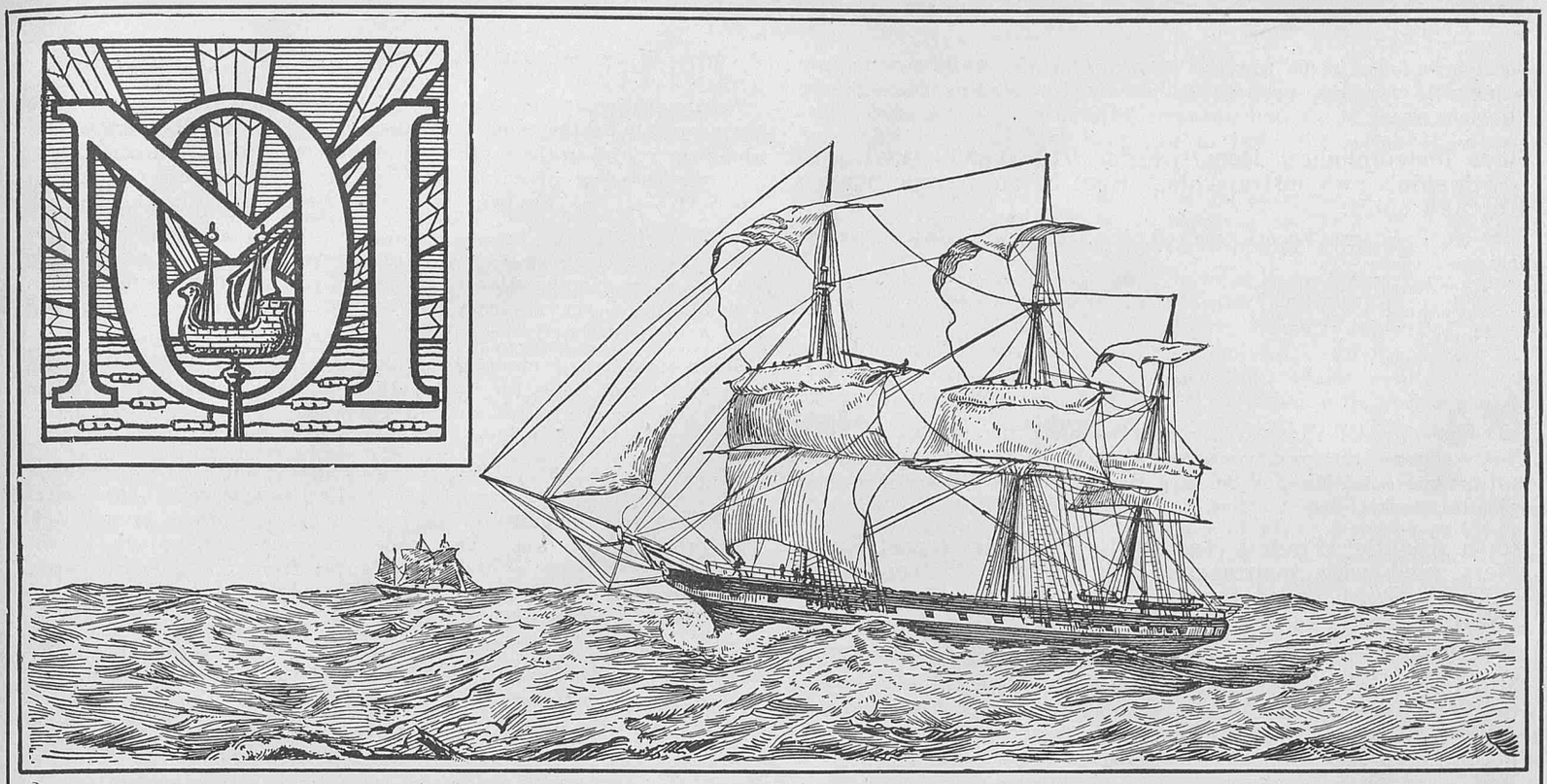

VOL. VII. No. 78. THE MARINE OBSERVER. JUNE, 1930.

TABLE OF PRINCIPAL CONTENTS.

WORK OF THE YEAR.

April 1st, 1929, to March 31st, 1930.

The work of the Corps of Voluntary Marine Observers at sea during the year has steadily continued to improve and has made its influence felt more than ever. In my notes under the heading of THE MARINE OBSERVER, 1930, in the January number we gave some account of the results of our labours at the Conferences which have absorbed a great deal of time and energy, so much in fact that we have not been able to devote as much care and attention as we should have liked, to the work of Marine Observers. The facts which follow therefore testify more highly to the work of Marine Observers, Port Meteorological Officers, Agents, and the staff of the Marine Division showing as they do determination, loyalty and initiative.

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 115 Merchantmen.

In accordance with the competitive principle adopted on 1st April, 1926, which is now so well known to the Corps of Marine Observers, of a total of 286 logs received, the following table shows the numbers and classification:—

Excellent	114
Very good	172
Good	0
Not classed	0
	286

An increasing number of meteorological logs have been illustrated by drawings, diagrams and photographs; and the officers who

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keep these logs, which are the backbone of the work, are mainly responsible for the prestige which British Marine Meteorology enjoys.

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

Of 2375 of these Forms received, the classification was as given below:—

Excellent	476
Very good	1889
Good	10
Not classed	0
	2375

The practice of illustration has been more in evidence in these Forms during the past year, and they have been more complete and better kept. Many "Selected Ships" keeping them have done splendid work.

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

The number and classification of these registers received was as follows:—

Excellent	140
Very good	175
Good	4
Not classed	0
	319

Generally these registers indicate that observation has maintained its very high standard. A few mistakes are made; this is inevitable; but occasionally a mistake makes itself seriously felt; and during the year an error of 10 millibars in a barometer reading had the effect of gale warnings being issued for part of the British coasts, when, had this observation been correctly made, it would have been evident that no gale was expected. In order to assist Marine Observers to guard against such errors, in the FIFTH EDITION of THE MARINE OBSERVER'S HANDBOOK suggestions are given for reducing the risk of incorrect barometer readings.

Generally the registers which are to come into force for world wide use on May 1st, 1930, have been simplified as far as possible. The work done by the observing officers of North Atlantic Liners has been invaluable, and their example has had much to do with the establishment of the world wide organisation which will be in force when this report is published.

Ice Reports Form 912.

The recording and returning of these reports during the past 12 months has been good.

Many valuable reports have been received, including the Southern Ocean, some of them being illustrated by sketches and photographs.

Home Waters Telegraphic Reports.

Nine packet steamers on the Newhaven-Dieppe, Guernsey-Weymouth and Holyhead-Dublin services have contributed 727 reports of observations made at mid-channel positions during the year. In addition to the other purposes which these reports serve, they have been found particularly useful for the purposes of aerial navigation, giving as they do information of wind and visibility in the vicinity of aeroplane routes.

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.

Miscellaneous Contributions.

In addition to the above routine returns a number of interesting reports of special phenomena, storms, ocean currents, and other experiences have been received from the Captains and Officers of ships who are not on the list of regular marine observers and who therefore do not make routine returns.

Extracts from the Remark books of H.M. Ships, dealing with meteorological phenomena and ocean currents, have been received through the HYDROGRAPHER of the NAVY.

THE USE MADE OF THE DATA COLLECTED.

During the year the charting of Ocean Currents observed since the year 1910 on the route from the River Plate to Cape Horn, and along the routes to the southward of Australia have been completed; and the charting of currents along the tracks across the Indian Ocean from Cape Leeuwin to Perim direct, and via Colombo, is in progress.

The construction of an Atlas of currents along the main trade routes in the North Atlantic, from the section charts published in THE MARINE OBSERVER from 1924 to 1927, has been completed; and this Atlas will shortly be published.

With eight years' observations now available on Hollerith cards, Fog and Wind Roses for the South West approaches to the British Isles, and for the approaches to Table Bay have been constructed, and are being published month by month in THE MARINE OBSERVER.

On the 1st January, 1930, after the first eight years' experience ever obtained in the use of the Hollerith system of mechanical extraction and computation for meteorological work, a revised code was brought into use. This code overcomes ambiguities in the mechanical printing of the code figures from the punched cards, so making the date more readily accessible for international exchange and other purposes.

The calls upon the Marine Division in preparing for International and Empire Conferences, and in revising logs, forms, and instructions to accord with the decisions of those conferences, together with the answering of many enquiries, have been so heavy that the extraction of data has received the heaviest set-back since the Great War.

The expenditure of time upon work which has been mainly responsible for this set-back of data extraction, i.e, that connected with British Empire and International Conferences, has been instrumental in obtaining agreements which it is hoped will be the means of accelerating this work and making it of greater value in the future; so that this must only be regarded as a temporary loss, out of which gain to the whole service should accrue.

The following table gives particulars for the past seven years. MARSDEN CHART No. I. shows the distribution of observations extracted during the last twelve months and MARSDEN CHART No. II. gives the distribution and number of observations extracted since re-organization on April 1st, 1920.

—	1929–30.	1928–29.	1927–28.	1926–27.	1925–26.	1924–25.	1923–24.
Percentage of logs received reaching the required standard completely extracted and phenomena indexed.	14	37	60	64	64	55	66
Number of complete sets of observations extracted and punched on cards, with currents entered in data books and phenomena indexed.	17,987	43,117	73,745	78,180	75,852	65,060	74,749
Current observations from 1910 extracted and entered in data books.	10,913	2,626	3,496	8,242	8,210	5,746	4,259

Supply of Data to Foreign and other Services.

The amount of marine meteorological data supplied to other services has been considerable, and it is considerably in excess of that provided by the Marine Division last year. This included:—

To the Dutch Meteorological Office 645 sets of observations on Hollerith Cards for 1928 in selected squares in the Atlantic, Pacific and Indian Oceans.

2,390 sets of observations for the months of September, October and November, 1920-1925 in selected squares in the Atlantic Ocean south of 10° N. Latitude also 360 observations of set and drift of current on the route Cape Blanco to Table Bay for the years 1923-1925.

To the International Bureau of Vulcanology, reports of all submarine earthquake shocks in 1928.

The supply of 66,100 sets of observations of wind force and temperature for all months of the years 1921 to 1928 in the

North Atlantic and North Sea, from Longitude 20° W. to 10° E., Latitude 65° N. to 45° N., and in the whole of the Mediterranean, sorted, tabulated, and printed by Hollerith machine for a scientific investigation conducted by another Division of the Meteorological Office.

To the Division for Airship Meteorology, 3,484 observations along the proposed Imperial Airship Routes for June, August, 1924, and January, 1925, for a special investigation of conditions as they affect airship navigation, thus completing 12 months observations (with the 7,576 sets provided in the last two years) totalling 11,060.

To the Scottish Fishery Board, 176 observations of current in the North Atlantic, all months, 1928.

Many data, generally in the form of extracts from Meteorological Logs and Forms 911, have been supplied in answering enquiries, amongst which was one from the Board of Trade for weather conditions in the Western North Atlantic at the time of the loss of S.S. *Vestris*, for which purpose a memorandum and weather charts were prepared.

The work in connexion with the supply of information for the Reseau Mondial, an International publication compiled by the Division for Climate is in arrears.

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 4,615 weather reports received at the Meteorological Office during the year from North Atlantic Liners, that:—

1,606 reports were received within 1 hour of observation,
1,518 reports were received within 2 hours of observation,
738 reports were received within 4 hours of observation,
753 reports were over 4 hours in transmission from observation time,

indicating by comparison that the state of communication remains much the same as last year.

There were only 328 errors in transmission; that is 0.2 per cent. of the figures received were wrongly sent or received.

Thus it is proved without doubt that the check system is unnecessary, and as will be seen by the International Wireless Weather Telegraphy Code which is to come into force on 1st May, 1930, the check system will then be abolished. 1,956 reports were made by ships to the Westward of Longitude 40° W. direct to the United States Weather Bureau—a selection of which were retransmitted to Europe.

APPLICATION OF THE WORK AT SEA.

The application of Marine Meteorology in the daily work of navigation in ships at sea has steadily progressed during the year, and "Selected Ships" have generally performed an increasingly useful service in broadcasting wireless meteorological reports, which not only give information of weather, but information of ocean currents, and also when necessary information of ice and floating navigational dangers.

Evidence of this work done by the British Corps of Voluntary Marine Observers was of very great value at the International Conference on Safety of Life at Sea, at the British Empire Meteorological Conference, and at the International Meteorological Conference, where it undoubtedly impressed the delegates, and formed a basis for the agreements reached, the International "Selected Ship" Wireless Weather System being the principal outcome.

This should be a great encouragement to those who do this work at sea, and we look with confidence to the Commanders, Officers, and W/T Operators of "Selected Ships" to make a complete success of the World Wide Scheme which commences on 1st May, 1930.

Chart No. III gives the position of every "Selected Ship" at sea and clear of inland waters on 1st June, 1929. Compared with Chart III in last year's "Work of the Year," Volume VI, No. 66, it shows not quite such a good general distribution all over the world. It also shows that though there were more "Selected Ships," a rather smaller percentage were at sea. This is largely due to the fact that we were so occupied in preparing for Conferences that desirable adjustments in selection had to be postponed; also that this year June 1st happened to fall on a Saturday, when a larger number of ships than usual are about to sail.

The working of such a daily position chart for **A Selected Ships** has been tried, and will be in constant use from May 1st, 1930, for the purpose of the control system through Portishead.

Since 4th December, 1929, all "Selected Ships" have been allotted numbers in the Fleet List in The Marine Observer and in doing so, ships formerly detailed as "Selected Ships," registered in the Colonies and Dominions, have been omitted; and the agents have requested their Commanders to get into touch with their own Meteorological Services, with a view to assisting in working up the British Empire complement of 356 "Selected Ships."

Marine Observers, prospective Marine Observers, Agents and Port Meteorological Officers are all asked to help in obtaining the best distribution of "Selected Ships" possible; that is to say, all are asked to consider this from the point of view of the whole service, so that "Selected Ships" which may not be so suitably placed may be replaced by other more favourably situated observing ships. This will mean give and take, and sometimes surrendering instruments, etc.

The best possible service can only be obtained by co-operation throughout the Marine Meteorological Service, and adhering to the arrangements made by the Marine Division as the organising centre, always remembering that numbers can only be allotted to "Selected Ships" by the Marine Division.

The number of British home registered "Selected Ships" on 31st March, 1930, was 290, being 27 short of the complement for Great Britain which is 317. It is intended to convert more regular observing ships to "Selected Ships" as soon as possible, and this will be done after the new Port Meteorological Officer has taken up his duties in London, when it will be possible to more suitably distribute instrumental equipment.

Port Meteorological Office, Visiting Officer and Merchant Navy Agents.

The work performed by the Agents has been of great assistance. During the year Captain Corrance, our Agent on the Clyde, resigned the Agency owing to pressure of work in connection with his duties as Senior Board of Trade Nautical Surveyor at Glasgow; and he was relieved by Captain W. E. Sommerville, Marine Superintendent of the Baron Line, who has since resigned on joining the Nautical Survey Service of the Board of Trade and Mr. R. Cleary, Master Mariner, has been appointed acting agent in his place.

Lieutenant Commander J. H. Drummond, D.S.C., R.N., Agent at Hong Kong, resigned on being recalled to England, and was relieved by Lieutenant Commander R. G. H. Milligan, R.N.

Mr. W. T. Grieves, Visiting Officer for the Port of London, resigned and returned to sea as master of his own ship, after ten years work in assisting to develop the work of the Voluntary Corps of Marine Observers. This work having increased so greatly, it has been decided to establish a Port Meteorological Office for the Port of London on the same lines as that at Liverpool, the Liverpool Port Meteorological Office having proved of great value to the service.

Acknowledgment, Appreciation and Awards.

We are much indebted to Master Mariners afloat and ashore, for all the valuable assistance and advice they have given, which has done so much in bringing to a successful issue the negotiation of agreements during the year at the Conferences previously mentioned. In particular our special thanks are due to Commander J. A. Slee, R.N., Technical Manager of the Marconi International Marine Communication Company, and Commander F. Loring, R.N., late Inspector of Wireless Telegraphy, General Post Office, for their co-operation in working out the details for wireless communication of the "Selected Ship" system.

In the foregoing report it has only been possible to give more or less dry statistics of the work done by the Voluntary Corps of Marine Observers. It really is impossible to give a full account of all the good work done, for on every bridge and in every chart house,

day by day, and at relief of watch at night, marine observers in regularly observing ships have worked consistently as volunteers, giving their best in furthering **The Work.**

We thank every member of the Corps of Voluntary Marine Observers and all who have contributed to British Marine Meteorology during the year. A list of commanders and principal observing officers, with their ships, to whom the Meteorological Committee have made Excellent awards in special recognition of very fine work is appended.

MARINE SUPERINTENDENT.

London,
April 1st, 1930.

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

Captain.	Principal Observing Officer.	Ship.
*ABBAY, A. T. N., D.S.O., Commr. R.N.	Bullock, F. G. L. ...	H.M.S. *Ambuscade.*
ADAMSON, B. W. ...	BRITTAIN, W. H. ...	*Shropshire.*
*ALLIN, C. H. C.... ...	ROCHE, C. B. ...	*Baradine.*
ALMOND, J. G.	PEARCE, A. V. ...	*Surrey.*
*BARNETT, H.	MARCHINGTON, T. S.	*Remuera.*
BINKS, J. W., R.D., Lieut.-Commr. R.N.R.	HUGHES, E. P. ...	*Calgaric.*
BRITTEN, P. O.	WILLIAMSON, H. V.	*Khiva.*
BROWN, F. G., Capt. R.N.R., R.D.	TAYLOR, E. R. ...	*Carmania.*
BROWN, J. F. S. ...	BILLINGHAM, J. ...	*Makura.*
*BROWNING, J. B., Commr. R.N.R., R.D.	TURNER, R. H. ...	*Maloja.*
BULMAN, J. B.	WILLS, F.	*Arabic.*
BURTON DAVIES, J. ...	WILKINSON, H. F. C.	*Hertford.*
CAMERON, E. P., Commr. R.N.R., R.D.	MORRISON, K. M. ...	*Oronsay.*
*CAMERON, J. J., Lieut.-Commr. R.N.R.	ALDRIDGE, R. C. ...	*Remuera.*
*CAMERON, J. M.... ...	SMITH, H. C. ...	*Mahana.*
CHARLTON, W. L. ...	SPRING, A. D. ...	*Maihar.*
CLIFTON MOGG, W. P., Lieut.-Commr. R.N.R.	SMITH, H. C. ...	*Pakeha.*
	BAKER, E.	*Tainui.*
COTTELL, S. C.	CRAIG, W. B. ...	*Port Hobart.*
CRAWFORD, R.	BILGER, E. V. ...	*Aorangi.*
DANIEL, T.	ECKFORD, R. D. ...	*Orduna.*
DAVIES, E.	CAMPBELL, C. W. R.	*Regina.*
*DICKINSON, C. C. ...	LEWIS, E. V. ...	*Khiva.*
DIGGLE, E. G., Capt. R.N.R., R.D.	DUGUID, G.... ...	*Aquitania.*
*DODDS, R.	OPPEN, F. C. ...	*Tantalus.*
DOMINY, R. H., C.B.E., Lieut.-Commr. R.N.R.	HICKS, E. C. ...	*Orbita.*
*DOYLE, M.	CONNELL, E. W. ...	*Laconia.*
DUNCAN, S. S.	STUBBS, E. W. ...	*Arracan.*
ENGLISH, G. L.	BRAND, E. D. ...	*Leicestershire.*
*EVANS, D. L. C	GEPP, E. A. H. ...	*Protesilaus.*
FARMAR, F. ...	BATTLE, V. G.	*Port Dunedin.*
	HOPKINS, W. B.	
FERRIS, J. ...	ROWLAND HILL, J.	*Port Denison.*
	HOWE, P. J.	
FOXWORTHY, A. W. ...	HANDLEY, R. F. ...	*Newfoundland.*
*GOBLE, C. J., Commr. R.N.R., R.D.	FLETCHER, R. N.	*Culebra.*
	PHILLIPSON, A. H.	
*HALL, G. S.	MOATE, J. S. ...	*Port Victor.*
*HAMILTON, F. S. ...	ROBINSON, A. G. ...	*Tongariro.*
*HEADLAM, P. C., Commr. R.N.R., R.D.	BANKS, W. T. ...	*Kaisar-i-Hind.*
HIGGS, W. G.	GORMAN, F. R. ...	*Port Sydney.*
HILL, T. V.	EHLERT, L.	*Niagara.*
HOLLAND, E.	DEVITT, T. M. ...	*Rotorua.*
HOMAN, C. E. ...	BISHOP, R. K.	*Glenamoy.*
	WETHERLEY, F. B. C.	
*HOWELL PRICE, T., D.S.O., D.S.C.	BAMFORTH, A. ...	*Somerset.*
*HUGHES, R. T.	SMITH, F. V. ...	*Tyndareus.*
*HUME, R.	PATCHETT, F. E. ...	*Doric.*
HUNTER, J. L. B. ...	COCKERILL, H. K. ...	*Rotorua.*
JACK, J.	BRICE, L.	*Port Nicholson.*
JOHNSON, J. W.... ...	SAVILL, P.	*Maimoa.*
*KEARNEY, J. Lieut.-Commr. R.N.R.	I'ANSON, A. C. ...	*Baltic.*
KERSHAW, W. A. R. ...	HILL, H. A. ...	*Mataroa.*
KETTLEWELL, C. R. ...	BALDWIN, G. D. ...	*Tongariro.*
KIPPINS, T., D.S.C. ...	SIMPSON, W. E. ...	*Port Melbourne.*
*LAIRD, J.	MCCULLOCH, J. ...	*Piako.*
*LOW, A.	PARKER, F.B. ...	*Clan Macwhirter.*
MALIN, R. G., Lieut.-Commr. R.N.R.	THOMAS, F. D. ...	*Samaria.*
MARSHALL, W., C.B., D.S.O., Commodore R.N.R., R.D.	YOUNG, A. H. ...	*Majestic.*
*MAXWELL, P. S. E., Commr. R.N.	STOKES, H. J. C. ...	H.M.S. *Herald.*
*MCBRYDE, A. M. ...	BALDWIN, S. H. ..	*Peshawur.*
MCINTOSH, A.	CLARK, H. M. ...	*Karamea.*
MCKELLAR, A. W., Capt. R.N.R., R.D.	ALDRIDGE, R. C. ...	*Remuera.*
MCMILLAN, D. ...	SHAKESPEARE, P. L.	*Cumberland.*
	VERNON, H.	
MCNEIL, S. G. S., Capt. R.N.R., R.D.	CRAWFORD, R. H. C.	*Mauretania.*
*MEAD, G. F. ...	DEVITT, T. M.	*Norfolk.*
	SHAKESPEARE, P. L.	
*MILLSON, H. E.... ...	WORSLEY, G. H. ...	*Abinsi.*
MOREHOUSE, W. A. ...	OTTERSON, C. ...	*Belgenland.*
MORTON BETTS, W. ...	PICKERING, G. H. ...	*Walmer Castle.*
NARES, J. D., D.S.O., Capt. R.N.	FOULERTON, A. B. B.	H.M.S. *Iroquois.*
*NICHOLAS, P. O.... ...	MORRICE, G. ...	*Actor.*
*NORTON, A. T.	KIME, G. H. ...	*Hauraki.*
*PAGE, W. J.	WOODS, S. R. J. ...	*Buteshire.*
PARKER, W. H., C.B.E., Capt. R.N.R., R.D.	DAY, H. J. C. ...	*Olympic.*
POWER, J.	SAVILLE, E.... ...	*Titan.*
*PRIDHAM WIPPELL, H. D., C.V.O., Capt. R.N.	HAMLEY, C. W. A. G.	H.M.S. *Enterprise.*
PROTHERO, W.	DUGUID, G. ...	*Aquitania.*
*QUIRK, T. W.	GEPP, E. A. H. ...	*Protesilaus.*
RATHKINS, C. E., Commr. R.N.R., R.D.	POPPLETON, R. H.	*Parana.*
	MACFADYN, D.	
RICHARDS, J.	LITTLECHILD, T. B. ...	*Astronomer.*
ROBINSON, F. W. ...	LAWSON, H. N. ...	*Ruapehu.*
ROBINSON, S., C.B.E., Commr. R.N.R., R.D.	SIMMONS, H. G.	*Empress of France.*
	FAWCETT, G. M.	
ROSTRON, Sir A. H., K.B.E., Capt. R.N.R., R.D.	COLLINS, F. P. ...	*Berengaria.*
SAWBRIDGE, I. R.	PINKNEY, H.	*Port Darwin.*
	MCCLOUNAN, A.	
SCUTT, W. ...	MILLARD, S. R. ...	*Wangaratta.*
	TETLEY, R. C. ...	*Australia.*
SHELFORD, W. S., Lieut.-Commr. R.N.R.	MACKAY, E. M. ...	*Oronsay.*
STANLEY, W. F., Commr. R.N.R., R.D.	SMITH, S. S. ...	*Carnarvon Castle.*
STRINGER, C. B. L. ...	MARR, S. S. ...	*Sinkiang.*
SUMMERS, F. F., Commr. R.N.R., R.D.	HILL, W.	*Albertic.*
*THORNE, G. G., Commr. R.N.R., R.D.	STANNARD, R. B. ...	*Orsova.*

