

VOL. VI. No. 66.

THE MARINE OBSERVER.

JUNE, 1929.

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WORK OF THE YEAR.

April 1st 1928 to March 31st, 1929.

THE work of the Corps of Voluntary Marine Observers at Sea during the twelve months ended March 31st, 1929, is of the greatest credit to the British service as will be seen in the pages of the Marine Observer's Log published month by month a year later, and as proved by the facts set out in this report. The most significant recognition of the value of the modern work of the Corps of Marine Observers and the Marine Division to shipping and seamen has come about during the past year, for the Committee on the Board of Trade examinations for Master and Mate have framed their syllabus for meteorology upon the practice developed of recent years by our Corps as advocated in this JOURNAL.

The year has been one of very heavy work and responsibility in the Marine Division, for we have been much engaged in formulating plans—in consultation with Marine Observers—and submitting considered proposals for world wide organization for collection, exchange and computation of Marine Meteorological Data and a scheme for International Ship's Weather Telegraphy, results of which cannot be fully realized for a long time.

In setting out all proposals, careful regard has been given to the fact that the master of a ship and his officers have to deal with all

matters in a proper sense of proportion for the efficient and safe running of their ship, and that unless due consideration is given to this, meteorological work at sea in the Merchant Navy cannot progress to the best advantage of all concerned. We have emphasized the fact that voluntary service in meteorological work in the British Merchant Navy is most suitable and this has never been better proved than by the past year's work done so well by the Corps of Voluntary Marine Observers.

COLLECTION OF DATA.

Meteorological Logs (4 hourly) used with Instruments lent by the Meteorological Office. Kept by an average number of 7 H.M. Ships and 116 Merchantmen.

IN accordance with the principle adopted on April 1st, 1926, the best 40 logs in every 100, taking into consideration the evidence recorded in them of the practical application of the work to navigation with W/T communication, are classed "Excellent." Those logs not reaching this competitive excellent standard but being of such a high

standard that they are efficient for the exacting purpose of mechanical extraction are classed "Very Good," while those logs which though useful are not in all respects efficient are classed "Good" and logs due to instruments used being not sufficiently reliable or which do not comply with requirements are "Not classed." Of a total of 275 logs received the following table shows the classification gained by competition:—

Excellent	...	...	...	...	...	109
Very Good	...	...	...	...	...	162
Good	...	...	...	...	...	—
Not Classed	...	...	...	...	...	4
						—
Total received	...	...	...	...	...	275

All observing ships keeping the meteorological log being suitably equipped for the purpose are "Selected Ships" whose voluntary duty is to make daily routine wireless weather reports to all ships and certain stations and much fine work has been done in this connection and recorded in the logs during the year.

Ships' Meteorological Report, Form 911 (twice daily), used with ship's own instruments kept by an average number of 324 ships.

THE table below gives the number and classification of these useful records received which complete the network of observation by British regular observing ships in all oceans which is not practicable with the Meteorological Log alone.

Excellent	...	...	...	...	...	467
Very Good	...	...	...	...	...	1,781
Good	...	...	...	...	...	42
Not Classed	...	...	...	...	...	—
						—
Total received	...	...	...	...	...	2,290

Observing ships keeping these forms having a reliable mercurial barometer are also "Selected Ships" and during the past year they have generally performed this voluntary duty of making routine wireless weather reports to all ships and certain stations exceedingly well. They have contributed much to the progress of Wireless and Weather an Aid to Navigation.

North Atlantic Wireless Telegraphy Weather Report Registers used with instruments lent by the Meteorological Office. Ships' coded reports. Used by an average number of 31 North Atlantic Liners.

THE table below indicates the number and classification of Registers received:—

Excellent	...	...	...	...	...	148
Very Good	...	...	...	...	...	174
Good	...	...	...	...	...	1
Not Classed	...	...	...	...	...	—
						—
Total received	...	...	...	...	...	323

These ships are "Selected Ships" and the majority of them accordingly repeat the reports to all ships and record these standard form plain language messages on Form 911, as well as recording the coded reports in the registers, thereby making this valuable information available to all ships within range as well as to the shore meteorological services in Europe and North America.

This duplication of written work and wireless communication will no longer be necessary when we can bring into force the general arrangements which are contemplated. Meanwhile this work is indispensable to the efficiency of the whole service, serving as it does both ships at sea direct and shipping in Home Waters through the

medium of the British Weather Shipping Bulletin and the Gale Warning Service.

Home Waters Telegraphic Reports.

Ten packet steamers on the Newhaven-Dieppe, Guernsey-Weymouth and Holyhead-Dublin services have contributed reports of observations made at mid-channel positions during the year. These reports are of great assistance to the forecasters especially in the prediction of visibility in the Mersey, Channel and Wight districts for the Weather Shipping Bulletin. The commanders and officers of these little ships are performing a valuable if indirect service to all navigators in home waters for there is probably no information of weather in regard to navigation so extensively used as are the 12-hour forecasts of wind and visibility broadcast by wireless telegraphy and radio telephony in the Weather Shipping Bulletin for the British coasts and adjacent waters.

Sea Water Samples.

Eight ships in the Liverpool South American and West Indian trades have returned water samples through the Port Meteorological Office at Liverpool for the Fisheries Laboratory at Lowestoft.

General.

Generally the data collected during the year prove that in British ships where Marine meteorological work is truly applied to the practical needs of navigation these British Voluntary Marine Observers are returning the best and most accurate data to the Meteorological Office for co-ordination.

THE USE MADE OF THE DATA COLLECTED.

DURING the year the charting of ocean currents observed since 1910 along the trade routes across the South Pacific from Panama to New Zealand and Australia has been completed, also the winds in these regions for four selected months have been charted. The question of the best routes across the South Pacific has been dealt with, with the assistance of the Commanders of observing ships, and the charting of currents between Cape Horn and the River Plate and South of Australia has been commenced, also the revision of the Southern Ice Charts and the publication of Southern Ice Reports received since 1917. From time to time many Marine Observers and others interested in Marine Meteorology have asked when modern atlases of Meteorological Charts for all oceans will be published. This is kept always in mind, and we have long had a plan worked out for charting all oceans. As is now generally well known more than 14,000 meteorological logs kept in British ships in all parts of the world since 1854 have been returned, but it has never been possible to extract all the data. We hope that the steps taken this year will eventually lead to sufficient Marine meteorological data being made available in suitable form not only for making meteorological charts of the oceans but also the many other purposes for which these data are required. These steps are set out in a note "The Oldest Branch of the Work—Its purpose and possibility of Acceleration," in the March number, and all are asked to bear in mind that suggestions regarding the proposed alterations in the code for mechanical extraction should reach the Meteorological Office by June 1st, for it is proposed to make the necessary changes on January 1st, 1930.

During the past year, owing to being short-handed and the calls upon the time of the Marine Division in answering enquiries and in formulating proposals and plans in an endeavour to obtain better International and British Empire organisation, so that the work may be simpler and of more use at sea, have been so heavy that the extraction of data has fallen seriously in arrears. The comparative table below gives the data extracted during the last seven years. MARSDEN CHART No. I shows the distribution of observations extracted during the last 12 months and MARSDEN CHART No. II gives the distribution and number of observations extracted since reorganisation on 1st April, 1920.

	1928- 29.	1927- 28.	1926- 27.	1925- 26.	1924- 25.	1923- 24.	1922- 23.
Percentage of logs received reaching the required standard completely extracted and phenomena indexed.	37	60	64	64	55	66	73
Number of complete sets of observations extracted and punched on cards, with currents entered in data books and phenomena indexed.	43,117	73,745	78,180	75,852	65,060	74,749	97,533
Current observations from 1910, extracted and entered in data books.	2,626	3,496	8,242	8,210	5,746	4,259	1,826

The results of our compilations and researches are to be found throughout the numbers of this JOURNAL and WIRELESS AND WEATHER AN AID TO NAVIGATION.

Exchange of Data.

The amount of marine meteorological data supplied to other services has been considerable though not so great as in the previous year when more than ever before was provided.

This year our supply has included—

To the International Bureau of Vulcanology reports of all submarine earthquake shocks, in 1927.

To the Scottish Fishery Board, 300 observations of current in the North Atlantic, all months 1927.

To the Indian Meteorological Department, observations in the Eastern Arabian Sea, during a cyclone in November, 1927.

To the Dutch Meteorological Office, 895 sets of observations on Hollerith cards for 1927 in selected squares in the Atlantic, Pacific and Indian Oceans.

To the Division for Airship Meteorology, 5,377 observations along the proposed Imperial Airship Routes for April, May, September, November, December, 1924, and March, 1925, for a special investigation of conditions as they apply to airship navigation.

To Réseau Mondial, an International publication compiled by the Division for Climate.

Monthly Means at certain West Indian and Falkland Islands Light stations and in certain squares in the North Atlantic.

The remaining enquiries and provisions of data are too numerous to name here. At present "exchange" is rather a misnomer, for the British Voluntary Observing Fleet and Marine Division provide data from all the Oceans and we hope that others will adopt the Hollerith system and then we may reap the full benefit of exchange of observations.

Coded Wireless Weather Reports from North Atlantic Liners.

After comparison in the Marine Division with the messages entered in the Registers already referred to under Collection of Data it was found, that of 4476 weather reports received at the Meteorological Office during the year from 32 North Atlantic Liners, that:—

1,597 reports were received within one hour of observation.

1,536 reports were received within two hours of observation.

778 reports were received within four hours of observation.

565 reports were over four hours in transmission from observation time—

indicating by comparison with last year an improvement in communication.

There were only 347 errors in transmission; that is 0.2 per cent. of the figures received were wrongly sent or received. This speaks for the great accuracy of Wireless Communication by the Operators of British Liners and Stations for only two mistakes in every 1,000 figures is remarkably good. The check system succeeded in 315 cases out of 347 but it would now seem doubtful whether the

work involved by Marine Observers and Wireless Operators due to the addition of the new check groups which lengthen the message is still justified, as it was when the service was organised after the Great War, while experience indicates that more figures are required to indicate properly other particulars of importance to Mariners generally.

Ships to the Westward of longitude 40° W. made 2,145 reports direct to the United States Weather Bureau—a selection of which are retransmitted to Europe. These reports are of very great value to the Forecast Services of Europe and North America and particularly to the British Service, situated as we are in the British Isles in a region where a succession of weather systems advancing upon us from the North Atlantic make information to the Westward indispensable to forecasting weather and issuing gale warnings.

APPLICATION OF THE WORK AT SEA.

THE increase in the practical application of Marine Meteorology at sea has been very marked indeed during the year and this is so general in ships of the regular observing fleet, especially those which have suitable equipment that it is not possible to single out any for special mention as has been done in previous years. As evidence of the application of the work with wireless communication is now considered in the competitive classifications of returns, the list of excellent awards becomes more important as indicating those who are doing the most valuable work and who have distinguished themselves and their ships thereby.

The progress made of recent years by the British Corps of Voluntary Marine Observers in the practical application of their work has during the past year received great recognition by those best able to judge its practical merits. To wit—the Departmental Committee of the Board of Trade on Examinations of Masters and Mates basing their syllabus for meteorology on the work of our Corps. Following this we have been able to set out what is desired generally regarding Marine Meteorology and the British Merchant Navy in the April, 1929, number.

The work of British Marine Observers has contributed during the year to British prestige in matters of organised Marine Meteorology in that International Conferences have accepted the principle of the "Selected Ship" for organised routine ships weather telegraphy in all parts of the world.

The Fleet List.

EVERY ship in our list is British and no ship in it has failed to make returns within a reasonable period. By careful replacement when vacancies have occurred the observing fleet and its distribution have been much improved. With the Hollerith system and an International Organisation for ships' weather telegraphy it will become unnecessary for British ships to make written returns to other meteorological services, for the data collected and transmitted by wireless may be made available to other services without duplication of this work at sea where under modern conditions the officers have much more clerical work than in the past.

Selected Ships.

IN the Fleet List selected ships are indicated by their meteorological equipment and since the April number we have also been able to indicate the nature of their wireless apparatus, information which is constantly required by all concerned afloat and ashore.

CHART III gives the position of every selected ship at sea and clear of inland waters on 1st June, 1928.

This is a typical day and gives a very good idea of the general distribution of "Selected Ships" at sea on any day. Comparison with CHART III accompanying last year's "Work of the Year" in Volume V, No. 54, will show that there has been considerable improvement.

During the 12 months ended 1st June, 1928, the number of selected ships had increased from 254 to 269. The percentage at sea increased from 35, which was considered very good, to 38, and the distribution has vastly improved; "Selected Ships" being less congested in the North Atlantic in good proportion from Gibraltar

to the East and in fair number and distribution in the Indian Ocean while there was some improvement in the Pacific. When all maritime nations maintain their complement of "Selected Ships" the distribution should be as nearly perfect as possible. The complement of "Selected Ships" for the British Empire according to the present world tonnage is 356 out of 1,000 of all nations, but it is not settled yet how many of these 356 "Selected Ships" of the British Empire are to be maintained by the Dominion Marine Meteorological Services.

As I write at the end of the financial year we have 289 "Selected Ships" on our list, all British, nearly all having ports of registry in Great Britain and a few registered in the Dominions.

Of these 289 "Selected Ships" no less than 207 are regularly making (and recording having done so) routine Wireless Weather Reports to all ships and such stations as are notified will receive them for Meteorological Centres, as against 165 at the end of last year and there is no doubt that all "Selected Ships" will carry out the same regularly as soon as the schedule which was drawn up in accordance with the representatives of Marine Observers and Wireless Officers can be adopted.

The need for reliable information of the index error of barometers in "Selected Ships" having increased with the progress of this work, early in the year we adopted an improvement and the barometers of "Selected Ships" are now subject to most careful checks by the Agents and visiting officers who attach to each barometer so checked a tally bearing the index error as found by comparison, with their signature and date.

As the International scheme for "Selected Ships" weather telegraphy will require that information of the instrumental equipment of "Selected Ships" should be published with the method of checking the constants (index error) of these instruments, the following brief statement will be helpful.

The Meteorological Equipment of British "Selected Ships."

At present all ships in the Fleet List in THE MARINE OBSERVER (latest number) which have the letters M.L. W.T. and M. abreast their names are "selected ships." Those with the letters M.L. have the equipment laid down on page 2 of the MARINE OBSERVER'S HANDBOOK, 4th Edition, for keeping the Meteorological Log. Those with the letters W.T. have a similar equipment except that at present they have no wet bulb thermometer. All these instruments have passed the test of the National Physical Laboratory. Those ships with the letter M. have a mercurial barometer, part of the ship's own outfit, which has been found by the Agents or Visiting Officer to be sufficiently reliable to indicate, after reduction to standard datum, the atmospheric pressure to within one millibar or .03 of an inch. All barometers are inspected twice yearly when they are compared by the Agents and visiting officers with standards. The index error then found by several comparisons is attached to the instrument by means of the signed tally already referred to.

In addition to this Marine Observers make comparison with barometers at coast stations by means of wireless, and obtain each voyage as necessary a further check upon the barometer from the Marine Division by means of test readings sent in by Blue Post Card.

Marine Observers, as is well known, are requested only to make by wireless, barometer readings duly corrected for index error, if any, temperature, height above sea level and Latitude. Marine Observers are therefore requested to take every possible precaution, to give the Agents and visiting officers every assistance and all possible information and not to relax return of the Blue Post Card at the end of each voyage.

Safety of Life at Sea.

Last year we used quotations from the speech of the Chairman of the International Shipping Conference in which he affirmed that the best safeguard at sea was a vigilant master and we stated that observation is an essential to vigilance and that meteorology if properly applied at sea not only helps to reduce the risk of disaster but steadily improves itself as a science. This is so important that we repeat it, and during the year, using examples

from actual experience at sea and on the British coasts, we have made every endeavour to impress this upon all concerned. In the October, 1928, number under the heading "Intelligence of Weather Tide Current and Ice and Safety of Life at Sea," we gave a brief description of the organisation and methods which experience indicates are the most desirable to aid safe navigation in the first place and life saving and salvage in the second.

The Marine Division has worked for just three quarters of a century in close contact with the Merchant Navy and it is imbued with the spirit of making the best possible use and doing full credit to the splendid work done by British seamen, work which is the foundation of the Meteorological Service. The Corps of Voluntary Marine Observers and the Marine Division have had no object of the many we work for, more at heart than safety of life at sea and we have therefore made such representations as we could with a view to Marine Meteorology being primarily used to serve that object.

Acknowledgment, Appreciation and Awards.

The steps taken last year to improve the service of the Agencies at the ports as a result of the suggestions made by the senior agent, Captain D. FORBES, have been fruitful in that the additional information made available at the agencies has proved of convenience.

The agencies have relieved Headquarters by assisting in spreading the work in maintaining a due proportion of observing ships working out of their respective ports and thereby improving the distribution for observation along all the trade routes in all oceans; as well as securing a better representation of the Merchant Navy from all types of shipping and increasing the proportionate number of "selected ships."

During the year Lieutenant-Commander J. H. DRUMMOND, D.S.C., R.N., took over the agency at Hong Kong and he has been conspicuously successful in working up the complement of observing ships on station in far Eastern Waters and the Pacific using the port of Hong Kong. Commander G. D. WILLIAMS, D.S.O., R.N.R., at Sydney, N.S.W., has been joined by Captain C. LINDBERGH with the result that this agency which is responsible for the supervision of observing ships on station in the South Pacific has been able to maintain closer personal touch than was possible single-handed with Marine Observers in ships based on this agency. The combined influence of Captain WILLIAMS and the intimate knowledge of the personnel of British shipping using Sydney, of Captain LINDBERGH has resulted in improved work in the South Pacific. Captain G. B. STURDY, after seven years of most useful work as agent at Hull, was obliged to resign on account of ill health. We are much indebted to him for his able assistance and never failing courtesy to Marine Observers and all with whom he came in contact. He has been relieved by Captain A. M. BROWN, who succeeded him as Assistant Marine Superintendent of the Ellerman Wilson Line when Captain STURDY retired some years ago.

We are more than ever indebted this year to Master Mariners at ports in the British Empire and in observing ships for all the trouble they have taken in consultations to obtain considered views for improvements in the organisation of the work.

The sea is such a hard master that in the Sea Service we live a life and have a practice which by the nature of things must be apart. It is difficult for those who have not this experience to understand all that is desirable with development of the work for good organisation in the Merchant Navy, and therefore the considered views of experienced seamen interested in Marine Meteorology help to create a better understanding and to further the claims for improvements.

The foregoing report shows as well as we can the enormous amount of good work done at sea for the whole community by the Corps of Voluntary Marine Observers. The figures alone are remarkable proof of the efficiency of this voluntary service. To express our appreciation adequately in words is not possible but the Director of the Meteorological Office bids me to thank one and all for their assistance in making the British Marine Meteorological Service a thing to be proud of.

As the officer of the Merchant Navy deputed to supervise and co-ordinate Voluntary Marine Meteorological work at sea and to compile this Journal I wish to thank every one afloat and at the ports and especially those who have done so much to make the

work an aid to safe navigation, for their loyalty and support; also to make known that the work of my assistants in the Marine Division and at Liverpool and that of the Agents is a very great factor. A list of commanders and principal observing officers, with their ships, to whom the Meteorological Committee have made Excellent awards in special recognition of very fine work is appended.

MARINE SUPERINTENDENT.

London.
2nd April, 1929.

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

Captain.	Principal Observing Officer.	Ship.
ADAMSON, B. W. ...	BRITTAIN, W. H. ...	<i>Shropshire.</i>
BERRY, G. ...	CRAWFORD, D. K. ...	<i>Celtic.</i>
*BINKS, J. W., Lieut.-Commr. R.N.R., R.D.	I'ANSON, A. C. ...	<i>Baltic.</i>
*BORLAND, J. McI., C.B., D.S.O., Capt. R.N.R., R.D.	WHITE, E. C. ...	<i>Comorin.</i>
*BRITTEN, P. O. ...	ARUNDEL, C. E. ...	<i>Khiva.</i>
BROWN, F. G., Capt. R.N.R., R.D. ...	STEWART, W. M. ...	<i>Carmania.</i>
*BROWN, J. F. S. ...	KNIGHT, V. ...	<i>Niagara.</i>
BULMAN, J. B. ...	JENKINS, W. N. ...	<i>Arabic.</i>
BURTON DAVIES, J. {	QUICK, E. ...	<i>Tongariro.</i>
	WILKINSON, H. ...	
*CHRISTIE, W. ...	PHILLIPS, T. R. ...	<i>Tyndareus.</i>
*CLAYTON, W. E. ...	ARDLEY, R. A. B. ...	<i>Alynbank.</i>
CLIFTON-MOGG, W. P., Lieut.-Commr. R.N.R.	SMITH, H. C. ...	<i>Pakeha.</i>
*COCHRAN, G. N. ...	FALCONER, G. B. ...	<i>Manipur.</i>
COTTELL, S. C. ...	LANGFORD, G. G. ...	<i>Port Hobart.</i>
CRAWFORD, R. ...	WEBER, W. J. ...	<i>Aorangi.</i>
	BILGER, E. ...	
*DALGLEISH, J. ...	DEAN, F. J. ...	<i>H.M.S.A.S. Protea</i>
*DANIEL, T. ...	ECKFORD, R. ...	<i>Orduna.</i>
*DAVIES, E. ...	WALKER, R. S. ...	<i>Regina.</i>
DE LEGH, P. ...	—	<i>Leicestershire.</i>
DIGGLE, E. G., Capt. R.N.R., R.D.	LOCKE, J. V. ...	<i>Aquitania.</i>
DOMINY, R. H., C.B.E., Lieut.-Commr. R.N.R.	BUBB, J. R. ...	<i>Orbita.</i>
DUNCAN, A. R. ...	BLAIR, D. ...	<i>Elysia.</i>
DUNCAN, S. S. ...	HENDERSON, J. ...	<i>Arracan.</i>
FARMAR, F. ...	JONES, E. G. ...	<i>Port Dunedin.</i>
FERRIS, J. ...	ROWLAND HILL, J. ...	<i>Port Denison.</i>
*FORRESTER, W. T., O.B.E.	ROBERTS, G. M. ...	<i>Camito.</i>
*FOXWORTHY, A. W. ...	HANDLEY, R. F. ...	<i>Newfoundland.</i>
*GARDNER, G. F., O.B.E., Lieut.-Commr. R.N.R.	MAY, R. ...	<i>Saxon.</i>
GORDON, A. L. ...	ILIFF, J. E. ...	<i>Elpenor.</i>
*HANNA, R. G. ...	JOHNSTON, T. ...	<i>Macharda.</i>
*HARTLEY, J. W. ...	HAND, C. H. ...	<i>Naldera.</i>
HASELFOOT, F. E. B., D.S.O., Capt. R.N.	MARTIN, W. H. ...	<i>H.M.S. Herald.</i>
HAYLETT, E. ...	MORRICE, G. ...	<i>Actor.</i>
*HAYTER, S. W. ...	—	<i>Port Hobart.</i>
*HEAD, B. P. ...	CLATWORTHY, A. J. ...	<i>Bulysses.</i>
HEMMING, F. A. ...	COOKE, F. ...	<i>Rimutaka.</i>
HESTER, C., Commr. {	PIRIE, C. S. ...	<i>Khyber.</i>
R.N.R., R.D.	FLEMING, C. G. R. ...	
HICKSON, V. W., Lieut.-Commr. R.N.R.	SHAW, R. H. ...	<i>Adriatic.</i>
HIGGINS, C. J. ...	BARKER, F. B. ...	<i>Clan Macwhirter.</i>
HIGGS, W. G. ...	KIDWELL, T. L. ...	<i>Port Sydney.</i>
	GORMAN, F. R. ...	
*HIGNETT, A. H., Commr. R.N.R., R.D.	BROWN, A. J. ...	<i>Nellore.</i>
HILL, T. V. ...	KNIGHT, V. ...	<i>Niagara.</i>
HOLDEN, W. R. F. ...	HILTON, F. W. ...	<i>Achilles.</i>
*HOLLAND, E. ...	COOKE, F. ...	<i>Rimutaka.</i>
*HOMAN, C. E. ...	BISHOP, R. H. ...	<i>Glenamoy.</i>
	EMERSON, R. M. ...	
HOSSACK, W. H., Capt. R.N.R., R.D.	PARRY, T. ...	<i>Caronia.</i>
HUDSON, J. J. ...	BROWN, A. ...	<i>Port Pirie.</i>
HUNTER, J. L. B. {	GRIFFITHS, L. ...	<i>Rotorua.</i>
	COCKERILL, H. ...	
*JOHNSON, J. W. ...	MASTERS, A. D. ...	<i>Maimoa.</i>
KERSHAW, W. A. R. ...	NICOLL, J. J. ...	<i>Mataroa.</i>
KETTLEWELL, C. R. {	CONNOLLY, P. J. ...	<i>Piako.</i>
	BREWER, C. J. ...	<i>Hertford.</i>
*KIPPINS, T. ...	ROUND, E. O. ...	<i>Port Pirie.</i>
LAW, E. F. B., Commr. R.N.	LANSDOWN, C. S. E.	<i>H.M.S. Endeavour.</i>
*MACFARLANE, W. M. F. ...	MORRISON, J. ...	<i>Arracan.</i>
*MACMILLAN, D. ...	SHAKESPEAR, P. ...	<i>Cumberland.</i>
MALIN, R. G., Lieut.-Comm. R.N.R.	TANNER, W. B. ...	<i>Samaria.</i>
MANLEY, G. ...	HAND, R. H. ...	<i>Kaisar-i-Hind.</i>
MARSHALL, W., C.B., D.S.O., Commadore R.N.R., R.D.	FITZGERALD, W. T.	<i>Majestic.</i>
*MCINTOSH, A. ...	JACKSON, J. ...	<i>Mahia.</i>
McKELLAR, A. W., Capt. R.N.R., R.D.	MALCOURONNE, L. F.	<i>Ruapehu.</i>
METCALFE, G. R., Lieut.-Commr. R.N.R.	FITZGERALD, W. T. ...	<i>Majestic.</i>
*MOREHOUSE, W. A. ...	GOOD, F. ...	<i>Belgenland.</i>
MORTON BETTS, W. ...	PICKERING, G. H. ...	<i>Walmer Castle.</i>
NARES, J. D., D.S.O., Capt. R.N.	FOULERTON, A. B. B.	<i>H.M.S. Iroquois.</i>
*NEEDHAM, R. ...	—	<i>Port Albany.</i>
*OHLSON, B. J., D.S.O., Commr. R.N.R., R.D.	DENNIS, A. D. ...	<i>Maloja.</i>
ORAM, B. B., Commr. R.N.R., R.D.	SHARPE, L. R. ...	<i>Lancastria.</i>
OWEN, W. T. ...	PERCY, D. O. ...	<i>Auditor.</i>
PARKER, W. H., C.B.E., Capt. R.N.R., R.D.	WELLER, A. E. ...	<i>Olympic.</i>
POWER, J. J. ...	SHENNAN, R. A. ...	<i>Titan.</i>
RATHKINS, C. E., Commr. R.N.R., R.D.	FLETCHER, R. N. ...	<i>Culebra.</i>
REILLY, J. V. ...	SIMPSON, L. J. C. ...	<i>Woodarra.</i>
*REYNOLDS, W. H. B. ...	BEAL, C. C. ...	<i>Pancras.</i>
RICHARDS, J. ...	FITZSIMONS, H. M. ...	<i>Astronomer.</i>
	STEPHENS, E. B. ...	
ROBINSON, F. W. ...	PRING, J. W. ...	<i>Hurunui.</i>
*ROBINSON, S., C.B.E., Commr. R.N.R., R.D.	SIMMONS, A. G. ...	<i>Empress of Canada.</i>
ROLLO, W. ...	ROCHE, C. B. ...	<i>Baradine.</i>
*ROME, W. ...	—	<i>Tuscania.</i>
ROSTRON, Sir A. H., K.B.E., Capt. R.N.R., R.D.	ROBSON, W. C. A. ...	<i>Berengaria.</i>
SAWBRIDGE, I. R. {	FENTON, E. M. ...	<i>Port Darwin.</i>
	PINKNEY, H. ...	
*SCUDAMORE, J. H. H., D.S.C., Commr. R.N.R., R.D.	CRONE, A. ...	<i>Ariguani.</i>
SCUTT, W. ...	MILLARD, S. R. ...	<i>Wangaratta.</i>
SHELFORD, W. S., Lieut.-Commr. R.N.R.	MORRISON, K. M. ...	<i>Oronsay.</i>

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

Captain.	Principal Observing Officer.	Ship.	Captain.	Principal Observing Officer.	Ship.
*STRINGER, C. B. L.	{ POWERIE, R. J. PARKER, G. }	<i>Chinkiang.</i>	*TRANT, E. L., Commr. R.N.R., R.D.	PETERS, J. W. ...	<i>Laurentic.</i>
*STUART, C. E., Capt. R.N.R., R.D.	WILLIAMS, C. H. ...	<i>Llandovery Castle.</i>	WARNER, G. E., Capt. R.N.R., R.D.	I'ANSON, A. C. ...	<i>Baltic.</i>
*SUMMERS, F. F., Commr. R.N.R., R.D.	PAINE, J. W. ...	<i>Albertic.</i>	WATERHOUSE, J.... ...	ROBBIE, W. A. ...	<i>Clan Macwhirter.</i>
THURSTON, H. P. ...	DICKSON, J. ...	<i>Matakana.</i>	WHITE, E. R., Commr. R.N.R., R.D.	MORFEE, S. B. ...	<i>Homeric.</i>
*TOWNLEY, J. C., R.N.R., R.D.	SHARPE, L. R. ...	<i>Lancastria.</i>	WILDING, H. G.... ...	BALDWIN, S. H. ...	<i>Peshawur.</i>
TOWNSHEND, W. P., Capt. R.N.R., R.D.	WARD, F. ...	<i>Balranald.</i>	*WILLIAMS, D. T. ...	HILTON, F. W. ...	<i>Achilles.</i>
			WILLIAMS, R. ...	CRAIG, W. B. ...	<i>Port Victor.</i>
			WILSON, C. A. ...	ROBB, T. ...	<i>Ascanius.</i>
			*WRIGHT, J. B. ...	ELLIS, R. B. ...	<i>Accra.</i>

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

THE MARINE OBSERVER'S LOG.

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

Responsibility for statements rests with the Contributor.

COUNTER EQUATORIAL CURRENT.

North Pacific Ocean.

THE following is an extract from the Meteorological Report of S.S. *Maunganui*, Captain B. M. ALDWELL, Wellington to San Francisco. Observer, Mr. C. R. CARLYON, 4th Officer:—

"June 30th a.m. to July 1st, p.m., 1928. Between Latitude 2° S. and 5° N. The usual Equatorial Current setting to the westward at about 20 miles per day was not encountered. Good stellar observations were obtained giving a strong easterly set. R.M.S. *Makura* about a week earlier reported having experienced a N.E. set average 25 miles per day between 10° N. and 3° S."

TIDE RIPS.

South Atlantic Ocean.

THE following is an extract from the Meteorological Report of S.S. *Barrabool*, Captain H. R. RHODES, United Kingdom to Australia via Cape of Good Hope. Observer, Mr. J. G. DAVIES, 3rd Officer:—

"At 9 a.m. on the 29th June, 1928, in Latitude 11° S., Longitude 0° W. a tide rip line was observed bearing S.E. True from the ship, the ship's course being S. 37° E. At five o'clock in the evening a tide rip was observed bearing N.W. Shortly following, the set and drift of the ship was favourable to us after being adverse for several days.

"A similar rip line was observed the next day bearing S.E."

TEMPERATURE IN THE GULF STREAM.

THE following is an extract from the Meteorological Report of S.S. *Caronia*, Captain W. H. HOSSACK, R.D., R.N.R., Southampton to New York.

"The following observations were made on June 1st, 1928. Unusual strength and extent of Labrador current causing one iceberg to drift S.W. 1.5 miles per hour:—

Time. G.M.T.	Lat. N.	Long. W.	Wind.	Course.	Temperature.		Remarks.
					Air.	Water.	
10.00	41° 39'	46° 44'	S.W. by W., force (3)	240°	67°	65°	Visibility decreasing.
11.00	41° 30'	47° 05'	do.	267°	60°	50°	Low fog, quite clear above 40 feet.
12.00	41° 29'	47° 27'	S.S.W., force (4) ..	267°	60°	48°	do.
13.00	41° 28'	47° 51'	do.	267°	60°	47°	do.
14.00	41° 27'	48° 14'	do.	267°	59°	48°	Fog increasing.

Time. G.M.T.	Lat. N.	Long. W.	Wind.	Course.	Temperature.		Remarks.
					Air.	Water.	
15.00	41° 26'	48° 28'	S.S.W., force (4) ..	267°	53°	46°	Dense fog.
16.00	41° 26'	48° 42'	do.	267°	56°	45°	do.
17.00	41° 25'	48° 56'	do.	267°	54°	44°	do.
18.00	41° 25'	49° 16'	S. by W., force (5) ..	267°	55°	44°	Fog lifting slightly.
19.00	41° 24'	49° 36'	S. by E., force (6) .	267°	70°	64°	Fog cleared; cloud increased.
20.00	41° 24'	49° 58'	S.S.W., force (6) ..	267°	72°	70°	Clear weather; heavy Cu-nb.
21.00	41° 22'	50° 18'	S.W. by S., force (7)	267°	71°	73°	Squally, with rain; clear Cu-nb.

