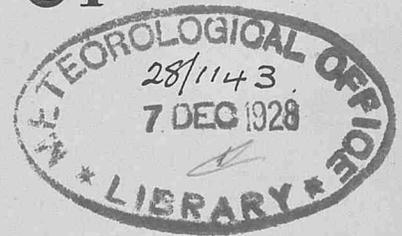


The Marine Observer



The Review of the
Marine Division of the Meteorological
Office, in co-operation with Voluntary
Marine Observers

Vol. VI., 1929.

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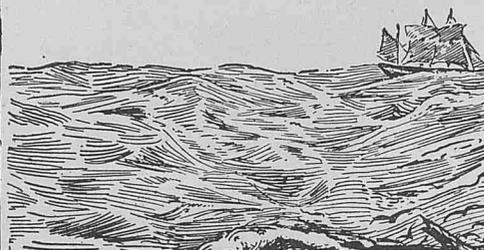
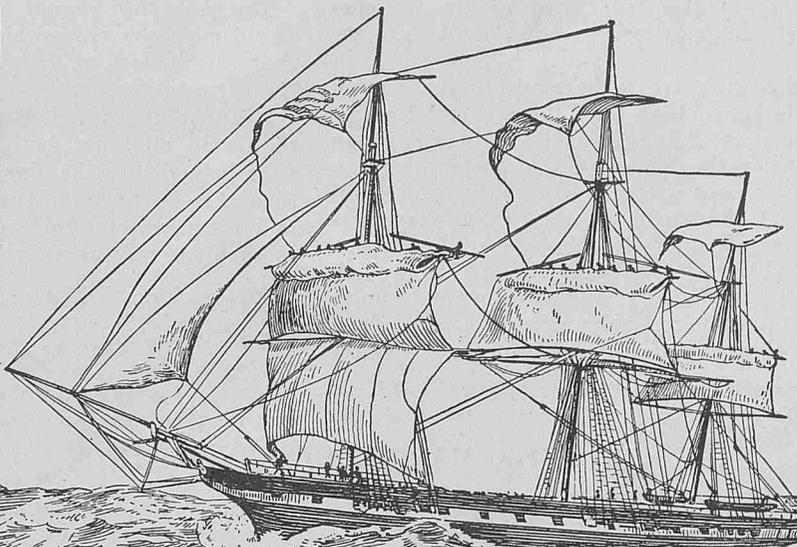


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FOREWORD TO VOLUME VI.

By DR. G. C. SIMPSON, C.B., F.R.S.

THE MARINE OBSERVER is now five years old, and with this Number we commence our sixth volume. Those of our readers who have been sufficiently interested to read the "forewords" which I have written for each volume will have noticed my concern for the health of our infant. Each year I have anxiously reviewed the progress made and recorded with satisfaction our growing hopes for the future. Now I have a feeling of relief and security. THE MARINE OBSERVER is no longer an infant, it has grown up with a sturdy body and a distinct mind of its own. I am confident that it will live to a good old age and perform great service to seamen and through them to the whole of the British race.

Science belongs to no one country, and this is probably more true of meteorology than of any other branch of science. One has grown rather tired of hearing the remark that "the weather recognizes no frontiers"; but it is a truth which is constantly being brought home to official meteorologists. No meteorologist can be a nationalist. This was realized in Europe many years ago and although each country maintained a national meteorological service, they were all so closely bound together by the International Meteorological Organization that for many years Europe has had in effect only one meteorological service. Unfortunately the necessity which has given Europe one meteorological service has not applied to the world as a whole. North America, India, Australia

and Japan have all been able to build up great meteorological services almost entirely independent of Europe and of one another. This caused little inconvenience when transport was slow and the exchange of information was too expensive to be used to any great extent; but during the last few years a great change has taken place. This change can best be expressed by saying that the world has suddenly become much smaller. When men and women can be in Europe one day and in America the next; when the journey from England to India takes less than five days; and when it is as easy to obtain weather reports from the middle of the Atlantic as from the next village; the world as a whole is smaller than Europe was only fifty years ago. It is not now immaterial to a man in London what the weather will be in New York to-morrow, and a world meteorological service is now as necessary as a European service was a few years ago.

Another change acting in the same direction but of a different nature has also taken place. The recognition amongst seamen that meteorology is a real aid to navigation has given rise to a demand that the seamen in all parts of the world should be supplied with accurate weather reports not only from the official meteorological services on land but from ships far out at sea. All this calls for uniformity in methods of observation, in codes and in signals used, and these can only be obtained by international co-operation. The

first serious step in this direction was taken during the summer just past when conferences met in Paris and London to make proposals for the collection of weather reports from the Atlantic and to organize the distribution of weather reports to ships at sea. The success of the conferences was greatly facilitated by the presence of the heads of the great meteorological services of Canada and the United States.

Other steps in the same direction are to be made in the coming year. In the first place it is hoped that the International Conference on Safety of Life at Sea, which is to meet in London early in 1929, will find time to consider the importance of meteorology in safe navigation, and any resolutions passed by this Conference will carry great weight throughout the world. Later in the year it is hoped to hold a conference of official meteorologists of the British Empire in London with the object of arranging that in the British Empire at least there will be uniformity in methods and reports especially in so far as reports to and from ships are concerned. Then still later in the year the directors of all meteorological services

in the world are to meet in Copenhagen, and with the reports of the previous conferences before them great progress should be made in the direction of getting uniformity in meteorological matters in all parts of the world.

The year 1929 should therefore be outstanding in the history of world meteorology, especially of marine meteorology, and I am sure that all readers of THE MARINE OBSERVER will wish all success to the three conferences.

I cannot close this Foreword without again expressing my personal thanks to all those, both at sea and in the Marine Division, who have helped to make THE MARINE OBSERVER a success. Without the cordial co-operation of our voluntary observers nothing could be done and I am grateful to them for all the help they have given and for the help we rely upon for the future.

DIRECTOR.

Meteorological Office,
Air Ministry.

October 23rd, 1928.

THE MARINE OBSERVER, 1929.

THE best of good luck to the Corps of Voluntary Marine Observers and to all who go down to the sea in ships upon their lawful occasions. May 1929 see the fruits of our labours in better established measures to promote Safety of Life at Sea.

British "Selected Ships" are now rendering world-wide service, and "Wireless and Weather an Aid to Navigation," the first off-spring as a separate book of this Journal, is giving information and guidance to all who wish to make use of this service performed for the good of all by our Corps.

To make sure that THE MARINE OBSERVER is serving our Voluntary Corps to the best advantage, we have taken pains to ascertain the opinions of the captains and officers of ships most interested in Marine Meteorology and they are unanimous that our Journal is of interest and assistance, many of them eulogizing THE MARINE OBSERVER.

For example, Captain F. A. HEMMING, of S.S. *Rimutaka*, wrote in March, 1928:—

"Its success, not only as a means of returning information to the Corps of Voluntary Observers but also as a means of promoting and maintaining interest in Marine Meteorology is of course beyond question. There is no doubt that it is of the greatest interest and assistance to all seamen and to the Corps of Voluntary Observers in particular."

Forty-two out of fifty-one observing ships expressing views regarding the publication of "Weather Signals" advocated that they should be continued in THE MARINE OBSERVER, the other nine suggesting that these should be published separately with permanency.

When THE MARINE OBSERVER was established we said in stating its aims and objects that:—

"Wireless Telegraphy has provided the Mariner with an aid to navigation and weather prediction which is revolutionizing both at sea. We are passing through a period of transition in methods and it is well to note that no attempt is made to force suggested new methods until those at sea indicate that these are desired";

and in the concluding chapter of "Wireless and Weather an Aid to Navigation" it was stated that:—

"The British 'Weather Shipping' Bulletin is the outcome of a very large expression of nautical opinion and as such is recommended as a pattern upon which to base weather Shipping Bulletins in other parts of the world but especially within the British Empire. Many British Seamen have advocated uniformity of code and method in these Bulletins so that time and trouble may be saved in their use at sea."

The late Captain T. C. E. DAYAS, of S.S. *Naldera*, whose work was mentioned in "Work of the Year" in the June, 1928, Number, summed up the present position when he wrote in February, 1928:—

"The description of weather signals is a valuable source of information to observers and should, in my opinion, be continued until the uniformity of method aimed at has been

achieved, they could then be embodied in a separate booklet if considered advantageous."

While the majority stated that they are unable to suggest any improvement and consider the present arrangement and plan of our Journal to be satisfactory in all respects, a number of suggestions which will entail work have been made; these are receiving careful consideration and two of them which will fit in very well with the work in hand will be dealt with immediately. One of these suggestions has already been published on page 150 of Volume V and is contained in the remarks of Captain CLIFTON MOGG, of S.S. *Pakeha*, but it may be repeated here. He wrote under date February 28th, 1928:—

"The suggestion is made that attention should be turned at an early date to the strong current which is found running to the north from Cape Horn, apparently along the bank of soundings off the coast, at the rate of approximately 30 miles per day as far north as Cape Corrientes, and information is sought as to its further direction and rate, observing that, on at least two occasions when steering N.E. along the east coast of the Falklands, no N.E. going current was observed."

After charting the currents on the route from Cape Blanco to the Brazils in the 1925 MARINE OBSERVER we left off near the latitude of the mouth of the River Plate and turned to the North Atlantic tracks in 1926 because they were at that time in most need of attention and because there was not a great deal of data to continue to the southward from the Plate. However, three years have added somewhat to the data available for the Cape Horn route and as was stated in our note in the September 1928 number "Ice on the Trade Routes of the Southern Ocean" we shall be dealing with ice in the South in this Volume. In this vicinity where ice drifts from the Antarctic, an investigation of currents carried out at the same time that ice reports are examined and charted may prove more valuable than if the work was done at some other time. Therefore we intend to chart the currents recorded by ships since 1910, using the trade routes from the latitude of the Plate to Magellan Straits and Cape Horn direct and via the Falkland Islands. The captains of ships who have used these routes are asked to send in remarks based upon their experience with regard to ice and its danger to navigation and their general impressions of the currents after they have seen the chart for the first quarter which will be published in the February Number, giving their views as to the navigation of this region. They have already been invited to send in records of set and drift of current observed since 1910, which they may not have returned before, by notice in the August 1928 Number on the reverse of the North Atlantic Ice Chart

The second suggestion referred to was made by Captain Sir FRANKE NOTLEY, Marine Superintendent of the P. & O.S.N. Co., who wrote on the same day as Captain CLIFTON MOGG:—

"I note that you are now occupied with Current Charts of the South Pacific Ocean; this is undoubtedly of great use and much interest to vessels on the Panama Route to the South. Perhaps I

may suggest that on completion of these charts, similar ones for the south coast of Australia and also the routes from Fremantle to Colombo and Aden might be commenced with advantage. From this Company's point of view this would certainly be an improvement."