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

Captain.	Principal Observing Officer.	Ship.
Upton, H. L., D.S.C., Commr. R.N.R., R.D.	Phillips, J. G. ...	*Northumberland.*
Warner, G. E., Capt. R.N.R., R.D.	Poustie, W. ...	*Homeric.*
White, E. R., Commr. R.N.R., R.D.	Poustie, W. ...	*Homeric.*
*Whitfield, G. A. ...	Davis, S. B. ...	*Thistleglen.*
Williams, D. T.	Hilton, F. W. Oddy, F. V.	*Achilles.*
Williams, R. ...	Belfield, R. A. Chadwick, D. H.	*Cambridge.*
Wright, J. B.	Ellis, R. B. ...	*Accra.*
	Blair, D. M. ...	*Elysia.*
	Chamberlain, D. W.	*Adriatic.*
	Peters, J. W. ...	*Laurentic.*
	Sayers, L. A. ...	*Pancras.*
	Thom, J. G. ...	*Port Campbell.*
	Williams, P. L. ...	*Lancastria.*

* 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.

APPARENT LINE OF DEMARCATION BETWEEN AGULHAS CURRENT AND COUNTER CURRENT.

The following is an extract from the Meteorological Report of S.S. *City of Bombay*, Captain O. Cheverton-Brown, London to Durban. Observer Mr. E. H. Roberts.

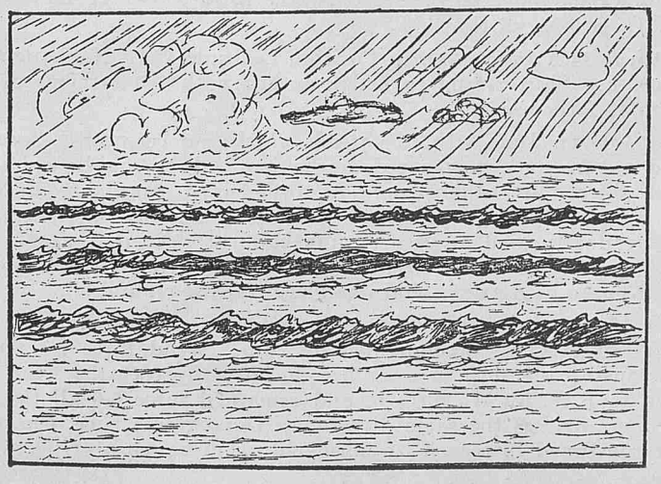
"18th June, 1929. In Latitude 32° 45′ S., Longitude 28° 25′ E., four miles off Cape Morgan, thirty miles N.E. of East London at 1.20 p.m., A.T.S. Steamer was observed to pass through a distinct line apparently caused by current running almost parallel with the shore, the colour of the water north of the line being of a light greenish hue and that to the southward of a much deeper colour. On the temperature of the water being taken after crossing the line it was found to be 68° F., or a rise of six degrees from the 8 a.m. temperature showing the presence of a warm current. The ship steaming at the time 51° speed eleven knots."

SEA DISTURBANCE AND CURRENT RIPS.

Bay of Bengal.

The following is an extract from the Meteorological Report of S.S. *Ningchow*, Captain H. E. Beale, Suez to Singapore. Observer Mr. H. Morley, 4th Officer.

"The accompanying sketch is of a sea disturbance sighted from the S.S. *Ningchow*, in Latitude 05° 52′ N., Longitude 93° 49′ E., at 7.30 a.m., A.T.S., on June 22nd, 1929.



"Three distinct wavelets, from two to three feet in height were seen, stretching in an East and Westerly direction. The crest of the waves broke continuously and the whole appeared to be moving in a Northerly direction. When the disturbance was first noticed, the sea was smooth with a slight South-Westerly swell, but on approaching, the swell changed to a moderate South-south-easterly one. Soon after this disturbance was passed numerous tide rips were encountered, extending from South-East to North-West. These were very frequent throughout the day until Pulo Weh was passed at 4.30 p.m. At times it was required to put the helm 'hard over' to counteract the tendency to take a sheer, which was in either direction. Steaming twelve knots on a true course N. 88° E. a strong adverse current was felt, the set and drift from stellar observations at 5.36 a.m. to 11.35 a.m. when the land was first sighted, being S. 54° W. 11.3 miles or 1.8 knots."

DISCOLOURED WATER.

Caribbean Sea.

The following is an extract from the Meteorological Log of R.M.S. *Rotorua*, Captain J. L. B. Hunter, Wellington to Southampton, Observer Mr. A. L. Nelson.

"June 20th, at 1.15 p.m. Position Latitude 11° 15′ N., Longitude 75° 08′ W. Wind N.E., force 4, sea N.E. slight, swell N.E. rather rough, sky overcast with cirrus haze; vessel entered discoloured water of greenish tinge. Density was taken and found to be 1022.2. On entering, vessel took no sheer either way. The separating line ran in a N.N.W./S.S.E. direction. 1.25 p.m. Entered a second part of discoloured water—also green and having muddy tinge. A well-defined line of demarcation ran in a N.E'ly direction containing spawn (or sand). Density 1017.7. This discolouration continued until 2.0 p.m. when only a very faint trace of greenish tinge was apparent. At 3 p.m. the density was found to be 1023.0.

PHOSPHORESCENCE.

South Atlantic Ocean.

The following is an extract from the Meterological Report of S.S. *Clan Morrison*, Captain W. M. Porterfield, St. Vincent, Cape Verd Islands to Cape Town. Observer Mr. L. C. Cuthbert, 3rd Officer.

"June 11th, at 21 hrs. 55 mins. A.T.S. in Latitude 21° 00′ S., Longitude 7° 10′ E., encountered unusual patches of phosphorescence. The phosphorescence flashed at almost regular intervals giving that nearest the ship, the appearance of brilliant flashing buoys whilst

that furthest away appeared as a weak form of sheet lightning flashing on the water surface.

"This phenomenon was only visible on the vessel's port side from about 4 points on the bow to abeam, the flashes on the starboard side being very weak and irregular.

"This lasted for 15 minutes after which only very occasional flashes were observed."

MAGNETIC DISTURBANCE.

East Indies.

THE following is an extract from the Meteorological Log of S.S. *Clan Macwhirter*, Captain A. Low, Singapore to Noumea. Observer Mr. F. B. PARKER, 2nd Officer.

"June 3rd, 1929, 9.45 a.m., in Latitude 7° 58′ 30″ S., Longitude 117° 54′ E., vicinity of Tambora Volcano. At first the deflection of the needle was very slow, so slow that the quartermaster began to follow his course and it was not until the officer noticed the land drawing ahead that any action was taken.

"The ship was brought on to her course again, approximately by sighting the wake astern.

"The needle was deflected 6 points (i.e., from North to E.N.E., true North being indicated by W.N.W.) and the card oscillated about a point (Ship's head by compass N.N.E.) for about 2 minutes.

"The disturbance lasted about four minutes, then the compass swung back very rapidly when clear of the field.

"The above deflections were noted on the steering compass (steel wheel house) and before accurate deflections could be noted from the standard compass the Ship was clear of the field."

NOTE: The following appears on page 239 of the "Eastern Archipelago Pilot, Vol. II."

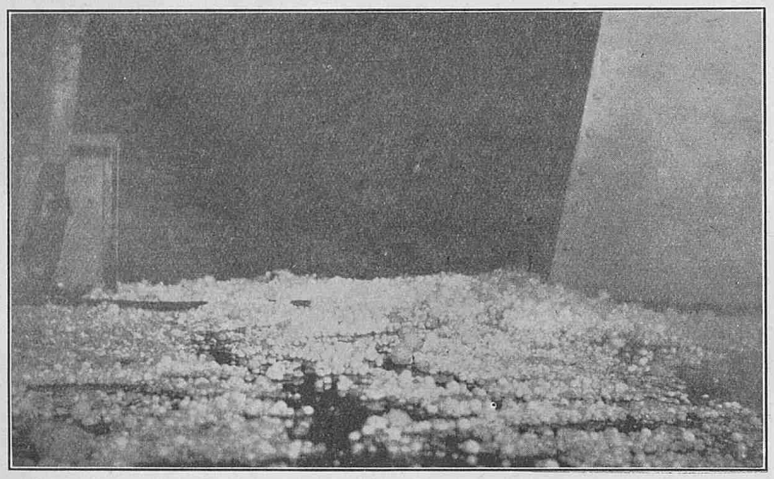
"Magnetic disturbance.—Caution. Abnormal values of the magnetic variation have been reported off the North point Sumbawa in the neighbourhood of Tambora Volcano, great care therefore should be taken when navigating in this vicinity."

LINE SQUALL.
THUNDERSTORM AND HAIL.

Durban, S. Africa.

THE following is an extract from the Remarks Book of H.M.S. *Lowestoft*, Captain J. H. YOUNG, R.N. Observer Lieutenant Commander G. A. FRENCH, R.N. Received through the HYDROGRAPHER OF THE NAVY.

"June 24th, 1929, a line squall accompanied by a devastating hailstorm struck Durban at 1830 on 24th June, 1929. The value of the damage done is variously estimated at between half and a quarter of a million pounds worth. Hailstones of 4″ in diameter and weighing 9 ounces were found in large quantities. This is the first storm of the kind since 1879. The accompanying snapshot was taken by flashlight on board H.M.S. *Lowestoft* after the storm.



"The following table gives extracts from the log for the day in question and day following:—

June.	Wind.	Weather.	Sea.	Pressure.	Temperature.		
					Wet.	Dry.	Sea.
24th				mb.	°F.	°F.	°F.
0400	S.E. 1	b	1	1007·4	72	62	72
0800	S.E. 1	b	1	1008·9	70	64	72
1200	S.E. 1	bc	1	1010·2	76	69	74
1600	S.E. 1	bc	1	1010·3	76	68	73
1800	S.E. 3-6	or lt h at 1830	4	1004·4	69	65	72
2000	S.W. 6-7	o lr	4	1006·8	59	59	64
2400	S.W. 2	bc	1	1007·8	59	59	64
25th							
0400	S.W. 1	bc	1	1007·8	55	53	52
0800	S.W. 3	bc	1	1009·1	56	54	59
1200	S.W. 2	bc	1	1009·7	65	58	64
1600	S.E. 2	bc	1	1009·4	64	60	65

NOTE.—

(1) The sudden drop in pressure and temperature and veering of wind eight points as 'cold front' or trough line arrived.

(2) The effect of the hail on the sea temperature.

(3) The long roll 'cumulo-nimbus' cloud appeared at 1600.

THE following is an extract from the Meteorological Report of S.S. *City of Bombay*, Captain O. CHEVERTON-BROWN, London to Durban. Observer Mr. E. H. ROBERTS.

"Violent Hail and Thunderstorm at Durban. June 24th, 1929. Atmosphere in the afternoon was very hot and oppressive, the barometer having fallen slowly for the past two days, at 5 p.m. heavy cumulo-nimbus clouds gathered overhead moving up from the East, about 5.30 rain began to fall accompanied by thunder and lightning, this continued to increase in violence until 6.10 p.m. when large hailstones began to fall. One average hailstone picked up on the steamer and measured was 2″ by 1″ by ½″ in size, the lightning and thunder overhead was at that time almost continuous, varieties known as 'sheet' and 'forked' being observed, such conditions prevailed until 6.30 p.m. when hail ceased and the storm gradually passed over. Owing to the violence of the storm and the danger of remaining in any exposed position it was impossible to follow the movements of the storm or to note the direction of the wind, which varied considerably in force and direction. Much damage to property was done by the hailstones. 6.30 p.m. Barometer corrected 29.66 in. Air 58° F."

SQUALLS.

South China Sea.

THE following is an extract from the Meteorological Log of H.M.S. *Herald*, Commander P. S. E. MAXWELL, R.N. Observer Lieutenant H. J. C. STOKES, R.N.

"11th to 14th June, 1929, in Position Latitude 4° 11′ N., Longitude 112° 56′ E. Ship riding to kedge anchor with 150 fathoms of 2½″ wire in 40 fathoms.

"At 1510 on June 11th, the wind, which had been SSE, force 3, veered to W. and commenced freshening. Rain squalls were observed all round the horizon. At 1545 heavy squalls from N.W. wind force 6-7, passed over the ship, lasting for an hour, when the wind gradually died away becoming calm at 1935, and starting to rain. At 2235 the wind freshened from W. to force 4, until 0015 when it again died away. Rain had been falling on and off.

"At 0450 on June 12th wind freshened from N.W. force 4, and at 0630 a heavy squall accompanied by rain. Wind force 6-7 passed over, causing the ship to drag her anchor. By 0800 the wind had backed to S.W. by W. force 6, and remained force 5-6 all the day from more or less the same direction. During this time, the barometer continued to record its normal diurnal range.

"After midnight the wind nearly died away again, until 0245 when a squall was observed approaching from W.S.W., which struck the ship at 0250 with wind force 9-10. Very heavy rain accompanied it and the sea rose rapidly on top of a fairly heavy westerly swell, while the ship again dragged her anchor until she was kept steaming up to it. At 0315 wind began easing and veered to W., sea was force 5-6. By 0400 wind had eased to force 6 and the rain ceased. At 0425 it started raining again and lightning was observed all round.

"At 0530 wind backed to W.S.W. force 7 with very heavy rain. This lasted for about half an hour, when the rain stopped and wind continued backing until by 0800 it was S. by W., force 5-6, squally. The sea by then was confused, force 4. Again during this night the barometer showed its normal diurnal range.

"At 1515 another heavy squall, wind force 6, was experienced from S.W. This lasted for about an hour, when the wind moderated and by 1915 died away completely, leaving a fairly heavy westerly swell. At 0115 on June 14th, wind increased to force 3 from S.W. by W., and at 0135 there was very heavy rain. At 0430 the wind increased to force 6 and was blowing force 8 by 0650, after which it started moderating and at 0930 veered to S.E. force 1. This ended the period of squalls, except for a westerly swell which lasted for several days. These squally periods occur throughout the S.W. monsoon in these parts, lasting for several days. They generally get more frequent towards the end of the monsoon about September and October."

North Atlantic Ocean.

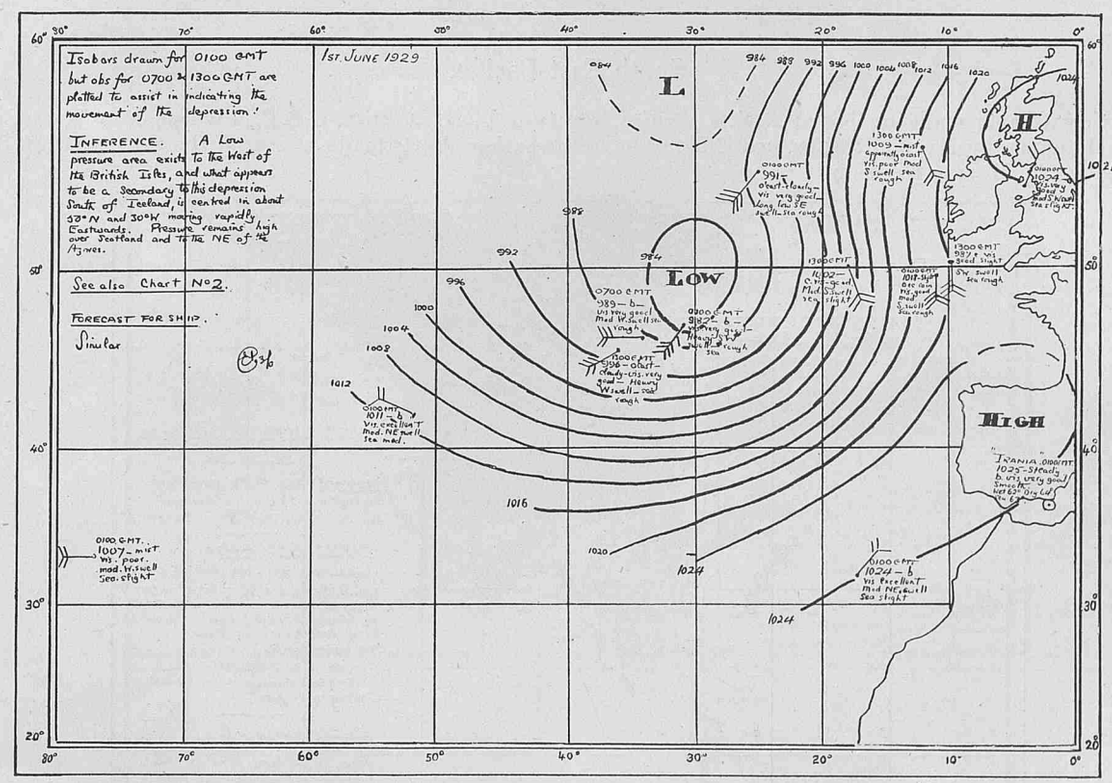
THE following is an extract from the Meteorological log of M.V. *Karamea*, Captain A. MCINTOSH, Colon to Southampton. Observer Mr. K. D. FISHER, 2nd Officer.

"June 22nd, 1929. 4.0 p.m. (2016 G.M.T.). Latitude 22° 51′ N., Longitude 63° 09′ W. Barometer corrected 1020.9 mb. Temperatures dry 81° F. Wet 74.8° F. Sea 79.5° F. Weather bc. Massive Cu.-Nb. approaching from Eastward apparently growing taller, the upper portions becoming attenuated and precipitating rain, Fr-Cu. and small wisps of stratus cloud moving rapidly from East. Wind East force 3. When overhead this cloud appeared to be associated with and masking a small squall. What had appeared to be one large cloud now seemed to be several, closely interwoven and revolving more or less round their own axis. Underneath, Fr-Cu. and Nb. Very short and highly concentrated rain squall passed close to ship falling over an area of about 200 sq. yds. only. Wind shifted temporarily to S.E. force 4. Barometer corrected 1022.8 mb. Temperatures Dry 77.5° F., Wet 72.2° F."