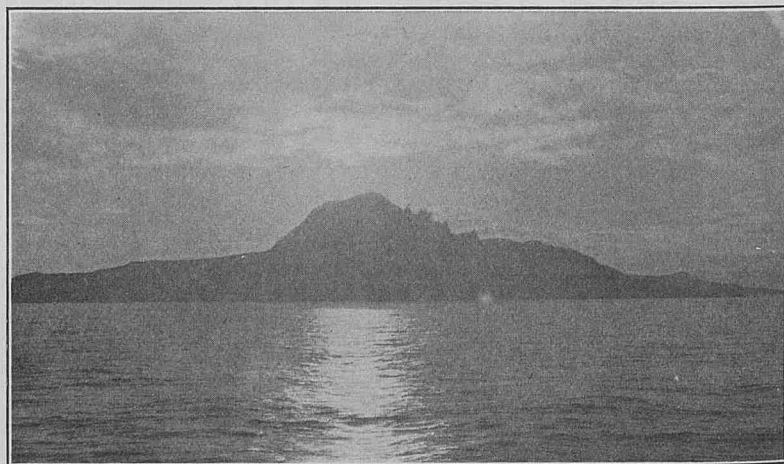
"By observation at 5 a.m. on June 2nd the *Caronia* was found to be 12' south of estimated position. It was assumed that this southerly drift was experienced in the cold water between 11.00 and 18.00 G.M.T. which agrees approximately with the recorded drift of the iceberg."

PHOTOGRAPH OF CAPE HORN.

Mid-Winter 1922.

THE photograph below was taken by Captain J. V. REILLY, Cadet Training Steam Ship *Woodarra* on June 12th, 1922, at Noon.

According to *Woodarra's* Meteorological Log the wind was calm, Barometer 1033.5 mb. Temperature Air 36° F., Sea 42° F. St-Cu cloud amount 7, sea smooth.



CYCLONIC DISTURBANCE.

South Pacific Ocean.

THE following is an extract from the Meteorological Report of S.S. *Waiotapu*, Captain D. TODD, San Francisco to Auckland. Observer, Mr. A. J. MCKENZIE, 3rd Officer:—

"A rather intense cyclone was experienced while within 200 miles of Auckland, N.Z.

"At 8 a.m. June 2nd, 1928, the barometer stood at 29.53 in. with the wind W.N.W. moderate, overcast, lower clouds moving from the west, upper clouds being apparently stationary. At 8.05 a.m. the wind changed sharply to W.S.W. and increased to a fresh breeze. The barometer then commenced to fall and frequent rain squalls were experienced. At noon the barometer was 29.47 in. falling steadily and at 4 p.m. 29.44 in. with the wind S.W. by W. fresh. 8 p.m. barometer 29.44 in. At midnight barometer was 29.39 in. and a moderate gale (with a rough rising sea) was blowing, then at 4 a.m. June 3rd the barometer being at 29.33 in. the wind was at strong gale force (10) and South. A very high dangerous sea was running and we experienced frequent fierce squalls accompanied by heavy rain. From here the barometer commenced to rise and at 8 a.m. it was at 29.57 in. with the weather and conditions unchanged. Noon barometer 29.61 in. with the gale somewhat moderating and at 4 p.m. 29.71 in. wind fresh, sky half clouded. At 6 p.m. barometer 29.84 in. wind S.S.E. moderate and sea moderately rough but falling quickly."

THUNDERSTORM.

West African Coast.

THE following is an extract from the Meteorological Log of M.V. *Adda*, Captain J. T. TOFT, Liverpool to West Africa. Observer, Mr. A. E. LOVGREEN, 2nd Officer:—

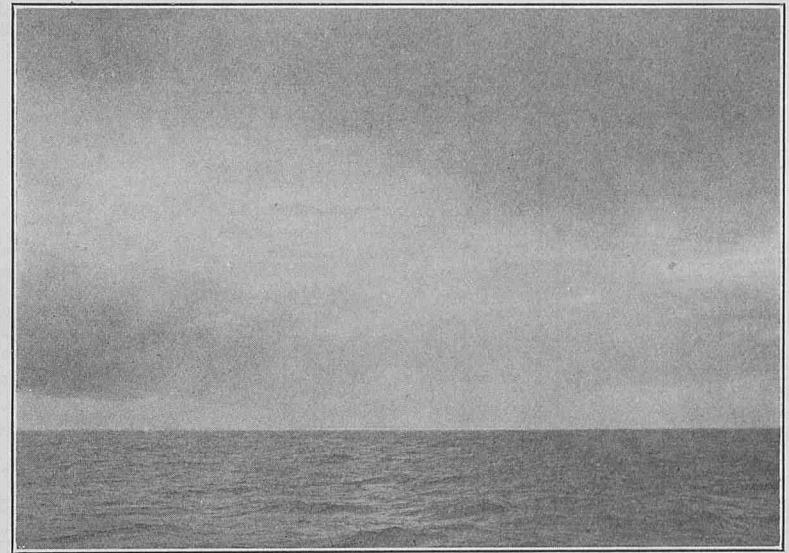
"June 17th, 1928. Latitude 6° 14' N., Longitude 11° 15' W. at 6 a.m. A.T.S. A loud thunderclap accompanied by an exceptionally

vivid streak of lightning occurred near the ship during a period of torrential rain. A white column like steam about 200 ft. high was observed to ascend from the spot where the lightning touched the sea, lasting for about three seconds before fading out."

LIGHT MIST CLOUDS.

THE accompanying photograph, taken by Captain J. F. McCHRISTIE, S.S. *Glensloy*, on a voyage from Cardiff to River Plate, has been forwarded by the Hydrographer of the Navy.

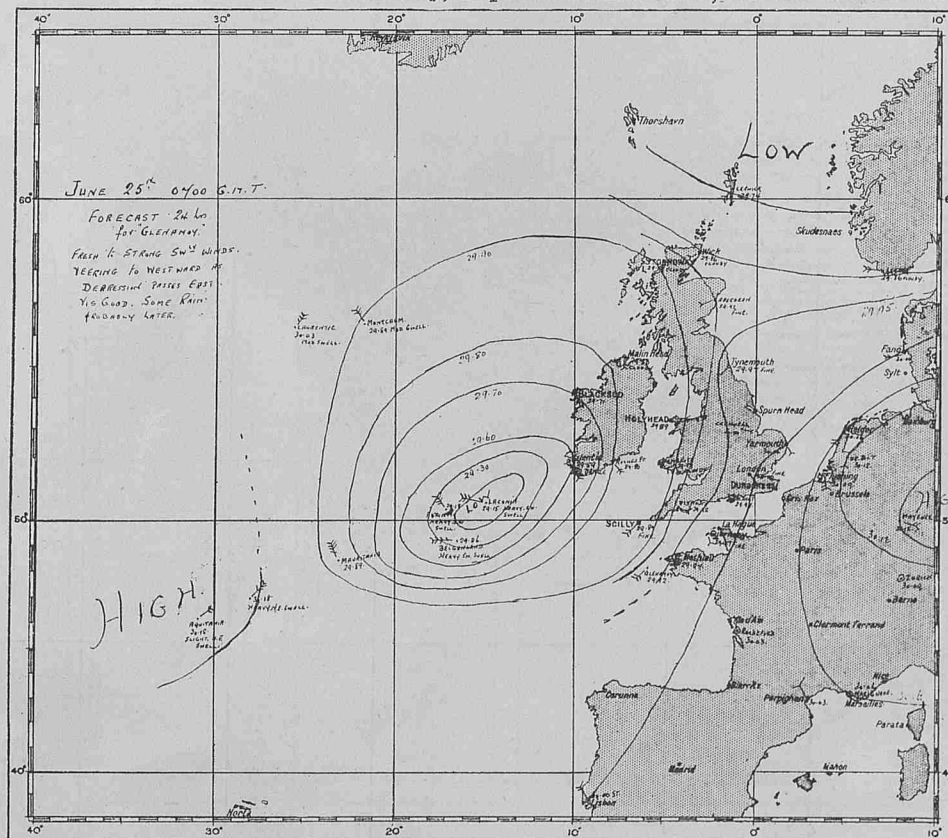
The photo was taken on 19th June, 1927, at 8.30 a.m. A.T.S., in Latitude 40° 46' N., Longitude 11° 54' W. Wind N.W. force 4 moderate, sea slight N.W. swell, overcast sky with passing mist and cloud banks.



WEATHER CHARTS MADE AT SEA.

North Atlantic.

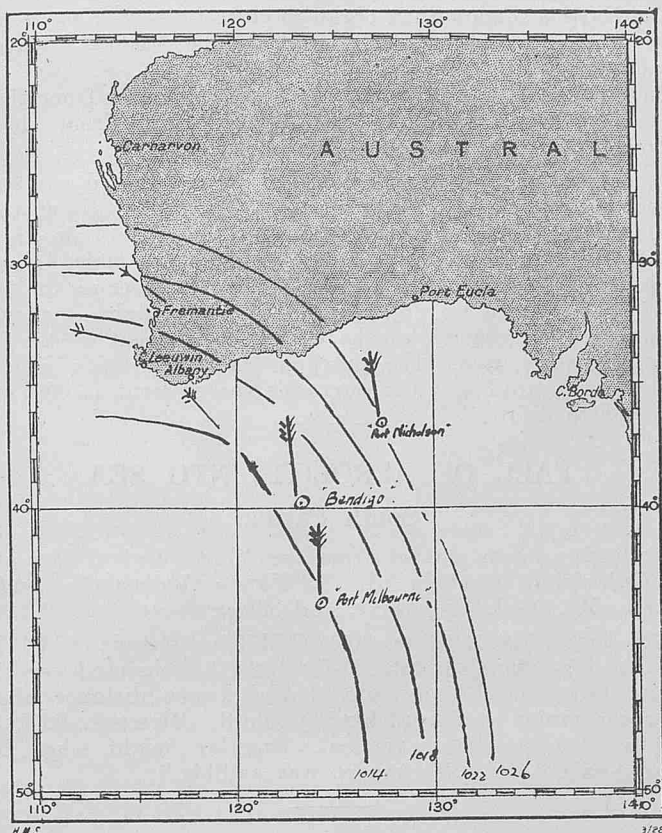
Weather Chart (one of a series) made on board S.S. *Glenamoy*, Captain C. E. HOMAN, London to Port Said, by Mr. R. W. EMERSON.



According to *Glenamoy's* Meteorological Log the wind was S.W. by W., force 5, veering to West at 10.30 p.m. Weather cloudy, rain at 8 p.m.

Australian Waters.

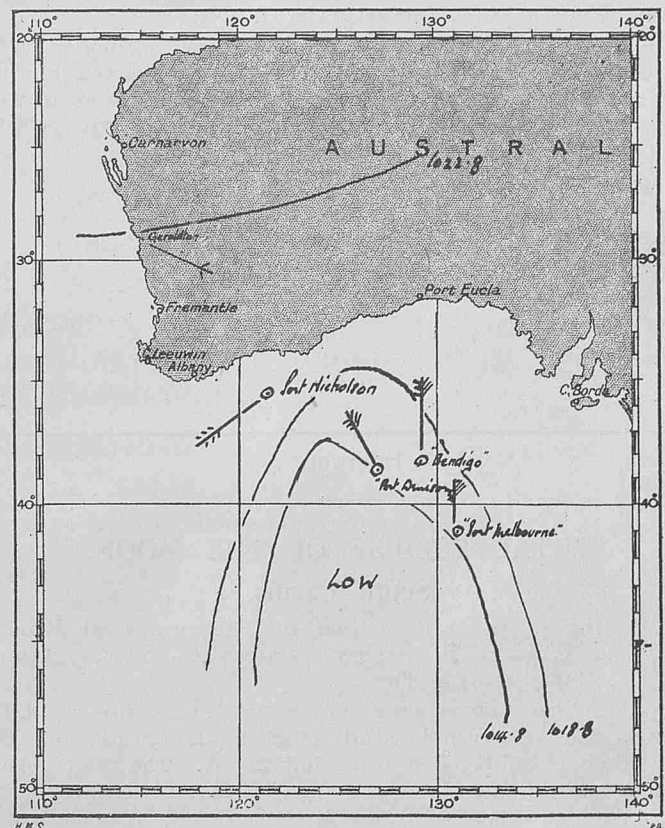
Weather Charts (three of a series) made at sea on board S. S. *Bendigo*. Captain R. N. C. NICHOLL, Cape Town to Australia, by Mr. P. M. RICHARDSON, second officer.



16th June, 1928, a.m.

FORECAST—Northerly winds, moderate to fresh.

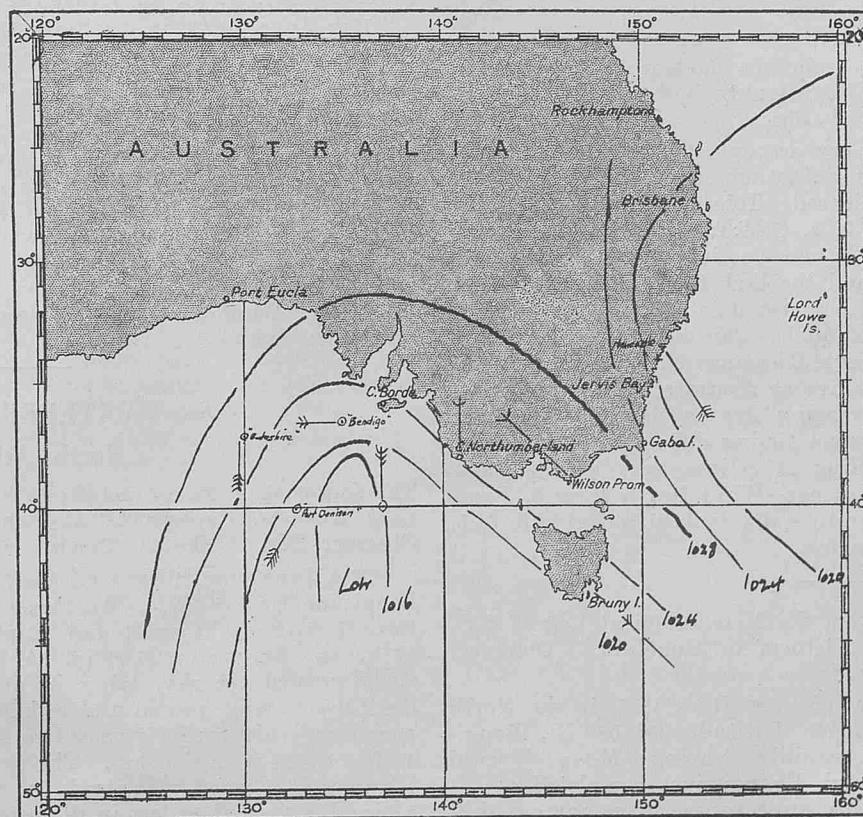
WEATHER EXPERIENCED—Fresh to strong Northerly winds.



17th June, 1928, a.m.

FORECAST—Wind will be fresh Northerly, backing later.

WEATHER EXPERIENCED—8 p.m. Rain set in and continued (light misty) until midnight, wind backed to Westward.



18th June, 1928, a.m.

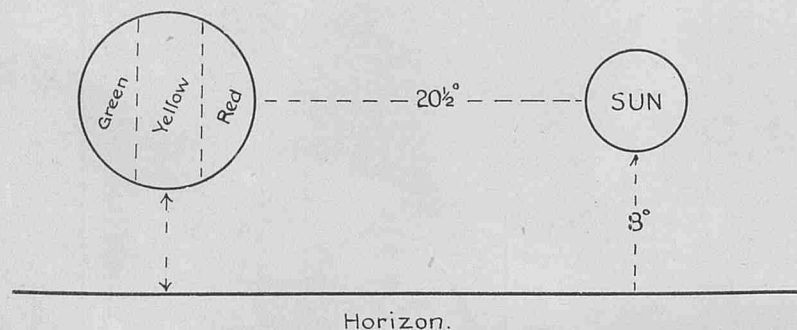
FORECAST—Moderate Westerly winds.

PARHELION.

North Atlantic.

THE following is an extract from the Meteorological Log of S.S. *Cameronia*, Captain W. GEMMELL, Glasgow to New York. Observer, Lieutenant D. CHAMBERLAIN, R.N.R.

"24th June, 1928, 22 hours 10 minutes G.M.T. (7.10 p.m. A.T.S.) in Latitude $48^{\circ} 55'$ N., Longitude $47^{\circ} 25'$ W. Observed Parhelion. Visible about 8 minutes. Sun's Altitude 8° . Parhelion about $20\frac{1}{2}^{\circ}$ E. of Sun. Clouds A-St. Ci-St. with heavy banks of Stratus below."



TOTAL ECLIPSE OF THE MOON.

South Pacific.

THE following is an extract from the Meteorological Report of S.S. *Tekoa*, Captain H. BARNETT, Balboa to Suva. Observer, Mr. A. W. MARSHALL, 4th officer.

"Total Eclipse commencing 3.30 a.m. A.T.S. 1044 G.M.T. on 3rd June, 1928. Between Latitude $1^{\circ} 26'$ S., Longitude $107^{\circ} 00'$ W., and Latitude $1^{\circ} 38'$ S., Longitude $107^{\circ} 35'$ W. The intervention of the Earth between the Moon and the Sun became apparent at 1045 G.M.T. And at 1114 G.M.T. the Moon bore 245° with an approximate altitude of 25° .

"The chief peculiarity of the phenomenon observed was the Brownish Red colour of the Earth's shadow projected on the Moon. The Moon gradually became effaced, the atmosphere darkening accordingly. The total Eclipse taking place prior to the Moon setting. The sky during the time of observations was cloudless with good visibility."

The following is an extract from the Meteorological Log of S.S. *Cumberland*, Captain D. MACMILLAN, Balboa to Auckland. Observer, Mr. P. SHAKESPEARE, 3rd Officer.

"June 3rd, 1928, in Latitude (by account) $36^{\circ} 13'$ S., Longitude (by account), $167^{\circ} 45'$ W. at midnight observed the moon to be partially eclipsed when sky cleared. Total eclipse occurred at 0.32 a.m. ship time (11 h. 30 m. 30 s. G.M.T.). Totality held until 12 h. 50 m. 00 s. (1.52 a.m.). The moon's limb to the S.S.W. was the last portion to be eclipsed and the limb to the E.S.E. the first to be reilluminated. During the period of totality the moon appeared as a dark reddish brown globe—darkest to N.N.W. paling to a drab yellow at the southern limb. The times G.M.T. of commencement and completion of totality are as accurate as possible under the circumstances—low rapidly moving stratus cloud passing over the face of the moon rendering exact timing difficult.

"Times of beginning and ending of eclipse were not available owing to presence of clouds. Weather—Wind North force 6, Barometer 1001.5 mb. falling. Temperature dry bulb 61.8 , Wet bulb 61.5 , sea 61.5 . Passing banks of damp fog.

The following is an extract from the Meteorological Log of S.S. *Niagara*, Captain T. V. HILL, Victoria to Honolulu. Observer, Mr. V. KNIGHT.

"At Noon G.M.T. 2.25 a.m. A.T.S., 3rd June, 1928, in the North Pacific Ocean, approximate position Latitude $35^{\circ} 58'$ N., Longitude $144^{\circ} 20'$ W. Sky St-Cu 8, rapidly clearing. Moon observed bearing 220° , altitude $21\frac{1}{2}^{\circ}$. Total Eclipse just completed.

"The lower limb presented the appearance of a narrow dull golden crescent shading towards the centre and upper half to a dark brown, red. The deepest colour being in the centre.

"The golden crescent was observed to very gradually brighten into a silver colour and at the same time appeared to revolve clockwise until at 1300 G.M.T., clear blue sky, stars brilliant, the Eastern limb showed its natural colour of a bright silver crescent fading to a golden red towards the centre and Western half.

"The Earth's shadow then began to clear from an East to a West direction until at 1330 G.M.T. one half the Moon's surface only was affected.

"Cu-Nb. clouds were again rapidly working up from the S.E. and very shortly after the Moon was obscured from view and daylight breaking."

NOTE.—The apparent rotation of the crescent noted at 1300 is a phenomenon frequently observed during eclipses both of the sun and moon, just before or just after the total phase and also in a partial eclipse where the greater part of the sun or moon is covered. If two pennies are held, the top one not quite covering the bottom, and if the top one be slowly moved in a straight line over the bottom one, the rotation of the uncovered crescent of the bottom penny is readily seen. The rotation observed during eclipses is usually quite rapid and the narrower the crescent is, the quicker it appears to rotate.

FALL OF AEROLITE INTO SEA.

South Pacific.

THE following is an extract from the Meteorological Log of S.S. *Northumberland*, Captain H. L. UPTON, Balboa to Auckland. Observer, Mr. A. J. ROBERTSON, 2nd officer.

"16th June, 1928, 2.45 a.m. (1325 G.M.T.), Latitude 32° S., Longitude 158° W. Sky Overcast (St-Cu. Cu-Nb.) observed very bright Aerolite fall from Clouds into the sea, some distance ahead of ship, accompanied by a loud hissing sound. Direction S.W. by W. Angle of descent almost vertical. Angular height when it first appeared—about 20° . No report was audible."

METEOR.

South Pacific Ocean.

THE following is an extract from the Meteorological Report of S.S. *Essequibo*, Captain J. H. KIRKWOOD, Valparaiso to New York. Observer, Mr. J. H. E. EVANS, 4th officer.

"19th June, 1928, in Latitude $13^{\circ} 43'$ S., Longitude $76^{\circ} 19'$ W. (Pisco Bay), at 10.10 p.m. Eastern Standard Time, observed an exceptionally bright meteor.

"This meteor was of a greenish colour, and appeared to form from an explosion in the sky bearing about S. 30° W. True, and at an altitude of about 20° . It appeared to fall vertically downwards and disappeared behind the land. It was visible from about three to four seconds, and when it disappeared the land in the vicinity was illuminated, somewhat similar to an illumination caused by lightning, which lasted for about three seconds.

"The meteor did not appear to have a tail. Weather at 10.10 p.m., Wind S.E. force 3, temperature, air 63° F., sea 60° F., no clouds, fine and clear."

WATERSPOUTS.

North Atlantic.

THE following is an extract from the Meteorological Report of S.S. *Loch Katrine*, Captain O. V. SCHLANBUSCH, Rotterdam to Colon. Observer, Mr. D. R. MALLINSON, Cadet.

"28th June, 1928, 10.00 a.m. (1407 G.M.T.) in Latitude $22^{\circ} 48'$ N., Longitude $60^{\circ} 35'$ W. Weather, fine and clear. Wind E.S.E. force 2 with slight swell and rippled sea. Course 236° . Speed 12 knots. Barometer 30.06 in. A long low arch of thick cumulus cloud crossed the sky, lying in an East and West direction. As the *Loch Katrine* passed under the arch a swirl was noticed on the port bow, which rapidly passed to starboard bow and abeam, about 40 feet away from the ship. The water was fretted by winds sweeping round at great velocity in a counter clockwise direction, over a circular area of 40 feet in diameter. This disturbance was visible for about 10 minutes, but there was no disturbance noticed in the cloud above to indicate a complete waterspout being formed.

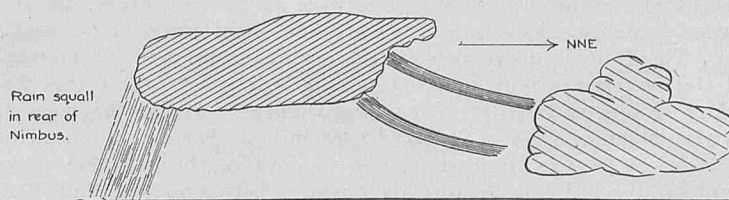
"At 11.00 a.m. (Ship's time) a complete waterspout formed under the same arch of clouds, on the starboard quarter, for a duration of 10 minutes. Two other waterspouts tried to form downwards but failed. This formation was in a different part of the cloud, remote from that under which the sea disturbance occurred."

WATERSPOUTS BETWEEN CLOUDS.

North Atlantic.

THE following is an extract from the Meteorological Report of S.S. *Dryden*, Captain T. W. MAJOR, Liverpool to Montevideo. Observer, Mr. G. OLDFIELD, 2nd officer.

"14th June, 1928, at 1.55 p.m., a nimbus cloud bearing W.N.W. and moving in a N.N.E'y direction was observed to be connected to a bank of cumulus cloud by two waterspouts, which did not reach sea, but merely stretched between the two cloud-banks. Position of ship at Noon, Latitude 6° 27' N., Longitude 27° 36' W."



STEAMSHIP ROUTE FROM COLOMBO, AND THE EAST, TO PERIM, DURING THE S.W. MONSOON, WITH A BRIEF SURVEY OF CURRENTS, WIND, CLOUD, AND CONDITIONS OF VISIBILITY, IN THE REGION OF SOKOTRA AND CAPE GUARDAFUI.

By L. A. BROOKE SMITH, MARINE SUPERINTENDENT.

THIS article last published in Volume I, No. 6, is reproduced in view of a number of requests from members of the Corps of Voluntary Marine Observers and others trading to the East. No attempt has been made to revise it or the accompanying charts because, as announced in the January number of this year, "we hope to get the extraction of data well in hand and to be able to tackle the charting of the currents on the routes from the Leeuwin to Perim direct and via Colombo in the 1930 Marine Observer, do the work more thoroughly and complete the preparation of the North Atlantic Atlas from Current Charts published in THE MARINE OBSERVER."

Following this article will be found an interesting report on the homeward passage during the 1928 S.W. Monsoon Season of the Third Destroyer Flotilla, which followed the track laid down for Low-power Steamers to Long. 60° E., and then took a somewhat more southerly route to Long. 52° 40' E., giving further confirmation of the correctness of our remark. "To put the case in a nutshell, if using the Southern Route, keep well to the southward."

THE interest shown in response to the articles published under this heading on the East Indian Seas Charts for the month of June in 1921, 1922 and 1923, prompts us to reproduce the charts and summarize those articles in the first June number of the "Marine Observer," through which the matter will be brought more generally to the notice of navigators when the S.W. monsoon breaks.

As long ago as 1853, Lieutenant A. DUNDAS TAYLOR, Indian Navy, compiled a chart of the Arabian Sea showing the Winds and Currents during the South-West monsoon from upwards of 100 logs of the vessels of the Indian Navy.

Unfortunately this chart, which was originally published by JOHN WALKER, Geographer to Hon. East India Company, is now out of print.

Upon it was indicated a region, elliptical in shape, between the parallels of 5° and 11° North and the meridians 59° and 71° East around which the following was inscribed. "In this region, and more particularly in the marked Steamer's track, the sky is generally cloudless, the wind light, water smooth and squalls seldom happen. The breezes are lightest in the Eastern half and become gradually stronger as the Western side is approached."

TAYLOR's "soft patch in the S.W. monsoon" has long been the subject of interest to many, and it is interesting to note that the barometric gradient shown on the charts of normals for June, July, August and September indicate less wind hereabouts.

This chart indicated the presence of a whirl of current and very high confused sea some 150 miles south of Sokotra.

It gave as "the probably best track for Steamers from Bombay to Aden in that season," rhumb lines from Bombay to Latitude 18° N., Longitude 72° E. to Latitude 9° N., Longitude 69° E. to Latitude 7° N., Longitude 62° E. to Latitude 8° N., Longitude 55° E. to Latitude 10½° N., Longitude 52½°, and thence to Cape Guardafui.

In June, 1891, Meteorological Charts of the Portion of the Indian Ocean adjacent to Cape Guardafui and Ras Hafun, compiled under the superintendence of Navigating Lieut. BAILLIE, R.N., then Marine Superintendent, were published. These charts only extended southward to Latitude 10° N. and were compiled mainly for the purpose of showing that a theory mooted that sea surface temperature could be used as a guide for rounding Cape Guardafui would be very dangerous in practice.

In the first year (1906) of the publication of the monthly Meteorological Charts of the Indian Ocean, Captain CAMPBELL HEPWORTH,

C.B., R.N.R., Marine Superintendent, drew attention to the Alternative Route which was first adopted by Captain J. F. RUTHVEN, then commanding R.M.S. *Orontes*, and had been used for a number of years by experienced Commanders of the P. & O. and Orient Services, including Captains T. S. ANGUS and C. D. BENNETT.

In 1920, owing to remarks and frequent discussion of this subject by navigators, we were led at the request of the Hydrographer of the Navy to further investigate the winds, currents, sea, swell, cloud, haziness and mist logged by observing vessels in sub-squares between the parallels of 14° and 7° N. and the meridians of 51° and 57° E.; at the same time captains of observing ships trading to the East were invited to give their views upon the route homeward during the S.W. monsoon.

The charts have since been extended to Latitude 15° N., Longitude 60° E., and those for current amended with observations received up to 1922.

During the S.W. monsoon, generally between Colombo and the 60th meridian, there is less wind the further south; as the African coast is approached it increases and backs. When conditions are normal, the strongest part of the monsoon lies east of the longitude of Sokotra in a line bending north-eastward and is clearly shown on the chart compiled by Lieut. DUNDAS TAYLOR, Indian Navy.

Between Colombo and the 60th meridian the set of the current is between E. and S.E., the lowest velocities being found between Latitude 9° and 6° N.; in July there is a westerly set between the parallels of 1° and 2° N. latitude.

Westward of the 60th meridian the current is strong. From Cape Delgado there is a strong set northward along the African coast dividing south of Sokotra; part of this current sets N. and N.E., while a large body of water curves E. and S.E., its greatest strength being in about Latitude 9° 30' N., Longitude 54° 00' E., according to the accompanying charts.

CHARTS I, II and III show component results from the data available. Currents are determined by the difference between observed and D.R. positions and do not necessarily give the set and drift at any particular spot but rather that experienced over a distance, so that the results are necessarily very general.

On September 9th, 1920, S.S. *Rotenfels*, Captain A. TAYLOR, from Calcutta to Suez, experienced a set and drift of S. 62° E., 5 knots, in Sub-Squares 93 and 94, found by reliable stellar observations.

With a moderate S.S.W. gale there was such a high confused sea, the vessel being deep laden with manganese ore, that it was found necessary to keep away and run north of Sokotra.

On July 2nd, 1906, S.S. *Ramsay*, Captain F. C. MULLAN, recorded a set between noon, Latitude $8^{\circ} 43'$ N., Longitude $52^{\circ} 10'$ E., and 6.40 p.m., Latitude $9^{\circ} 43'$ N., Longitude $52^{\circ} 42'$ E. of N. 72° E., 51 miles, which works out at the rate of 183 miles per day, or 7.6 knots. The following appears in the remark column:—"6.40 p.m., good stellar observations showing strong N.E. set, suspect this was running from a.m. sights. Very clear weather"; and the noon to noon result shows a set of N. 66° E., 66 miles. The first inclination was to reject this as impossible, but we find in the valuable set of current and wind charts for his voyages between 1894 and 1906, contributed by Captain HARRIS, of the Bibby Line, a current experienced by him in the S.S. *Worcestershire*, on July 3rd, 1906, the day following the observation of *Ramsay*, between noon, Latitude $8^{\circ} 58'$ N., Longitude $54^{\circ} 42'$ E., and 7 p.m., stellar position Latitude $9^{\circ} 07'$ N., Longitude $54^{\circ} 18'$ E., of E.S.E., 7.4 knots or 51.8 miles, equal to 177 miles for 24 hours. The noon to noon result on July 4th was S.E. 108 miles. Now the distance between the positions midway between the two observation points on these steamer tracks is 120 miles, and the interval 24 hours. It seems possible that *Worcestershire* was passing through the same water as that traversed by *Ramsay*. *Ramsay* steered N. 24° W., true, speed $7\frac{1}{4}$ knots, and actually made N. 27° E. It is more than likely that part of this current attributed to the interval between noon and 6.40 p.m. was experienced between a.m. sights and noon, but there can be little doubt that the ship passed through a streak of very strong current, as did *Rotenfels* eastward of this position on September 9th, 1920.

If the current attained such a velocity it is abnormal, but the winds logged by *Worcestershire* and *Ramsay* at the spot are not. With the exception of the P. & O. S.S. *China*, who experienced a whole gale from S.W. in Latitude $12\frac{1}{2}^{\circ}$ N., Longitude $55\frac{1}{2}^{\circ}$ E. on June 19th, 1906, we have been unable to find records of wind which depart from the normal anywhere in the Arabian Sea for the period immediately prior to July 2nd, 1906.

Between noon, August 12th, Latitude $8^{\circ} 05'$ N., Longitude $53^{\circ} 22'$ E., and noon, August 13th, 1912, Latitude $9^{\circ} 48'$ N., Longitude $53^{\circ} 32'$ E., S.S. *Shadwell*, Captain W. H. KNOX, experienced a set S. 72° E., 117 miles.

During the 1922 South-West monsoon season, S.S. *Nore*, Captain H. W. RANDALL, from Colombo to Suez, experienced a set and drift of S. 58° E., 55 miles, on August 24th, 1922, between Latitude $9^{\circ} 22'$ N., Longitude $55^{\circ} 16'$ E., and Latitude $9^{\circ} 25'$ N., Longitude $53^{\circ} 54'$ E. in 11 hours, which is equivalent to 120 miles in 24 hours.

With middle position of run in Sub-Square 93, S.S. *Port Augusta*, Captain C. A. ROBINSON, from Albany to Suez direct, experienced a set at the rate of 128 miles per day to S. 71° E., on August 12th, 1922.

These observations have been included, and by calculating the resultants from all observations available for which there was not ample grounds for rejection, we arrive at the currents shown on the chart which may be taken as fairly representing the mean during the height of the S.W. monsoon season. From this it is seen that during July and August the current is at its greatest strength in Sub-Square 94, where it sets E.S.E. at the rate of 98 miles per day. An examination of Sub-Square 83 current rose, with explanation of charts, will show that there the currents are variable, as is indeed the case for the whole of this area.

In Sub-Square 94 the percentage of observations of confused swell is highest, 44; here the mean direction of the wind is S.W. and its force 6.2, it thus blows nearly athwart the direction of the current are at their greatest divergence and where both are strong, the swell is most confused.

