHART No. II gives these particulars since April, 1920.

Results of researches and compilations made in the Marine Division are before you in this Journal, by which it will be seen that steady progress is being made in the charting and examination of currents, and though we have given some deductions it must be admitted that the more we know of currents both from personal experience when in service afloat, and from the vast store of data collected in the Marine Division, the more difficult it seems to explain their causes or to associate the conditions which may be affecting them. We are particularly glad to have found a means of charting their vagaries which seems to give very general satisfaction.

In this as in most else the man on the spot, with the aid of wireless communication and the co-operation of his brother seaman, can probably do most if he is provided with suitable charts.

Further proofs of the utility of the Hollerith System are given in the Wind, Fog, and Mist Roses for the S.W. Approaches to the British Isles and in the Charts of Cloud frequencies along the Trans-North Atlantic tracks in this Number. As time advances and the number of observations punched on cards increases, so the value of this system increases, and effort of producing results is reduced. In this system we think we have one which will repay you in time for your work and will leave those who follow us the ground work which they will expect.

Exchange of Data.

To no one is the need of uniformity in general method more evident than to the foreign-going seaman since diversity of code affects him most adversely; therefore Marine Observers will more readily understand the mutual advantage which maritime nations working at a common object may derive by having similar systems. As regards Marine Meteorological data, Great Britain and Holland have come to an agreement through their respective Marine Divisions, and up to this year, as we have shown in "Work of the Year," Holland has derived benefit from your observations. This year the benefit has been mutual; we have gained considerably, for we have received from the Dutch no less than 15,429 observations of current for the Trans-North Atlantic tracks for the years 1910 to 1924, which are being incorporated with your observations in the Quarterly Charts of Currents published in this year's MARINE OBSERVER.

1,241 sets of observations for 1924 for selected squares in the Atlantic, Indian and Pacific Oceans, punched on Hollerith cards were sent to Holland, which involved practically no additional work to us.

The Dutch also desired observations for the same squares in the years 1917 to 1920, and we were able to supply 1,979 of your observations which had been extracted before the Hollerith system was introduced. Finding these, and referring to the log books for time of observation, and copying them out, occupied 85 man hours, which by comparison with the new system worked since 1921 will give some idea of the great advantage which may be derived from the Hollerith System amongst maritime countries co-operating in these times of limited clerical aid.

To the Norwegians we have supplied 1,197 sets of observations made in the North Sea, North Atlantic and Mediterranean, between January 26th and February 5th, 1922, on Hollerith cards for special investigation. At present we cannot make use of observations in the Marine Division

which might be available from Norway in return, because the work of incorporating data not on Hollerith cards would be considerable, but the British service is deriving great benefits to other branches of Meteorology which proves the value of international co-operation.

To Italy have been sent copies of all observations of submarine earthquake phenomena received for the years 1922 to 1924.

To the "Reseau Mondial," an international publication for making meteorological data available to all services, the following have been supplied:—

Monthly means of pressure and air temperature for Watling Island, West Indies, 1919 to 1921, and similar information for the year 1921 for Cape Pembroke, Falkland Islands.

Mean pressure, air and sea surface temperature for nine 5° squares in the South Atlantic off the East Coast of South America for the years 1855 to 1900.

Mean air and sea temperature in two 5° squares in the North Atlantic on the tracks North-about from Western European ports to North American ports for the year 1924.

Mean pressure air and sea temperature in two 5° squares on the Trans-North Atlantic Tracks for the years 1922 and 1923.

The International Upper Air Commission was supplied with observations from ships in all parts of the Southern Hemisphere on January 4th, February 12th to 17th, and March 8th, 1923, for making world synoptic charts for those special dates.

The new Division for Airship Meteorology was provided with your observations from Longitude 25° W. to the Longitude of Rangoon for 8 a.m. on 16th February, 1925, for the purpose of seeing to what extent ships' reports could assist airship navigation to India.

The Scottish Fishery Board was provided with observations of currents for the year 1924 in the North Atlantic between the parallels of 40° and 60° N. Latitude and the meridians of 10° W. and 50° W.

Mr. HUNT, the Commonwealth Meteorologist at Melbourne, enquired as to our system and full particulars were sent to Australia of the Hollerith System of data extraction and computation; we hope that this may prove to be a good omen for uniformity of system in the Commonwealths, Dominions and Colonies which form the British Empire, and that other countries besides Holland may see fit to work in with us. France has shown interest this year.

This system was described in the third and concluding note upon "Marine Meteorology, History and Progress," page 173 to 175, No. 23, Volume II.

Wireless Telegraphy Coded Reports from North Atlantic Liners.

During the year 4,467 weather reports were received and used for the purpose of the forecasts issued in the "Weather Shipping" Bulletin for Home Waters and in the Daily Weather Maps, and many newspapers for Great Britain and Ireland. These have also given the Forecast Division valuable information for the issue of Gale Warnings.

Upon examination of the Registers in the Marine Division compared with the signals received it was found that 1,193 reports were received within one hour of observation, 1,217 within two hours, 981 within four hours; while 1,076 were over four hours in transmission from the time of observation.

2,090 reports were sent by ships to the westward of Longitude 40° W. through Bar Harbour and other American Coast Stations direct to the United States Weather Bureau at Washington, D.C.

510 errors in transmission were corrected by the check system, the registers proving that the check had only failed in 32 cases.

The ships making these reports are to be congratulated in having maintained this service throughout the Marine Wireless dispute, for by so doing they have given uninterrupted aid to the making of Gale Warning Signals which are of so much importance to small craft in Home Waters.

Practical Application of the Work at Sea.

Wireless and Weather as an Aid to Navigation.

Up to the end of 1925 the number of regular observing ships having Meteorological Office mercurial barometers, complying with the invitation to make regular daily routine wireless reports to "All Ships," of observations synchronising with those of the nearest coast, had steadily increased, as shown by the records at the end of Meteorological Logs. With this proof that the system was becoming more customary, in

view of suggestions and requests from Marine Observers for organisation and the probable requirements of airships in future, the principles of an organised voluntary service were outlined, see Vol. II, No. 24, page 188 to 190. A number of favourable comments have been received, samples of which have been published.

As the system suggested would, if adopted, probably take time to perfect and establish, on account of the difficulties to be overcome, including the necessity of the change of observation time on many coasts, further efforts have been made to extend the existing very loosely organised system; and in the January Number this year all Marine Observers in ships on our list having mercurial barometers, whether M.O. or ships, were informed that the greatest service they could perform as regards Marine Meteorology in the general interests of seamen, was to regularly make these signals. Just as this service appeared to be materially gaining ground the wireless dispute arose and from what commanders have told us there is no doubt that growth has been temporarily checked.

With return to happier conditions we wish to give all possible encouragement, and it is therefore well to show how a great deal may be done in the interests of navigation and meteorology at sea with the facilities already in existence.

Weather Bulletins giving coast station observation reports are now issued for the South African and Australian Coasts as well as for Europe, America and Japan, and the most hopeful sign that Meteorological State Services are beginning to realise how important the matter of uniformity of code and method are to seamen is the fact that Sweden has followed Great Britain in the adoption of a "Weather Shipping" Bulletin of uniform code, groups, and forecast areas, as advocated by a great many experienced seamen.

Thus the information regarding the coast is available to seamen on many coasts throughout the world upon which to base a weather chart.

If observations over the ocean synchronising with these coast observations are made available the seaman will have the material for increasing the value of his weather chart to such an extent that it will frequently give him the advantages which will make all the difference between hazard and safety, or excessive fuel consumption and economy. Experiences already published amply justify this contention. The matter mainly rests with Regular Marine Observers who have mercurial barometers. For the information of those who are doubtful that sufficient suitable observations can be reported on any day we have plotted the position of every British ship on the List of Regular Marine Observers with a mercurial barometer at sea on June 1st, 1925, and have shown the nature of their wireless installation on CHART OF THE WORLD, No. III. This day is typical.

This chart shows that along the main trade routes of the Atlantic, Mediterranean and Arabian Sea there are ample suitably equipped ships to report to "All Ships," and the steps now being taken to improve geographical distribution will not only tend to supply the deficiency in the Pacific and Southern Ocean but will lessen any congestion that there may be elsewhere.

From time to time there have been suggestions, usually from outside the Corps of Marine Observers, that all ships should report. Very little thought, even to those who have the slightest knowledge of the limitations of wireless communication, would make it obvious that if all ships were to report to "All Ships" except in places remote from the trade routes, probably no ship would receive, and this is the main reason for the selection principle, which of course can only be voluntary and by invitation.

Then again many have practised the exchange of weather information with one or two, perhaps three, other ships in fairly close proximity, but that does not make the information available to all ships within range of the reporting ship nor does it provide sufficiently far distant and scattered observations.

As I write, Captain ISAACSON, late of S.S. *Manistee*, No. 17 on CHART No. III, who now commands S.S. *Cristales* on her maiden voyage, called. He is one of the active supporters of this new movement in Marine Meteorology and broadcasts daily a report to "All Ships;" so that we may take *Manistee* as an example, for it is called first hand.

Now at 7 a.m. G.M.T. the observations are made in *Manistee* so that they will synchronise with those of the British Coast given in the "Weather Shipping" Bulletin which *Manistee*, fitted for C.W. reception, takes in direct from GFA, Air Ministry, at 9 a.m. G.M.T.

Manistee can only send on spark and her report is made to "All Ships" as soon as possible after observation, on 600 metres spark, she

is a two wireless operator ship in Zone F for watches and will be keeping wireless watch.

Those reporting ships with one operator would probably make the 7 a.m. report just after noon in Zone F. Most ships within a radius of say 250 miles of *Manistee* will receive her report, on this occasion it will probably not reach other reporting ships, but there are doubtless others. Nor will she receive reports on spark, for the other ships expected to report on spark are out of range.

Shortly after 7 a.m. G.M.T. Atlantic liners indicated with a number in the Fleet List and by W.T. at the end of the latest number of THE MARINE OBSERVER, are busy making their coded reports on 2,100 metres C.W. to Devizes, GKU; and as ships will at this time be looking out for reports addressed "All Ships" on 600 m. spark, they are not likely to be able to intercept these; but it is hoped that C.W. ships with mercurial barometers on our list will make a plain language edition of these reports, including the barometer tendency with course and speed, which are of the utmost importance at sea from one to two hours after observation time, on 2,100 metres C.W. For example, within a range of about 1,200 miles (they have been received much further) as shown by circle on chart, the observations made in No. 1, *Montrose* may often be made available to ships fitted for C.W.R. Then as regards ships not engaged in code reporting to the shore but on our List with mercurial barometers, No. 15, *Osterley* would cover the radius shown, and she has 3 W/T Operators, and keeps continuous watch.

Between 9.30 a.m. after the receipt of the shore bulletin and 11 a.m. will be a suitable time for making her report to "All Ships" and so on. Without organised times for transmission the wireless operators will doubtless do some little arranging each day, and QRY ("What is my turn?") will of necessity be asked, but the mixture of C.W., C.W.R., and Spark ships on our List which are invited to make reports to "All Ships" will help matters.

The reports can only be fitted in between the many other messages which ships have to send. Until universal observation times are fixed as suggested in the December Number, in mid-ocean the difference between times of observation will to some extent reduce jamming but here synchronisation of observations will be lacking. These G.M. observation times are given on a Chart of the World in the January Number and we have shown them on Chart No. III for your convenience.

At present and until an organisation can be introduced it will be necessary as far as possible to make the reports at times which are suitable to the zones for watches, as well as fitting in for the different observation times on different coasts; and therefore the whole system is complicated and is entirely dependent upon the initiative of each of the ships indicated by the letters M.L., M., and W.T. in the Fleet List, in whatever part of the World they may be at sea. As to the drawing of weather charts ample evidence has been produced in this Journal to show that the officers of the Mercantile Marine are capable of this practice with a little advice and assistance. With practice, if the observations available are suitably disposed, the drawing of a simple weather chart on the lines advocated in Chapters III and VII of "Wireless and Weather an Aid to Navigation," Volume I, occupies but about a quarter of an hour. There should be from this year onwards a number of young officers obtaining their master's certificates who have been trained in the *Conway, Worcester*, and at the *Nautical College, Pangbourne*, in marine observation with the Cadet's Log, who have received instruction in weather charting, and the Visiting Officers at the Ports of London and Liverpool are giving daily instruction to all Marine Observers who wish to have it on board their ships.

The Fleet List in THE MARINE OBSERVER will not only be useful to those at sea to indicate from what ships routine synchronized observation reports may be expected; but as the Weather Services of the British Dominions extend their work in connection with shipping, it is hoped that it will be of assistance to them for enlisting ships. By selecting those registered at their own ports and those registered in Great Britain which are not on our List, distribution of observation may be improved, the work furthered with greater economy, and duplication avoided.

The Practical use of published information.

Just as in the case of immediate information being made generally available at sea by wireless, so it is our endeavour to place the results of your work which we are able to put on paper at the disposal of

shipping and seamen generally and all to whom it may be useful. This is one of the objects of THE MARINE OBSERVER, and if the members of our Corps will bring to the notice of shipowners and others the fact that the work will help all navigators if they are provided with THE MARINE OBSERVER, your work at sea may be made of still greater value to the nation and incidentally publication may be rendered less costly.

By restricting the number of regular observing ships to 500, better results are achieved; there is more continuity of observation by practised observers, and the work done in the Marine Division is kept within the bounds which the present need for national economy demands.

Acknowledgment and Awards.

Old Marine Observers and Marine Agents.

The Corps of Marine Observers and the Marine Division are much indebted to these gentlemen for the interest they show and the great help they give us in all parts of the British Empire, and we wish to make grateful acknowledgment to them one and all. When THE MARINE OBSERVER was established, one of the first things to be done was to commence the publication in it of notes with portraits of those who had pioneered Marine Meteorology, and later we have been enabled to put into print upon retirement the records of more modern officers who have excelled in furthering the work.

Unless a personal note is written with personal knowledge of its subject it may lack a great deal. Those who have served under distinguished commanders who have performed particularly valuable service to the nation and have furthered the work of the Corps of Voluntary Marine Observers, are invited to contribute notes, and if possible portraits, when these officers retire or at other suitable occasions so that a selection may be published in this Journal for the purpose of paying suitable acknowledgment to the Sea Service through its leaders.

Excellent Awards and Conclusion.

A list of commanders and principal observing officers to whom the Meteorological Committee have made "Excellent" awards for Meteorological Logs and Wireless Registers is appended.

The publications awarded will be forwarded as soon as the inscriptions have been made. The Director wishes to express his thanks to one and all who have contributed by their efforts to the work of the Meteorological Office; and as the officer directly responsible for supervision of Voluntary Marine Observation, I would like to thank every member of our Corps for the attention and consideration they have given to our suggestions and requests and for the great support given to the Marine Division.

It may be well said of our Corps that one volunteer is worth ten pressed men. There can be few works of such high endeavour performed voluntarily in the service of HIS MAJESTY KING GEORGE V as those which are being done by the British Corps of Voluntary Marine Observers in all parts of the Seven Seas.

London.

April 1st, 1926.

MARINE SUPERINTENDENT.

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

Captain.	Principal Observing Officer.	Ship.
ADAMSON, B. W.	CUMING, R.	<i>Dorsetshire.</i>
BEADNELL, F. E., Capt., R.N.R.	F'ANSON, A. C.	<i>Adriatic.</i>
*BEEDLE, T. S.	WELLS, F.	<i>Hatarana.</i>
BERRY, G.	ALLINGHAM, J. W.	<i>Celtic.</i>
*BETTS, W. MORTON	KEEN, C. S.	<i>Edinburgh Castle.</i>
*BOLTON, S., D.S.C., Commr., R.N.R., R.D.	SHAW, R. H.	<i>Doric.</i>
BOOTH, W. M.	{ HARRIMAN, L. F. RAE, J. }	<i>Astronomer.</i>

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

Captain.	Principal Observing Officer.	Ship.	Captain.	Principal Observing Officer.	Ship.
BRADSHAW, J.	APPLEBY, J. M.	<i>Belgenland.</i>	KNOWLES, C. H., D.S.O., Commr., R.N.	HUGHES, A. M.	<i>H.M.S. Ormonde.</i>
*BROWN, A. M.	SHAW, F. T.	<i>Kovno.</i>	LATTA, R. G.	{ HUTCHINGS, K.	<i>Empress of Scotland.</i>
*BUCKERIDGE, G.	NORRIS, H. W.	<i>Bambra.</i>	LEA, W. H.	—	<i>Montroyal.</i>
BURET, T. J. C.	—	<i>Nariva.</i>	de LEGH, P.	GROVES, C.	<i>Port Sydney.</i>
BURTON-DAVIES, J.	POVER, F.	<i>Hurunui.</i>	*LETTON, F. W.	HAWKINS, P.	<i>Somersetshire.</i>
BYERS, G.	STRINGER, C.	<i>Chinhua.</i>	MACKAY, A. S., Commr., R.N.R., R.D.	WILSON, F. G.	<i>City of Chester.</i>
*CALDWELL, R.	PROUDFOOT, W.	<i>Olympia.</i>	*MACKIE, R. W.	DUNCAN, J. W.	<i>Culebra.</i>
CARTMER, G. E., O.B.E.	BURFITT, L. M.	<i>Frankenfels.</i>	*MANDER, T.	ISAAC, W. F.	<i>Clan Mackinnon.</i>
CASSON, D. H., Commr., R.N.R., R.D.	SHAW, F. T.	<i>Kovno.</i>	MARSHALL, W., C.B., D.S.O., Capt., R.N.R., R.D.	ECKFORD, R. D.	<i>Oriana.</i>
CHAMBERS, F. W., D.S.C.	CONN, W. B.	<i>Digby.</i>	MATHESON, C. G., D.S.O., Capt., R.N.R., R.D.	WARLTIRE, C. J.	<i>Olympic.</i>
CHARLES, SIR J. T. W., K.B.E., C.B., Commodore, R.N.R., R.D.	LOCKE, J. V.	<i>Aquitania.</i>	*MATTHEWS, G. P.	DODGSON, C. V.	<i>Orsova.</i>
CLIFTON MOGG, W. P., Lieut.-Commr., R.N.R.	VANDERVAR, R. K.	<i>Pakeha.</i>	MCKELLAR, A. W., Capt., R.N.R., R.D.	SUMPTON, R. W.	<i>Orduna.</i>
COAD, A. J., Commr., R.N.R.	ROGERSON, R. K.	<i>Oronsay.</i>	*MCNEIL, S. G. S., Capt., R.N.R., R.D.	WEBB, A. J.	<i>Ruapehu.</i>
COLLINS, P. J., O.B.E.	COX, H. S.	<i>Euripides.</i>	METCALFE, G. R., Lieut.- Commr., R.N.R.	STEWART, W. M.	<i>Carmania.</i>
COLUMBINE, F. F.	GARTSIDE, R. E.	<i>Matheran.</i>	MILNE, R. A., Commr., R.N.R., R.D.	PEARSON, W. W.	<i>Majestic.</i>
COTTELL, S. C.	POST, C. F.	<i>Port Hunter.</i>	*MITCHELL, W.	WRIGHT, P.	<i>Margha.</i>
*CRAWFORD, R.	BRAY, J. V.	<i>Aorangi.</i>	OWENS, A. L., Commr., R.N.R., R.D.	MACQUEEN, D.	<i>Saturnia.</i>
*DOSSOR, W. A.	SHAW, F. T.	<i>Kovno.</i>	PARK, G.	ROGERSON, R. K.	<i>Oronsay.</i>
ENGLISH, G. L.	SHARROCK, D. Y.	<i>Leicestershire.</i>	*PARKER, J. J. W., Lieut.- Commr., R.N.R., R.D.	CAVALLO, A. J.	<i>Risaldar.</i>
ESSLEMONT, C.	SUMMERS, J.	<i>Chindwin.</i>	PROTHERO, W.	ROCHE, C. B.	<i>Nore.</i>
FRENCH, H. E., M.B.E.	HARBORD, W.	<i>Spero.</i>	REILLY, J. V.	PARRY, T.	<i>Scythia.</i>
GILLIES, J., C.B.E.	HUTCHINGS, K.	<i>Empress of Scotland.</i>	RENAUT, F. A.	HYLAND, G.	<i>Woodarra.</i>
GRIFFITHS, E., Lieut.-Commr., R.N.R.	{ ROBERTS, E.	<i>Empress of France.</i>	ROBINSON, C. A.	CHAMBERLAIN, C.	<i>Port Caroline.</i>
HAGUE, J. W., Commr., R.N.R.	{ WALKER, R.	<i>Metagama.</i>	ROBINSON, F. W.	LEAVETT, E. A.	<i>Port Albany.</i>
HAILEY, A. J., Lieut.- Commr., R.N.R.	BLAIKLOCK, G. D.	<i>Arundel Castle.</i>	ROSTRON, A. H., C.B.E., Capt., R.N.R., R.D.	WILKINSON, W. C.	<i>Orari.</i>
HANNEY, T. W.	LEICESTER, R. A.	<i>Empress of Australia.</i>	ROWE, J. P.	MACKELLAR, A.	<i>Mauretania.</i>
*HARVEY, J. R., O.B.E., Commr., R.N.	ROBERTSON, M.	<i>Elpenor.</i>	SCUTT, W.	SCOINS, H. F.	<i>Maihar.</i>
HEMMING, F. A.	JENKS, W. C.	<i>H.M.S. Herald.</i>	*SHOWMAN, A. C.	{ CRIPPS, W. C.	{ <i>Wangaratta.</i>
*HENDERSON, D. A., Lieut.- Commr., R.N.	HORWOOD, H.	<i>Rimutaka.</i>	SIBBONS, H.	MILLARD, S. R.	<i>Niagara.</i>
HESTER, C., Commr., R.N.R., R.D.	EXTON TURNER, H.	<i>H.M.S. Flinders.</i>	*SLATER, H. N.	MACPHERSON, T. A.	<i>Montcalm.</i>
*HICKSON, V. W., Lieut.- Commr., R.N.R., R.D.	NORTH, E. J. R.	<i>Peshawur.</i>	*STRONG, H., Commr., R.N.R., R.D.	MCFADYEN, H.	<i>Tyndareus.</i>
HIGGINS, C. J.	YATES, H. J.	<i>Cedric.</i>	SWAN, L. H.	JONES, A. C. H.	<i>Edinburgh Castle.</i>
HIGGS, W. G.	YOUNG, T. G.	<i>Clan Malcolm.</i>	TURNBULL, J., C.B.E., Capt., R.N.R., R.D.	KEEN, C. S.	
HOLME, A.	{ NICHOLSON, J. T.	{ <i>Port Pirie.</i>	WARNER, G. E., Capt., R.N.R., R.D.	RENOUF, W.	<i>Port Victor.</i>
*HUGHES, J.	{ HEARN, S.	{ <i>Baltic.</i>	WEBSTER, G. S., Lieut.- Commr., R.N.R., R.D.	HARRISON, A. C.	<i>Montnairn.</i>
IRVINE, W. R. D., Capt., R.N.R., R.D.	{ PATCHETT, F.	<i>Homeric.</i>	*WHITE, E. R., Commr., R.N.R.	WHITTLE, H. G.	<i>Orbita.</i>
*JACKSON, A. L., Commr., R.N.	{ GRIFFITHS, A.	<i>Aba.</i>	*WILKINSON, T. G.	PHILLIPS, W.	<i>Montclare.</i>
JAMES, L. V., D.S.C.	PUGH WILLIAMS, G.	<i>Berengaria.</i>	WOODGET, H. T.	CLARKE, J.	<i>Megantic.</i>
KEARNEY, F. J.	ROBSON, W. C. A.	<i>H.M.S. Iroquois.</i>	*WORRALL, L. C. H.	THOMPSON, N. L.	<i>Titan.</i>
KETTLEWELL, C. R.	BAXENDELL, A. K.	<i>Orvieto.</i>		WELLS, F.	<i>Hatarana.</i>
	DYER, A. H.	<i>Port Melbourne.</i>		NOBLE, A. R.	<i>Makura.</i>
	{ FAIRBAIRN, J. A.	{ <i>Dorset.</i>			
	{ CAPON, F. G.				
	{ SMITH, E.				

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

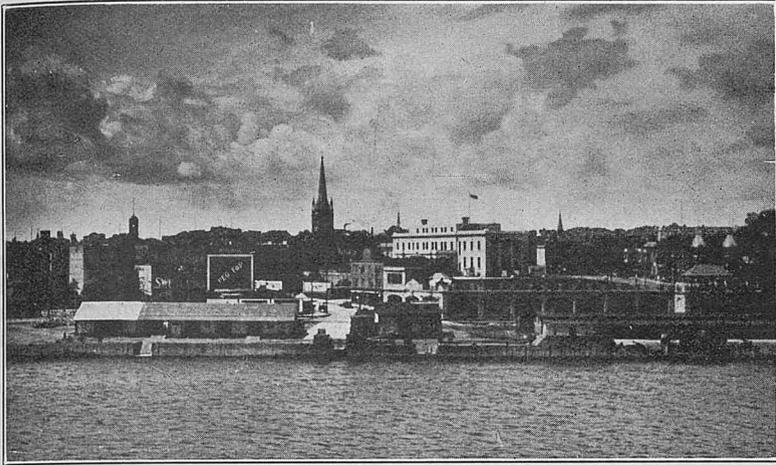
Note.—Plates produced by Lithographic process, including Charts and other large diagrams, will be found in each number after "Weather Signals."

THE MARINE OBSERVER'S LOG.

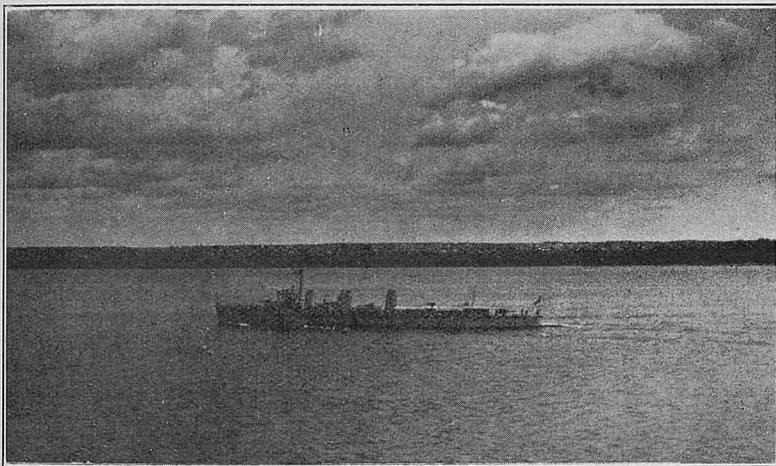
It is hoped that these pages will be filled each month with a selection of the contributions of Mariners in manuscript, or remarks from the Logs and Reports of regular Marine Observers.