WEATHER CHARTS MADE AT SEA.

Eastern North Atlantic.

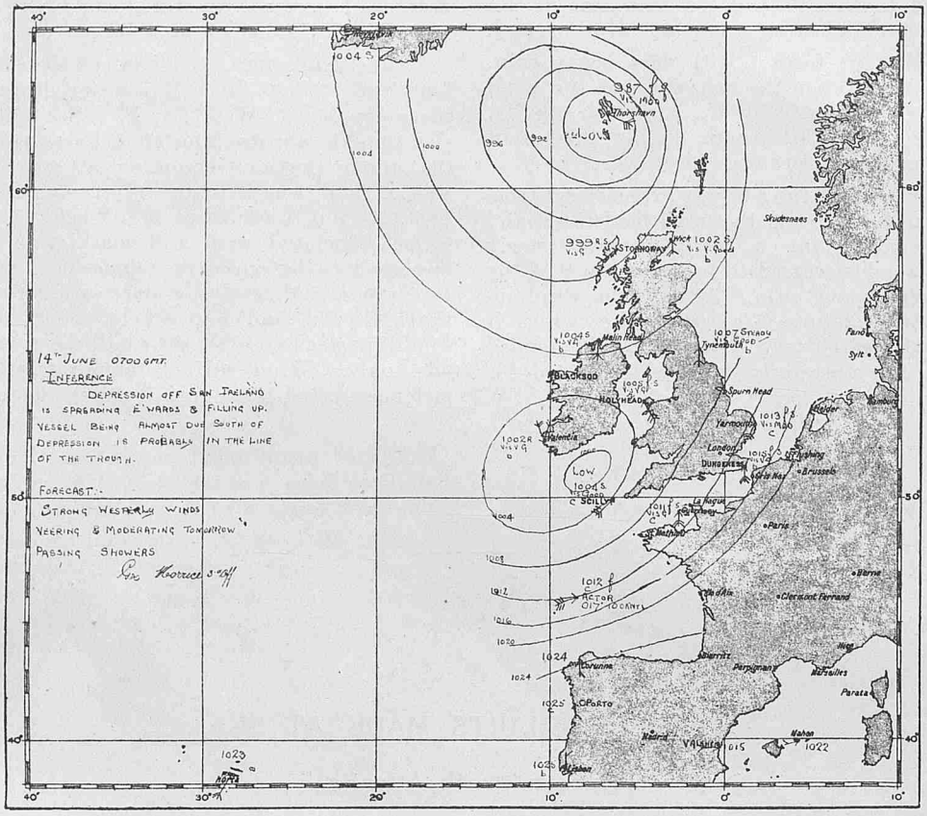
Weather Chart made on board M.V. *Irania*, Captain P. A. ADAMS, Batum to Rouen, by Mr. E. ALLEN, 3rd Officer.



WEATHER CHARTS MADE AT SEA (*continued*).

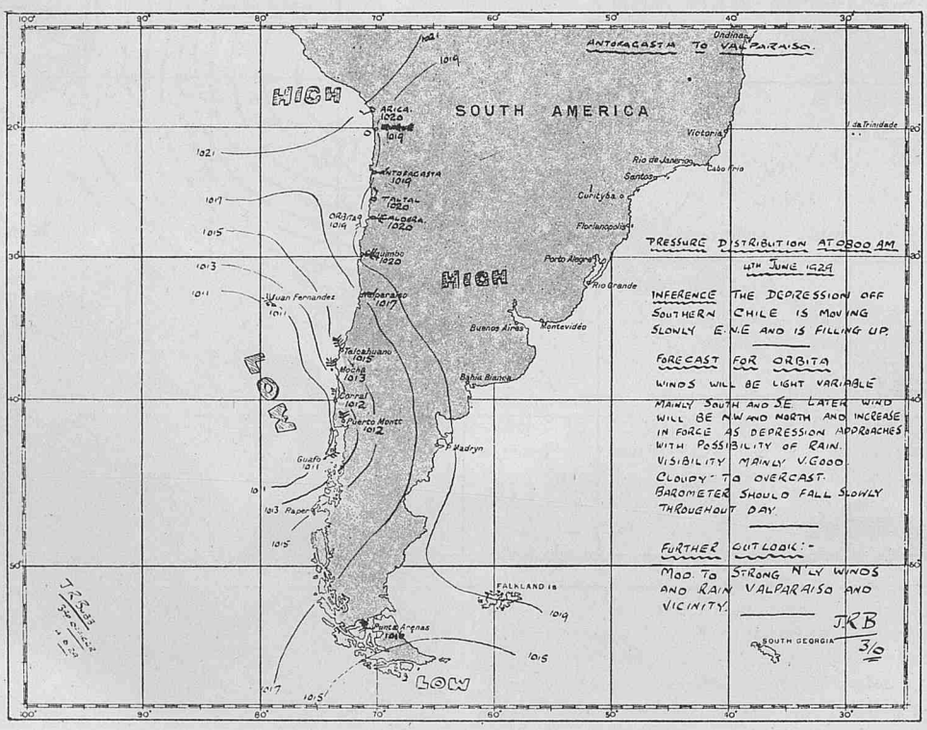
Eastern North Atlantic.

Weather Chart made on board S.S. *Actor*, Captain P. O. NICHOLAS, Cape Town to Glasgow, by Mr. G. MORRICE, 3rd Officer.

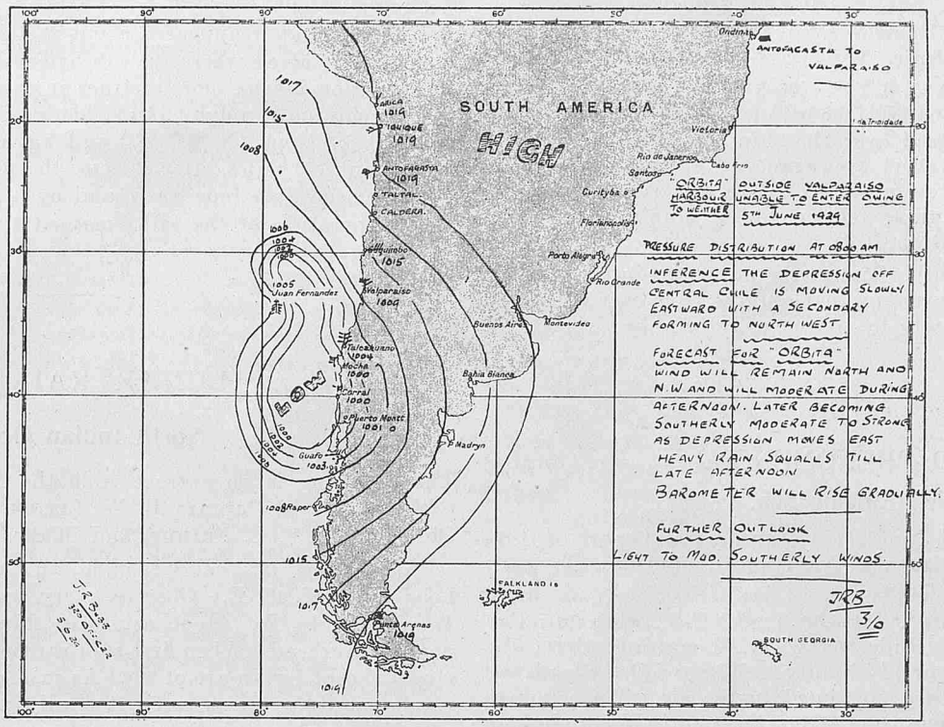


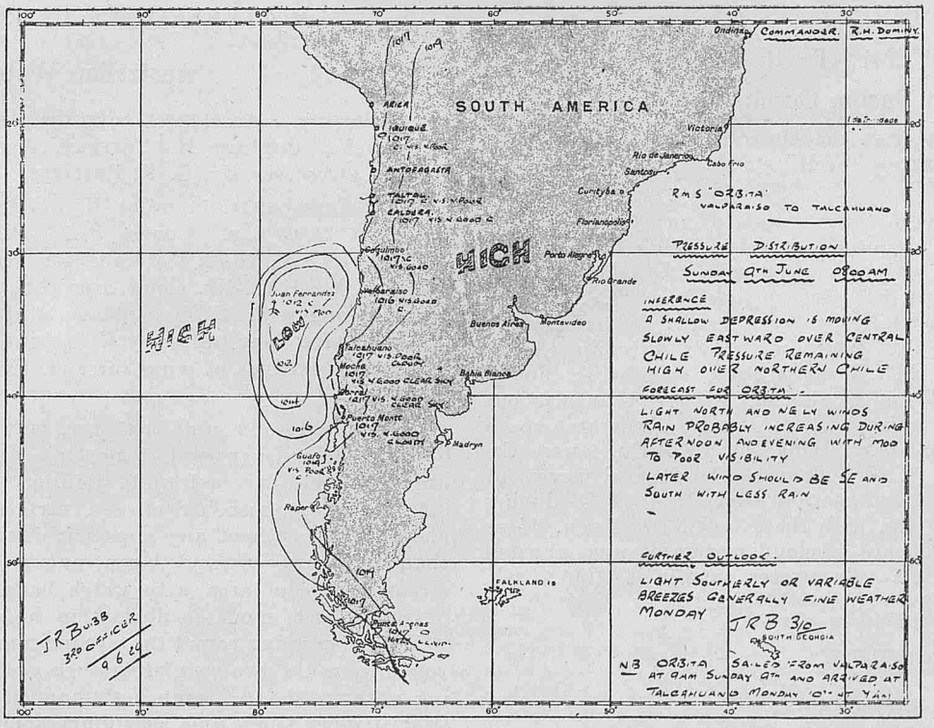
South East Pacific.

A series of Weather Charts made on board R.M.S. *Orbita*, Captain R. H. DOMINY, C.B.E., Liverpool to West Coast of South America via Panama, by Mr. J. R. BUBB, 3rd Officer, the first weather charts made at sea off the west coast of South America to be received in the Marine Division.



South East Pacific.





CLOUD OF LOCUSTS.

Arabian Sea.

THE following is an extract from the Meteorological Report of S.S. *Hatimura*, Captain W. H. HEMMINGS, Bombay to London. Observer Mr. L. E. HEATH, Chief Officer.

"June 23rd, 1929, at 10.30 A.T.S. (0605 G.M.T.) in Latitude 17° 43′ N., Longitude 66° 56′ E., the wind being S.W. force 4, a large cloud of Locusts passed over the ship, from the N.W. and moving to the S.E. It had every appearance of a large rain squall. Fierce rain squalls were prevalent both before and after this cloud of Locusts. Hundreds of these fell on to the ship's deck in an apparently exhausted condition."

NOTE:—The Agricultural Authorities in Egypt have pointed out that information of Locusts approaching that country from over the sea if reported by ships immediately by Wireless Telegraphy may be of considerable value.

CLOUD PHENOMENON.

Mediterranean Sea.

THE following is an extract from the Meteorological Report of S.S. *Mangalore*, Captain J. J. MULCAHY, Algiers to Avonmouth. Observer Mr. James A. LEITCH, 3rd Officer.

"Wednesday, June 5th, 1929. At 8.30 p.m. A.T.S., when 12 miles South of Torrox point, Latitude 36° 32′ N., Longitude 3° 50′ W. Calm, glassy sea, clear sky and slightly S.W'ly swell. Clouds of steamers' smoke were hanging suspended in the air. We observed a long line of this cloud coming up from the South West. It had the appearance of a line of smoke, but had hard, well-defined edges. It passed over the ship at a low altitude travelling rapidly towards the high Spanish land to the Northward. The passage of this cloud at such an apparently low altitude was somewhat startling, as the air was so still on the surface."

SPIRAL MOVEMENT OF CLOUD.

South Pacific Ocean.

THE following is an extract from the Meteorological Log of M.V. *Karamea*, Captain A. MCINTOSH, Wellington to Balboa. Mr. A. C. JONES, 3rd Officer.

"June 12th, 1929. 8.34 a.m. Ci. clouds from North rapidly changing to Ci-Cu. and A-Cu. spreading and covering Eastern half of sky. Direction changing to East and movement becoming slower. 8.49 a.m. Intermediate wisps of A-Cu. moving from W.S.W. 8.51 a.m. A-Cu. clouds from E.N.E. 9.02 a.m. Cirrus/Rippled Ci-Cu/Ci-St. from N.E. by N. 9.05 a.m. Ci-St. becoming A-Cu. and changing direction to E.N.E. as altitude decreases; finally joining Cu. clouds from S.E. and moving more slowly than previous Cu. (Trade Clouds) which remained at steady moderate speed throughout phenomenon. 9.10 a.m. One belt of A-Cu. across the sky astern moving N.E. by N. very slowly. The general movement of clouds was a clockwise spiral motion from N. to S.E. during their transition from Ci. to Cu. with the exception of A-Cu. wisps from W.S.W. The same sequence of cloud movement was repeated several times during morning. Barometer steady at 1016.1 mb. (D.R. Position at 8 a.m. 11° 18′ S., 101° 57′ W.)."

MIRAGE.

Indian Ocean.

THE following is an extract from the Meteorological Reports of S.S. *Glenshane*, Captain V. F. MARTIN, Suez to Penang. Observer Mr. A. C. RADLEY, 2nd Officer.

"June 5th, 1929, at 6.10 p.m. A.T.S. in Latitude 5° 55′ N., Longitude 95° 37′ E., after passing Po Weh observed an exceptionally fine sunset and mirage. Wind N.W. Force 1. Barometer 29.76 in. Temperature Air 85° F. Sea 85° F., smooth, slight W'ly swell. Cloud Ci-St. A-St. A-Cu. Cu-Nb. Soon after sunset a mirage was seen to be forming on the N.W. horizon and about two points North of where the sun had set. At 6.18 p.m. the mirage was well defined and took up the form of a large island with three peaks. A faint reddish glow appeared about 2° above the horizon at 6.20 p.m. and directly above where the sun had set (N. 67½° W.). At 6.23 p.m. this red glow became more distinct at an altitude of 4° and resembled the sun shining through Cirrus clouds. A bearing of the mirage was taken at 6.33 p.m. (N. 63° W.) and was presumed to be Gt. Nicobar Is. distant 130 miles. At 6.35 p.m. the mirage and reflection of the sun commenced to fade away and by 6.40 had totally disappeared. The temperature of the air remained steady throughout (85° F.)."

LUNAR RAINBOW.

North Indian Ocean.

THE following is an extract from the Meteorological Log of S.S. *City of Chester*, Captain F. W. LETTON, Dar-es-Salaam to Madras. Observer Mr. P. C. ARTHUR, 2nd Officer.

"20th June, 1929, at 2.25 a.m., in position Latitude 4° 26′ N., Longitude 78° 49′ E. Observed very well defined Lunar Rainbow. Wind S.W. by W. Moon astern of ship altitude 15°. Rain squall passing overhead. When first seen rainbow formed nearly a complete circle, except for an arc of 20°. As rain squall worked ahead of ship, rainbow became larger until it finally disappeared. Colours, outer edge, brownish red, heliotrope and orange. The colour on the outer edge had the most luminosity and also the widest band of colour."

WATERSPOUTS IN FORMATION.

Australian Waters.

THE following is an extract from the Meteorological Report of S.S. *Wonganella*, Captain H. SUFFERN, Australian Ports to Pacific Islands. Observer Mr. G. F. PHILLIPS.

"17th June, 1929, 14 miles E. of South Solitary Island Light House at 11.42 a.m. Course S.12° W. Speed 9 knots. Wind variable (S.S.E. to S.W.) force 2-3, sea smooth, swell N.E.4. A heavy dark roll Cu-Nb. cloud from S.S.E. through zenith to N.N.W. about 1 mile wide E-W with blue sky to East and West of same. Cloud moving longitudinally with wind carried a little light rain in patches, extreme of wind force, 4, from S, length of cloud about 16 miles.

"Between 11 a.m. and 11.45 a.m. between Latitudes of N. and S. Solitary Islands, passed 8 partial waterspouts, two having the upper funnels, but not quite joining. Passed half cable off four others just commencing on sea surface. These had diameter of about 150 ft. without any apparent disturbance of sea surface other than light spray rising. A continuous ring of spray blowing round circumference of area with watch hands. Additional to this ring of spray each spout in formation had a number of subsidiary whirls progressing round the circumference of parent spout, but each rotating on its own axis at a much greater speed than the containing waterspout. All spun right-handed; sometimes there were only two, at other times nine subsidiary spouts in one parent spout, the lesser ones springing full formed to height of parent spout, progressing a few times round circle then dying away again. None of these forming spouts exceeded 40 ft. in height while they travelled very slowly with the wind, changing direction, as the wind changed."

OLD TIME MARINE OBSERVER'S LOG

Under this heading are reproduced extracts of records and sketches made at sea over fifty years ago. Marine Observers of the present day are invited to compare these with their own experience, and should they know of surviving Old Time Marine Observers whose remarks appear, it is hoped that they will bring these to their notice.

HURRICANE.

Remarks by Captain S. T. S. Lecky accompanying the Weather Book Register of S.S. *Halley* when in the vicinity of a Hurricane in September, 1870.

" September 3rd, 1870.

" We were in a Latitude where a steady N.E. trade wind prevails unless deflected or obstructed by tempests common to these seas at this period of the year; but instead of the regular trade wind, adverse Northerly breezes were blowing, force 1-4, with squalls and passing showers. However, I did not then apprehend anything serious, as a careful review of the Barometric observations taken every two hours shewed apparently settled weather in our immediate vicinity. Notwithstanding this, and knowing that the intertropic Barometric fluctuations were usually small in amount, my suspicions were excited, and I was led to watch closely for atmospheric phenomena whereby to detect, if possible, the reason of this abnormal state of things. Among other indications I noticed a peculiar moaning sound in the wind which I have always taken as a sure forerunner of bad weather, denoting as it seems to do an atmosphere electrically surcharged. At 8 p.m. Ship's course N.43°W. the wind being N.18°W. (true) force 2, and the Barometer 30.046 attached Thermometer 82.9 the light upper strata of clouds were passing slowly over the moon from East to West; the moon had a burr round it, and a long deep swell prevailed at the time from E.N.E. (true). There were light squalls during the nights with rain, and the barometer, though still conforming to the remarkable law and regulating its diurnal tidal motion, evinced a slight inclination to fall.

" September 4th, 1870.

" At daybreak the swell was heavier and coming from E. by N., causing vessel to roll heavily as we had no sail set to steady her. The sun at rising appeared of a dead brassy paleness and looked preternaturally large; some ten minutes previous to its appearance the clouds (Cum. and Cum-s.) round the horizon to an altitude of, say 25° were strongly tinted of reddish orange colour, these unusual tints disappeared however some few minutes after sunrise, but it was not till it had attained an altitude of 3° that the sun began to give any rays, and these only faulty.

" At noon the ship's position was 16° 32′ N., and 50° 35′ W. Course N.40°W. Wind N.83°.W. force 4; and a long heavy swell at N.E.½E. Barometer 30.056, Thermometer 82.7. After 6 p.m. the sun disappeared in a bank; the clouds were strongly tinged deep red all round from the horizon to the zenith, and had a strange lurid caste, which lasted fully 40 minutes after the sun had set; the moon about this time was observed to have a decided greenish hue which, as night came on, gradually resolved itself into a pale and sickly appearance: about 7.13 p.m. it was surrounded by a strongly marked halo 30° to 35° in diameter, and the sky was overspread with a thin cloudy film amid which the stars were dimly visible as through a veil; the wind came in hollow gusts and moaned fitfully. Had the barometer now fallen, I most certainly would have looked for one of these tropical visitations known as hurricanes. As it was, and to be on the safe side, we made due preparation for such an unwelcome guest by sending down topgallant

Copy of the Meteorological Register of S.S. *Halley*, for September 10th, 1870, written by Captain Lecky's own hand.