Further evidence of strong current in this vicinity was published on the June, 1922, U.S.A. North Pacific Pilot chart; S.S. *Pearl Shell*, Captain OSCAR LANE, having experienced a set of S. 58° E., 111 miles, in 24.1 hours on September 9th, 1921, in Sub-Square 94.

During last South-West monsoon season, 1923, S.S. *Chindwin*, Captain G. PATERSON, experienced a set and drift of S. 84° E. 105 miles, between Latitude $8^{\circ} 55'$ N., Longitude $54^{\circ} 51'$ E., and Latitude $9^{\circ} 59'$ N., Longitude $53^{\circ} 05'$ E. between noon July 30th and noon July 31st.

CHART II shows that the mean force and direction of the wind is remarkably uniform, but the tendency for it to back as the African coast is approached from the eastward is clearly indicated.

Squalls are frequent over the whole area, but are particularly frequent and violent under the lee of Sokotra. An examination of the wind rose for Sub-Square 83 shows how the direction and force vary. The cloud amount logged is more pronounced away from the land. The neighbourhood of Ras Hafun is the worst for haze and mist; the vicinity of Ras Radressa is rather more hazy than that of Guardafui.

The percentage of cloud logged shows that the sky is favourable generally for solar or stellar sights; though the haze and mist percentage may indicate that sun sights may often be unreliable from the height of eye on a large steamer's bridge, while stellar observations may be impossible, **but if stars can be observed with suitable azimuths, the mean result may be very accurate.** The frequency of observed positions by both stellar and solar observations indicates that sights are obtained far more often than not.

In 1921 the following conclusions and suggestions were offered; subsequent experience appears to support them.

Steamers using the southern route should not pass N.E. of Latitude $8^{\circ} 30'$ N., Longitude 53° E., in order to avoid the strongest part of the current setting to the southward of east, where there is frequently a confused swell.

Ras Hafun could be used in daylight and clear weather for making a landfall with advantage, it being the most easily distinguished landmark in this vicinity. If possible make the land in daylight.

At night, or by day in hazy weather, the lead is the safest and surest guide; in these circumstances steer for the bank of soundings off Ras Jard Hafun; this land is high and steep and may be seen furthest during the hours of darkness; **for instructions see "Red Sea and Gulf of Aden Pilot."**

Track 1.—Low-power steamers from Colombo might with advantage pass through the Eight Degree Channel skirting the Northern Maldives, edge to the southward until in Latitude 6° N., then steer west along that parallel to Longitude 60° E., whence as the wind and sea increases, course should be altered to north-westward to pass through Latitude 8° N., Longitude $52^{\circ} 30'$ E., thence to make Ras Hafun or the Bank off Ras Jard Hafun, according to circumstances, as above.

By going so far west, before altering course materially to the northward, the strength of the current will be abaft the port beam and the wind on the port quarter from the last position.

Track 2.—Full-power steamers might adopt Track 1 with advantage, but if it is desired not to so increase the distance, pass 10 to 15 miles south of Minikoi, and steer west along the parallel of 8° N. to Longitude 60° E., when a decision should be made, in which W/T reports from vessels to the westward will be of great assistance.

If certain of making land in daylight, and it is considered expedient, course should be shaped to pass through Latitude $8^{\circ} 30'$ N., Longitude 53° E., and thence as usual to round Guardafui, though there is not much to be gained as the wind will be on the bow, and the current adverse until the last position is passed.

Track 3.—If not certain of making the land in daylight or for other reasons, the alternative southern route is not chosen, edge away to the north-westward, as the wind and sea increases and pass 30 to 40 miles N.E. of Ras Radressa. It is not advisable to make this land unless the weather is clear, for the lead gives little warning. There is little advantage in passing close under the lee of Sokotra, as here squalls are frequent and violent off the land.

Track 4.—Very large high-speed steamers find it advantageous to steer for a position south-eastward of Ras Radressa until in from Longitude 60° E. to 57° E., whence course is altered to pass at a distance N.E. of that point, keeping the wind and sea abeam.

Observations by the Hydrographer of the Navy. (Published in 1921.)

The recommendations given, as to routes, illustrated on the appended CHART No. 4, appear to be a fair resultant of the varying opinions of navigators quoted in the preceding notes. There seems to be no doubt that both wind and sea are considerably less felt along the route indicated southward of Sokotra; but that the currents are both stronger and more uncertain in direction than those usually

encountered on the northern route. As regards visibility, there seems to be little to choose between the conditions over the island of Sokotra, and those over the main land of Africa at Ras Asir, and Ras Jard Hafun. The latter, however, if sighted, is much more distinctive than Ras Radressa, the eastern point of Sokotra, owing to its greater height and surroundings.

Ras Jard Hafun, too, has the additional advantage as a "landfall" from the fact that, if it should not be visible on account of haze, &c., it has off it an unmistakable and abruptly defined 100-fathom line, surrounding a large and safe area of about 40-fathom depths, extending about 30 miles from the coast.

Off Ras Radressa, on the other hand, the 100-fathom line has not yet been defined, and plotted soundings extend for a bare 10 miles from the point. Though this latter offers little safeguard in making the landfall in hazy weather, there is, however, unlimited, if stormy sea-room; while the straits off Ras Jard Hafun and Ras Asir are but 40 miles wide—not a great amount to "veer and haul on," with an uncertain horizon for sights, and a current of unknown set (but probably to the eastward) and of considerable strength, into dangerous waters.

The conclusions to be drawn are that while better conditions of wind and sea are undoubtedly gained by taking the southern route in the South-West monsoon, and consequent saving of coal, wear and tear, this track should be taken only by navigators accustomed to fix the ship's position by sights frequently and at any time during day and night when opportunity offers; and also accustomed to "feeling the way" by continuous and methodical sounding. The latter is especially necessary on account of the uncertainty of the position given by sights taken with a "bad" horizon, and in haze.

It is unfortunate that there are, as yet, no D.F. W/T stations anywhere in the vicinity. With this means of fixing available, there can be no doubt as to which is the better route.

(Sgd.) F. C. LEARMONTH,
Rear-Admiral.

23rd March, 1921.

These tracks are now recommended in "Ocean Passages for the World," compiled by Rear-Admiral BOYLE T. SOMERVILLE, C.M.G., and published in 1923 by the Hydrographic Department of the Admiralty.

Comparison was made of the winds, sea and current logged by regular observing ships approximating Recommended Tracks 1, 2, 3 and 4, during the 1921 and 1922 S.W. monsoon season, which showed that generally better conditions were experienced the more southerly the route.

Several steamers proceeding south of Sokotra steered a course which took them through the strength of the current setting E.S.E. in the vicinity of Latitude $9\frac{1}{2}^{\circ}$ N., Longitude 54° E., and their experience appears to fully justify the recommendation not to alter course to the north-westward until to the westward of Longitude 53° E. To put the case in a nutshell, if using the Southern Route, keep well to the southward.

Last South-West monsoon season, 1923, a larger proportion of regular observing ships used the more southerly routes, i.e., they approximated Tracks 2 and 3.

Information has been received that an unwatched light is in the course of construction at Cape Guardafui, and at Ras Hafun a light is now established; details are given in March, 1924, Notice to Mariners.

It will be interesting to see to what extent these lights influence the use of Tracks I and II.

In view of local obscurity great caution will still be necessary in making a landfall.

During the discussion which took place in 1920 the most convincing proof of the advantages of the southern route was that supplied by Captain T. S. ANGUS, late Nautical Inspector, P. & O. S.N. Co.

The P. & O. S.S. *Pera*, Captain A. L. VALENTINI, left Colombo on June 28th, 1904, at noon, and, passing through $8^{\circ} 34'$ N., $71^{\circ} 10'$ E., $12^{\circ} 34'$ N., $59^{\circ} 15'$ E., $13^{\circ} 07'$ N., $56^{\circ} 12'$ E., $13^{\circ} 30'$ N., $52^{\circ} 20'$ E., passed Aden July 8th, 1904, 7 a.m. Her mean displacement was 12,023 tons; coal consumed, 544 tons, and time of passage, 235 hours.

The S.S. *Syria*, Captain D. G. GREGOR, R.N.R., of the same line, left Colombo on June 29th, 1904, at 7 a.m., and passing through

$7^{\circ} 31'$ N., $76^{\circ} 00'$ E., $7^{\circ} 28'$ N., $71^{\circ} 45'$ E., $5^{\circ} 45'$ N., $68^{\circ} 00'$ E., $6^{\circ} 00'$ N., $59^{\circ} 50'$ E., $6^{\circ} 33'$ N., $55^{\circ} 25'$ E., $8^{\circ} 30'$ N., $52^{\circ} 00'$ E., $10^{\circ} 32'$ N., $51^{\circ} 50'$ E., $12^{\circ} 02'$ N., $51^{\circ} 25'$ E., $11^{\circ} 10'$ N., $46^{\circ} 40'$ E., passed Aden at 2 p.m. July 8th, 1904. Her mean displacement was 12,851 tons; coal consumed, 513 tons, and time of passage, 223 hours.

Thus the *Syria*, with 800 tons more displacement than *Pera*, ran from Colombo to Aden on less coal in 12 hours less time, notwithstanding her route involved 240 additional miles.

Passage of Third Destroyer Flotilla from Colombo to Aden, during S.W. Monsoon 1928.

The following is a report received from the Admiralty on the passage of the Third Destroyer Flotilla from Colombo to Aden, from 0900 on 29th July to 2300 on 5th August, 1928.

2.—ROUTE TAKEN.

On leaving Colombo—Course 277° .

1600/30 July (position $7^{\circ} 42'$ N., $73^{\circ} 25'$ E.)—Altered course to 253° .

0915/31 July (position $6^{\circ} 20'$ N., $68^{\circ} 00'$ E.)—Altered course to 265° .

0650/1 August (position $6^{\circ} 00'$ N., $64^{\circ} 00'$ E.)—Altered course to 270° .

0830/2 August (position $6^{\circ} 00'$ N., $60^{\circ} 00'$ E.)—Altered course to 282° .

0100/4 August (position $8^{\circ} 00'$ N., $52^{\circ} 40'$ E.)—Altered course to 332° .

1630/4 August (position: RAS ASIR bearing 325° , distant $3\frac{1}{2}$ miles)—Altered course as requisite round RAS ASIR to Aden.

Total distance—2,388 miles.

On leaving Colombo moderate monsoon weather was encountered: wind force 5, sea strength 3. This decreased to some extent on the second day, and the Flotilla, using revolutions for 13 knots, was able to make good about 12.7 knots up to 1st August inclusive.

Weather conditions started to become worse p.m. on Wednesday, 1st August: Quarterdeck awnings, which had hitherto been kept spread, had then to be furled.

By noon on Thursday, 2nd August, wind had reached force 6 and sea strength 4-5, coming from 40° off the port bow. This rendered necessary a reduction of speed by revolutions to 12 knots at 1600, which was increased to 12.3 knots at 1900 and to 13 knots at midnight.

Conditions were again worse on Friday, 3rd August, the worst weather during the trip (wind 8, sea 7) being encountered p.m. that day: speed was again reduced to 12 knots for some hours.

Land was first sighted for a few minutes during the forenoon of Saturday, 4th August, but owing to the haze it was not until 1332 that a landfall was made off RAS JARD HAFUN. The weather improved throughout the day until, after passing Cape Guardafui, the sea was flat calm and the wind had practically died away by 1900.

The Flotilla arrived at Aden, after some further bad weather whilst crossing the Gulf, at 2300 on Sunday, 5th August, remaining in the outer Anchorage for the night.

As soon as the Flotilla turned to the Northwards on passing position 8° N., $52^{\circ} 40'$ E., a current of approximately 3 knots was experienced running with us, and this was naturally a very pleasant help.

The Sailing Directions warn one that during this Monsoon the African coast is usually covered in mist and hard to make; but for a period of 10 minutes during the forenoon of 4th August the coast was actually sighted approximately 50 miles away. When a definite landfall was made off RAS JARD HAFUN the tops of the hills became visible but the lower part of the coast line was covered by mist. Two Directional W/T Bearings were obtained from the RAS ASIR Station; one at a distance of about 120 miles and one closer, and these were both found to be remarkably accurate.

On the whole I would suggest that the route followed by the Third Flotilla from Colombo to Aden was a most successful one, and I would recommend it for small craft on any future occasion.

THE MONSOONS.

II.—The Monsoons of the India Ocean, China Seas and the Eastern Mediterranean.

General Remarks.

In the present article a summary is given of the information we have about those Monsoons which are related to the great summer area of low pressure and the great winter anticyclone of the continent of Asia. We have a better knowledge of the average winds in the Indian Ocean and South China Sea than we have of the Trade Winds of the North Atlantic and the Pacific Oceans, ships' observations for about 60 years being summarised in the Meteorological Charts of the East Indian Seas, which show a wind rose for each 5° square. This is not the same thing as saying that our knowledge is complete or that other 60-year periods would give precisely the same averages, and even on these charts there are in some months isolated areas where the data is insufficient to give any results. As in the case of the Trade Winds there are also other sources of knowledge, the accumulated practical experience of seamen and also observations made at coastal and island stations. In the present article an endeavour is made to combine the information derived from these various sources. Disagreement between them is less than it was between the sources of information for the Trade Winds and is more confined to points of detail. The tables of the limits of the several Monsoons are based entirely on the charts above referred to and may be considered to be as reliable as can be obtained from a grouping of the winds into areas of 5° square.

The Monsoons are not purely oceanic winds such as are the Trade Winds. They blow, for example, over the whole of the Indian Peninsula and in the narrow waters of the East Indies. It follows that there are numerous local and coastal variations of these winds, which it would not be possible to set out in detail within the limits of the present article. Such variations of the Monsoon come properly under the heading of local winds; in this article the Monsoons of the ocean are dealt with while those of more restricted seas are summarised only in broad outline.

General Description of the Monsoons.

Before proceeding to a detailed description of the Monsoons it will be useful to give a short summary showing the relation of the various Monsoons dealt with in this article. It must be understood that the periods given in this paragraph are only general statements which are not necessarily exact for all areas of the ocean or sea referred to. During the winter half-year the N.E. Monsoon blows in the Indian Ocean (October to April) and the N.E. Monsoon blows in the South China Sea (November to March). At this period the Trade Wind belt of the South Indian Ocean is most southerly, leaving a wide equatorial belt between it and the N.E. Monsoon. This area is occupied during the shorter period December to March by the N.W. Monsoon, which is also experienced in the Malay Archipelago, constituting the winter Monsoon of that region and sometimes reaching eastwards into the Pacific to a considerable extent. During the summer half-year the S.W. Monsoon blows in the Indian Ocean (May to September), equatorial calms being in general very rare, so that the S.E. Trade Wind, which has moved northwards with the sun, continues without interruption as the S.W. Monsoon. The S.W. Monsoon blows in the South China Sea (June to August), the S.E. Trade Wind replaces the N.W. Monsoon of the Malay Archipelago (April to October) and N. or N.W. winds predominate in the Eastern Mediterranean.

The following points should be noted. The N.E. and S.W. winds of the North Indian Ocean are true Monsoons and so are the corresponding winds of the China Sea, although the N.E. Monsoon in the South China Sea is normally continuous with the N.E. Trade Winds of the North Pacific Ocean. In the equatorial region of the Indian Ocean the alternation is between the N.W. Monsoon and a S.E. Wind which is frequently called the S.E. Monsoon but which is really the S.E. Trade Wind. In the Eastern Mediterranean the summer winds are definitely monsoonal in character but there is no alternation of Monsoons there, the region in winter being subject to cyclonic circulation of essentially the same type as that experienced in the British Isles and North-West Europe.

Of the six oceanic regions where tropical cyclones occur, four come within the Trade Wind regions. The remaining two occur within Monsoon regions, (I) the Arabian Sea and the Bay of Bengal, (II) the China Seas. The relation of the periods of occurrence of cyclones to those of the Monsoons may be briefly summarised as follows:—

Arabian Sea. Cyclones occur during two periods, from April to July and from September to January. Their greatest activity is about the times of the change of the Monsoons, in May and June and October and November.

Bay of Bengal. Cyclones are of very rare occurrence during the height of the N.E. Monsoon season in January to March. They are experienced from about the beginning of April to the end of December, thus occurring during the S.W. Monsoon, the changes of the Monsoons and the early part of the N.E. Monsoon period. A classification of cyclones into severe (wind exceeding force 10) and less severe shows that the former have their maxima at the periods of the changes of the Monsoons while the latter have their maximum during the height of the S.W. Monsoon, from July to September inclusive.

China Sea. The typhoons of the China Sea have been known to occur in every month of the year but are most prevalent in the period July to October. They are therefore experienced mainly during the height of the S.W. Monsoon and at the period of change to the N.E. Monsoon. The change to the S.W. Monsoon is not specially marked by cyclonic activity.

The Indian Monsoons.

The N.E. is the dry or fine weather Monsoon and the S.W. the wet Monsoon. It is the latter which is referred to as "The Monsoon" in India, its outstanding importance to that country being due to the rainfall which it brings. The expression is indeed often used to denote the rainfall without reference to the wind. RUDYARD KIPLING coined an expressive adverb when he wrote "It rained monsoonishly." There is a certain amount of variability in the time of onset of the Monsoon and the rainfall it brings to India also varies from year to year. Hence the expression "the failure of the Monsoon" for years of low rainfall. A detailed account of the heavy Monsoon rainfall of India does not however come within the scope of this article. The conditions over the open ocean during the S.W. Monsoon period may be described generally as cloudy with high humidity and occasional rainfall.

The S.W. Monsoon is stronger than the N.E. Monsoon and the percentage of winds of force 8 and above is considerably higher for the S.W. Monsoon. There is not much difference in the open ocean between the Monsoons as regards steadiness of direction; but in some parts of the ocean the wind is on the average steadier than in others during the occurrence of the same Monsoon. In Admiral SOMERVILLE'S OCEAN PASSAGES FOR THE WORLD the strength of the N.E. Monsoon is thus summarised "The mean force of this Monsoon is from about 2 to 3 in October to about 4 to 5 in December, though at times the actual force of the wind is much greater." In P. H. GALLÉ'S KLIMATOLOGIE VAN DEN INDISCHEN OCEAN the following mean monthly results were obtained for the strength and direction of the Monsoon. The figures apply to the region of Latitude 5° N. to 15° N., Longitude 50° E. to 60° E. (Arabian Sea towards the African Coast), and were derived from more than 50 years' observations by Dutch ships:—

	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Beaufort Force ...	3.0	2.6	2.0	0.9	1.8	5.1	5.5	4.9	3.5	0.1	2.4	3.2
Direction in degrees	57	66	81	109	216	223	221	220	213	86	48	54

GALLÉ's results for the S.E. Trade in the region of Latitude 10° S. to 20° S., Longitude 80° E. to 90° E., are given here for comparison:—

	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Beaufort Force ...	3.6	3.0	2.9	3.9	4.1	4.0	4.8	4.7	4.8	4.6	4.3	4.1
Direction in degrees	123	111	128	126	137	147	143	147	140	133	129	134

For the region of the Arabian Sea above referred to, GALLÉ gives for each month and for each wind direction the percentage number of wind observations for the several Beaufort Forces (1-10). This is the most detailed knowledge yet available for a Monsoon area and from it TABLE I has been compiled. The wind directions are grouped into the 8 directions N., N.E., E., &c.

Table I.

WIND INFORMATION FOR THE REGION, LATITUDE 5° N. TO 15° N.,
LONGITUDE 50° E. TO 60° E.

Month.	PREDOMINANT WIND.						ALL DIRECTIONS.		
	Direction.	Percentage of total observations.	Highest percentage of observation of one Beaufort Force.	Force.	Second highest percentage of observation of one Beaufort Force.	Force.	Highest percentage of observation of one Beaufort Force	Force.	Percentage of Winds of Force 8-10.
January ...	N.E.	56.4	16.7	4	16.3	3	29.2	3	0.2
February ...	N.E.	45.6	13.9	3	11.9	4	31.4	3	0.0
March ...	E.	43.7	14.0	3	13.9	2	29.1	2	0.0
April ...	E.	25.1	9.4	2	7.1	3	29.8	2	0.0
May ...	S.W.	33.9	7.3	3	6.9	4	20.9	2	0.6
June ...	S.W.	67.4	19.3	6	16.2	7	24.8	6	14.3
July ...	S.W.	71.6	20.3	6	19.9	7	25.9	6	16.0
August ...	S.W.	69.2	21.2	6	15.2	7	26.8	6	9.6
September ...	S.W.	58.0	15.4	5	12.7	4	21.7	5	2.1
October ...	N.E.	16.5	5.7	2	4.8	3	27.3	2	0.2
November ...	N.E.	53.1	17.7	3	14.1	4	30.8	3	0.3
December ...	N.E.	68.4	22.4	4	17.8	3	29.8	4	0.0

As an example of the use of this Table we see that in January the predominant wind is N.E. and that this wind blows during 56.4 per cent. of all observations. Also during 16.7 per cent of all observations the N.E. wind blows with force 4 and during a further 16.3 per cent. of observations with force 3. We see, therefore, that during more than half the number of observations of N.E. wind it is blowing with a force of either 3 or 4, the remaining observations being of forces less than 3 or greater than 4. Turning now to the last three columns of the Table and considering winds of all directions we see that in this month the force most commonly observed is 3, with a percentage of 29.2. Also that winds of force 8 and above are nearly absent, being recorded on only 0.2 per cent. of the observations.

In Table I the high percentage of gales during the S.W. Monsoon will be noted. The charts also show that winds of force 8 and over in the Monsoon areas occur mainly during the months of June to September inclusive and that they are infrequent save in two areas, the central and eastern parts of the Arabian Sea and the whole of the Bay of Bengal.

MAURY examined the ship's logs of his day and summarised 11,697 observations of the wind at sea between the meridians of 80° E. and 85° E., from Calcutta to the equator. The results are shown in TABLE II, taken from his PHYSICAL GEOGRAPHY OF THE SEA, Twelfth Edition, 1866, where the average duration in days of N.E. and S.W. winds is given for various parallels.

With regard to the diurnal variation of the Monsoons GALLÉ made an investigation for a part of the Arabian Sea more than 200 miles distant from land, Latitude 5° N. to 14° N., Longitude 50° E. to 59° E. He found that during the prevalence of the N.E. Monsoon the strength of the wind is greatest about 6 p.m., while during the S.W. Monsoon it is greatest about 10 a.m.

Table II.

DURATION IN DAYS OF N.E. AND S.W. MONSOONS,
LONGITUDE 80° E. TO 85° E.

Month.	22°N.-20°N.		20°N.-15°N.		15°N.-10°N.		10°N.-5°N.		5°N.-0°	
	N.E.	S.W.	N.E.	S.W.	N.E.	S.W.	N.E.	S.W.	N.E.	S.W.
January ...	17	6	21	2	23	1	20	1	19	3
February ...	11	11	13	6	19	3	22	1	16	2
March ...	4	18	7	15	18	5	13	0	15	2
April ...	2	24	2	22	6	12	6	11	4	14
May ...	1	26	1	24	3	21	1	23	0	19
June ...	0	28	1	27	0	29	1	25	0	24
July ...	2	24	1	27	0	30	0	28	0	24
August ...	0	28	1	24	0	24	1	22	0	18
September ...	6	14	1	18	0	23	0	26	1	18
October ...	9	6	12	6	8	10	6	16	4	14
November ...	11	6	25	2	21	2	10	6	5	14
December ...	27	0	26	1	24	1	15	3	12	11

According to MAURY the S.W. Monsoon begins in the extreme north of the Bay of Bengal and works southward, being established in equatorial regions six or eight weeks later. Hence he calculated the rate of what seamen call the "backing down of the Monsoon" as 15 to 20 miles per day. The wind charts bear out this progression, marked south-westerly winds being shown only on the roses for the extreme north of the Bay in March and the S.W. Monsoon being established over the whole area down to the equator in the chart for May. This however should not be taken to imply that the process is regular or that other winds are not intermittently experienced. Other accounts, in fact, speak of the progress of the S.W. Monsoon up the Bay after an interval of light and variable winds subsequent to the N.E. Monsoon.

The "Burst of the Monsoon."—The onset of the S.W. Monsoon is a comparatively sudden process. The following account is quoted from Admiral SOMERVILLE'S OCEAN PASSAGES FOR THE WORLD as being typical of the bursting of the Monsoon on the coasts of India. It should be understood that it does not necessarily occur at the same time in different places and that it is not so strikingly developed over the open ocean. "The first signs of the approach of the south-west Monsoon appear about the end of May, when large clouds begin to make their appearance daily at noon over the mountains; advancing from eastward against the wind then blowing, and the sky exhibit a display, first of sheet, and afterwards of forked lightning, which after dark disappears. This continues for a week or more, when the lightning is more vivid every evening. Until the rains fall the clouds invariably disappear immediately after dark; and, though the sun may have gone down amid signs of coming tempest, the sky is cloudless a few hours after."

"Suddenly, after perhaps a week as above, a little after sunset, there is a blast of wind from the clouds in the east, followed by heavy rain with thunder and lightning. This generally lasts from one to two hours, when the wind veers round to south-west, blowing with increasing steadiness and diminished force, and thunder is only heard in the distance."

"This phenomenon, which is known as the 'burst of the monsoon,' seldom lasts for more than 36 hours, and is followed by S.W. wind, which blows strongest in the afternoon, and then, gradually, day by day, the monsoon sets in with increasing vigour. The sky becomes overcast, and heavy rains fall, more or less continuously, for 40 to 50 days, with occasional fine intervals."

The "Madras Monsoon."—On the coasts of the extreme south of the Indian peninsula variable and gentle breezes, with smooth water, are usually experienced in October, lasting until the setting in of the N.E. Monsoon at the end of the month or the beginning of November. The N.E. Monsoon sets in with two or three weeks of heavy rain; this is locally termed the "Madras Monsoon." Generally speaking, however, there are no special phenomena associated with the onset of the N.E. Monsoon.

The Limits and Extent of the N.E. Monsoon, Indian Ocean.—The N.E. Monsoon normally begins in October and continues to blow until April. In October the winds are usually light with frequent

calms and both N.E. and S.W. winds are shown on the roses. The N.E. Monsoon commences in the Arabian Sea and in the Bay of Bengal with light N.E. winds, though S.W. and variable winds still occur in these regions. The greatest frequency of N.E. wind occurs in the regions of Latitude 10° N. to 20° N., Longitude 60° E. to 70° E. To the south of the Arabian Sea between Latitude 10° N. and the equator there are some light westerly and north-westerly winds. From Latitude 10° N. to the limit of the S.E. Trade in about Latitude 5° S., in the central and eastern longitudes of the Indian Ocean, the S.W. Monsoon is still maintained.

The extent of the N.E. Monsoon can be best represented by setting out the southern limit in the form of a table.

Table III.

SOUTHERN LIMIT OF THE N.E. MONSOON, INDIAN OCEAN.

NOTE.—Where dashes are given land intervenes.

Month.	LONGITUDES (EAST).					
	40°	50°	60°	70°	80°	90°
November ...	—	3½° N.	6° N.	8° N.	10½° N.	11½° N.
December ...	10° S.	3° S.	1½° N.	3° N.	3° N.	4° N.
January ...	10° S.	5½° S.	2° S.	0°	1½° N.	3° N.
February ...	7° S.	3° S.	0°	2° N.	2½° N.	4° N.
March ...	—	½° N.	1° N.	3° N.	6° N.	7° N.

In November the N.E. Monsoon is steadiest in the Bay of Bengal and in the Arabian Sea away from all coasts, with one exception. The exception is the area close to the African coast, south of Cape Guardafui, in about Latitude 7° N., which affords the steadiest N.E. and E.N.E. wind for the whole ocean during this month. Near the northern and Indian coasts of the Arabian Sea the winds are northerly. In December to February the N.E. Monsoon is steadier everywhere and as shown in TABLE III extends considerably further south. The characteristics of the Monsoon remain very nearly the same during these months. The wind is mainly from the quadrant N. to E., with N.E. wind predominating, in the central areas of the Arabian Sea and Bay of Bengal and on the windward coasts (east coast of India and east coast of Africa, south of Cape Guardafui). Near the west coast of India northerly winds predominate, but all directions from N.W. to E. are well represented. The latitude of Ceylon (5° N. to 10° N.), for Longitude 70° E. to the Malay Peninsula, shows moderate percentages of winds between S. and W. Near the Arabian shores the winds are light and very variable, mostly from the northerly points of the compass, with occasional predominance of north-westerly winds. Near the eastern and south-eastern shores of the Bay of Bengal the N.E. Monsoon is also steady during December and January, but in February the winds become lighter and more northerly. In March the strength and steadiness of the N.E. Monsoon has everywhere diminished. The remarks above made as to wind direction in the Arabian Sea apply also to this month. In the eastern part of the Bay of Bengal the winds have become north-westerly, and in the northern and western parts down to latitude 15° N. the S.W. Monsoon commences with fair strength and steadiness.

The Limits and Extent of the S.W. Monsoon, Indian Ocean.—April is a month of transition in the North Indian Ocean. The N.E. Monsoon is dying out, the S.W. Monsoon is not established except in the northern half of the Bay of Bengal; the N.W. Monsoon is also dying out. Winds between N.W. and S.W. predominate in the neighbourhood of Karachi and there is a high percentage of northerly wind in the Arabian Sea from Longitude 60° E. to the Indian coast; elsewhere winds are variable. W.S.W. and S.W. gales are, however, shown on the rose for Latitude 0° to 5° S., Longitude 65° E., to 70° E. In May the S.W. Monsoon is blowing generally but is not at its full strength or steadiness and there are some areas where it is not yet in evidence, such as the west coasts of India. It is steadiest in the Bay of Bengal and off the Arabian Coast. In the belt between the equator and Latitude 5° N. there is much more south-westerly wind than in that between the equator and Latitude

5° S. where the wind may be from any direction between E. and W. through S.

In June, July and August the S.W. Monsoon is at its height everywhere and the wind charts for these months are very similar in character. Some interesting points may be noted. The greatest strength and steadiness of the S.W. Monsoon occurs in the same regions as that of the N.E. Monsoon, namely, in the Bay of Bengal (especially in its central and western areas), and in the diagonal from the African coast south of Cape Guardafui to the central longitudes of the Arabian Sea in Latitude 15° N. to 20° N. These are also the regions where gales chiefly occur.

In 1853 Lieutenant A. DUNDAS TAYLOR, Indian Navy, compiled a chart of the Arabian Sea showing the Winds and Currents during the S.W. Monsoon from upwards of 100 logs of vessels of the Indian Navy. Upon this chart two special Monsoon areas were indicated, (I) a streak starting in about Latitude 9° N., Longitude 52° E. and running diagonally into the central longitude of the Sea in Latitude 16° N. to 18° N. This was marked "The line of strongest Monsoon and apparent course of the Rain Cloud from Africa." (II) A region, elliptical in shape, between the parallels of 5° N. and 11° N. and the meridians 59° E. and 71° E. thus noted:—"In this region . . . the sky is generally cloudless, the wind light, water smooth and squalls seldom happen. The breezes are lightest in the eastern half and strongest on the western side." It is interesting to note that TAYLOR's strong streak is confirmed by the much greater number of observations of the modern charts, except that it actually covers a wider area than he shows. The "soft patch in the S.W. Monsoon" is, however, not shown on the charts, the strength of the wind in this area being much the same as elsewhere in the Arabian Sea and North Indian Ocean outside the "strong streak."

In the belt south of India, in Latitude 0° to 5° N., Longitude 60° E. to the coasts of Sumatra, the S.W. Monsoon is less steady and not so strong, just as we saw occurs in the case of the N.E. Monsoon. In June, July and August the belt of southerly winds immediately to the South of the equator, noted above in May, persists, forming a connecting link between the S.E. Trade and the S.W. Monsoon. While equatorial calms are rare during the occurrence of the S.W. Monsoon they are nevertheless more frequent than in the higher latitudes of the Monsoon, the majority of the roses for the latter regions showing at most one or two per cent. of calms and usually none at all. The highest proportion of calms is shown in the region of Latitude 0° to 5° N., Longitude 65° E. to 75° E., south-west of the Maldiv Islands, in all three months, the highest percentages being 11 and 13 on the two roses for July. As MAURY wrote:—"The outward-bound Indiaman, who, when on his way to Calcutta, crosses the equator in August, for example, will find the south-east trades, as he approaches the line, to haul more and more to the south. As he advances still further north they get to the west of south. Finally, he discovers that he has got the regular south-west monsoons, and that he has passed from the south-east trades into them without any intervening calm. This in summer is the rule; it has its exceptions, but they are rare." In September the general character of the S.W. Monsoon is again the same but it is weakening. In the eastern half of the Arabian Sea to the Indian coast the wind is veering to the N.W.

The southern limit of the S.W. Monsoon has been indicated by the above remarks; it lies in all months between the equator and about latitude 5° S. In all months except June it lies practically along the equator in the western part of the ocean.

The N.W. Monsoon.—During the greater part of the period when the N.E. Monsoon is blowing in the northern part of the Indian Ocean, the equatorial region is occupied with a wind whose general direction is north-westerly. This wind is not so steady in direction as either the N.E. or the S.W. Monsoons but is sufficiently steady in the open ocean, in conjunction with its seasonal occurrence, to be called a Monsoon. It is known as the N.W. Monsoon and sometimes as the Middle Monsoon. Older names for it are the Line, or Equatorial Westerly, Monsoon and the Cross Monsoon. The following quotation, from a little book written by Captain THOMAS FORRESTER in 1782, shows the origin of two of these names:—"As the N.W. wind which blows from the Line to eight or 10 degrees of South latitude in winter, blows in a direction across the N.E. Monsoon, I have called it the Cross Monsoon, it being bounded to the South by the S.E. Trade Wind. I call it also the MIDDLE

MONSOON, it lying, as it were, enclosed between the N.E. Monsoon to the northward, and the S.E. Trade to the southward."