Now we have to look at these matters from the point of view of all regular observing ships and the whole of the sea services. Sir FRANKE not only has the views of the officers of the P. & O. Company, but he has had great experience himself of navigating the routes which he advocates should be next charted for currents, and there is no doubt that the investigation is overdue as are others.

We are charting the trade routes for currents as the work can best be taken in hand, having regard to the existing published information and the number of observations available. Having navigated the Australian route via Colombo for a good many years, my desire has long been to take it in hand, but other routes had prior claim.

Last year the work of charting the routes from Panama to New Zealand and Australia proved a formidable task, and it, and the report on Ships' Wireless Weather Telegraphy, put a strain upon the Marine Division which cannot be continued. This year it is necessary to ease that strain so that in future years we may be able to continue the work with freshness and vigour.

This year, following Sir FRANKE's suggestions and incidentally continuing as is natural from where we left off last year, we intend to chart the currents reported along the routes between Cape Howe and the neighbourhood of Cape Leeuwin, both via Bass Strait and south of Tasmania.

The first quarter's chart will be published in the March MARINE OBSERVER, and we hope as soon as commanders have seen this chart that they will send along their remarks in the same way as has been done when the charts of currents on the other routes were being published. They have already been invited to send in records of set and drift which they may not have returned before.

By only charting the currents on these two comparatively short stretches of ocean routes this year and revising the Southern Ice Charts we hope to get the extraction of data well in hand and to be able to tackle the charting of the currents on the routes from the Leeuwin to Perim direct and via Colombo in the 1930 MARINE OBSERVER, and by so doing to ease the strain upon the Marine Division, do the work more thoroughly and complete the preparation of the North Atlantic Atlas from the current charts published in THE MARINE OBSERVER.

The series of articles on the Trade Winds, published in 1928, will be followed by a similar series dealing with the Monsoons, the Brave West Winds and Roaring Forties, and the wind systems of the Arctic and Antarctic, thus completing the information in our first six volumes of THE MARINE OBSERVER for a separate volume of General Marine Meteorology in the same way as "Wireless and Weather an Aid to Navigation" was compiled.

Each month as time and space permit, notes of weather, currents, and navigation, with charts as necessary, for the same month of the previous year, will be published. Certain articles of special interest prepared in the Marine Division and published in the first Volume, after the passing of five years, will be revised and brought up to date, for there are many new to our corps who have not seen them. We hope that, as in previous years, technical experts will contribute articles upon matters of special interest to seamen. The most interesting of all will be the pages of "The Marine Observer's Log," now too well known and appreciated to need any introduction.

Such is the outline of THE MARINE OBSERVER for 1929, and having fulfilled our guarantee with the first five volumes we hope that there is no doubt left anywhere as to THE MARINE OBSERVER being firmly established. We have never had any doubt from the first that so long as we were able to work and write in the manner of seamen that all the necessary voluntary assistance from those at sea would be forthcoming.

In THE MARINE OBSERVER we have done our utmost to do credit to the splendid work of the Corps of Voluntary Marine Observers, work done for three-quarters of a century, and we believe that that work is best done when it is done with a measure of self-government, and so it has been our practice whenever possible to consult marine observers before making changes. Sometimes these consultations have been made in conversation on board observing ships, in the Marine Division, or at meetings at the ports, sometimes by letter, but we hope to be able to consult our Corps more and more through the pages of THE MARINE OBSERVER.

Lest there should be some who may have overlooked the thanks and acknowledgment given monthly for work done, in "The Work of the Year" and our note in the December 1928 Number let us thank one and all who have contributed directly or indirectly to the good work of THE MARINE OBSERVER. If we have made it a seamanlike production there is nothing that we are more proud of.

London,
October 8th, 1928.

MARINE SUPERINTENDENT.

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.

DANGEROUS ICE.

Australian Bight.

THE following report of ice sighted by S.S. *Tymeric*, Captain E. P. ROE, has been received from Captain J. J. AIREY, Deputy Director of Navigation, our Agent at Fremantle, Western Australia:—

"I beg to inform you that on the 29th January, 1928, at 0800 G.M.T. whilst I was on the bridge of the above-named vessel I sighted (personally) a white object on my starboard quarter. I turned my vessel round to make an investigation, this object proved to be an iceberg and the following message was broadcast by wireless from this vessel:—

"All Ships—

"At 0800 G.M.T., Latitude 35 05 S., Longitude 129 55 E., *Tymeric* passed within 70 feet of a piece of ice 4 to 6 feet above water and 30 feet surface circumference under water area larger dangerous to navigation."

CURRENT.

Red Sea.

THE following is an extract from the Meteorological Report of S.S. *Ningchow*, Captain H. E. BEALE, Suez to Singapore. Observer, Mr. M. H. VINCENT, 4th Officer:—

"On January 9th, 1928, steaming 12 knots, approaching Jebel Teir from the northward, a current setting S 51° W ½ knot was experienced from 6.0 a.m. to 4.56 p.m. when Jebel Teir was abeam. During this period the ship's position was frequently checked by celestial and terrestrial observations.

"After passing Jebel Teir a current setting N 43° E 1 knot was immediately experienced and persisted until 8.02 p.m. when Centre Peak Island was abeam.

"From Centre Peak Island to Abu Ail slack water was experienced."

NOTE.—The above observations afford an example of the currents setting across the Red Sea which are referred to in the following caution printed on Admiralty Chart 2523 (Red Sea, general).

"Strong Currents occasionally set across the Red Sea, the mariner should therefore give a good berth to all outlying reefs and shoals."

Indian Ocean.

THE following is an extract from the Meteorological Report of S.S. *Stockwell*, Captain E. THOWLESS, Calcutta to Suez. Observer, Mr. R. A. KNEEN, 3rd Officer:—

"It will be observed by a comparison of the Currents recorded on the voyage from Calcutta to Suez, via Colombo, January 4th to 20th, 1928, and those on the Monthly Current Chart of the Indian Ocean, that in quite a few cases the currents actually experienced are entirely contra to those described in the chart for the month of January.

"From Colombo to Minikoi Island the set was favourable, but not to the extent we had anticipated. From Minikoi Island to Socotra Island the set was either adverse or due north when a set of an entirely opposite character was expected.

"Whether this is phenomenal or otherwise I cannot say: but I would be pleased to read any accounts of experience of other observers with regard to currents for this month which may be forthcoming."

NOTE.—The above remarks provide a good example of the variability of ocean currents and of the fact that the charts, hitherto in use, do not show the character or degree of the variations. As is stated in the Marine Superintendent's note on "The Marine Observer, 1929," published in this Number, it is hoped to be able to publish Charts in THE MARINE OBSERVER for the routes from the Leeuwin to Perim direct and via Colombo, in the 1930 Volume.

EASTERLY CURRENT IN CARIBBEAN SEA.

THE following is an extract from the Meteorological Report of C.S. *Henry Holmes*, Captain A. BICKER CAARTEN, cable work in West Indies. Observer, Mr. M. A. GREEN, 2nd Officer:—

"On the 27th January to 28th January, 1928, met with 'Abnormal Current' between Latitude 17° 36' N., Longitude 71° 54' W., and Latitude 17° 59½' N., Longitude 73° 50' W. Current setting due east (90°) at the rate of 1.7 knots. This was verified by the land bearings, also the 'Patent Log.' Engineers reported heavy drag on engines."

NOTE.—The roses on the Charts in THE MARINE OBSERVER of Currents on the tracks to and from the West Indies and Panama for the quarter November to January show occasional easterly currents in all parts of the Caribbean Sea except the area in which C.S. *Henry Holmes* was at the time of the above observation. During the next quarter, February to April, however, a proportion of easterly currents are shown by the rose for this area.

LINE OF DEMARCATION BETWEEN CURRENTS.

North Pacific Ocean.

THE following is an extract from the Meteorological Report of S.S. *Loch Katrine*, Captain T. J. C. BURET, Los Angeles to Panama. Observer, Mr. R. A. STENHOUSE:—

"On January 11th, 1928, at 10.30 A.T.S. Passed a well-defined line of demarcation between two ocean currents, extending S.W. and N.E. in a sinuous line as far as the eye could see. Brown strips of grass, etc., in large quantities constituted this line. Position of ship at 8 a.m., Latitude 20° 48' N., Longitude 107° 27' W."

CURRENT RIPS IN THE SOUTH EQUATORIAL CURRENT.

Pacific Ocean.

THE following is an extract from the Meteorological Report of S.S. *Middlesex*, Captain A. B. MACRAE, D.S.C., Balboa to Auckland, N.Z. Observer, Mr. R. G. REES, 2nd Officer:—

"At 2.00 p.m., on January 10th, 1928, Latitude 2° 55' N., Longitude 86° 33' W., 290 miles eastward of Abingdon Island, passed

through a series of four remarkably strong current rips extending in regular formation to the horizon in a N.N.E.—S.S.W. direction. The first rip, running against a slight sea from N.E., caused quite a considerable chop all along its front of progression, and was about a ship's length in width (160 yards). Smooth water intervened for 200 yards between the first and second rip, which was followed again by a third and weaker rip, then smooth water for 300 yards, and finally a fourth rip, barely perceptible. Helm had to be given freely to counteract the effect on the vessel on entering and passing out of each rip. Wind was N.E. force 3, very slight S'ly swell, slight sea, steering S 63° W, true. Current experienced during the preceding 24 hours set N 87° W, rate 0.6 knots. Sea temperature rose 2° to 85° F."