Date, 1870.		Latitude.		Longitude.		Temperature of Sea Surface.		Current in the 24 Hours.	Winds.		Barometer.	
Month, Day and Moon.	Hours.	Observed.	D.R.	Observed.	D.R.	Temperature by No. 1044.	Hyd. 128.		True Direction.	Force.	Height.	Attached Thermometer.
	2								S. 10° W.	9–10	29·700	83·4
	4								—	—		
	6								—	—		
	8					81·9	254		S. 10° W.	10	29·730	83·0
	10								S. 14° W.	10	29·770	82·5
14·6 IX 10	Noon	—	28° 31′	—	61° 55′			Unknown	S. 20° W.	9	29·826	82·7
	2								S. 20° W.	9–10	29·812	83·2
	4					81·8	256		S. 25° W.	9	29·840	83·9
	6								S. 38° W.	8	29·988	83·0
	8								S. 35° W.	8–9	29·922	83·5
	10								S. 53° W.	8	30·004	81·8
	Midt.								S. 63° W.	7	30·014	81·0

Date, 1870.		Thermometer.		Clouds.			Weather.	Meteorological Remarks, including any observations on the 19—State of the Sea. 21—Specific Gravity of Water. 22—Temperature at Depths and Deep Soundings (to be inserted at the nearest hour lines).
Month, Day and Moon.	Hours.	Dry Bulb No. 1043.	Damp Bulb No. 1040.	Form or Character.	Amount 1–10.	Direction of Upper.	Fog, Rain, Snow, Hail, Thunder, Lightning, &c.	
	2	80·9	79·0		10			12·30, Bar. 29·800. 2·30, Bar. 29·720.
	4						R Q	1 a.m., Hove to on Starbd. tack, ship heading under.
	6							Close reefed trysails to the Sd. and Ed. Hard gale.
	8	80·0	77·9		9			8. Hard squalls and heavy rain.
	10	81·0	78·5				Q	Hard squalls with lulls. Lulls lasting longer than
14·6 IX 10	Noon	81·7	79·0		10			the squalls. Heavy but tolerably regular sea.
	2	81·9	79·0		9		Q	Hard dry squalls.
	4	81·0	78·7		5			
	6	79·3	76·8		5			
	8	80·1	77·8		8			
	10	79·4	76·0		6			
	Midt.	79·0	75·7		4			

yards, masts and rigging, close reefing topsails and trysails—battening hatches—securing everything alow and aloft—reeving lifelines and looking to lashings generally. At 10 p.m. the wind had veered more to the Westward (S.87°W. force 3) and the heavy swell which in the morning had been coming from E. by N. was now rolling along from N. by E., having come gradually round during the day, from this, coupled with the steady veering of the wind, I had little doubt a circular storm was raging some 170 miles or so to the Northward of us, and pursuing the usual N.W. by W. track common to these latitudes. It needed no projection on the chart to shew that we ran no danger by keeping on our course to the N.W. as the storm's progressive motion was certain to be faster than our own, which did not exceed 7 knots per hour; moreover the barometer would be sure to give timely warning of a too near approach to the centre by over-running it; we therefore stood on and watched all the indications with unusual interest.

"Throughout the day the onward motion of the body of the storm could easily be traced, as its position (always at right angles to the wind) was distinctly marked by a denser formation or heaping up and thickening of the clouds in that particular quarter. These clouds were of a uniform dull leaden colour, about 15° high, with patches of Cum-s. in the foreground; there was none of that ragged tufted and rapidly changing formation which a nearer approach to the meteor would certainly have developed, and which I had seen on other and similar occasions in the Indian Ocean.

"SEPTEMBER 5TH.

"8 a.m. Wind by this time had veered to S.25°W. force 4, head N.38°W., Barometer 30.098, Thermometer 81.9. The heaviest of the swell was now coming from N.W., but this swell was cross and confused, being mixed up with the N.E'ly sea of yesterday; the vessel therefore pitched and knocked about considerably, and was now evidently in the rear or S.E'ern. Quadrants of the meteor which had crossed her bow speeding on its way towards the Bahama Islands, which I feel convinced must have experienced its full force. This evening the sun again set in a bank, the centre of the storm then bearing about West: the clouds in that direction were lit up as before with reddish tints, but of a softer look; the moon though surrounded by a large halo had resumed its normal appearance, but the same filmy sky existed as on the previous night. 8 p.m. Barometer 30.076, Thermometer 82.5. Wind S.13°E. force 2-3. Heavy swell from W. by N.

"SEPTEMBER 6TH.

"8 a.m. A very heavy cross confused and pyramidial sea, the waves running together from all directions, but principally from West, head N.37°W. Barometer 30.126, Thermometer 81.9. Wind S.60°E. force 5. Considered that we were now crossing the track of the vortex of the storm. Though the weather had still a somewhat unsettled look, the general appearance indicated a gradual restoration of the atmospheric equilibrium.

"Noon: Sea much troubled and running in all directions, but now principally from E.S.E., shewing that we had crossed to the Northward of the axial line: Barometer 30.136, Thermometer 83°: Wind S.63°E. force 3. At 8 p.m. the barometer had risen to 30.150, Thermometer 82.8, wind the same in force and direction. The sea had perceptibly subsided, the sky looked bright and clear, and the moon, now approaching the full, shone brilliantly, occasional light showers seemed to clear the air still more, and no trace of the storm remained if we except the still ruffled surface of the sea.

"SEPTEMBER 7TH.

"8 a.m. Steady breezer at East force 4, the trades having resumed their sway. Barometer 30.228, Thermometer 80.4, fine clear weather, moderate swell from the two opposite points of East and West, the latter slightly predominating. Noon. Latitude 23° 18′ N., Longitude 56° 03′ W. Barometer 30.214, Thermometer 80.4. Wind S.88°E. force 4, fine pleasant weather.

"From the foregoing it will be seen by those versed in the law of storms as propounded by Piddington, Redfield, Reid and others, that the "Halley" steering N.39°W. (true) at an average speed of 7 knots was coming up behind a revolving gale, which crossed her bow by some 170 or 180 miles in advance of her position, as was proved by the violently agitated state of the sea between 8 a.m. and 4 p.m. of September 6th. We had, therefore, good cause to be thankful for having experienced head winds during part of the passage, which retarding our progress somewhat probably saved us from much worse infliction.

"It will be seen by reference to the register that on September 10th the vessel was saved from running into a circular storm passing up between Hatteras and Bermuda, by heaving to on the Starboard tack. This may have been the same storm as that above referred to. Calculating its path of speed and knowing that the majority of these storms recurved to the N.E. I came to the conclusion it was one and the same revolving gale."

COMMANDER S. T. S. LECKY, R.N.R., OF WRINKLES FAME.

The publication under the heading of "Old Time Marine Observer's Log," during the last few years in this Journal, of especially interesting entries and drawings made over 50 years ago has not only stimulated interest and revived memories, but it has had the effect of re-establishing touch with descendants of some of those old-time Marine Observers whose work, long stowed away, has been brought to light afresh.

In the last instalment, that in the December, 1929, number, the reproduction of the picture of the Ship *Alfred* led to re-establishing touch with the son of possibly the best known navigator who has been a member of the British Corps of Voluntary Marine Observers. For Captain H. S. LECKY, C.B., A.M., Royal Navy, son of the late Commander SQUIRE THORNTON STRATFORD LECKY, Royal Naval Reserve, told us of his father's Meteorological Registers, remarks from one of which are reproduced in this number.

Alfred was LECKY'S first ship.

This photograph of his portrait by Miss C. M. BRIGHT is reproduced with his son's kind permission and the following notes are taken mainly from "A Memoir by His Son," which appears in the twenty-first edition of "Wrinkles in Practical Navigation," which may well be referred to.

Born at Ballyholland House, Holywood, Co. Down, one of his father's residences, on April 9th, 1838, he was educated at a day school at Brighton, by tutors at home, and at Gracehill School near Ballymena, Co. Antrim.

At the age of sixteen LECKY lost his father, Mr. HOLLAND LECKY, who died suddenly at Armagh.

SQUIRE LECKY was the twelfth child of a family of fourteen. He elected to make the sea his profession and was presented with a cheque of £300, with which to make his arrangements, by his eldest brother, Mr. MARCUS DALY LECKY, who inherited their father's estate.

On September 21st, 1855, he joined in London as midshipman Messrs. GREEN'S Ship *Alfred*, Captain W. H. POPE and made a voyage to Calcutta and home, the Hooghly being navigated under sail.

He was proud of his first ship this tall East Indiaman, and wrote of her crew—

"Sixty able seamen, every one a sailor in the true sense of the word, and scarce a foreigner among them; eighteen ordinary seamen, young men who could hand, reef, and steer, but were not yet up to all complexities of sailoring demanded from A.B's in those stern days, four boys, six mates, and twelve or sixteen midshipmen who were officers in embryo, and paying heavily for the privilege of receiving their nautical training on board one of the fine frigates of Messrs. GREEN."

Seeing how slow was promotion in GREEN'S service, on August 11th, 1856, in London, on his own initiative he left the *Alfred*, forfeited the patronage of Messrs. GREEN, and took the bold step of proceeding to Liverpool where he had no friends or acquaintances,

The Master of the *British Prince*, 1882.

COMMANDER SQUIRE T. S. LECKY, ROYAL NAVAL RESERVE

saw Mr. JAMES BEAZLEY, the shipowner, to whom he became apprenticed, and on October 14th, 1856, joined the ship *Prince Arthur*, Captain JAMES WYNESS, a fine clipper of 1,086 tons. He was promoted to 3rd mate of this ship on October 14th, 1859. Leaving her on April 7th, 1860, he passed for 2nd mate three days later without going to a navigation school.

On July 7th 1860, he joined as 2nd mate the Ship *Swithamley*, of Liverpool, 727 tons, Captain R. A. WEIR, on a voyage to Karachi, where on December 5th, 1860, he took his discharge and entered HER MAJESTY'S INDIAN NAVY, the descendant of the HON. EAST INDIA COMPANY'S Navy, not the ROYAL INDIAN MARINE. He served in H.M. Ships *Indus*, *Frere* and *Napier*. When the order was given to abolish the Indian Navy he rejoined his old ship *Swithamley* as 2nd mate on March 10th, 1862.

He was mate of the Ship *Nell Gwyn*, of Bridgewater, 938 tons, Captain JOHN PEARSON, from May 28th, 1862, to October 14th, 1862.

On December 4th, 1862, he shipped as 3rd mate in the four-masted steamer *Bellona*, of Waterford, 1,589 tons, Captain J. ALEXANDER. This ship was new and constantly breaking down and without regret he left her at Liverpool on February 16th, 1863.

On March 17th, 1863, he joined the INMAN LINE as 2nd mate and served in their S.S. *City of Washington*, 1,618 tons, S.S. *City of Manchester*, 1,296 tons, S.S. *Edinboro'*, 1,494 tons, and S.S. *Glasgow*, 1,154 tons. He was acting 1st mate of the *City of Manchester* from March 14th, 1865, to April, 1865. He passed for master on March 22nd, 1864, at the age of twenty-six and was thinking of writing a book on navigation and began to collect the necessary data.

On September 13th, 1864, while serving in the *City of Limerick* he obtained his extra master's certificate, passing the quickest examination on record, and on October 27th of the same year he "passed in Steam," a rare thing in those days, but typical of the man, and the knowledge gained of machinery was invaluable to him during the rest of his career.

Though he had earned the high opinion of the INMAN LINE DIRECTORATE as a promising officer, LECKY decided to leave their service, which he did on April 25th, 1865, and settled down to superintend the building and fitting out of S.S. *Krishna*, 967 tons, for the BOMBAY AND BENGAL S.S. COMPANY.

During 1865 this company was wound up, "But," wrote LECKY, "my luck still held good for I immediately got command of a screw collier trading between Liverpool, Cardiff and elsewhere."

This vessel was the S.S. *Ironsides*, 514 tons, of Liverpool. This experience added greatly to his store of knowledge.

On February 17th, 1866, while master of this collier he was gazetted a Sub-Lieutenant in the Royal Naval Reserve and while she was in port he devoted his short holidays to putting in his drills in H.M.S. *Eagle* at Liverpool.

By a stroke of good luck for LECKY *Ironsides* was bought by Messrs. LAMPORT & HOLT who retained his services as master and he remained in their service for four years, commanding also the *Cassina*, 687 tons, *Uruguay*, 856 tons, and *Halley*, 995 tons. It was while in the latter two ships when trading to South Eastern American ports that he was a member of the British Corps of Voluntary Marine Observers, and his remarks, now reproduced in the "Old Time Marine Observer's Log," indicate his power of observation and knowledge of the Laws of Storms.

There are in all six Weather Book Registers kept on board *Uruguay* and *Halley* in Captain LECKY'S own hand-writing, all classed "Excellent," this classification being confirmed in Captain TOYNBEE'S writing on the test sheet in each Register.

In 1870 LECKY resigned his position in LAMPORT & HOLTS.

Within two months of leaving LAMPORT & HOLTS' service and having then been five years in command he joined the S.S. *Patagonia* belonging to the PACIFIC STEAM NAVIGATION COMPANY as mate in January, 1871. A few months later he was given command of their S.S. *Europe*, 2,242 tons, and remaining in their service for six years commanded also *Penguin* (chartered), *Araucania*, 2,877 tons, and *Galicia*, 3,829 tons.

On June 9th, 1872, LECKY obtained the Board of Trade certificate for compass adjustment, having a complete mastery of the subject. During his service with the P.S.N.Co. LECKY performed some of his most useful service and his name became prominent as a nautical surveyor. He contributed a great deal of valuable information to the charts of South American waters, more especially that intricate waterway Magellan Straits. For some years his running surveys of Magellan Straits were the only available reliable guides for safe navigation, and these were made when navigating steamers with the usual responsibility of a master with lives of passengers and property as well as his ship and ship's company entrusted to his charge, a very different thing to a surveying ship specially appointed for the purpose.

His name, together with those of his ships *Europe*, *Penguin* and *Galicia* remain to this day on the world navigating charts and serve to remind seafarers generally of his genius and industry and are a source of pride to the Merchant Navy.

He left the P.S.N.Co. after six years' service, and in the summer of 1876 was invited by Lord BRASSEY, then Sir THOMAS BRASSEY, to accompany him on a voyage round the world in the famous old yacht *Sunbeam*. BRASSEY commanded his own ship and LECKY had no official capacity on board. During the voyage he saved Lady MABEL BRASSEY'S life. On arrival at Buenos Aires he was recalled to England upon important business. Years after in conversation Lord BRASSEY told Captain H. S. LECKY that his father's knowledge and skill of Weather Forecasting was extraordinary, that was of course before the use of Wireless Telegraphy was thought of, and when the seaman had to rely entirely upon his own isolated observation, his knowledge of the laws of storms and his ability to make correct deductions without information beyond the horizon.

He now had to find employment, and failing to get a command, took the first vacancy offering that of 3rd mate and boatswain of S.S. *City of Mecca*, 2,290 tons, Captain JOHN MARR. In this ship the Boatswain held evening classes of instruction in Navigation and Meteorology for the master and his mates! On return home he was duly their honoured guest at a magnificent dinner at the Cannon Street Hotel.

On February 6th, 1878, he was married, for the second time, at Walton-on-the-Hill, near Liverpool, to ELIZABETH SUSAN, daughter of W. H. HENDERSON, Esq., of Liverpool. Mrs. LECKY is still alive and we are told was much delighted to see the picture of her late husband's first ship in THE MARINE OBSERVER. The Corps of Voluntary Marine Observers and the Marine Division join in heartily congratulating her upon her long life and are glad to be able to take this opportunity of recording their pride in her husband's work, which has been of such enormous value to seamen, and indeed the shipping of the world.

In the summer of 1878 LECKY returned to the service of his old employer, the owner of the Ship *Prince Arthur*, Mr. BEAZLEY, whose firm now trading as the BRITISH SHIPOWNERS' COMPANY, LIMITED, was operating a new line of steamers to Philadelphia.

He was appointed master of the S.S. *British Empire*, 3,361 tons, and made COMMODORE OF THE LINE; thus honoured and with full powers he was happy.

He superintended the fitting out at the builders and commanded in turn the new *British Crown*, 3,487 tons, *British Queen*, 3,558 tons, *British King*, 3,559 tons, and *British Prince*, 3,974 tons.

In 1881, Messrs. GEORGE PHILLIPS & SON, of South Castle Street, Liverpool, published his first book, "WRINKLES IN PRACTICAL NAVIGATION," resulting from 26 years of work, experience and study at sea. This book has run through twenty-one editions and it is used as a guide by the navigators of all nations. Many fine things have been said of it. It is in fact the book on Navigation which has done more to help us than any other; there has been nothing to compare with it in modern times.

During the Egyptian War of 1882 the *British Prince* under LECKY'S command was taken over as Transport No. 46. He was awarded the Queen's Egyptian Medal and Khedive's Bronze Star for his services.

At the conclusion of the Egyptian War he was appointed MARINE SUPERINTENDENT of the GREAT WESTERN RAILWAY CO., took up his duties on December 19th, 1882, at the age of 44 years, and carried them out with remarkable success for sixteen years.

The Packet Steamers built during his tenure of office testified to his ability, for during the Great War several of them were converted into Fleet Mine Sweepers, which put them to the severest tests. His industry was remarkable. In 1882 his "Danger Angle

and Offshore Distance Tables " were published, which have had no less than 26 editions. In 1884 he brought out the second edition of " Wrinkles " and edition after edition followed. In 1897 he produced " LECKY'S General Utility Tables " which he dedicated to Captain H. S. BLACKBURN from whom he had acquired certain rights.

LECKY'S main pastime was work, though he was fond of boat sailing and a frequent guest at shooting parties.

In 1898 his strenuous and increasing labour was telling upon him and he retired, but the GREAT WESTERN RAILWAY COMPANY appointed him their MARINE CONSULTANT for life at a salary which was a generous and useful supplement to his pension.

He spent some time in visiting Meran, Montreux, Geneva, Mentone and Naples. In August, 1900, the GREAT WESTERN RAILWAY COMPANY required their Consultant to report on certain subjects which needed elucidation. He then returned to Montreux, visited Corsica, Nice and Mentone where he went as the guest of General H. O. JEFFRIES in the steam yacht *Namouna* and employed his time in fitting her out with charts and navigational books for her voyage from Genoa to Panama via Magellan Straits.

Returning to England in June, 1901, after a spell in the West Country, he spent a few days at Paddington on the G.W.R. Company's business. With winter approaching, on November 2nd he sailed for the Canary Islands and there, though in poor health, with the help of an amateur astronomer, he produced two books, " Star Charts for Navigators " and " Popular Star Maps," which were both published posthumously by G. PHILIP & Son, Ltd., who have been responsible for every one of his publications.

Returning to Liverpool he was very ill. On October 18th, 1902, he was taken on board S.S. *Sekondi* in an ambulance, and sailed for Las Palmas, where within hearing of the sea which he so well knew, on November 23rd, 1902, the great navigator passed away in his sixty-fifth year.

He was buried in the English Cemetery at Las Palmas and at the bottom of the inscription on the memorial which his widow had erected are these words—

" The Storms of Life are Over."

SQUIRE LECKY was a Younger Brother of Trinity House, a member of the Mercantile Marine Service Association and a fellow of the Royal Astronomical and Royal Geographical Societies. In his day the Merchant Service did not receive honours such as have been awarded to Master Mariners of recent years. LECKY'S work and what he has taught us and the resulting improvement of skill and knowledge in those things which matter at sea are an honour to the man and to the service he adorned.

L.A.B.S.

ABNORMAL REFRACTION AND MIRAGE AT SEA.

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

Experienced navigators know only too well that an altitude of a heavenly body must be corrected for refraction before it is used to find a position line but it cannot be too strongly emphasised that refraction may be abnormal and far in excess of that given in nautical tables. Captain S. T. S. LECKY sums up in discussing abnormal refraction in " Wrinkles " :—" These things point strongly to the necessity for great caution in the navigation of a ship. Nothing ' slapdash ' should be allowed in connection with it, nor too much taken for granted. Who can tell how many wrecks might be traced to this cause, which at the time were ignorantly set down to some extraordinary jump of the compasses, or some unlooked for current? Seamen might do well to give this important subject the attention it merits."

Approximate formulae have been arrived at and tables calculated which give fairly true corrections for refraction when the normal distribution of pressure and temperature pertains.

The problem from the point of view of the navigator is to determine whether conditions are such as make it necessary to accept his sights with caution on account of excessive refraction. Where there is distortion of the horizon, or looming or some other well-marked refraction phenomenon there is of course no question, but it frequently happens that although at the time of observation there is no apparent excessive refraction, subsequent fixes prove it to have been present. For example the following report from S.S. *Port Sidney*, Captain W. G. HIGGS, bound Montreal to London. Observer Mr. G. L. H. DEAN, 2nd Officer, in " The Marine Observers' Log " in Volume IV, No. 43, p. 128, shows an error in what was apparently a perfectly good sight.

" July 28th, 1926. When making the channel on this date excessive refraction was observed as follows: latitude by Mer. Alt. Sun (Captain HIGGS and two officers all agreeing upon altitude) was found to be 49° 42′ N. Shortly afterwards the Bishop Rock Lighthouse was sighted and a definite fix off this at 2.30 p.m. worked back to noon and gave the latitude as 49° 36′ N., i.e., six miles to the southward, this large discrepancy being obviously due to refraction. Wind N.W. by W., force 2. Barometer 1030 mb. Dry bulb 59°. Wet bulb 59°. Weather oe."

Similarly Captain S. T. S. LECKY in " Wrinkles " gives an example from his own experience, of what appeared to be incorrect charting of the relative positions of two groups of islands in the Red Sea, but which was subsequently proved to be discrepancies caused by excessive refraction in obtaining the altitude of the sun, although not able to be seen at the time of observation.

Generally speaking, abnormal refraction at sea is due to an inversion of temperature in a layer of air, the variations in density thus produced causing the light rays to be bent considerably in excess of normal conditions. The most frequent and most favourable conditions where excessive refraction occurs and under which most of the more fantastic forms of mirage and distortion take place, is when a layer of warm air is in contact with cooler water. The air resting on the surface of the sea is cooled and consequently the upper layers are warmer than the lower so that there is an increase of temperature with height instead of the usual decrease. It is at the boundary of this cold dense layer of air at the surface of the sea and in the less dense warm air above, that most of the refraction phenomena are formed. It will be observed that the condition is identical with that which is responsible for the formation of most of the fog that occurs at sea and the presence of fog in the vicinity is an indication that excessive refraction may possibly be met with.*

Similar inversions may be caused by the presence of cold air over warm water and the consequent turbulence in the atmosphere would produce mirage phenomena due to reflection, e.g., the white line observed at the base of cliffs. Such temperature inversions are of course not confined to layers of air at the sea surface, but may occur between currents of air of different temperatures in the upper air, when they will be the means of producing abnormal astronomical refraction.