The N.W. Monsoon blows from December to March inclusive, being strongest and best defined in December, January and February. The months of November and April represent transition months when this Monsoon is being established, but during which the winds blow also from all directions in the equatorial region. It is possible to lay down the southern limit of the N.W. Monsoon in April as a fairly definite line for the northern limit of the S.E. Trade, but no northern limit can be given to the N.W. Monsoon region in this month, which as we have seen is a transition period over the whole of the North Indian Ocean. Thus roses with predominant north-westerly winds occur even in the northern parts of the Arabian Sea. The position during the other transition month, November, is quite different. Here there is a definite southern limit to the N.E. Monsoon and a definite northern limit to the S.E. Trade. In the wide space between these the winds are of very variable direction, predominatingly north-westerly only in one or two areas and westerly over a somewhat bigger region. The N.W. Monsoon when fully developed is most marked over the region of Longitude 65° E. to 95° E., roughly speaking the central longitudes of the Indian Ocean. The percentage of calms and variable or "baffling" winds varies in different areas but in all months is much higher than in the cases of the N.E. and S.W. Monsoons.

The boundaries of the N.W. Monsoon belt are irregularly curved lines trending upwards to more northerly latitudes on the eastern side of the Indian Ocean. The width of the belt increases somewhat from west to east, the northern limit nearly touching the northern point of the island of Sumatra, Acheen Head. The southern limit, after Longitude 100° E., bends south-eastward and reaches the north-western coast of Australia. The limits for various longitudes in the Indian Ocean are given in TABLES IV and V.

Table IV.

NORTHERN LIMIT OF THE N.W. MONSOON, INDIAN OCEAN.

Month.	LONGITUDE (EAST).					
	45°	55°	65°	75°	85°	95°
December ...	6° S.	$\frac{1}{2}$ ° S.	2 $\frac{1}{2}$ ° N.	3° N.	3° N.	5 $\frac{1}{2}$ ° N.
January ...	8° S.	3 $\frac{1}{2}$ ° S.	1° S.	1° N.	2° N.	5° N.
February ...	5° S.	1° S.	1 $\frac{1}{2}$ ° N.	2 $\frac{1}{2}$ ° N.	3° N.	5° N.
March ...	0°	1° N.	2° N.	5° N.	7° N.	8° N.

Table V.

SOUTHERN LIMIT OF THE N.W. MONSOON, INDIAN OCEAN.

NOTE.—Where dashes are given land intervenes.

Month.	LONGITUDE (EAST).							
	45°	55°	65°	75°	85°	95°	105°	115°
December ...	—	10 $\frac{1}{2}$ ° S.	9° S.	8 $\frac{1}{2}$ ° S.	8° S.	6 $\frac{1}{2}$ ° S.	11 $\frac{1}{2}$ ° S.	21 $\frac{1}{2}$ ° S.*
January ...	—	15° S.	12° S.	11° S.	10° S.	10° S.	13° S.	21 $\frac{1}{2}$ ° S.*
February ...	—	17 $\frac{1}{2}$ ° S.	13° S.	11° S.	10 $\frac{1}{2}$ ° S.	11° S.	15° S.	21 $\frac{1}{2}$ ° S.*
March ...	12 $\frac{1}{2}$ ° S.	11 $\frac{1}{2}$ ° S.	13° S.	10 $\frac{1}{2}$ ° S.	11° S.	11° S.	10° S.	12° S.
April ...	5° S.	7° S.	8° S.	7° S.	6 $\frac{1}{2}$ ° S.	6 $\frac{1}{2}$ ° S.	5 $\frac{1}{2}$ ° S.	—

* The Monsoon here reaches the N.W. Coast of Australia.

The N.E. Monsoon blows in Malacca Strait during the period December to March and is therefore experienced on the eastern coasts of Sumatra. During the same period the N.W. Monsoon blows in the ocean off the western coasts of this island, which thus acts as a barrier separating the two winds. The N.W. Monsoon is not confined to the Indian Ocean but blows also in the Malay Archipelago, as will be referred to later. During the months January to March, unsettled squally weather with rain is frequently experienced in the N.W. Monsoon region.

Monsoons of the China Seas.—The Monsoon system of the China Seas extends from about Latitude 30° N. to the equator between Sumatra and Borneo. It also extends seaward into the North Pacific Ocean on the east of the Philippines. Of the China Seas the region concerned is the South China Sea and the Straits of Formosa, together with the extreme south of the China (or Eastern) Sea, and the region east of Formosa and Luzon to Longitude 125° E. Over the whole of this area the Monsoons are steady and regular, the N.E. Monsoon blowing from November to March and the S.W. Monsoon from June to August. The former is much the stronger and steadier of the two, interruptions being rare, while the S.W. Monsoon is very irregular and often very weak. The conditions are thus reversed from those of the Indian Ocean, where the S.W. Monsoon is the stronger. Land and sea breezes in the vicinity of the coasts of the China Seas are experienced more frequently during the prevalence of the S.W. Monsoon.

The N.E. Monsoon occasionally sets in as early as the last week in August but normally begins in the northern part of the region about the end of September or early in October. This Monsoon usually commences with a gale, sometimes without warning, which frequently lasts 10 or 12 days and blows with great violence. In October the Monsoon is usually established and blows fresh, being strongest in the northern part of the region; south of Latitude 10° N. it seldom blows steadily before November. In November the N.E. Monsoon prevails generally and blows more steadily in most of the region, but its strength still diminishes with decreasing latitude. The most uncertain parts are the region of Latitude 5° N. to 10° N., Longitude 110° E. to 115° E., where all wind directions are experienced, though those between N.E. and N.W. predominate, and southward of this towards the N.W. coast of Borneo. In December the Monsoon prevails everywhere but is uncertain near the N.W. coast of Borneo; elsewhere it is even steadier than in November. In January the N.E. Monsoon blows fresh to strong in the northern part of the region, occasionally rising to gale force and accompanied by a rough or high sea. Near the Borneo coast it has now increased in strength. In February the wind is everywhere steady and is usually strong. In March there is some diminution of strength but with a proportion of stronger winds in the extreme north of the area. Towards the middle or end of April the change of the Monsoon occurs, preceded by a period of calms and light variable winds from between N.E. and S.E. Occasionally the change is not fully established before the middle of May or even the beginning of June.

We have seen above that the N.E. Monsoon commences in the extreme north of the area. The S.W. Monsoon commences on the contrary between Latitude 5° N. and 10° N. in May, most strongly in mid-sea. In accordance with the remarks on the change from the N.E. to the S.W. Monsoon the roses for May show in many cases both N.E. and S.W. winds, the N.E. winds being predominant in the northern part of the region. During June, July and August, though the S.W. Monsoon is fully established, a small frequency or north-easterly winds still occurs, notably in the northern part. In September the S.W. Monsoon is dying out, except in central latitudes, and is being replaced by N.E. and variable winds.

Strength of the China Seas Monsoons.—Precise data as to the strength of the Monsoons is not available, but roughly speaking the N.E. Monsoon has a similar strength to the S.W. Monsoon of the Indian Ocean and the majority of the gales experienced are from N.E. These remarks apply chiefly to the regions most distant from the mainland and the strongest N.E. Monsoon and N.E. gales are encountered both eastward and westward of Formosa and Luzon (north of Latitude 15° N.). The S.W. Monsoon is most strongly developed in mid-sea south of Latitude 15° N. and in the northern part of the Gulf of Siam, and is in this region probably somewhat stronger than the N.E. Monsoon of the Indian Ocean. Over the sea as a whole it is however less steady and weaker. Occasional south-westerly gales occur in the S.W. Monsoon, the highest percentage being shown by the rose for the region of Latitude 5° N. to 10° N., Longitude 110° E. to 115° E. during August.

Weather of the China Seas.—As in the case of the Indian Ocean the weather of that part of the China Seas which we are considering is affected by the Monsoons, the months of June, July and August being the cloudiest and having most rain. Even during these months

however the percentage of observations of rain is in many regions less than 10 and does not exceed 16. During the prevalence of the N.E. Monsoon the weather is often unsettled and overcast, especially in the northern part of the region. March and April are the finest months in the southern part, and April in the northern part. There is a moderate proportion of mist and fog, especially in the northern part and in the Tong King Gulf in the months of February to June.

The North Pacific Ocean East of Longitude 125° E.—The area of the North Pacific Ocean affected by the Monsoons is not entirely confined to the region we have been discussing but reaches eastward into the Ocean, it is said to about Longitude 150° E. This extension of the Monsoons was not described with those of the China Seas because information about it is much less exact, there being no detailed wind charts of the Pacific giving percentage frequencies of wind force as well as direction. As has been said, the N.E. Monsoon in the Pacific Ocean is generally speaking continuous with the N.E. Trade Wind and it is therefore difficult to set any boundary to it. The S.W. Monsoon is not experienced steadily over any very large area east of the Philippines. It is apparently not prevalent until July and is then confined chiefly to the region of Latitude 10° N. to 15° N., Longitude 125° E. to 135° E. In September it is well developed eastward of Mindanao in Latitude 5° N. to 10° N., Longitude 130° E. to 135° E. It does not appear to extend much further eastwards than this and in general there are considerable percentages of S., W. and even S.E. and E. winds at the same time.

Over a large area northward of the China Seas, including the Yellow Sea, Korea, Japan, &c., the winds are also influenced by the Asiatic pressure systems and therefore to a large extent seasonal in character, but they have not the steadiness which would entitle them to be classed as Monsoons.

The N.W. Monsoon of the Malay Archipelago.—We have seen that the N.W. Monsoon blows in the equatorial region of the Indian Ocean during the months of December to March inclusive. During the same period this wind is experienced in the Malay or Eastern Archipelago. On account of the presence of irregular large and small land areas the wind is coastal over a great part of the Archipelago, both its direction and force being affected thereby. As was stated in the introduction to this article, such local modifications cannot here be dealt with and reference to the series of articles on Local Winds in this Journal must be made for them.

We shall therefore confine ourselves to a few remarks upon the wind roses for the open sea as shown in the charts. The area starts from the equator between Sumatra and Borneo and includes the Java Sea and its continuation as far as Longitude 125° E. where the charts end. In speaking of the China Sea we included the region down to the equator between Sumatra and Borneo, the equator here forming a line of demarcation between the N.E. and the N.W. Monsoons. In October the S.E. Trade is weakening in the Java Sea, especially in its western end, and November is the month of transition, with winds pretty evenly divided among all points of the compass. The strength and steadiness of the N.W. Monsoon from December to March is about the same as in the Indian Ocean. In December in the middle longitudes of the Java Sea, south of Borneo, the wind is between N.W. and S.W. with W. predominating, the regions on either side having a definitely N.W. wind. In January the wind in Latitude 0° to 5° S. in the western end of the sea is more to the N. and N.N.W., thus showing a progression from the N.E. Monsoon north of the equator to the N.W. Monsoon of the rest of the Java Sea. In February the wind is everywhere north-westerly, and in March the strength and steadiness is less in the west, while westerly wind predominates in central and eastern longitudes. April is the other month of transition, with variable winds, but with a preponderance of S.E. Trade in central and eastern longitudes. The S.E. Trade is not established in full strength in the western area, up to the equator, until July. The N.W. Monsoon is not confined to the Archipelago but extends into the Pacific Ocean in gradually weakening strength. Occasional and fitful N.W. winds are experienced as far as the New Hebrides, in Longitude 165° E. to 170° E. In the Sulu and Celebes Seas there is a certain amount of N.E. and S.W. Monsoon and these therefore come within the China Seas area; the Monsoons are however fitful here, though they occasionally blow with strength and steadiness, and there is a high proportion of calms and light winds.

The Northerly Monsoon of the Eastern Mediterranean.—During summer the Monsoon circulation is dominant over the Levant and Eastern Mediterranean generally. At this season of the year the distribution of pressure is very stable, depressions being confined to the north-western part of the Mediterranean. Such disturbances as do occur seldom give rise to winds of any considerable strength, though thunderstorms, which may be accompanied by severe squalls of wind and heavy rain, are frequent. The monsoonal winds are predominantly N.W. and N. and blow at full strength during June, July and August. May and September are transition months.

SOUTHERN ICE REPORTS

During the Years 1917 to 1928.

June.

Year.	Day.	Position of Ice.		Description.	Remarks.	Name of Ship reporting.
		Latitude.	Longitude.			
1917		No reports received.				
1927	1	48° 21' S.	33° 17' W.	Medium sloping tabular berg	.. .. .	R.S.S. <i>William Scoresby</i> ,
		48° 08' S.	32° 37' W.	Medium peaked berg	.. .. .	do.
		47° 49' S.	31° 36' W.	Small berg	.. .. .	do.
		47° 46' S.	31° 31' W.	Large sloping tabular berg	.. .. .	do.
		47° 45' S.	31° 30' W.	2 growlers	.. .. .	do.
		47° 44' S.	31° 21' W.	Large peaked berg	.. .. .	do.
		47° 38' S.	31° 03' W.	Medium peaked berg and growler	.. .. .	do.
	2	47° 13' S.	29° 46' W.	Small berg	.. .. .	do.
		47° 12' S.	29° 42' W.	Growler	.. .. .	do.
		47° 10' S.	29° 35' W.	Medium berg	.. .. .	do.
		47° 10' S.	29° 34' W.	2 growlers	.. .. .	do.

Reports of ice previous to June, 1917, will be found on the back of Monthly Meteorological Chart of the East Indian Seas, April 1917, No. 132.

WEATHER SIGNALS.

WIRELESS WEATHER SIGNALS.

II.—WIRELESS WEATHER BULLETINS.

ARABIA.

Aden W/T Station, approximate Latitude $12^{\circ} 49' N.$, Longitude $45^{\circ} 02' E.$, call sign **GZO**, broadcasts weather bulletins, *en clair*, at 0948 and 1748 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 additional weather bulletin will be broadcast at 0148 G.M.T. on a wavelength of 600 metres.

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

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

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

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

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

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

WIRELESS STORM WARNINGS.

ARABIA.

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

BRITISH INDIA.

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

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

* After the time signal.

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

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 $5^{\circ} 59' N.$, Longitude $80^{\circ} 32' E.$, call sign **GZP**, broadcasts weather bulletins, *en clair*, at 0948 and 1748 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 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	call sign	VWK	} at 0430, 1230 and 2030 G.M.T.
Calcutta	" "	VWC	
Port Blair (Andaman Is.)	" "	VTP	
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 AND CEYLON.

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

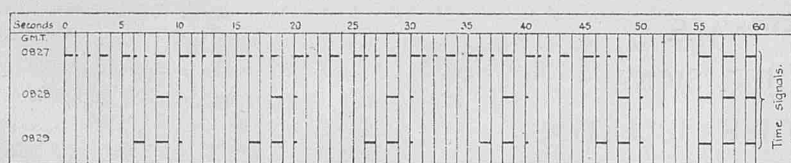


Figure 1.

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

(2) Signals automatically controlled from Alipore Observatory.

(3) Time Signal accurate to within 0.2 sec.

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

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

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

IV.—VISUAL STORM WARNINGS.

ADEN AND BRITISH INDIA.

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

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

General System.

Distant Signals.

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

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

Day.

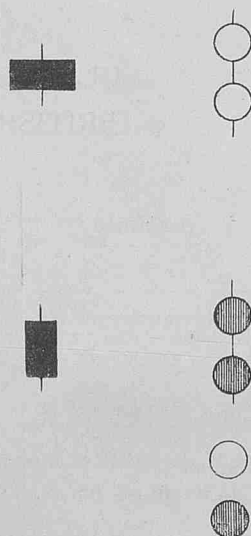
Night.

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

II. Warning.—A storm has formed.

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

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



Local Signals.

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

Day.

Night.

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



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



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

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



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



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



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



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



	Day.	Night.
X. Great Danger. —The port will experience severe weather from a storm of great intensity that is expected to cross over or near to the port.		
XI. Failure of Communications. —Communication with the Meteorological headquarters has broken down and the local officer considers that there is danger of bad weather.		

This system is in force at the following ports:—

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

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

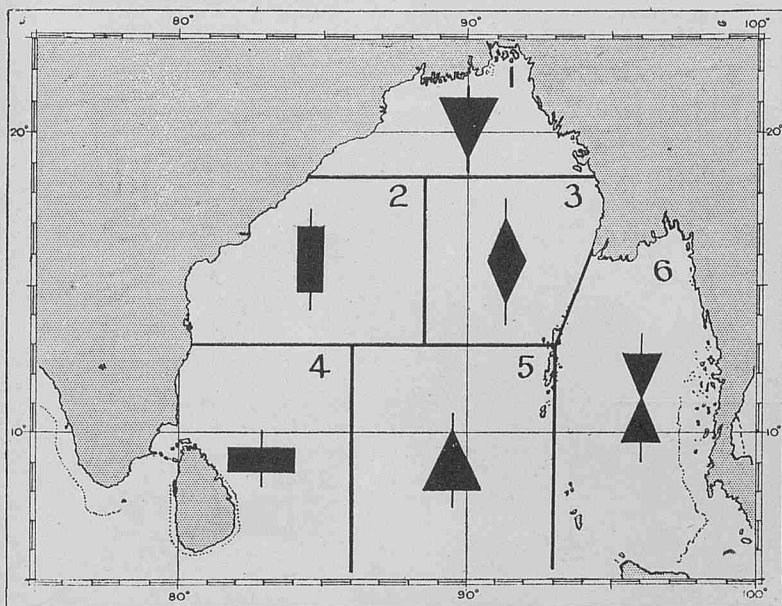
These signals are also exhibited at Sabang, Pulo Weh, off the north-west end of Sumatra; the data for the signals being received from the W/T station at Port Blair. Two balls, placed vertically, denote that the latest weather report has not been received, a request can be made for the last weather report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

General System with Additional Signals, Bay of Bengal.

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

The Bay of Bengal is divided into six sections, *see* Chartlet, thus, if there is squally weather in Section 5 of the Bay the signal, a cylinder placed horizontally over a cone, point upwards, would be hoisted at the various ports.

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



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

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

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

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

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 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 at sea, and the rise of the barometer indicate that the storm has either broken up or passed inland. It should be remembered that cyclonic storms of small extent in the Bay of Bengal sometimes blow with hurricane force, and raise a high sea near their centres.

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

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

mouth of the Húgli will probably veer from north-east, through east, to south-east or south.

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

The above signals are exhibited at Sagar island, 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.

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

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

Special Notices Regarding Personnel.

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

Obituary.

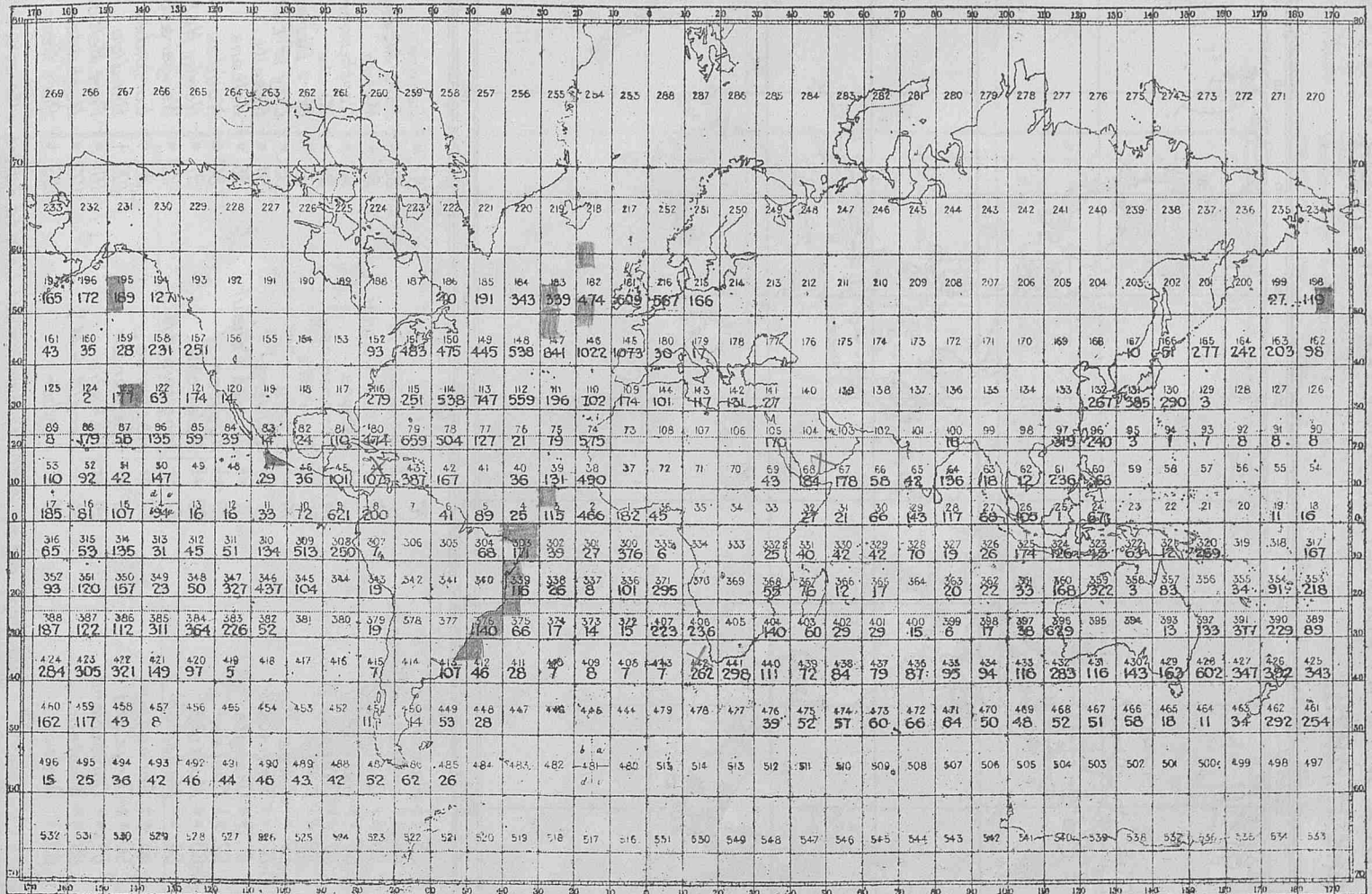
THE death of Mr. W. C. CURTIS, clerical assistant in the Marine Division, which took place on the 16th March, 1929, after a long illness, is recorded with deep regret.

During eight years service in the Marine Division Mr. CURTIS was mainly engaged on data extraction and his devotion to duty in this exacting work, often in the face of continued ill-health, has contributed materially to the success of our work.

WORK OF THE YEAR. MARSDEN CHART I.

Vol. VI. No. 66.

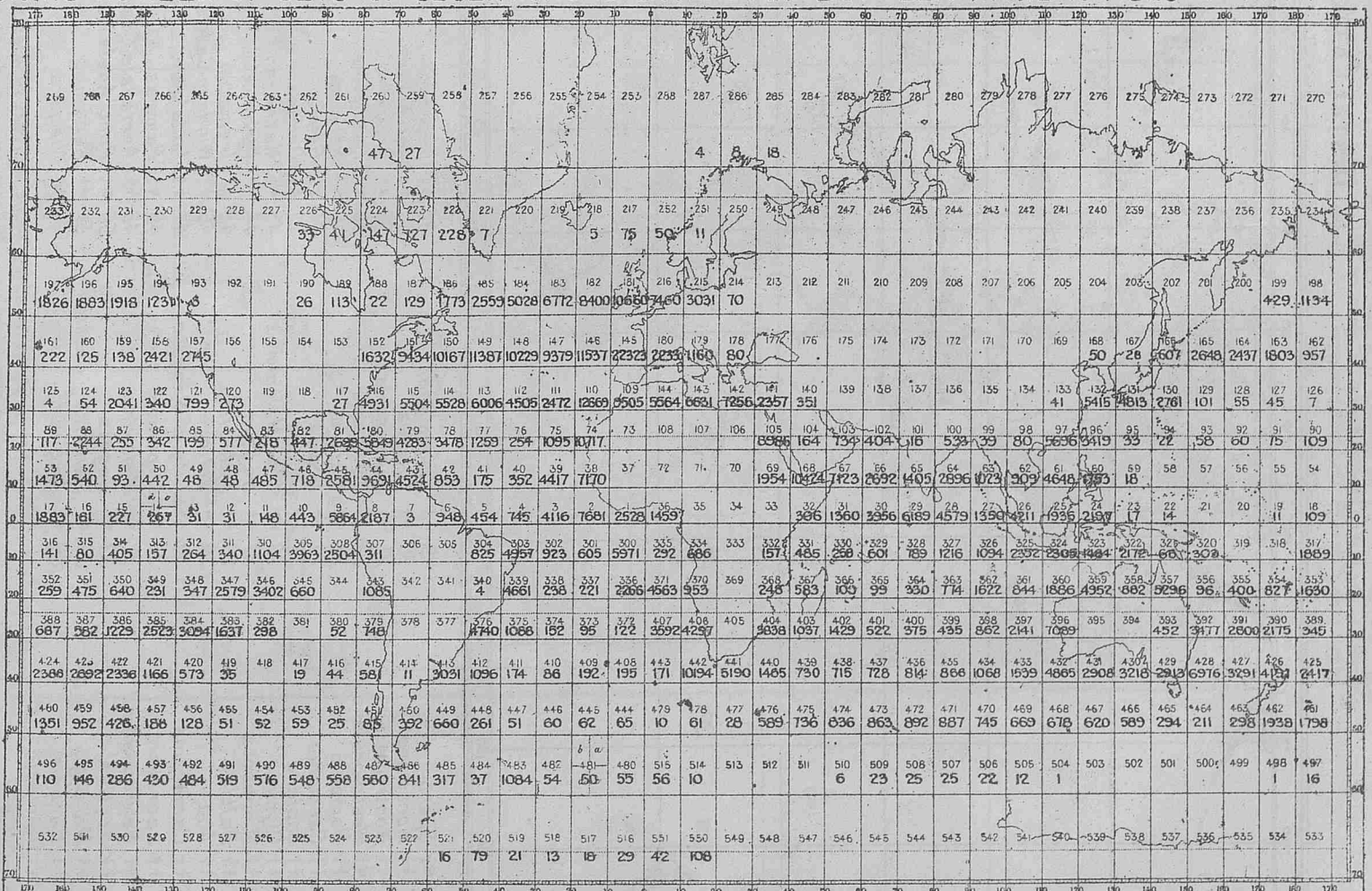
SHOWING NUMBER OF SETS OF OBSERVATIONS EXTRACTED BETWEEN APRIL 1st. 1928 & MARCH 31st. 1929



Total observations extracted 1928-1929. 43,117

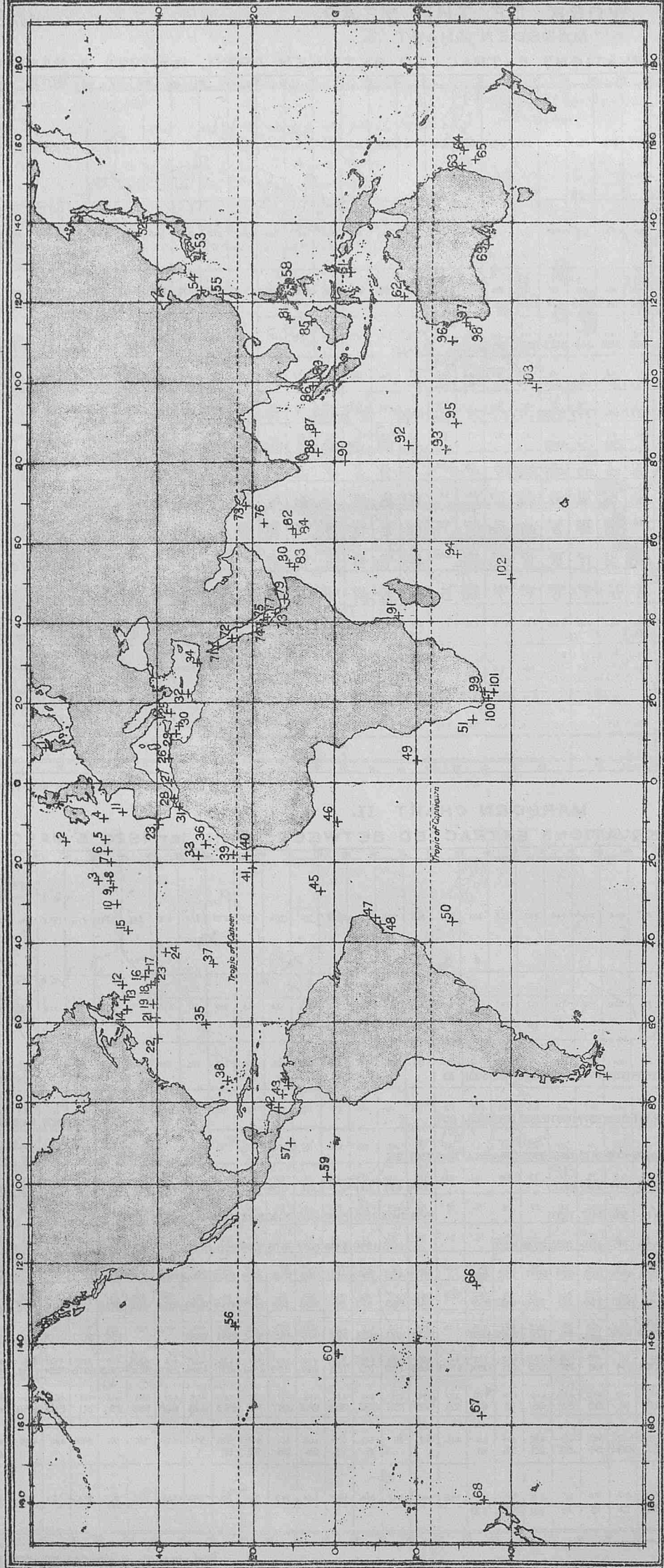
MARSDEN CHART II.

SHOWING NUMBER OF SETS OF OBSERVATIONS EXTRACTED BETWEEN APRIL 1st. 1920 & MARCH 31st. 1929.



Total observations extracted 1920-1929. 655,431

CHART OF THE WORLD SHOWING POSITION OF SELECTED SHIPS AT SEA WITH MERCURIAL BAROMETERS AND THEIR WIRELESS INSTALLATION — JUNE 1ST 1928.



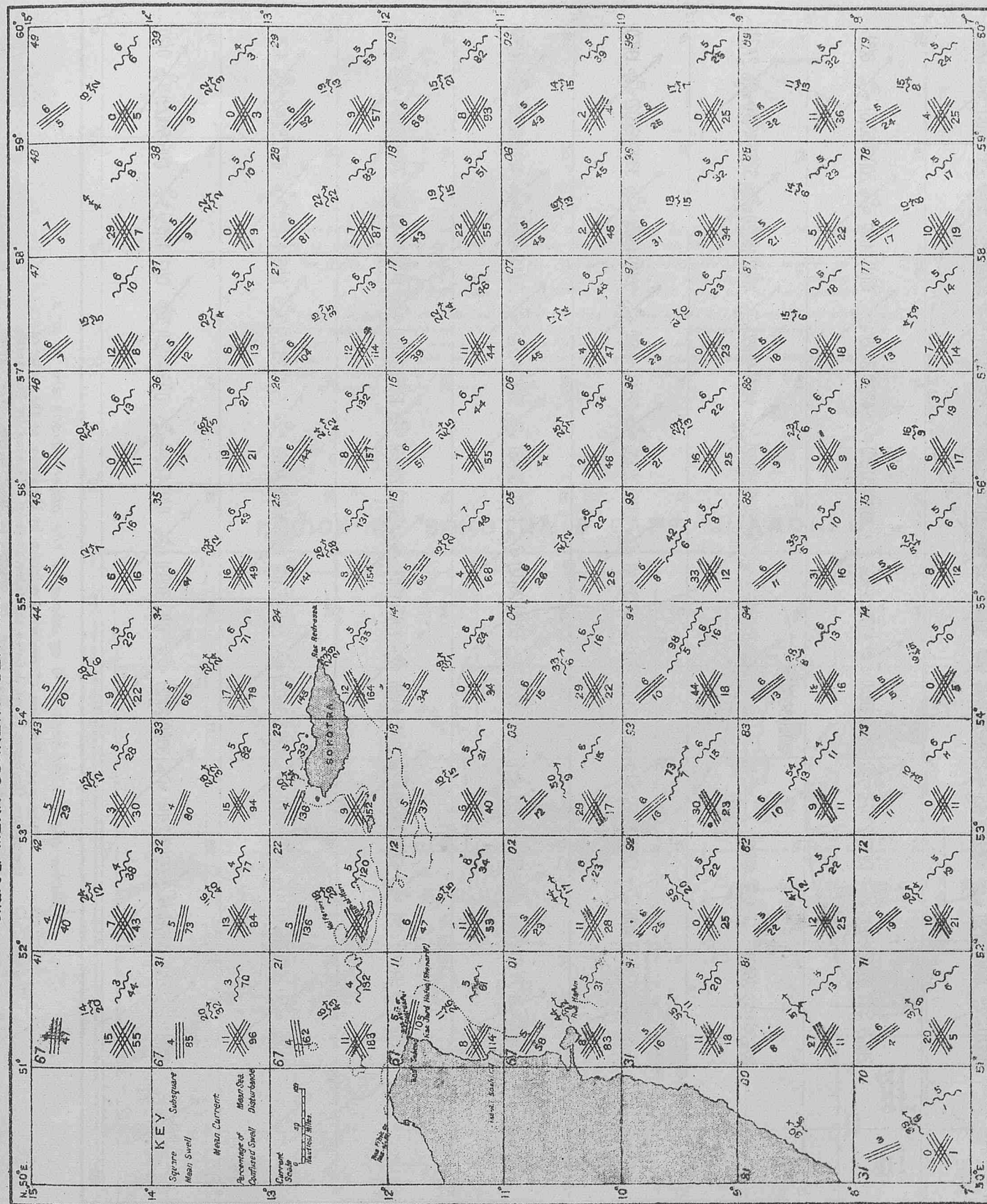
1 *† Speno	19 †† Belgenland	36 †† Deseado	53 †† Ranpura	70 †† Mahia	87 *† Lahore
2 †† Montclane	20 †† Laconia	37 *† War Nizam	54 †† Empress of Canada	71 *† Peshawur	88 *† Port Albany
3 †† Montroyal	21 †† Lancastria	38 *† Oroya	55 *† Chingkiang	72 *† British Colonel	89 †† Malwa
4 *† Westmoreland	22 †† Aquitania	39 *† Port Pirie	56 *† Hauraki	73 *† Manora	90 *† Northumberland
5 †† Homeric	23 †† Margha	40 *† Benrima	57 *† Canadian Winner	74 *† Shropshire	91 *† Malda
6 †† Carmania	24 †† Arawa	41 †† Gelria	58 *† Titan	75 †† Morvada	92 *† Port Darwin
7 †† Lapland	25 †† Orama	42 †† Orduna	59 *† Tekoa	76 *† Elysia	93 *† City of Edinburgh
8 †† Olympic	26 *† Clan Malcolm	43 *† Matheran	60 *† Makura	77 †† Naldera	94 *† Benalla
9 †† Minnesota	27 *† Nagoya	44 *† Taranaki	61 *† Changte	78 *† Auditor	95 *† Beltana
10 †† Baltic	28 *† Mahronida	45 *† Trematon	62 *† Centaur	79 *† Malancha	96 *† Nuddea
11 †† Aba	29 *† Nellore	46 †† Windsor Castle	63 *† Montoro	80 *† Malancha	97 *† Newby HaH
12 †† Cameronia	30 *† City of Rangoon	47 †† Andalucia	64 *† Makambo	81 — Iroquois H.M.S.	98 *† Wangaratta
13 †† Laurentic	31 *† Explorer	48 *† Pancras	65 *† Aorangi	82 *† Macharda	99 †† Euripides
14 *† Newfoundland	32 *† Malakuta	49 †† Armadale Castle	66 *† Tongariro	83 *† Statesman	100 †† Bendigo
15 †† Scythia	33 *† Bogota	50 *† Port Adelaide	67 *† Cumberland	84 *† Makalla	101 *† Port Melbourne
16 *† Marengo	34 *† Llandoverly Castle	51 *† Ascanius	68 *† Waitapu	85 — Herald H.M.S.	102 *† Nerbudda
17 †† Caronia	35 *† Ariguani	52 *† Niagara	69 †† Orsova	86 *† Khyber	103 *† Port Caroline
18 †† Adriatic					

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

103 Ships out of 269 in favourable positions to report, with about 166 in port or narrow waters. This is typical and represents a fair average day.
38 per cent in position to report.