Responsibility for statements rests with the Contributor.

CLOUD PHOTOGRAPHS.
In the St. Lawrence River.



Three Rivers, Quebec.



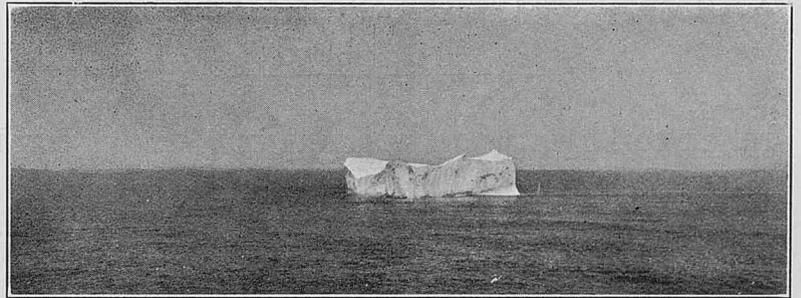
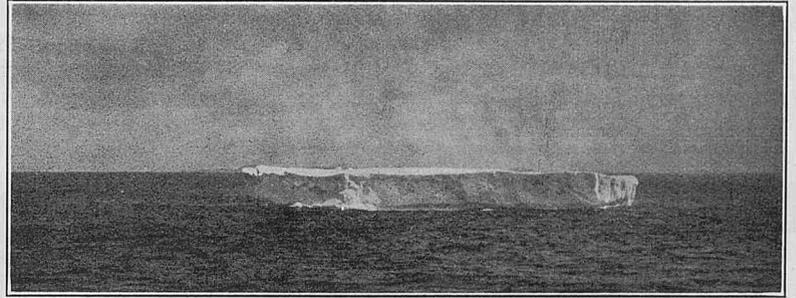
Destroyer going down River.



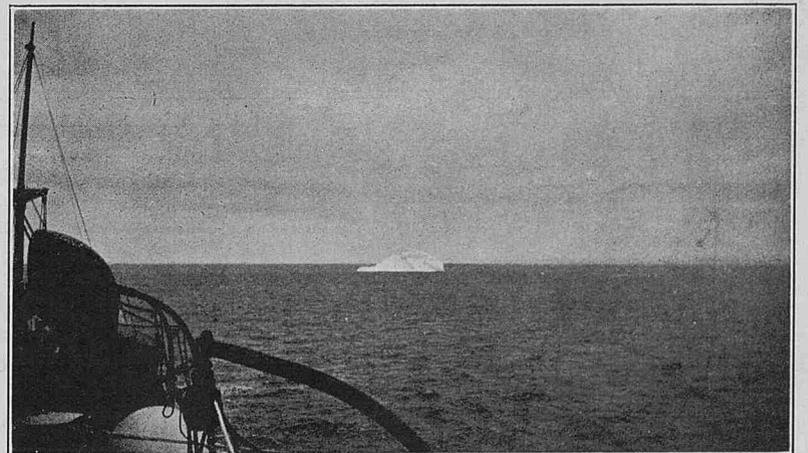
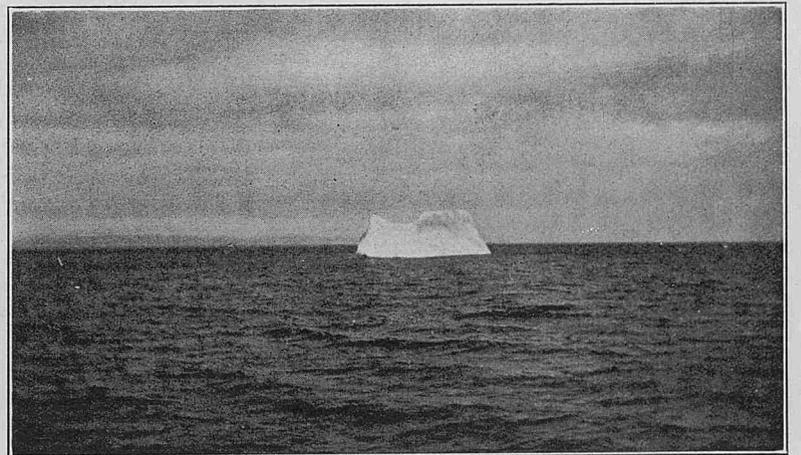
Clouds before Rain.

THE accompanying photographs have been received from Mr. H. S. KNIGHT, 3rd Officer, S.S. *Montclare*, Captain G. S. WEBSTER, and were taken on June 26th, 1925, between 2-3 p.m. Wind S.W. 5. Barometer 29.77, rising rapidly. Temperature 67°, rising. Six hours previously light variable winds, overcast, continuous misty rain.

ICEBERGS SEEN OFF BELLE ISLE.



THE above photographs have been received from Mr. H. S. KNIGHT, 3rd Officer, S.S. *Montclare*, Captain G. S. WEBSTER,, and were taken during June, 1925.



THE above photographs have been received from Captain J. E. RILEY, S.S. *Manchester Importer*, and were taken on June 1st, 1925, off Cape Norman.

WATERSPOUT.

South of the Cape of Good Hope.

THE following is an extract from the Meteorological Log of S.S. *Port Albany*, Captain C. A. ROBINSON, Cape Town to Melbourne, Observer Mr. E. A. LEAVETT, 2nd Officer :—

“ 8th June, at 11.20 a.m. Wind backed to S.W., increasing to force 6.

“ 11.25 a.m. A.T.Ship. 2148 G.M.T., in Latitude 37° 14' S., Longitude 23° 55' E. Wind S.W., force 6, sea confused, rough; sky overcast, heavy Nimbus, rain falling. Barometer 1009.9. Dry Bulb 57.5°, wet 55.8°. Observed waterspout form bearing N.N.E. distance 1 mile, revolving clockwise and moving slowly in northerly direction. Angular height by sextant being 19°. The spout remained intact for 3 minutes and then fractured about one-fourth of its height from surface and gradually disappeared. Four other waterspouts partly formed were observed on the surface to eastward, distance $\frac{1}{2}$ to 3 miles.

“ 11.30 a.m. Fierce hail squall of 5 minutes duration, with heavy thunder and vivid lightning, wind force 7 during same.

“ 11.45 a.m. Wind veered W.N.W., force 5.”

TRACK FOR GAINING WITH CURRENT IN SOUTH-WEST MONSOON SEASON.

Ras Alula to Bab-el-Mandeb.

THE following is an extract from the Meteorological Log of M.V. *Somersetshire*, Captain P. de LEGH, Rangoon to Suez :—

“ The following may be of some interest to shipmasters bound for the east during the S.W. Monsoon. I passed 4 miles north of Ras Alula at 0.33 a.m., on June 3rd, and set a course to pass 4 miles north of Burnt Island, and experienced a set and drift of 270° 9 miles. From there I steered to position Latitude 12° 23' N., Longitude 43° 51' E. and experienced a set and drift of 284° 12 miles. Direct course from 4' North of Ras Alula to position Latitude 12° 23' N., Longitude 43° 51' E., is N. 87° W., 406 miles. My distance made was 425 miles, and I had a favourable current of 21 miles. On May 26th the S.S. *Lancashire*, speed 13 knots, bound east, reported she had experienced $\frac{3}{4}$ knot favourable current from Aden to Ras Alula, so that I consider I gained 25 miles by taking the above track. I should think in July and August, when the Monsoon is stronger, that the current on this track will be much stronger.”

NOTE.—Navigators are referred to CHART IV, “Steam Tracks recommended—Colombo to Perim, South-West Monsoon.” Vol. I, No. 6. It will be noted that *Somersetshire* took a route which has been recommended for some time.

BUOY DRIFTS.

South Indian Ocean.

THE following report has been received from C.S. *Lady Denison Pender*, Captain G. W. WEST, cable work, East Coast, Africa :—

“ In June, 1924, whilst repairing cable in Latitude 28° 00' S., Longitude 44° 00' E., a large cable buoy broke adrift from its moorings in 1,230 fathoms, owing to strong currents.

“ The buoy was recovered and is now on board this ship, having been sighted by a Portuguese Pilot off Cape Bazaruto (Latitude 21° 32' S., Longitude 35° 30' E.) and towed to Bazaruto Island in November last.

“ This is approximately 630 miles distant from the position in which the buoy was lost, and in view of the strong southerly current prevailing in the Mozambique Channel its courses and distances during the five months' passage will remain a matter of interesting conjecture.”

The following account has been received from the EASTERN TELEGRAPH Co., Ltd., through the Hydrographer of the Navy :—

“ In August, 1921, our C.S. *Cambria*, while on repair to the Aden-Zanzibar cable about 1,000 miles north of Zanzibar, lost a large buoy

through the excessive currents experienced. It may interest you to note that we have just been advised (June, 1925) that the Walvis Bay Police Patrol report this buoy has been washed ashore near Sandfish Harbour South of Walvis Bay.

“ This buoy has thus drifted considerably more than 4,000 miles since it was lost in 1921.”

CURRENT.

Off the Ivory Coast, West Africa.

THE following is an extract from the Meteorological Log of S.S. *Aba*, Captain J. HUGHES, West Coast of Africa to Liverpool. Observer, Mr. G. PUGH-WILLIAMS :—

“ June 22nd, 1925. A remarkably strong current was experienced between Cape Three Points and Tabu. The strongest experienced by the Commander in thirteen years. From Tabu to Cape Palmas the current had apparently changed a little in direction and rate. The sun was obscured at noon, no observations being possible, so the current was taken throughout from Point to Point, being 66 miles, in 28 hours 48 minutes equals 2.29 knots.”

CURRENT RIPS

In the Straits of Gibraltar.

THE following is an extract from the Meteorological Report of S.S. *Discoverer*, Captain J. T. LING, Port Said to London. Observer, Mr. H. HALL :—

“ June 8th, 1925. Very strong tide rips were experienced off Carnero Pt., so strong as to swing the ship from two to three points off her course, with helm hard over against it. Another very strong tide rip was about 5 miles west of Carnero Pt. A whaler just ahead of us was turned almost completely round by it.”

CURRENTS

On the Brazils Route.

THE following is an extract from the Meteorological Report of S.S. *Socrates*, Captain A. R. BIBBY, Cardiff to Buenos Aires. Observer, Mr. W. E. JORDAN, 2nd Officer :—

“ June 16th, 1925, steering to pass 5 miles east of Anaga Point, Teneriffe, good observations were obtained at noon, the vessel making a good course with no appreciable set. At 4.20 a.m. on the 17th the light was abeam distant 18 miles, showing a remarkable easterly set when it should have been westerly. Wind N.N.W. to N.E., force 2, sea disturbance 2-3, Northerly to N.E.

“ June 23rd-24th, 1925. Another remarkable set was experienced between Latitude 6° 39' N., Longitude 27° 17' W., and Latitude 3° 17' N., Longitude 28° 34' W. From the Canaries, south, the prevailing set was S.W. When on the day in question we were set N. 85° E., 20 miles. We attributed this to the Guinea Current, as we only experienced it for one day. The following day we were in the Equatorial Current and swept to the N.W.. Wind S.E., force 3-4-5, sea E.N.E. to E.S.E., disturbance 3-2-6, during 24 hours.”

REMARKS ON AGULHAS CURRENT.

June to August, 1923.

THE following remarks from H.M.S. *Lowestoft*, Captain H. J. S. BROWNRIFF, D.S.O., R.N., survey work off South Africa, Observer, Navigating Officer, Commander E. J. SPOONER, D.S.O., R.N., have been received from the Hydrographer of the Navy :—

“ The main body of the current sweeps down the coast, keeping outside the 100-fathom line, at, and outside of which a 4-knot current was experienced. In calm weather in approximate position of 100-fathom line, a well-defined ripple was observed stretching as far as visibility allowed parallel to coast and the 100-fathom line. This was observed off East London.

"Inside the 100-fathom line current gradually decreases as it reaches coast.

"The 100-fathom line is nearest the coast, about 9 miles in vicinity of Waterfall Bluff (31° 31' S., 29° 56' E.), where bank is apparently very steep.

"Inside the 100-fathom line to the coast the strength of current varies considerably with the wind. Proceeding north from C. Agulhas to Durban, with strong E. and E.S.E. winds a current of average strength 1.5 to 2 knots was experienced at an average distance of 5 to 7 miles from shore. This increased to 3 knots between C. Hermes and Port Shepstone, where 100-fathom line is nearer coast.

"Proceeding south from East London to C. Agulhas during strong westerly winds no current at all was experienced—7 miles from shore.

"To sum up:—The S.S.W'ly. current is strong in deep water off C. St. Lucia (28° S.) and sweeps down, being deflected off shore by and keeping outside the Tugela Bank. Thence closely following 100-fathom line and so sweeps in close to coast in vicinity of Waterfall Bluff (31° 31' S.) and then runs parallel to 100-fathom line. Within

3 miles of coast from Port Shepstone to Durban Bluff, and also on Tugela Bank between Durban Bluff and C. St. Lucia a northerly set, then, is experienced with westerly winds.

"With westerly winds a very heavy sea is experienced outside 100-fathom line in strength of current, and although with no wind, but after S.W'ly winds of medium strength, a steep and big swell was experienced in August between Durban and East London outside 100-fathom line.

"It is important therefore when proceeding north to hug the coast not only to avoid the current, but also to avoid heavy seas if westerly winds prevail, and more especially between C. Hermes and Port Shepstone.

"The coast between Bashie River and Durban is incompletely surveyed, and a light in vicinity of Waterfall Bluff would be of great assistance to the mariner.

"Many outlying dangers close to coast reported between Algoa Bay and Durban also require immediate investigation."

THE TIDAL AND HYDROGRAPHICAL FUNCTIONS OF THE PORT OF LONDON.

By COMMANDER E. C. SHANKLAND, R.N.R., RIVER SUPERINTENDENT AND CHIEF HARBOUR MASTER OF THE PORT OF LONDON.

AFTER some years of estuarial experience I have come to the conclusion that for complete information no less than four surveys are requisite in an estuary, tidal river or harbour supplying commercial accommodation for shipping.

These surveys should be undertaken in the following order:—

1. **Hydrographic.**—To ascertain the situation and character of the channels, shoals and banks, tidal streams and currents.
2. **Meteorological.**—To fix frequency, duration and direction of winds in association with navigation, visibility and rainfall.
3. **Acoustic.**—To determine and if possible predict the effect under varying conditions of haze or fog, temperature and wind force on the reliability of fog signals established to guide the mariner.
4. **Geological.**—This tells us where and under what laws the sandstone, chalk or conglomerate may outcrop. The inclination of stratification and its history. From this we learn about buried channels, the ancient flood plain and modern watercourse, the location of the alluvium of sand which we dredge.

The first three are intimately associated with the doings of the seaman, more especially in relation to tidal level. It is therefore with the subject of tidal level and its contiguous or associated factors that I propose to deal.

The interception, in terms of tidal range, which a peninsula or island exerts, great as it appears to measure, is a passing phase of a very large impulse moving on its way almost uninterruptedly, to effect a balance of forces.

As the distribution of land to water is 28 per cent. approximately to 72 per cent. on our globe these oscillations of the tide at one place are nevertheless what the seaman encounters in harbours.

We therefore have chosen from the great tidal movement a datum level to measure our along-shore effects, and we call this datum line Mean Sea Level—an oceanic mean. Mean Tide Level being a local mean and not always in agreement with Mean Sea Level.

As the earth is an oblate spheroid any part thereof is relatively rotund and consequently we must avoid stretching the Mean Sea Level idea too far, otherwise we must dip, using the word in both the geographical and literal sense, into all the obscure theories of tidal origins.

It will be sufficient for practical purposes to look at the two CHARTS, FIGURES 1 AND 2, accompanying this article; these will enable us to visualise what is taking place on both sides of our islands—in the Atlantic and North Sea respectively.

The figure showing the 100-fathom line to the westward of Ireland, serving almost as a meridian to the sounder, may be said to represent the eastward limit of normal oceanic range.

It is assumed from tidal observations taken at Rockall, an isolated rock west of the Hebrides, that the spring tide vertical oscillation is probably 3 ft.

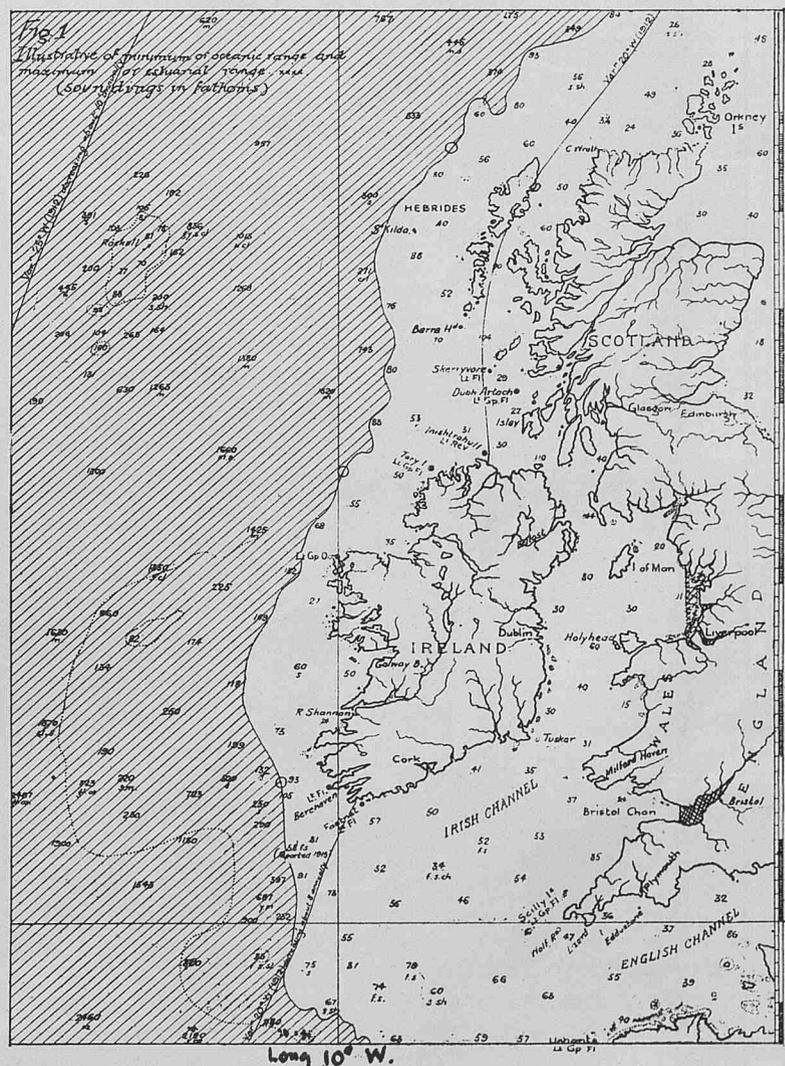


Figure 1.

Owing to the Atlantic swell it has been found difficult to obtain satisfactory data.

Referring now to the CHART OF THE NORTH SEA No. 301 recently published, and which displaced our previous conceptions of co-tidal conditions, we have here a chart which is based on accurate tidal measurement, and it possesses three nodal areas from which the tidal lines emanate in terms of time and range.

On this CHART, times are shown by the continuous black lines,

and high water occurs, on the average, simultaneously at all points on any one continuous line. Ranges are shown by the pecked black lines, and the range is, on the average, the same at all points on any pecked line.

The CHART may be utilised for finding the times and heights of high and low water, and thence the height of the tide at any time,

at any position in the North Sea.

At the nodal or amphidromic points the tide has zero range.

These two maps suggest how the difference in range at an oceanic position and in an estuary or harbour may be reconciled. For instance, the range in some of the Bristol Channel Ports embraces an oscillation of 40 ft. and at Liverpool 30 ft., or approximately 20 ft. and 15 ft.

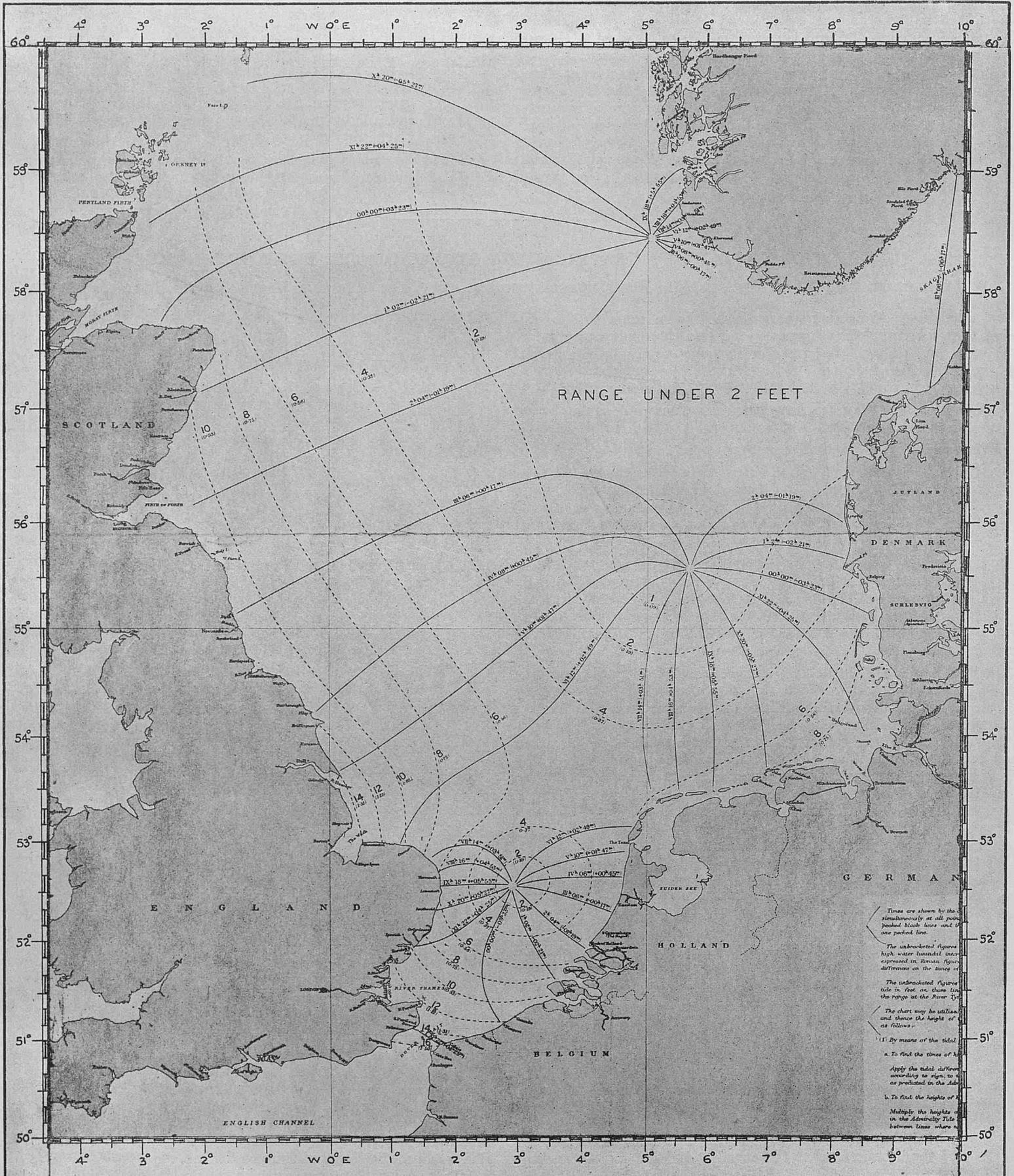


Figure 2.—The North Sea.—Chart showing Co-tidal Time and Range Lines. (Reproduction of portion of Admiralty Chart No. 301.)

respectively above and below Mean Sea Level. At the Bay of Fundy and in the tidal pocket it embraces a range of 50 ft., whereas the oceanic range may be only 3 ft. With CHART NO. 301 the tidal stream factors may be used to compute the surface gradient of the sea at any moment from the observed directions and velocities of the streams at that moment, and the height of the tide at sea may then be found from the known height on the coast and the computed gradient.

The mixing of the tidal streams at sea is marked by overfalls and tide rips which are known to seamen at places where the tides compete with time and terrestrial configurations in its flow.

Mean Sea Level therefore serves to co-ordinate the small oceanic range with the greater estuarial range, and this TIDE CHART NO. 301 with its amphidromic or nodal points is a very great step forward in co-ordination.

By its means we are now able to join the tidal components of the Port of London with those of the North Sea.

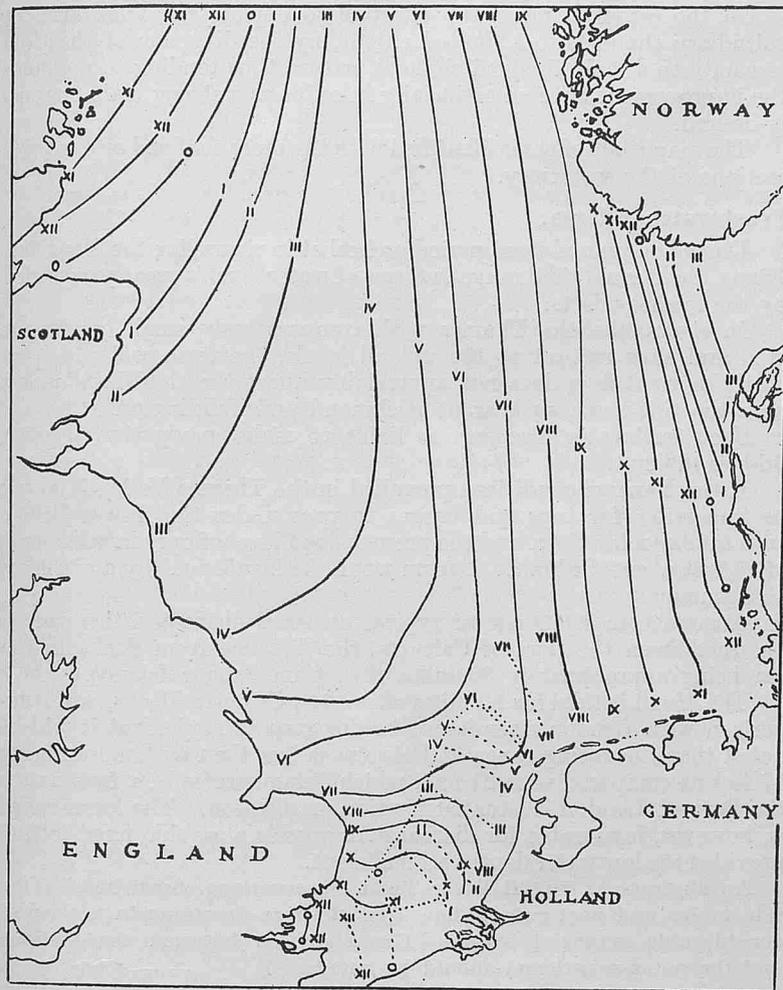


Figure 3.
Co-Tidal Lines in the North Sea.
(Lunitidal Interval on Full and Change days.)
(Original Type)
1913.