Marked differences between air and sea temperatures are therefore the chief guide to the navigator of the presence of excessive refraction.

The occurrence of refraction phenomena at sea is very frequent and the distortion of the sun and stars, at rising or setting, the displacement of the horizon, the looming of lights and objects below the horizon, and the fantastic distortion and superimposed images of terrestrial objects are familiar sights to all seamen, Mirage is a refraction phenomenon.

* A full explanation of the formation of Fog, Lapse Rate, etc., is given in " Fog," by H. KEETON, published in THE MARINE OBSERVER, Volume VI, No. 65, page 106.

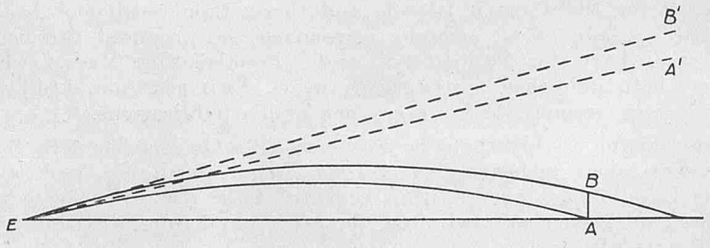


Figure 1. *Reproduced from "Light."— P. G. Tait, M.A.*

The normal refraction of light is shown in FIG. 1. In the figures, E represent the eye, A.B. the object and A_1 B_1 the object as seen. The earth is represented as a plane surface. In FIG. 1 the refractive index of successive layers of air depends only on the height above the earth and the rate of diminution of temperature with height is constant.

The paths of rays of light from A.B. will be segments of equal circles. The eye looking along the final direction of the path of the light, i.e., in the direction of E.A_1 E.B_1 will see the object A.B. at the position A_1B_1, elevated above the horizon normal to the curvature of the earth's surface. In other words the horizon is farther distant than if there were no refraction. A rate of decrease of density with height greater than normal will produce abnormal refraction. This may give rise to the various types of mirage described below.

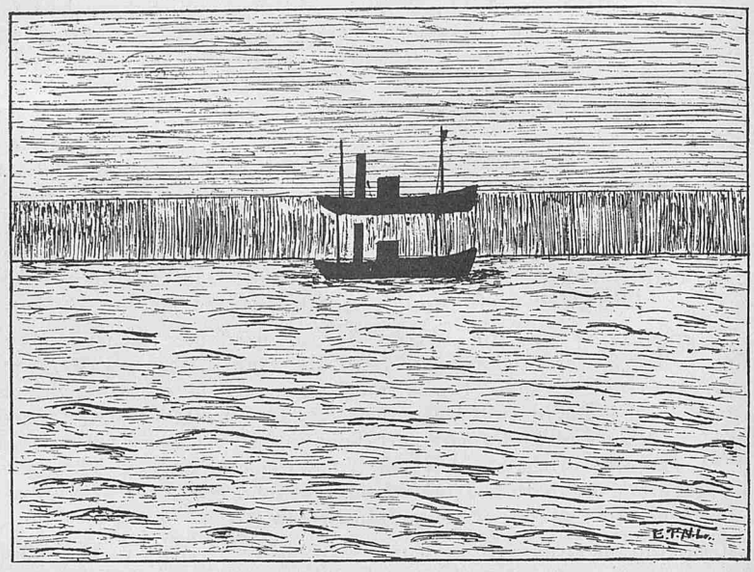
An image which is the right way up, not inverted, may sometimes be seen, its formation being similar to that shown in FIG. 1, the diagram for normal refraction. In the case of such a direct image its size is usually more or less diminished. Excessive flattening of the discs of the sun or moon near the horizon is an example of this type of mirage. When the object can be seen direct by rays passing through the lower air of nearly uniform density, at the same time as the raised image is seen, then there occurs the mirage of say a distant vessel having an exact replica of herself resting on her mast-heads. The report reproduced below from S.S. *Port Darwin*, Captain I. SAWBRIDGE, London to Melbourne via Cape of Good Hope. Observers Messrs. E. T. N. LAUREY and S. HEARN, published in Volume V, No. 50, is an instance of such a mirage.

"February 21st, 1927. Noon position, Latitude 33° 27′ S., Longitude 17° 28′ E. Wind S.S.W. force 1-2. Barometer 1008.6 mb. Temperature, dry bulb 63.0° F., wet bulb 61.8° F. Sea 66.5° F. Cloudless.

"At 0.10 p.m. A.T.S. (1113 G.M.T.) sighted Table Mountain bearing 122°, 57 miles. What appeared to be a fog bank extended around the horizon and Table Mountain was visible above this. At 3.45 p.m. A.T.S. (1446 G.M.T.), when 20 miles west of Table Bay a whaler bore N.E., distant about 3 miles. This whaler appeared as two vessels one on top of the other, as depicted in the accompanying sketch. The image of the whaler was quite distinct generally, but became distorted at times. Ascending to the upper bridge (7 feet higher) only the whaler itself was visible. Descending immediately I saw both whaler and image again, 4.0 p.m. A.T.S., position by land fix, Latitude 33° 57′ S., Longitude 18° 02′ E. Wind S.S.W. force 1. Barometer 1006.7 mb. Temperature dry bulb 64.9° F., wet bulb 61.5° F. Sea 61° F. Cloudless. What appeared to be a fog bank still occupied the horizon to seaward, but towards the land it was obvious that mirage raised the horizon above normal about the same amount that the top of the 'fog bank' was raised above the seaward horizon. Probably this fog bank was an effect of mirage.

"17.40 A.T.S. (1640 G.M.T.) Slang Kop Light House, 060°, 6¼ miles. Barometer 1006.2 mb. Temperature dry bulb 63.7° F., wet bulb 61.2° F. Wind S.S.E. force 1. Cloudless. Calm sea.

"The sea horizon from a S. by E. to S. by W. direction appeared raised in two hummocks, having the appearance of distant high land, which gradually flattened out till at 1645 G.M.T. the horizon was normal. Just below the line of the horizon the sea had the appearance of being viewed through a shimmering heat haze. This effect also disappeared shortly after."



If the density diminishes very slightly near the surface of the sea but somewhat quicker in the next layer then the paths of the light will be as in FIG. 2. Light travelling along the path A.E. will

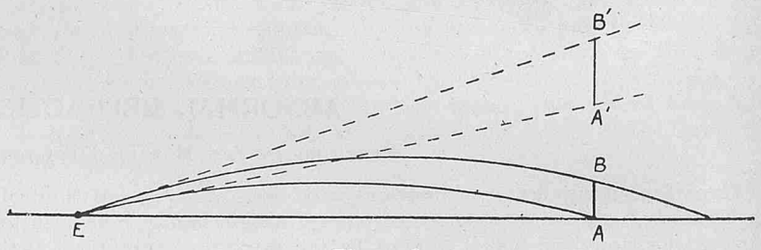


Figure 2.

be only slightly bent while light travelling from B. will be more bent, with the consequence that the object as seen at A_1 B_1 will be drawn out vertically. This vertical drawing-out is known as "looming." Numerous examples of looming have been published in "The Marine Observers' Log." In all seas, many reports of the extraordinary distances at which lights are observed are constantly being received. Instances of the elongation of distant ships' funnels and superstructure and the distortion of the appearance of land are not infrequent.

Now if the refractive index changes rapidly in the layers immediately above the cold dense layer of air at the surface, then the effect is shown in FIG. 3. In this case the object as seen is inverted and if at the same time the object can be seen directly, then there is the common mirage effect of an inverted image resting on top of the actual object.

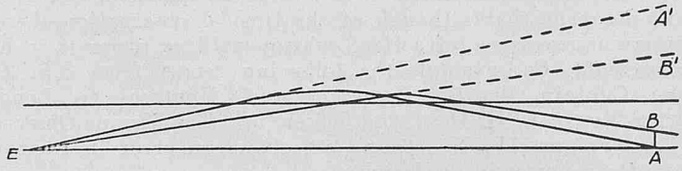


Figure 3. *Reproduced from "Light."— P G. Tait, M.A.*

Mirage of these types are known as superior mirage and are associated with the presence of warm air over cold water.

The reverse conditions, i.e., cold air over warmer water, produce what is known as inferior mirage. The effect is shown in FIG. 4. Instead of the path of the light being bent away from the surface of the earth, it is bent towards it and consequently the object is seen apparently reflected.

This type of mirage is practically never seen at sea and the conditions are those usually associated with mirage over the land. The only case in which it occurs is in very narrow waters, e.g., the

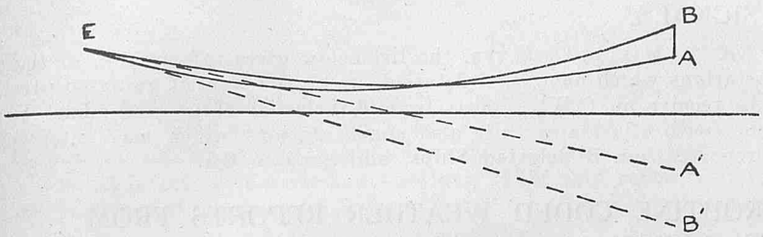


Figure 4.

Fata Morgana in the Messina Strait. The Fata Morgana is a multiple mirage consisting of superior and inferior images and is a genuine combination of the land and sea type of mirage.

All mirage effects are variations on these types. With the constant fluctuations in the atmospheric conditions in its strivings towards attaining stability, it generally happens that mirage effects are subject to rapid changes and that in a few minutes one type will merge into another. For instance, in the report given below, reproduced from MARINE OBSERVER, Vol. IV, No. 40, p. 65, there are a series of changes in 45 minutes. First at 7 a.m. the "looming" of the lighthouse beyond the normal range of visibility. Then at 7.15 the appearance of an elevated inverted image. At 7.25 the inverted image resting on top of the lighthouse. At 7.28 the appearance of three images, a vertical image being superimposed on the inverted one. At 7.30 the disappearance of the inverted image and distortion of the lighthouse and at 7.38 the disappearance of all images with only the distortion of the object remaining.

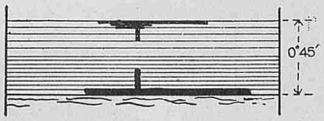
THE following is an extract from the Meteorological Log of S.S. *Chindwin*, Captain C. ESSLEMONT, Suez to Rangoon; Observer Mr. J. P. STEWART, 4th Officer:—

"April 3rd, 1926, 7.00 a.m. A.T.S., approaching the Brothers Light (Latitude 26° 19′ N., Longitude 34° 51′ E.), picked up ahead and altered course to pass 1 mile to westward. Light southerly airs, force 1-2, smooth sea, no swell, Barometer 1006.5 mb. Temperature, dry bulb, 76°; wet bulb, 69.5°; Sea surface 74° Ci/Ci-Cu/Ci-St, amount 7 to 8. Visibility 9."

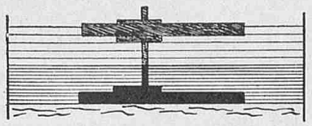
7 a.m. First appearance thus, distance 23 miles.

7.15 a.m.

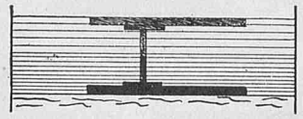
7.20 a.m. All around horizon to an altitude of 0° 45′ (where there was a distinct line) appeared to be covered in steam and half-way down was twice as dense.



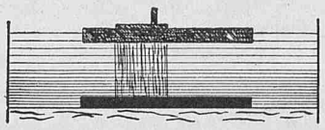
7.25 a.m.



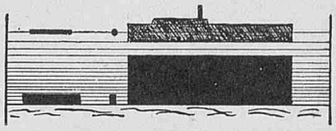
7.28 a.m. Three images. Coast line visible on starboard bow 35 miles, apparently quite normal.



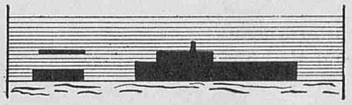
7.30 a.m. Several ships passing were also disturbed.



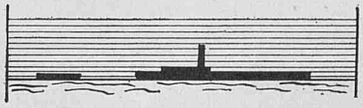
7.35 a.m.



7.38 a.m.



7.45 a.m. Normal.



A feature of many reports of mirage is the mention of apparent mist or fog. It has been pointed out that the conditions are exactly the same as those responsible for the production of sea fog and in many cases it is actually fog forming at the same time. In some cases, as for instance, where elevated coast lines appear above a bank of apparent mist it is more probably the reflection of the sky from the boundary of the cold and warm layers of air.

In recording observations of mirage the most important thing to be noted is the difference between air and sea temperatures.

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

WEATHER SIGNALS.

I.—SHIPS' WIRELESS WEATHER SIGNALS.

With reference to the Voluntary Scheme of communication for British "Selected Ships" Routine Wireless Weather Telegraphy, Trial to commence 1st May, 1930, given on pages 22-24, Volume VII, No. 73, MARINE OBSERVER, the list below gives information of those stations which have been detailed, up to the time of going to press, to receive on C.W., reports from **A Selected Ships**, and Chart VII herewith illustrates this, also spark stations which may intercept reports from **B Selected Ships**, addressed to **CQ**.

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

Request for Information.

THE ATTENTION OF METEOROLOGICAL SERVICES IS INVITED TO THE INVITATION GIVEN ON PAGE 14 OF VOL. VII, NO. 73, JANUARY MARINE OBSERVER.

Ocean.	Station.	Position.	Call Sign.	Frequency and Wave Length.		Area and limits covered by Station.	Telegraphic address of Meteorological Centre.	Information required—Limit of Groups.	Notes.
				For Station to call up "Selected Ships."	For "Selected Ships" to report to Station.				
North Atlantic and North Sea.	Portishead.	Lat. 51° 28′ 41″ N. Long. 2° 47′ 30″ W.	GKU.	149 kc/s. (2013 metres).	143 kc/s. (2100 metres).	Eastern North Atlantic and North Sea to about 1,500 miles from Station, but not within 300 miles of station (see Chart VII).	Weather London.	Weather only, up to seven groups, preferably No. 3 Supplementary Groups.	Control system. "Selected Ships" chosen to report in given order notified by station daily at 0430 and 1030 G.M.T. Roll call thus—Weather begins—Call signs of chosen "Selected Ships"—Weather ends.
Mediterranean and Red Sea.									
South Atlantic.									
Indian Ocean.									
North Pacific.									
South Pacific.									

I.—SHIPS' WIRELESS WEATHER SIGNALS.

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

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

Ships encountering Ice or other navigational dangers should report immediately to all ships and the appropriate station; see instructions for Danger to Navigation Signals for all ships, page 27, Vol. VII, No. 73.

For full particulars of " Selected Ships " Routine Meteorological Reports with Schedule for Communication, see pages 22 to 24, Vol. VII, No. 73.

See List of W/T Stations detailed to receive reports from **A Selected Ships**, with particulars up to date on previous page.

In parts of the world where such stations and particulars are not given, British **A Selected Ships** should make their reports to **CQ** on 2100 metres (143 Kc/s) as stated on page 24, Vol. VII, No. 73 (January, 1930, MARINE OBSERVER).

B Selected Ships when within range of stations ringed in on Chart VII, in making their reports to **CQ** should make special endeavour to ensure that the report is received at these shore stations.

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

II.—WIRELESS WEATHER SIGNALS.

WIRELESS WEATHER BULLETINS.

Arabia.

C.W. Issues.

Aden W/T Station, approximate Latitude 12° 49′ N., Longitude 45° 02′ E., call sign **GZQ,** broadcasts weather bulletins, *en clair*, at 0948 and 1748 G.M.T. daily, on a wavelength of 2,000 metres 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.

British India.

C.W. and Spark Issues.

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

Time G.M.T.	Stations.	Position (approx.).		Call Sign.	Wavelength, metres.
		Latitude.	Longitude.		
0830 and 1630	**Karachi** ...	24° 51′ N.	67° 03′ E.	**VWK**	1,550 (C.W.)†
	Calcutta*	22° 34′ N.	88° 20′ E.	**VWC**	2,000 (C.W.)
0900 and 1700	**Bombay** ...	19° 05′ N.	72° 50′ E.	**VWB**	1,000 (spk.)
	Madras ...	12° 59′ N.	80° 11′ E.	**VWM**	1,000 ,,
	Rangoon...	16° 46′ N.	96° 12′ E.	**VTR**	1,200 ,,

* After the time signal.
† In the event of interruption on the wavelength of 1,550m. the message will be broadcast on 600m. (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.

C.W. Issues.

Matara W/T Station, approximate Latitude 6° 01′ N., Longitude 80° 36′ E., call sign **GZP,** broadcasts weather bulletins, *en clair*, at 0948 and 1748 G.M.T. daily, on a wavelength of 2,000 metres C.W. These bulletins give information regarding weather conditions in the Bay of Bengal and Arabian Sea, being prefixed accordingly.

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

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

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

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

Colombo W/T Station, approximate Latitude 6° 55′ N., Longitude 79° 53′ E., call sign **VPB,** broadcasts brief reports, on the weather conditions near Ceylon after the time signals at 0600 G.M.T. on a wavelength of 2,300 metres C.W. and at 1700 G.M.T. on a wavelength of 600 metres I.C.W.

WIRELESS STORM WARNINGS.

Arabia.

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

British India.

Spark Issues.

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

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

Station.	Call Sign.	Wave length, metres.	G.M.T. of Time Signal.	System.
Calcutta. Lat. 22° 33′ 31″ N. Long. 88° 20′ 16″ E.	**VWC**	2,000 C.W.	0827–0830 1627–1630	*See* Figure 1.
Colombo. Lat. 6° 55′ 05″ N. Long. 79° 52′ 53″ E.	**VPB**	2,300 C.W. 600 I.C.W.	0557–0600 1657–1700	*See* Figure 1.

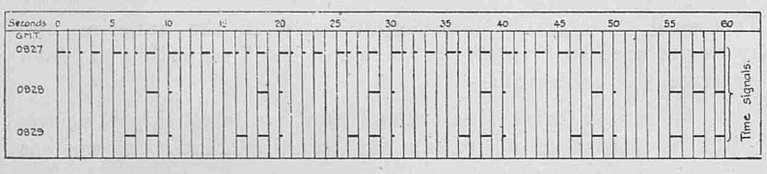


Figure 1.

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

(2) Signals automatically controlled from Alipore Observatory.

(3) Time Signal accurate to within 0.2 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.

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

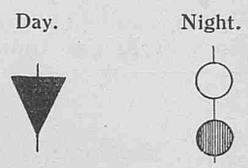
II. Warning.—A storm has formed.

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

Note.—Night Signals { *white* light represented by / *red* light represented by

Local Signals.

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



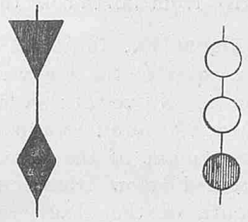
III. Cautionary.—The port is threatened by squally weather.

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

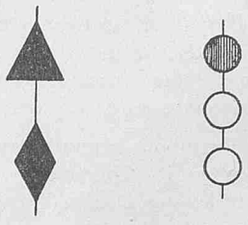
The existence of a storm can often be determined before the direction of its movement can be fixed. In this case all those ports which the storm could possibly strike will be warned by this signal.

Day. Night.

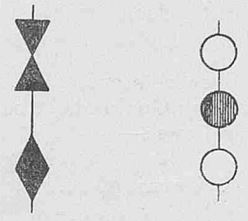
V. Danger.—The port will experience severe weather from a storm of slight or moderate intensity that is expected to cross the coast to the south of the port (or to the east in the case of Veraval, the Húgli ports, Diamond island, Bassein, Rangoon, and the Andamans).



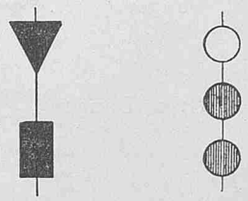
VI. Danger.—The port will experience severe weather from a storm of slight or moderate intensity that is expected to cross the coast to the north of the port (or to the west in the case of the Húgli ports, Chittagong, Rangoon, Moulmein, Karachi, and the Andamans).



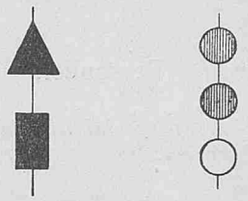
VII. Danger.—The port will experience severe weather from a storm of slight or moderate intensity that is expected to cross over or near to the port.



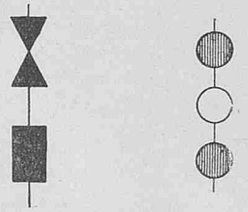
VIII. Great Danger.—The port will experience severe weather from a storm of great intensity that is expected to cross the coast to the south of the port (or to the east in the case of Veraval, the Húgli ports, Diamond island, Bassein, Rangoon and the Andamans).