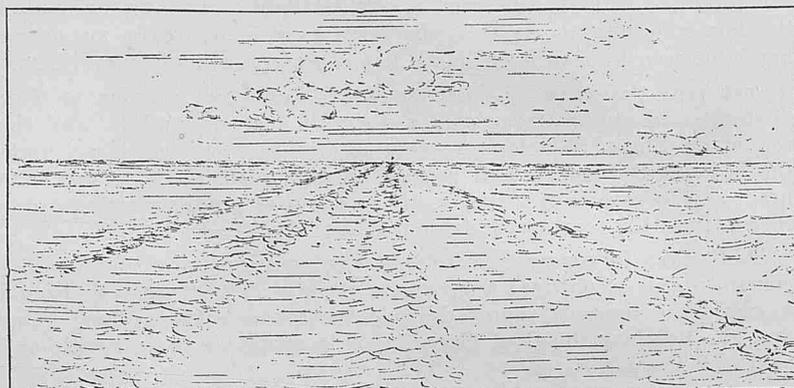
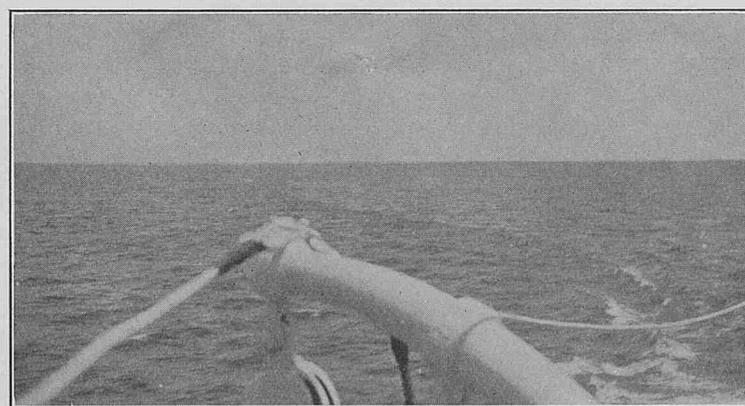


Diagram shows the appearance of the sea, looking N.N.E., when vessel was in centre of disturbed area.

TIDE RIP.

East Indies.

THE following is an extract from the Meteorological Log of S.S. *Gascoyne*, Captain L. JOHNSON, Batavia to Singapore. Observer, Mr. S. L. R. SIMPSON, 2nd Officer:—



"January 8th, 1928, 0.40 p.m., in Banka Strait, Latitude 3° S., Longitude 106° E. Navigating Banka Strait from the southward

and approaching the northern exit, observed very well-defined line dividing fresh and salt water. The fresh, which appeared as a dark umber colour, streaked away from the Sumatra shore (doubtless coming from the Palembang estuary) and ran almost east and west down the Strait, the tidal stream setting strongly (quite three knots) to the eastward at the time of observation. Took temperature and specific gravity on each side of the dividing line, and found fresh water to be 86.6° F., specific gravity 9, and salt water 82.5° F., specific gravity 18."

PHOSPHORESCENCE.

South Atlantic.

THE following is an extract from the Meteorological Report of S.S. *Barrabool*, Captain H. R. RHODES, London to Australia via Cape. Observer, Mr. G. S. B. COLLARD, 3rd Officer:—

"On January 4th, 1928, at 0450 G.M.T., in Latitude 1° 10' S., Longitude 8° 06' W., observed a large quantity of phosphorescence which was composed of circular patches, the greatest of which was about 18 inches in diameter. There were three distinct lines (formed with the circular patches) running from N.E. by E. to S.W. by W. and of about 80 feet each in breadth. The area covered was about $1\frac{3}{4}$ miles in a north to south direction and as far as the eye could see to the eastward and westward. Wind S.S.E., force 3. Sea S.S.E., disturbance 2. Temperature, air 77°, sea 79°."

EARTHQUAKE.

Mombasa, Kenya.

The following is an extract from a letter received from Captain R. SARGEANT, the Port Captain at Mombasa, Kenya:—

"You will no doubt have seen reports of the earthquake which affected this country on the 6th of January this year (1928). The shock, which was very marked at Mombasa, occurred at 10.04 p.m. (Standard Time $2\frac{1}{2}$ hours east of Greenwich). My house, which is situated very close to the sea, about one hundred yards from the top of the cliff, which slopes gradually, shook severely. Suspending objects were observed to swing some eight inches either side of the perpendicular. When I went outside, immediately after the shock, it was bright moonlight, and the sky presented a perfectly normal appearance, with a few light clouds, almost stationary. The wind was from the north-east, and light. No effect of the earthquake appeared over the sea, nor was any reported by either, ship, dhow, or fishing craft. Several of the latter were out anchored close to the reefs that night. No damage resulted at Mombasa, but in several inland districts damage to land and property occurred.

"The nature of the soil at Mombasa is mostly coral, very hard. The country is, in fact, to a great extent volcanic."

SUBMARINE VOLCANIC ERUPTION.

Straits of Sunda.

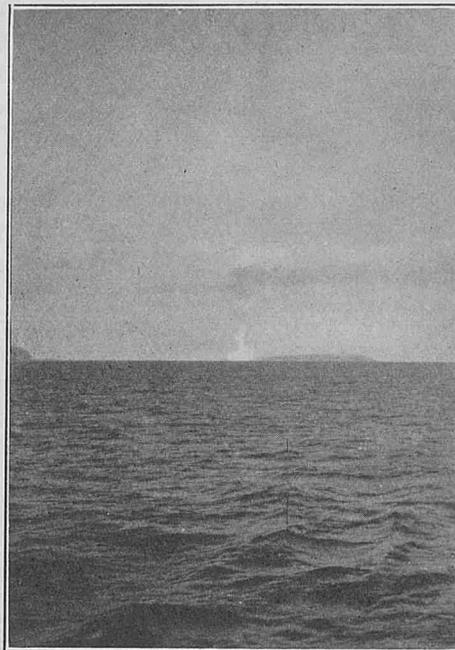
The following is an extract from the Meteorological Report of S.S. *Memnon*, Captain W. T. DOUGALL, Hong Kong to Suez via East Indies. Observer, Mr. J. A. G. MACGREGOR, 3rd Officer:—

"January 18th, 1928. At 4.25 p.m. A.T.S., in Latitude 6° 11½' S., Longitude 105° 22' E., a very fine view was obtained of Krakatoa Volcano (Sunda Strait), which was then in eruption. At short intervals, which rarely exceeded more than five minutes, great columns of steam were ejected, attaining a height of over 2,000 feet. A considerable amount of rock and mud could be clearly distinguished in these upheavals, fragments of rock frequently reaching greater heights than the steam. The bearing of the centre from above position was 036°, and distance approximately 6.5 miles. This distance and bearing placed the eruption in 14 fathoms of water.

"The accompanying photograph is of one of the upheavals.

"The 'Eastern Archipelago Pilot,' Volume II, states:—

"The volcano of Krakatoa was in eruption in the year 1680, and although included within the category of active volcanoes it remained in a state of quiescence for upwards of 200 years.



"In the year 1883, on May 20th, the volcano burst out with great violence, accompanied by earthquakes, which were severely felt at Batavia, and at the same time vast showers of pumice and ashes were projected to a great distance. The eruption was observed from the Imperial German ship, *Elizabeth*, and on the following day, when 100 miles from Krakatoa, a shower of dust was experienced which was estimated to become a layer one inch in thickness in 24 hours, and this was still falling when the vessel had gained a position 300 miles south-west of Sunda Strait.

"On 26th August of the same year, Krakatoa again burst into eruption, and of such a terrible nature that miles of coast on both sides of the strait were wholly devastated, and multitudes of people perished. On the 27th August, a succession of earthquake waves swept the shores of the strait, utterly destroying the towns of Anjer, Merak, Charingin and Telok Betung, together with some of the lighthouses on both shores. This remarkable disturbance of the sea made itself felt in various parts of the world upon the same date, notably in Australia and Southern Africa, also at Karachi in India.

"The vast amount of pumice which lay upon the surface of the sea, in some places many feet in thickness, gave an appearance as if the ocean bed had appeared above water.

"The steam from the volcano was estimated to have been driven to a height of more than 12 miles, and the rain of ashes fell over all southern Sumatra and northward to Singapore, eastward to Batavia, and south-westward to the Cocos islands; finer particles of dust floating in the upper atmosphere enveloped the earth, and caused brilliant sunsets up to December of that year. The sound of the explosions was heard at Perth, in Western Australia, in New Guinea, Ceylon and the island of Mauritius.

"The tidal wave, which, where obstructed, increased greatly in volume, was observed at Toppers island to rise 72 feet (22^m0); at Merak, between the island and mainland, about 120 feet (36^m0); and from Varkenshoek to Telok Betung the average height was about 80 feet (24^m4). Every object on the shore, in to the first range of hills, was levelled with the ground, and where the land was low the sea penetrated 5 miles inward. At Telok Betung the water rose to the square of the resident's house, 118 feet (36^m0) above high water; and the Government steamer *Berouw* was swept over the pier into the Chinese quarter of the town, a distance of nearly 2 miles from the anchorage. The undulation was felt on the north coast of Java; in Batavia road it rose 8 feet (2^m4) in height, and, in Tanjong Priok harbour, on August 27th, from 1230 to 1330, the water suddenly fell 18 feet (5^m5).

"The island, for 100 feet (30^m5) up, remained a mass of glowing lava and stones; all animal and vegetable life was destroyed, and it was five years before verdure again returned.