The previous type of co-tidal chart now superseded is also shown—dated 1913.

At Southend the Port of London Authority have their most seaward station for automatic tidal readings, and at Sheerness the Admiralty have of many years establishment, their automatic gauge, but the open water conditions at Southend are not fully comparable with the more confined conditions at the Medway, the differences being slight but important.

This importance has relation to fixing the value of "K," a meteorological factor of occasional and periodic occurrence in tidal level, and in the determination thereof the elimination of all other inequalities is desirable.

"K" is the ratio of change of height of sea level to change of barometer.

In 1831, Mr. DAUSSY, the French Hydrographer, published his researches of this subject and concluded that (presumably at Brest)

a variation of one millimetre in the barometer produced a change of opposite sign of 14.7 millimetres in the level of the sea. This appears to be the first determination of the value of the quantity.

The Director General of Ordnance Survey, Colonel Sir CHARLES CLOSE, in 1918 collected and reviewed the recorded results of "K" in connection with his Mean Sea Level observations at Dunbar, Felixstowe and Newlyn for the re-levelling of England and Wales, then in progress.

These recorded results are shown on attached table and provide food for reflection not only to the tidal expert but also to the practical seaman.

Many of these observations were obtained from visual tidal readings, but for that reason are not to be belittled in the slightest, for it must be borne in mind that some of the best automatic gauges by their mechanical gearing reduce the actual rise and fall by one-twelfth from the natural movement.

With the knowledge of how "K" may be estimated and applied we can proceed to the next important factor in estuarial navigation, *i.e.*, the selection of a low water datum for the charts.

Values of "K" (Ratio of Variation in Mean Sea Level to Variation of Local Barometer) for Periods of One Year or longer.

Place.	Dates.	Authority.	Value of "K."	No. of Years.
Brest -	1817	DAUSSY - -	15.2	1
Liverpool -	?	LUBBOCK - -	11.1	—
London -	?	do. - -	7.0	—
Bristol -	1834/1854	BUNT - -	12.8	21
Aberdeen -	1862/1913	Harbour Authority	32.8*	52
Dundee -	1867/1912	do. do. -	21.3*	46
Milford -	1886/1892	Admiralty - -	17.6	7
Dunbar -	1913/1917	Ordnance Survey -	9.6	4
Newlyn (1) -	1915/1917	do. do. -	16.5	2
Newlyn (2) -	1916/1917	do. do. -	12.2	1

* Longest period analysed.

Low water of ordinary spring tides has for many years proved the most acceptable datum to the seamen, but there are several ports abroad which chart the mean low water, thus including neaps as well as springs.

At New York mean low water is the datum, and it therefore shows a frequently good condition as opposed to our British way of selecting the frequently less favourable condition.

The International Hydrographic Bureau have now under their consideration the desirability of promoting a consistent level for all ports where applicable.

The term "half tide-rock" is well known to sailors, but if the datum is indefinite the basis of half tide is also relatively indefinite.

Still more important is this datum when applied to sandbanks. It has been noted that the crest of sandbanks such as the Goodwins, Long Sand, etc., dry at approximately half tide or mean sea level. Why nature imposes this static condition near a coastline and is satisfied with a submerged knoll in deeper water is an interesting question.

Computing a Datum.

To compute any tidal datum exactly requires tidal observations extending over a long period in order that seasonal changes in level, and changes of longer period in both level and range, may be eliminated; a good approximation may be obtained from one year's tides, for the important seasonal variation which may amount to as much as about + 3 ft., is then eliminated and longer period changes are small and insignificant. As a standard method of obtaining the average lowest low water, the averaging of the lowest tide in each calendar month for a solar year is suggested; another method would be to average the lowest tide in each of twelve lunar periods, using synodic, tropical or anomalistic months according to the type of tide.

Synodic.—When the variation from springs to neaps, in accord with the moon's phases, is the predominant feature.

Anomalistic.—When the greatest variation is in accord with the moon's distance from perigee to apogee, *i.e.*, closer or farther from the earth.

Declinational type.—Characterised by diurnal inequality which is so pronounced as to be the leading variation.

Having selected the tidal datum and computed the value, there come other important calculations and observations to define the level of the tide in the upper reaches of a waterway of 69 miles, such as the Port of London possesses.

It will be accepted that as the bed of a channel rises towards the source so does the tidal range decrease until we proceed so far up stream as to be beyond the influence of the tide at all.

For instance :—

(1) At Richmond the range of the tide is less than at London Bridge, due to this rise in bed of channel. Distance by water-course 15 statute miles.

(2) At London Bridge it is greatest, as this is within the pocket of maximum tidal oscillation or near the middle of the Thames lower flood plain.

(3) At Southend the range, approaching sea level conditions, is therefore less than London Bridge but greater than Richmond.

Prediction of Tides.

Next in order to the computation of a datum comes the estimation or prediction of future tides in order that the mariner can be armed with some information as to height and times of high water and low water.

Apparently Great Britain took the lead in this marine development, and in 1833 the British Admiralty embarked on the issue of tide tables, giving the predictions for the four principal ports in the United Kingdom.

It was a natural act to select the principal ports so as to supply commerce with the tidal figures affecting them, but, as it has since been pointed out, the choice of such places was mainly on account of their importance as sea ports rather than their suitability for tidal movements.

It has been found consequently that accurate prediction has not been reached in every case, and to some localities the manner of computing the tables is a scientific problem now being carefully sifted.

To some ports the method of Harmonic Analysis appears to satisfy the conditions. To others the method of Sir JOHN LUBBOCK gives satisfactory results, and an extension of that analysis is the modern equation method.

Shallow water predictions appear to be best developed by the equation method.

We now have to consider what may be described as the hydrographic progression—the change in the tides due to change in character of a modern waterway from embanking, dredging and otherwise assisting or deflecting nature.

The deepening of the tideway or rivers below a certain point in the narrower reaches has the natural effect of draining off the water more rapidly into the pools thus formed and with a consequent addition of the number of low waters which fall below datum at the higher position. This number is fairly consistent as a rule with the amount of cube yards of dredged improvement.

At high water the river or tideway receiving a greater volume from the improved capacity sends an amplified wave through the old level, but the facilities for expansion over foreshores, creeks and waterways make the extra volume scarcely noticeable. Of special interest to those who desire to pursue the history of prediction and the modern achievements of our marine scientists on this subject is the Manual of Commander H. W. WARBURG, R.N. (1925), "Tides and Tidal Streams."

Seismograph records of Tides.

When a tidal wave, either phenomenal or natural, ascends an estuary or surrounds a peninsula, it is possible to obtain indications of this transfer of weight by the seismograph.

I am able to reproduce a typical record of this character showing with the daily retardation in time the 12-hourly pressures and alternate release of pressure clearly indicated.

Regime or Character of Tidal Rivers.

On the previous pages I have referred to the hydrographic progression or change in tides due to change in character of waterway.

It is necessary to dwell on this for a moment because it is the condition under which many of our great estuarial ports to-day do function.

The policy of river engineers and hydrographic authorities has always been to increase rather than to retard the volume and current in respect of tidal rivers in order, by its increased scour, to keep open and cleanse the channel.

This can only be effected at the cost of increase in range of tide, that is, the tide falls to a lower level and possibly rises to a higher level than before the augmentation of the current due to the momentum of the tidal wave being increased.

Dredging is the principal means of causing this increase of tidal amplitude.

In the estuarial basin the effect is to deplete the tributarial or subsidiary channels to a limited extent, by the diversion of the tidal stream into a main dredged channel, nature thus tending to augment the improvement effected artificially in so far as a strong main channel is desired.

The amplitude effect is identified with the more confined or narrower sections of the waterway.

Freshwater Effects.

During an upland flood period or freshet in rivers like the Yang-tse-Kiang, the normal tidal range in terms of water level is greatly exceeded by the freshet effects.

In rivers like the Thames with comparatively small catchment area and slow run off at the upland levels, the fresh water surplus to the normal flow does not appreciably affect the tidal level unless near the tide-head, such as at Richmond and Teddington.

Such freshwater discharge is liable to make navigation through bridges difficult.

If the Yangtse conditions prevailed in the Thames Valley it would be impossible for tugs and barges to pass under the Tower Bridge with the bascules down and the present flood level of our embankments of 18 feet above Ordnance Datum would be insufficient by a considerable amount.

A more complete view of typical estuarial characteristics can be obtained from the port of Calcutta, the distance from docks to the sea being approximately 80 miles (*i.e.*, from Saugor Island).

The Hugli is tidal for 80 miles above the Calcutta Docks, and comparison with London river is not in this respect made, but it will be noted that the spring range at Calcutta is less than at London, being 17 feet as compared with 21 feet, which demonstrates how fortunately the Port of London is situated for tidal navigation. The lesser range is, however, favourable for discharge of vessels alongside fixed jetties, provided the low water depths are sufficient.

An abstract of Hughli River Tidal Observations (furnished for the tide tables and port rules) show how the tide functions in a river of considerable estuarial length. The distances between the stations and the notes mentioned should be noted.

Station.	High Water, Full and Change.		Spring, Rise.	Neaps, Rise.	Neaps, Range.	Distances in Estuarial Course.
	h.	m.	Ft. ins.	Ft. ins.	Ft. ins.	
Calcutta (Kidderpore)	II	0	17 0	12 0	7 0	.9
Diamond Harbour -	XI	45	16 6	12 3	7 3	42.4
Upper Gaspar -	X	12	15 8	12 2	6 7	89.0
Lower Gaspar -	X	5	15 7	12 0	6 5	95.6
Intermediate -	IX	50	13 10	10 0	5 1	107.6
Eastern Channel -	IX	28	11 0	7 11	4 6	121.8
Mutlah -	IX	33	9 4	6 8	3 4	—
Pilots Ridge -	IX	38	9 0	7 1	5 9	141.0 (approx.)

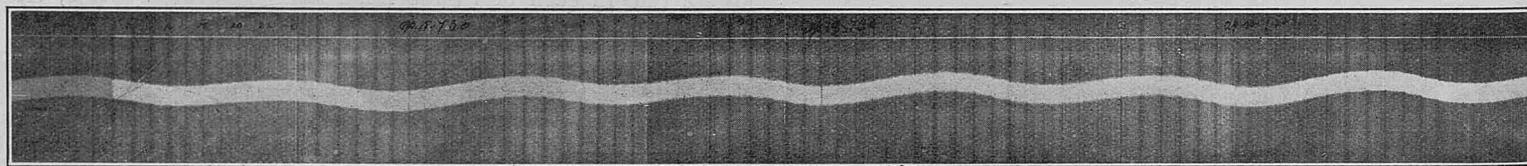


Figure 4.—Seismograph Record of Tidal Pressure at High Water and Release of Pressure at Low Water Seismograph on a Peninsula.

Remarks on Progress of the Tide Wave.

In the pre-war issues of the Admiralty Tide Tables a brief digest on the progress of the main tide wave was given.

I would suggest that the footnote be read with priority to all other tidal matter. This note says: "The best way to disentangle the phenomena of the tides when we are observing them at any place (in the world) is to refer the time of high water and low water to the time of moon's transit and to do this *at once* while the series of observations are going on. Thus the relationship is at once established and a long series of tidal observations possibly avoided." In other words, long and abstruse calculations are not required to quickly find the lunar relation.

The general progress of the tide wave along the most frequented shores is still imperfectly known, and about the connection of the tides over the general areas of large oceans we are as yet in the dark. There is, therefore, an important and useful field of important discovery in this subject, even by means of brief and scattered series of observations and still more of simultaneous or connected observations. The general features of the progress of the tidal wave, as hitherto ascertained, are as follows:—

The tide wave which brings the tides to the coasts of Europe, comes from the Atlantic and brings high water to the Western coast of Spain and Portugal about two hours after the moon's transit, to the west coast of France about three hours, to the western coast of Ireland and to the Land's End about four hours.

The tide wave then runs along the South Coast of England and North Coast of France to the Strait of Dover, which it reaches about eleven hours after the moon's transit. It also runs along the West Coasts of Ireland and Scotland and reaches the Orkneys about nine hours after the moon's transit. From thence it enters the North Sea and runs along the East Coast of Britain so as to reach Peterhead about twelve hours after the moon's transit, and Harwich in about twelve hours more, where it meets the tide wave which had come through the Strait of Dover derived from the Atlantic wave about twelve hours earlier.

The tides of the North Sea are produced by a mixture of these two tide waves, and hence follow the complex laws which result in the peculiar co-tidal chart we have described in another page.

It is remarkable that the European Tide Wave though following the moon's transit at a definite interval (nearly) moves (at first) in a direction opposite to the moon, viz., west to east. The same occurs in the Pacific, the tides on the western shore of South America, near Cape Horn, also move from west to east.

With these observations in mind the mariner will readily appreciate that high water by the shore is one thing and when clear of the coast line it becomes another, and that inshore currents be regarded studiously as local and sometimes unreliable.

Tide Gauges. Typical Instruments.

Automatic Instruments.—Measurement of the rise and fall of tides is the primary function of the automatic tide gauge, but since their introduction they have been adapted for the recording of fresh water levels in lakes, reservoirs, &c. Their principal advantage over personal observations is the continuous record produced at small cost. Their disadvantage, if any, being the reduced scale on which it is necessary to operate them. CARY PORTER, LTD., have, within recent years, manufactured automatic gauges which reproduce in graphic record the rise and fall of tide on a scale which is reduced 12 times from nature.

Obviously, if an observer can record the tidal movement at its natural dimension and without reduction in scale, this record is superior, for there not only intervenes between the float level and the graphic record, mechanical gear liable to displacement and also the reduction in scale itself. The modern automatic gauges of CARY PORTER are probably the largest scale and most advanced pattern for tidal work existing. They were installed at Dunbar, Felixstowe and Newlyn in connection with the re-levelling of England, Scotland and Wales.

The gauge consists of a revolving drum 25 ins. long by 8 ins. in diameter mounted horizontally with its spindle working in ball bearings, and driven by high class 8-day clock movement rotating the drum, once in 24 hours.

On the revolving drum is fitted the tidal charts on a scale of 1 inch = 1 foot. The float is exceptionally large—18 ins. in diameter and is of copper—the spare end of the float band after passing over a large sprocket wheel, is connected to a gathering wheel, to the spindle

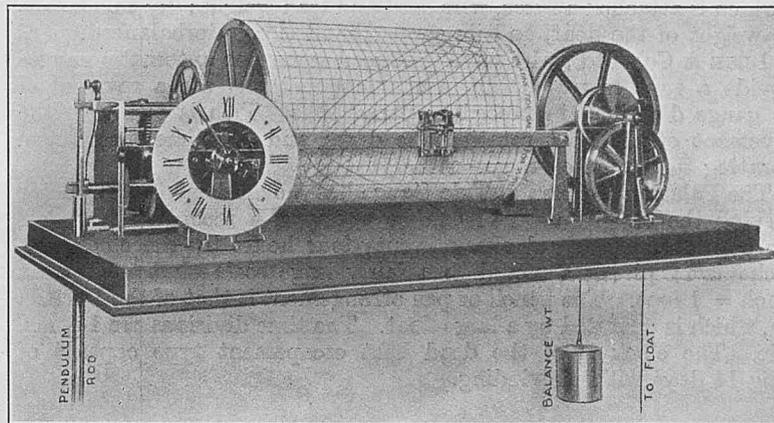


Figure 5.—Palatine Tide Gauge Horizontal Pattern.

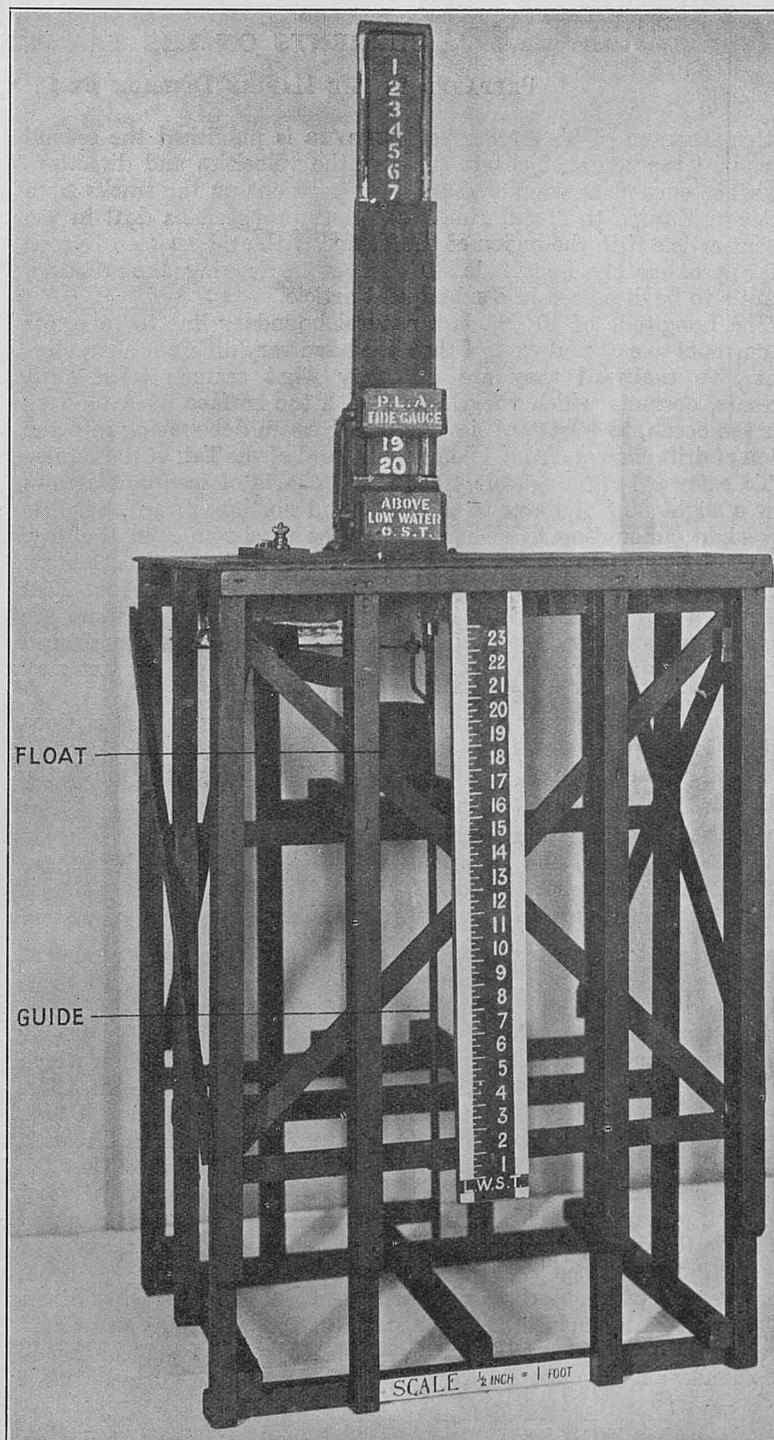


Figure 6.
Port of London Authority's Illuminated Tide Recorder at Purfleet.

of which is attached a fusee, wire cord and lead weight; by this means the weight of the float, and its copper band is counterbalanced.

LEGE & Co., Ltd., who have produced some fine automatic gauges provide a type in which the mechanical methods are a reversal of the gauge described in preceding paragraphs. This is owing to the movement of the float rotating the drum and the time mechanism operating the pencil carriage.

The Palatine Horizontal Tide Gauge has a cylinder 9 ins. diameter carrying the chart on which can be obtained a record of 28 tides. The cylinder is revolved every twenty-four hours by the clockwork mechanism; giving a record to a fairly large scale—but usually on $\frac{1}{2}$ -inch = 1 foot. The pencil or pen arrangement is that of the DITMAR pen, which is operated by a large float. The time divisions are $1\frac{3}{16}$ ins. wide. The clock is of the dead beat escapement type capable of going 14 days without winding.

Methods of illuminating tide gauges.—Illuminated clock indicators have been used in harbour to show rise and fall of the tide for many years, and are operated through mechanism which is comparatively expensive to instal and maintain.

In practice illumination of a tide-board by flood light projected on the figures is not satisfactory inasmuch as the angle of reflection is equal to the angle of incidence, which with a varying water level is difficult to adjust. Added to this luminous inequality, the movement of the water surface when disturbed by wind, produces capricious effects.

There exists on the Thames an illuminated tide gauge of simple operation which, for short visual range, forms an efficient indicator. It is erected at Purfleet, which is midway between Woolwich and Gravesend. The instrument is from a design of the Port of London Authority, by whom it is controlled and maintained. See illustration.

CURRENTS ON THE TRANS-NORTH ATLANTIC TRACKS.

PREPARED IN THE MARINE DIVISION BY C. S. DURST, SENIOR PROFESSIONAL ASSISTANT.

IN this NUMBER of THE MARINE OBSERVER is published the second quarter of the series of charts showing the velocities and directions of surface current as computed from observations on the tracks from Northern Europe to North America. It is proposed to deal in the present article with the region of the Eastern Atlantic between Europe and approximately Longitude 40° W., while leaving the Western Atlantic to be discussed in a subsequent article.

The Longitude of 40° W. is a natural boundary line to take, for the currents to east and west of that line have very different characteristics. To eastward they are primarily what seamen term Drift Currents, currents which vary largely with the surface wind blowing over the ocean, to westward lies the Gulf Stream debouching into the region of drift currents from a point southward of the Tail of the Banks.

To eastward of Longitude 40° W. the charts of resultant arrows show a slight flow of water to eastward and north-eastward, but it is very slight, amounting to no more than one to six miles in the day, certainly not enough for a navigator to be seriously concerned about. The current roses, however, tell a somewhat different tale. From them it is seen that the currents of a velocity of half a knot or more are by no means uncommon, though nearly half the currents experienced were under a quarter of a knot. It is also seen that the current may flow in any direction with a preponderance to E.N.E.

The question naturally arises: Why should the current be so various in direction and velocity?

Ocean currents (which are always influenced by the rotation of the earth) are brought about by:—

- (a) Wind friction at the surface;
- (b) Slope of the ocean surface (which produces a horizontal pressure gradient);
- (c) Differences of density in the water.

These three interplay the one on the other, and to know why a current flows in any direction it is necessary to take into account all three factors.

The wind effect can be separated from the other two by taking mean values suitably. This has been done in an investigation which was published on the back of the North Atlantic Chart for April, 1922. The most important result of that investigation is reproduced here as FIGURE 1. This gives the relationship between wind direction and current direction in the form of a rose. It will be seen that the point of greatest frequency is directed at 45° to the right of the wind direction, which is quite in accordance with the theory of drift currents put forward by EKMAN. There are, however, still a large number of observations in which the current flows contrary to theory. From over two thousand observations of current made in many parts of the globe, but not in any of the main streams, a relationship was found between the velocities of the current and of the wind. According to this calculation the current directly produced by the wind in Latitude 45° is:—

Beaufort Wind force.	2	3	4	5	6
Current miles per day.	1.2	1.9	3.0	4.2	5.3

To get the values for other latitudes these quantities have to be multiplied by the following factors:—

Latitude Nos	-	-	20°	30°	40°	50°	60°
Factor	-	-	1.4	1.2	1.0	1.0	0.9

In low latitudes the factor increases rapidly.

From these figures it will be seen that on this assumption even with a strong breeze the average velocity of current directly produced by wind does not attain to a quarter of a knot outside the Tropics, so that wind alone does not seem to be sufficient to account for the fluctuations of current shown on the charts.

RELATION OF CURRENT TO WIND.

North Atlantic, Lat. 47° to 53° N. Long. 10° to 30° W.

Summer Months, 1909—1920.

If the wind arrow is slewed to fly with the wind, the frequency of current in any direction is given by the length of the arrow of the rose in that direction.

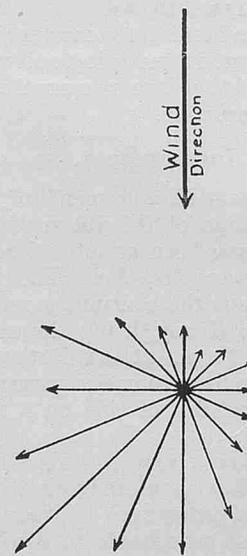


Figure 1.

509 observations.

Scale, 1 cm. = 4 per cent.

In order to be able to form a conjecture even of how surface currents will be affected by the slope of the surface and the density it is essential to know the general distribution of temperature and salinity in the depths of the ocean. A hydrographical section showing these was made by the research ship *Michael Sars* across the North Atlantic between Newfoundland and Ireland. It is reproduced as FIGURE 2.

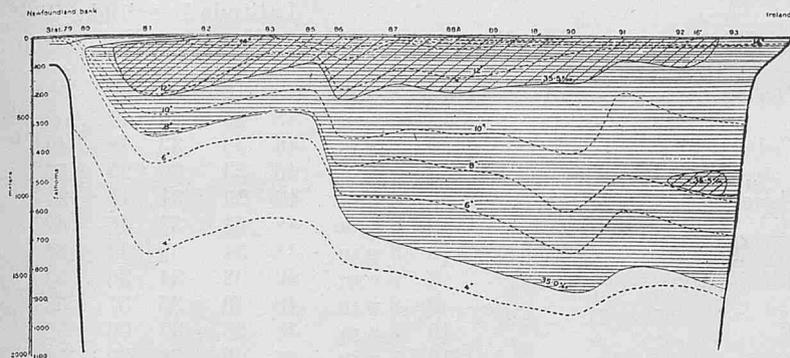


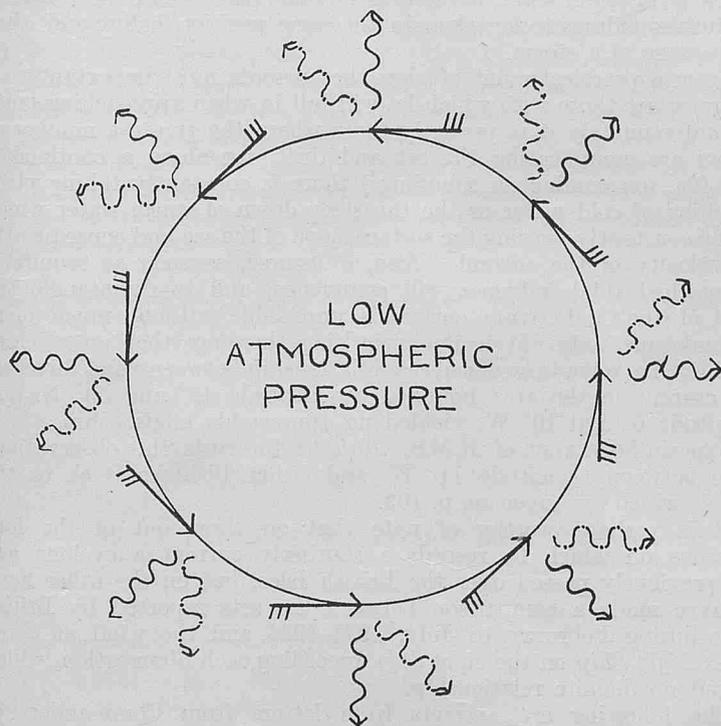
Figure 2. Hydrographical Section, Newfoundland to Ireland.