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



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



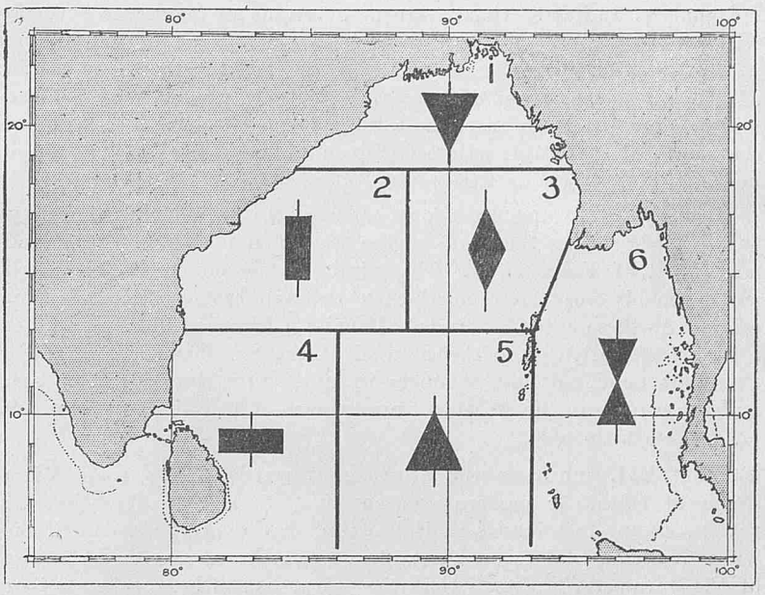
XI. Failure of Communications.—Communication with the Meteorological headquarters has broken down and the local officer considers that there is danger of bad weather.

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

This system is in force at the following ports:—

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

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

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

Brief System.

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

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

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:—

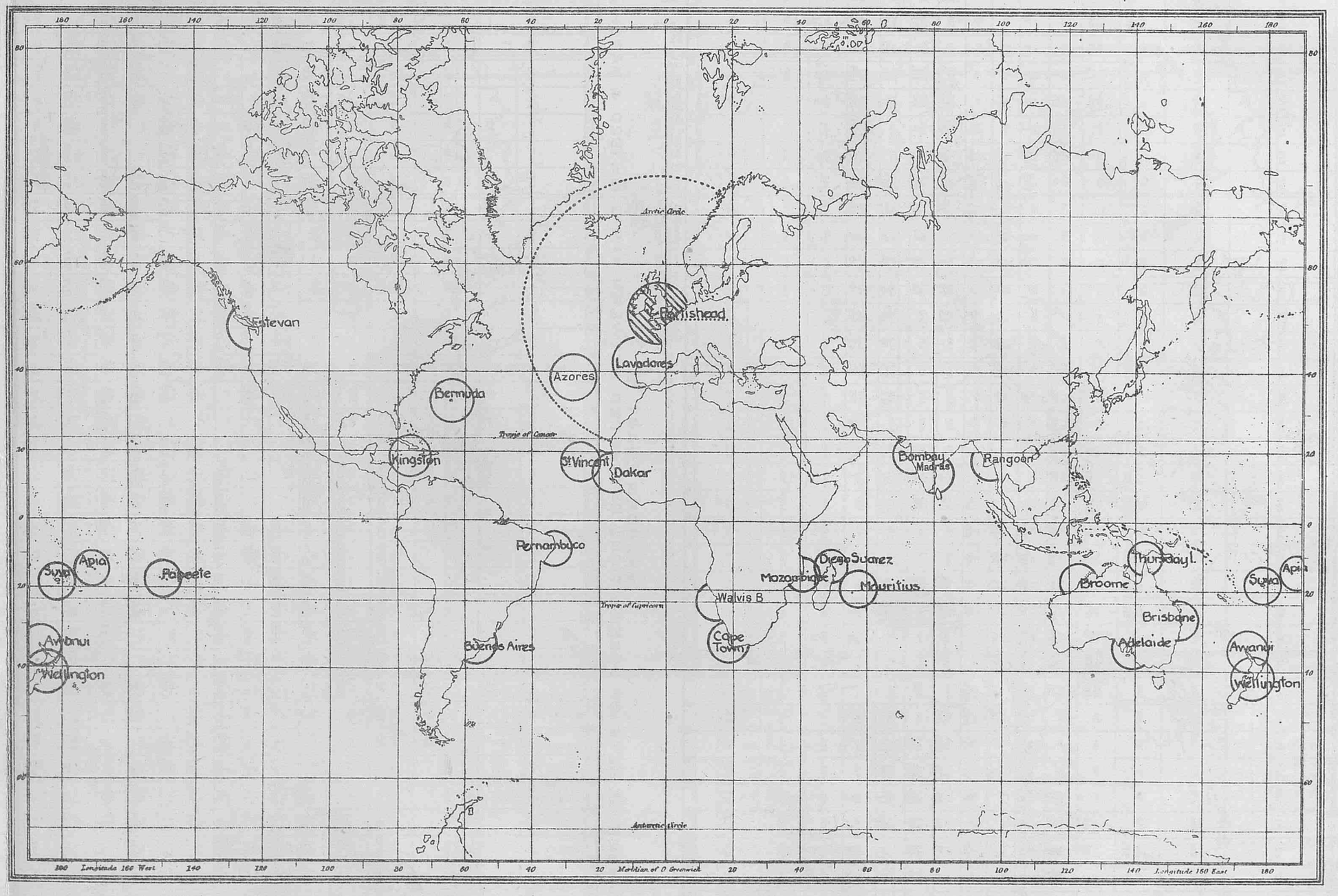
1. Warning	... by day, black ball / by night, red light	"Storm may affect you shortly."
2. Danger	... by day, cone point up / by night, 2 red lights vertical.	"Storm will soon strike you."
3. Great Danger	by day, cylinder vertical / by night, 3 red lights vertical.	"Violent storm will soon strike you."

Special Notices Regarding Personnel.

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

Chart VII.- SHIPS' WIRELESS WEATHER SIGNALS.

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



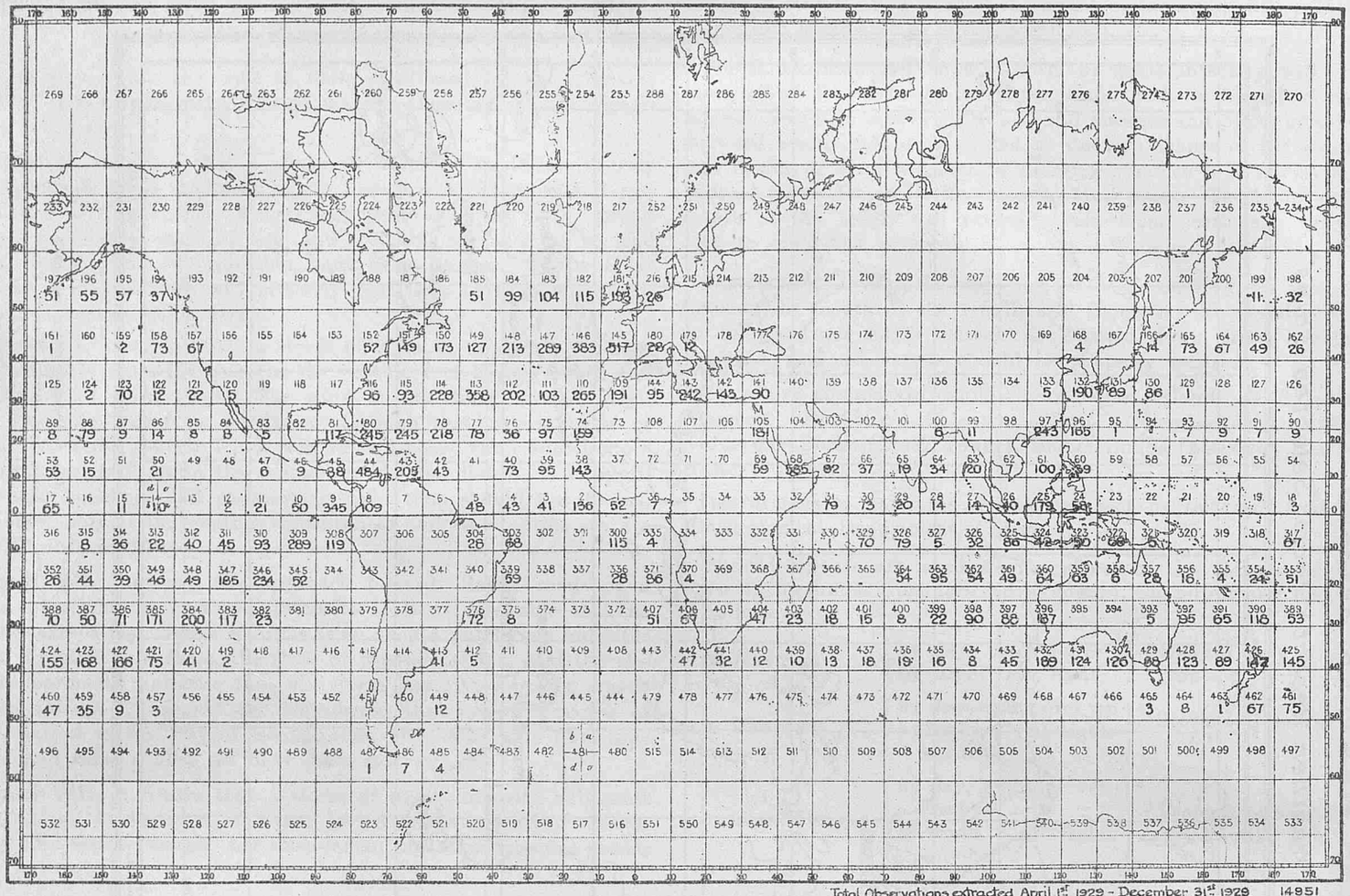
The dotted circle indicates the area in which British ships report to Portishead.
The small shaded circle indicates the area from which reports are prohibited to Portishead

The full-line circles indicate the areas round islands and coast stations which can receive spark "Selected Ships" reports to C.Q.

WORK OF THE YEAR.

MARSDEN CHART I.

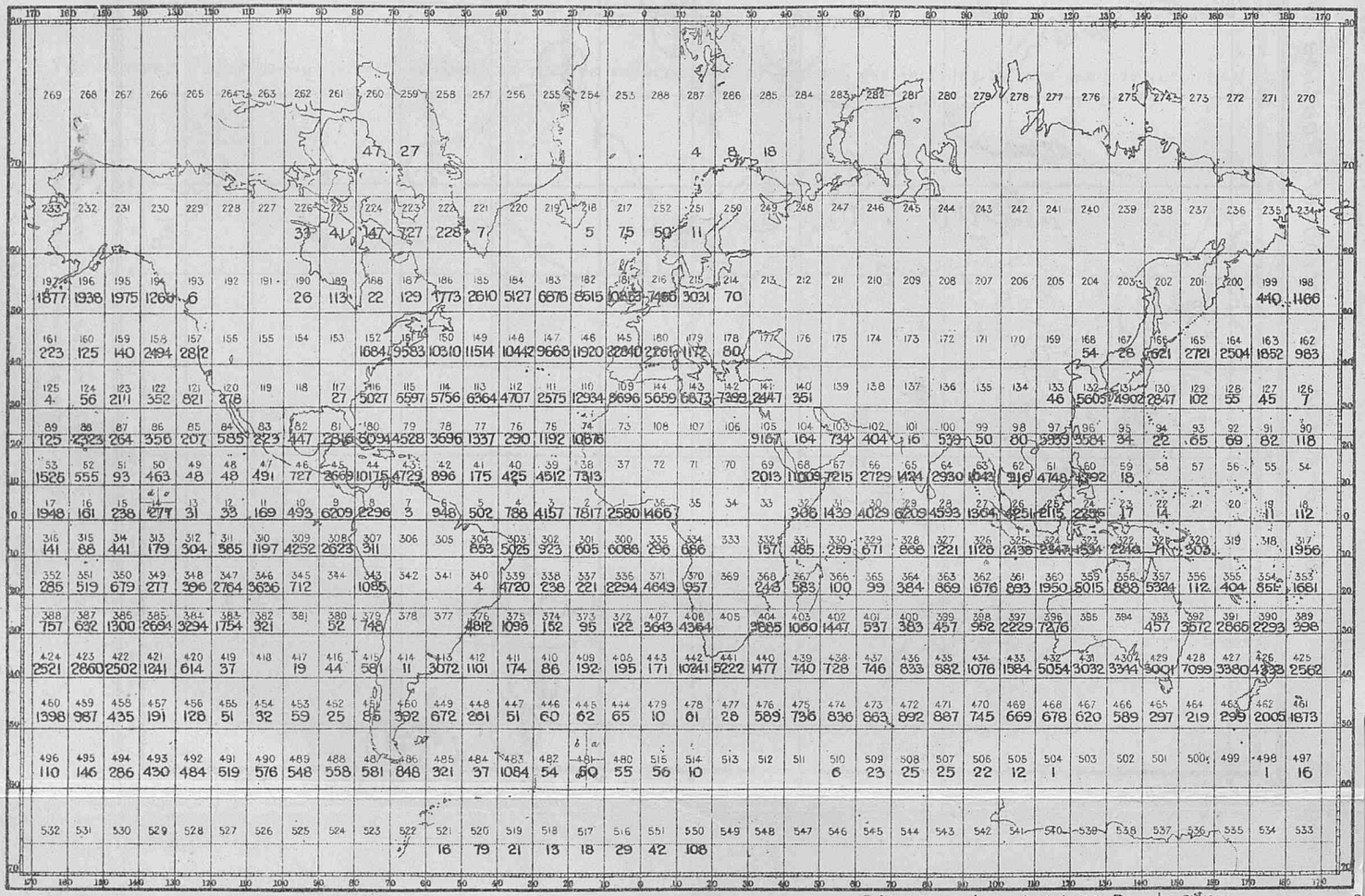
SHOWING NUMBER OF SETS OF OBSERVATIONS EXTRACTED BETWEEN APRIL 1st. 1929 & MARCH 31st. 1930



Total Observations extracted April 1st 1929 - December 31st 1929 14851
Total Observations (New Code) extracted January 1st - March 31st 1930 3036
Grand Total since April 1st 1929. 17987

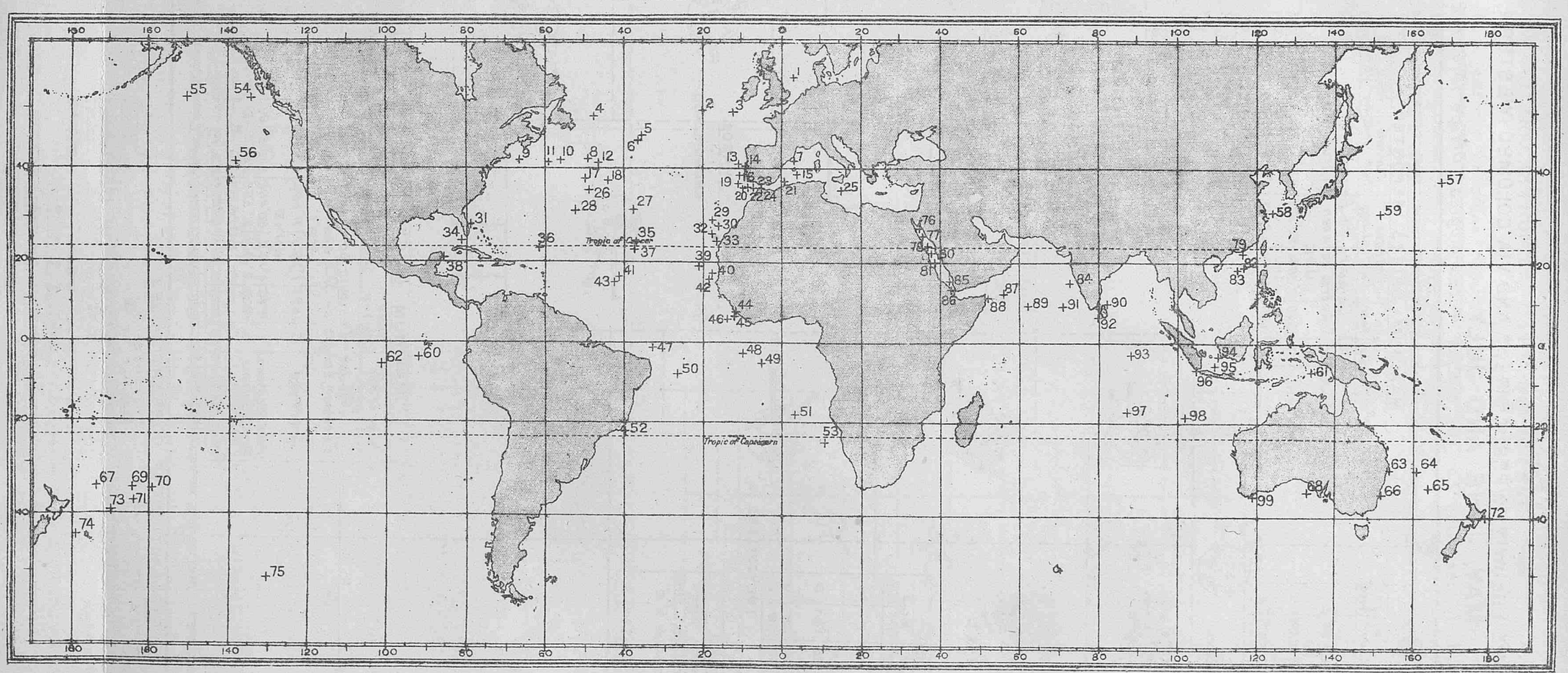
MARSDEN CHART II.

SHOWING NUMBER OF SETS OF OBSERVATIONS EXTRACTED BETWEEN APRIL 1st. 1920 & MARCH 31st. 1930.



Total Observations extracted 1920 - December 31st 1929
Total Observations (New Code) extracted January 1st 1930 - March 31st 1930.
Grand Total since April 1st 1920

CHART OF THE WORLD SHOWING POSITION OF SELECTED SHIPS AT SEA WITH MERCURIAL BAROMETERS AND THEIR WIRELESS INSTALLATION — JUNE 1ST 1929.



1 *† Spero
2 †† Cedric
3 †† Minnetonka
4 *† Manchester Brigade
5 †† Olympic
6 *† Marengo
7 †† Kaisar-i-Hind
8 ** Port Denison
9 †† Cameronia
10 †† Lancastria
11 †† Minnewaska
12 †† Aquitania
13 *† Auditor
14 *† Manella
15 †† Orama
16 *† Maidan
17 *† Culebra
18 *† Port Dunedin
19 †† Andes
20 *† Matiana
21 *† Nellore
22 *† Largs Bay
23 *† Daga
24 *† Nirvana
25 *† Mangalore
26 *† Lobos
27 *† Ingoma
28 *† Nagara
29 *† Upwey Grange
30 *† Elpenor
31 *† Essequibo
32 †† Demerara
33 †† Deseado
34 *† Oroya
35 *† Leicestershire
36 *† Lautaro
37 †† Mulbera
38 †† Orduna
39 *† Rimutaka
40 †† Demosthenes
41 *† Tekoa
42 *† City of Bombay
43 †† Ranpura
44 †† Accra
45 †† Carnarvon Castle
46 †† Walmer Castle
47 [illegible] Hardwick Grange
48 *† Actor
49 *† Argyllshire
50 *† Trematon
51 *† Beltana
52 *† Highland Chieftain
53 †† Armadale Castle
54 ** Empress of Russia
55 *† Ixion
56 *† Aorangi
57 ** Ulimora
58 *† Delta
59 ** Waiotapu
60 *† Cumberland
61 ** Changte
62 *† Port Darwin
63 ** Taipang
64 ** Makambo
65 ** Niagara
66 ** Hauraki
67 *† Maimoa
68 *† Buteshire
69 *† Surrey
70 †† Corinthic
71 *† Rotorua
72 ** Makura
73 *† Karamea
74 *† Devon
75 *† Port Campbell
76 *† City of Baroda
77 †† Narkunda
78 *† British Merchant
79 *† Tyndareus
80 *† Kalyan
81 *† Mahronda
82 †† Empress of France
83 ** Tanda
84 *† Alipore
85 *† Titan
86 *† Hobsons Bay
87 *† Port Adelaide
88 *† Modasa
89 *† Malakuta
90 †† Margha
91 †† Osterley
92 *† Balranald
93 *† Otaki
94 ** Clan Macwhirter
95 *† Centaur
96 *† Nowshera
97 *† Port Sydney
98 †† Maloja
99 †† Orsova

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

99 ships out of 302 in favourable positions to report with about 203 in port or narrow waters. This is typical and represents a fair average day. 33 per cent in position to report.

CURRENTS ON THE TRACKS FROM CAPE LEEUWIN TO PERIM, DIRECT AND VIA COLOMBO (WESTERN PORTION).

MAY, JUNE AND JULY.

Observations of ships regularly observing for the British Meteorological Office 1910–1928.

MAXIMUM DRIFTS REPORTED.

Name of Ship	Date Day	Date Year	Middle Lat.	Middle Long.	Current Set	Current Drift	Wind Dir^{n}	Wind Force
Route Colombo to Perim Tracks North of Sokotra between Longitude 51° and 64°E								
			JUNE.					
Demodocus	19	1913	12°55′N	55°19′E	N 85°E	56	SW/W	7
			JULY.					
Kybfels	2	1920	12°55′N	55°10′E	N 78°E	60	SW/S	8

MAXIMUM DRIFTS REPORTED.

Name of Ship	Date Day	Date Year	Middle Lat.	Middle Long.	Current Set	Current Drift	Wind Dir^{n}	Wind Force
Route Colombo to Perim Tracks South of Sokotra between Longitude 51° and 76°E								
			JUNE					
Clan Mackinnon	17	1926	9°06′N	52°22′E	N 71°E	96	SW	6
			JULY					
Knight Companion	3	1927	9° 18′N	53°03′E	N 69°E	127	–	–

MAXIMUM DRIFTS REPORTED.