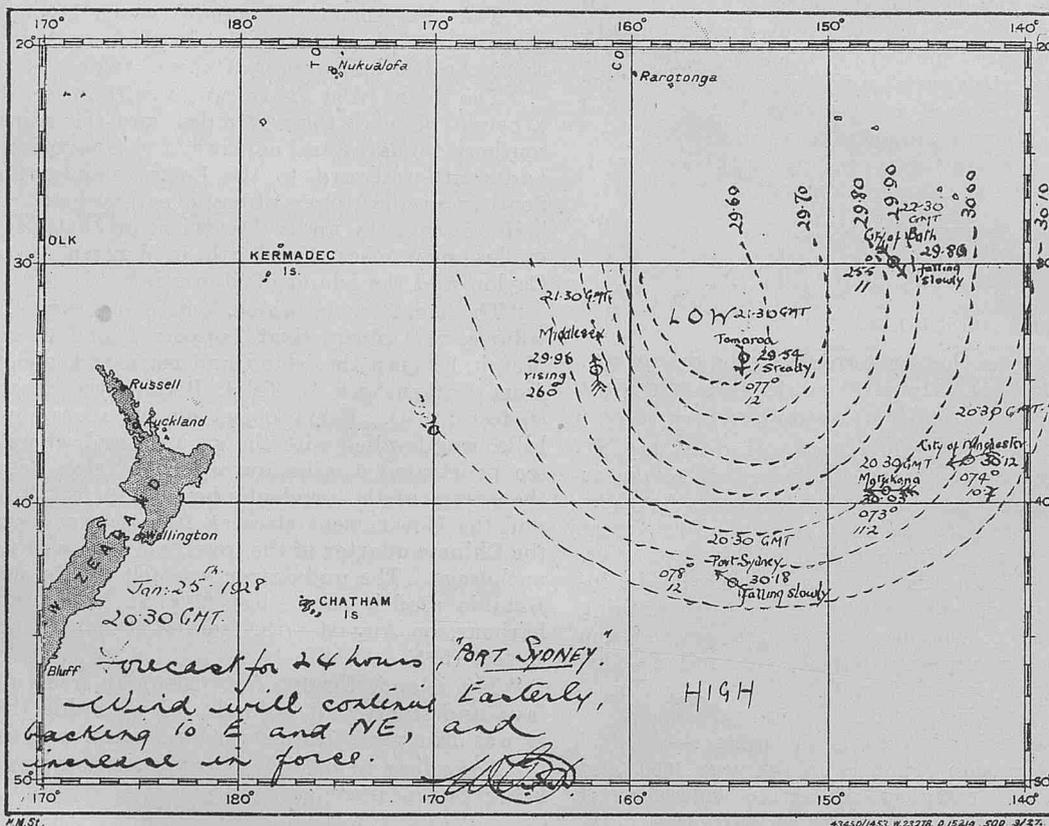
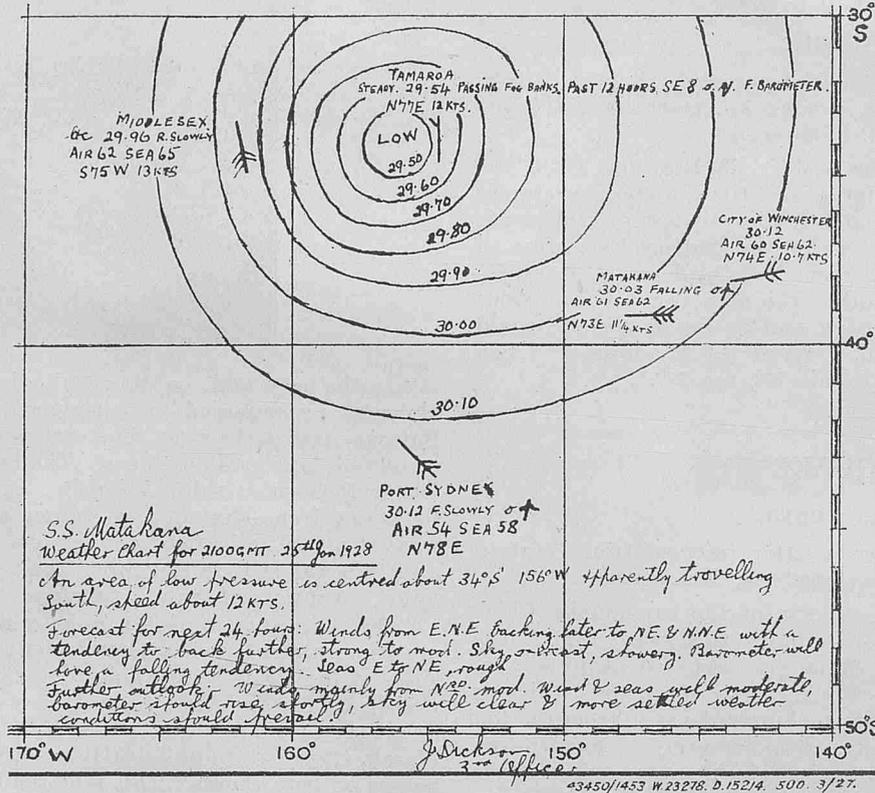
"According to official report 36,417 persons perished, 37 of these being Europeans."

WEATHER CHARTS MADE AT SEA.

South Pacific.

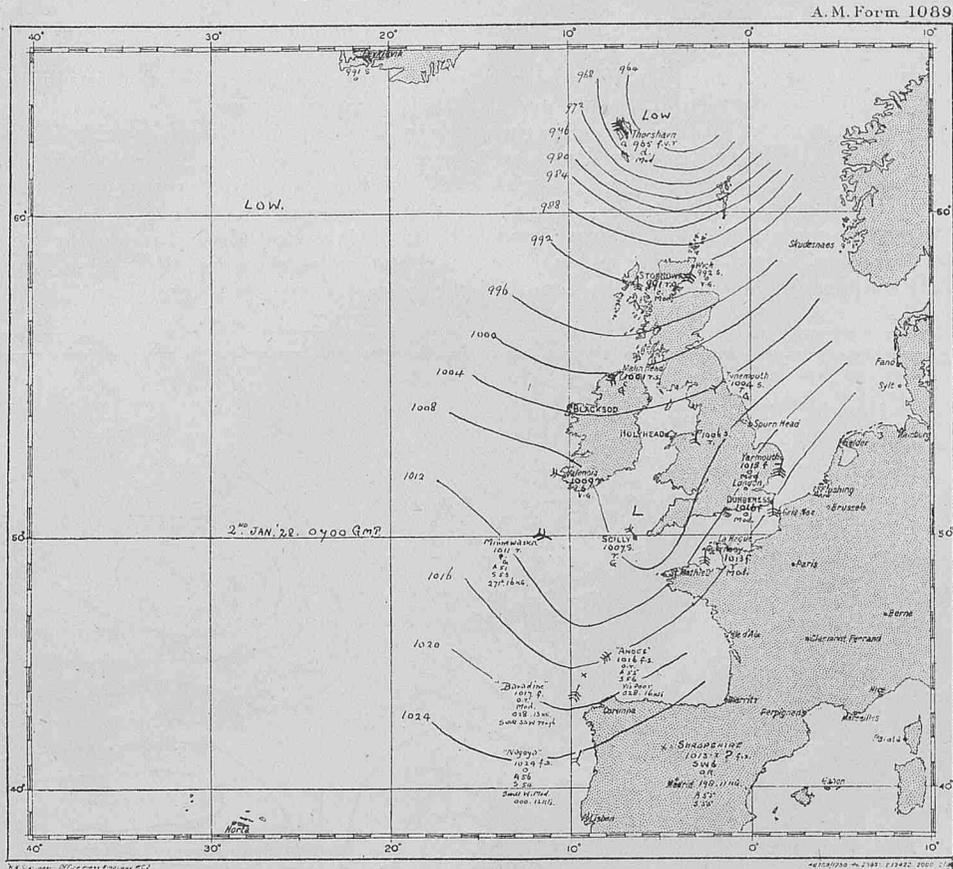
These charts were made on board S.S. *Port Sydney*, Captain W. G. HIGGS, by Mr. T. L. KIDWELL, 3rd Officer, and S.S. *Matakana*, Captain H. P. THURSTON, by Mr. J. DICKSON, 3rd Officer, on 25th January, 1928, and in both cases they are of a series. They were included amongst the exhibits from British observing ships used at the meetings of the Sub-Commission of the International

Meteorological Committee at Paris in May, 1928, to prove the practicability of the British system of ships' weather telegraphy and the advantages to be gained by the adoption of the principle of the "selected ship." These charts show that two independent navigating officers in two ships obtained from the same reports, broadcast to all ships, practically the same pressure distribution.



Eastern North Atlantic.

Weather Chart (one of a series) made on board S.S. *Baradine*, Captain W. ROLLO, Fremantle to London via Cape of Good Hope, by Mr. C. B. ROCHE, Chief Officer.



Australian Waters.

Weather Chart (one of a series) made on board S.S. *Wangaratta*, Captain W. SCUTT, Melbourne to Suez, by Mr. S. R. MILLARD, 2nd Officer.



According to *Wangaratta's* Meteorological Log, the wind remained S. E'ly, force 2-3, during the 21st, barometer steady with fine weather.

WEATHER FORECASTING ON BOARD SHIP IN THE MEDITERRANEAN.

In Port and at Sea.

By LIEUTENANT W. E. ALLEN, R.N.R., Cable Ship *Colonia*, Commander G. F. CARLTON, O.B.E., R.N.R.

"During a voyage of two months, it was found that for weather purposes, the Mediterranean Sea could be divided into two parts, the eastern and western with the meridian of Malta as a dividing line. When in the western area, Eiffel Tower "Meteo Europe" weather reports broadcast at 0940 G.M.T. were used together with any ship reports to hand. In the eastern area Ismailia (Egypt) which broadcasts 0600 G.M.T. observations at 1100 G.M.T. were used.