(Reproduced from "The Depths of the Ocean," by Sir JOHN MURRAY and Dr. JOHAN HJORT, through the courtesy of the publishers, Messrs. MACMILLAN & Co., Ltd.)

Centigrade.	=	Fahrenheit.	Centigrade.	=	Fahrenheit.
4°	=	39°	10°	=	50°
6°	=	43°	12°	=	54°
8°	=	46°	14°	=	57°

From it, it will be seen that the temperature, which is the most important factor in determining the density of the water, grows less as the depth increases, rapidly near the surface, more slowly lower down. As the temperature becomes less the density increases, i.e., the water becomes heavier. If for any reason a column of water extending from the depths of the ocean to near the surface is colder than the water surrounding it, there will tend to be a slight depression of the ocean surface above the cold column and the pressure gradient at the surface will tend to make a current flow counter-clockwise around the cold water. Such a column of cold water was found in the warm waters of the Gulf Stream by the research ship *Michael Sars* in June, 1910, and she experienced a set which agreed with the theory given above. That was an extreme case, but it does not seem improbable that the cold water of the depths is constantly being drawn up towards the surface over small areas by the action of passing cyclones. For the revolving winds around a cyclone tend to draw away the surface water outwards from the centre, as will be realised by the examination of FIGURE 3, having regard to what was written in "Currents on the Track, Latitude of Cape Blanco

Northern Hemisphere.



Direction of wind shown thus \rightarrow
 Direction of total drift current thus \rightsquigarrow
 Direction of surface drift current thus \rightsquigarrow

Figure 3.

and the Brazils," page 164, Vol. II, No. 22. A compensation tends to take place at the bottom by an inflow of colder (heavier) water, so that the water in the whole column will tend to rise slightly. Then, on the principle stated previously, this column of cold water will produce a surface current flowing counter-clockwise.

The column of cold water will be raised in a shorter time than it will take to sink back to its former level and so the net result of the passage of a cyclone would be to leave behind it (probably for some days) two currents running parallel to the track of the cyclone—the one on the right hand side of the track (in the Northern Hemisphere) running in the same direction as the cyclone travelled, the one on the left hand side of the track running in a precisely opposite direction.

A search was made to see if any corroborations of this theory could be found in ship's observations. On all except one of the occasions when it was expected that such an effect would be most pronounced the observations of set and drift were too few and too scattered to either confirm or disprove it. The one instance when a sufficient number of observations of current could be obtained is shown in FIGURE 4.

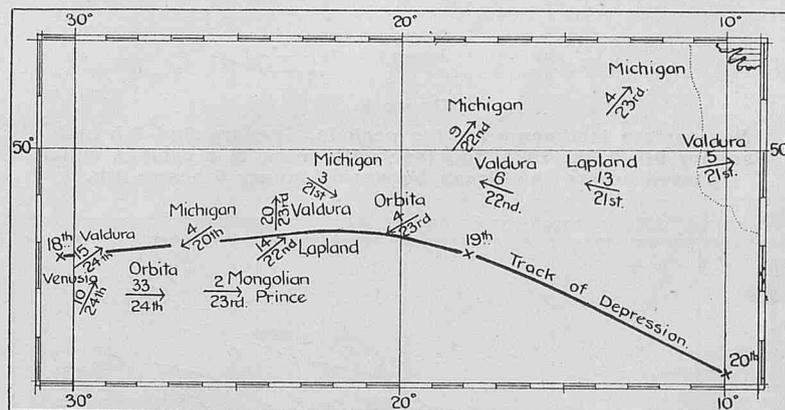


Figure 4.

Chartlet showing currents reported between April 21st and 24th, 1923, together with track of depression which passed between April 18th and 20th, 1923. Figure above arrow gives miles in 24 hours; figure below, the date.

NOTE.—S.S. *Mongolian Prince* reported also, a set of S. 68° W., 27 miles, in 48 hours, between Noon, 23rd, Lat. 47° 29' N., Long. 23° 02' W., and Noon, 25th, Lat. 49° 04' N., Long. 11° 14' W.

Between April 18th and 21st, 1923, a deep cyclone passed along the track shown. There certainly seems to be an indication of a westerly flowing current to the north of the track between April 21st and 24th between Longitude 10° and 20° W. and an easterly one south of the track between Longitude 20° and 30° W. Even in this instance, however, no definite conclusion can be drawn because the wind during the 21st and 22nd was from north and north-east between Longitude 10° and 20° W., so that any drift current would be to westward in that region.

This possible explanation of some of the vagaries of current is stated here because it is hoped that seamen navigating these waters may seize a suitable occasion and by exerting even greater care than usual and, if possible, collecting reports from neighbouring ships, may be able to supply a sufficient amount of accurate data for a thorough test to be made.

FIGURES 5 and 6 show the changes in sea surface temperature after the passage of two very pronounced cyclones—one in January, 1924, the weather conditions of which were commented on in THE MARINE OBSERVER, Volume II, No. 13, and one in September, 1922, when a West Indian hurricane recurved across the Atlantic (*vide* North Atlantic Chart, September, 1923). Isotherms were constructed by taking the mean of all observations in two degree squares during five days before and five days after the passage of the cyclones. Admittedly this method is open to objections, for when the number of observations is limited the mean of any square may refer to one or two days only. This method of drawing isotherms was one adopted by Captain HEPWORTH when considering the variations in sea surface temperature, and though it may be misleading in small irregularities it will show broadly the changes taking place. These charts would seem to show that in each case after the depression had passed there was a decided fall in the sea surface temperature, indicated on the charts by a shift of the isotherms to the southward. Probably this will be more readily realised by the tables, p. 102, which give the

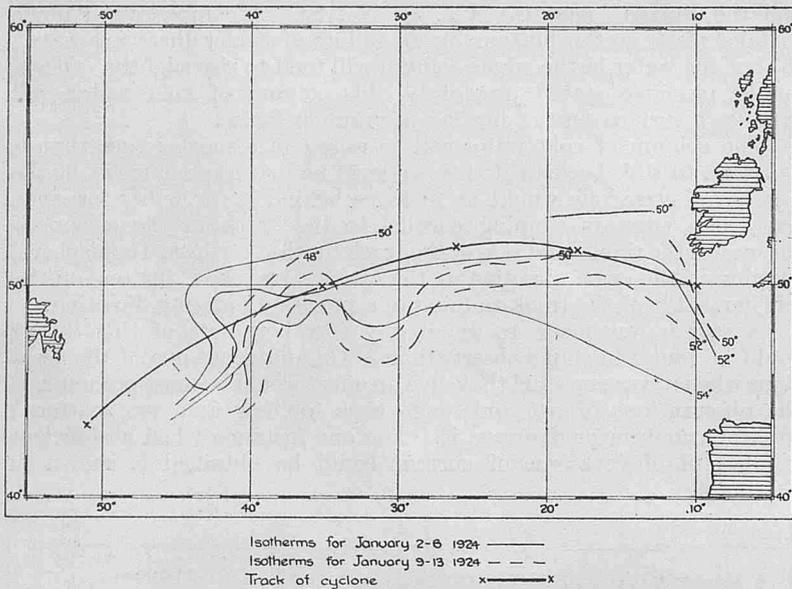


Figure 5.

Sea surface isotherms for the periods, January 2nd-6th and January 9th-13th, 1924, together with track of a cyclone which passed across the Ocean between January 6th and 9th.

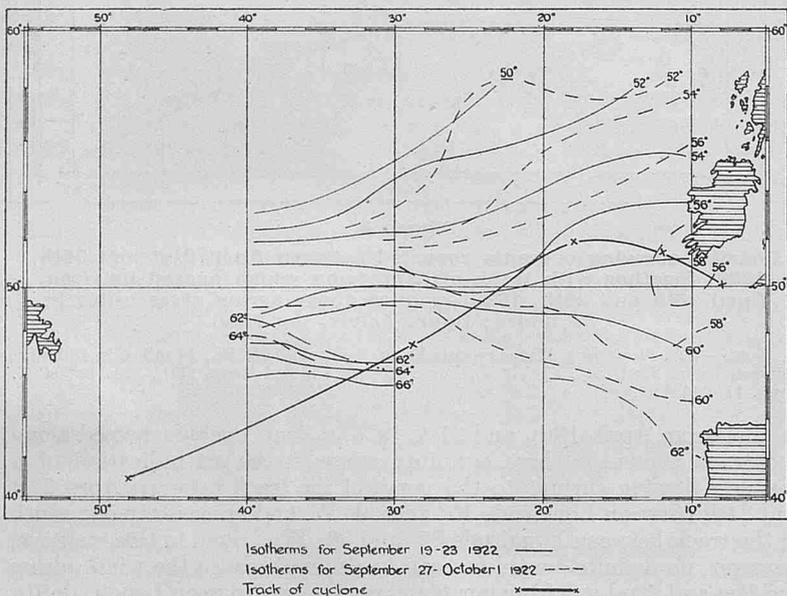


Figure 6.

Sea surface isotherms for the periods, September 19th-23rd, and September 27th to October 1st, 1922, together with track of a cyclone which passed across the Ocean between September 23rd and 27th.

actual observations of temperature in the area Latitude 48°-50° N., Longitude 30°-40° W., during January 2nd-6th and 9th-13th, 1924. The mean temperature for that area fell from 53°·3 to 50°·5. The normal for that area being 53°, as is shown by the chart published in THE MARINE OBSERVER, Vol. III, No. 25.

Sea surface temperatures recorded between Latitude 48° and 50° N., Longitude 30° and 40° W., in January, 1924 :-

Ship.	Date.	Latitude N.	Longitude W.	Sea Temp.
<i>Minnedosa</i>	January 2 8 a.m.	48° 24'	37° 58'	56°
"	" 2 8 p.m.	49 07	33 55	54
<i>Celtic</i>	" 3 8 p.m.	48 30	30 25	56
<i>Maryland</i>	" 5 8 p.m.	48 18	38 55	56
"	" 6 8 a.m.	48 52	35 40	59
"	" 6 8 p.m.	49 22	31 55	56
<i>Welshman</i>	" 3 8 a.m.	49 34	31 06	46
"	" 3 8 p.m.	48 57	33 51	44
"	" 4 8 a.m.	48 28	35 52	58
"	" 4 8 p.m.	48 01	37 49	48
Mean				53°·3

Ship.	Date.	Latitude N.	Longitude W.	Sea Temp.
<i>Darian</i>	January 12 8 p.m.	48° 12'	34° 01'	56°
"	" 13 8 a.m.	48 49	30 44	52
<i>Cedric</i>	" 9 8 p.m.	48 58	33 48	49
"	" 10 8 a.m.	48 23	36 25	56
<i>Ausonia</i>	" 9 8 p.m.	49 23	31 41	37
"	" 10 8 a.m.	48 54	33 46	52
"	" 10 8 p.m.	48 34	35 33	52
<i>Winifredian</i>	" 9 8 a.m.	49 02	34 30	53
"	" 9 8 p.m.	48 40	35 57	53
"	" 10 8 a.m.	48 25	37 00	52
"	" 10 8 p.m.	48 20	38 20	50
<i>Orduna</i>	" 9 8 a.m.	48 56	30 56	52
"	" 9 8 p.m.	48 23	33 02	42
<i>Manchester Mariner</i>	" 11 noon	49 58	30 02	51
"	" 11 4 p.m.	49 42	30 30	50
"	" 11 8 p.m.	49 24	31 00	48
"	" 11 midt.	49 05	31 32	52
"	" 12 4 a.m.	48 47	32 04	50
"	" 12 8 a.m.	48 23	32 28	52

Mean 50°·5

Such a fall could be produced in three ways :-

(i) By a general horizontal movement of the water of the ocean from north to south; but to produce so large a fall as is shown in general by these charts it would require a steady drift current due to N.W. winds of gale force to be in existence for about five days.

(ii) By churning up of the sea water.

(iii) By a drawing off laterally of the surface water and a raising of water from below.

The decrease of temperature by radiation and cold rain falling on the surface of the ocean will almost certainly be negligible.

The effect of the churning up of the sea by gales and of the raising of water from below cannot be precisely differentiated, but these charts do seem to show that there is a fall in temperature which would be expected to take place if the action of cyclonic winds raised the cold water of the depths.

The only way in which it would be possible definitely to decide if such a raising of water actually does take place would be for temperature soundings to be taken in the same position before and after the passage of a storm.

From a practical point of view the currents most important to a navigator are those with which he will fall in when approaching land, and unfortunately it is precisely there where the greatest number of factors are complicating the set and drift, for along a continental shelf (*i.e.*, on coming on soundings) there is constantly taking place upwelling of cold water or the thrusting down of warm water which will be constantly varying the surface slope of the sea and consequently the velocity of the current. Also, of course, as soon as soundings are reached tidal influence will commence, and to disentangle the effect of the tidal stream current is impossible without much more elaborate methods. It is not surprising therefore that an attempt which we have made to discover a relationship between wind direction and current in the area bounded by Latitude 48° and 50° N. and Longitude 6° and 10° W. yielded no appreciable relationship.

Captain METCALFE of R.M.S. *Majestic* forwards the observations made between Longitude 11° W. and either Bishop's Rock or the Lizard, which are given on p. 103.

It is perhaps worthy of note that on three out of the four occasions on which he records a southerly current a cyclone had just previously passed over the British Isles, but on the other hand we have made a comparison between the sets reported by British Ships during February to July, 1921-1924, and the wind at *Seven Stones Light Ship* on the eight days preceding each observation, which showed no definite relationship.

The following are extracts from letters from Commanders of long experience in North Atlantic navigation referring mainly to the question of current in the Eastern Atlantic, which have been received up to the time of going to press :-

Captain R. G. SMITH, S.S. *Regina*.

"I regret that I am unable to furnish you with any definite

1925 and 1926.

S.S. *Majestic*.

Captain G. R. METCALFE.

Date.	Time G.M.T.	Moons Dec.	H.W. Dover.	Wind.	F.	Sea.	From	To	Current.	Remarks.
Oct. 14th -	3.08 a.m. to 11.04 a.m.	10.09 N.	9.41 a.m.	N.	2	Smooth -	Bishop's Rock.	11.00 W.	No current -	Westbound. Voy. 48.
Oct. 30th -					No	observations,	Land made	by D.R.		Eastbound. Voy. 48.
Nov. 5th -	3.29 a.m. to 0.30 p.m.	21.18 N.	1.18 a.m.	W.	3	Slight head swell.	Lizard -	11.00 W.	South 3 miles -	Westbound. Voy. 49.
Nov. 19th -	6.39 p.m.	21.33 S.	0.22 p.m.	S.E.	5	Rough -	11.00 W.	Lizard -	No current -	Eastbound. Voy. 49.
Nov. 26th -	1.20 a.m.	0.04 N.	7.51 a.m.	S.W.	3	Slight -	Lizard -	11.00 W.	No current -	Westbound. Voy. 50.
Dec. 10th -	1.30 p.m. to 8.59 p.m.	11.00 N.	7.09 p.m.	N.N.W.	4	Heavy N'y swell.	11.00 W.	Bishop's Rock.	South 12 miles	Eastbound. Voy. 50.
Dec. 17th -	1.51 a.m.	21.40 S.	11.50 a.m.	N./N.E.	2	Smooth -	Lizard -	11.00 W.	No current -	Westbound. Voy. 51.
Jan. 2nd -	4.00 p.m. to 0.10 a.m.	16.48 N.	1.02 p.m.	N.W./S.W.	5	Rough beam sea and swell.	11.00 W.	Bishop's Rock.	South 6 miles -	Eastbound. Voy. 51.
Jan. 7th -	5.04 a.m. to 5.30 p.m.	1.41 S.	4.00 a.m.	S.W./W.	7	High Head Sea.	Lizard -	11.00 W.	No current -	Westbound. Voy. 52.
Jan. 21st -	10.22 a.m. to 6.09 p.m.	10.01 N.	5.00 p.m.	N.W./W.	5	Rough NW'y sea.	11.00 W.	Bishop's Rock.	South 6 miles -	Eastbound. Voy. 52.

information upon this subject. For the last four seasons I have been in the Canadian Service, where our observations are few and far between, fogs frequent and speed very often reduced and uncertain, consequently we have very little chance of verifying our position. We have to depend largely upon our D.F. to pick ourselves up.

"I have noticed a decided set to the northward making the north coast of Ireland; usually we find ourselves 10 miles north each voyage, sometimes more and sometimes less, according to the weather conditions. Last voyage we were set some 30 miles to the north after two days on dead reckoning."

NOTE.—With regard to the first part of Captain SMITH'S remarks, the charts showing the frequency of overcast skies will be of interest to seamen. These show conclusively that sights can be obtained much less often on the Belle Isle routes than on the more southern routes to the U.S.A., and in view of correspondence which appeared recently in the press as to navigation on the Canadian routes will be of special interest.

Captain J. ROBERTS, C.B.E., D.S.O., R.D., R.N.R., S.S. *Ceramic*.

"From the Fastnet on the Great Circle tracks westbound, in moderate weather, instead of finding the current setting north-east,

it would be to the north-west from 15° West to 20° West, six to ten miles per day. Occasionally this would continue to 40° West. When expecting the limits of the Gulf Stream current to set the ship to the eastward, west of 40° West in overcast weather, and allowing for it so as not to be south of the track, I have found the ship to be set north, and, after many voyages, ceased to allow for it, and still found the set or drift to the northward. This has been verified on the eastbound track, when, if one did not allow for northerly set (except with fresh northerly winds), the ship would be found north by observations. On the other hand, when making the Fastnet, probably the result of being on soundings, the ship would more often be south than north. Even with strong west winds when between 25° W. and 15° W. there has frequently been a current setting west. When I have spoken of this to other shipmasters, the fact seemed to have been observed generally—the day preceding that of making the Fastnet the ship is invariably found to be astern of the reckoning. This is also verified by finding the ship ahead of the reckoning the day following departure from soundings westbound with west winds. I have supposed that the fact that westerly gales usually begin with south winds, backing and freshening to the south-east explained this vagary, but observations are infrequent during this weather making accurate data difficult."

(To be continued.)

WEATHER SIGNALS.

WIRELESS WEATHER SIGNALS.

II.—WIRELESS WEATHER BULLETINS.

ARABIA.

Aden W/T Station, approximate Latitude 12° 49' N., Longitude 45° 02' E., call sign BZF, broadcasts weather bulletins, *en clair*, at 0945 and 1745 G.M.T. daily, on a wavelength of 2,000 metres 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 "Extra" weather bulletin will be broadcast at 0148 G.M.T. on a wavelength of 600 metres. This bulletin will be preceded by the W/T Safety Signal — — — (TTT). When necessary further messages are broadcast under the TTT signal at intervening times also.

BRITISH INDIA.

Weather bulletins are broadcast twice daily, *en clair*, from stations in British India at the following times. The transmitting

station will signal the "All Stations" call (CQ) five times before sending the messages, so that ships can correctly adjust their instruments.

Time G.M.T.	Stations.	Position (approx.)		Call Sign.	Wavelength, metres (spark).
		Latitude.	Longitude.		
0830 and 1630 0900 and 1700	Karachi	24° 51' N.	67° 03' E.	VWK	1,000
	Calcutta*	22° 34' N.	88° 20' E.	VWC	2,000
	Bombay	18° 57' N.	72° 54' E.	VWB	2,000
	Madras	12° 59' N.	80° 11' E.	VWM	1,000
	Rangoon	16° 46' N.	96° 12' E.	VTR	1,200

* After the time signal.

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:—

0030 G.M.T.; by Karachi, and Calcutta W/T Stations.

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

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

CEYLON.

Matara W/T Station, approximate Latitude 5° 59' N., Longitude 80° 32' E., call sign BZE, broadcasts weather bulletins, *en clair*, at 0945 and 1745 G.M.T. daily, on a wavelength of 2,000 metres C.W. These bulletins give information regarding weather conditions in the Bay of Bengal and Arabian Sea, being prefixed accordingly.

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 "Extra" weather bulletin will be broadcast at 0148 G.M.T. on a wavelength of 600 metres. This bulletin will be preceded by the W/T Safety Signal — — — (TTT).

When necessary further messages are broadcast under the TTT signal at intervening times also.

NOTE.—At the conclusion of the 0945 and 1745 G.M.T. weather bulletins Matara W/T station listens in on the 600-metre wave for 15 minutes and replies on 2,000 metres C.W., to ships wishing to transmit weather messages, and who are unable to communicate with Colombo W/T Station.

Colombo W/T Station, approximate Latitude 6° 55' N., Longitude 79° 53' E., call sign VPB, broadcasts local weather reports, 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 (spark).

WIRELESS STORM WARNINGS.

ARABIA.

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

BRITISH INDIA.

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). Wavelength used, 600 metres spark (Karachi 1,000 metres, spark):—

Karachi	call sign	VWK	} at 0430, 1230 and 2030 G.M.T.
Calcutta	" "	VWC	
Port Blair	" "	VTP	
(Andaman Is.)			
Bombay	call sign	VWB	} at 0500, 1300 and 2100 G.M.T.
Madras	" "	VWM	
Rangoon	" "	VTR	
	" "		

CEYLON.

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

III.—WIRELESS TIME SIGNALS. BRITISH INDIA.

Station.	Call Sign.	Wave length, metres.	G.M.T. of Time Signal.	System.
Calcutta.				
Lat. 22° 33' 34" N.	VWC	2,000 sp.	0827-0830	New International, <i>see</i> FIGURE 1.
Long. 88° 20' 14" E.			1627-1630	New International, <i>see</i> FIGURE 1.

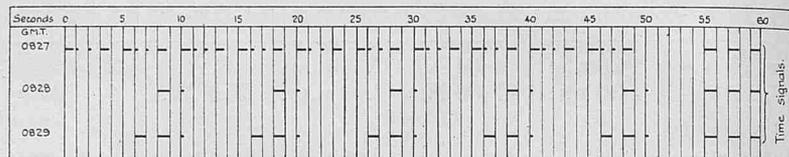


Figure 1.

- NOTES.—(1) Preliminary signals sent two minutes before transmission of T.S. proper, call (— — — — —) repeated three times, the words "ordinary time signals," and the signal "wait" (• — — — •); all these signals are sent by hand.
- (2) Signals automatically controlled from Alipore Observatory, Calcutta.
- (3) T.S. accurate to within 0.2 sec.
- (4) Should there be any inaccuracy, the T.S. is followed by the "erase" signal and the words "signal failed."

CEYLON.

Colombo W/T Station, approximate Latitude 6° 55' N., Longitude 79° 53' E., call sign VPB, broadcasts time signals twice daily, based on the International system. The actual time signals will be automatically controlled from Colombo Observatory, the remaining signals being sent by hand.

The times of transmission, wavelengths and method employed are as follows:—

G.M.T.	Wave length.	G.M.T.	Wave length.
h. m. s.	(metres.)	h. m. s.	(metres.)
5 57 00	} 2,300 (C.W.)	16 57 00	} 600 (spark).
to 6 00 00		to 17 00 00	

Time—G.M.T.			Signal.			Signification.
h. m. s.	h. m. s.		CQ de VPB (repeated 3 times) Time Signal			Preparative signal.
16 } 55 00	to 16 } 57 00		Wait (• — — — •)			
57 55	58 00		55 56	57 58	59 60	} Time signals.
58 08	58 10			08 09	10	
58 18	58 20			18 19	20	
58 28	58 30			28 29	30	
58 38	58 40			38 39	40	
58 48	58 50			48 49	50	
58 55	59 00		55 56	57 58	59 60	
59 06	59 10		06 07	08 09	10	
59 16	59 20		16 17	18 19	20	
59 26	59 30		26 27	28 29	30	
59 36	59 40		36 37	38 39	40	
59 46	59 50		46 47	48 49	50	
5 } 59 55	6 } 00 00		55 56	57 58	59 60	

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.

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.

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 as 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 eastward of Sagar Island and westward of Chittagong. Vessels may proceed to sea if the height of the barometer, state of the 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 westward 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 and 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.

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 Barisál, Goalunda, Noakhali, Narayanganj, Chandpur, Khulna, Sagar Island, Mud Point, 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.

GREAT BRITAIN AND IRELAND—AMENDMENTS.

Wireless Telephony R/T Issues.

"Weather Shipping" Bulletin.

PAGES 34-35. VOL. III, No. 26.

Changes of time of issue of Parts I, III, IV and V through the British Broadcasting Company's station at Daventry are occasionally necessary at short notice, and in future mariners are referred to the *Radio Times*, the official organ of the British Broadcasting Company, which is published weekly, for notice of the times of issue of this message; these are also given in the daily press.

It should be noted that the times given are G.M.T. only when summer time is not in operation, while all times for Wireless Weather Telegraphy in the *MARINE OBSERVER* are G.M.T.

Wireless Storm Warnings.

To come into force on and after June 1st, 1926.

PAGE 35, VOLUME III, No. 26—WIRELESS STORM WARNINGS. 2ND PARAGRAPH.

On and after June 1st, 1926, the procedure explained in the above-mentioned paragraph for the broadcasting of Wireless Gale Warnings will be altered.

Preceded by the International Safety Signal TTT (— — —), transmitted at short intervals 10 times on full power, the warnings will be broadcast one minute later **once** only.

Should the warnings be sent during the period when one-operator ships do not keep watch, they will be repeated at the commencement of the next single operator watch.

NOTE.—For locating depressions the use of the words Ireland or Iceland is frequent, and in order that they shall not be confused when Iceland is appropriate it will be repeated thus—Iceland Iceland.

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 Admiral Sir JOHN FRANKLIN PARRY, K.C.B., President of the International Hydrographic Bureau, Monaco, at Harrogate, on April 21st, 1926, is noted with deep regret.

Sir JOHN PARRY was Hydrographer of the Navy from 1914 to 1919, and represented the Admiralty on the Meteorological Committee.