REGION OF SOKOTRA & CAPE GUARDAFUI.

Chart I.—MEAN CURRENT SEA AND SWELL FOR JULY AND AUGUST.



The Currents shown on this Chart are Mean Results. Currents vary considerably in this area, in set and drift.

EXPLANATION OF CHART.

Chart I. The direction of the mean current is shown by the current arrow at the centre of each one-degree square. The velocity of the mean current is given by the length of this arrow on the scale shown, and by the figure above the arrow, the number beneath it is the number of observations on which it is based.

In the lower left-hand corner is given the sign for confused swell. The number below this sign gives the number of observations in the square, while the number above gives the percentage of these observations logged as confused.

In the upper left-hand corner is shown the swell by the conventional sign drawn at right angles to the direction of propagation, the number above the sign denoting the mean amount of swell determined from those observations for which a single direction is given, the number of which is shown below the sign.

Sea is shown by the sign at right angles to the direction of propagation. The figure above denoting the amount of sea, the figure below the number of observations. Each sub-square is numbered.

Chart II. MEAN WIND, CLOUD AMOUNT, AND STATE OF OBSCURITY OF THE ATMOSPHERE—JULY AND AUGUST.



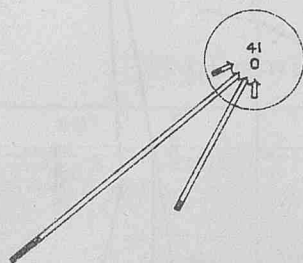
Within the shaded area 50% or above of the observations are *m* or *z*.

The mean direction of the wind is given by the arrow at the centre of the square, the figure above denotes the mean force of the wind by Beaufort's scale to nearest tenth, that below the number of observations. The figures on the left-hand side of the sub-squares denote the mean cloud amount and the number of observations, those on the right the percentage frequency of occasions on which the air is obscured by mist or haze.

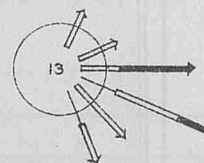
COMPILED FROM SAME OBSERVATIONS AS ARROWS GIVEN ON CHARTS I AND II.

SUBSQUARE 83.

WIND ROSE.



CURRENT ROSE.



The arrows which fly with the wind or current show by their length the frequency of the wind or current, and by their thickness the strength on the scales :-

For winds, Forces 1-3 = For currents, under 40 miles per day =
 Forces 4-7 = 40-80 miles per day =
 Forces 8-12 = over 80 miles per day =

The circles supply a scale for estimating the frequency of winds or currents in any direction. The distance measured outwards along the arrows to the circle represents 5 per cent of the whole number of observed winds or currents (100 per cent equals 2½ in.)

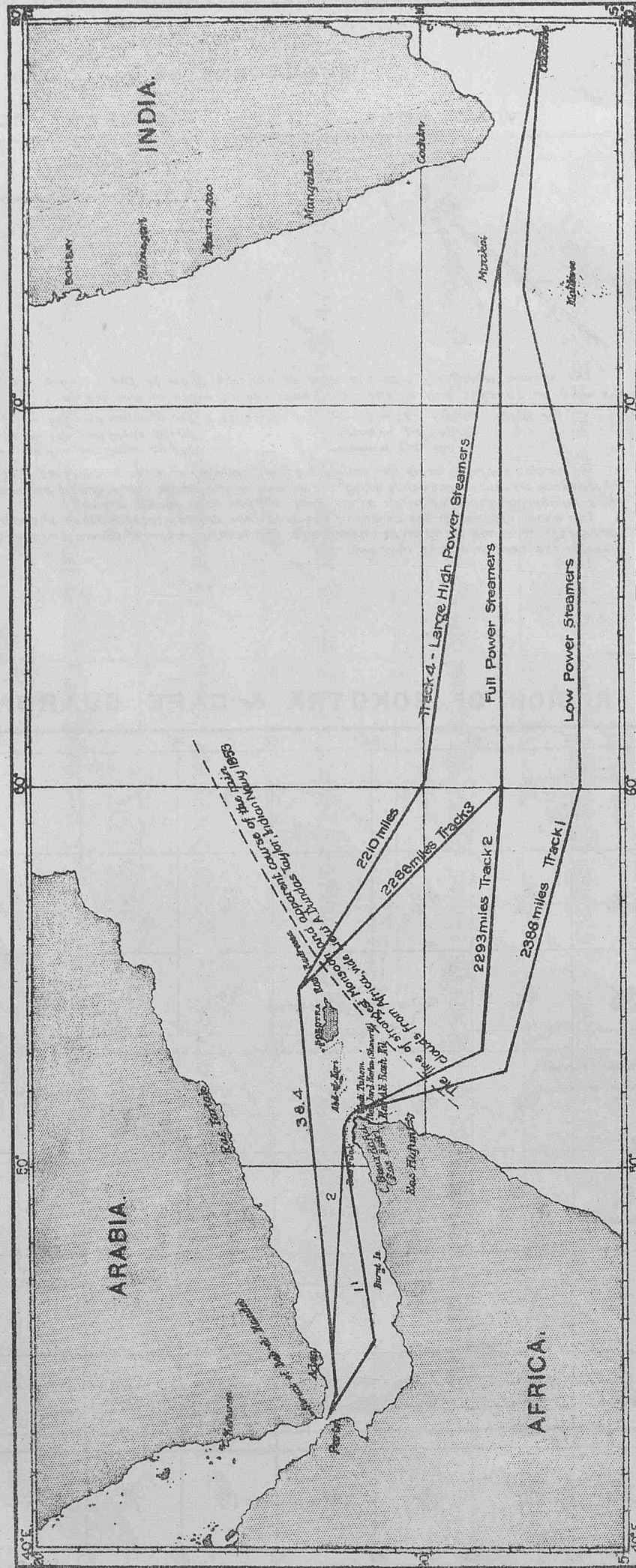
The upper figures in the centre of the wind rose are the total number of observations, the percentage of calms being given underneath. The total number of observations of current is given in the centre of the current rose.

REGION OF SOKOTRA & CAPE GUARDAFUI.



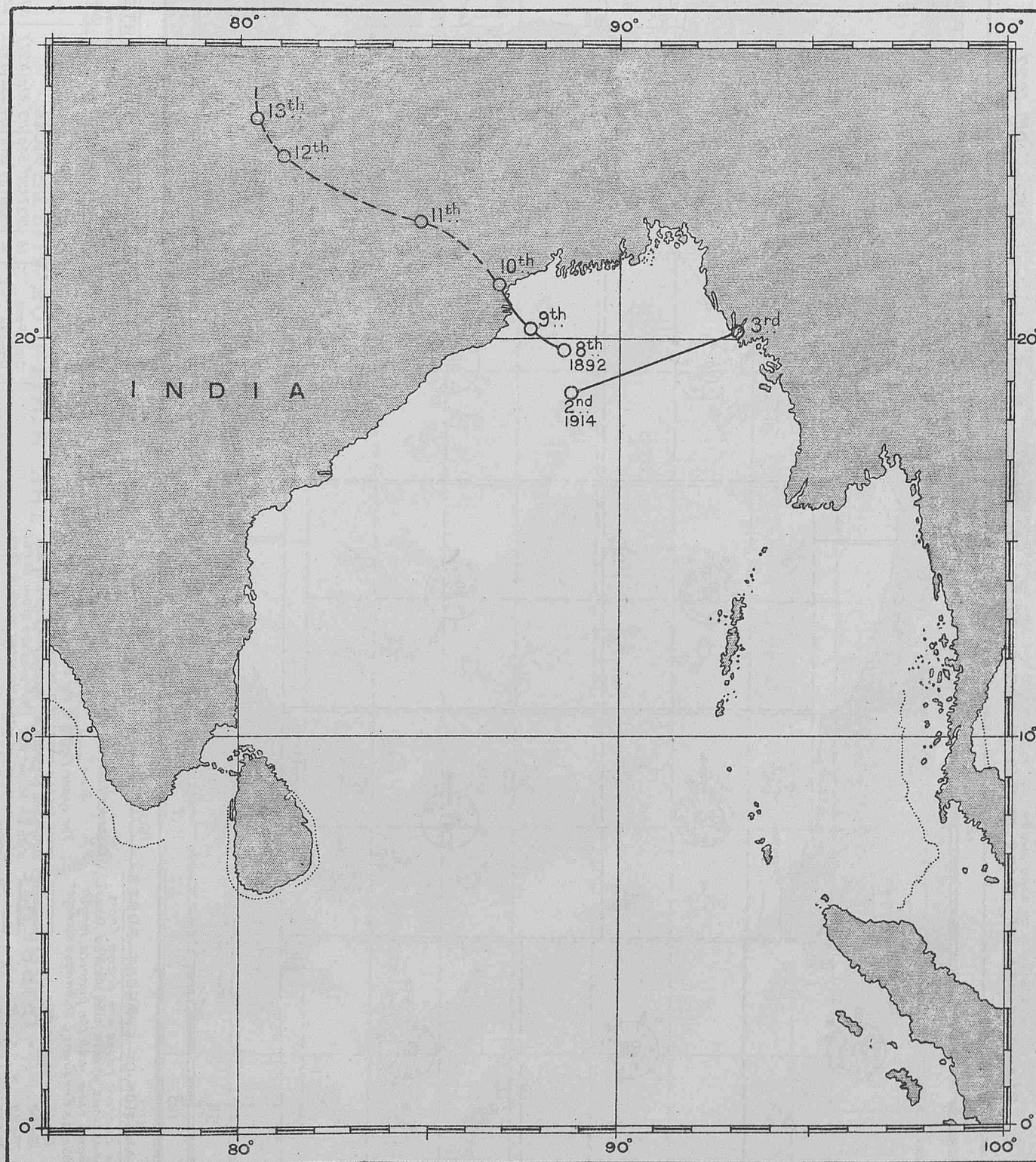
Chart III.—MEAN CURRENT FOR SEPTEMBER.

CHART IV. STEAM TRACKS RECOMMENDED—COLOMBO TO PERIM, SOUTH-WEST MONSOON.



Tracks 1 and 2 should only be adopted by Navigators who are accustomed frequently to fix the position by stellar observations: and the precautions given in the "Gulf of Aden and Red Sea Pilot" should be carefully observed when making the land and rounding Cape Guardafui.

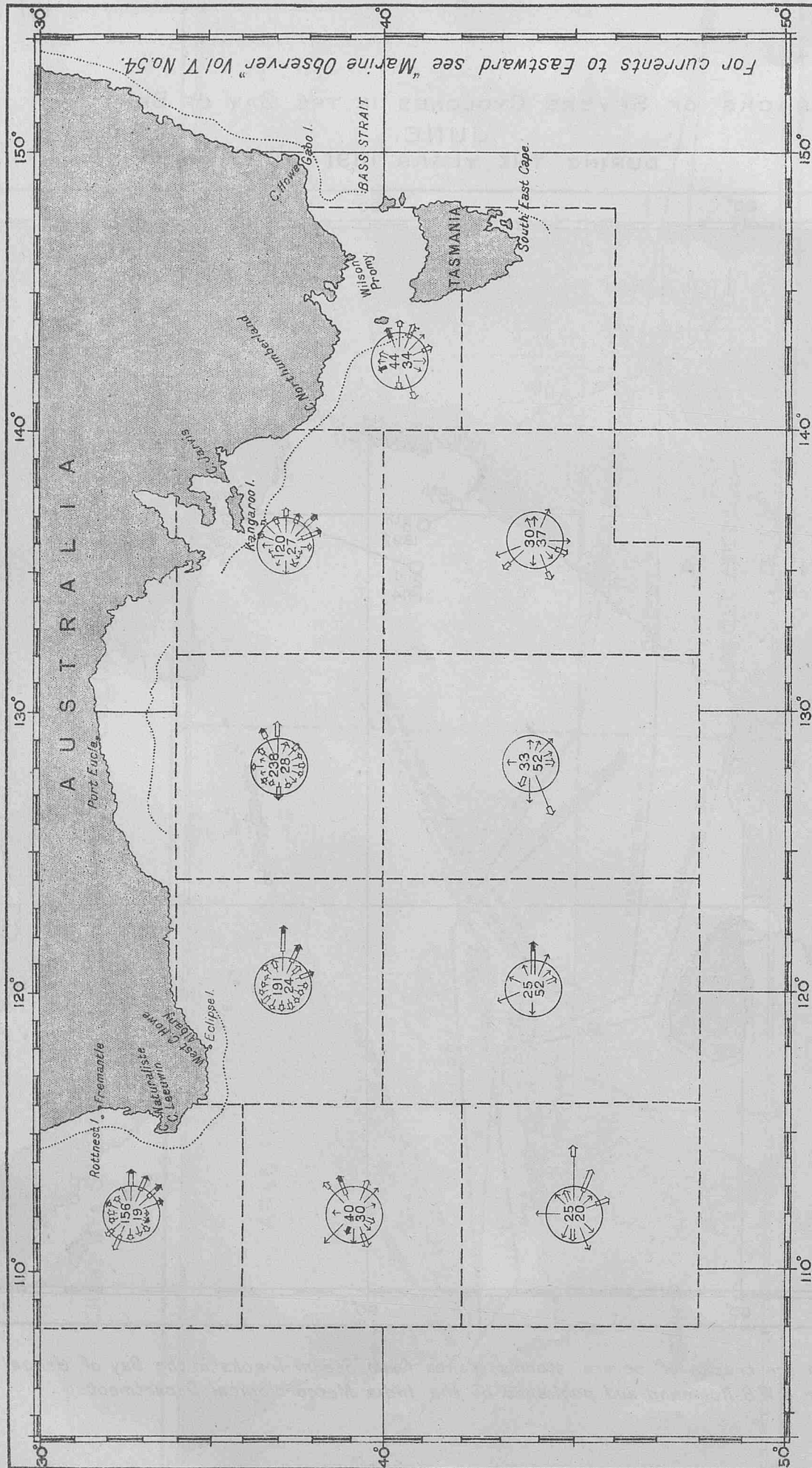
TRACKS OF SEVERE CYCLONES IN THE BAY OF BENGAL
JUNE.
DURING THE YEARS 1891-1923.



The above are tracks of severe storms taken from "Storm Tracks in the Bay of Bengal" compiled by Dr. C.W.B. Normand and published by the India Meteorological Department.

CURRENTS ON THE TRACKS TO THE SOUTH OF AUSTRALIA, MAY, JUNE AND JULY.

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



EXPLANATION OF CURRENT ROSES.

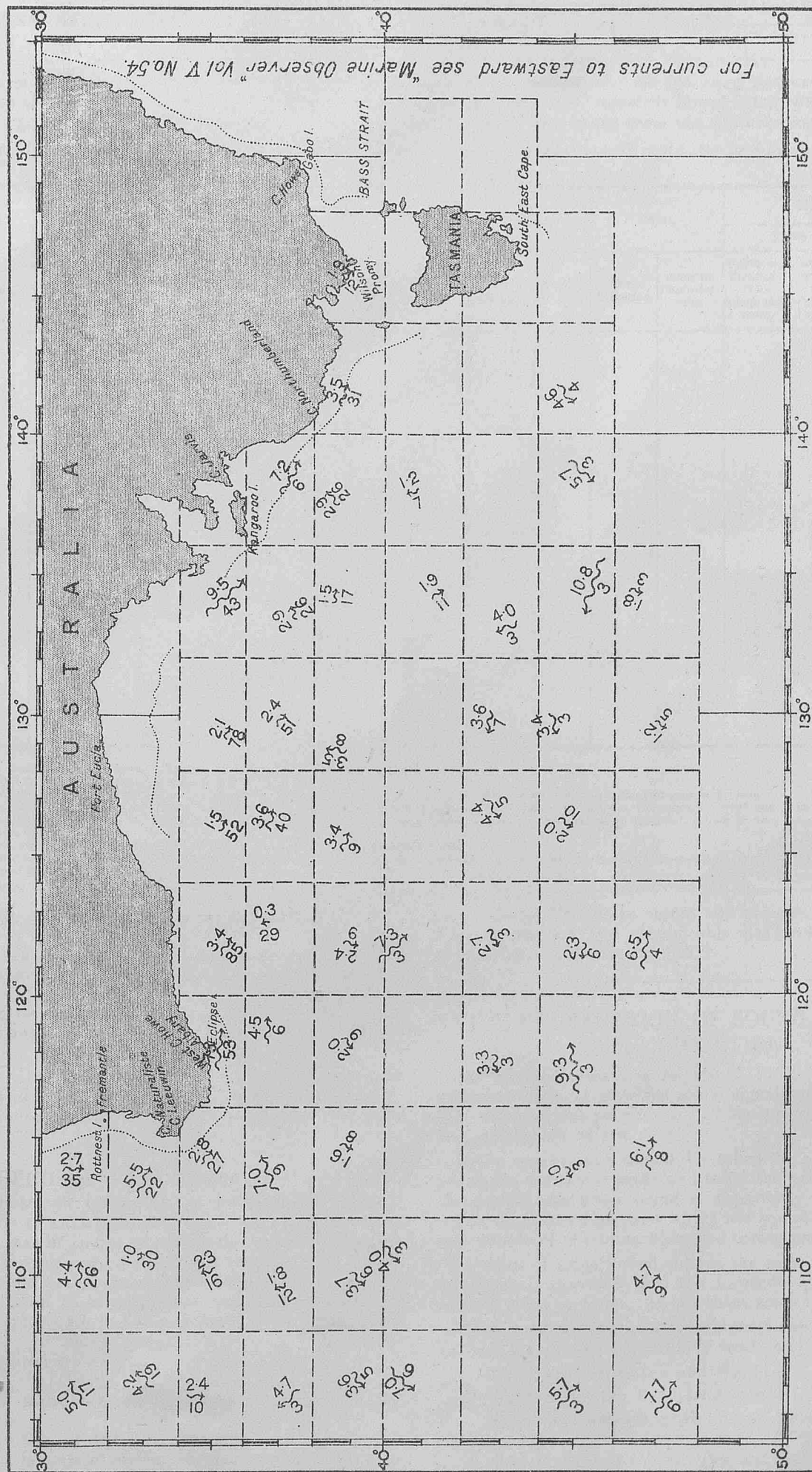
The current roses are drawn from observations within the pecked lines. Arrows flow with the current, length represents frequency, thickness strength. 6-12 miles per day 13-24 " " " 25-48 " " " 49-72 " " " 73 " " and above

Distance from tail of arrow to circle represents 5%. Scale 0 10 20 30 40 50% The upper figure in the centre of the rose gives total number of observations, the lower figure the percentage frequency of currents less than 6 miles per day. The roses are drawn so that their centres lie within the areas to which they refer.

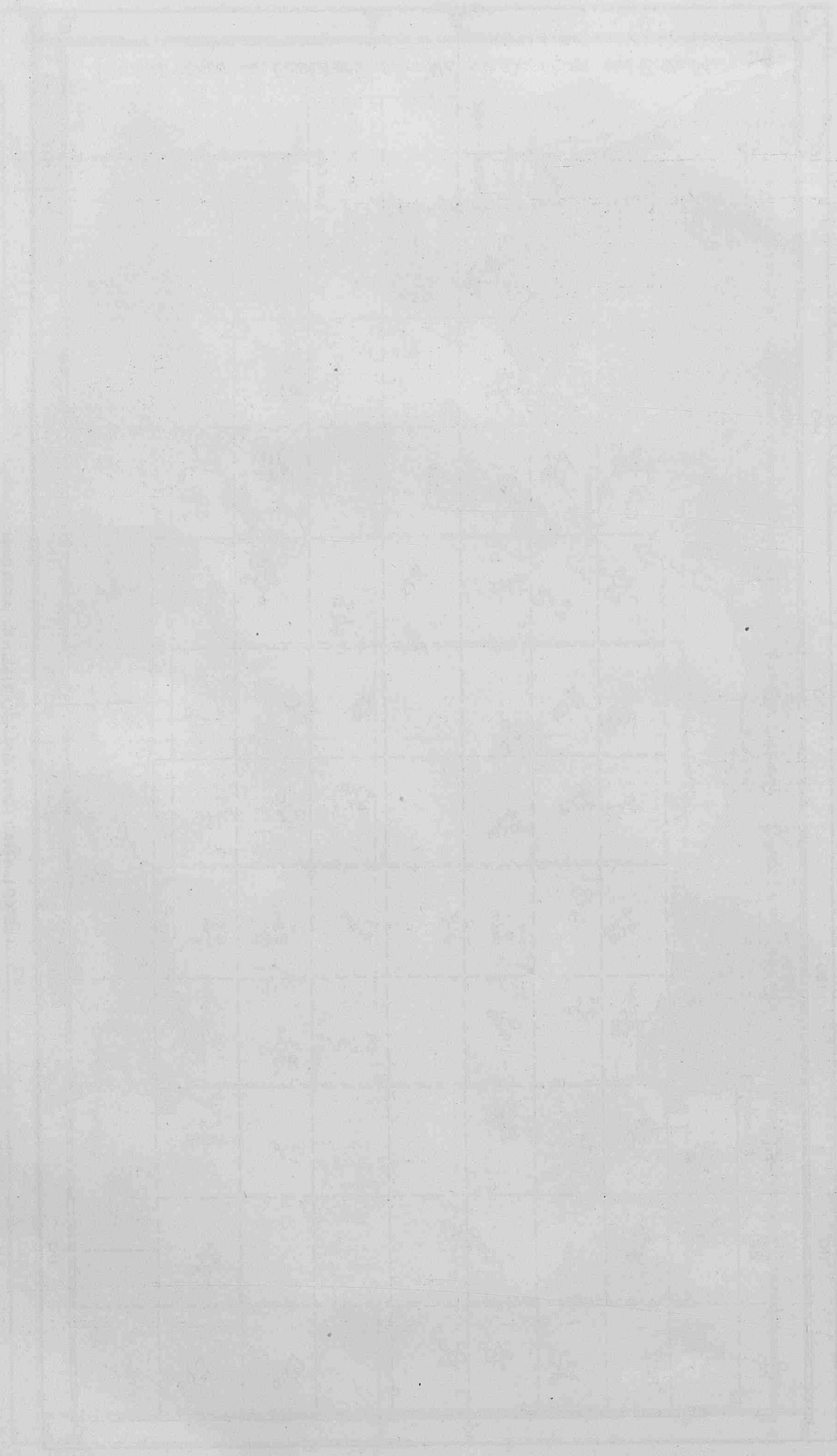
Name of Ship	Date Day	Date Year	Middle		Current Set	Current Drift	Wind Dir.	Wind Force
			Lat.	Long.				
Borda	10	1924	34° 49' S	115° 45' E	S 52° E	32	-	-
Clan Ross	19	1927	30° 54' S	113° 30' E	N 27° E	37	-	-
Orsova	4	1926	35° 35' S	134° 33' E	S 45° E	32	N by W	5
Port Sydney	25	1922	39° 24' S	142° 10' E	N 26° W	34	E	4
Hillmere	22	1911	35° 30' S	118° 36' E	S 75° E	32	NNE	5
Volga	7	1910	35° 45' S	128° 23' E	N 81° W	33	SSE	2
Euripides	27	1922	36° 08' S	115° 01' E	N 65° E	31	SW by W	5

CURRENTS ON THE TRACKS TO THE SOUTH OF AUSTRALIA, MAY, JUNE AND JULY.

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



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



THEY ARE THE TWO

THEY ARE THE TWO

NOTICES.

REPORTS ON TROPICAL CYCLONES, HURRICANES AND TYPHOONS.

Form 905.

REPORT ON CYCLONE EXPERIENCED BY S.S. _____

Captain _____

Owners _____ from _____ to _____

This Form is intended for ships in or near tropical cyclones or hurricanes who do not keep meteorological logs. When completed please return to the Director, Meteorological Office, Air Ministry, Adastral House, Kingsway, London, W.C.2. (Observations are desired even if the ship may be up to 600 miles from the disturbance.)

It will be of great assistance, if, in all cases in the vicinity of cyclones, observers will note the period and length of swell

Date. 192...	Time of Observation.	Position.		True Course.	Dis- tance.	Barometer Uncorrected.	Attd. Ther- mometer.	Wind.		Weather by Beaufort Notation.	Sea.		Swell.		Clouds.			Remarks.
		Lat.	Long.			Height above sea.....ft.		True Direction.	Force by Beaufort Scale.		True Direction.	Amount 0 to 9.	True Direction.	Amount Characteristic.	Upper, and direction from which they move.	Lower, and direction from which they move.	Amount 0-10.	
	4 a.m.																	
	8 a.m.																	
	Noon.																	
	4 p.m.																	
	8 p.m.																	
	Midt.																	

Copies of W/T. weather messages received or sent, from or to other ships or the shore, are specially desired.

It is specially desired that it should be stated if the Barometer is Mercurial or Aneroid.

The accompanying blue postcard should be completed in accordance with instructions thereon in order that the error of the barometer may be known.

If the position by observation at noon is given when obtained, and by D.R. at noon when sights are not obtained, so long as the courses (True) and distances between each set of weather observations are given with time, it will enable the computers to ascertain the position of the ship when each set of observations is recorded, which is very important. Hourly observations are desirable near the storm centre.

Please state at each Noon how much ship's time differs from G.M.T.; also state if ship's time is used.

If in addition to the observations required by the above form a narrative of the experiences in cyclones is given it will be greatly appreciated.

This report will give great assistance in investigating cyclones.

Address to which acknowledgment may be sent, _____

SEA AND SWELL MEASUREMENTS.

Marine Observers are invited to make special efforts to obtain measurements of Sea and Swell in all parts of the Oceans and under all conditions of weather. These observations are required for completing scales for routine observation and for many other purposes including information upon which to base form of ship's hull and construction.

An article will be found in Volume II, No. 19, upon "Sea and Swell" and on pages 43-8, of "The Marine Observer's Handbook" 4th Edition, instructions are given. Form 684 may be obtained from the Agents.

SPEED OF PORPOISES.

The Aeronautical Research Committee of the National Physical Laboratory are anxious to have reliable information of the speed of Porpoises and in the case of spurts of speed, the duration of them. A member of this committee suggests that "If the very high speeds at which some fishes and sea mammals—particularly the porpoise—are reported to swim could be substantiated, the information would be of great scientific value both to hydrodynamical and aeronautical engineers."

The information required is:—

Speed of ship.

The time during which a particular porpoise maintained the same speed as ship.

The relative position of porpoise and ship.

The estimated difference of speed between porpoise and ship when on nearly parallel courses, with times.

General remarks and confirmatory evidence.

Marine Observers in high speed ships are asked to enter such observations as they may be able to make, in the Meteorological

Log or Form 911 and to obtain and return similar information from Whalers, Sealers and others who may have special opportunities of studying the speed of "fish."

THE PROPAGATION OF SOUND AND WEATHER CONDITIONS.

Marine Observers are requested to log whenever possible the maximum distance at which sound signals or noises are heard at sea, also vagaries and peculiarities of the propagation of sound through the atmosphere at sea.

Every opportunity should be taken to ascertain the position at which the sound was made and to fix the position of the ship hearing the sound, also when sound is apparently cut off, the positions at which this takes place and where the sound is reheard. The method and details of obtaining fixes and measurements should be given.

In cases of ships' sound signals the relative bearings and distance is sufficient, provided that the Latitude and Longitude of the observing ships is given. In all cases time and date is essential.

When such observations are obtained the following weather observations should also be carefully made and recorded:—

Wind True Direction and Force.

Weather by the Beaufort notation.

Types and amount of cloud and their apparent direction and velocity.

Temperature of the air, dry and wet bulb.

Temperature of the sea.

Visibility by scale.

General remarks.

ICE CHART. WESTERN NORTH ATLANTIC.

LETTERS OF TRANSATLANTIC TRACKS INDICATE.

NOTE.—In case of necessity owing to extreme southerly drift of ice, operative dates will be fixed for Track A. (see Copy of letter from Cunard S.S. Co. on this Chart)

- (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) From the opening of the Straits of Belle Isle 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.

IMPORTANT. ROUTE NOTICES.

For latest information re Tracks see Copy of letter from Cunard S.S. Co. on this Chart

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/I Ice Warning Station.

PHENOMENAL POSITIONS OF ICE.

Date.	Ship or Source of Report.	Position. Lat. Long.	Remarks.
June 25, 1886	Brig Blanch...	48°40' N. 15°22' W.	Large berg.
" 5, 1907	S.S. Kingswell ...	39°37' N. 64°25' W.	Several bergs.
" —, 1907	Bque. Silverstream..	80 miles W. of Pastnet.	Berg.
" 11, 1912	S.S. Valetta ...	37°30' N. 74°24' 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 ...	38°23' N. 57°45' W.	Small piece.
" 30, 1921	U.S. Navy Dept.	33°20' N. 49°18' W.	Berg, 10 ft. high.
" 16, 1924	S.S. West Irmo ...	38°03' N. 63°20' W.	Growler.
" 25, 1926	S.S. Baxtergate ...	30°20' N. 62°32' W.	Large pieces, about 30 ft. long and 15 ft. wide, showing about 3 ft. above water.

Reports of Ice sighted between April 1st and April 30th, 1929, which have been received by the Meteorological Office, are shown by the Symbols plotted in the position reported, the figures indicating the day of the month.

LATEST ICE REPORT FROM CANADA.

The following cablegram, dated 12th April, 1929, was received from the Superintendent, Canadian Signal Service, Quebec:—

"Montreal to Fame Point, no ice in sight. Anticosti, Magdalen Islands, Cabot Strait, Northumberland Strait, Gut of Canso, Belle Isle Strait, heavy open and heavy close packed ice everywhere."

IMPORTANT

The following is a copy of a letter received from the Cunard S.S. Co., dated 22nd April, 1929.

North Atlantic Tracks.

"We desire to inform you that the following telegram has to-day been sent to all Lines party to the North Atlantic Lane Routes Agreement:—

"Track Washington reports at least one Iceberg South Westbound 'B' track near Meridian stop in view this and extremely heavy ice conditions have decided that Eastbound 'A' track shall become operative today and Westbound on Twentyseventh April stop Steamers on 'B' track Westbound Twentysecond to twenty-sixth April inclusive make corner latitude fortyone North Longitude Fortyseven West stop Please notify all ships immediately."

This message was sent after consultation with the White Star Line following receipt of cable advice from New York reporting that extremely heavy ice conditions existing along the Eastern edge of the Great Bank indicate much more ice will probably cross 'B' track this Spring."

DERELICTS AND FLOATING WRECKAGE.

Co-operation of Shipowners, Masters and Mates.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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Nearest station Temple, District Railway.
Mr. W. T. GRIEVES, Visiting Officer for the Port
of London.

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

Agents.