"Good forecasts were obtained from using both these stations, CHART 1 which was actually made on board from the Ismailia reports,

shows the general pressure distribution which persisted over the Mediterranean from the 13th to 16th January, 1928, causing at Larnaka, Cyprus, strong easterly winds, the consequent heavy seas prevented all communication with the shore by boat and stopped all loading and discharging of cargo at the port. The local inhabitants say that easterly winds at Larnaka persist for three to four days and then shift to the westward with rain, CHART 1 is instructive as showing the reason for local weather lore. As will be seen Cyprus is situated on the northern side of depressions

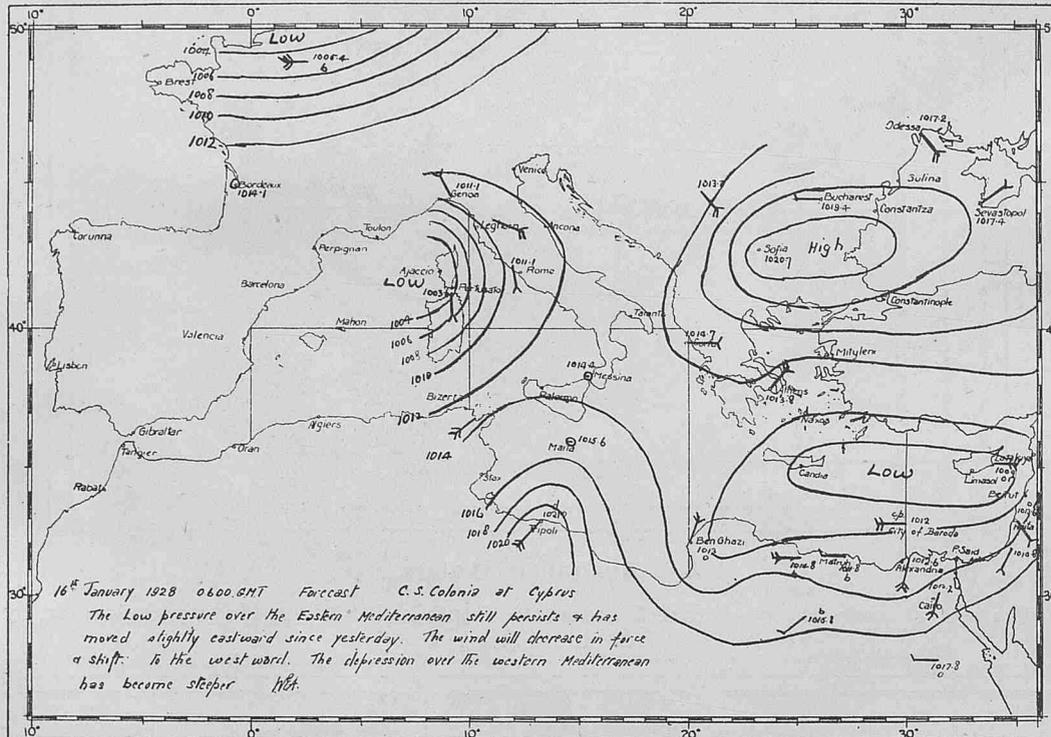


Chart 1.

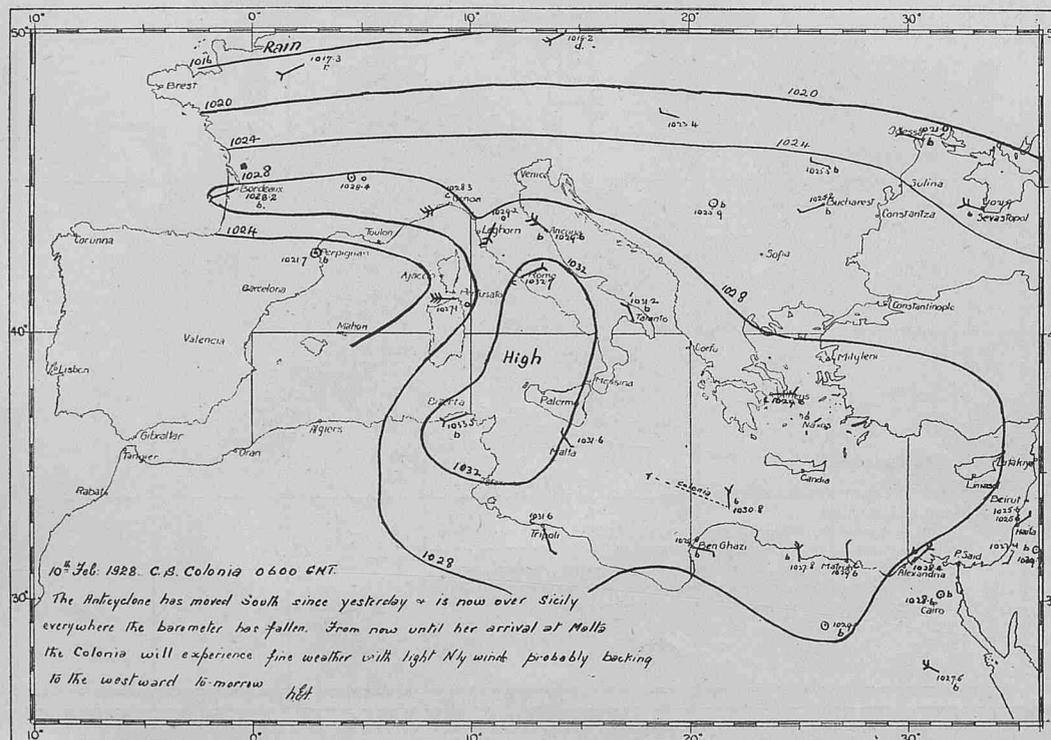


Chart 2.

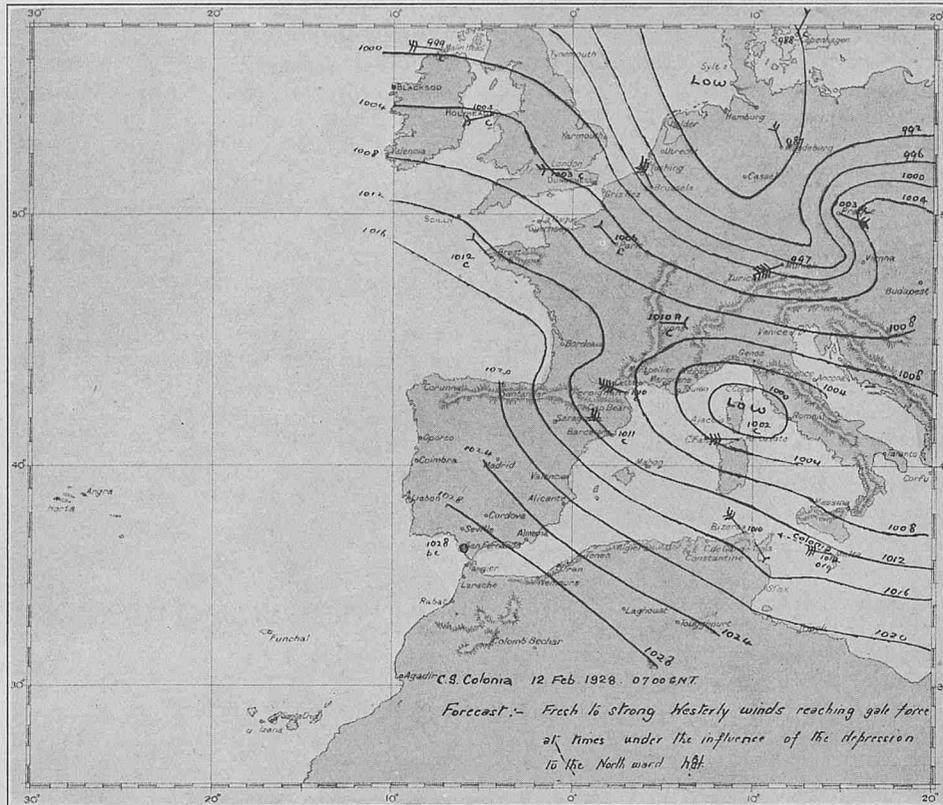


Chart 3.

travelling slowly E.N.E., and the sequence of events is in accordance with Buys Ballot's law.

"In the north-eastern Mediterranean during a spell of easterly winds the upper clouds were seen to be travelling in a reverse direction to the surface wind. On the appearance of Cirro-Stratus on the western horizon the wind would gradually increase until the passage of these upper clouds, when it would fall lighter, again increasing on the appearance of the Cirro-Stratus in the west.

"It was forcibly brought to one's notice that in order to forecast the strength of the wind at sea, the only reliable guide was the barometric gradient as found from the weather chart, the force of the wind as reported by land stations in nearly all cases being less

than the strength off shore. This shows the necessity of ships' weather observations being synchronised with the observations at the land stations in the vicinity and at the same time the usefulness of ships' observations for plotting purposes.

"CHART 2 shows an Anticyclone over the middle portion of the Mediterranean; this, together with a blue sea and large ship, produces the weather of the Tourist Advertisement class.

"CHART 3 is of interest as it shows the pressure distribution, direction and force of wind caused by a Low just east of the Gulf of Lyons. It was during the night of the 12th February, 1928, the date of this weather chart, that the *Colonia* and other vessels experienced a set of 1.3 Kts., to the S.S.E. between Pantellaria and

Current Roses.

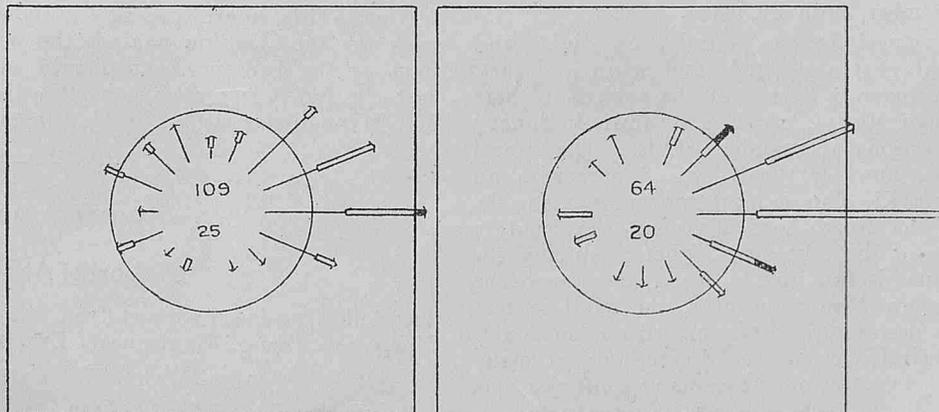
On the route between Gibraltar and Port Said, Longitude 0° to 10° E.

April to September 1911 to 1914 and 1920 to 1922.

Winds from N.E. to S.E.

Winds from N.W. to S.W.

Scale: - 10% 20 30 40 50 60 70 80%



Arrows flow with current; length represents frequency, thickness strength: - 6-12 miles per day →, 13-24 miles per day ⇨, 25 miles per day or over ⇩. Distance from tail of arrow to circle represents 5% of all observations, (see scale above). The figures in the centre indicate the number of observations and percentage frequency of current less than 5 miles per day.