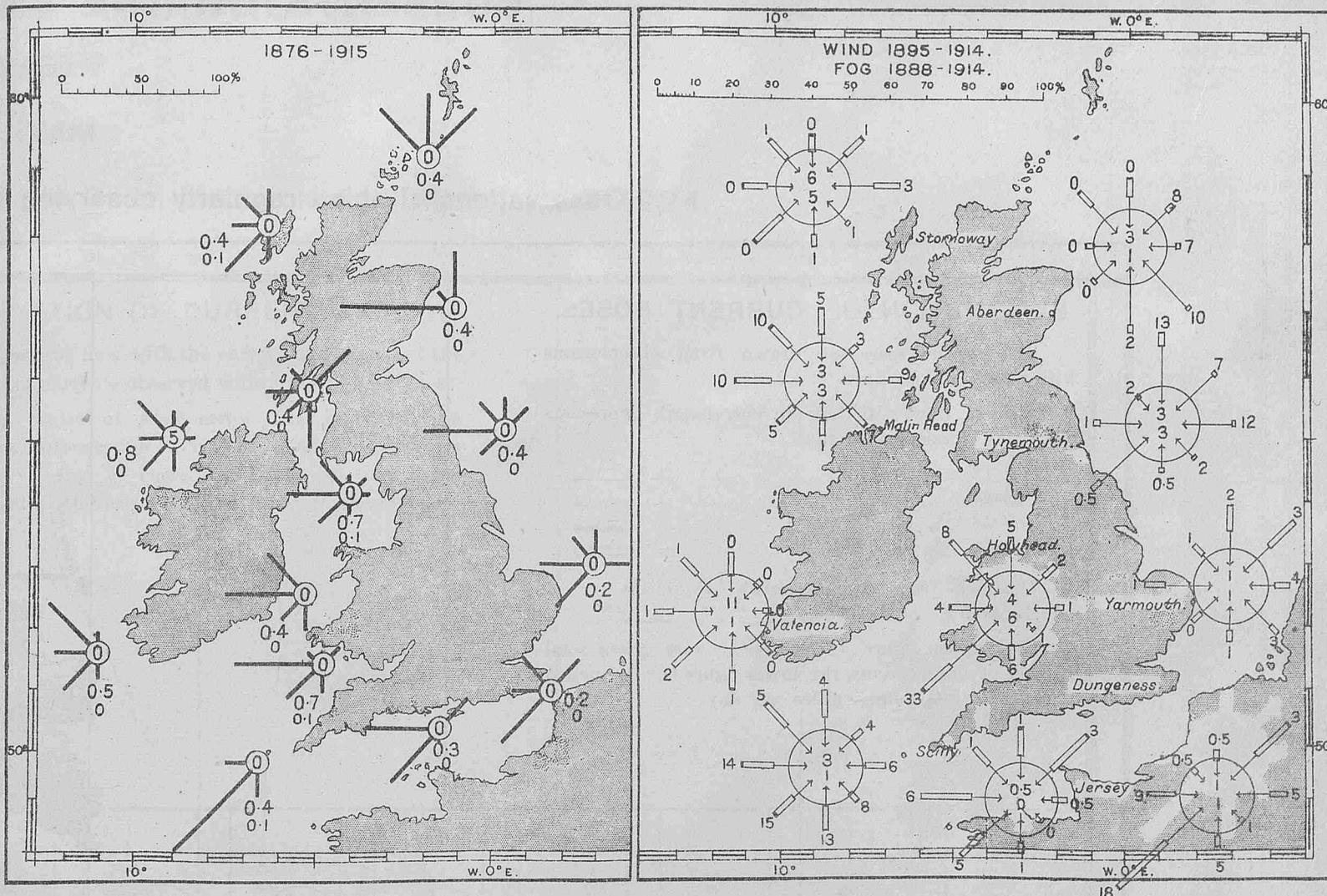
As Hydrographer of the British Navy during the great war, he was responsible for the application of Hydrographic science on a far greater scale than ever before, and as the first President of the International Hydrographic Bureau he has been largely responsible for the progress made in International standardization of method and practice. Sir JOHN PARRY will be remembered as a benefactor to seamen of all nations.

He commanded H.M. Surveying Ships *Dart*, *Egeria* and *Merlin*, between 1898 and 1909, and was a member of the Corps of Voluntary Marine Observers, contributing eight Meteorological Logs.

The Corps of Marine Observers and Marine Division join in expressing sympathy with the Royal Navy and the International Hydrographic Bureau in their great loss.

JUNE.

WIND AND FOG AT COAST STATIONS. GREAT BRITAIN AND IRELAND



WIND, FOG AND MIST.

S.W. APPROACHES TO GREAT BRITAIN AND IRELAND.

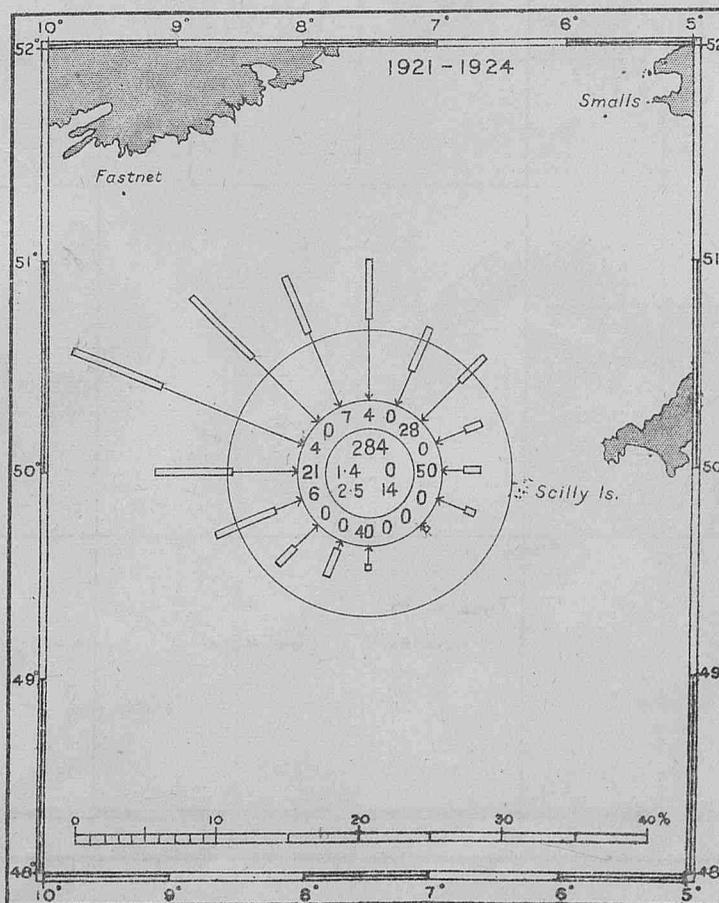
Frequency of fog per thousand observations for each 2 points of compass 1921-1924.

Latitude 48° - 52° N.

Longitude 5° - 10° W.

Direction.	Frequency.
N	4
NNE	0
NE	18
ENE	0
E	7
ESE	0
SE	0
SSE	0
S	7
SSW	0
SW	0
WSW	4
W	21
WNW	7
NW	0
NNW	7
Colm	0
Var.	4
Total	79

Percentage frequency of fog and mist for area = 8%.

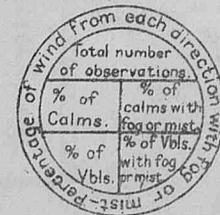


Mean and Maximum number of days with fog during the month at the different stations.

Station.	Mean.	Max.
Stornoway	1.0	4
Malin Head	3.4	10
Valencia	0.5	4
Holyhead	5.1	11
Scilly	4.7	12
Jersey	2.8	10
Dungeness	4.1	9
Yarmouth	1.2	4
Tynemouth	2.9	10
Aberdeen	3.2	7

For explanation of charts see Vol. III. No 25, page 10, of this Journal.

Key to numbers in rose, S.W. Approaches.

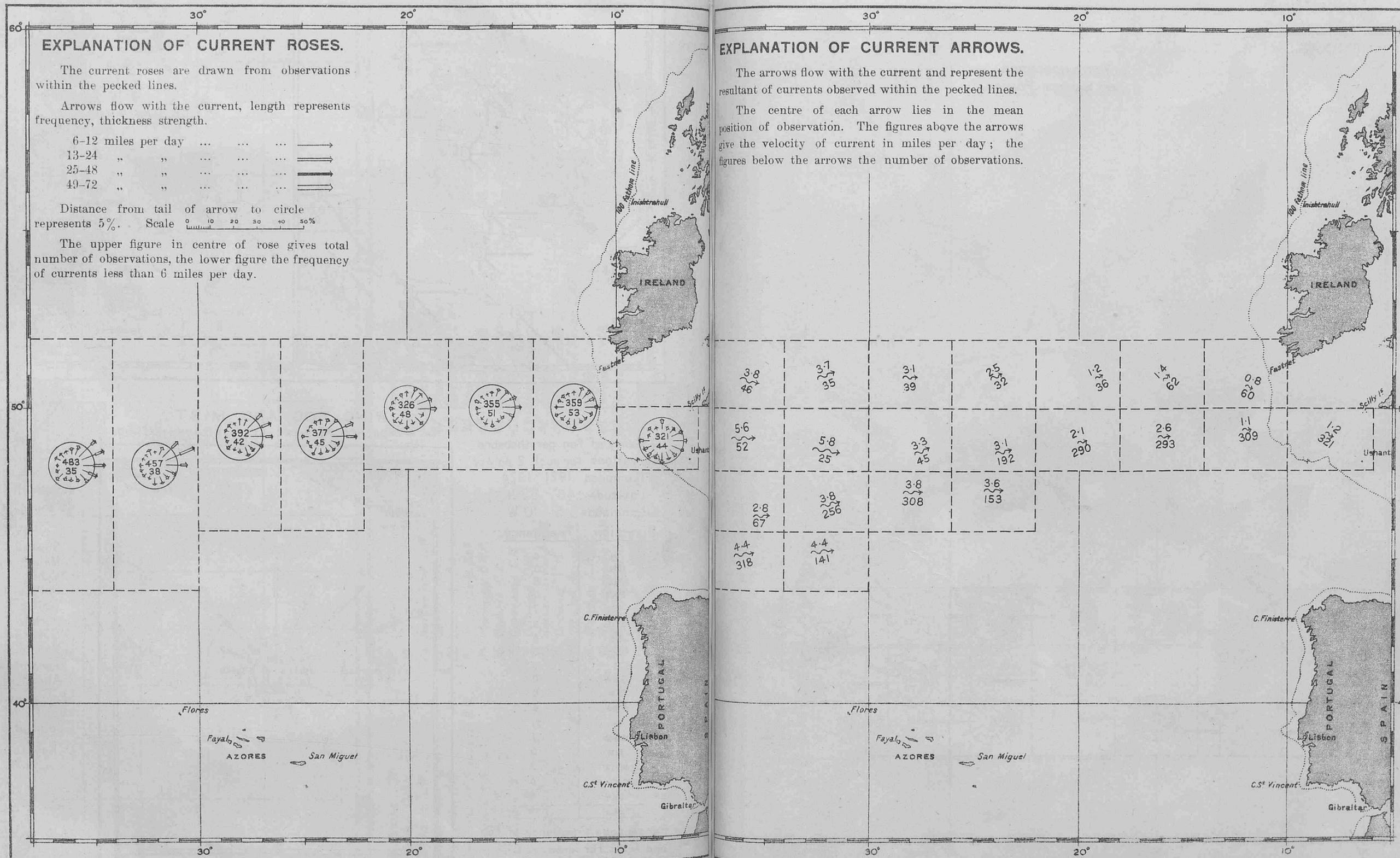


CURRENTS ON THE TRANS NORTH ATLANTIC TRACKS

(EASTERN PORTION)

MAY, JUNE AND JULY.

Observations of ships regularly observing for the British and Dutch Meteorological Offices, 1910-1924.



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 " " →→→→

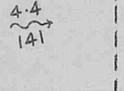
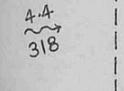
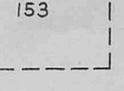
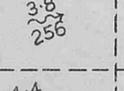
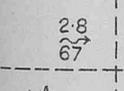
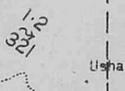
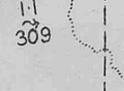
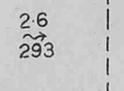
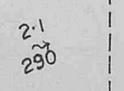
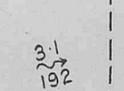
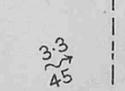
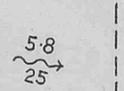
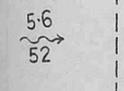
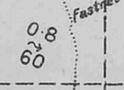
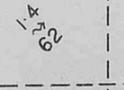
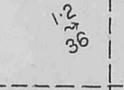
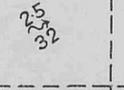
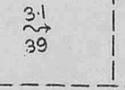
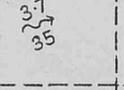
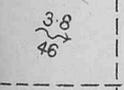
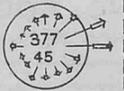
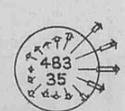
Distance from tail of arrow to circle represents 5%. Scale 0 10 20 30 40 50%

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

EXPLANATION OF CURRENT ARROWS.

The arrows flow with the current and represent the resultant of currents observed within the pecked lines.

The centre of each arrow lies in the 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.



Flores

Fayal
AZORES

San Miguel

C. Finisterre

PORTUGAL
Lisbon

C. St Vincent

Gibraltar

Flores

Fayal
AZORES

San Miguel

C. Finisterre

PORTUGAL
Lisbon

C. St Vincent

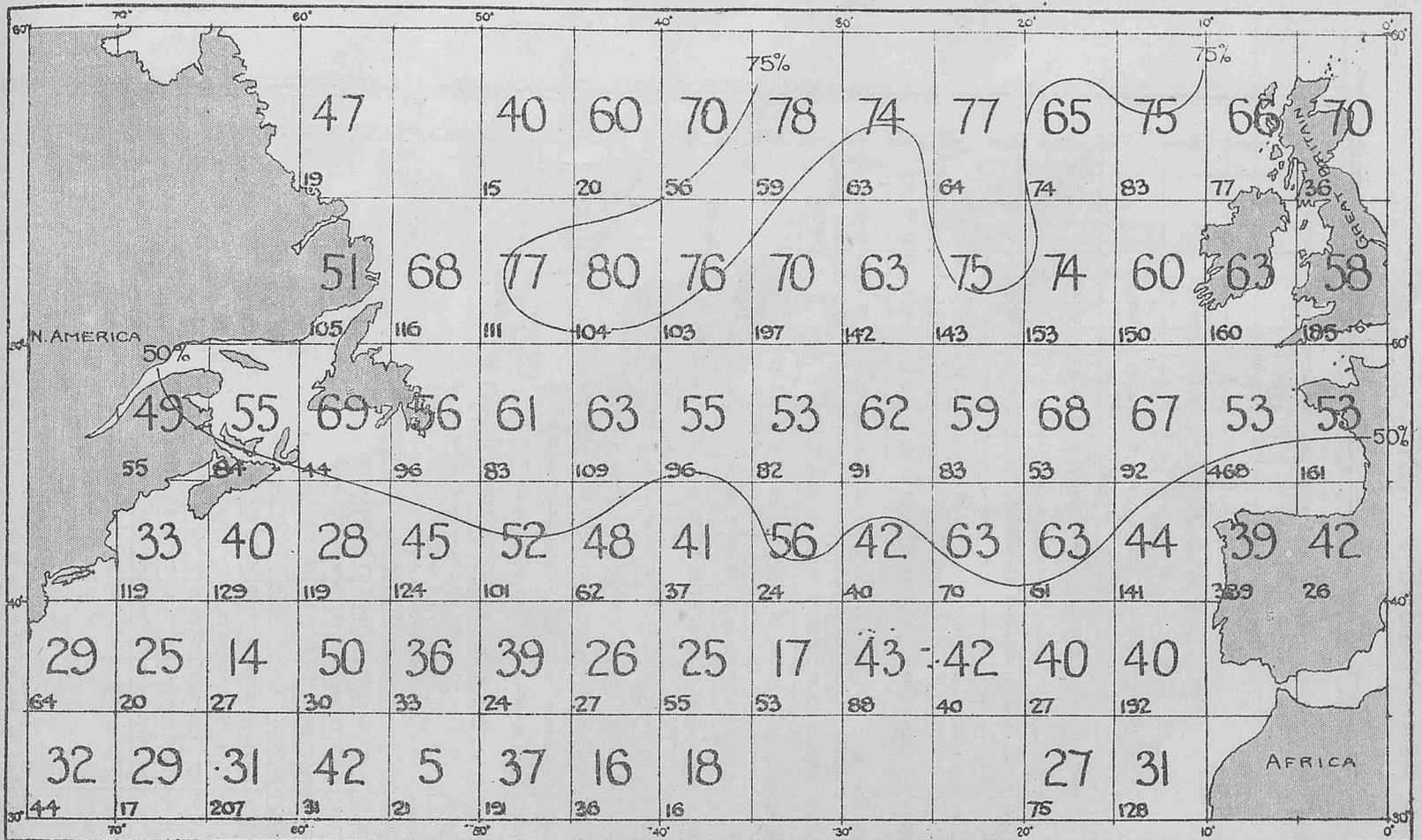
Gibraltar

SPAIN

LOUDNESS OVER THE NORTH ATLANTIC. Latitude 30°-60° N. (Vol. III. No. 30.)

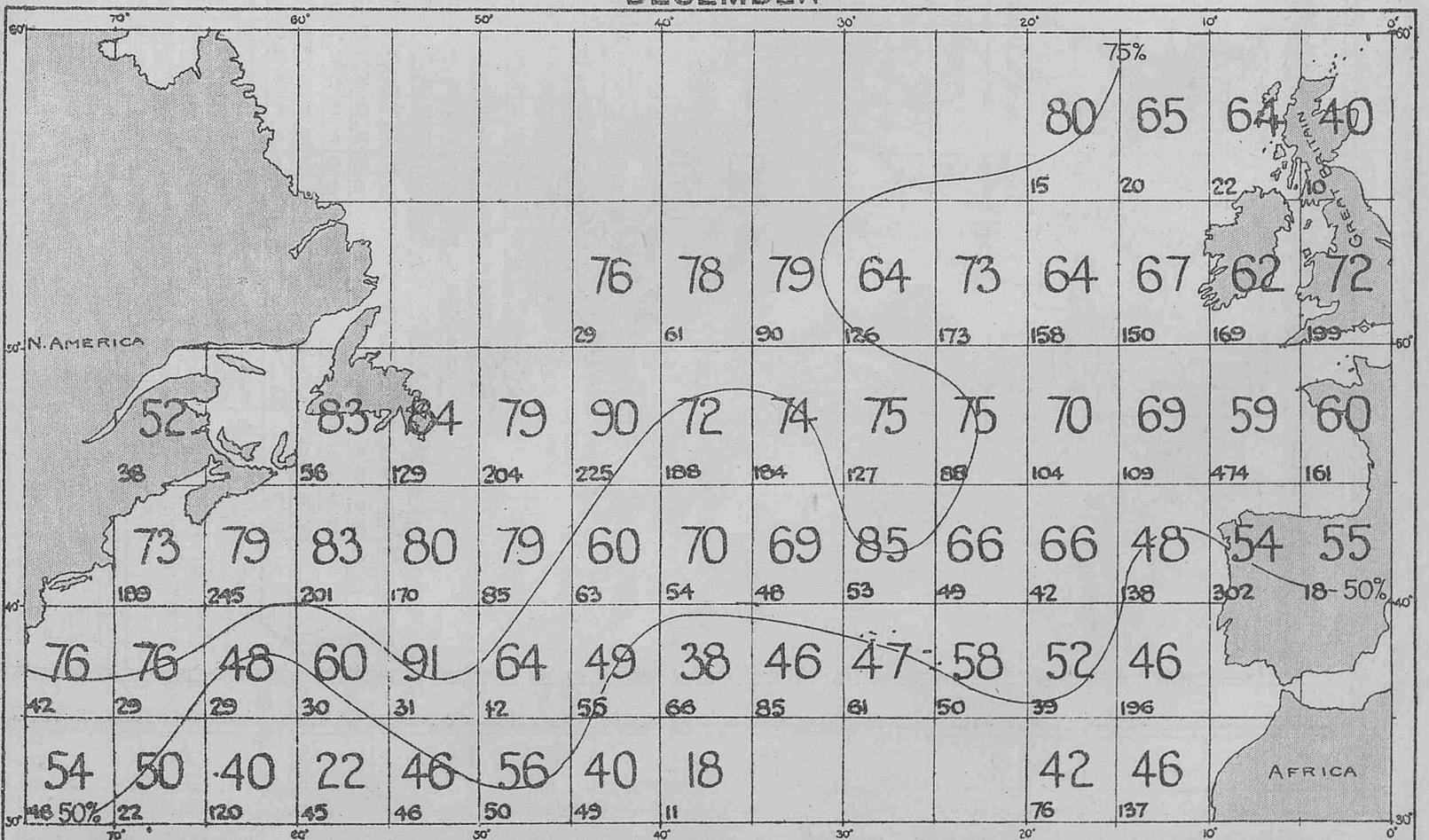
Compiled from observations for the years 1921-1925. Percentage Frequency of Cloud Amount 7-10.

SEPTEMBER



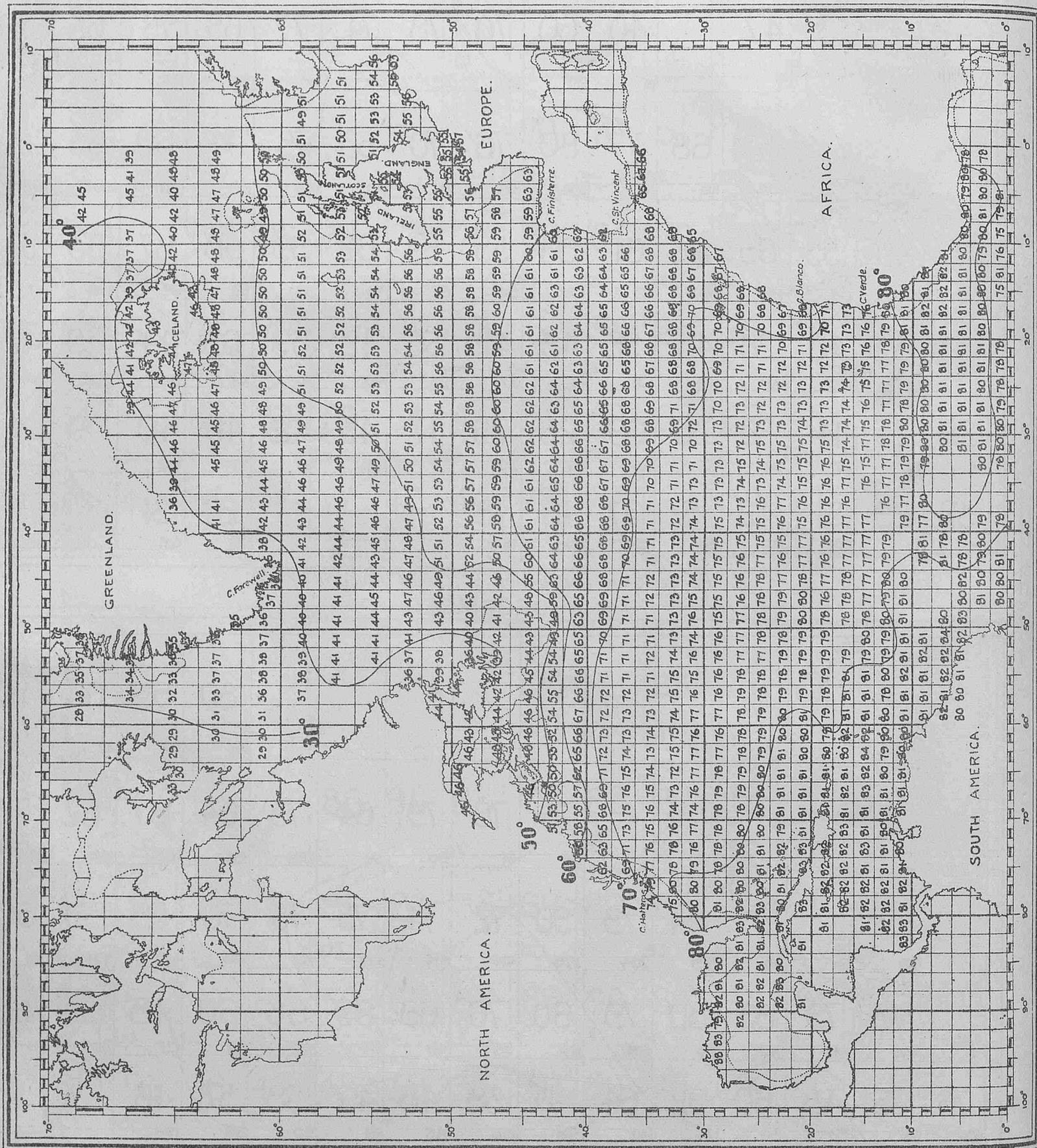
Percentage Frequency of Cloud Amount 7-10.

DECEMBER



The numbers in the centre of each 5° square show the frequency of observations of overcast skies. The numbers in the lower left hand corner, the number of observations on which it is based. Lines of equal frequency are drawn for 50% and 75%.

MEAN SEA SURFACE TEMPERATURES FOR MONTH OF JUNE COMPUTED FROM ALL AVAILABLE SOURCES DURING THE PERIOD 1855 TO 1917. NORTH ATLANTIC.



ICE CHART. WESTERN NORTH ATLANTIC.

IMPORTANT. TRANSATLANTIC TRACKS.

- (A) In case of necessity, owing to extreme southerly drift of ice, operative dates will be fixed for Track A.
- (B) From 1st February to 31st August, inclusive.
- (F) From 16th May to Opening of Belle Isle route, and to 30th November when not using the Belle Isle route.
- (G) Westbound, on approaching Cape Race steer a course to pass 10 miles S. of Cape Race.
- (G) Eastbound, steer from position 25 miles S. of Cape Race.
- (G) From opening of Belle Isle route to 14th November.

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

ROUTE NOTICES.

For latest information re Tracks see page 13, "Supplementary Board of Trade Notices to Mariners," 20th April, 1926.

SYMBOLS USED ON THE CHART.

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

PHENOMENAL DRIFTS OF ICE.