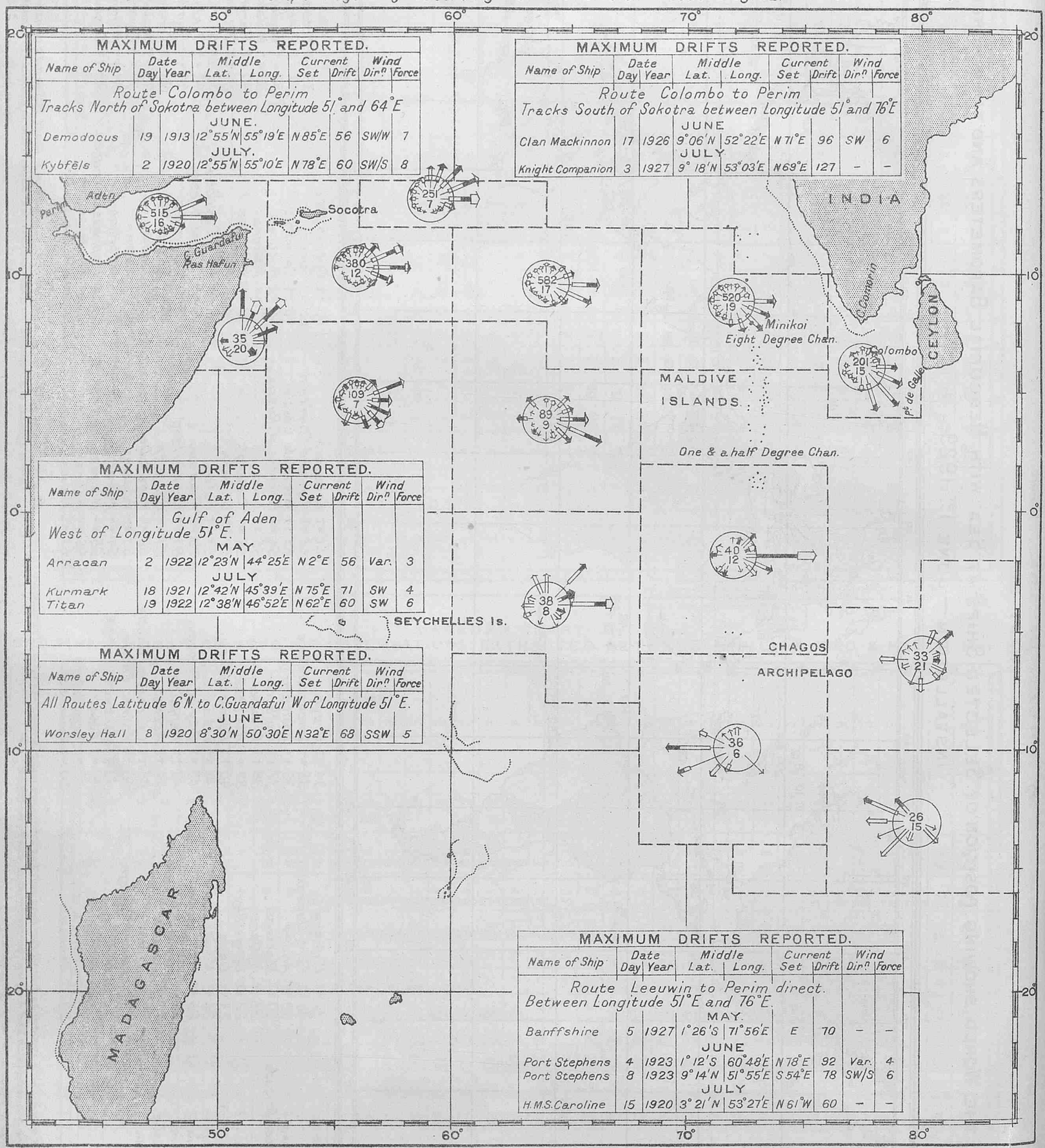
Name of Ship	Date Day	Date Year	Middle Lat.	Middle Long.	Current Set	Current Drift	Wind Dir^{n}	Wind Force
Gulf of Aden West of Longitude 51°E.								
			MAY					
Arracan	2	1922	12°23′N	44°25′E	N 2°E	56	Var.	3
			JULY					
Kurmark	18	1921	12°42′N	45°39′E	N 75°E	71	SW	4
Titan	19	1922	12°38′N	46°52′E	N 62°E	60	SW	6

MAXIMUM DRIFTS REPORTED.

Name of Ship	Date Day	Date Year	Middle Lat.	Middle Long.	Current Set	Current Drift	Wind Dir^{n}	Wind Force
All Routes Latitude 6°N. to C. Guardafui W of Longitude 51°E.								
			JUNE					
Worsley Hall	8	1920	8°30′N	50°30′E	N 32°E	68	SSW	5

MAXIMUM DRIFTS REPORTED.

Name of Ship	Date Day	Date Year	Middle Lat.	Middle Long.	Current Set	Current Drift	Wind Dir^{n}	Wind Force
Route Leeuwin to Perim direct. Between Longitude 51°E and 76°E.								
			MAY.					
Banffshire	5	1927	1°26′S	71°56′E	E	70	–	–
			JUNE					
Port Stephens	4	1923	1°12′S	60°48′E	N 78°E	92	Var.	4
Port Stephens	8	1923	9°14′N	51°55′E	S 54°E	78	SW/S	6
			JULY					
H.M.S. Caroline	15	1920	3°21′N	53°27′E	N 61°W	60	–	–



EXPLANATION OF CURRENT ROSES.

The current roses are drawn from observations within the pecked lines.

Arrows flow with the current, length represents frequency, thickness strength.

6–12 miles per day ... ...

13–24 " " " ... ...

25–48 " " " ... ...

49–72 " " " ... ...

73 " " " and above ...

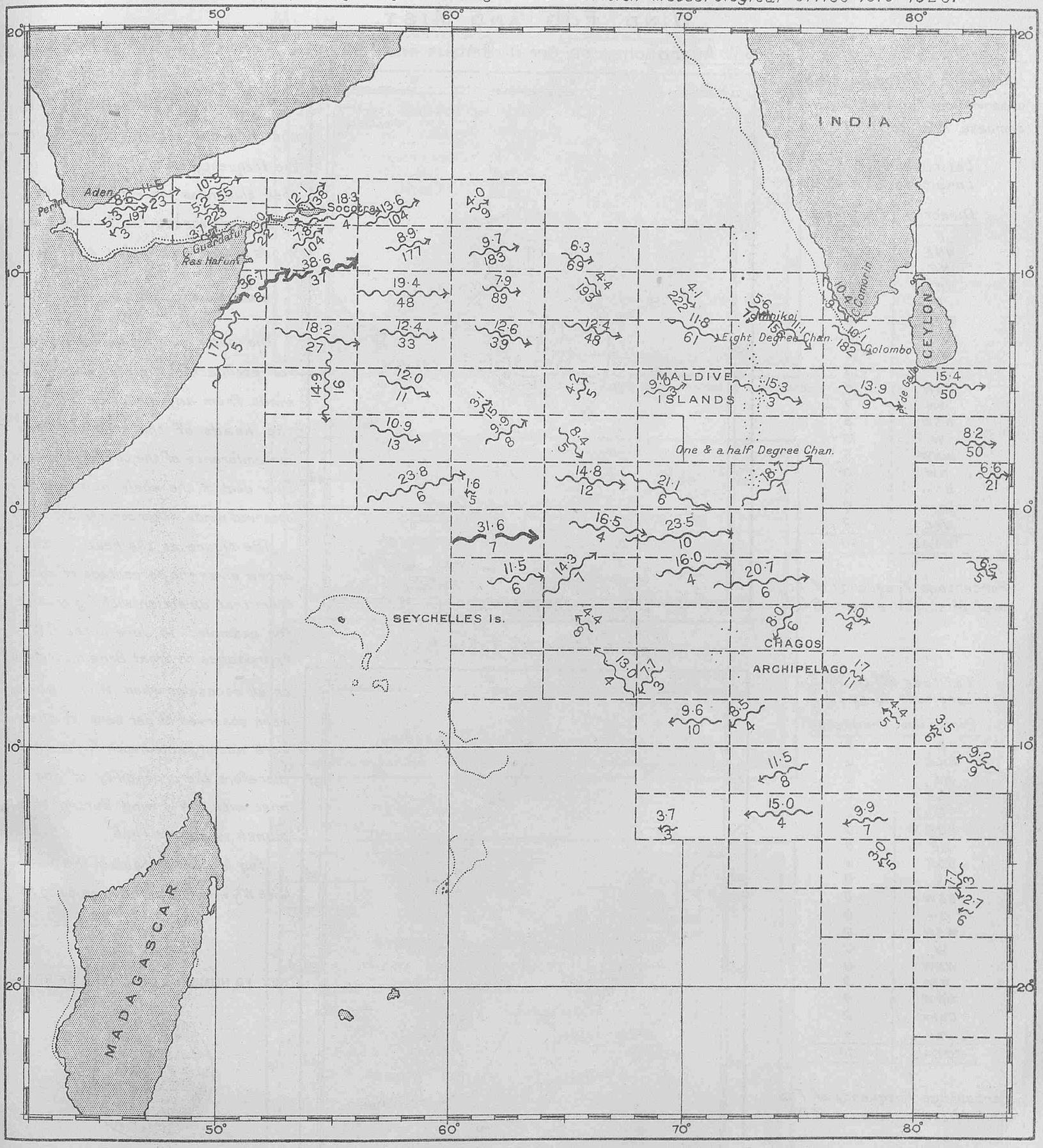
Distance from tail of arrow to circle represents 5%. Scale 0 10 20 30 40 50

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

CURRENTS ON THE TRACKS FROM CAPE LEEUWIN TO PERIM, DIRECT AND VIA COLOMBO, (WESTERN PORTION).

MAY, JUNE AND JULY.

Observations of ships regularly observing for the British Meteorological Office 1910-1928.



EXPLANATION OF CURRENT ARROWS.

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

In cases where the arrows drawn to scale are inconveniently long the symbol ~~~→ *is substituted.*

JUNE

WIND, FOG AND MIST.

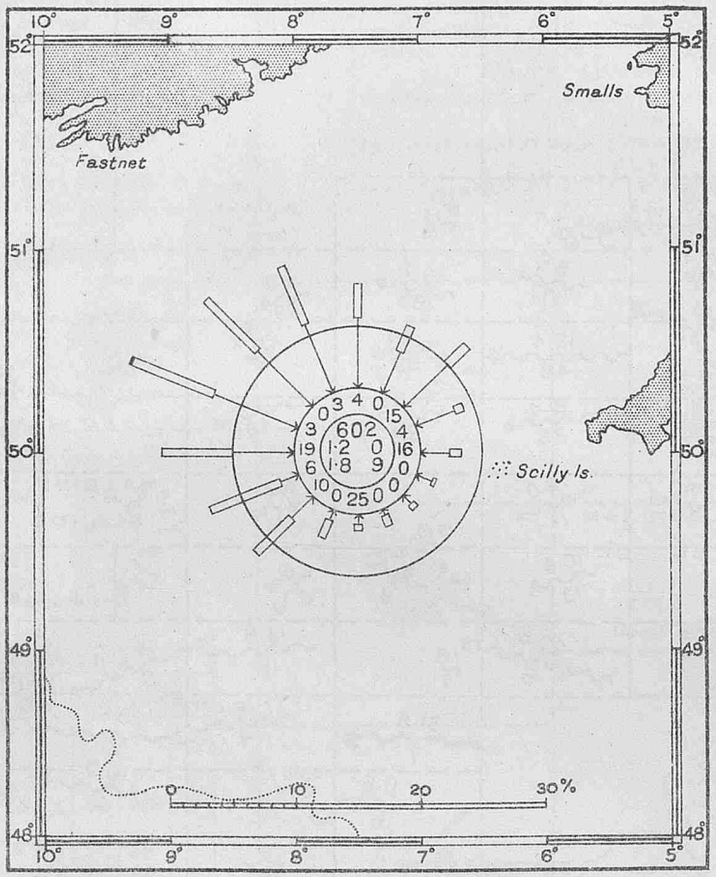
S.W. Approaches to Great Britain and Ireland

Frequency of fog per thousand observations for each 2 points of compass, 1921 to 1928.

Latitude 48° to 52° N.
Longitude 5° to 10° W.

Direction.	Frequency.
N	3
NNE	0
NE	10
ENE	2
E	5
ESE	0
SE	0
SSE	0
S	3
SSW	0
SW	7
WSW	5
W	15
WNW	5
NW	0
NNW	3
Calm	0
Var.	2
TOTAL	60

Percentage Frequency of Fog and Mist for area = 6·0%.

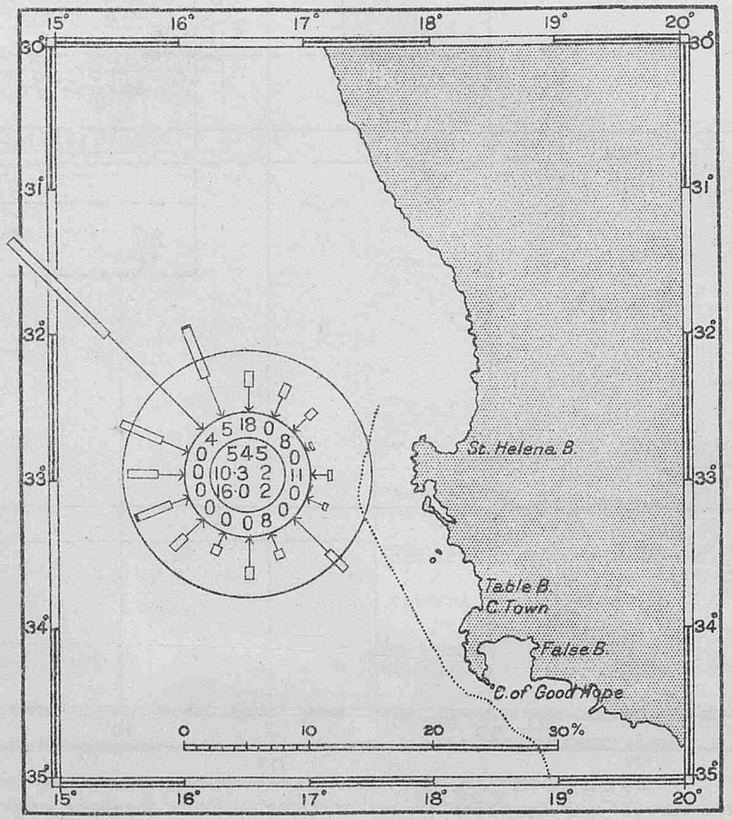


Approaches to Table Bay.

Latitude 30° to 35° S.
Longitude 15° to 20° E.

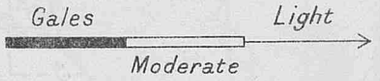
Direction.	Frequency.
N	5
NNE	0
NE	2
ENE	0
E	2
ESE	0
SE	0
SSE	2
S	0
SSW	0
SW	0
WSW	0
W	0
WNW	0
NW	9
NNW	4
Calm	2
Var.	4
TOTAL	30

Percentage Frequency of Fog and Mist for area = 3·0%.



EXPLANATION.

The arrows in the roses fly with the wind and show by their length the frequency of the winds and by their thickness the various forces, light winds forces 1 to 3, moderate winds 4 to 7 and gales 8 to 12.

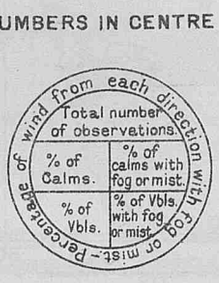


The outer circle supplies a scale for estimating the frequency of winds from any direction. From the heads of the arrows to the circumference of the circle represents 5 per cent of the whole number of observed winds. (100 per cent = 10° longitude).

The figure at the head of the arrow gives the percentage of wind from that direction with fog or mist, for example:- In June in the S.W. Approaches to Great Britain & Ireland on all occasions when W'ly winds were observed 19 per cent of them were accompanied with fog or mist, therefore the probability of fog or mist with a W'ly wind during this month is about 1 in 5.

Fog is most probable in this month with W'ly winds the percentage being 1·5.

KEY TO NUMBERS IN CENTRE OF ROSES.



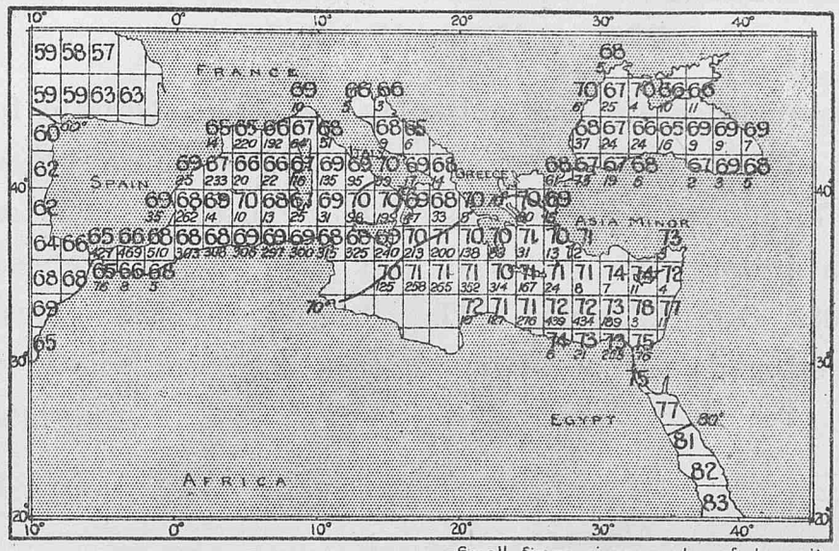
Compiled from observations of British Ships received since the adoption of the Hollerith system of extraction covering the years 1921 to 1928.

MEDITERRANEAN SEA

SEA SURFACE TEMPERATURES

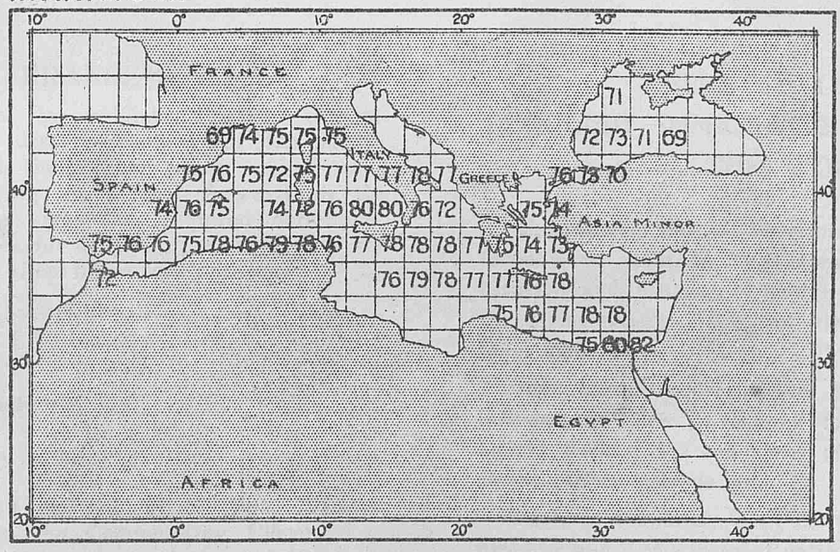
JUNE

MEAN.

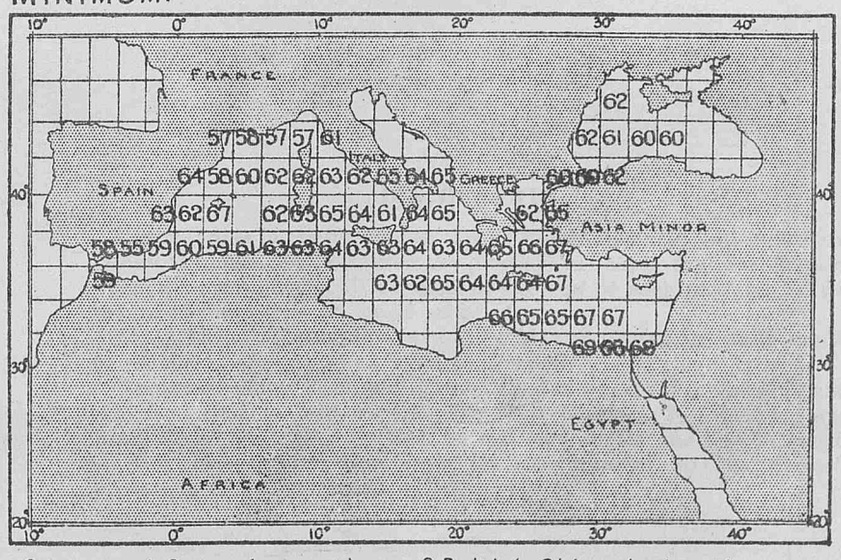


Small figure gives number of observations.

MAXIMUM.



MINIMUM.