Cape Bon. There seems here to be an obvious connection between the pressure distribution and current, it would therefore be interesting to know if under the same conditions vessels at other times have experienced the same effects, especially as the visibility deteriorated with this type of weather making landfalls rather an anxiety. Although it is impossible to give any figures it appeared as if the current increased in strength as the ship approached Cape Bon from Pantellaria.

"In connection with this, S.S. *Nore* on or about the 17th March, 1925, may have experienced such a current. I have been looking at a Weather Chart on board that ship and reproduced on page 43, Volume III of THE MARINE OBSERVER, the conditions are similar to CHART 3."

NOTE.—On March 17th, 1925, when the chart referred to by Mr. ALLEN was made S.S. *Nore*, Captain J. W. PARKER, recorded a set and drift of S 16° W 11 miles between Noon March 17th, Latitude 37° 22' N., Longitude 9° 32' E., and Noon March 18th, Latitude 36° 02' N., Longitude 14° 25' E. At this time there was a high sea and heavy swell on *Nore's* port beam and according to a note made in her Meteorological Log at the time doubt is thrown upon this set and drift being entirely due to current, part of it may have been due to leeway.

The current roses on p. 9 are taken from the back of the "Monthly Meteorological Chart of the North Atlantic for July, 1923," Sheet No. 268. These appeared in the last article on "Ocean Currents" published before the final adoption of the present method of charting currents in THE MARINE OBSERVER. They are for the area to the westward of that where *Colonia* experienced the strong S.S.E'ly set during a N.W'ly Gale and show clearly the increase in frequency and strength of the easterly stream with winds from a westerly quarter. Therefore when Weather Charts show by the pressure distribution that N.W'ly gales may be expected a stronger set to the eastward is also likely to be encountered, in this region. Hence the desirability of including reliable observations of set and drift of current in Routine Wireless Weather Reports.

INFORMATION REGARDING METEOROLOGICAL SERVICES OF MARITIME COUNTRIES.

The following is an extract from a letter received from Captain R. SARGEANT, the Port Captain at Mombasa, Kenya:—

"With regard to the request for meteorological services contained in the January 1928 Number, I would observe as follows:—

"Information of weather signals:—No weather signals are made for the information of shipping and seamen in this country.

"There is, in fact, little information in this respect which could be given. This Port is situated in that belt of the Indian Ocean which is unaffected by cyclones and revolving storms. The weather is therefore most regular, being governed entirely by the changes of Monsoons, viz:

"North-East Monsoon from December to March, South-West Monsoon from May to September, both inclusive.

"During the intervening periods, the winds are light and gradually veer round through east and south, and south and east, as the case may be. These periods are termed by the natives in their own Swahili language, 'Tanga Mbili', which, a Swahili dictionary will tell you, means 'The seasons of variable winds,' The literal translation of the words is, however, 'sail twice' otherwise an abbreviation for 'Sail two ways.' This is most appropriate, for the simple reason that, during the North-East Monsoon, the wind is fair down the coast, but ahead the other way, whereas during the South-West Monsoon, the wind is fair up the coast, and ahead the opposite way. During 'Tanga Mbili,' however, the wind is fair both ways. Hence this very descriptive name, passed on, no doubt, to the present day sailors of this coast, the descendants of many generations of seamen, by their ancestors who, many centuries ago, sailed the Indian Ocean in dhows such as are still seen to-day.

"The rains occur during April, May and June, and heavy showers continue during the South-West Monsoon, gradually lessening in frequency as the monsoon subsides.

"The small rains occur immediately prior to the North-East Monsoon, and showers are usually experienced during the first part

of this monsoon. Thunderstorms are rare, when they occur, they do so when the rains break.

"These weather conditions naturally apply to the coast, and more or less prevail from Cape Guardafui to the northern limit of Mozambique Channel. Inland, the winds vary, although the rains occur there at much the same period as at the coast, in this Territory.

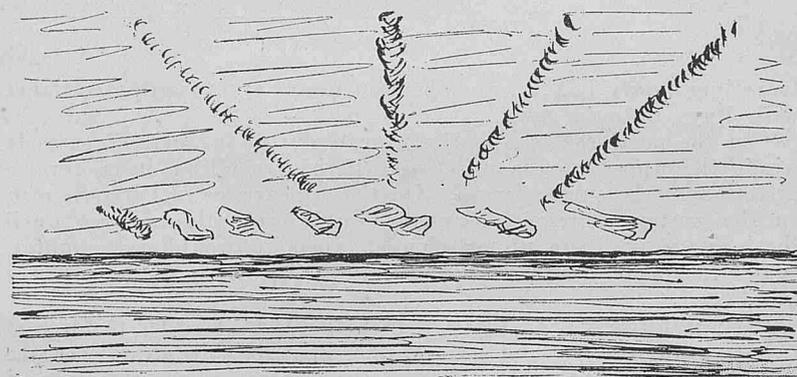
"It will be seen from the above that, owing to its geographical position, this Port is singularly free from cyclonic disturbances. On very rare occasions, a slight disturbance of this nature has taken place on a very narrow track only. One which I personally witnessed occurred several years ago at the breaking of the rains, when the galvanized iron roof of a house was lifted off bodily, and turned completely over, and left lying on the ground in front of the house. Nothing else, whether near or far, was affected.

"It would appear therefore that weather forecasting is hardly practicable here, at any rate as far as being useful to seamen. The mercurial barometer which is in my office, practically never changes its reading from 30.00 inches, apart from a small diurnal range which is constant."

CLOUD FORMATION IN S.E. TRADE WIND.

Indian Ocean.

The following is an extract from the Meteorological Log of S.S. *Naldera*, the late Captain T. C. E. DAYAS, Sydney to London. Observer, Mr. C. H. HAND, 2nd Officer:—



View bearing W.S.W., Ship steering N. 42° W.

"January 27th, 1928, Latitude 14½° S., Longitude 97¼° E. Barometer 1009.2 mb. Temperature, dry bulb 82°, wet bulb 75°. Wind S.E., force 2. Sun set at 6.24 p.m. Sky heavily veiled with Ci-St, low dark Cumulus on horizon, tops sloping to S.E. At sunset the peculiar cloud effect illustrated above was observed the Cirrus radiating from WSW and having a tubular appearance. The effect remained for about half an hour after sunset."

NOTE.—This interesting sketch shows the typical Trade Cumulus with the tops sloping against the wind. The upper wind in this part of the Indian Ocean should normally be easterly or north-easterly and it is probable that the lie of the Cirrus cloud to which Mr. HAND directs attention indicates a direction from ENE.

LIGHT RAYS.

North Atlantic.

The following is an extract from the Meteorological Report of S.S. *Mongolian Prince*, Captain W. EDWARDS, Cape Town to New York. Observer, Mr. V. C. PALMER:—

"January 7th, 1928, 4.19 p.m., A.T.S., 1845 G.M.T., in Latitude 5° 19' N., Longitude 34° 53' W., observed rays of light emanating in the eastern section of the sky and extending to the southward bearing S 77° E true, and to the northward bearing N 35° E.

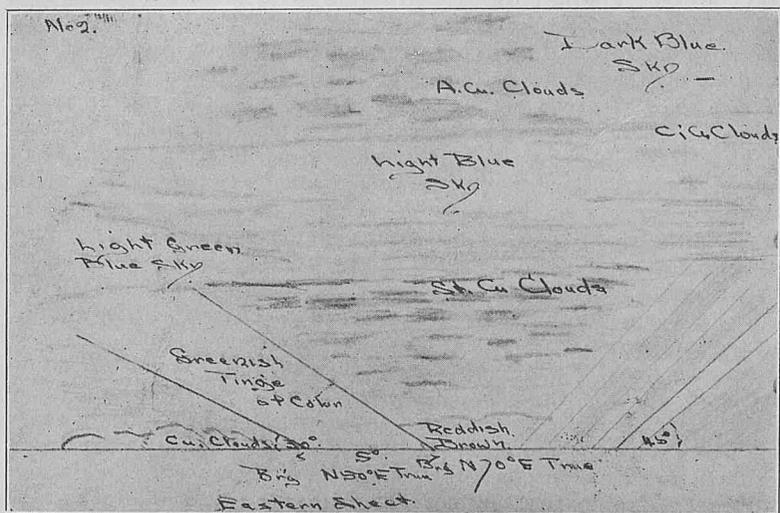
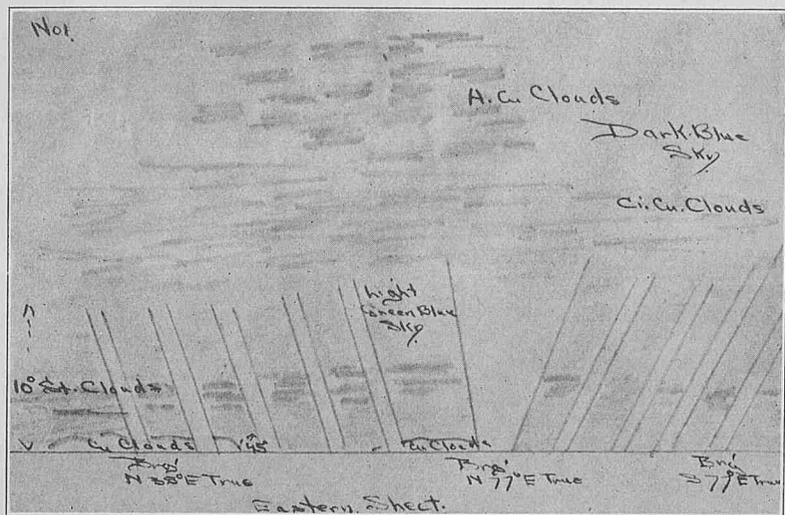
"The extreme altitude was 10° and they appeared in white and grey contrasts.

"1956 G.M.T., a broad ray appeared bearing N 50° E., true, and had the appearance of being light green in colour.