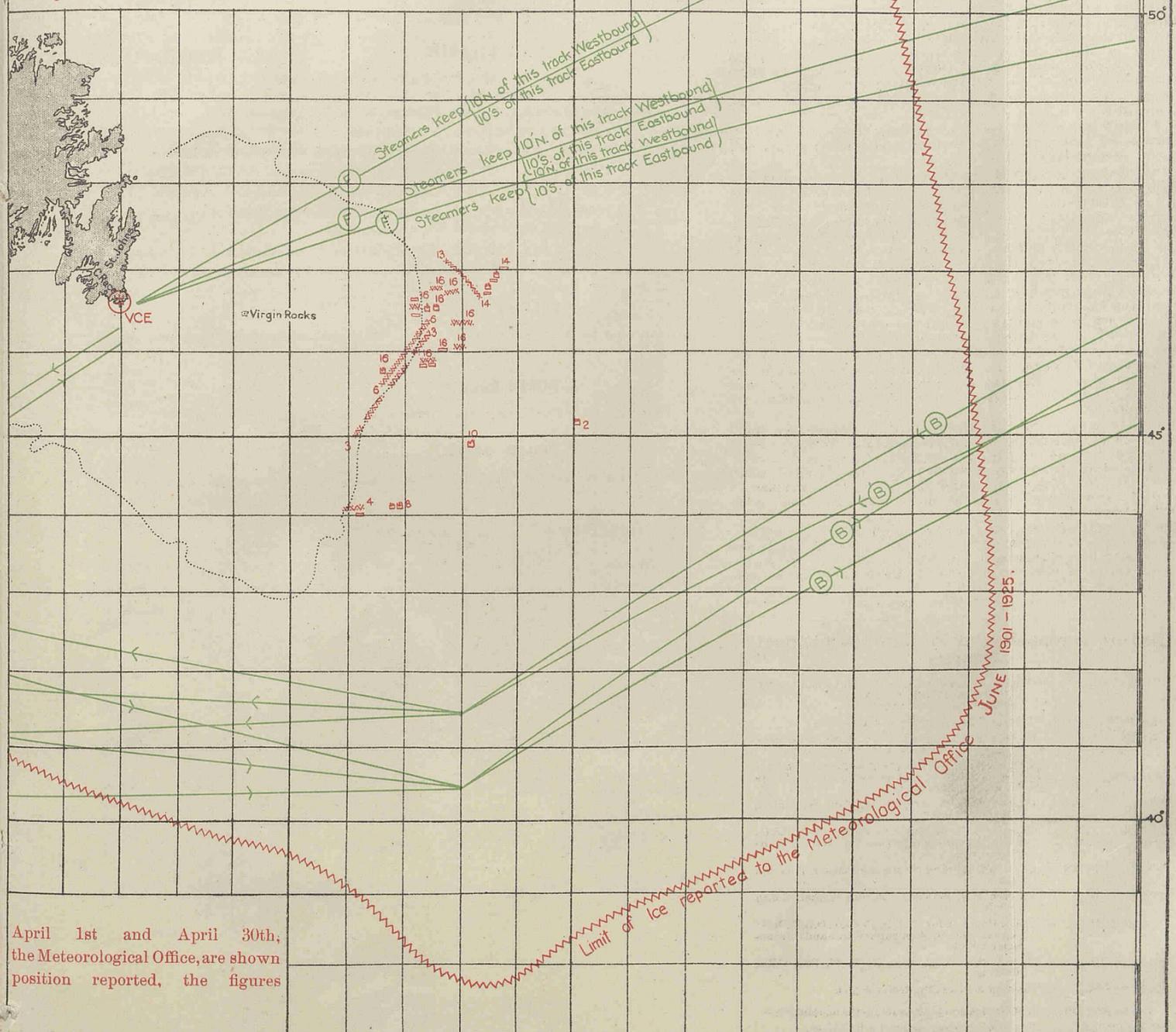
Date.	Ship or Source of Report.	Position.		Remarks.
		Lat.	Long.	
June 25, 1886	Brig Blanch...	48°40' N.	15°22' W.	Large berg.
" 5, 1907	S.S. Kingswell ...	32°37' N.	64°25' W.	Several bergs.
" - , 1907	Bark Silverstream...	80 miles W. of Fastnet.		Berg.
" 11, 1912	S.S. Valetta ...	37°30' N.	74°21' W.	3 pieces of ice.
" 7, 1913	S.S. Holtby ...	39°35' N.	64°50' W.	Berg, 10 ft. high.
" 27, 1915	S.S. Stella ...	39°23' N.	57°45' W.	Small piece.
" 30, 1921	U.S. Navy Dept. via Lloyds List.	33°20' N.	49°18' W.	Berg, 10 ft. high.
" 16, 1924	S.S. West Irma, via U.S. Hydro. Office.	38°03' N.	63°20' W.	Growler.

Reports of Ice sighted between April 1st and April 30th, 1926, which have been received by the Symbols plotted in the indicating the day of the month.

LATEST ICE REPORT FROM CANADA.

The following cablegram, dated 12th April, 1926, was received from the Superintendent, Canadian Signal Service, Quebec:—

"Montreal to Lake St. Peter, river solid, eastward to Quebec, channel open, Quebec to Fame Point, no ice in sight. Cape des Rosiers to Magdalen Island, Cabot Strait, Belle Isle Strait, Northumberland Strait, Flat Point, Scatari, St. Pauls, heavy close packed ice, Cape Race, snowing."



April 1st and April 30th, the Meteorological Office, are shown in position reported, the figures

MARINE METEOROLOGY.

NOTICES.

Co-operation of Shipowners, Masters and Mates.

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

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

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

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

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

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

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

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

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

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

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

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

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

Marine Observers who wish to assist in developing the rapid interchange of Meteorological information and Weather Forecasting at sea can do so by using the standard form, not in code, of W/T Weather Report suggested in "Weather Signals," given in Vol. III, No. 25, pages 14 and 15. For this purpose a mercurial barometer of which the index error has been ascertained is essential.

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

LATE PRESS.

DERELICTS AND FLOATING WRECKAGE.

Date.	Position.		Description.
	Latitude.	Longitude.	
NORTH SEA.			
16.4.26	2 m. W. by N. $\frac{1}{2}$ N. of Humber Lt. V.		Floating wreckage, apparently part of wooden vessel or spar buoy.
ENGLISH CHANNEL.			
8.4.26	Start Lt. H. N. 28° W. $3\frac{1}{2}$ m.		Large black cylindrical object.
MEDITERRANEAN.			
22.4.26	$34^{\circ}35'$ N. $19^{\circ}15'$ E.		Small floating wreckage.
NORTH ATLANTIC.			
8.4.26	30 m. S. by W. $\frac{1}{2}$ W. from Smalls.		Heavy submerged object.
8.4.26	$40^{\circ}13'$ N. $65^{\circ}11'$ W.		Fisherman's dory, no sign of life.
9.4.26	$43^{\circ}24'$ N. $64^{\circ}29'$ W.		Conical buoy.
12.4.26	$29^{\circ}53'$ N. $80^{\circ}03'$ W.		Piece of wreckage, dangerous to navigation.
19.4.26	$40^{\circ}41'$ N. $43^{\circ}00'$ W.		Light buoy adrift, painted red, light missing.
20.4.26	$49^{\circ}14'$ N. $10^{\circ}05'$ W.		Schooner <i>M.F.C.</i> abandoned and set on fire.
20.4.26	35° —N. 35° —W.		Schooner <i>Little Stephano</i> abandoned.
22.4.26	$47^{\circ}57'$ N. $6^{\circ}03'$ W.		Red spherical buoy
23.4.26	$49^{\circ}24'$ N. $8^{\circ}55'$ W.		Large round gas buoy, painted red.
25.4.26	$49^{\circ}49'$ N. $11^{\circ}20'$ W.		Whistle buoy with red top, minus whistle.
GULF OF MEXICO.			
8.4.26	$28^{\circ}25'$ N. $92^{\circ}18'$ W.		Large tree trunk, 30 feet long, roots well out of water.
NORTH PACIFIC.			
12.4.26	$7^{\circ}12'$ N. $80^{\circ}20'$ W.		Submerged object or uncharted shoal.
INDIAN OCEAN.			
1.4.26	$14^{\circ}03'$ N. $74^{\circ}27'$ E.		Mast, apparently attached to sunken wreckage.

Marine Agencies and Port Meteorological Officers.

- LIVERPOOL .. (Port Meteorological Office), Lieut.-Commander M. Cresswell, R.N.R., Dock Office. Telephone No.: Bank 8959.
- CARDIFF Captain T. Johnston, Technical College.
- CLYDE Captain M. C. Corrance, Board of Trade Surveyor's Office, 73, Robertson Street, Glasgow.
- DUBLIN { Captain M. H. Clarke, Chief Surveyor, Department of Industry and Commerce, Marine Branch, 27, Eden Quay.
- HULL Captain Geo. B. Sturdy, c/o Mr. W. Hakes, Commercial Road.
- LEITH.. .. Captains G. Black and C. G. Bonner, V.C., D.S.C., Leith Salvage and Towage Co., Ltd., 2, Commercial Street.
- SOUTHAMPTON .. Captain D. Forbes, Nautical Academy, 1, Albion Place.
- TYNE Captain J. J. McEwan, Marine School, South Shields.
- HONG KONG .. Lieut.-Commander C. R. H. Harvey, O.B.E., R.N. Superintendent, Admiralty Chart and Chronometer Depot.
- VANCOUVER .. T. S. H. Shearman, Esq., Room 40, Post Office Building.
- AUSTRALIA .. The Commonwealth Meteorologist.

The Deputy Directors of Navigation act as sub-agents as follows:—

- FREMANTLE .. Captain J. J. Airey, Dalgety's Buildings.
- MELBOURNE .. Captain L. J. Bolger, Electricity Commissioners Building, 22, William Street.
- SYDNEY Commander G. D. Williams, D.S.O., R.D., R.N.R. Customs House.

LIST OF VOLUNTARY OBSERVING SHIPS.

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 reports received, are given with the date and description of last log, register or report 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 reports 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.

Unless otherwise stated, vessels on the following list are s.s.

M.L. = Equipped with tested Instruments for keeping Meteorological Log.

W.T. = Equipped with tested Instruments for making coded W/T reports to the Meteorological Office, London.

No. = Keeps Ship's Meteorological Report Form 911 with ship's instruments. Letter M after No. indicates ship's barometer Mercurial; A. ship's barometer Aneroid.

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

The numbers which appear before the names of ships equipped for making coded W/T reports to the Meteorological Office, London, are used for the purpose of identification when the observations are re-transmitted in synoptic messages by Wireless or Cable.

Name of Vessel.	Captain.	Observing Officers.	Official Meteorological Equipment.	Line.	Last Log, Register, or Report Contributed. Received up to 16.4.26.	Date Received.
<i>Aba</i> ...	Hughes, J. ...	G. Pugh Williams, R. Wilkinson, J. R. Jones.	M.L.	Elder Dempster ...	Met. Log. 22.7.25 to 25.10.25...	11.11.25.
<i>Abinsi</i> ...	Wright, J. B. ...	R. R. Watson ...	No. A.	" " " " ...	Form 911 4.2.26 to 13.3.26 ...	17.3.26.
<i>Achilles</i> ...	Hill, R. ...	D. MacTavish ...	" A.	A. Holt ...	" 8.10.25 to 19.10.25...	18.11.25.
<i>Actor</i> ...	Haylett, E. ...	A. Frew, J. McKay, G. Penston.	M.L.	Harrison ...	Met. Log. 28.1.26 to 4.4.26 ...	12.4.26.
<i>Adda</i> ...	Toft, J. T. ...	W. Skuttl ...	No. M.	Elder Dempster ...	" 21.1.26 to 25.2.26 ...	2.3.26.
<i>50 Adriatic</i> ...	Beadnell, F. E., Capt., R.N.R.	J. Collins, A. C. I. Anson, R. G. Roberts.	W.T.	White Star ...	W.T. Reg. Form 911 13.2.26 to 4.3.26 ...	16.3.26.
<i>Aeneas</i> ...	Wallace, W. K. ...	J. M. Anderson ...	No. A.	A. Holt ...	" 27.2.26 to 20.3.26 ...	13.4.26.
<i>Agapenor</i> ...	Ramsay, J. ...	A. T. Gillard ...	" A.	" " " " ...	" 1.3.26 to 13.3.26 ...	22.3.26.
<i>Alban</i> ...	Whayman, W. ...	C. D. Lane, A. T. Douglas ...	" A.	Booth ...	" 6.12.25 to 22.12.25...	4.1.26.
<i>Albania</i> ...	Gronow, S. ...	L. Harper ...	" A.	Cunard ...	" 29.8.25 to 22.9.25 ...	24.9.26.
<i>Altpore</i> ...	Gordon, L. M., R.D., Commr., R.N.R.	F. R. W. Page ...	" M.	P. and O. ...	" 3.8.25 to 22.8.25 ...	21.9.25.
<i>Almanzora</i> ...	Mackenzie, G. A. ...	J. Clark ...	" A.	R.M.S.P. ...	" 6.2.26 to 21.3.26 ...	25.3.26.
<i>Alondra</i> ...	Vandergast, J. J. ...	H. Peters ...	" A.	Yeoward ...	" 13.2.26 to 8.3.26 ...	13.3.26.
<i>Ampelco</i> ...	Vandenkerckhove, A. ...	A. Aspslagh ...	" A.	American Petroleum... ..	" 5.3.26 to 24.3.26 ...	12.4.26.
<i>Antilochus</i> ...	Wilkinson, H. ...	E. T. Bayes ...	" A.	A. Holt ...	" 10.11.25 to 31.3.26...	6.4.26.
<i>Aorangi</i> ...	Crawford, R. ...	J. W. Bray, G. H. Kime, H. A. Titchfield.	M.L.	Canadian-Australasian	Met. Log. 24.9.25 to 7.1.26 ...	2.2.26.
<i>Appam</i> ...	Yardley, H. A., D.S.C.	S. C. Fry, J. A. McGough, W. Page.	"	Elder Dempster ...	" 24.6.25 to 5.12.25 ...	24.12.25.
<i>30 Aquitania</i> ...	Charles, Sir J. T., W., K.B.E., C.B., R.D., Commodore, R.N.R.	J. L. Croasdaile, J. Locke, R. V. Youd	W.T.	Cunard ...	W.T. Reg. 11.3.26 to 25.3.26 ...	29.3.26.
<i>62 Arabic</i> ...	Davies, J. ...	R. Walker, H. G. Morgan, W. Clements.	"	White Star ...	Form 911 17.3.26 to 8.4.26 ...	10.4.26.
<i>Arafura</i> ...	Gordon, A. S. ...	J. T. Heddle, G. C. Smith, C. Stratford, F. O. Colvin.	M.L.	Eastern and Australian	Met. Log. 6.10.25 to 3.1.26 ...	26.2.26.
<i>Archimedes</i> ...	Taylor, F. C. ...	F. W. Johnson ...	No. A.	Lampert & Holt ...	Form 911 7.6.25 to 8.7.25 ...	9.7.25.
<i>Ariguani</i> ...	Scudamore, J. H. H., D.S.C., R.D., Commr., R.N.R.	G. Dobson ...	M.L.	Elders & Fyffes ...	" 28.2.26 to 3.4.26 ...	8.4.26.
<i>Armadale Castle</i> ...	Millard, L. A., Knight, A.	M. M. Tomkins, R. F. Bayer, C. H. Williams.	M.L.	Union Castle ...	Met. Log. 31.1.25 to 22.7.25 ...	8.8.25.
<i>Arracan</i> ...	Willis, M. ...	R. McInnes, M. S. Stuart, A. McCullum.	"	P. Henderson ...	" 2.7.25 to 27.11.25...	10.12.25.
<i>Arundel</i> ...	Short, H. ...	Mr. Hill ...	C.C.	Southern Rly. ...	Telegraphic Report 29.3.26 ...	29.3.26.
<i>Arundel Castle</i> ...	Hague, J. W., Commr., R.N.R.	G. Blaiklock, C. Lloyd, H. S. Colbourne, I. A. Rainey, F. O. Wilbraham.	M.L.	Union Castle ...	Met. Log. 24.10.25 to 15.2.26...	23.2.26.
<i>Assyria</i> ...	Donald, D. R. ...	A. Middleton ...	No. A.	Anchor ...	Form 911 16.8.25 to 7.9.25 ...	9.9.25.
<i>Astronomer</i> ...	Booth, W. M. ...	J. Rae, H. Thomas, E. Shotton.	M.L.	Harrison ...	Met. Log. 29.8.25 to 12.1.26 ...	14.1.26.
<i>Athenic</i> ...	Davies, E. ...	W. Hill ...	No. A.	White Star ...	Form 911 30.1.26 to 16.2.26 ...	8.3.26.
<i>Atreus</i> ...	Salter, G. H. ...	J. C. Podmore ...	" A.	A. Holt ...	" 21.3.26 to 30.3.26 ...	8.4.26.
<i>Aisuta Maru</i> ...	Saito, B. ...	K. Murazumi ...	" A.	Nippon Yusen Kaisha	" 23.2.26 to 8.3.26 ...	15.3.26.
<i>Auditor</i> ...	Owen, W. T. ...	T. E. Steel ...	" M.	Harrison ...	" 24.1.26 to 17.2.26 ...	16.3.26.
<i>Ausonia</i> ...	Gibbons, G., R.D., Commr., R.N.R.	E. T. Sampson ...	" A.	Cunard ...	" 5.3.26 to 23.3.26 ...	6.4.26.
<i>Author</i> ...	Kinloch, R. ...	" " " " ...	" M.	Harrison ...	" " " " ...	" " " "
<i>Avon</i> ...	Adam, C., R.D., Commr., R.N.R.	E. S. Munch ...	" M.	R.M.S.P. ...	Form 911 27.1.26 to 12.3.26 ...	17.3.26.
<i>Balfour</i> ...	Rothwell, A. ...	A. Hammersley ...	No. A.	Canadian Pacific ...	" 26.11.25 to 5.1.26 ...	20.1.26.
<i>51 Baltic</i> ...	White, E. R., Commr., R.N.R.	J. Farrell, H. R. Wilkinson, R. Conway.	W.T.	White Star ...	W.T. Reg. Form 911 22.3.26 to 10.4.26 ...	13.4.26.
					" 21.3.26 to 11.4.26 ...	14.4.26.

LIST OF VOLUNTARY OBSERVING SHIPS

Name of Vessel.	Captain.	Observing Officers.	Official Meteorological Equipment.	Line.	Last Log, Register, or Report Contributed. Received up to 16.4.26.	Date Received.
<i>Clan Mackinnon</i>	McLean, J. G.	W. F. Isaac, S. Y. Strange, J. E. Clayton.	M.L.	Clan	Met. Log. 5.11.25 to 16.2.26	22.3.26.
<i>Clan Macphee</i>	Gourlay, J. B.	D. S. Rae, A. W. Jones, J. J. Millar.	"	"	" 28.12.24 to 24.7.25	4.8.25.
<i>Clan Macnaughton</i>	Thomson, W.	A. J. Storkey, D. MacDiarmid	No. A.	"	Form 911 24.12.25 to 13.1.26	22.2.26.
<i>Clan Macgregor</i>	Gray, J. N.	W. J. Henderson	" A.	"	" 12.2.26 to 1.3.26	6.4.26.
<i>Clan MacTavish</i>	Higgins, C. J.	"	" A.	"	"	"
<i>Clan Macvicar</i>	Phillips, G. P.	L. S. Murrin	" A.	"	Form 911 14.7.25 to 2.8.25	24.8.25.
<i>Clan Macwilliam</i>	Williamson, A.	"	" A.	"	"	"
<i>Clan Malcolm</i>	Neill, G. A.	S. M. Werrey Easterbrook, N. MacLeod.	M.L.	"	Met. Log. 18.10.25 to 5.4.26	13.4.26.
<i>Clan Morrison</i>	Porterfield, W. M.	G. Morren	No. A.	"	Form 911 21.7.25 to 13.10.25	15.10.25.
<i>Clan Murdoch</i>	Miller, W.	P. McMillan	" A.	"	" 9.12.25 to 27.1.26	16.2.26.
<i>Clan Ranald</i>	Openshaw, L. G.	T. E. Woodall	" A.	"	" 22.1.26 to 23.2.26	25.2.26.
<i>Clan Ross</i>	Jones, R. C.	G. Short	" A.	"	" 8.2.26 to 26.2.26	23.3.26.
<i>Clan Sinclair</i>	Neill, G. A.	J. Brittain	" A.	"	" 10.3.25 to 29.7.25	5.8.25.
<i>Clan Urquhart</i>	Gibb, A. F. W.	T. G. Mitchell	" A.	"	" 4.3.26 to 22.3.26	12.4.26.
<i>Colonia, C.S.</i>	Garnham, S. A.	A. S. Muir, F. Bolingbroke, J. M. Matthews, W. Sangwine.	M.L.	Telegraph Construction & Maintenance.	Met. Log. 29.8.25 to 1.10.25	9.10.25.
<i>Colonian</i>	Gittins, R. P.	T. A. Schofield-Miller	No. A.	Leyland	Form 911 7.1.26 to 31.1.26	8.2.26.
<i>Concordia</i>	Morris, J.	T. Philip, J. McIntosh, J. Davies, H. A. Hartley.	M.L.	Anchor Donaldson	Met. Log. 7.8.25 to 8.2.26	19.2.26.
<i>Comino</i>	Nuttall, E. L.	E. J. Johnson	No. A.	Furness Withy	Form 911 27.1.26 to 6.3.26	9.3.26.
<i>Copenhagen</i>	Kerr, J. J.	"	"	Glen & Co.	"	"
<i>Corinthia</i>	Hart, F.	F. Kean, M. Bennett, F. G. Rogers.	M.L.	White Star	Met. Log. 4.4.25 to 18.7.25	27.7.25.
<i>Cornish City</i>	James, D. P.	"	No. A.	Reardon Smith	"	"
<i>Cornwall</i>	Haines, F. P.	Mr. Maltby, Mr. Ray	No. A.	Federal	Form 911 4.7.25 to 13.8.25	21.9.25.
<i>Crawford Castle</i>	Morgan, A. O., R.D., Commr. R.N.R.	J. E. R. Wilford	" A.	Union Castle	" 10.1.26 to 9.2.26	15.2.26.
<i>Cristales</i>	Isaacson, J. M.	"	M.L.	Elders & Fyffes	"	"
<i>Culebra</i>	Mackay, A. S., R.D., Commr. R.N.R.	P. Cooper, J. W. Duncan, C. A. Payne.	"	R.M.S.P. Co.	Met. Log. 4.5.25 to 15.12.25	1.1.26.
<i>Cumberland</i>	Deith, G. T.	"	No.	Federal	"	"
<i>Cuthbert</i>	Barlow, F. P.	S. E. Adam	No. A.	Booth	Form 911 10.1.26 to 24.2.26	15.3.26.
<i>Cyclaps</i>	Cosker, W.	H. L. Cole	" A.	A. Holt	" 4.3.26 to 16.3.26	8.4.26.
<i>Dardanus</i>	Williams, D. T.	W. K. Kerr	" A.	"	" 23.1.26 to 1.3.26	8.3.26.
<i>Darian</i>	Masters, W.	A. S. Holland	" A.	Leyland	" 17.1.26 to 8.3.26	10.3.26.
<i>Darro</i>	Matthews, G. P.	R. S. Holland, A. Barff	" M.	R.M.S.P. Co.	" 24.1.26 to 21.3.26	23.3.26.
<i>Daytonian</i>	Walker, C. J., D.S.C.	"	" A.	Leyland	" 30.3.25 to 13.5.25	21.5.25.
<i>Demerara</i>	Willan, F. C. L.	J. J. C. Blake	" M.	R.M.S.P. Co.	" 12.1.26 to 8.3.26	10.3.26.
<i>Demosthenes</i>	Orriss, F. A.	S. J. Buckland	" M.	Aberdeen	" 24.1.26 to 9.3.26	18.3.26.
<i>Deseado</i>	Hannam, F. S.	A. H. Phillipson	" M.	R.M.S.P. Co.	" 12.2.26 to 31.3.26	6.4.26.
<i>Desna</i>	Huff, G. F.	J. W. Smith	" M.	"	" 12.12.25 to 6.2.26	10.2.26.
<i>Devocation</i>	Findlay, J.	L. E. Brown	" A.	A. Holt	" 16.1.26 to 5.4.26	12.4.26.
<i>Dieppe</i>	Marmery, S.	Mr. Parsons	C.C.	Southern Railway	Telegraphic Report 15.4.26	15.4.26.
<i>Dimboola</i>	Roy, C. M.	H. L. Price	No. A.	Melbourne S.S. Co.	Form 911 22.1.26 to 17.2.26	22.3.26.
<i>Discoverer</i>	Ling, J. T.	H. Hall	" M.	Harrison	" 19.12.25 to 5.2.26	25.3.26.
<i>Discovery, R.R.S.</i>	Stenhouse, J. R., D.S.O., D.S.C., O.B.E., R.D., Commr. R.N.R.	T. W. Goodchild	M.L.	Discovery Expedition	Met. Log. 24.7.25 to 7.1.26	19.2.26.
<i>Domala, M.V.</i>	Buswell, W.	C. E. Merchant	No. M.	British India	Form 911 11.10.25 to 18.2.26	22.3.26.
<i>61 Doric</i>	S. Bolton, D.S.C., R.D., Commr. R.N.R.	W. F. Dennison, W. Nicoll, E. N. Lloyd.	W.T.	White Star	W.T. Reg. 21.3.26 to 10.4.26	13.4.26.
<i>Doric Star</i>	Thomas, R. T.	T. Williams	No. M.	Blue Star	Form 911 19.3.26 to 11.4.26	14.4.26.
<i>Dorington Court</i>	Isaacs, W. A.	E. D. A. Gibbs	" A.	Haldin & Co.	" 1.8.25 to 15.9.25	16.9.25.
<i>Dorset</i>	Kettlewell, C. R.	E. Smith, H. S. Rogers, S. T. Woodhouse.	M.L.	New Zealand S.S. Co.	Met. Log. 12.9.25 to 6.11.25	20.11.25.
<i>Dorsetshire</i>	Adamson, B. W.	C. H. Griffiths, W. A. Kent, R. Cuming, J. Logan.	"	Bibby	" 3.10.25 to 7.1.26	12.1.26.
<i>Dromore Castle</i>	Vincent, E. S., R.D., Commr. R.N.R.	D. H. McDougall	No. A.	Union Castle	Form 911 6.2.26 to 29.2.26	23.3.26.
<i>Dryden</i>	Major, T. W.	A. Hewitt	" M.	Lampert & Holt	" 1.9.25 to 17.9.25	7.10.25.
<i>Duendes</i>	Cox, F. D.	H. Jones	" M.	P.S.N. Co.	" 15.2.26 to 3.3.26	8.3.26.
<i>Dunrum Castle</i>	Weller, H. E.	W. S. Byles	" A.	Union Castle	" 9.2.26 to 9.3.26	10.3.26.
<i>Dunrobin</i>	Ramsay, J. D.	M. M. Ramsay	" A.	Glen & Co.	" 26.1.26 to 23.2.26	8.3.26.
<i>Duquesa</i>	Ellis, F., D.S.C.	W. Myerscough	" M.	Furness Withy	" 6.2.26 to 2.4.26	12.4.26.
<i>Durenda</i>	Wilson, W.	K. G. Pullman	" M.	British India	" 1.1.26 to 9.1.26	1.2.26.
<i>Edinburgh Castle</i>	Morton Betts, W.	"	M.L.	Union Castle	Met. Log. 5.9.25 to 27.12.25	30.12.25.
<i>El Cordobes</i>	Noton, F. G.	J. W. Ekins	No. A.	British & Argentine S.N. Co.	Form 911 26.9.25 to 16.12.25	19.12.25.
<i>Elmina</i>	Allen, E. E.	R. A. Roberts, J. A. Jones, C. V. Evans.	M.L.	Elder Dempster	Met. Log. 9.9.25 to 3.11.25	16.11.25.
<i>El Paraguay</i>	Smith, F. C.	J. Allerton	No. M.	Houlder Bros.	Form 911 4.2.26 to 28.3.26	6.4.26.
<i>Elpenor</i>	T. W. Hannay	M. Robertson	M.L.	A. Holt	Met. Log. 1.11.25 to 1.3.26	4.3.26.
<i>Empress of Asia</i>	Douglas, L. D., R.D., Lt. - Commr., R.N.R.	R. H. Foley, M. Kissack, L. Johnston, L. C. Hogg, T. M. W. Golby.	"	Canadian Pacific	" 17.9.25 to 29.1.26	2.3.26.
<i>Empress of Australia</i>	Hailey, A. J.	R. Leicester, J. Downes	"	"	" 21.3.25 to 17.12.25	12.1.26.
<i>Empress of Canada</i>	Robinson, S., C.B.E., R.D., Commr., R.N.R.	W. S. Halliday, L. C. Barry, J. W. Thomas.	"	"	" 15.5.25 to 21.9.25	16.12.25.
<i>Empress of France</i>	Griffiths, E.	O. Pennington, E. Roberts, A. W. Patrick, W. Ewens.	"	"	" 21.6.25 to 17.11.25	24.11.25.
<i>Empress of Russia</i>	Hosken, A. J.	G. R. Newell, H. B. Metcalfe, J. S. Clark, J. H. Reid.	"	"	" 17.10.25 to 22.2.26	29.3.26.
<i>Empress of Scotland</i>	Latta, R. G.	B. Grant, D. Loram, W. Bacon, K. Hutchings, F. G. Hutchings.	"	"	" 3.5.25 to 7.10.25	3.11.25.
<i>Endeavour</i>	Commr. S. A. Geary-Hill, D.S.O., R.N.	G. S. Norrington, E. V. B. Baker, E. H. B. Baker, J. Torlesse.	"	His Majesty's Ship	" 7.11.25 to 2.3.26	23.3.26.
<i>Essequibo</i>	Duncan, F. E.	A. Lyall	No. M.	R.M.S.P. Co.	Form 911 29.1.26 to 14.3.26	29.3.26.
<i>Eumaeus</i>	Read, J. W.	W. J. Ryan	" A.	A. Holt	" 12.3.26 to 18.3.26	22.3.26.
<i>Euripides</i>	Collins, P. J., O.B.E.	H. S. Cox, G. R. Fisher, A. J. Terry.	M.L.	Aberdeen	Met. Log. 27.2.25 to 18.6.25	29.6.25.
<i>Eurybates</i>	Carnon, C. G.	C. Napier	No. A.	A. Holt	Form 911 1.1.26 to 13.2.26	18.2.26.
<i>Explorer</i>	Lamont, A.	Scientific Staff	M.L.	Scottish Fishery Board	Met. Log. 2.3.25 to 17.10.25	29.12.25.
<i>Ferndale</i>	Daniel, F.	D. Jones	No. M.	Commonwealth Govt.	Form 911 25.12.25 to 31.1.26	4.2.26.