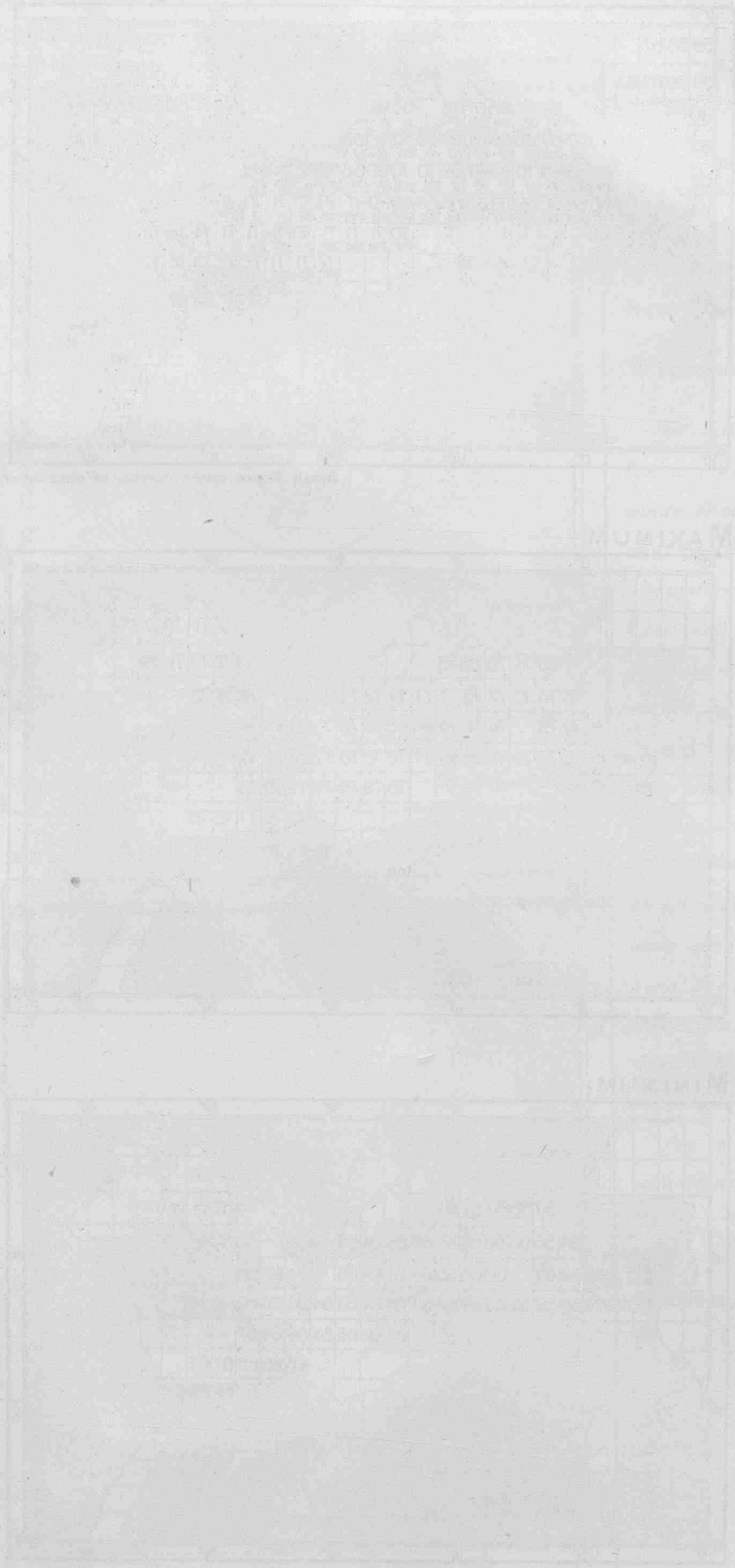


Computed from observations of British Ships during the years 1900-1914 in the Mediterranean and Black Seas.

Maximum and Minimum figures are not shown unless the Mean Temperature has been computed from not less than 12 observations.

H.M. Stationery Office Press, Kingsway W.C. 2.

1315/2062. We. 94 A. D. 25. 1250. 4/30.



NOTICES.

DECODE.

For use with the International Code for Wireless Weather Messages from Ships (M.O. 329).

In the general interests of Safe Navigation and Meteorology, the Corps of Voluntary Marine Observers are asked to assist in the advertising of this pamphlet which gives a general description of the International "Selected Ship" System of Routine Meteorological Reports in all Oceans, together with the necessary information and tables for decoding reports received from "Selected Ships." This pamphlet, M.O. 329, is published and sold by H.M. Stationery Office, price 3d., and should be in the chart-house of every ship fitted with Wireless Telegraphy.

POSTAL ARRANGEMENTS.

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

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

S.S...... *Captain*.....

Port of Call.....

Date of Homeward Departure.....

Postal Address.....

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

DESPATCH OF INFORMATION REQUIRED IMMEDIATELY FOR THE CONDUCT OF THE WORK AT SEA.

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

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

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

ICE REPORTS.

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

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

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

ICE CHART.

WESTERN NORTH ATLANTIC.

LETTERS OF TRANSATLANTIC TRACKS INDICATE.

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

(B) From 1st April 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.
Westbound, on approaching Cape Race steer a course to pass 10 miles S. of Cape Race.
Eastbound, steer from position 25 miles S. of Cape Race.

(G) From the opening of the Straits of Belle Isle to 14th November.

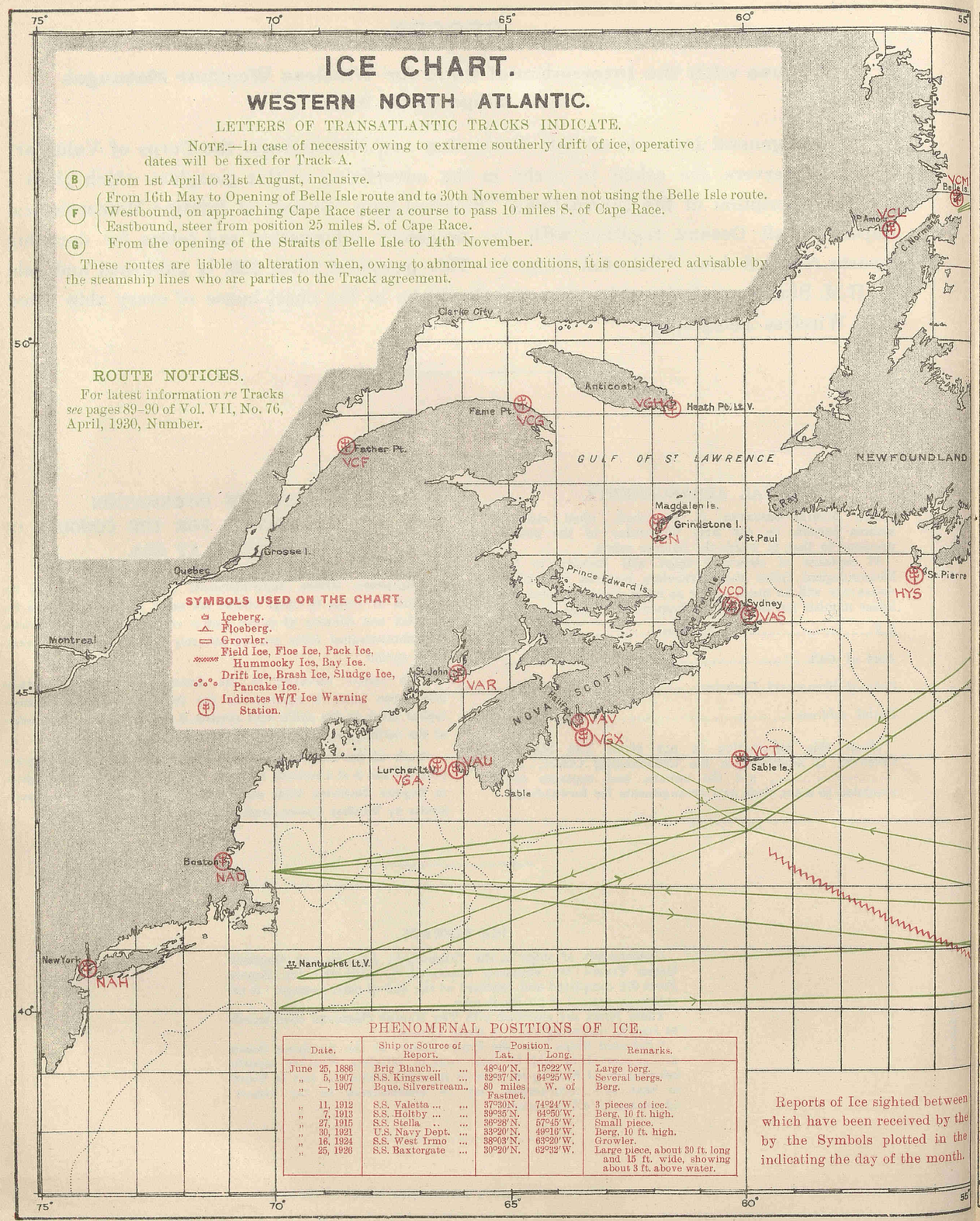
These routes are liable to alteration when, owing to abnormal ice conditions, it is considered advisable by the steamship lines who are parties to the Track agreement.

ROUTE NOTICES.

For latest information *re* Tracks *see* pages 89–90 of Vol. VII, No. 76, April, 1930, Number.

SYMBOLS USED ON THE CHART.

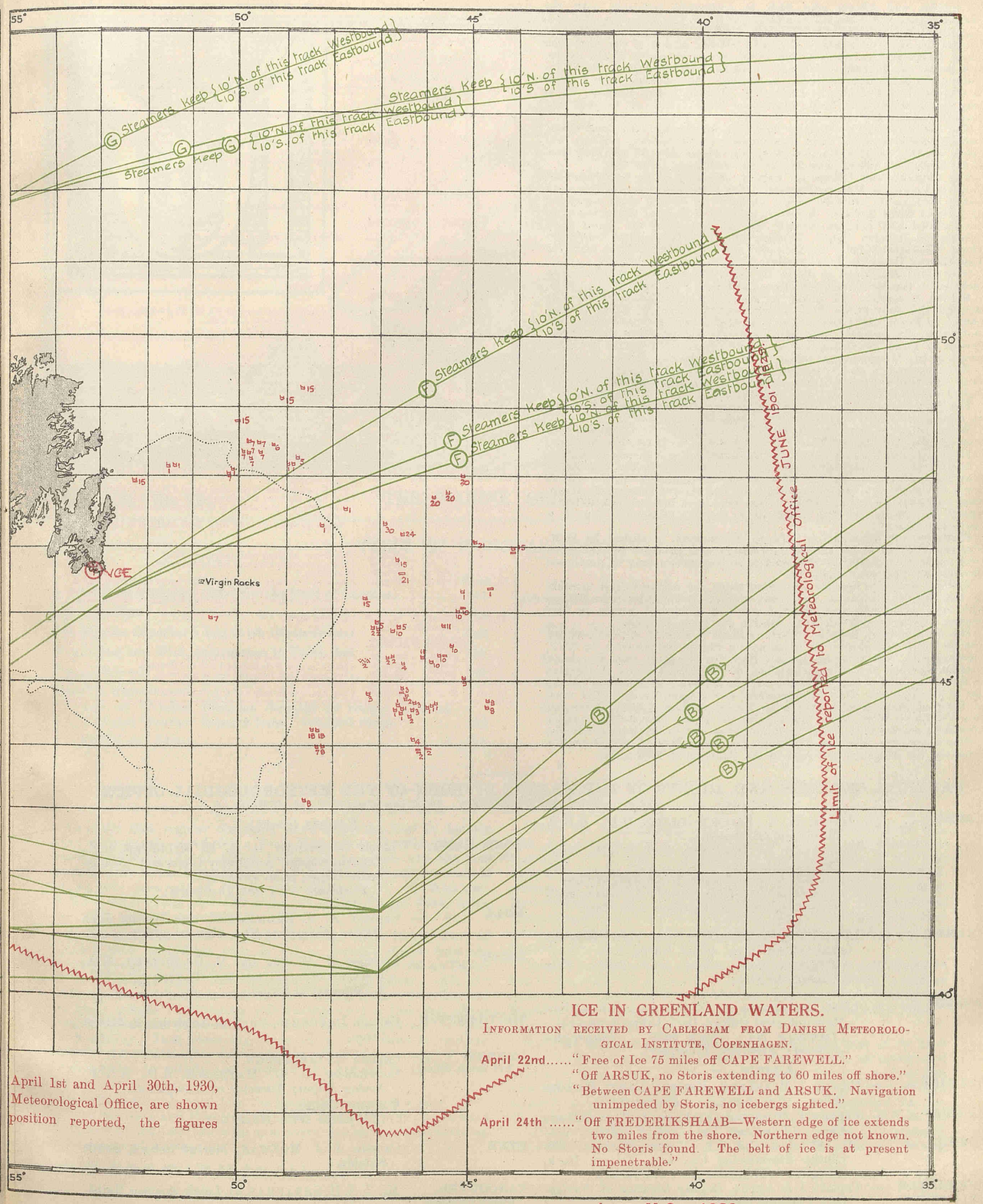
- Iceberg.
- Floeberg.
- Growler.
- Field Ice, Floe Ice, Pack Ice, Hummocky Ice, Bay Ice.
- Drift Ice, Brash Ice, Sludge Ice, Pancake Ice.
- Indicates W/T Ice Warning Station.



PHENOMENAL 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 ...	82°37′N.	64°25′W.	Several bergs.
,, —, 1907	Bque. Silverstream..	80 miles W. of Fastnet.		Berg.
,, 11, 1912	S.S. Valetta	37°30′N.	74°24′W.	3 pieces of ice.
,, 7, 1913	S.S. Holthy	39°35′N.	64°50′W.	Berg, 10 ft. high.
,, 27, 1915	S.S. Stella ,, ...	38°28′N.	57°45′W.	Small piece.
,, 30, 1921	U.S. Navy Dept. ...	33°20′N.	49°16′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 piece, about 30 ft. long and 15 ft. wide, showing about 3 ft. above water.

Reports of Ice sighted between April 1st and April 30th, 1930, 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.



ICE IN GREENLAND WATERS.

INFORMATION RECEIVED BY CABLEGRAM FROM DANISH METEOROLOGICAL INSTITUTE, COPENHAGEN.

April 22nd.....“Free of Ice 75 miles off CAPE FAREWELL.”
“Off ARSUK, no Storis extending to 60 miles off shore.”
“Between CAPE FAREWELL and ARSUK. Navigation unimpeded by Storis, no icebergs sighted.”

April 24th .....“Off FREDERIKSHAAB—Western edge of ice extends two miles from the shore. Northern edge not known. No Storis found. The belt of ice is at present impenetrable.”

1315/2062. Wt. 944 A. D.25. 1100. 4/30.

JUNE M.O., 1930. H.M.S.O. Press, Kingsway, W.C.2.

NOTICES.

MARINE METEOROLOGY.

CO-OPERATION OF SHIPOWNERS, MASTERS AND MATES.

Captains and officers who wish to co-operate regularly with the Meteorological Office should apply *by letter* to The Director, Meteorological Office, Air Ministry, Kingsway, London, W.C.2, or in person to the Marine Superintendent at the same address, or any of the gentlemen whose names and addresses appear below, acting as agents at the respective ports. A general description of Marine Meteorological Work, including the particulars desired from intending Marine Observers, is given in Chapter I of The Marine Observer's Handbook, 5th Edition, which may be obtained from H.M. Stationery Office direct, or through any bookseller, price 2/6 .

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

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

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

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

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

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

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

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

Wireless and Weather an Aid to Navigation, published by H.M. Stationery Office, which affords information and guidance for the practical application of Marine Meteorology to Navigation, may be purchased through any bookseller, price 5s.

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

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

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

LATE PRESS.

DERELICTS AND FLOATING WRECKAGE.

Date.	Position. Latitude.	Position. Longitude	Description.
	NORTH SEA.		
5.4.30	52°01′N.	1°49′E.	Large accommodation ladder about 20 ft. long and 4 ft. broad, made of heavy timber, dangerous to navigation.
6.4.30	55°34′N.	1°32′W.	Ship's lifeboat, dark yellow, floating bottom up.
13.4.30	53°05′N.	4°26′E.	Drifting conical buoy with red and white horizontal stripes, marked *H* in black.
15.4.30	7 m. N. 25 (deg.) E. true of Haaks Light Vessel.		Horizontal striped buoy.
	ENGLISH CHANNEL.		
9.4.30	50°53′N.	1°08′E.	Submerged obstruction.
	BRISTOL CHANNEL.		
12.4.30	3 m. WNW of Bull Point.		Large square wooden mooring buoy adrift.
	MEDITERRANEAN.		
3.4.30	4 m. from Planier.		Large red buoy with stripe on waterline, dangerous to navigation.
	NORTH ATLANTIC.		
1.4.30	37°15′N.	63°05′W.	Red whistle buoy marked *No. 70*: in good condition.
1.4.30	48°45′N.	5°02′W.	Drifting fishing boat *L.C. 4746*.
2.4.30	31°45′N.	80°32′W.	Nun buoy marked *2A*.
3.4.30	30°22′N.	74°15′W.	Obstruction about 100 ft. long having the appearance of a barge, bottom up.
3.4.30	32°—′N.	75°10′W.	Small barge with house on deck.
5.4.30	39°06′N.	73°15′W.	Red and black spar buoy marked 7.
5.4.30	24°24′N.	83°02′W.	Log 20 ft. long and 2 ft. in diameter.
6.4.30	51°12′N.	8°34′W.	Small vessel's mast, about 30 ft. long.
6.4.30	54°19′N.	16°49′W.	Mast, painted yellow, about 18 ft. in length, unattached.
6.4.30	40°33′N.	53°44′W.	Red buoy.
6.4.30	32°10′N.	80°19′W.	Red nun buoy.
7.4.30	40°34′N.	63°21′W.	Buoy painted grey, surmounted by a mast 10 ft. high, showing flags *J.K.*
9.4.30	49°48′N.	6°49′W.	Small fishing craft, hull awash, no superstructure, dangerous to navigation.
10.4.30	32°13′N.	77°41′W.	Buoy consisting of a barrel with white framework about 10 to 15 ft. high with a white flag.
13.4.30	30°44′N.	70°55′W.	Red gas and whistle buoy, light extinguished, whistle working faintly.
14.4.30	31°15′N.	73°54′W.	Small pontoon barge showing about 3 ft. out of water.
14.4.30	39°42′N.	41°16′W.	Gas buoy showing a flashing white light every 5 seconds.
15.4.30	28°—′N.	74°08′W.	Wreckage of a hull about 30 ft. long and showing 3 ft. out of water.
16.4.30	27°38′N.	79°46′W.	Waterlogged motor boat *SEA DOG* about 26 ft. long adrift.
	GULF OF MEXICO.		
1.4.30	24°23′N.	80°42′W.	Nun buoy covered with marine growth.
4.4.30	29°—′N.	93°46′W.	Log about 30 ft. long and 3 ft. in diameter.
8.4.30	27°47′N.	90°10′W.	Small log.
9.4.30	27°51′N.	87°42′W.	Piece of wreckage consisting of the cabin roof of a yacht or tug, about 12 ft. by 8 ft., floating upside down. The obstruction was painted white and had the appearance of being new.
11.4.30	About 12 m. 250° from Sand Key.		Launch adrift.
	NORTH PACIFIC.		
5.4.30	41°28′N.	125°—′W.	Log 60 ft. long and 6 ft. in diameter.
7.4.30	43°42′N.	136°31′W.	Large timber 40 ft. long and 2 ft. in diameter.
9.4.30	40°58′N.	124°40′W.	Log about 40 ft. long and 3 ft. in diameter.
11.4.30	42°12′N.	124°53′W.	Large log.
12.4.30	38°16′N.	122°50′W.	Log about 50 ft. long and 5 ft. in diameter.

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

LONDON ... ... Captain L. A. Brooke Smith, R.D., R.N.R., Marine Superintendent.
Commander J. Hennessy, R.D., R.N.R., Senior Nautical Assistant.
Room 319, Adastral House, Kingsway, W.C.2.
(*Telephone No.: Holborn 3434 Extension 421*).
Nearest station Temple, District Railway.

THAMES ... ... Lieut. C. H. Williams, R.N.R., Port Meteorological Officer, Royal Albert Docks, E.16.
(*Telephone No.: Albert Dock 2659. Telegraphic Address:*).

MERSEY ... ... Lieut. Commander M. Cresswell, R.N.R., Port Meteorological Officer, Dock Office, Liverpool.
(*Telephone No.: Bank 8959. Telegraphic Address: Meteorite, Liverpool*).

Agents.

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

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

CLYDE ... ... Mr. Robert Cleary, Master Mariner, The Clutha Stevedoring Co., Ltd., Princes Dock, Glasgow. (*Telephone No.: 513 Ibrox*).

FREMANTLE, W. Australia. ... Captain J. J. Airey, Deputy Director of Navigation, Customs House.
(*Telephone No.: B 1391*).

Agents (*contd.*).

HONG KONG, China. Lieut. Commander R. G. H. Milligan, R.N., Superintendent, Admiralty Chart and Chronometer Depot, H.M. Dockyard.
(*Telephone No.: 108 Dockyard*).

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

LEITH ... ... Captains G. Black and C. G. Bonner, V.C., D.S.C., Leith Salvage and Towage Co., Ltd., 2, Commercial Street.

SOUTHAMPTON Captain D. Forbes, Nautical Academy, 1, Albion Place.

SYDNEY, New South Wales. Captain C. Lindbergh.
Commander C. D. Matheson, R.D., R.N.R., Acting Deputy Director of Navigation.
Customs House.
(*Telephone No.: B 6421*).

TYNE ... ... Captain J. J. McEwan, Marine School, South Shields.

VANCOUVER, British Columbia. Mr. T. S. H. Shearman, 61, Leigh Spencer Building, 553, Granville Street.
(*Telephone No.: Seymour 3309*).