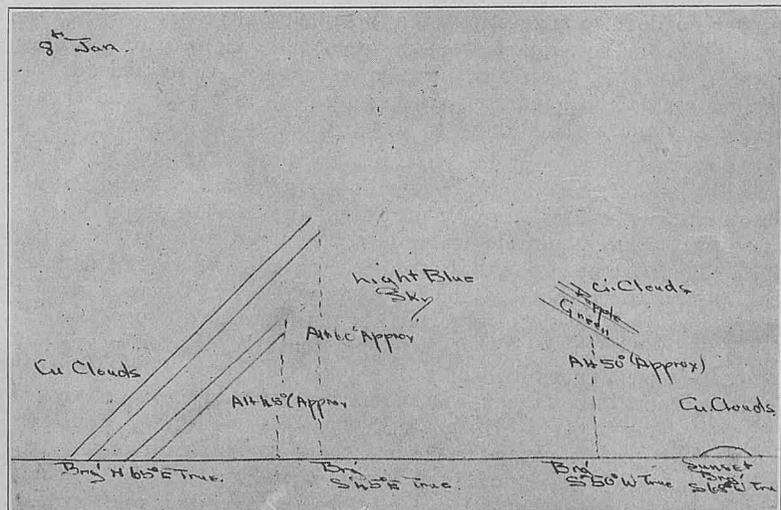
"At 2011 G.M.T., there were no rays visible. The computed time of moon rise U.L. was 6.26 A.T.S. and bearing N 67° E.

"The sun's bearing at sunset was S 68° W, true. The computed time of moon-rise and bearing was, 7.20 A.T.S., N 70° E.

"The W/T Operator reported heavy static rushes."



"January 8th, 1928, 5.45 p.m., A.T.S., 2022 G.M.T., in Latitude 8° 59' N., Longitude 37° 45' W. At sunset observed two rays of light in the eastern section of the sky emanating from a point on the horizon bearing N 65° E, true; one extended to an altitude of 45° and the other to an altitude of 60°. At the same time an arc was visible in the western section of the sky bearing S 50° W, true, and had an altitude of 50°, this was showing through Cirrus clouds. The colours visible were purple and green. This effect was visible till 2038 G.M.T.



DOUBLE LUNAR CORONA.

North Atlantic.

THE following is an extract from the Meteorological Log of S.S. Woodarra, Captain J. V. REILLY, Liverpool to Cape Town. Observer, Mr. L. G. C. SIMPSON, 2nd Officer:—

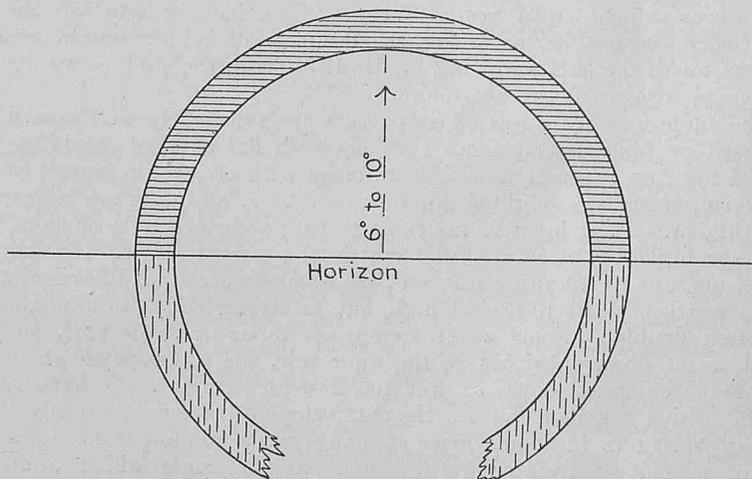
"On the 9th January, 1928, in the middle watch, a magnificent corona of the moon was observed. The first hour of the watch the sky was clear, at one o'clock a bank of cloud appeared to the eastward and fifteen minutes later the moon was veiled by Cirro-Stratus cloud causing a well-defined corona. The diameter of the inner ring was 5° approximately and commencing at the outside of the ring five colours were clearly visible in this order:—brownish red, yellow, green, violet. Outside of all this there was another ring having three colours visible:—brownish red, green and violet. The phenomenon lasted about fifteen minutes. Moon's altitude 50°. Approximate position of ship, Latitude 9½° N., Longitude 16° W."

FOG BOW.

North Atlantic.

THE following is an extract from the Meteorological Report of S.S. Saxon, Captain G. F. GARDNER, O.B.E., Madeira to Cape Town. Observer, Mr. G. H. PICKERING, 4th Officer:—

"January 7th, 1928, between 4 a.m. and 7 a.m. Weather, passing fog banks and low Cumulus cloud. Visibility poor. Air 54°, sea 54°. Barometer 30.34 in. A single halo was observed at intervals, opposite the moon, i.e., 180°. The angle between the horizon and upper limb varied in size from about 6° to 10°, the lower limb appearing to reach to side of the ship. Position of ship at 8 a.m., Latitude 42° 08' N., Longitude 10° 09' W."



NOTE.—A fog bow is formed in the same manner as an ordinary rainbow by refraction and reflection of light from the sun or moon within drops of water. In the case of fog the phenomenon is produced by the very small drops of water suspended in the air. It can be proved that when the drops of water are very small, either in the form of fog or very fine rain, the resulting bow is white and not coloured as in the ordinary rainbow, because of the feebleness and overlapping of the colours. When the moon is the source of light the separate colours are rarely seen in a rainbow on account of its lack of brilliancy.

LUNAR RAINBOW.

North Atlantic.

THE following is an extract from the Meteorological Log of S.S. Maihar, Captain W. L. CHARLTON, Liverpool to Port Said. Observer, Mr. C. CADWALLADER:—

"January 31st, 1928, 1.00 a.m., A.T.S. (0152 G.M.T.). Ship's position, Latitude 39° 10' N., Longitude 9° 40' W., observed a white

bow in the sky opposite to the moon which was setting. The bow bore about ESE, but owing to the presence of shipping in the near vicinity it was impossible to take any measurement of it. At first the right part of this bow was distinctly visible and the left side was indistinct, but before it disappeared at 1.30 a.m. the whole was showing clearly. It was a silvery white and very narrow; the distance between the two extremities would probably be about 80° and its altitude roughly 40°. The sky was overcast at the time and fine rain was falling."

WATERSPOUT PHENOMENA.

Mediterranean Sea.

THE following is an extract from the Meteorological Log of S.S. *Newby Hall*, Captain R. C. ZEAL, Port Said to Oran:—

"16th January, 1928, 11.50 a.m., A.T.S., Latitude 33° 08' N., Longitude 26° 16' E. Course 288°. Barometer 1007.8 mb., steady.

Temperature 58° F. Wind force 4, veering and backing WNW—WSW. Sky $\frac{3}{4}$ covered, Cumulus and Nimbus Clouds, heavy rain squalls frequently passing throughout watch. Observed heavy rain squalls passing ahead and on port beam, clear in the middle. A waterspout suspended from the after edge of a bank of heavy Nimbus cloud about 3 points on port bow. Base of spout would drop to sea, with large eruption of water, then climb up again; this repeated several times till spout burst at 11.58 a.m. At noon A.T.S. observed three large and several small whirlpools following track of squall, climbing from sea into spout, would rise about 60 feet burst, then recommence to climb. Lasted till 0010 A.T.S. when all ceased except one which climbed until it had the appearance of smoke, to about 200 feet then finally burst and dispersed. The water was fiercely boiling at the base of these spouts, giving appearance of exploding. These phenomena occurred about 1 mile from the vessel at 0015. No more signs of spouts and weather cleared."

CORAL REEFS.

By PROFESSOR J. STANLEY GARDINER, F.R.S.

The formation of Coral Reefs is again exciting considerable interest, particularly on account of a book, "The Coral Reef Problem," the result of the 14 years' work of Professor DAVIS among the reefs of the Pacific and West Indies and on account of the despatch of a large expedition to the Low Islands, near Cairns, Great Barrier Reef. The Coral Reef Seas occupy an area roughly West from Hawaii and the Paumotuas to the East Indies and then to the East African Coast and the Red Sea. The eastern half of the Indian Ocean has only Cocos Keeling and the elevated Christmas Island. In the Atlantic there is the area of the West Indies and certain pseudo-reefs off the Brazilian Coast. The peculiarity of these areas is that their seas seldom have a lower temperature than 70° F., and this is supposed to govern the distribution of the organisms which build reefs. Where the colder waters of the Southern Ocean flow, or where the deeper and colder waters are drawn up to the surface owing to winds blowing the surface waters off shore, coral reefs are not found.

The surface appearances of coral reefs are sufficiently well known to need no long description. They show as flat surface shoals exposed for 1 or 2 feet at Low Tide Springs with occasional masses of rock (negroheads), weighing up to a few tons, standing up a few feet higher. Their breadth varies from 100 yards to a mile or more, but the higher part is always towards the seaward face. On this edge, perhaps 50-100 yards seaward, the breakers crash, ordinarily in calm weather about 10-15 feet high, but in strong winds this height is often doubled. Some water sweeps on to or over the reef, but most water flows outwards in the undertow, the presence of which has been registered down to over 100 fms. off Minikoi. Perhaps it is this which is responsible for the outer slope of the reefs, usually a fall of 40-50 fms. in about thrice as many yards. This passes into a steep, which, off isolated coral reefs, has an angle which often reaches 55° or 60°, continuing for about 100 fms., when a more gradual slope commences, tailing off to the sea bottom in the vicinity. The edge of the reef occasionally shows torn surfaces of rock, but usually is much channelled for the outgoing water. The first slope to 40 fms. is moderately smooth rock, but with some channels and often undulations, seldom giving good holding, unless the anchor jams in a hole. The steep for the next 100 fms. downwards is largely loose rock masses from the reef above, and below is a rubble merging first into coral mud and then into globigerina ooze, the latter gradually dominating. The steep is clearly a talus slope, and the section of this part of the fall is usually concave, in contrast to the convexity found off most volcanic islands.