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

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

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

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

HONG KONG,
China.

HULL

LEITH

SOUTHAMPTON

SYDNEY,
New South Wales.

TYNE

VANCOUVER,
British Columbia.

Agents (contd.).

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

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

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

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

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

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

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

Date,	Position.		Description.
	Latitude.	Longitude.	
BALTIC.			
6.4.29	55°01'N.	10°55'E.	Drifting wreck.
9.4.29	1½ miles N.E. of Tranekioer Light-house.		Drifting wreck in Langelands Belt.
NORTH SEA.			
1.4.29	53°50'N.	6°30'E.	Black conical buoy, surmounted by staff and marked H.6.
11.4.29	54°56'N.	0°20'E.	Trawler <i>Pegasus G. Y. 1101</i> , abandoned in sinking condition; dangerous to navigation.
14.4.29	53°57'N.	7°22'E.	Sunken wreck with broken mast about 18 ins. in diameter and 2 ft. above surface.
22.4.29	53°46'N.	5°56'E.	Black painted drift globe buoy.
ENGLISH CHANNEL.			
19.4.29	49°52'N.	00°16'W.	Wreckage with waterlogged boat apparently attached to it.
MEDITERRANEAN.			
4.4.29	38°09'N.	24°43'E.	Small Greek ship abandoned.
6.4.29	41°15'N.	3°50'E.	Derelict.
NORTH ATLANTIC.			
1.4.29	21°35'N.	74°08'W.	Wreckage.
2.4.29	43°25'N.	60°20'W.	Black whistling buoy marked <i>Bar Reef</i> dangerous to navigation.
3.4.29	40°09'N.	48°15'W.	Heavy wreckage.
4.4.29	32°20'N.	79°26'W.	Heavy spar, about 60 ft. long, partly submerged.
5.4.29	36°16'N.	75°34'W.	Derelict awash in good condition, drifting slowly to the northeastward.
6.4.29	47°36'N.	9°35'W.	Large log, dangerous to navigation.
6.4.29	44°20'N.	59°56'W.	Passed a broken mast projecting about 7 ft. above the water apparently attached to submerged wreckage.
6.4.29	30°35'N.	79°35'W.	Derelict awash.
6.4.29	29°38'N.	73°46'W.	Derelict about 250 ft. long, with about 5 ft. freeboard.
7.4.29	32°27'N.	79°11'W.	Buoy with cylindrical topmark.
12.4.29	42°37'N.	48°34'W.	Abandoned schooner <i>Sylbrana</i> on fire.
19.4.29	45°32'N.	9°13'W.	Floating wreckage, small skylight painted white, apparently attached to submerged object—probably dangerous.
21.4.29	57°28'N.	18°47'W.	Gas buoy, no marks or number, two lights, one on each side, ball on top, very rusty.
ARABIAN SEA.			
13.4.29	15°52'N.	53°39'E.	Dangerous obstruction totally submerged.
GULF OF MEXICO.			
1.4.29	29°12'N.	94°51'W.	A capsized barge awash, about 85 ft. long and 26 ft. wide and numbered 2.
7.4.29	27°43'N.	91°00'W.	Black cylindrical buoy.
10.4.29	26°40'N.	87°35'W.	Black can buoy, covered with marine growth.
NORTH PACIFIC.			
1.4.29	29°21'N.	167°43'E.	Derelict three masted schooner awash.
3.4.29	40°22'N.	124°33'W.	Log about 14 ft. long and 4 ft. in diameter.
10.4.29	7°08'N.	80°45'W.	Large native log canoe.

LIST OF VOLUNTARY OBSERVING SHIPS

i

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.

Explanation of Abbreviations.

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

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

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

No. = No Meteorological Office instrumental equipment on board.

M = Ship's barometer *mercurial*.

A = Ship's barometer *aneroid*.

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

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

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

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

** = Short range transmission and reception.

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

Selected Ships.

Those ships in this list which have the letters M.L., W.T. or M. after their names in the equipment column are "Selected ships" invited to make by W/T, standard form reports of observations taken at arranged G.M. Times to "All Ships." See "Wireless and Weather an aid to Navigation."

Name of Vessel.	Captain.	Observing Officers.	Meteorological Equipment.	Line.	Last Log, Register, or Report Contributed. Received up to 12.4.29.	Date Received.
Abinsi	Allen, E. E.	L. B. Silvester	No. A.	Elder Dempster	Form 911 27.12.28 to 3.2.29	13.2.29
†† Acera	Wright, J. B.	R. Jones, R. B. Ellis, J. R. Badley, B. C. Haigh, S. H. Griffiths.	M.L.	"	Met. Log. 26.9.28 to 5.2.29.	12.2.29
*† Achilles	Williams, D. T.	A. G. Phillips, N. Anderson, F. W. Hilton.	"	A. Holt	" 17.6.28 to 29.10.28	29.11.28
*† Actor	Haylett, E.	E. Pearce, F. M. Eales, G. Morrice.	"	Harrison	" 27.8.28 to 9.11.28	22.11.28
†† Adda, M.V.	Toft, J. T.	A. E. Lovgreen, J. B. Wright, A. J. Kennedy.	No. M.	Elder Dempster	Form 911 6.6.28 to 20.10.28	1.2.29
††50 Adriatic	Hickson, V. W., R.D., Lt.-Commr. R.N.R.	O. V. Lucas, H. R. Wilkinson, D. W. Chamberlain.	W.T.	White Star	W.T. Reg. 17.2.29 to 7.3.29... Form 911 17.2.29 to 9.3.29...	16.3.29 16.3.29
Aeneas	Wallace, W. K.	D. R. Bannerman	No. A.	A. Holt	" 5.2.29 to 20.2.29...	5.3.29
Agapenor	Ramsay, J.	B. Bell	" A.	"	" 14.2.29 to 4.4.29...	13.4.29
Aidan	Evans, L.	N. Caris	" A.	Booth	" 26.10.28 to 24.2.29	15.3.29
Alban	Buck, R. H.	G. M. Duff	" A.	"	" 28.1.29 to 14.2.29	11.3.29
*† Alipora	Dawson, E. E. N.	C. H. Stokes	" M.	P. and O.	" 1.12.28 to 14.1.29	16.1.29
Almanzora	Huff, G. F.	G. K. Elliott, K. H. Whitaker	" A.	R.M.S.P.	" 3.3.29 to 24.3.29...	26.3.29
††63 Alvertic	Summers, F. F., R.D., Commr. R.N.R.	W. F. Dennison, W. Hill, J. A. Webbe.	W.T.	White Star	W.T. Reg. 3.3.29 to 24.3.29... Form 911 3.3.29 to 24.3.29...	26.3.29 26.3.29
Alondra	Scott, L. S.	H. Peters	No. A.	Yeoward	Form 911 9.3.29 to 31.3.29...	4.4.29
Alynbank	Clayton, W. E.	R. A. B. Ardley	" A.	A. Weir & Co.	" 29.12.28 to 28.2.29	10.4.29
† Andaluia	Thomas, R. J.	H. Austen	No. M.	Blue Star	" 27.1.29 to 11.3.29	18.3.29
Anchises	Woodgett, R. J.	R. Fountain, T. Coyne	" A.	A. Holt	" 18.1.29 to 4.2.29...	13.2.29
†† Andes	Smith, W. E., D.S.O., R.D., Capt. R.N.R.	H. Whittle, H. Sang, A. Nicholls, R. N. Mayo.	M.L.	R.M.S.P. Co.	Met. Log. 27.10.28 to 6.2.29	18.2.29
Antillian	Hannaford, W. T.	"	No. A.	Leyland	Form 911 11.5.28 to 24.7.28	26.7.28
Antiochus	Salter, G. H.	A. C. Abbott	" A.	A. Holt	" 18.1.29 to 10.3.29	19.3.29
*† Aorangi	Crawford, R.	E. V. Bilger, R. Kendall, E. M. Anderson, D. Richards.	M.L.	Canadian-Australasian	Met. Log. 17.10.28 to 31.1.29	12.3.29
††30 Aquitania	Diggle, E. G., R.D., Capt. R.N.R.	R. W. Bee, J. Locke, G. Duguid.	W.T.	Cunard	W.T. Reg. 21.2.29 to 7.3.29... " 14.3.29 to 29.3.29...	16.3.29 2.4.29
††62 Arabic	Bulman, J. B.	W. Hesketh, F. W. Laws.	"	White Star	" 4.3.29 to 22.3.29...	26.3.29
** Arafura	Gordon, A. S.	F. R. Miller, B. W. Dun, C. Stratford.	M.L.	Eastern and Australian	Met. Log. 4.5.28 to 2.11.28...	21.12.28
*† Argyllshire	Wallace, J.	R. W. Cook, C. Reeder	No. M.	Federal	Form 911 9.12.28 to 24.12.28	28.1.29
*† Ariguani	Scudamore, J. H. H., D.S.C., R.D., Commr. R.N.R.	G. McKee, J. W. Dodd, W. Ireland, A. Crone.	M.L.	Elders & Fyffes	Met. Log. 30.7.28 to 25.11.28	13.12.28
Ariosto	Biggins, R. L.	"	No. A.	Ellerman Wilson	Form 911 17.12.28 to 29.12.28	4.2.29
†† Armadale Castle	Knight, A.	"	M.L.	Union Castle	Met. Log. 7.9.28 to 3.3.29	11.3.29
*† Arracan	Macfarlane, W. M. F.	J. Henderson, J. Morrison, F. Scott.	"	P. Henderson	" 18.10.28 to 7.3.29	27.3.29
Arundel	Short, H.	Mr. Hill	C.C.	Southern Rly.	Telegraphic Report 4.4.29	4.4.29
Arundel Castle	Owen, S. H.	P. Clissold	No. A.	Union Castle	Form 911 8.2.29 to 31.3.29...	4.4.29
*† Astronomer	Richards, J.	A. Frew, E. B. Stephens, W. B. Littlechild.	M.L.	Harrison	Met. Log. 5.9.28 to 31.1.29...	14.2.29

Name of Vessel.	Captain.	Observing Officers.	Meteoro- logical Equipment.	Line	Last Log, Register, or Report Contributed. Received up to 12.4.29.	Date Received.
*† <i>Ascanius</i> ...	Wilson, C. A. ...	T. Robb. E. M. Robb. W. H. Elliott.	M.L.	A. Holt ...	Met. Log. 28.10.28 to 1.3.29	18.3.29
<i>Atrous</i> ...	Wilkinson, T. G. ...	H. Nicholas S. C. Linmouth.	No. A.	A. Holt ...	Form 911 28.1.29 to 20.3.29	25.3.29
*† <i>Auditor</i> ...	Owen, W. T. ...	D. O. Percy ...	" M.	Harrison ...	" 23.12.28 to 9.2.29	19.2.29
<i>Autolyceus</i> ...	Dunlop, J. K. ...	" ...	" A.	A. Holt ...	" 25.10.28 to 11.11.28	26.11.28
<i>Balmoral Castle</i> ...	J. H. Kerbey ...	H. A. Deller ...	" A.	Union Castle ...	" 8.2.29 to 25.2.29...	11.3.29
*† <i>Balrarnald</i> ...	Townshend, W. P., Capt., R.N.R.	H. Stinn, G. Owen, F. Ward, L. Bailey.	M.L.	P. & O. Branch	Met. Log. 13.9.28 to 10.1.29	23.1.29
††51 <i>Baltic</i> ...	Warner, G. E., R.D., Capt., R.N.R.	A. C. T'Anson, W. F. Denni- son, H. Phillips.	W.T.	White Star ...	W.T. Reg. 27.11.28 to 17.12.28	19.12.28
<i>Bampton Castle</i> ...	Hutchings, A. H. ...	E. Hamlyn ...	No. A.	Union Castle ...	Form 911 24.12.28 to 14.1.29	16.1.29
*† <i>Banffshire</i> ...	Westropp, T. G. ...	A. Mc L. Pilcher ...	" M.	Turnbull Martin	" 27.11.28 to 14.1.29	16.1.29
*† <i>Baradine</i> ...	Rollo, W. ...	C. B. Roche, B. H. Pollitt, P. Haworth, J. H. Anderson.	M.L.	P. & O. Branch	Met. Log. 1.2.29 to 23.2.29...	2.4.29
*† <i>Barpeta</i> ...	Chandler, H. V. ...	N. Apps ...	No. M.	British India ...	Form 911 9.1.29 to 7.2.29...	11.3.29
*† <i>Barrabool</i> ...	Rhodes, H. R. ...	T. G. Davies ...	" M.	P. & O. Branch	" 11.1.29 to 26.1.29	5.3.29
*† <i>Barranca</i> ...	Edwards, A. C. ...	" ...	M.L.	Elders & Fyffes	" ...	3.12.28
<i>Baychimo</i> ...	Cornwall, S. A. ...	" ...	" A.	Hudson's Bay Co.	W.T. Reg. 5.10.28 to 19.11.28	8.1.29
††59 <i>Belgenland</i> ...	Morehouse, W. A. ...	F. Good, C. H. Otterson, F. Clitty.	W.T.	Red Star ...	Form 911 7.12.28 to 13.12.28	13.8.28
*† <i>Beltana</i> ...	Rollo, W. ...	G. V. Legassick. ...	No. M.	P. & O. Branch	" 24.6.28 to 9.8.28	25.3.29
<i>Benalder</i> ...	Fairweather, J. J. ...	D. T. McCullum ...	" A.	Ben Line ...	" 10.2.29 to 1.3.29...	12.4.29
*† <i>Benalla</i> ...	Sheepwash, J. H. ...	D. E. C. Otter ...	" M.	P. & O. Branch	" 31.1.29 to 1.4.29...	5.3.29
†† <i>Bendigo</i> ...	Nicholl, R. N. C. ...	G. G. Mason ...	" M.	" ...	" 23.1.29 to 14.2.29	3.10.28
*† <i>Benfactor</i> ...	Jones, C. W. ...	S. M. Smith, R. Huntingdon.	" M.	Harrison ...	" 9.8.28 to 28.9.28	2.4.29
<i>Bengloe</i> ...	McCorquodale, A. ...	G. Davidson ...	" A.	Ben Line ...	" 4.2.29 to 4.3.29 ...	8.6.28
††31 <i>Berengaria</i> ...	Rostron, Sir A. H., K.B.E., R.D., Capt. R.N.R.	J. A. Myles, S. A. T. Bullock	W.T.	Cunard ...	W.T. Reg. 1.3.29 to 14.3.29...	18.3.29
*† <i>Berrima</i> ...	Short, C. E. ...	G. H. Durrant ...	No. M.	P. & O. Branch	Form 911 21.3.29 to 4.4.29...	8.4.29
<i>Brenda</i> ...	Lamont, A. ...	N. Ross ...	" A.	Scottish Fishery Brd.	" 25.5.28 to 3.6.28	27.8.28
<i>Brighton</i> ...	Hill, A. ...	Mr. Munton ...	C.C.	Southern Railway	Telegraphic Report 24.3.29	2.4.29
*† <i>British Dominion</i> ...	Taylor, R. J. ...	" ...	No. M.	British Tankers	" ...	24.3.29
*† <i>British Merchant</i> ...	Putt, R. O. ...	" ...	" M.	" ...	" ...	"
<i>Bronte</i> ...	Crappier, J. S. ...	J. B. Scott ...	" A.	Lampart & Holt	Form 911 25.3.28 to 26.4.28	8.6.28
<i>Bruyere</i> ...	Birch, A. ...	" ...	" A.	" ...	" 27.11.28 to 24.2.29	4.3.29
*† <i>Bulysse M.V.</i> ...	Head, B. P. ...	A. J. Clatworthy, J. S. Pike.	" M.	Anglo-Saxon	" 24.1.29 to 11.3.29	15.3.29
*† <i>Buteshire</i> ...	Page, W. J. ...	" ...	M.L.	Petroleum Co.	" ...	"
††65 <i>Calgarie</i> ...	Western, W. ...	C. Cochrane, A. Thompson, E. Hughes.	W.T.	Turnbull Martin	" 14.2.29 to 4.3.29	8.3.29
<i>Cambria</i> ...	Copland, C. P. ...	O. W. Ll. Jones ...	C.C.	White Star ...	W.T. Reg. 15.2.29 to 21.2.29	11.3.29
*† <i>Cambridge</i> ...	Williams, R. ...	" ...	M.L.	L.M. & S. Rly ...	Telegraphic Report 11.4.29	11.4.29
†† <i>Cameronia</i> ...	Gemmell, W. ...	D. Chamberlain ...	M.L.	Federal	" ...	"
†† <i>Camito</i> ...	Forrester, W. T., O.B.E.	H. H. Dunning, W. E. Grant, G. M. Roberts.	"	Anchor	Met. Log. 28.4.28 to 15.9.28	6.11.28
<i>Canadian Importer</i> ...	Forson, A. ...	E. Hamilton ...	No. A.	Elders & Fyffes	" 11.10.28 to 8.3.29	13.3.29
*† <i>Canadian Winner</i> ...	McConechy, W. G. ...	J. M. Lang ...	" M.	Canadian Gov. Mer- cantile Marine.	Form 911 31.1.29 to 28.2.29	6.4.29
*† <i>Canonesa</i> ...	Brodie, W. H. ...	T. Wetherall ...	" M.	" ...	" 17.9.28 to 13.10.28	27.11.28
<i>Cape of Good Hope</i> ...	Lamont, J. ...	W. S. Bartlett ...	No. A.	Furness Houlder ...	" 25.2.29 to 25.3.29	4.4.29
††35 <i>Carmania</i> ...	Brown, F. G., R.D., Capt., R.N.R.	W. M. Stewart, E. R. Taylor, E. Gleave.	W.T.	Lyle S.S. Co. ...	" 30.1.29 to 11.3.29	2.4.29
†† <i>Carnarvon Castle</i> ...	Stanley, W. F., R.D., Commr., R.N.R.	W. G. Smith, T. C. Goldstone, S. S. Smith.	M.L.	Cunard ...	W.T. Reg. 29.10.28 to 17.11.28	20.11.28
††34 <i>Caronia</i> ...	Hossack, W. H., R.D., Capt., R.N.R.	H. G. Hayward, T. Parry, E. R. B. Freeman.	W.T.	Union Castle ...	Met. Log. 14.7.28 to 4.11.28	26.11.28
<i>Casanare</i> ...	Browne, S. ...	" ...	No. A.	Cunard ...	W.T. Reg. 16.12.28 to 31.3.29	5.4.29
†† <i>Cathay</i> ...	Griffin, R. H., O.B.E., R.D., Capt. R.N.R.	" ...	" M.	Elders & Fyffes	Form 911 16.12.28 to 30.3.29	4.4.28
<i>Cavina</i> ...	Riseley, A. D. ...	R. C. Harradon ...	" A.	P. & O. ...	" 26.1.29 to 3.3.29	5.3.29
††52 <i>Cedric</i> ...	Smith R. G. ...	J. H. Walker, S. Fieldwood, W. Nicoll.	W.T.	" ...	" ...	"
*† <i>Centaur</i> ...	Ward Hughes, J. ...	N. L. Thompson, J. Cock- burn, B. L. Brind.	M.L.	Elders & Fyffes	Form 911 25.2.29 to 29.3.29	2.4.29
<i>Ceramic</i> ...	Musgrave, T. ...	H. A. R. Daman ...	No. A.	White Star ...	W.T. Reg. 17.2.29 to 6.4.29...	10.4.29
*† <i>Change</i> ...	Gambrell, F. C. ...	T. Tyer, D. Baigent, D. H. O'Hulton.	M.L.	White Star ...	Form 911 17.2.29 to 7.4.29...	9.4.29
<i>Changuinola</i> ...	Thorburn, R. A., R.D., Commr., R.N.R.	W. G. Chanter ...	No. A.	Ynill & Co. ...	Met. Log. 16.7.28 to 14.12.28	18.2.29
<i>Chindwin</i> ...	Paterson, G. ...	" ...	" A.	Elders & Fyffes	Form 911 15.2.29 to 1.3.29	8.4.29
† <i>Chinkiang</i> ...	Stringer, C. B. L. ...	G. Parker ...	M.L.	" ...	Met. Log. 1.9.28 to 17.1.29...	20.3.29
*† <i>Chirripo</i> ...	McColm, F. ...	S. J. Jackson ...	No. A.	Henderson ...	Form 911 8.2.29 to 12.3.29...	16.3.29
*† <i>City of Baroda</i> ...	McMillan, J. ...	J. E. Jenkins, W. Faichney, F. T. Mallett.	M.L.	China Navigation Co.	Met. Log. 26.11.28 to 7.2.29	8.3.29
<i>City of Benares</i> ...	Anderson, W. W. ...	P. C. Wilson ...	No. A.	China Navigation Co.	Met. Log. 2.8.28 to 31.12.28	5.3.29
*† <i>City of Bombay</i> ...	Brown, O. C. ...	E. H. Roberts ...	" M.	Elders & Fyffes	Form 911 24.1.29 to 23.2.29	5.3.29
*† <i>City of Bristol</i> ...	Jenkins, D. ...	K. G. Crockett ...	" M.	Ellerman ...	Met. Log. 20.7.28 to 31.12.28	2.2.29
<i>City of Canterbury</i> ...	Stanley, A. ...	R. H. Hodgson ...	" A.	" ...	Form 911 5.11.28 to 16.2.29	13.3.29
<i>City of Carlisle</i> ...	Mordue, J. A. ...	" ...	" A.	" ...	" 16.1.29 to 7.4.29...	12.4.29
*† <i>City of Chester</i> ...	Letton, F. W. ...	C. C. Duncan, P. C. Arthur, M. J. Mc Nicol.	M.L.	" ...	" 11.11.28 to 1.12.28	7.1.29
*† <i>City of Edinburgh</i> ...	Wyper, J. ...	G. H. Hummell ...	No. M.	" ...	" 17.2.29 to 19.3.29	8.4.29
<i>City of Hong Kong</i> ...	Walton, H. L., O.B.E., R.D., Commr., R.N.R.	H. Saunders ...	" A.	" ...	Met. Log. 11.1.29 to 12.2.29	18.2.29
<i>City of Khios</i> ...	Reay, A. S. ...	R. E. Thornton ...	" A.	" ...	" 7.10.28 to 13.2.29	25.2.29
<i>City of London</i> ...	Parker, F. W., R.D., Commr., R.N.R.	" ...	No. A.	" ...	Form 911 24.12.28 to 25.1.29	18.2.29
*† <i>City of Osaka</i> ...	Smith, W. H. ...	R. K. Walker ...	No. M.	" ...	" 16.3.29 to 29.3.29	10.4.29
*† <i>City of Rangoon</i> ...	Jones, P. ...	E. R. Wildermuth, R. H. Stewart, F. E. Broadbent.	M.L.	" ...	" 19.2.29 to 10.3.29	2.4.29
<i>City of Yokohama</i> ...	Singleton, J. G. ...	" ...	" A.	" ...	Form 911 28.9.28 to 4.12.28	7.1.29
<i>Clan Alpine</i> ...	Lyall, A. B. ...	P. Sargent ...	No. A.	" ...	" 15.2.29 to 27.3.29	6.4.29
<i>Clan Kenneth</i> ...	Young, A. H., Commr., R.D., R.N.R.	" ...	" A.	" ...	Met. Log. 28.3.28 to 9.7.28	1.8.28
<i>Clan Lindsay</i> ...	Giles, H. J., R.D., Commr., R.N.R.	J. P. Dunkley ...	" A.	" ...	" 5.12.28 to 15.1.29	11.2.29
<i>Clan MacBean</i> ...	Worthington, J. H. ...	W. A. Nicholas ...	" A.	" ...	" 21.12.28 to 14.2.29	18.2.29
<i>Clan Macbeth</i> ...	Hannay, L. G. ...	J. C. Robertson ...	" A.	" ...	" 3.11.28 to 28.11.28	1.1.29
<i>Clan Macfadyen</i> ...	Laird, C. ...	R. L. Smallbone ...	" A.	" ...	" 25.1.29 to 24.2.29	5.3.29
<i>Clan Macfarlane</i> ...	Redford, L. F. ...	T. A. Pearson ...	" A.	" ...	" 8.3.29 to 20.3.29	8.4.29
					" 20.1.29 to 1.2.29	20.2.29
					" 3.11.28 to 30.11.28	23.12.28
					" 28.10.28 to 14.12.28	21.1.29

LIST OF VOLUNTARY OBSERVING SHIPS

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Name of Vessel.	Captain.	Observing Officers.	Meteoro-logical Equipment.	Line.	Last Log, Register, or Report Contributed. Received up to 12.4.29.	Date Received.
<i>Clan Macgillivray</i> ...	Mackinlay, A. ...	F. H. Thornton ...	No. A.	Clan ...	Form 911 11.1.29 to 30.1.29 ...	26.2.29
<i>Clan Macindoe</i> ...	Holman, W. G. ...	... ..	" A.	" ...	" 17.8.28 to 19.9.28 ...	26.2.28
<i>Clan Mackellar</i> ...	Smith, W. P. ...	E. Crowther ...	" A.	" ...	" 16.12.28 to 16.3.29 ...	23.3.29
<i>Clan Macphie</i> ...	Gourlay, J. B. ...	E. H. Stone, K. C. Simpson, I. R. Legg.	M.L.	" ...	Met. Log. 11.6.28 to 12.12.28 ...	28.1.29
<i>Clan Macnaughton</i> ...	Clark, J. ...	A. H. Hersee ...	No. A.	" ...	Form 911 18.3.29 to 30.3.29 ...	10.4.29
<i>Clan Macquarrie</i> ...	West, W. F. ...	T. P. Cranwill ...	" A.	" ...	" 5.1.29 to 7.2.29 ...	12.2.29
<i>Clan Macgarrart</i> ...	Higgins C. J. ...	E. A. Hewson ...	" A.	" ...	" 19.10.28 to 8.1.29 ...	18.1.29
<i>Clan Macwhirter</i> ...	Low, A. ...	F. B. Barker, H. M. Watkins	M.L.	" ...	Met. Log. 18.6.28 to 18.1.29 ...	11.2.29
<i>Clan Malcolm</i> ...	George, L. S. ...	J. Masters, R. L. Ranford, J. F. Hubbard, R. L. Martin.	"	" ...	" 7.7.28 to 21.10.28 ...	19.11.28
<i>Clan Morrison</i> ...	Porterfield, W. M. Lt.-Commr., R.N.R.	L. C. Cuthbert ...	No. A.	" ...	Form 911 5.2.29 to 3.4.29... ..	12.4.29
<i>Clan Murdoch</i> ...	Calderwood, W. ...	J. B. Davies ...	" A.	" ...	" 11.1.29 to 10.2.29 ...	23.2.29
<i>Clan Ranald</i> ...	Fraser, R. K. ...	K. G. Tucker ...	" A.	" ...	" 13.10.28 to 24.12.28 ...	3.1.29
<i>Clan Ross</i> ...	Neill, G. A. ...	... ..	" A.	" ...	" 1.1.29 to 20.1.29 ...	18.2.29
<i>Clan Sinclair</i> ...	Taylor, P. V. ...	J. H. Dennis ...	" A.	" ...	" 17.3.29 to 29.3.29 ...	8.4.29
<i>Colonial</i> ...	Worthington, B. ...	A. S. Milne ...	" M.	T. & J. Harrison	" 18.9.28 to 23.3.29 ...	6.4.29
<i>Comorin</i> ...	Borland, J. Mc.L., C.B., D.S.O., R.D., Capt., R.N.R.	E. C. White ...	" M.	P. & O. ...	" 26.12.28 to 7.2.29 ...	22.2.29
<i>Corinthic</i> ...	Freeman, C. P. ...	E. M. Burt, M. Bennett, I. A. Macnaughton.	M.L.	White Star ...	Met. Log. 8.12.28 to 26.3.29 ...	8.4.29
<i>Cornwall</i> ...	Lamb, C. B. ...	C. R. Brown ...	No. A.	Federal ...	Form 911 10.12.28 to 17.1.29 ...	18.3.29
<i>Culebra</i> ...	Goble, C. J., R.D., Commr., R.N.R.	H. D. Cooper, R. N. Fletcher, W. S. Thomas.	M.L.	R.M.S.P. Co. ...	Met. Log. 6.1.29 to 13.3.29... ..	1.4.29
<i>Cumberland</i> ...	Macmillan, D. ...	P. Shakespear, F. Loughhead, T. Shillito, J. Lennox.	"	Federal... ..	" 29.10.28 to 29.3.29 ...	5.4.29
<i>Cyclops</i> ...	Cosker, W. ...	C. B. P. Anderson ...	No. A.	A. Holt ...	" 26.2.29 to 13.3.29 ...	26.3.29
<i>Daga</i> ...	Wiles, N. ...	A. Olding... ..	No. M.	P. Henderson... ..	" 16.11.28 to 9.12.28 ...	22.12.28
<i>Dakotian</i> ...	Robb, J. ...	H. Arnold ...	" A.	Leyland ...	" 20.1.29 to 26.3.29 ...	3.4.29
<i>Dardanus</i> ...	Glossop, S. ...	R. W. Ellis ...	" A.	A. Holt ...	" 16.3.29 to 31.3.29 ...	10.4.29
<i>Darro</i> ...	Matthews, G. P. ...	... ..	" M.	R.M.S.P. Co. ...	" 26.1.29 to 11.2.29 ...	15.2.29
<i>Delphic</i> ...	Evans, W. ...	H. Williams ...	" M.	White Star ...	" 31.12.28 to 17.1.29 ...	29.1.29
<i>Delta</i> ...	Townshend, W. P., R.D., Capt., R.N.R.	... ..	" M.	P. & O. ...	"	"
<i>Demerara</i> ...	Willan, F. G. L., R.D., Capt., R.N.R.	J. C. Blake ...	" M.	R.M.S.P. Co. ...	" 5.2.29 to 27.3.29.. ..	2.4.29
<i>Demosthenes</i> ...	Ogilvy, A. ...	H. Phillips ...	" M.	Aberdeen Common-wealth	" 25.9.28 to 11.11.28 ...	14.11.28
<i>Denis</i> ...	Harris, F. C. P. ...	J. H. Stokes ...	" A.	Booth ...	" 6.12.28 to 25.2.29 ...	6.4.29
<i>Descado</i> ...	F. S. Hannam ...	G. H. Jordan, A. Barff	" M.	R.M.S.P. Co. ...	" 6.1.29 to 1.3.29 ...	7.3.29
<i>Desna</i> ...	Green, J. ...	L. T. Peterson ...	" M.	" ...	" 3.9.28 to 24.10.28 ...	12.11.28
<i>Deucalion</i> ...	Melling, C. F. ...	R. F. Dryden ...	" A.	A. Holt ...	" 16.3.29 to 21.3.29 ...	2.4.29
<i>Devon</i> ...	Kinnell, G. ...	S. C. Bradley ...	" M.	Federal ...	" 11.2.29 to 3.3.29... ..	26.3.29
<i>Dieppe</i> ...	Marmery, S. ...	Mr. Parsons ...	C.C.	Southern Railway	Telegraphic Report 12.4.29 ...	12.4.29
<i>Dimboola</i> ...	Dawson, J. ...	S. J. Griffith ...	No. A.	Melbourne S.S. Co. ...	Form 911 18.1.29 to 12.2.29 ...	25.3.29
<i>Domala, M.V.</i> ...	Kitson, A. G. ...	H. Robertson ...	" M.	British India ...	" 21.10.28 to 29.12.28 ...	14.1.29
<i>Dominia, C.S.</i> ...	Campos, V., O.B.E., Lt.-Commr., R.N.R.	S. A. Garnham, A. S. Muir, L. J. Hegarty, W. F. Anderson.	M.L.	Telegraph Construc-tion & Maintenance.	Met. Log. 8.8.28 to 5.12.28... ..	27.12.28
<i>Dominic</i> ...	Saxton, C. ...	G. H. Clark ...	No. A.	Booth ...	Form 911 6.1.29 to 4.4.29 ..	10.4.29
<i>EdDoric</i> ...	Binks, J. W., R.D., Lt.-Commr., R.N.R.	F. E. Patchett, J. Farrell, W. E. Smith.	W.T.	White Star ...	" 26.2.29 to 18.3.29 ...	22.3.29
<i>Dorington Court</i> ...	Clarke, E. J. ...	P. Jones ...	No. A.	Haldin & Co. ...	W.T. Reg. 26.2.29 to 18.3.29 ...	23.3.29
<i>Dromore Castle</i> ...	MacMahon, J., R.D., Commr., R.N.R.	J. A. Sowden ...	" A.	Union Castle ...	Form 911 7.1.29 to 14.2.29 ...	16.3.29
<i>Dryden</i> ...	Major, T. W. ...	... ..	" M.	Lampart & Holt	" 3.11.28 to 1.12.28 ...	1.1.29
<i>Dunaff Head</i> ...	Butt, H. L., R.D., Lt.-Commr., R.N.R.	D. Martin ...	" A.	Ulster S.S. Co. ...	" 21.10.28 to 14.1.29 ...	7.2.29
<i>Dundrum Castle</i> ...	Goodacre, R. W., R.D., Commr., R.N.R.	A. R. J. Tilston ...	" A.	Union Castle ...	" 22.1.29 to 6.2.29 ...	18.2.29
<i>Dunluce Castle</i> ...	Morgan, A. O., R.D., Commr., R.N.R.	W. M. Mulhall ...	" A.	" ...	" 13.4.28 to 11.5.28 ...	21.5.28
<i>Dunrobin</i> ...	Ramsay, J. D. ...	C. H. Kendall ...	" A.	" ...	" 19.10.28 to 27.12.28 ...	28.12.28
<i>Duquesa</i> ...	Barker, A. W. ...	J. G. Freeman ...	" M.	Glen & Co. ...	" 1.3.29 to 8.4.29 ...	12.4.29
<i>Durenda, M.V.</i> ...	Beeching, P. H. ...	F. E. Liles ...	" M.	Furness Withy ...	" 13.1.29 to 14.3.29 ...	19.3.29
<i>Edinburgh Castle</i> ...	Gardner, G. F., O.B.E., Lt.-Commr., R.N.R.	C. P. Goode ...	" A.	British India ...	" 8.12.28 to 17.12.28 ...	21.1.29
<i>Egori</i> ...	Sola, P., D.S.O. ...	R. W. Pattinson ...	" A.	Union Castle ...	" 25.1.29 to 17.3.29 ...	21.3.29
<i>Eldon Park</i> ...	Burns, R. ...	D. Rankine ...	" M.	Elder Dempster ...	" 26.11.28 to 22.1.29 ...	1.2.29
<i>Elpenor</i> ...	Gordon, A. L. ...	C. Kavanagh, J. E. Iliff	M.L.	Denholm S.S. Co. ...	" 5.11.28 to 9.2.29 ...	20.2.29
<i>Elstree Grange</i> ...	St. Pierre, P. ...	... ..	No. M.	A. Holt ...	Met. Log. 7.7.28 to 2.11.28... ..	7.11.28
<i>Elysia</i> ...	Duncan, A. R. ...	D. Blair, G. S. Sinclair, W. Black.	M.L.	Houlder ...	"	"
<i>Empress of Asia</i> ...	Hailey, A. J., Lt.-Commr., R.N.R.	L. M. Goddard, J. F. Patrick, R. J. Hickey, E. Newell, A. G. Simmons	"	Anchor ...	Met. Log. 9.11.28 to 16.1.29 ...	25.1.29
<i>Empress of France</i> ...	Robinson, S., C.B.E., R.D., Commr., R.N.R.	... ..	"	Canadian Pacific ...	" 11.10.28 to 9.2.29 ...	13.3.29
<i>Empress of Russia</i> ...	Hosken, A. J. ...	R. A. Leicester, J. G. McQuarrie, A. C. Jones.	"	" ...	" 28.11.28 to 2.3.29 ...	3.4.29
<i>Endeavour</i> ...	Law, E. F. B., Commr., R.N.	P. Barlow, S. J. Hennessey, W. M. Passmore, M. B. Thomas.	"	" ...	" 2.8.28 to 10.11.28 ...	10.12.28
<i>Enterprise</i> ...	Pridham-Wippell, H.D., Capt., R.N.	... ..	"	His Majesty's Ship ...	" 15.11.28 to 14.3.29 ...	8.4.29
<i>Essequibo</i> ...	Kirkwood, J. H. ...	J. H. E. Evans ...	No. M.	" ...	"	"
<i>Eumæus</i> ...	Read, J. W. ...	... ..	" A.	R.M.S.P. Co. ...	Form 911 12.7.28 to 26.9.28 ...	16.11.28
<i>Euryades</i> ...	Findlay, J. ...	W. K. Hole ...	No. A.	A. Holt ...	" 17.2.29 to 19.3.29 ...	4.4.29
<i>Explorer</i> ...	Ling, J. T. ...	H. W. Gostage ...	" M.	A. Holt ...	" 26.1.29 to 8.3.29... ..	6.4.29
<i>Explorer</i> ...	Allan, J. ...	A. Stout, F. O. Sheehy	" A.	Harrison ...	" 14.10.28 to 4.1.29 ...	9.1.29
<i>Ferndale</i> ...	Thompson, W. ...	R. S. Hartrick ...	No. M.	Scottish Fishery Board.	" 2.3.29 to 27.3.29... ..	2.4.29
<i>Fordsdale</i> ...	Richardson, A. V. ...	F. Vaughan ...	" M.	Aberdeen Common-wealth.	" 7.7.28 to 5.8.28 ...	23.8.28
				Aberdeen Common-wealth.	" 22.2.29 to 18.3.29 ...	4.4.29