Name of Vessel.	Captain.	Observing Officers.	Official Meteorological Equipment.	Line.	Last Log, Register, or Report Contributed, Received up to 16.4.26.	Date Received.
<i>Fitzroy</i> ...	Silk, H. V., Lt-Commr, R.N.	M. E. Welby ...	M.L.	His Majesty's Ship ...	Met. Log. 25.8.25 to 16.11.25...	21.11.25.
<i>Flandria</i> ...	Veldkamp, G. J. ...	T. Doornbosch ...	No. M.	Holland Lloyd ...	Form 911 8.1.26 to 25.2.26 ...	1.3.26.
<i>Flanders</i> ...	Henderson, D. A., Lt.-Commr., R.N.	H. E. Turner ...	M.L.	His Majesty's Ship ...	Met. Log. 23.8.25 to 20.11.25...	2.12.25.
<i>Francisco</i> ...	Collins, F. ...	C. Walker ...	No. A.	Ellerman Wilson ...	Form 911 23.1.26 to 5.2.26 ...	15.2.26.
<i>Freya</i> ...	Angus, W. ...	J. H. Hennessey ...	" A.	Scottish Fishery Board ...	" 18.3.26 to 31.3.26 ...	6.4.26.
<i>Garret</i> ...	Visser, C. W. ...	C. J. Vandenboom ...	" M.	Rotterdam Lloyd ...	" 20.1.26 to 20.2.26 ...	12.4.26.
<i>Gascoyne</i> ...	Rutt, W. N. ...	R. Simpson ...	" A.	Dalgety & Co. ...	" 19.1.26 to 24.2.26 ...	30.3.26.
<i>Gelria</i> ...	Bakker, T. J. ...	K. H. Schilp ...	" M.	Holland Lloyd ...	" 22.1.26 to 11.3.26 ...	13.3.26.
<i>Glenamoy, M.V.</i> ...	Angier, J. ...	R. H. Bishop ...	" A.	Glen Line ...	" 18.1.26 to 6.3.26 ...	12.4.26.
<i>Glenapp, M.V.</i> ...	Roberts, W. E. ...	S. W. Bell ...	" A.	" ...	" 14.11.25 to 27.12.25 ...	4.1.26.
<i>Glenashane</i> ...	Beer, E. ...	R. A. Dale ...	" A.	" ...	" 21.2.26 to 11.3.26 ...	6.4.26.
<i>Gloucestershire</i> ...	Robin, E. ...	M. W. Simmons ...	" A.	Bibby ...	" 30.1.26 to 9.4.26 ...	12.4.26.
<i>Gorgon</i> ...	Hughes, J. W. ...	E. W. Powell ...	" A.	A. Holt & Co. ...	" 22.2.26 to 14.3.26 ...	12.4.26.
<i>Gourko</i> ...	Aspinall, A. E. ...	G. B. Bray, S. N. Stokes, J. D. Birch.	No.	Ellerman Wilson ...	Met. Log. 16.5.25 to 1.11.25...	10.12.25.
<i>Haliartus</i> ...	Marsh, L. V. ...	W. H. Upton ...	No. A.	R. P. Houston ...	Form 911 11.2.26 to 11.3.26 ...	12.4.26.
<i>Harmonides</i> ...	Hughes, W. J. ...	D. L. Roberts ...	" A.	" ...	" 1.3.25 to 16.3.25 ...	30.4.25.
<i>Harmony, AUKY.</i> ...	Jackson, J. C. ...	A. W. Bush ...	" A.	Moravian Mission ...	" 1.12.25 to 18.12.25...	29.12.25.
<i>Hatarana</i> ...	Denne, G. H. A. ...	F. Wells, C. Parkes, W. T. Barnes.	M.L.	British India ...	" 12.6.25 to 27.2.26 ...	29.3.26.
<i>Hauraki, M.V.</i> ...	Frew, J. D. ...	J. A. Pearson ...	No. M.	Union S.S. Co., N.Z....	" 10.11.25 to 17.12.25	16.2.26.
<i>Henry Holmes, C.S.</i> ...	Bicker Caarten, A.	R. J. M. Pearce ...	" M.	W. I. & Panama Telegraph Co.	" 7.7.25 to 5.9.25 ...	23.9.25.
<i>Herald</i> ...	Harvey, J. R., O.B.E., Commr., R.N.	W. C. Jenks ...	M.L.	His Majesty's Ship ...	Met. Log. 25.9.25 to 25.12.25	24.2.26.
<i>Herefordshire</i> ...	Mann, R. P. ...	J. E. Cullen, G. Whitworth, P. S. Cooper.	No.	Bibby ...	" 11.10.25 to 17.12.25	14.1.26.
<i>Herschel</i> ...	Davies, G. W. ...	J. M. Edgar ...	No. A.	Lampport & Holt ...	Form 911 14.10.25 to 15.12.25	29.12.25.
<i>Hertford</i> ...	Urguhart, D. ...	A. Robertson ...	No. A.	Federal ...	" ...	" ...
<i>Hibernia</i> ...	Tanner, E. B. ...	R. Woodall ...	C.C.	L.M. & S. Rly. ...	Telegraphic Report, 13.3.26 ...	13.3.26.
<i>Highland Enterprise</i> ...	Pond, R. H. ...	J. H. Tifton ...	No. A.	Nelson ...	Form 911 12.12.25 to 11.2.26...	10.3.26.
" <i>Glen</i> ...	Jones, T. J. ...	C. M. Best ...	" A.	" ...	" 8.2.26 to 27.2.26 ...	13.3.26.
" <i>Heather</i> ...	Powell, G. A. ...	J. H. Cables, F. Jeyes ...	No.	" ...	Met. Log. 10.12.24 to 1.6.25 ...	16.6.25.
" <i>Laddie</i> ...	Alford, C. ...	R. Simpson ...	No. A.	" ...	Form 911 5.11.25 to 4.1.26 ...	6.1.26.
" <i>Piper</i> ...	Collings, D. ...	A. S. Jones, J. S. Collins, W. T. Breen, E. F. Smart.	M.L.	" ...	Met. Log. 20.6.25 to 3.11.25 ...	18.11.25.
" <i>Pride</i> ...	Davies, G. A. ...	F. Falconer, R. R. Soanes, G. E. Leech.	No.	" ...	" 5.12.25 to 31.1.26 ...	4.2.26.
" <i>Rover</i> ...	Ashby Graves, F. ...	G. J. Evans ...	No. A.	" ...	Form 911 18.12.25 to 13.2.26...	26.2.26.
" <i>Warrior</i> ...	Robinson, R. H. ...	R. B. Scullard ...	" M.	" ...	" 15.12.25 to 21.2.26...	24.2.26.
<i>Hildebrand</i> ...	Maddrell, J. ...	A. Allan ...	" A.	Booth ...	" 18.11.25 to 31.12.25...	14.1.26.
<i>Hobsons Bay</i> ...	Kydd, O. J. ...	Morrison, Hendy, Grantham, M. P. Pearce.	M.L.	Commonwealth Govt.	Met. Log. 24.11.25 to 12.3.26...	18.3.26.
<i>Holbein</i> ...	Gough, W. A. ...	H. L. Rudd ...	No. A.	Lampport & Holt ...	Form 911 8.11.25 to 16.1.26 ...	21.1.26.
<i>54 Homeric</i> ...	Holme, A. ...	A. E. Dyer, A. Griffiths, S. A. Jones, S. B. Morfee.	W.T.	White Star ...	W.T. Reg. 14.1.26 to 28.1.26 ...	9.2.26.
<i>Hororata</i> ...	Holland, E. ...	H. J. Wilde ...	No. A.	New Zealand S.S. Co. ...	Form 911 16.7.25 to 27.1.26 ...	2.2.26.
<i>Honorius</i> ...	Samuels, C. ...	J. E. Martin, W. G. Iddees ...	" A.	R. P. Houston ...	" 27.7.25 to 27.8.25 ...	31.8.25.
<i>Hubert</i> ...	Pym, J. H. ...	S. G. Edwards ...	" A.	Booth ...	" 14.1.26 to 12.3.26 ...	6.4.26.
<i>Hurunui</i> ...	Burton Davies, J. ...	J. C. Tuckett, C. D. Watt, F. Pover, G. R. Hogg.	M.L.	New Zealand S.S. Co. ...	Met. Log. 20.11.24 to 17.5.25...	9.6.25.
<i>Ikala</i> ...	Meetham, J. T. ...	E. Lightfoot, C. W. Smithurst ...	No. A.	J. H. Welsford & Co. ...	Form 911 22.5.25 to 5.6.25 ...	16.7.25.
<i>Ingoma</i> ...	Barrow, R. K. ...	O. Stanhope ...	" M.	Harrison ...	" 31.1.26 to 19.3.26 ...	22.3.26.
<i>Intaba</i> ...	Gibbins, W. A. ...	A. M. Hughes ...	" A.	" ...	" 3.1.26 to 17.2.26 ...	24.2.26.
<i>Iris, C.S.</i> ...	Hughes, H. R. ...	" ...	" M.L.	Pacific Cable Board ...	" ...	" ...
<i>Iroquois</i> ...	Jackson, A. L., Commr., R.N.	A. K. Baxendell ...	"	His Majesty's Ship ...	Met. Log. 17.8.25 to 30.11.25...	27.1.26.
<i>Ixion</i> ...	Williams, R. J. ...	A. S. Brotherton ...	No. A.	A. Holt ...	Form 911 10.11.25 to 7.12.25...	8.2.26.
<i>Javanese Prince</i> ...	Naylor, E. ...	F. Armstrong ...	" A.	Prince ...	" ...	" ...
<i>Jervis Bay</i> ...	Chaplin, W. R. ...	R. W. Laycock ...	" M.	Commonwealth Govt. ...	Form 911 12.1.26 to 14.2.26 ...	17.2.26.
<i>John Pender, C.S.</i> ...	Gibson, L. ...	A. E. Everall ...	" A.	Eastern Tel. Co. ...	" 31.10.25 to 19.11.25	9.12.25.
<i>Juin</i> ...	Benson, C. W. ...	A. Beharrel ...	" A.	Pacific S.N. Co. ...	" 16.5.25 to 5.6.25 ...	17.6.25.
<i>Justin</i> ...	Evans, L. ...	A. R. Fasting ...	" A.	Booth ...	" ...	" ...
<i>Kaikoura</i> ...	McNish, R. ...	H. E. Reilly, H. Neagle, D. Glegg, S. Toyne.	M.L.	New Zealand S.S. Co. ...	Met. Log. 26.1.25 to 8.8.25 ...	26.8.25.
<i>Kaisar-i-Hind</i> ...	Manley G. ...	G. R. Baker ...	No. M.	P. & O. ...	Form 911 6.3.26 to 25.3.26 ...	12.4.26.
<i>Kamo Maru</i> ...	Shiratori, S. ...	" ...	" A.	Nippon Yusen Kaisha	" 9.1.26 to 7.2.26 ...	12.2.26.
<i>Kangaroo</i> ...	Norris, H. C. ...	R. J. Sinclair, V. Gilbert, J. Egglestone.	M.L.	State Service Australia	Met. Log. 11.4.25 to 20.9.25 ...	2.11.25.
<i>Kashmir</i> ...	Stringer, R.H., O.B.E., Commr., R.N.R.	H. A. Tod ...	No. M.	P. & O. ...	Form 911 22.2.26 to 10.4.26 ...	13.4.26.
<i>Kathlamba</i> ...	Mordue, J. A. ...	" ...	" A.	Ellerman Bucknall ...	" 19.2.26 to 7.3.26 ...	18.3.26.
<i>Kellett</i> ...	Maxwell, P. S. E., Commr., R.N.	D. G. V. Williams... ..	M.L.	His Majesty's Ship ...	Met. Log. 29.7.25 to 16.11.25...	18.11.25.
<i>Kenilworth Castle</i> ...	Chave, Sir B., K.B.E.	J. W. Beckh, A. C. Grove Price, L. G. May, H. L. Iddas.	"	Union Castle ...	" 8.2.25 to 26.8.25 ...	12.1.26.
<i>Kent</i> ...	Downton, M. ...	" ...	No. A.	New Zealand, S.S. Co. ...	" ...	" ...
<i>Khiva</i> ...	Randall, H.W.R.D., Capt., R.N.R.	M. R. Little, A. H. Cole, L. A. Hill	M.L.	P. & O. ...	" 29.8.25 to 9.12.25 ...	12.12.25.
<i>Khyber</i> ...	Collyer, R. M. M., R.D., Commr., R.N.R.	J. B. Child ...	No. M.	" ...	Form 911 4.7.25 to 29.10.25 ...	7.11.25.
<i>Kia Ora</i> ...	McIntosh, A. ...	E. A. Hickling ...	" A.	Shaw Savill & Albion	" 27.2.26 to 9.4.26 ...	13.4.26.
<i>Kildonan Castle</i> ...	Imlah, C. B. ...	G. H. Pickering ...	" A.	Union Castle ...	" 2.1.26 to 21.2.26 ...	1.3.26.
<i>Kitano Maru</i> ...	Gotoh, M. ...	M. Hara ...	" A.	Nippon Yusen Kaisha	" 12.9.25 to 6.10.25 ...	13.11.25.
<i>Knight Companion</i> ...	Beale, H. E. ...	J. J. Daniel, A. M. Hunter... ..	" M.	A. Holt ...	" 8.7.25 to 23.7.25 ...	24.8.25.
<i>Kovno</i> ...	Dosser, W. A. ...	J. Marshall, T. Tindell, J. J. Brown, A. M. Collier, F. T. Shaw.	M.L.	Ellerman Wilson ...	Met. Log. 26.4.25 to 3.10.25 ...	10.11.25.
<i>Kwang Tung</i> ...	Byers, G. ...	" ...	"	China Nav. Co. ...	" ...	" ...
<i>Kyogle</i> ...	Coalstad, C. ...	C. B. Odman, E. W. Hughes	No. A.	Commonwealth Light-house Service.	Form 911 17.8.25 to 9.11.25 ...	14.12.25.
<i>Lady Denison Pender, C.S.</i> ...	West, G. W. ...	F. Lawrence ...	" A.	Eastern Tel. Co. ...	Met. Log. 9.1.26 to 26.1.26 ...	2.3.26.
<i>Laguna</i> ...	Pape, E. R. ...	W. P. Boon ...	" A.	Pacific S.N. Co. ...	" 22.12.25 to 8.1.26 ...	25.1.26.
<i>Lahore</i> ...	Gordon, L. M., R.D., Commr. R.N.R.	" ...	" M.	P. & O. ...	" ...	" ...
<i>Lalande</i> ...	Hamill, H. ...	A. N. Blundell ...	" A.	Lampport & Holt ...	" 15.10.25 to 14.12.25	8.2.26.
<i>Lancashire</i> ...	Beckett, F. W. ...	W. M. S. Higginson ...	" A.	Bibby ...	" 21.11.25 to 28.1.26...	5.2.26.
<i>36 Lancastria</i> ...	Brown, F. G. ...	P. J. Robinson L. Har per... ..	W.T.	Cunard ...	W.T. R. Form 9 12.10.25 to 1.11.25...	5.11.25.
<i>Laomedon</i> ...	Beswick, W. ...	H. Howe... ..	No. A.	A. Holt ...	" 11.12.25 to 15.1.26...	15.3.26.
<i>La Paz, M.V.</i> ...	Dunn, R. E. ...	F. T. Gale ...	" M.	Pacific S.N. Co. ...	" 13.2.26 to 4.3.26 ...	25.3.26.

Name of Vessel.	Captain.	Observing Officers.	Official Meteorological Equipment.	Line.	Last Log, Register, or Report Contributed. Received up to 16.4.26.	Date Received.
<i>Morvada</i> ...	Mills, T. L., O.B.E., R.D., Commr., R.N.R.	A. J. Norris	No. M.	British India ...	Form 911 9.11.25 to 6.2.26 ...	9.2.26.
<i>Mulbera</i> ...	Steadman W. R. ...	F. Broomhead	No. M.	" ...	" 5.3.26 to 18.3.26 ...	22.3.26.
<i>Nagara</i> ...	Buret, T. J. C. ...	F. A. C. Thacker	" M.	R.M.S.P. Co. ...	" 16.1.26 to 19.3.26 ...	26.3.26.
<i>Nagoya</i> ...	Davis, H. C. ...	P. Haworth	" M.	P. & O. ...	" 23.1.26 to 14.2.26 ...	8.3.26.
<i>Nardana</i> ...	Moth, F. L. ...	S. C. T. Smith	" M.	British India ...	" 15.9.25 to 25.10.25...	31.10.25.
<i>Nariva</i> ...	Hodge, W. C., Spriddell, F. G., R.D., Commr., R.N.R.	H. M. S. Laidlaw, A. E. Randle, W. A. Delap, R. A. B. Ardley, C. Frankson	M.L.	R.M.S.P. Co. ...	Met. Log. 12.9.25 to 24.2.26 ...	4.3.26.
<i>Nellore</i> ...	Hignett, A. H., R.D., Lt. Commr., R.N.R.	F. Squire	No. M.	P. & O. ...	Form 911 10.1.26 to 7.2.26 ...	9.2.26.
<i>Nestor</i> ...	Owen, R. D., O.B.E.	D. Rees, R. Wilks, F. J. Silva	M.L.	A. Holt ...	Met. Log. 30.8.25 to 8.1.26 ...	18.1.26.
<i>Nevasa</i> ...	Swanson C. J. ...	W. G. Bussey	No. M.	British India ...	Form 911 15.1.26 to 19.2.26 ...	24.2.26.
<i>Newby Hall</i> ...	Edge T. P. ...	R. H. Stewart, G. E. M. Jenkins, R. M. Redhead.	M.L.	Ellerman ...	Met. Log. 2.5.25 to 24.10.25 ...	25.11.25.
<i>Niagara</i> ...	Showman, A. C. ...	T. A. Macpherson, J. Dawson, A. P. Cousin, D. McKenzie	"	Canadian-Australian...	" 27.8.25 to 10.1.26 ...	2.3.26.
<i>Ningchow</i> ...	Wilson, C. A. ...	G. H. Oldridge	No. A.	A. Holt ...	Form 911 6.11.25 to 9.3.26 ...	15.3.26.
<i>Norna</i> ...	Wright, J. ...	T. Mather	" A.	Scottish Fishery Board	" 17.2.26 to 28.3.26 ...	6.4.26.
<i>Norseman, C.S.</i> ...	Douglas, W. ...	R. Forrest, E. Pearse, J. A. Barter, H. O. Prosser.	M.L.	Western Tel. Co. ...	Met. Log. 16.2.25 to 1.9.25 ...	28.9.25.
<i>Nubian</i> ...	Watmough, T. M. ...	H. R. Gaskill	No. A.	Leyland ...	Form 911 23.12.25 to 24.1.26	28.1.26.
<i>Nyanza</i> ...	Norman, W. A. ...	R. H. Hand, R. G. Freeman, R. E. Mackay.	M.L.	P. & O. ...	Met. Log. 7.10.25 to 24.12.25...	31.12.25.
<i>Oaklands Grange</i> ...	Routledge, R. ...	E. J. Longhead	No. A.	Houlder Bros. ...	Form 911 5.2.26 to 2.3.26	6.4.26.
<i>42 Ohio</i> ...	Parker, W. H., C.B.E., R.D., Capt. R.N.R.	J. Smith, H. Baylis, E. A. E. Littlewood.	W.T.	R.M.S.P. Co. ...	W.T. Reg. 8.1.26 to 3.4.26 ...	9.4.26.
<i>Olympia</i> ...	Caldwell, R. ...	D. R. Urquhart, G. Lynas, W. Proudfoot.	M.L.	Anchor ...	Form 911 20.2.26 to 5.4.26 ...	12.4.26.
<i>57 Olympic</i> ...	Marshall, W., C.B., D.S.O., R.D., Capt., R.N.R.	H. J. C. Day, A. Fisher, J. Law, J. Boyce.	W.T.	White Star ...	W.T. Reg. 19.3.26 to 1.4.26 ...	7.4.26.
<i>Orama</i> ...	Staunton, H. G., C.B.E., R.D., Commr., R.N.R.	L. J. Vesty, F. L. Hubbard, J. S. Metcalfe, A. S. Nicholls, T. Fox Russell.	M.L.	Orient ...	Form 911 15.11.25 to 16.2.26...	23.2.26.
<i>Oranian</i> ...	Hoskins, W. ...	R. H. Theaker	No. A.	Leyland ...	Form 911 16.8.25 to 3.9.25 ...	17.9.25.
<i>Orari</i> ...	Robinson, F. W. ...	F. Longhead, C. Wilkinson, W. Tarr.	M.L.	New Zealand S.S. Co.	Met. Log. 7.3.25 to 11.8.25 ...	15.8.25.
<i>40 Orbita</i> ...	Smith, W. E., D.S.O., R.D., Capt. R.N.R.	B. C. Dodds, H. G. Whittle, H. M. Rennie, H. Baylis.	W.T.	R.M.S.P. Co. ...	W.T. Reg. 19.10.25 to 9.11.25	12.11.25.
<i>Orcoma</i> ...	Dominy, R. H., C.B.E., Commr., R.N.R.	R. Skellorn, R. Griffiths, W. Billington.	M.L.	Pacific S.N. Co. ...	Form 911 17.10.25 to 10.11.25	12.11.25.
<i>41 Orduna</i> ...	Smith, W. E., D.S.O., R.D., Capt. R.N.R.	H. G. Whittle, S. Robbins, R. W. Sumpton, R. J. Finch	W.T.	R.M.S.P. Co. ...	Met. Log. 22.11.25 to 4.2.26 ...	13.2.26.
<i>Oriana</i> ...	Mander, T. ...	W. Pearce, R. D. Eckford, T. H. McGill.	M.L.	Pacific S.N. Co. ...	W.T. Reg. 23.1.26 to 14.3.26 ...	17.3.26.
<i>Orita</i> ...	Splatt, W. A. ...	T. R. Scott, D. W. Hutchinson, R. W. Hanson.	"	" " ...	Form 911 25.1.26 to 15.3.26 ...	18.3.26.
<i>Ormonde</i> ...	Knowles, C. H., D.S.O., Commr., R.N.	A. M. Hughes	"	His Majesty's Ship ...	Met. Log. 12.11.25 to 19.1.26...	29.1.26.
<i>Ormonde</i> ...	Shelford, W. S., Lt. Commr., R.N.R.	T. B. Granger Grieve, N. A. Whinfield, J. F. Thompson.	"	Orient ...	" 1.11.25 to 4.2.26 ...	10.2.26.
<i>Ormuz</i> ...	O'Sullivan, F. R. ...	E. Hatch, W. Wickham, W. Elliot.	"	" ...	" 20.9.25 to 26.12.25...	31.12.25.
<i>Oronsay</i> ...	Owens, A. L., R.D., Lt. Commr., R.N.R.	C. Dodgson, P. R. Murphy, R. K. Rogerson.	" M.	" ...	Form 911 27.1.26 to 6.4.26 ...	13.4.26.
<i>Oroya</i> ...	Pearce, A. ...	S. Lewis	No. M.	Pacific S.N. Co. ...	Met. Log. 26.7.25 to 12.1.26 ...	20.1.26.
<i>Orsova</i> ...	Matheson, C. G., D.S.O., R.D., Capt., R.N.R.	G. E. Martin, A. J. Croft, Cohen, H. Petit Dann.	M.L.	Orient ...	" 24.8.25 to 17.3.26 ...	23.3.26.
<i>Orvieto</i> ...	James, L. V., D.S.C.	L. E. Fordham, J. Goldsworthy, A. Hawker, A. H. Dyer.	M.L.	" ...	" 4.10.25 to 7.1.26 ...	18.1.26.
<i>Osterley</i> ...	Cameron, E. P., R.D., Commr., R.N.R.	H. Tanner, J. E. Goldsworthy, G. L. Carter.	"	" ...	Form 911 6.9.25 to 27.11.25 ...	15.2.26.
<i>Othello</i> ...	Montgomery, H. ...	A. C. Fullerton	No. A.	Ellerman Wilson ...	" 11.1.26 to 3.2.26 ...	22.3.26.
<i>Otira</i> ...	Elford H. E. ...	E. J. Riccard	" M.	Shaw, Savill & Albion	" 29.1.26 to 10.4.26 ...	15.4.26.
<i>Otranto</i> ...	Sinner, G. L., R.D., Commr., R.N.R.	R. H. Rogerson	" M.	Orient ...	" 2.3.26 to 15.3.26 ...	22.3.26.
<i>Ovid</i> ...	Groom, A. C. B. ...	"	" A.	Shakespear Shipping Co.	" 13.2.26 to 15.3.26 ...	6.4.26.
<i>Oxfordshire</i> ...	Crumplin, W. E. ...	F. C. Brooks	" A.	Bibby Bros. ...	" 14.12.25 to 17.3.26	22.3.26.
<i>Pacific Shipper, M.V.</i> ...	Newman, G. W. A.	G. Davis	" A.	Furness Withy ...	" 26.9.25 to 28.2.26 ...	8.3.26.
<i>Pakeha</i> ...	W. P. Clifton Mogg	E. T. Baker, A. Black, A. Lockhart	M.L.	Shaw, Savill & Albion	Form 911 28.12.25 to 6.2.26 ...	11.2.26.
<i>Pareora</i> ...	Evans, J. O. ...	R. F. Hillings	No. A.	Hain S.S. Co. ...	Telegraphic Report. 14.4.26	14.4.26.
<i>Paris</i> ...	Cook, C. L. ...	Mr. Biles	C.C.	Southern Ry. ...	Form 911 4.7.25 to 8.8.25	12.8.25.
<i>Patia</i> ...	Bostock, R. J. ...	W. McIlwaine	No. A.	Elders & Fyffes ...	Met. Log. 8.7.25 to 3.2.26 ...	1.4.26.
<i>Patrol C.S.</i> ...	Welsh, T. K. ...	H. F. P. Albrecht	M.L.	Eastern Extension (A. & C.) Telegraph Co.	Form 911 27.9.25 to 4.11.25 ...	17.3.26.
<i>Persic</i> ...	Bulman, J. B. ...	R. Conway	No. A.	White Star ...	Met. Log. 18.7.25 to 22.11.25...	24.11.25.
<i>Peshawar</i> ...	Hester, C. W., R.D., Commr., R.N.R.	D. G. Baillie, E. J. R. North, R. D. Whyte-Mackay.	M.L.	P. & O. ...	Form 911 29.6.25 to 14.8.25 ...	18.8.25.
<i>Pharos</i> ...	Ewing, T. N. ...	A. McLachlan	No. A.	Northern Lighthouse Board.	" 9.10.25 to 1.11.25 ...	16.11.25.
<i>Philadelphum</i> ...	Baker, J. A. ...	W. T. Godwin	" A.	Leyland ...	" 6.1.26 to 16.1.26 ...	1.2.26.
<i>Polycarp</i> ...	Evans, T. G. ...	C. W. Smethurst	" A.	Booth ...	Met. Log. 21.8.25 to 28.12.25...	7.1.26.
<i>Port Adelaide</i> ...	Hayter S. W. ...	E. Catchpole, G. Lovegrove, C. Hodson.	M.L.	Commonwealth & Dominion.	" 16.5.25 to 28.9.25 ...	12.10.25.
<i>Port Albany</i> ...	Robinson, C. A. ...	E. A. Leavett, A. G. Newbury, W. Eastoe, J. L. Richardson.	"	" " ...	"	