Name of Vessel.	Captain.	Observing Officers.	Meteoro-logical Equipment.	Line	Last Log, Register, or Report Contributed. Received up to 12.4.29.	Date Received.
<i>Francisco</i> ...	Aspinall, A. E. ...	W. F. Hewetson ...	No. A.	Ellerman Wilson ...	Form 911 17.2.29 to 29.3.29 ...	2.4.29
<i>Freya</i> ...	Angus, W. ...	W. Pirrie ...	" A.	Scottish Fishery Board.	" 12.3.29 to 31.3.29 ...	3.4.29
<i>Garth Castle</i> ...	Linklater, H. ...	T. H. Whatley ...	" A.	Union Castle ...	" 1.11.28 to 29.12.28 ...	3.1.29
<i>Gascoyne</i> ...	Johnson, L. ...	W. J. Macphedran, C. Melson, J. S. Macbryde.	M.L.	A. Holt & Co. ...	Met. Log. 21.5.28 to 6.9.28 ...	29.10.28
<i>Glamorganshire</i> ...	Purvis, A. ...	E. A. E. Littlewood ...	No. M.	R.M.S.P. Co. ...	Form 911 17.9.28 to 19.10.28 ...	25.10.28
<i>Glenamoy, M.V.</i> ...	Homan, C. E. ...	R. W. Emerson, R. W. Brooks, J. R. Taylor.	M.L.	Glen Line ...	Met. Log. 25.6.28 to 7.11.28 ...	6.12.28
<i>Glenapp</i> ...	Ingram, T. F. ...	" ...	No. A.	" ...	Form 911 19.1.29 to 27.2.29 ...	2.4.29
<i>Glenbeg</i> ...	Newing, L. ...	A. D. Brown ...	No. A.	" ...	" 27.10.29 to 18.1.29 ...	22.1.29
<i>Glenegarray</i> ...	Angier, J. ...	F. C. White ...	" M.	" ...	Form 911 30.1.29 to 27.2.29 ...	22.3.29
<i>Glenluce</i> ...	Kennett, W. H. ...	H. B. Porter ...	" A.	" ...	" 10.1.29 to 29.1.29 ...	25.2.29
<i>Glenishane</i> ...	Suter, S. C. ...	" ...	" A.	" ...	" 10.11.28 to 1.4.29 ...	6.4.29
<i>Glenworth</i> ...	Kilgour, H. A. ...	J. S. Armstrong ...	No. A.	R. S. Dalgleish ...	" 26.12.28 to 5.2.29 ...	14.2.29
<i>Gloucestershire</i> ...	Robin, E. ...	W. Moore ...	" A.	Bibby ...	" 1.12.28 to 8.2.29 ...	12.2.29
<i>Gloxinia</i> ...	Pool, F. G. ...	" ...	" A.	Stag Line ...	" 4.1.29 to 26.1.29 ...	30.1.29
<i>Halesius</i> ...	Samuels, C. ...	N. MacLeod ...	" A.	R. P. Houston ...	" 6.1.29 to 4.2.29 ...	25.2.29
<i>Haliartius</i> ...	Felton, W. J. ...	F. D. Bonney ...	" A.	" ...	" 13.11.28 to 8.2.29 ...	28.2.29
<i>Hardwicke Grange</i> ...	Powder, W. H. ...	" ...	No. M.	Houlder ...	" 20.1.29 to 20.3.29 ...	2.4.29
<i>Harmonides</i> ...	Elwell, F. R. ...	R. H. Pape ...	" A.	R. P. Houston ...	" 11.1.29 to 4.2.29 ...	5.3.29
<i>Hatimura</i> ...	Parkin, J. W. ...	L. E. Heath ...	" M.	British India ...	" 13.2.29 to 14.3.29 ...	16.3.29
<i>Hauraki, M.V.</i> ...	Norton, A. T. ...	D. M. McLeish, C. H. George, F. C. Cochran.	M.L.	Union S.S. Co., N.Z. ...	Met. Log. 17.4.28 to 25.10.28 ...	4.1.29
<i>Henry G.S.</i> ...	Bicker Caarten, A. ...	M. A. Green ...	No. M.	W. I. & Panama Telegraph Co.	Form 911 13.10.28 to 31.10.28 ...	3.12.28
<i>Herald</i> ...	Turner, H. E., Lieut.-Commr.	W. H. Martin ...	M.L.	His Majesty's Ship ...	Met. Log. 31.10.28 to 28.11.28 ...	9.1.29
<i>Herefordshire</i> ...	Griffiths, C. H. ...	M. D. Loutill ...	No. A.	Bibby ...	Form 911 17.11.28 to 24.1.29 ...	2.2.29
<i>Herminius</i> ...	Roberts, T. V. ...	D. W. MacGregor ...	" A.	Aberdeen Commonwealth.	" 17.1.29 to 2.3.29 ...	12.4.29
<i>Herschel</i> ...	Watson, W. W. ...	" ...	" A.	Lampert & Holt ...	" 13.11.28 to 2.12.28 ...	8.12.28
<i>Hestone</i> ...	McComish, A. B. ...	" ...	No.	R. P. Houston ...	" ...	"
<i>Hibernia</i> ...	Roberts, W. Ivor, M.B.E.	R. Woodall, A. Marsh ...	C.C.	L.M. & S. Railway ...	Telegraphic Report 16.3.29 ...	16.3.29
<i>Highland Laddie</i> ...	Jones, T. J. ...	E. F. Smart ...	No. A.	Nelson ...	Form 911 22.4.28 to 12.6.28 ...	9.7.28
<i>" Piper</i> ...	Collings, D. ...	R. G. Owen, A. Southgate, W. Stephen.	M.L.	" ...	Met. Log. 23.6.28 to 10.1.29 ...	21.1.29
<i>" Pride</i> ...	Robinson, R. H. ...	F. Quelch ...	No. A.	" ...	Form 911 8.9.28 to 3.11.28 ...	7.11.28
<i>" Prince</i> ...	Taylor, F. ...	W. A. Hall ...	" A.	Prince ...	" 1.1.29 to 10.3.29 ...	27.3.29
<i>" Rover</i> ...	McKinnon, H. ...	E. Smart ...	" A.	Nelson ...	" 1.1.29 to 18.2.29 ...	11.3.29
<i>Hildebrand</i> ...	Peregrine, D. ...	" ...	" A.	Booth ...	" 11.1.29 to 26.2.29 ...	28.2.29
<i>Hobson's Bay</i> ...	Kydd, O. J. ...	R. Pearce, J. Worrall, D. Horn, R. S. Winnall.	M.L.	Aberdeen Commonwealth.	Met. Log. 30.10.28 to 11.2.29 ...	5.3.29
<i>Holbein</i> ...	Gough, W. A. ...	F. Delaney ...	No. A.	Lampert & Holt ...	Form 911 6.1.29 to 17.3.29 ...	2.4.29
<i>††54 Homerie</i> ...	White, E. R., R.D., Commr. R.N.R.	H. G. Morgan, S. B. Morfee, W. T. Poustie.	W.T.	White Star ...	W.T. Reg. 17.1.29 to 31.1.29 ...	13.2.29
<i>Hororata</i> ...	Barnett, H. ...	E. A. Quick ...	No. A.	New Zealand S.S. Co.	Form 911 17.1.29 to 8.2.29 ...	18.3.29
<i>Hubert</i> ...	Briscoe, W. ...	G. G. Westhorp ...	" A.	Booth ...	" 21.2.29 to 1.3.29 ...	22.3.29
<i>Huntingdon</i> ...	Field, H. G. B. ...	H. G. Letts ...	" A.	Federal ...	" 16.2.29 to 5.3.29 ...	25.3.29
<i>†† Huntsman</i> ...	Russell, H. ...	J. Richardson ...	" M.	Harrison ...	" 13.4.28 to 15.8.28 ...	3.9.28
<i>†† Hydaspes</i> ...	Williams, P. E. ...	P. McMillan ...	No. M.	R. P. Houston ...	" 5.1.29 to 16.2.29 ...	11.3.29
<i>†† Ingoma</i> ...	Gibbings, W. ...	W. E. Williams ...	" M.	Harrison ...	Form 911 26.1.29 to 11.3.29 ...	21.3.29
<i>Inkum</i> ...	Meethan, J. T. ...	" ...	" A.	J. H. Welsford ...	" 10.10.28 to 24.10.28 ...	3.11.28
<i>†† Iris, C.S.</i> ...	Hughes, H. E. ...	D. MacDonald, T. Vickers, J. Hare, G. Holthouse.	M.L.	Pacific Cable Board ...	Met. Log. 23.2.28 to 10.1.29 ...	15.3.29
<i>Iroquois</i> ...	Nares, J. D., D.S.O., Capt. R.N.	A. B. Foulston ...	"	His Majesty's Ship ...	" 1.9.28 to 30.11.28 ...	8.1.29
<i>†† Ixion</i> ...	Collins, H. M. ...	" ...	"	A. Holt ...	Form 911 9.10.28 to 26.10.28 ...	19.12.28
<i>Japanese Prince</i> ...	Marshall, F. ...	J. B. Morrison ...	No. A.	Prince ...	" 19.1.29 to 15.2.29 ...	18.3.29
<i>†† Jervis Bay</i> ...	Chaplin, W. R. ...	R. W. Laycock ...	" M.	Aberdeen Commonwealth.	" 20.12.27 to 23.4.28 ...	14.5.28
<i>†† Jeypore</i> ...	Cooper, C. P., O.B.E., R.D. Capt. R.N.R.	" ...	" M.	P. & O. ...	" ...	"
<i>Justin</i> ...	Bush, H. ...	L. G. McMillan ...	" A.	Booth ...	" 28.12.28 to 10.1.29 ...	8.2.29
<i>†† Kaisar-i-Hind</i> ...	Manley, G. ...	R. H. Hand ...	" M.	P. & O. ...	" 2.2.29 to 28.3.29 ...	6.4.29
<i>†† Kalyan</i> ...	Cornwall Jones, B. ...	W. R. B. Noel ...	" M.	P. & O. ...	" 10.12.28 to 22.2.29 ...	5.3.29
<i>†† Kangaroo</i> ...	Norris, H. C. ...	E. Hutchinson, J. Edward, H. Reynolds.	M.L.	State Service Australia.	Met. Log. 2.4.28 to 1.8.28 ...	29.10.28
<i>†† Karamea</i> ...	McIntosh, A. ...	" ...	" M.	Shaw, Savill & Albion	" 15.9.28 to 17.1.29 ...	23.1.29
<i>†† Karapara</i> ...	Miller, A. C. ...	J. Smail ...	No. M.	British India ...	Form 911 13.2.29 to 5.3.29 ...	2.4.29
<i>†† Kashgar</i> ...	Northcote, H. B., R.D., Commr. R.N.R.	R. P. Eddy ...	" M.	P. & O. ...	" 12.2.29 to 22.3.29 ...	26.3.29
<i>†† Kashmir</i> ...	Bent, E. ...	" ...	" M.	P. & O. ...	Form 911 19.10.28 to 4.1.29 ...	17.1.29
<i>†† Khandalla</i> ...	Baird, S.K. ...	" ...	" M.	British India ...	" ...	"
<i>†† Khiva</i> ...	Britten, P. O. ...	C. E. Arundel, J. A. Ridley, H. V. Williamson.	M.L.	P. & O. ...	Met. Log. 23.8.28 to 2.12.28 ...	7.12.28
<i>†† Knight Companion</i> ...	Davis, A. L. ...	J. H. Isherwood ...	No. M.	A. Holt ...	Form 911 24.2.29 to 15.3.29 ...	27.3.29
<i>†† Koolinda, M.V.</i> ...	Buckeridge, J. Kavanagh, J.	" ...	" M.	State Service, Australia.	" 24.7.28 to 6.9.28 ...	15.10.28
<i>††37 Laconia</i> ...	Doyle, M. ...	E. W. Connell, A. B. Fasting, F. G. Russell ...	W.T.	Cunard ...	W.T. Reg. 3.3.29 to 24.3.29 ...	2.4.29
<i>Laguna</i> ...	Dunn, R. E., O.B.E. ...	R. W. Hanson ...	No. A.	Pacific S.N. Co. ...	Form 911 20.1.29 to 26.2.29 ...	28.2.29
<i>†† Lahore</i> ...	Gordon, L. M., R.D., Commr. R.N.R.	E. B. Elcoate ...	" M.	P. & O. ...	" 25.1.29 to 11.2.29 ...	22.3.29
<i>Lalande</i> ...	Hamill, H. ...	" ...	No. A.	Lampert & Holt ...	" 30.10.28 to 27.1.29 ...	7.2.29
<i>Lancashire</i> ...	de Legh, P. ...	R. Allen ...	" A.	Bibby ...	" 29.12.28 to 6.3.29 ...	11.3.29
<i>††36 Lancastria</i> ...	Townley, J. C. R.D., Commr. R.N.R.	G. Overton, P. L. Williams, J. W. Counce.	W.T.	Cunard ...	W.T. Reg. 11.3.29 to 12.3.29 ...	2.4.29
<i>Laomedon</i> ...	Hatfield, F. ...	O. P. H. Wynne ...	No. A.	A. Holt ...	Form 911 10.3.29 to 16.3.29 ...	2.4.29
					Form 911 27.2.29 to 14.3.29 ...	8.4.29

LIST OF VOLUNTARY OBSERVING SHIPS

V

Name of Vessel.	Captain.	Observing Officers.	Meteoro-logical Equipment.	Line.	Last Log, Register, or Report Contributed. Received up to 12.4.29.	Date Received.
*† La Paz, M.V. ...	Benson, C. W. ...	J. D. Richards ...	No. M.	Pacific S.N. Co. ...	Form 911 4.2.29 to 11.3.29...	15.3.28
††55 Lapland ...	Harvey, H. ...	B. Harries, L. A. Williams J. C. Flett, J. A. Mackie.	W.T.	Red Star ...	W.T. Reg. 26.11.28 to 15.12.28 Form 911 19.1.29 to 26.1.29	19.12.28 8.3.29
*† Largs Bay ...	Beighton, J. N. ...	... ..	No. M.	Aberdeen Common-wealth.	Form 911 19.9.28 to 28.12.28	12.2.29
††64 Laurentic ...	Trant, E. L., R.D., Commr., R.N.R.	J. W. Peters, R. Hawkyms ...	W.T.	White Star ...	W.T. Reg. 26.2.29 to 5.3.29... Form 911 26.2.29 to 18.3.29	26.3.29 25.3.29
*† Lautaro, M.V. ...	Leyne, R. W. ...	J. T. Denley ...	No. M.	Pacific S.N. Co. ...	" 27.11.28 to 12.1.29	22.1.29
*† Leicestershire ...	English, G. L. ...	R. S. Evans, H. G. Walton, E. D. Brand, A. Thomson.	M.L.	Bibby ...	Met. Log. 27.10.28 to 9.1.29	30.1.29
Leighton, M.V. ...	Lindesay, J. M. ...	... ..	No. A.	Lampart & Holt ...	Form 911 1.5.28 to 20.5.28	19.6.28
Leltrim ...	Robertson, A. ...	S. J. Woodhouse ...	" A.	" " " " " "	" 13.12.28 to 3.1.29	4.2.29
*† Limerick ...	Molyneux, P. L. ...	G. Chaplin ...	" M.	Federal ...	" 18.1.29 to 24.2.29	18.3.29
Llandaff Castle ...	Gilbert, E. F. ...	W. A. Cooke ...	" A.	Union Castle ...	" 29.12.28 to 16.1.29	12.2.29
*† Llandovery Castle ...	Stuart, R. E., Capt. R.N.R.	C. H. Williams, G. Moon, P. Clissold.	M.L.	" " " " " "	Met. Log. 15.11.28 to 21.1.29	1.2.29
*† Lobos, M.V. ...	Pape, E. R. ...	S. E. Ayland ...	No. M.	Pacific S.N. Co. ...	Form 911 17.12.28 to 5.1.29	15.1.29
Loch Katrine ...	Schlanbusch, O. V. ...	D. A. Mallinson ...	No. A.	R.M.S.P. Co. ...	" 8.10.28 to 4.1.29	9.1.29
*† Logician ...	Gibbings, W. ...	A. G. S. Madrell ...	No. M.	Harrison ...	" 22.6.28 to 15.10.28	19.10.28
*† London Importer ...	Nuttall, E. L. ...	F. F. Feint, J. H. Metcalfe, J. G. Freeman.	" M.	Furness Withy ...	Met. Log. 8.1.28 to 31.3.28	14.4.28
Lord Antrim ...	Jarvis, F. E. ...	... ..	No. A.	Ulster S.S. Co. ...	Form 911 4.1.29 to 19.1.29...	23.1.29
Loriga, M.V. ...	Clapham, E. C. ...	D. P. Morgan ...	" A.	Pacific S.N. Co. ...	" 20.11.28 to 14.12.28	3.1.29
*† Losada, M.V. ...	Ross, J. ...	D. Beamer ...	" M.	" " " " " "	" 12.1.29 to 28.1.29	16.2.29
†† Macedonia ...	Harrison, R. ...	C. J. L. Hayward ...	" M.	P. & O. ...	" 21.1.29 to 2.2.29...	26.3.29
*† Macharda ...	Hanna, R. G. ...	T. Johnston, H. M. Russell ...	" M.	Brocklebank ...	" 12.11.28 to 26.1.29	11.2.29
*† Mahrona ...	Addy, M. J. ...	J. Kettlewell ...	No. M.	" " " " " "	" 17.1.29 to 23.2.29	18.3.29
*† Mahsud ...	Kershaw, R. W. ...	J. D. Paisley ...	" M.	" " " " " "	" 23.2.29 to 11.3.29	2.4.29
*† Maldan ...	Rowe, J. P. ...	... ..	" M.	" " " " " "	" " " " " "	" " " " " "
*† Malhar ...	Charlton, W. L. ...	J. W. B. Robertson, C. Cad- wallader, A. D. Spring.	M.L.	" " " " " "	Met. Log. 2.11.28 to 10.3.29	8.4.29
*† Maimoa ...	Johnson, J. W. ...	D. Aitchison, A. D. Masters, R. Belford.	"	Shaw, Savill & Albion	" 11.11.28 to 15.3.29	19.3.29
Matmyo ...	Smith, G. C. ...	H. M. Drummond ...	No. A.	Brocklebank ...	Form 911 18.8.28 to 14.11.28	29.11.28
††58 Majestic ...	Marshall, W. C.B., D. S. O., R. D., Commodore R.N.R.	W. W. Pearson, A. E. Dyer W. T. Fitz Gerald, A. H. Young.	W.T.	White Star ...	W.T. Reg. 1.2.29 to 14.2.29	18.2.29
*† Makalla ...	Maugham, J. W. ...	A. L. Harrop ...	No. M.	Brocklebank ...	Form 911 29.1.29 to 8.3.29	2.4.29
*† Makambo ...	Williams, D. J. ...	R. Perry, R. A. Williams S. Sandison.	M.L.	Burns Philp ...	Met. Log. 30.6.28 to 20.11.28	4.1.29
*† Makura ...	McLean, J. ...	J. Hood, J. Billingham, G. Edwards.	"	Canadian- Australasian	" 17.5.28 to 27.9.28	2.1.29
*† Malabar, M.V. ...	Donaldson, A. ...	L. Millar ...	" M.	Burns, Philp & Co. ...	" 5.5.28 to 14.10.28	2.1.29
*† Malakuta ...	Adamson, F. L. ...	N. Grayson ...	No. M.	Brocklebank ...	Form 911 18.9.28 to 28.11.28	6.12.28
*† Malancha ...	Whitham, F. ...	... ..	" M.	" " " " " "	" 1.12.28 to 21.2.29	26.3.29
*† Malda ...	Gray, T. N. ...	... ..	" M.	British India ...	" 11.2.29 to 20.3.29	4.4.29
†† Maloja ...	Browning, J. B., R.D., Commr. R.N.R.	A. D. Dennis ...	" M.	P. & O. ...	" 4.2.29 to 17.2.29	2.4.29
†† Malva ...	Norman, W. A. ...	G. C. Case, F. D. Shaw ...	" M.	" " " " " "	" 6.10.28 to 9.1.29	22.1.29
†† Manchester Brigade ...	Stott, C. H. ...	J. H. Round, H. Boyce, E. E. Bonnaud.	M.L.	Manchester Liners ...	Met. Log. 25.8.28 to 4.2.29	15.2.29
Manchester Cor- poration.	Makin, T. ...	J. F. Whitley ...	No. A.	" " " " " "	Form 911 6.1.29 to 12.2.29	19.2.29
*† Manchester Hero ...	Riley, J. E. ...	H. Anderton, J. H. Emmett, H. Dobson, A. Ricketts, A. Grant.	M.L.	" " " " " "	Met. Log. 24.3.28 to 12.10.28	19.10.28
Manchester Producer	Struss, F. D. ...	... ..	No. A.	" " " " " "	Form 911 2.3.29 to 31.3.29	3.4.29
*† Manela ...	Maples, S. H. ...	... ..	No. M.	British India ...	" " " " " "	" " " " " "
*† Mangalore ...	Mulchay, G. ...	... ..	" M.	Brocklebank ...	" " " " " "	" " " " " "
*† Manipur ...	Cochran, G. N. ...	R. Penston, G. B. Falconer ...	No. M.	Brocklebank ...	" 28.10.28 to 14.1.29	24.1.29
*† Manistee ...	Pengelly, J. ...	... ..	No.	Elders & Fyfes ...	" " " " " "	" " " " " "
*† Manora ...	Hudson, H. T., R.D., Commr., R.N.R.	... ..	No. M.	British India ...	Form 911 30.12.28 to 28.3.29	2.4.29
†† Mantua ...	Davis, H. C. D.S.C., Commr., R.N.R.	... ..	" M.	P. & O. ...	" 4.11.28 to 7.2.29...	25.2.29
*† Marella ...	Mortimer, S. ...	... ..	M.L.	Burns Philp ...	Met. Log. 3.7.28 to 18.9.28...	19.1.29
*† Marengo ...	Curle, J. ...	H. Bryan, G. W. Revell, F. Foyal, S. Butcher.	"	Ellerman Wilson ...	" 18.7.28 to 6.1.29...	22.1.29
Maresfield ...	Berry, V. ...	T. Connolly ...	No. A.	Woods, Tyler & Brown	Form 911 3.5.28 to 19.5.28...	9.6.28
†† Margha ...	Hughes, C. G. ...	P. Wright, H. Watkins ...	M.L.	British India ...	Met. Log. 1.12.28 to 28.2.29	5.3.29
†† Marquesa ...	Smiles, R. S. ...	L. Owen ...	No. M.	Furness Houlder ...	Form 911 15.10.28 to 22.12.28	28.12.28
*† Marsina ...	Williams, G. E. ...	... ..	No. A.	Burns, Philp & Co. ...	" 4.2.29 to 2.3.29	8.4.29
*† Matakana ...	Thurston, H. P. ...	E. Davies, B. Forbes-Moffatt, J. Dickson.	M.L.	Shaw, Savill & Albion	Met. Log. 29.9.28 to 11.2.29	13.2.29
Mataram ...	Voy, W. ...	... ..	No. A.	Burns, Philp & Co. ...	Form 911 23.1.29 to 22.2.29	2.4.29
†† Mataroa ...	Kershaw, W. A. R. ...	F. Eadon, J. J. Nicoll, C. Meyer.	M.L.	Shaw, Savill, & Albion	Met. Log. 28.9.28 to 4.1.29	7.1.29
*† Matheran ...	Ison, W. A. ...	J. Richardson ...	No. M.	Brocklebank ...	Form 911 6.11.28 to 18.11.28	23.11.28
*† Matiana ...	Green, F. V. ...	... ..	" M.	British India ...	" 4.12.28 to 12.2.29	16.3.29
*† Matra ...	Cornish, N. P. ...	W. Gibson ...	" M.	Brocklebank ...	" 28.11.28 to 23.3.29	27.3.29
*† Maunganui ...	Martin, W. ...	A. J. Herbert ...	" M.	Union S.S. Co. of N.Z.	" 25.1.29 to 18.2.29	2.4.29
††32 Mauritania ...	McNeil, S. G.S., R.D., Capt. R.N.R.	R. H. C. Crawford, C. B. Os- borne, B. J. P. Tuck.	W.T.	Cunard ...	W.T. Reg. 6.2.29 to 22.3.29	26.3.29
††66 Megantic ...	Kearney, J. ...	F. E. Patchett ...	W.T.	White Star ...	Form 911 16.7.28 to 2.8.28	13.8.28
††22 Melita ...	Stewart, A. ...	J. Shearer ...	W.T.	Canadian Pacific ...	W.T. Reg. 15.3.29 to 30.3.29	2.4.29
*† Memnon ...	Watson, C. J. ...	J. A. C. McGregor ...	No. A.	A. Holt ...	Form 911 12.1.29 to 23.1.29	28.1.29
††21 Metagama ...	McCombie, G. F., R.D., Commr.	C. L. de H. Bell, J. Stewart, J. Coldwell	W.T.	Canadian Pacific	W.T. Reg. 4.3.29 to 21.3.29	8.4.29
*† Middlesex ...	Wilde, H. ...	D. J. Murray, ...	No. M.	Federal ...	Form 911 22.1.29 to 6.2.29	5.3.29
*† Minna ...	Mackenzie, G. G. ...	A. M. Campbell ...	" A.	Scottish Fishery Brd.	" 28.2.29 to 25.3.29	2.4.29
††23 Minnedosa ...	McQueen, D. S. ...	F. E. Williams, C. D. Watt, W. J. P. Roberts.	W.T.	Canadian Pacific ...	W. T. Reg. 17.2.29 to 3.3.29	18.3.29
†† Minnesota ...	Finch, E., R. D., Commr. R.N.R.	... ..	No. M.	Atlantic Transport ...	Form 911 27.11.28 to 16.12.28	28.12.28
†† Minnetonka ...	Gates, T. F., C.B.E. ...	H. E. D. McCartney ...	" M.	" " " " " "	" 17.2.29 to 6.4.29	9.4.29
†† Minnewaska ...	Claret, F. H., C.B.E., Commr. R.N.R.	F. J. Mummery ...	" M.	" " " " " "	" 4.3.29 to 9.3.29	26.3.29
Mississippi ...	Wylie, J. T. J. ...	W. M. Shoesmith ...	No. A.	Atlantic Transport ...	" 13.2.29 to 25.2.29	27.2.29
*† Modasa ...	Gilchrist, J. W. ...	A. E. Baker, E. Crozier ...	" M.	British India ...	" 10.6.28 to 28.8.28	18.9.28
Moeraki ...	Loriard, C. ...	F. E. Lucas ...	No. A.	Union S.S. Co. of N.Z.	" 11.1.29 to 17.2.29	2.4.29