LIST OF VOLUNTARY OBSERVING SHIPS

Name of Vessel.	Captain.	Observing Officers.	Official Meteorological Equipment.	Line.	Last Log, Register, or Report Contributed. Received up to 16.4.26.	Date Received.
<i>Port Auckland</i> ...	Durham, R. S. ...	R. B. Stannard ...	No. A.	Commonwealth & Dominion.	Form 911 25.11.25 to 5.1.26 ...	20.1.26.
„ <i>Bowen</i> ...	Gilling, W. L. ...	W. R. Johnston ...	„	„	„	„
„ <i>Caroline</i> ...	Renaut, F. A. ...	T. Copeland, E. Fenton, C. Chamberlin.	M.L.	„	Met. Log. 24.1.25 to 13.6.25 ...	22.7.25.
„ <i>Chalmers</i> ...	Enright, W. J. ...	„	„	„	„	„
„ <i>Curtis</i> ...	Van den Bergh, C. ...	W. H. Miles ...	No. A.	„	Form 911 14.12.24 to 25.4.25 ...	2.6.25.
„ <i>Darwin</i> ...	Sawbridge, I. R. ...	E. T. N. Lawrey, G. F. Pannett.	„ A.	„	„ 25.11.25 to 10.1.26 ...	13.1.26.
„ <i>Denison</i> ...	Ferris, J. ...	W. H. Sadler, J. C. Goddard ...	„ M.	„	„ 15.6.25 to 14.8.25 ...	21.9.25.
„ <i>Dunedin</i> ...	„	E. G. Jones ...	No.	„	„	„
„ <i>Hacking</i> ...	Hoad, A. C. ...	C. Newton ...	No. A.	„	Form 911 18.11.25 to 2.1.26 ...	5.1.26.
„ <i>Hobart</i> ...	Craven, R. ...	L. Copeland ...	No.	„	„	„
„ <i>Hunter</i> ...	Cottell, S. C. ...	A. Cooper, C. F. Post, J. T. Weldin.	M.L.	„	Met. Log. 30.10.25 to 2.4.26 ...	14.4.26.
„ <i>Lincoln</i> ...	„	„	No.	„	„	„
„ <i>Melbourne</i> ...	Kearney, F. J. ...	D. G. H. Bradley, J. A. Fairbairn, A. G. Starkey.	M.L.	„	Met. Log. 17.10.25 to 1.4.26 ...	7.4.26.
„ <i>Napier</i> ...	„	„	No.	„	„	„
„ <i>Nicholson</i> ...	Jack, J. ...	„	„	„	„	„
„ <i>Pirie</i> ...	Higgs, W. G. ...	H. C. Jeffery, W. G. Jones, N. M. Muzzill, S. Hearn.	M.L.	„	Met. Log. 26.8.25 to 27.2.26 ...	2.3.26.
„ <i>Sydney</i> ...	Lea, W. H. ...	A. W. Sams, C. Groves, H. Higgs, H. Boys Smith.	„	„	„ 9.7.25 to 31.3.26 ...	9.4.26.
„ <i>Victor</i> ...	Swan, L. H. ...	E. G. Fullick, W. Howe, W. Renouf.	„	„	„ 5.4.25 to 14.8.25 ...	22.8.25.
„ <i>Wellington</i> ...	Farmer, F. ...	„	No.	„	„	„
<i>President Jackson</i> ...	Griffith, J. ...	H. G. Holland ...	No. A.	Pacific Mail S.S. Co. ...	Form 911 21.12.26 to 22.1.26 ...	15.3.26.
<i>President Jefferson</i> ...	Nichols, F. R. ...	C. H. Moen ...	„ A.	Admiral Oriental Line	„ 4.2.26 to 23.3.26 ...	12.4.26.
<i>Protea, H.M.S.A.S.</i> ...	Woodhouse, A. F. B., Lt.-Commr., R.N.	R. J. Whitley ...	„ A.	South African Naval Service.	„ 27.1.26 to 7.3.26 ...	13.4.26.
<i>Pyrrhus</i> ...	Elford, W. J. ...	J. L. Millar ...	„ A.	A. Holt ...	„ 7.1.26 to 23.3.26 ...	6.4.26.
<i>Rangura</i> ...	King, A. M. ...	„	No. M.	P. & O. ...	„	„
<i>60 Regina</i> ...	Smith, R. G. ...	G. W. Couch, H. Daman, C. Cochrane.	W.T.	White Star-Dominion	W.T. Reg. 8.3.26 to 28.3.26 ...	6.4.26.
<i>Reindeer</i> ...	Langdon, C. ...	„	C.C.	G.W. Railway	Form 911 8.3.26 to 28.3.26 ...	31.3.26.
<i>Remuera</i> ...	Cameron ...	P. McCullum ...	No.	New Zealand S.S. Co.	Telegraphic Report 15.4.26 ...	15.4.26.
<i>Rhodesian Transport</i> ...	Fowler, W. H. ...	W. Heritage ...	No. A.	Houlder Bros.	Form 911 14.11.25 to 12.3.26 ...	18.3.26.
<i>Rimutaka</i> ...	Hemming, F. A. ...	F. Bishop ...	M.L.	New Zealand S.S. Co.	Met. Log. 31.5.25 to 29.3.26 ...	1.4.26.
<i>Risaldar</i> ...	Park, G. ...	A. J. Cavallo, H. Hardwick, C. M. Knight.	„	Asiatic S.N. Co. ...	„ 21.4.25 to 10.10.25 ...	17.11.25.
<i>Romney</i> ...	Syms, G. ...	H. Trodden ...	No. A.	Lampart & Holt ...	Form 911 9.10.25 to 21.10.25 ...	30.11.25.
<i>Rotorua</i> ...	Hunter, J. B. ...	D. F. Clegg ...	M.L.	N.Z.S. Co. ...	„ 26.9.25 to 12.1.26 ...	20.1.26.
<i>Royal Fusilier</i> ...	Dawson, J. ...	J. Fraser ...	No. A.	London & Edinburgh S.S. Co.	„ 28.2.26 to 28.3.26 ...	6.4.26.
<i>Royal Transport</i> ...	Dove, J. ...	R. Martin ...	„ A.	Houlder Bros. ...	„ 17.11.25 to 17.12.25	21.12.25.
<i>Ruaphu</i> ...	McKellar, A. W., R.D., Capt., R.N.R.	- Lettington, J. D. Tooms, A. J. Webb, R. Russel.	M.L.	New Zealand S.S. Co.	Met. Log. 20.11.25 to 22.3.26 ...	27.3.26.
<i>Sachem</i> ...	Westgarth, W. A. D.S.C.	C. Waldron, E. Sainty, G. R. Watson.	„	Furness Withy ...	„ 30.6.25 to 10.12.25 ...	17.12.25.
<i>St. Albans</i> ...	Smith, G. L. ...	J. W. Kavanagh, J. F. Heddle, H. J. Jeans, W. McIntyre.	„	Eastern and Australian	„ 5.8.25 to 2.12.25 ...	24.3.26.
<i>St. Helier</i> ...	Mulhall, W. ...	C. Bell ...	C.C.	G.W. Railway ...	Telegraphic Report 9.3.26 ...	9.3.26.
<i>St. Julien</i> ...	Langdon, C. H. ...	C. Joy ...	„	„	„ 8.4.26 ...	8.4.26.
<i>St. Patrick</i> ...	Bearpark, E. W. ...	J. Hill ...	No. A.	Rankin Gilmour ...	Form 911 15.1.26 to 1.2.26 ...	15.2.26.
<i>Salaga</i> ...	Sola, P., D.S.O. ...	G. E. Dutton ...	„ A.	Elder Dempster ...	„ 12.1.26 to 9.2.26 ...	15.2.26.
<i>Samaria</i> ...	McNeil, S. G. S. ...	H. L. Pryse ...	„ A.	Cunard ...	„ 15.1.26 to 6.2.26 ...	6.4.26.
<i>Sandown Castle</i> ...	Jackson, C. R. ...	P. G. MacIver ...	„ A.	Union Castle ...	„ 16.12.25 to 23.2.26 ...	26.2.26.
<i>10 Saturnia</i> ...	Mitchell, W. ...	D. Macqueen ...	W.T.	Anchor Donaldson ...	W.T. Reg. 17.10.25 to 6.11.25	11.11.25.
<i>Saxoleine</i> ...	Rodgers, C. S. ...	B. Johnsen ...	No. A.	Hunting & Son ...	Form 911 16.10.25 to 7.11.25	11.11.25.
<i>Saxon</i> ...	Knight, A. ...	T. M. Lockwood ...	„ A.	Union Castle ...	„ 18.2.26 to 9.3.26 ...	29.3.26.
<i>Scholar</i> ...	McCullum, J. ...	J. D. Grieves ...	„ M.	Harrison ...	„ 1.4.25 to 20.6.25 ...	2.7.25.
<i>Scindia</i> ...	Matthews, W. ...	R. S. Paton ...	„ A.	Anchor ...	„ 28.11.25 to 1.3.26 ...	8.3.26.
<i>Scotia</i> ...	Pritchard, S. D. ...	O. W. L. Jones ...	C.C.	L.M. & S. Rly. ...	Telegraphic Report 15.4.26 ...	15.4.26.
<i>Scottish Bard</i> ...	J. W. Lilley ...	J. W. Lilley ...	No. A.	Tankers Ltd. ...	Form 911 31.1.26 to 15.2.26 ...	9.3.26.
<i>33 Scythia</i> ...	Prothero, W. ...	A. Nicholson, J. C. Munro, J. W. Counce.	W.T.	Cunard ...	W.T. Reg. 12.1.26 to 5.2.26 ...	30.3.26.
<i>Sheaf Mount</i> ...	Groves, C. V. ...	C. A. Goold ...	No. A.	W. A. Souter ...	„ 22.1.26 to 26.2.26 ...	12.4.26.
<i>Sheaf Spear</i> ...	Whitfield, G. A., O.B.E.	W. H. Grisewood, N. Thompson.	M.L.	„	Met. Log. 22.7.25 to 5.3.26 ...	29.3.26.
<i>Socrates</i> ...	Taylor, F. C. ...	W. E. Jordan ...	No. A.	Lampart & Holt ...	Form 911 22.12.25 to 21.1.26 ...	25.1.26.
<i>Soekaboemi</i> ...	Z. W. Flach ...	C. van Reenen ...	„ M.	Rotterdam Lloyd ...	„ 28.9.25 to 2.11.25 ...	7.11.25.
<i>Somerset</i> ...	Barnett, H. ...	J. J. Youngs ...	„ M.	N.Z.S. Co. ...	„ 15.12.25 to 21.1.26 ...	26.1.26.
<i>Somersetshire</i> ...	Leitch, R. C. ...	P. Hawkins, R. C. Leitch, H. G. Walton.	M.L.	Bibby ...	Met. Log. 14.12.25 to 18.3.26 ...	8.4.26.
<i>Somme</i> ...	Miles, F. R., Commr., R.N.R.	H. Chamberlain, A. P. Portsmouth.	No.	R.M.S.P. Co. ...	„ 22.11.24 to 29.8.25 ...	10.2.26.
<i>Spectator</i> ...	Harding, C. H. J. ...	D. Fraser, J. G. F. Betson ...	No. A.	„	Form 911 20.11.25 to 20.2.26 ...	26.2.26.
<i>Spero</i> ...	Norton, W. J. ...	T. E. Fea, R. O. Otley ...	M.L.	Ellerman Wilson ...	Met. Log. 22.5.25 to 6.12.25 ...	10.12.25.
<i>Stockwell</i> ...	Kershaw, R. W. ...	W. Baxter ...	No. A.	Brocklebank ...	Form 911 20.9.25 to 9.10.25 ...	21.10.25.
<i>Stuart Prince</i> ...	Durrant, G. D. ...	W. C. Freeman ...	„ A.	Prince ...	Met. Log. 9.5.25 to 22.10.25 ...	26.10.25.
<i>Surrey</i> ...	Field, H. G. B. ...	C. P. Jackson, C. Welch, H. Harris.	M.L.	Federal ...	„ 9.5.25 to 22.10.25 ...	26.10.25.
<i>Suwa Maru</i> ...	Okuno, Y. ...	H. Yamashita ...	No. A.	Nippon Yusen Kaisha	Form 911 10.11.25 to 2.1.26 ...	11.1.26.
<i>Tainui</i> ...	Hartman, W. H. ...	P. S. Horwood ...	„ A.	Shaw, Savill & Albion	„ 9.1.26 to 27.1.26 ...	31.3.26.
<i>Tairoa</i> ...	Summers, W. G. ...	S. A. Bannister ...	„ A.	„	„ 2.7.25 to 10.8.25 ...	12.10.25.
<i>Tahiti</i> ...	Aldwell, B. L. ...	W. Gould ...	„ A.	Union S.S. Co. of N.Z.	„ 5.1.26 to 19.2.26 ...	6.4.26.
<i>Taiying</i> ...	Hamilton, H. E. ...	„	M.L.	Yuill & Co. ...	„	„
<i>Talhybius</i> ...	Ireland, T. R. ...	P. Elder ...	No. A.	A. Holt ...	Form 911 19.9.25 to 26.10.25 ...	2.11.25.
<i>Tanda</i> ...	Pilcher, E. ...	C. G. Holdaway, R. Lloyd	M.L.	E. & A. S.S. Co. ...	Met. Log. 2.12.25 to 1.3.26 ...	7.4.26.
<i>Tambora</i> ...	Laing, J. D. ...	Harry, B. Dun, H. Jeans.	„	„	„	„
	Huisman, N. ...	H. Van Manen ...	No. M.	Rotterdam Lloyd ...	Form 911 22.10.25 to 9.12.25 ...	22.12.25.

Name of Vessel.	Captain.	Observing Officers.	Official Meteorological Equipment.	Line.	Last Log, Register, or Report Contributed. Received up to 16.4.26.	Date Received.
<i>Teiresias</i> ...	Dodds, R. ...	W. H. Newby ...	No. A.	A. Holt & Co. ...	Form 911 13.12.25 to 14.1.26...	28.1.26.
<i>Tekoa</i> ...	Barnett, H. ...	D. M. Lambert ...	No. M.	New Zealand S.S. Co. ...	" 1.3.26 to 15.3.26 ...	6.4.26.
<i>Telamon</i> ...	Duggan, C. ...	G. Bevan ...	No. A.	A. Holt ...	" 4.3.26 to 20.3.26 ...	13.4.26.
<i>Teucer</i> ...	Hodgson, R. N. ...	A. Lightbody ...	" A.	" ...	" 12.1.26 to 30.1.26 ...	10.2.26.
<i>Themistocles</i> ...	Jermyn, W. M. ...	W. F. Sargent ...	" M.	Aberdeen ...	" 10.12.25 to 23.1.26...	1.2.26.
<i>Theseus</i> ...	Jones, E. ...	W. A. Fyffe ...	" A.	A. Holt ...	" 20.3.26 to 30.3.25 ...	8.4.26.
<i>Titan</i> ...	Wilkinson, T. G. ...	S. C. Timmouthe, J. Morris, N. L. Thompson.	M.L.	" ...	Met. Log. 20.10.25 to 11.3.26...	18.3.26.
<i>Tongariro</i> ...	White Parsons, V.C. ...	C. B. H. Jones, E. A. Quick ...	No. M.	New Zealand S.S. Co. ...	Form 911 18.1.26 to 23.2.26	6.4.26.
<i>Transylvania</i> ...	Bone, D. W. ...	" ...	"	Anchor ...	"	"
<i>Trematon</i> ...	Evans, B. ...	R. Gregory, J. Toms, J. Bell. ...	M.L.	Hain S.S. Co. ...	Met. Log. 2.9.25 to 8.2.26 ...	2.3.26.
<i>Turakina</i> ...	" ...	W. Dickinson ...	No.	New Zealand S.S. Co. ...	"	"
<i>Tuscana</i> ...	Gemmell, W. J. ...	G. H. Squires ...	No. A.	Anchor ...	Form 911 3.10.25 to 11.10.25...	20.10.25.
<i>Tyndareus</i> ...	Stater, H. N. ...	C. Broad, A. C. H. Jones, S. A. Beith.	M.L.	A. Holt ...	Met. Log. 16.7.25 to 16.12.25...	12.1.26.
<i>Ulimaroa</i> ...	Wylie, W. J. ...	J. Gilbertson ...	No. M.	Huddart Parker, Ltd. ...	"	"
<i>Ulysses</i> ...	McHutcheon, W. ...	H. A. Standfield ...	No. A.	A. Holt ...	Form 911 28.1.26 to 11.3.26 ...	16.3.26.
<i>Urvolosi</i> ...	Barnes, E. W. ...	H. Green ...	" A.	Bullard King ...	" 24.12.25 to 15.2.26...	23.3.26.
<i>Valacia</i> ...	Doyle, M. ...	N. Grayson ...	" M.	Cunard ...	" 19.10.25 to 25.11.25	3.12.25.
<i>Vardulia</i> ...	Hughes, W. ...	A. Watts ...	No. A.	Cunard ...	" 3.11.25 to 14.11.25...	8.2.26.
<i>Vasconia</i> ...	Inch, F. ...	G. Watts ...	" A.	" ...	" 22.1.26 to 15.3.26 ...	26.3.26.
<i>Vellavia</i> ...	Fear, E. T. C. ...	F. R. Gorman ...	" A.	" ...	" 2.2.26 to 4.3.26 ...	8.3.26.
<i>Ventura de Larrinaga</i> ...	Keay, W. S. ...	H. J. Kay ...	" A.	Larrinaga ...	" 3.12.24 to 28.3.25 ...	19.5.25.
<i>Verbania</i> ...	Pooley, T. S. M. ...	W. Bradley ...	" A.	Cunard ...	" 6.1.26 to 12.2.26 ...	15.2.26.
<i>Verentia</i> ...	Wray, C. M. ...	F. H. Wood ...	" A.	" ...	" 11.1.26 to 24.3.26 ...	6.4.26.
<i>Vigilant</i> ...	Simpson, E. S. S. ...	J. Hunter ...	" A.	Scottish Fishery Board	" 13.3.26 to 31.3.26 ...	8.4.26.
<i>Waimana</i> ...	Andrews, C. M. ...	T. A. Smith ...	" A.	Shaw, Savill & Albion	"	"
<i>Waotapu</i> ...	Norton, A. ...	W. Johnson ...	" A.	Canadian-Australasian	" 14.11.25 to 18.12.25	4.1.26.
<i>Walmer Castle</i> ...	Stuart, C. E. ...	H. A. Deller ...	" A.	Union Castle ...	" 29.1.26 to 22.3.26 ...	6.4.26.
<i>Wangarata</i> ...	Seutt, W. ...	T. W. Wordingham, G. R. Millard, K. M. Morrison, N. A. Pope.	M.L.	British India ...	Met. Log. 30.8.25 to 19.1.26 ...	26.1.26.
<i>Warfield</i> ...	Steel, R. ...	H. Coffey ...	No. A.	" ...	Form 911 29.1.26 to 10.2.26 ...	22.2.26.
<i>Welshman</i> ...	Rollerson, W. ...	W. A. Fletcher ...	" M.	White Star-Dominion	" 9.2.26 to 11.3.26 ...	22.3.26.
<i>Westmoreland</i> ...	" ...	" ...	"	Federal ...	"	"
<i>White Heather, Ketch</i> ...	Glenister, S. L. ...	F. R. Smith ...	"	S. L. Glenister ...	"	"
<i>Windsor Castle</i> ...	Strong, H., R.D., Commr., R.N.R.	T. M. Gordon ...	" A.	Union Castle ...	Form 911 23.1.26 to 14.3.26 ...	16.3.26.
<i>Winifredian</i> ...	Harrocks, W. ...	G. P. Boyle ...	" M.	Leyland ...	" 14.12.25 to 19.1.26...	30.1.26.
<i>Woodarra</i> ...	Reilly, J. V. ...	L. D. Graham, G. Hyland, L. C. Comber, J. Wallace.	M.L.	British India ...	Met Log. 27.9.25 to 13.2.26 ...	22.2.26.
<i>Yorkshire</i> ...	Millson, G. C. ...	E. E. Jones ...	No. A.	Bibby ...	Form 911 11.12.25 to 17.2.26...	19.2.26.
<i>Zeeland</i> ...	Thomas, A. J. ...	N. Lee ...	" M.	Red Star ...	" 21.2.26 to 15.3.26 ...	17.3.26.
<i>Conway</i> H.M.S.	Broadbent, H. W., R.D. Capt., R.N.R.	The Senior Cadets...	Cadets' M.L.	"	Cadets' Met. Log. 24.1.26 to 3.4.26	12.4.26.
<i>Pangbourne</i> Nautical College.	Tracy, A. F. G., Commr., R.N.	"	"	"	Cadets' Met. Log. 18.1.26 to 26.3.26	1.4.26.
<i>Worcester</i> , H.M.S.	Sayer, M. B., O.B.E., R.D., Capt., R.N.R.	"	"	"	Cadets' Met. Log. 25.9.25 to 15.12.25	21.12.25.
<i>Abaco</i> ...	"	The Keepers ...	Lighthouse Register.	"	Lighthouse Register 20.7.25 to 31.12.25	9.3.26.
<i>Cay Lobos</i> ...	"	"	"	"	Lighthouse Register 1.7.25 to 31.12.25	8.3.26.
<i>Double Headed Shot</i> ...	"	"	"	"	Lighthouse Register 1.1.25 to 30.6.25	9.11.25.
<i>Inagua</i> ...	"	"	"	"	Lighthouse Register 1.7.25 to 31.12.25	9.3.26.
<i>Sombrero</i> ...	"	"	"	"	Lighthouse Register 1.7.25 to 31.12.25	9.2.26.
<i>Watling Island</i> ...	"	"	"	"	Lighthouse Register 1.7.25 to 31.12.25	8.3.26.
<i>Cape Pembroke</i> (Falkland Is.).	"	"	"	"	Lighthouse Register 18.7.25 to 16.1.26 1.7.25 to 31.12.25	24.2.26.

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 31.3.26.	Date Received.
<i>Herschel</i> ...	Davies, G. W. ...	T. Lester Guy ...	Lampont & Holt	Water Samples ...	26.3.26.
<i>Hildebrand</i> ...	Maddrell, J. ...	A. Allan ...	Booth ...	"	8.1.26.
<i>Holbein</i> ...	Gough, W. A. ...	G. P. Kitto ...	Lampont & Holt	"	23.1.26.
<i>Manzanaras</i> ...	Maxwell Brown, W. E. ...	G. S. Gracie ...	Elders & Fyffes	"	12.3.26.
<i>Miami</i> ...	Makepeace, S. ...	W. E. Grant ...	"	"	12.3.26.

June M.O., 1926.