Name of Vessel.	Captain.	Observing Officers.	Meteoro-logical Equipment.	Line.	Last Log, Register, or Report Contributed. Received up to 12.4.29.	Date Received.
†† <i>Moldavia</i> ...	Burleigh, C. W., D.S.O., R.D., Capt., R.N.R.	C. B. Holmes ...	No. M.	P. & O. ...	Form 911 8.2.29 to 23.2.29 ...	11.3.29
†† <i>Mongolia</i> ...	Furlong, G. H. S., R.D., Capt., R.N.R.	A. H. Cole ...	" M.	" ...	" 26.1.29 to 15.2.29 ...	2.4.29
††24 <i>Montcalm</i> ...	Landy, E. ...	F. H. Steel, M. Williams, L. Thornton.	W.T.	Canadian Pacific ...	W.T. Reg. 11.11.28 to 29.11.28 ...	4.12.28
††25 <i>Montclare</i> ...	Griffiths, J. N. ...	A. Mansey, E. A. Shergold, T. Sargent.	"	" ...	" 24.2.29 to 10.4.29 ...	12.4.29
†† <i>Montoro</i> ...	Williams, D. J. ...	D. J. L. Pemberton, R. M. Blunt, J. Campbell,	M.L.	Burns, Philp & Co. ...	Met. Log. 15.3.28 to 12.7.28 ...	31.10.28
††26 <i>Montrose</i> ...	Dott, J. F. ...	J. Soame, J. M. Roche ...	W.T.	Canadian Pacific ...	W.T. Reg. 11.3.29 to 29.3.29 ...	5.4.29
††20 <i>Montroyal</i> ...	Freer, A. R.D., Capt., R.N.R.	L. Outram, D. Ewing ...	"	" ...	" 3.3.29 to 20.3.29... ...	26.3.29
†† <i>Moresby</i> ...	Henderson, D. A., Commr., R.N.	G. A. Gould ...	M.L.	His Majesty's Australian Ship.	Form 911 8.12.28 to 27.12.28 ...	3.1.29
†† <i>Morvada</i> ...	Mills, T. L., O.B.E., R.D., Commr., R.N.R.	A. J. Norris, H. Maguire ...	No. M.	British India ...	Met. Log. 7.8.28 to 13.12.28 ...	13.3.29
†† <i>Mulbera</i> ...	Caffyn, F. ...	J. B. B. Robertson ...	" M.	" ...	Form 911 29.7.28 to 29.10.28 ...	31.10.28
†† <i>Nagara</i> ...	Miles, F. R., R.D., Capt., R.N.R.	G. Elliott ...	" M.	R.M.S.P. Co. ...	" 14.1.29 to 12.2.29 ...	11.3.29
†† <i>Nagoya</i> ...	Bedwell, L. A. ...	S. Gerrans ...	" M.	P. & O. ...	" 26.7.28 to 20.9.28 ...	25.9.28
†† <i>Naldera</i> ...	Randell, G. G. ...	C. H. Hand, M. F. Shute, J. C. Davies.	M.L.	" ...	" 26.5.28 to 19.8.28 ...	23.8.28
†† <i>Nardana</i> ...	Moth, F. L. ...	F. G. Sharps ...	No. M.	British India ...	Met. Log. 20.10.28 to 23.1.29 ...	8.2.29
†† <i>Narkunda</i> ...	Collyer, R. M. M., R.D., Commr., R.N.R.	M. Boyd ...	" M.	P & O. ...	Form 911 8.10.28 to 13.11.28 ...	3.12.28
†† <i>Nellore</i> ...	Hignett, A. H., R.D., Lt.-Commr., R.N.R.	A. J. Brown ...	" M.	P. & O. ...	" 9.1.29 to 20.2.29 ...	22.2.29
†† <i>Nerbudda</i> ...	Williams, B. N. ...	G. A. Farley, S. Henderson ...	" M.	British India ...	" 17.1.29 to 17.2.29 ...	19.2.29
†† <i>Nestor</i> ...	Houghton, G. K. ...	A. Caird, N. Anderson, R. T. Dryden.	M.L.	A. Holt ...	" 16.12.28 to 8.2.29 ...	11.2.29
†† <i>Newby Hall</i> ...	Gorst, W. ...	E. M. Robertson, F. Wrigley, A. W. Wise, W. S. Smith.	No. M.	Ellerman ...	Met. Log. 8.1.28 to 13.5.28 ...	24.5.28
†† <i>Newfoundland</i> ...	Foxworthy, A. W. ...	R. F. Handley, E. Sainty, D. Hetherington.	M.L.	Furness Withy ...	" 17.8.28 to 27.1.29 ...	18.2.29
†† <i>Niagara</i> ...	Brown, J. F. S. ...	V. Knight, J. Hood, L. Ehler.	"	Canadian-Australasian	" 31.7.28 to 10.12.28 ...	22.12.28
†† <i>Ningchow</i> ...	Hill, T. V. ...	H. Morley ...	No. A.	A. Holt ...	" 15.11.28 to 28.2.29 ...	2.4.29
†† <i>Nirvana</i> ...	Beale, H. E. ...	J. K. Ridger ...	" M.	British India ...	Form 911 18.2.29 to 6.3.29 ...	2.4.29
†† <i>Norfolk</i> ...	Ayres, R. M. ...	A. Hocken ...	M.L.	Federal ...	" 7.1.29 to 15.2.29 ...	18.3.29
†† <i>Norna</i> ...	Mead, G. F. ...	T. R. Ness ...	No. A.	Scottish Fishery Bnd	" 30.12.28 to 6.2.29 ...	8.2.29
†† <i>Norseman, C.S.</i> ...	Wright, J. W. ...	R. W. Greenfield ...	" M.	Western Tel. Co. ...	" 15.2.29 to 6.3.29 ...	20.3.29
†† <i>Northumberland</i> ...	Davis, E. R. ...	A. J. Robertson, W. J. Glass-borow, J. F. Clements.	M.L.	Federal ...	" 30.1.29 to 7.3.29 ...	8.4.29
†† <i>Nova Scotia</i> ...	Upton, H. L., D.S.C., R.D., Lt.-Commr., R.N.R.	Furneaux, S. ...	No. A.	Furness Withy ...	Met. Log. 12.5.28 to 13.10.28 ...	17.10.28
†† <i>Nowshera</i> ...	Rowe, S. N. ...	W. Ashcroft ...	" M.	British India ...	Form 911 31.10.28 to 6.11.28 ...	20.11.28
†† <i>Nudda</i> ...	Morrison, W. C. ...	A. W. Smith ...	" M.	British India ...	" 8.1.29 to 18.1.29 ...	21.1.29
†† <i>Oaklands Grange</i> ...	St. Clair, C., D.S.C. ...	C. F. Foxwell ...	" A.	Houlder Bros. ...	" 12.2.29 to 9.3.29 ...	13.3.29
††57 <i>Olympic</i> ...	Parker, W. H., C.B.E., R.D., Capt., R.N.R.	A. E. Harvey, A. E. Dyer, J. Day, J. W. Paine.	W.T.	White Star ...	Form 911 1.1.29 to 25.1.29... ...	28.1.29
†† <i>Orama</i> ...	Matheson, C. G., D.S.O., R.D., Capt., R.N.R.	J. M. M. Swanson, C. K. Blake, J. D. Archer.	M.L.	Orient ...	W.T. Reg. 7.3.29 to 21.3.29 ...	26.3.29
†† <i>Oranian</i> ...	Arkle, J. ...	J. R. Bubb ...	No. A.	Leyland ...	Form 911 13.12.28 to 27.12.28 ...	5.1.29
†† <i>Orbita</i> ...	Dominic, R. H., C.B.E., Commr., R.N.R.	T. J. Waylor, R. H. Sissons, J. W. Fraser, J. Allan.	" M.	Pacific S.N. Co. ...	Met. Log. 11.11.28 to 12.2.29 ...	15.2.29
†† <i>Orcoma</i> ...	Mander, T. ...	R. D. Eckford, W. Pearce ...	No. M.	" ...	Form 911 25.11.28 to 2.1.29 ...	19.3.29
†† <i>Orduna</i> ...	Daniel, T. ...	R. Martin ...	" A.	A. Holt ...	" 1.1.28 to 17.1.29 ...	25.1.29
†† <i>Orestes</i> ...	Flynn, G. A. ...	O. C. Davies ...	" M.	Orient ...	Met. Log. 31.5.28 to 14.8.28 ...	30.8.28
†† <i>Orford</i> ...	Owens, A. L., Commr., R.D., R.N.R.	D. W. Hutchinson, G. W. Irvine, L. L. Hunter.	M.L.	Pacific S.N. Co. ...	Form 911 12.1.29 to 28.3.29 ...	2.4.29
†† <i>Orlita</i> ...	Barkley, E. ...	H. P. Price ...	"	His Majesty's Ship... ..	" 28.7.28 to 8.9.28 ...	26.11.28
†† <i>Ormonde</i> ...	Rice, W. V., D.S.O., D.S.C., Commr., R.N.	T. Fox Russell, R. S. Hawker, K. M. Morrison.	M.L.	Orient ...	" 26.10.28 to 4.1.29 ...	19.1.29
†† <i>Oronsay</i> ...	Shelford, W. S., Lt.-Commr., R.N.R.	P. H. Ray ...	No. M.	Pacific S.N. Co. ...	Met. Log. 18.6.28 to 27.11.28 ...	4.12.28
†† <i>Oroya</i> ...	Ridyard, A. ...	L. J. Vesty, N. W. Smith, J. D. Birch.	M.L.	Orient ...	" 9.8.28 to 2.11.28 ...	8.1.29
†† <i>Orsova</i> ...	Thorne, G. G., R.D., Commr., R.N.R.	G. L. Carter, H. A. Whittle, C. D. Lane.	"	" ...	" 28.10.28 to 29.1.29 ...	31.1.29
†† <i>Orvieto</i> ...	O'Sullivan, F. R. ...	G. B. H. Jones ...	No. M.	" ...	Form 911 21.11.28 to 29.1.29 ...	5.2.29
†† <i>Osterley</i> ...	Sarson, M. J. ...	G. Dibley ...	" A.	New Zealand S.S. Co.	Met. Log. 9.12.28 to 12.3.29 ...	15.3.29
†† <i>Otake</i> ...	McNish, R. ...	S. Winton ...	" M.	Shaw, Savill & Albion	" 23.12.28 to 27.3.29 ...	4.4.29
†† <i>Otra</i> ...	Wood, C., D.S.O., C.B.E., R.D., Commr., R.N.R.	O. C. Davies ...	" M.	Orient ...	Form 911 26.11.28 to 26.2.29 ...	5.3.29
†† <i>Otranto</i> ...	Staunton, H. G., C.B.E., R.D., Commr., R.N.R.	E. A. Insley ...	" A.	Bibby Bros. ...	" 3.1.29 to 1.3.29 ...	8.3.29
†† <i>Oxfordshire</i> ...	Foster, W. L. ...	" ...	"	" ...	" 22.3.28 to 28.4.28 ...	8.5.28
†† <i>Pacific Shipper, M.V.</i> ...	Goodwin, J. ...	H. C. Smith, G. Almond, W. Canner ...	M.L.	Furness Withy Shaw, Savill & Albion	" 29.1.28 to 30.3.28 ...	14.4.28
†† <i>Pakeha</i> ...	W. P. Clifton Mogg, Lt.-Commr., R.N.R.	C. C. Beal, E. Owen, R. Parry.	"	R.M.S.P. ...	" 24.1.29 to 21.2.29 ...	4.3.29
†† <i>Pancras</i> ...	Reynolds, H. B. W. ...	J. Greenaway ...	No. A.	Hain S.S. Co. ...	" 5.9.28 to 4.12.28... ..	28.12.28
†† <i>Parana</i> ...	Jones, W. C. H. ...	Mr. Biles ...	C.C.	Southern Rly. ...	Met. Log. 23.6.28 to 10.11.28 ...	15.11.28
†† <i>Pareora</i> ...	Rathkings, C. E., R.D., Commr., R.N.R.	J. Green ...	No. A.	Elders & Fyffes ...	" 31.7.28 to 5.2.29 ...	1.3.29
†† <i>Paris</i> ...	Cook, C. L. ...	H. E. Readshaw ...	" A.	A. Holt ...	Form 911 7.8.28 to 7.9.28 ...	19.11.28
†† <i>Patia</i> ...	Makepeace, S. ...	" ...	"	" ...	" 26.11.28 to 26.2.29 ...	5.3.29
†† <i>Peisander</i> ...	Slater, H. N. ...	" ...	"	" ...	" 3.1.29 to 1.3.29 ...	8.3.29
†† <i>Pennland</i> ...	Making, V. L. ...	" ...	"	" ...	" 22.3.28 to 28.4.28 ...	8.5.28
†† <i>Peshawur</i> ...	Wilding, H. G. ...	K. A. H. Cummins, S. H. Baldwin, A. M. Tolfree.	M.L.	P. & O. ...	" 29.12.28 to 28.1.29 ...	31.1.29

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Name of Vessel.	Captain.	Observing Officers.	Meteoro-logical Equipment.	Line.	Last Log. Register, or Report Contributed. Received up to 12.4.29.	Date Received.
<i>Polycarp</i> ... † <i>Port Adelaide</i> ...	Reynolds, W. H. B. ... Swan, L. H. ...	H. W. Taggart ... R. B. Linklater, C. J. Gorley, F. J. Lavers.	No. A. M.L.	Booth ... Commonwealth Dominion.	Form 911 7.2.29 to 18.2.29... Met. Log. 20.7.28 to 14.12.28	20.3.29 28.12.28
† <i>Auckland</i> ...	Durham, R. S., D.S.C.	C. F. Post, E. R. Rowlands, W. Roberts, E. W. Dingle.	"	" " "	" 28.8.28 to 24.1.29	21.2.29
" <i>Bowen</i> ...	Hearn, G. W. ...	S. Ray ...	No. A.	" " "	Form 911 9.9.28 to 17.9.28...	26.10.28
† <i>Campbell</i> ...	Needham, R. ...	J. G. Thom ...	M.L.	" " "	15.8.28 to 6.1.29...	14.1.29
† <i>Caroline</i> ...	Brown, A. H. ...	J. B. Bradley, G. Langford, J. Stannard, L. J. Brice ...	"	" " "	Met. Log. 26.10.28 to 3.4.29	8.4.29
† <i>Darwin</i> ...	Sawbridge, I. R. ...	H. Pinkney, E. M. Fenton, S. Moate.	"	" " "	" 2.9.28 to 3.1.29 ...	7.1.29
† <i>Denison</i> ...	Ferris, J. ...	L. W. Cady, A. A. Cooper, E. Beard, J. Rowland- Hill.	"	" " "	" 10.10.28 to 14.3.29	1.4.29
" <i>Dunedin</i> , M.V.	Farmar, F. ...	E. G. Jones, H. M. Post, N. M. Muzzell.	"	" " "	" 10.8.28 to 17.11.28	21.11.28
" <i>Fremantle</i> , M.V.	Kearney, F. J. ...	A. G. Rhind ...	No. A.	" " "	Form 911 5.5.28 to 8.6.28 ...	15.6.28
" <i>Gisborne</i> , M.V.	Hayter, S. W. ...	H. Boys-Smith ...	" A.	" " "	8.7.28 to 10.11.28	15.11.28
† <i>Hobart</i> , M. V.	Cottell, S. C. ...	L. Copeland, C. L. Webb, G. J. O. Jinman, W. B. Craig	M.L.	" " "	Met. Log. 21.11.28 to 23.3.29	3.4.29
† <i>Hunter</i> ...	Robinson, C. A. ...	R. B. Stannard, A. McClounan, J. T. Weldin.	"	" " "	" 1.8.28 to 23.12.28	31.12.28
† <i>Huon</i> ...	Compton, J. E. ...	" " " " " " " "	No. A.	" " "	Form 911 6.3.29 to 3.4.29 ...	10.4.29
† <i>Melbourne</i> ...	Kippins, T. ...	A. R. Martin, F. W. Elgar, W. E. Simpson.	M.L.	" " "	Met. Log. 12.5.28 to 8.10.28	22.10.28
† <i>Nicholson</i> ...	Jack, J. ...	J. H. Sloan, T. L. Kidwell, J. A. D. Fisher.	M.L.	" " "	Met. Log. 12.9.28 to 30.1.29	27.2.29
† <i>Pirte</i> ...	Hudson, J. J. ...	W. G. Jones, J. F. Martin, A. Brown.	"	" " "	" 26.5.28 to 24.10.28	10.11.28
† <i>Sydney</i> ...	Higgs, W. G. ...	E. E. Roswell, F. R. Gorman, R. D. Chamberlain.	"	" " "	" 25.9.28 to 29.1.29	8.2.29
† <i>Victor</i> ...	Williams, R. ...	W. Pickup, C. Hodson, C. E. Midwinter.	"	" " "	" 14.7.28 to 1.1.29...	23.1.29
" <i>Wellington</i> ...	Jones, C. N. ...	L. J. Skalls ...	No. A.	" " "	Form 911 5.1.29 to 16.2.29...	20.2.29
<i>Protea</i> , H.M.S.A.S.	Dalglish, J., Lt. Commr., S.A.N.S.	F. J. Dean ...	M.L.	South African Naval Service.	Met. Log. 16.10.28 to 20.2.29	21.5.29
† <i>Protesilaus</i> ...	Quirk, T. W. ...	J. Milhench, A. C. Abbott, A. E. Martin, E. A. H. Gopp.	"	A. Holt ...	" 5.6.28 to 1.11.28...	10.12.28
<i>Pyrrhus</i> ...	Elford, W. J. ...	R. Singleton ...	No. A.	" " "	Form 911 15.2.29 to 4.3.29...	14.3.29
† <i>Quiloa</i> ...	Cave, S. G. ...	E. M. B. Heath, W. Welch ...	No. M.	British India...	" 31.7.28 to 21.1.29	20.2.29
† <i>Rajputana</i> ...	Parker, J. W., R.D., Commr., R.N.R.	R. E. Tucker ...	" M.	P. & O. ...	" 9.12.28 to 1.2.29	5.2.29
† <i>Ranchi</i> ...	Brooks, C., D.S.O., R.D., Commr.,	D. Meikle ...	" M.	P. & O. ...	" " " " " " " "	"
† <i>Ranpura</i> ...	King, A. M., D.S.C. ...	E. J. Spurling ...	No. M.	P. & O. ...	" 9.2.29 to 28.2.29...	5.3.29
† <i>Regina</i> ...	Davies, E. ...	R. S. Walker, E. A. A. Crowley, C. W. R. Campbell	W.T.	White Star - Do- minion }	11.3.29 to 1.4.29...	4.4.29
† <i>Rennuera</i> ...	Cameron, J. J. ...	H. Harward ...	M.L.	New Zealand S.S. Co.	W.T. Reg. 11.3.29 to 31.3.29	3.4.29
† <i>Rhezenor</i> ...	Stout, G. L. ...	W. E. Barrett ...	No. A.	A. Holt ...	Form 911 6.7.28 to 19.10.28	8.11.28
† <i>Rhodesian Trans- port</i> ...	Bullock, F. W. H. ...	J. G. Freeman ...	" A.	Houlder Bros. ...	3.3.29 to 13.3.29...	21.3.29
† <i>Rimutaka</i> ...	Holland, E. W. ...	F. Pretty, H. S. Cashmore, F. Cooke, E. Foster.	M.L.	New Zealand S.S. Co.	6.9.28 to 24.12.28	28.12.28
† <i>Ripley Castle</i> ...	Aylen, C. E. H. ...	R. A. D. Cambridge ...	No. A.	Union Castle ...	Met. Log. 31.8.28 to 3.1.29...	7.1.29
† <i>Rother</i> ...	Woodhead, T. H. ...	N. Thompson ...	" A.	Goole Steam Shipping	Form 911 14.11.28 to 12.12.28	17.12.28
† <i>Rotorua</i> ...	Hunter, J. L. B. ...	L. Griffiths, T. M. Devitt, H. Cockerill.	M.L.	New Zealand S.S. Co.	9.2.29 to 13.3.29...	2.4.29
† <i>Royal Transport</i> ...	Oliver, R. C. ...	R. Hughes ...	No. A.	Houlder Bros. ...	Met. Log. 26.10.28 to 16.2.29	26.2.29
† <i>Ruapehu</i> ...	McKellar, A. W., R.D., Capt., R.N.R.	H. N. Lawson, E. H. Hopkins, L. F. Malcouronne.	M.L.	New Zealand S.S. Co.	Form 911 17.6.28 to 15.9.28	21.9.28
† <i>St. Albans</i> ...	Diamond, S. L. ...	R. L. Harry, J. Moodie Heddlie, J. D. Kavanagh. F. O. Colvin, R. Millington	"	Eastern and Aus- tralian.	Met. Log. 2.11.28 to 11.3.29...	15.3.29
† <i>St. Helier</i> ...	Richardson, L. ...	C. Bell ...	C.C.	G.W. Railway ...	" 3.8.28 to 3.12.28...	8.1.29
† <i>St. Julien</i> ...	Pitman, R. ...	C. W. Sanderson ...	"	" " "	Telegraphic Report 28.2.29	28.2.29
† <i>St. Andrew</i> ...	Bearpark, E. W. ...	J. Meade ...	No. A.	Rankin Gilmour ...	11.4.29	11.4.29
† <i>38 Samaria</i> ...	Malin, R. G., Lieut- Commr., R.N.R.	F. D. Thomas, W. B. Tanner, P. G. Britten.	W.T.	Cunard ...	Form 911 1.1.29 to 19.2.29...	16.3.29
<i>Sardinian Prince</i> ...	Brown, J. F. ...	G. A. Davies ...	No. A.	Prince ...	W.T. Reg. 8.1.29 to 26.1.29	5.2.29
<i>Saxon</i> ...	Shilston, P. G., R.D., Capt., R.N.R.	E. V. Quickenden ...	" A.	Union Castle ...	Form 911 9.1.29 to 24.2.29...	8.3.29
† <i>Scholar</i> ...	Peterkin, A. G. ...	G. Baker ...	" M.	Harrison ...	" 3.2.29 to 24.3.29...	27.3.29
† <i>Scotia</i> ...	Prichard, S.D., M.B.E.	W. L. Hughes ...	C.C.	L.M. & S. Railway ...	" 15.11.28 to 3.12.28	7.12.28
† <i>33 Seythia</i> ...	Irving, R. B., O.B.E. R.D., Capt. R.N.R.	R. Sell, G. H. Morris, J. G. Bradley.	W.T.	Cunard ...	Telegraphic Report 6.4.29...	6.4.29
† <i>Sheaf Mount</i> ...	Groves, C. V. ...	A. Macarthur ...	No. A.	W. A. Souter ...	W.T. Reg. 24.12.28 to 8.2.29	8.4.29
† <i>Sheaf Spear</i> ...	Whitfield, G. A., O.B.E.	P. L. Hay ...	M.L.	" " "	Form 911 24.12.28 to 7.2.29	6.4.29
† <i>Shropshire</i> , M.V. ...	Adamson, B. W. ...	A. Macarthur ...	No. A.	" " "	Met. Log. 2.12.29 to 13.3.29	1.4.29
† <i>Somerset</i> ...	Howell Price, J. ...	P. L. Hay ...	"	Bibby ...	Met. Log. 2.9.28 to 17.1.29	1.2.29
† <i>Spero</i> ...	Montgomery, H. ...	W. L. Whiteside, R. Cumming, W. H. Brittain.	"	" " "	" 3.11.28 to 11.1.29	15.1.29
† <i>Statesman</i> ...	Mowat, J. ...	W. Redwood ...	"	Federal... ..	Form 911 26.1.29 to 12.3.29	18.3.29
† <i>Stephen</i> ...	Evans, L. G. ...	H. W. Vickers ...	"	Ellerman Wilson	Met. Log. 6.7.28 to 12.1.29...	22.1.29
† <i>Stockwell</i> ...	Smith, W. ...	T. R. R. Letten ...	No. M.	Harrison ...	Form 911 27.10.28 to 5.1.29	7.1.29
† <i>Surrey</i> ...	Mac Rae, A. B. ...	L. Mc Millan ...	No. A.	Booth ...	" 10.2.29 to 2.3.29...	8.4.29
† <i>Sutton Hall</i> ...	Walmsley, R. J. ...	F. Moore ...	" A.	Brocklebank ...	" 26.10.28 to 22.11.28	28.12.28
<i>Sylvafeld</i> , M.V. ...	Biddick, E. ...	A. V. Pearce ...	M.L.	Federal... ..	Form 911 5.11.28 to 12.3.29	6.4.29
<i>Tainui</i> ...	Elford, H. E. ...	P. L. Hay ...	No. M.	Ellerman ...	" " " " " " " "	"
<i>Tahiti</i> ...	Aldwell, B. M. ...	A. A. Tully ...	" A.	Shaw, Savill & Albion	" 20.12.28 to 29.1.29	7.2.29
† <i>Taiping</i> ...	Frame, A. M. ...	L. J. Hopkins ...	" A.	Union S.S. Co. of N.Z.	" 22.12.28 to 26.1.29	2.2.29
† <i>Takada</i> ...	Lindon, J. ...	F. W. Bales ...	M.L.	Yuill & Co. ...	Met. Log. 27.12.28 to 14.2.29	8.3.29
† <i>Talma</i> ...	Hocking, R. W., R.D., Lieut. - Commr., R.N.R.	F. Stratford, A. C. Kennedy, E. S. Birrell ...	"	" " "	" 14.9.28 to 5.1.29	13.2.29
† <i>Talhybius</i> ...	Wilson, R. J. ...	A. R. Andrew... ..	No. M.	British India ...	Form 911 3.2.29 to 21.2.29...	26.3.29
† <i>Tamaroa</i> ...	Hartman, W. H. ...	A. J. Galvin ...	M.L.	A. Holt ...	" 12.12.28 to 29.12.28	17.1.29
			No. M.	Shaw, Savill & Albion	" 10.11.28 to 21.2.29	11.3.29

Name of Vessel.	Captain.	Observing Officers.	Meteoro-logical Equipment.	Line.	Last Log, Register, or Report Contributed. Received up to 12.4.29.	Date Received.
** <i>Tanda</i> ...	Pilcher, E. T., Lieut.-Commr., R.N.R.	G. C. Smith, H. Murday, H. Nuzum.	M.L.	E. & A. S.S. Co. ...	Met. Log 16.10.28 to 19.2.29 ...	6.4.29
*† <i>Taranaki, M.V.</i> ...	Wood, C. ...	A. Chrystal, G. Campbell, P. Savill.	"	Shaw, Savill & Albion	" 17.10.28 to 12.2.29 ...	27.2.29
<i>Tarantia</i> ...	Henderson, F. M. ...	N. H. King ...	No. A.	Anchor ...	Form 911 29.12.28 to 5.2.29 ...	1.3.29
<i>Tetresias</i> ...	Wilkinson, W. H. ...	R. Blakey ...	" A.	A. Holt & Co. ...	" 2.12.28 to 23.3.29 ...	8.4.29
*† <i>Tekoa</i> ...	Robinson, F. W. ...	T. K. MacDonald ...	" M.	New Zealand S.S. Co. ...	" 4.1.29 to 13.3.29 ...	16.3.29
<i>Telamon</i> ...	Willecox, J. H. ...	F. A. Brown ...	" A.	A. Holt ...	" 15.9.28 to 8.12.28 ...	17.12.28
<i>Tetela</i> ...	Brice, E. H. ...	F. L. Brealy ...	" A.	Elders & Fyffes ...	" 28.12.28 to 30.1.29 ...	7.2.29
<i>Teucer</i> ...	Beswick, W., D.S.C., Lt.-Commr., R.N.R.	W. F. Cook, H. Rudd ...	" A.	A. Holt ...	" 31.1.29 to 30.3.29 ...	4.4.29
†† <i>Themistocles</i> ...	Young, A. D. ...	" ...	" M.	Aberdeen Common-wealth	" 12.12.28 to 20.1.29 ...	28.1.29
<i>Theseus</i> ...	Jones, E. ...	W. A. Fyffe ...	" A.	A. Holt ...	" 10.8.28 to 7.10.28 ...	18.10.28
*† <i>Tilawa</i> ...	Rowe, P. W. ...	E. A. Rabey ...	" M.	British India ...	" 16.1.29 to 22.2.29 ...	18.3.29
*† <i>Tinhow</i> ...	Andoe, G. ...	J. S. King ...	" M.	A. Weir & Co. ...	" ...	"
*† <i>Titan</i> ...	Power, J. J. ...	P. Cross, R. A. Shennan, C. F. Bailey.	M.L.	A. Holt ...	Met. Log. 19.8.28 to 3.1.29 ...	14.1.29
*† <i>Tongariro</i> ...	Burton Davies, J. ...	E. A. Burton, A. E. Williams, H. Wilkinson, D. Baldwin.	"	New Zealand S.S. Co.	Met. Log. 12.8.28 to 7.1.29 ...	18.1.29
<i>Transylvania</i> ...	Erskine, R. ...	P. Middleton ...	No. A.	Anchor ...	Form 911 23.9.28 to 10.11.28 ...	20.11.28
<i>Trefusis</i> ...	Hunt, D. ...	R. H. Silley ...	" A.	Hain S.S. Co. ...	" 29.12.28 to 17.1.29 ...	14.2.29
*† <i>Trematon</i> ...	Evans, B. ...	J. Jenkyn, C. M. Quick, R. Sutson.	M.L.	Hain S.S. Co. ...	Met. Log. 18.5.28 to 24.12.28 ...	7.1.29
*† <i>Turakina</i> ...	Field, H. G. B. ...	J. D. B. Fisher ...	No. M.	New Zealand S.S. Co.	Form 911 1.12.28 to 28.12.28 ...	14.1.29
†† <i>Tuscania</i> ...	Rome, W. B. ...	J. Noble ...	W.T.	Anchor ...	W.T. Reg. 26.11.28 to 16.12.28 ...	22.12.28
*† <i>Tyndareus</i> ...	Christie, W. ...	A. F. Barclay, T. R. Phillips, F. V. Smith, D. S. Bruce.	M.L.	A. Holt ...	Form 911 24.11.28 to 17.12.28 ...	20.12.28
*† <i>Ulmara</i> ...	Wylie, W. J. ...	S. B. Komall ...	No. M.	Huddart Parker, Ltd.	Met. Log. 15.5.28 to 7.10.28 ...	30.11.28
<i>Ulysses</i> ...	Owen, R. D., O.B.E. ...	C. W. Jones ...	" A.	A. Holt ...	Form 911 18.1.29 to 11.2.29 ...	25.3.29
<i>Unvolost</i> ...	Barnes, E. W. ...	R. Dyns ...	" A.	Bullard King ...	" 24.11.28 to 6.1.29 ...	9.1.29
*† <i>Upwey Grange</i> ...	Goodrick, H. F. ...	" ...	" M.	Houlder ...	" 19.1.29 to 5.2.29 ...	25.2.29
*† <i>Valacia</i> ...	Inch, F. ...	" ...	" M.	Cunard ...	Form 911 26.3.28 to 13.5.28 ...	17.5.28
<i>Vardulia</i> ...	Fear, E. T. C. ...	W. H. Barker ...	" A.	" ...	" 1.12.28 to 11.1.29 ...	15.1.29
†† <i>Viceroy of India</i> ...	Ohlson, B. J., D.S.O., R.D., Commr., R.N.R.	A. G. Stansfield ...	" M.	P. & O. ...	" ...	"
<i>Vigilant</i> ...	Simpson, E. S. S. ...	J. H. Hennessey ...	" A.	Scottish Fishery Board.	Form 911 1.3.29 to 31.3.29 ...	4.4.29
*† <i>Waioapu</i> ...	Todd, D. ...	L. Leeder ...	" M.	Canadian - Australasian.	" 17.2.29 to 14.3.29 ...	6.4.29
*† <i>Wairuna</i> ...	Ryan J. ...	H. W. Jones, E. A. Stein, E. R. Pate.	M.L.	Union S.S. Co. of N.Z.	Met. Log. 19.10.28 to 21.1.29 ...	15.3.29
<i>Wangaratta</i> ...	Morton Betts, W. ...	G. H. Pickering ...	No. A.	Union Castle ...	Form 911 16.2.29 to 7.4.29 ...	9.4.29
*† <i>Warfield</i> ...	Seutt, W. ...	T. W. Wordingham, S. R. Millard, A. G. Brooks, A. G. Earl.	M.L.	British India ...	Met. Log. 11.11.29 to 29.3.29 ...	5.4.29
*† <i>War Nizam</i> ...	Steel, R. ...	" ...	No. A.	" ...	Form 911 2.2.29 to 21.3.29 ...	2.4.29
*† <i>Westmoreland</i> ...	Moncrieff, T. ...	F. J. Marshall ...	" M.	British Tankers ...	" 5.5.28 to 11.6.28 ...	26.6.28
†† <i>William Scoresby, R.S.S.</i> ...	Gardner, H. W. ...	G. A. Shepherd, K. S. Phillips, R. L. Warren.	M.L.	Federal ...	Met. Log. 3.8.28 to 22.11.28 ...	29.11.28
†† <i>Windsor Castle</i> ...	Shannon, R. L. V., Lieut.-Commr., R.N.	" ...	"	Falkland Islands Government.	" ...	"
*† <i>Winifredian</i> ...	Chave, Sir B., K.B.E.	A. J. Tweddell, C. Gorringer, R. Tyser.	"	Union Castle ...	" 25.8.28 to 17.2.29 ...	21.2.29
*† <i>Wonganella</i> ...	Trant, A. W. V., O.B.E.	G. F. Phillips ...	No. M.	Leyland	Form 911 30.12.28 to 8.1.29 ...	14.1.29
*† <i>Woodarra</i> ...	Suffern, H. ...	H. Goater, L. J. C. Simpson, G. F. Alexander J. McPhail.	M.L.	W. Crossby & Sons ...	" 16.10.28 to 17.11.28 ...	28.12.28
<i>Zent</i> ...	Reilly, J. V. ...	" ...	"	British India ...	Met. Log. 15.7.28 to 31.12.28 ...	4.1.29
<i>Conway, H.M.S.</i> ...	Roberts, H. ...	" ...	No. A.	Elders & Fyffes ...	Form 911 3.2.29 to 9.3.29 ...	13.3.29
<i>Pangbourne Nautical College</i> ...	Richardson, F. A., D.S.C., Commr., R.N.	The Senior Cadets ...	Cadets' M.L.	" ...	Cadets' Met. Log. 23.9.28 to 15.12.28 ...	19.12.28
<i>Worcester, H.M.S.</i> ...	Tracy, A. F. G., Commr., R.N.	" ...	"	" ...	Cadets' Met. Log. 16.1.29 to 23.3.29 ...	10.4.29
<i>Abaco</i> ...	" ...	" ...	"	" ...	Cadets' Met. Log. 21.9.28 to 19.12.28 ...	21.12.28
<i>Cay Lobos</i> ...	" ...	" ...	"	" ...	Lighthouse Register 1.1.28 to 30.6.28 ...	14.9.28
<i>Double Headed Shot</i> ...	" ...	" ...	"	" ...	Lighthouse Register 1.1.27 to 11.7.27 ...	29.9.27
<i>Inagua</i> ...	" ...	" ...	"	" ...	Lighthouse Register 4.9.27 to 29.2.28 ...	24.4.28
<i>Sombrero</i> ...	" ...	" ...	"	" ...	Lighthouse Register 14.1.28 to 19.7.28 ...	14.9.28
<i>Watling Island</i> ...	" ...	" ...	"	" ...	Lighthouse Register 1.7.28 to 31.12.28 ...	5.2.29
<i>Cape Pembroke</i> ...	" ...	" ...	"	" ...	Lighthouse Register 1.1.28 to 30.6.28 ...	14.9.28
<i>(Falkland Is.)</i> ...	" ...	" ...	"	" ...	Lighthouse Register 1.7.28 to 31.12.28 ...	10.2.29

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Name of Vessel.	Captain.	Observing Officer.	Line.	Last Case of Water Samples, Reports, etc., received up to 31.3.29.	Date Received
<i>Antillian</i> ...	Hannaford, W. ...	J. L. Crighton ...	Leyland	Water Samples ...	14.3.29
<i>Dakotian</i> ...	Robb, J. ...	W. F. Sloan ...	"	"	7.1.29
<i>Darro</i> ...	Matthews, G. P. ...	J. Clark ...	R.M.S.P. Co.	"	5.10.28
<i>Desado</i> ...	Hannan, F. S. ...	J. G. Scott ...	"	"	18.10.28
<i>Hildebrand</i> ...	Peregrine, D. ...	E. Jones ...	Booth	"	11.3.29
<i>Oranian</i> ...	Bolton, W. ...	T. J. Jones ...	Leyland	"	19.3.29

June, M.O., 1929.

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MARINE METEOROLOGY, ATLASES, BOOKS AND MEMOIRS.

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

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

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

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