The surface reef itself may be a quite narrow flat, a few yards across, extending out from some volcanic island shore, the latter usually cliffed and often having in the Pacific a narrow platform cut into its base, a few feet about high tide level. Sometimes on a broader reef, about the same distance in from the reef edge, may be an accumulation of coral rubble, an island, on which coconuts have grown up as a dense wall 100 feet or more in height, simulating a cliff in the darkness. Narrow reefs, mostly reefs in an early stage

of formation, can usually be distinguished by the irregularity of the breakers, the crashing and regular sound of which on a more mature reef coast cannot, if once heard, be mistaken. There are all stages from such narrow fringing reefs to structures up to a mile or two broad along the coast of some high land, first the breakers, then the reef edge 50 yards back and the same broad, this part marked at low tide springs by exposed coral masses; next the inner reef flat, coral masses bedded in sand hollowed out perhaps to form a boat channel, the chief area of communication for the canoes of the native coastal settlements on the land behind. Where a greater breadth of the whole structure is found, the boat channel is usually deeper and may become a regular "lagoon" of any breadth up to 100 miles or more, as off North Queensland. Where the distance of the reef edge to the land is a mile or more broad, there is generally little cliffing, and the land coast is usually cut into numerous bays and points, the former the terminals of rain-cut valleys behind. The lagoon has any depth up to 50 fms., but 20-30 fms. is usual; its bottom is commonly relatively firm, the best anchorage being in the mouth of some bay, where there is an accumulation of land sediment. Here and there are passages through the barrier, often opposite the larger land bays; if of 5 fms. or more in depth, the line of breakers is broken in nearly all weathers, and entrance is safe, though the ebb currents are often troublesome to sailing craft. Fortunately, shoal patches in such ship or entrance channels are usually clearly visible, the sides of the same and of the channels sloping precipitously; the bottom is generally hard and smooth. Within the lagoon itself the number of shoals vary, but all are flat-topped and arise steeply, being clearly visible from the masthead by their light green colour in most weathers. Fortunately, there are relatively few shoals, and these large and hence charted, if a survey has been made where the general depth is 15 fms. or more, but with lesser depths there may be such a regular maze that navigation is almost impossible. I can discover no definite suggestion of any submerged shoals *growing up* towards the surface, apart from the immediate vicinity of entrance channels. In such positions their danger can be estimated for individual corals can grow up 6 inches or more in a year and shoals could easily put on a fathom in less than 20 years.

On any reef there may be land, seldom more than 10 feet above high tide level, formed by the accumulation of coral material, either thrown up by the breakers or more often due to some slight alteration of water level, perhaps water lately removed to form ice at the poles. This land soon has drifted to it the seeds or fruits of various trees, particularly those of the coconut, which are dragged up by the crabs and which rapidly germinate and flourish in such "soil." These coconut-covered islands are particularly characteristic of ring-shaped reefs or atolls, where they form the only land, no central island existing only lagoon of the same depths and characteristics as that of barrier reefs. Such atolls may exist as in Fiji, together with barrier and fringing reefs, but there are many groups composed practically solely of such coral structures in the Pacific, besides the Maldives, Laccadive and Chagos Archipelagoes in the

Indian Ocean. The characteristic of all is the surface flat surrounding the lagoon at low tide springs except where ship channels exist, and the rise of the atolls of such groups from mean depth of the neighbouring ocean is commonly 2,000-2,500 fms. Then there are banks like submerged atolls with 20-50 fms., surrounded by a covered rim at 10-20 fms., often arising from similar great depths. They are usually coral covered and, even if recently charted, may present dangerous peaks reaching close to the surface, so that it is well advised to give them a wide berth. North of Fiji there is practically a submerged archipelago, but the most famous bank is Great Chagos, about the middle of the India Ocean, 80 miles across, general depth 44 fms., rim depth 10 fms.; it has 4 little islands. Such banks may be atolls in the building or being destroyed. Clearly, not nearly all are as yet known, and any suspicious broken water in coral seas should be reported.

It is quite clear that the surface structures and growth of coral reefs are due to organisms, which lay down structures of limestone and magnesia of a semi-permanent nature in certain tropical seas. The chief of these are the corals, the limestones of which are deposited under anemones, similar to those of temperate seas, a thin surface layer of living animals on a dense limestone skeleton. They form massive, branching, cup-like, lamellar and even mushroom-shaped structures, and the anemones may vary from a pin's head to several inches across. Their colouration in life is from white to green, with certain branching forms pink to violet. Then there are other similarly massive usually attached organisms, which if broken exhibit a still denser and whiter magnesia limestone, practically structureless. They are found encrusting and filling up the bases of branching corals; their surface is smooth or mammillated seldom with any sharp points. In hollows they may form rounded masses of tightly interlacing branches, and at the reef edge and under the breakers they are the dominant organisms, little coral skeletons merely in their pits. Their colour is white to various shades of pink, red and violet, and they are termed collectively nullipores (more correctly Lithothamnionaceae). They are known to fishermen of northern seas as branching loose structures, an inch or so across, and, where "coral" is marked on the charts in such areas below 50 fms. in depth, a bottom of this loose material is implied; the branching true corals of such areas only grow deeper, with best conditions at about 125 fms.

These two groups of organisms are the chief visible builders of coral reefs. They grow up together and interlace with each other. Any hollows and crevices are filled up by bivalved and coiled shells, together with remains of sea urchins and with the calcareous leaves of many marine plants. Then there is sand, mostly the shells of the same animals as form "globigerina ooze." The coral anemone is an animal, and may feed on small plants or animals such as may be wafted to its open mouths, but it feeds principally by means of small plants, which occupy its cavities and give it its basal green colouration. Nullipores are plants, and like all plants require sunlight for their nutrition, not feeding at night. But this light is absorbed by the water, and, even under a vertical sun in clear tropical waters, is not sufficiently strong for their growth below 50 fms., the penetrability of light through water probably governing the depth of the foundations of all true coral reefs.

This leaves the basal foundations, below 40-50 fms., to be considered, and this is the subject of much controversy. Atoll rings were once supposed to have been built on submerged volcanic craters, but this view is now quite exploded, for no such craters have been found below the waves. Further, the hot lava of eruptions, when meeting with water, explodes into ash, and ash would easily be levelled down to a plateau by wave action. Such an eruption in our own times was that of Falcon Island, Tonga, which, erupted in 1885, gave an island $1\frac{1}{4}$ miles long, 1 mile broad and 153 feet high, all of cinder and ash. This by 1921 was a bank, most of it covered by 7 fms. of water. In 1927 an eruption raised it to over 305 feet, this capped by a smoke bank of 4,000 feet. Such instances led to the suggestion by a late Hydrographer (Admiral WHARTON) that the basal foundations of coral atolls are largely erupted material from submarine disturbances cut down by the waves to 30, 40 or 50 fms. on the edge of which coral reefs would grow up first, since such parts would be peculiarly favourable to organic growth, being the first to

be bathed by waves and currents, and hence getting all the food material for organic growth, the centre of the plateau being starved. The depth of the foundations at 40 or 50 fms. synchronises with the depth of wind wave action all over the seas, and this critical depth agrees with that at which the organisms could flourish so that the theory seems reasonable enough and likely to be correct for some reefs, the only proven example being Providence Reef (North of Madagascar), off the slopes of which at 744 fms. over a ton of volcanic ash was dredged.

A similar view of submarine abrasion was put forward by ALEXANDER AGASSIZ and applied to all sorts of islands of rock. All islands in oceans at considerable distances from continents are either of volcanic rock or of limestone, the sole exception being Seychelles, which is of granite. It is possible to conceive of such abrasion happening with limestones where chemical water actions might supplement the mechanical erosion of the waves, but many atoll and barrier reef formations are too large for this to be a possibility. The high islands of the latter have not the necessary shores of abrasion cliffs, being protected from the waves by coral formations, and, furthermore, are usually much dissected by rain and other weathering. Their shores have many bays, with streams feeding their ends and the rocks at their sides falling to the sea at the same angles as the slopes to the streams above. It is well known how bays frequently have currents passing in along one side and out at the other, these perhaps having formed them, and, if cliffs are present, certainly enlarging them, but it is claimed by DAVIS that these are embayed or subsided land valleys. He thus supports the theory of CHARLES DARWIN, that at first fringing reefs formed round land; that this land began to sink, but that the reef builders kept the rim of the fringing structure at the surface. The fringing reefs thus became barrier reefs as the land sunk, and finally atolls as the whole original land disappeared. DALY considered recent times, when ice covered most of the northern hemispheres and from the South passed on to South America and South Africa. He supposed that these great ice caps used up 200 to 300 feet vertically of the water of the tropical oceans in this way. This meant a reduction of the same amount in depth and with cooling a great restriction of coral growth. Many islands not protected by organic growth were cut down to sea level flats, and on the edges of these as the melted ice flowed back coral rims, barrier or atoll grew up. The depth of coral reef foundations agrees, but the waves would have cut down the lands to 20 or 30 fms. further, viz., to nearer 400 or 500 feet. There should be on this view plenty of flat banks at 50 to 80 or even 90 fms. off islets, but few such exist, and in any case it only drives down the unknown foundations a little deeper, as most of our coral reefs stand up from 1,000 fms. or more. In any case the subsidence view still remains and is not invalidated by it, but whereas DARWIN supposed a general sinking synchronising with the topographical limits of coral reef areas, we to-day are able to consider each reef by itself. If its area decreases in weight, the earth's crust below it will rise, being supposed to rest on fluid material at 100 miles depth or so. If there is an increase of weight, it will sink, and there is always such increase produced by coral or other limestones, which, if considered with a certain elasticity of view, may be regarded as possibly producing the continuous subsidence necessary for the equally continuous upgrowth of fringing reef to be replaced in turn by barrier reef and atoll. Thus, the depth of foundation of any individual reef would be local and due to local causes (weight), obviously requiring no world-wide crustal movements over immense areas.

Probably, each view of reef formation is correct for some reefs, that of subsidence alone being capable of general applicability. It is possible that on any deep sea bank the level might be raised by deep sea organisms to 40 or 50 fms, a depth suitable to the true reef builders. A small bank extending on its own talus might become a large bank and a fringing reef a barrier reef, if its inner parts can be removed by some agency to form a lagoon of 20-50 fms. in depth. The characteristics of lagoons are such as to make the idea that they may increase in size and in depth quite possible. The reefs around them fall precipitously to them and indeed are almost perpendicular walls. The limestones within them are riddled and rotted by worms and all sorts of organisms and easily break up. There are plenty of other worms and bechê-demer (sea slugs) which further break up this material into the coral mud, which is swept out of these lagoons and off these reefs to form around them the oceanic deposit of the same name. There is not

an atoll or barrier reef with a narrow lagoon having a greater depth than 50 fms., and yet in New Georgia, where a barrier reef has been elevated, there is indubitable evidence of a lagoon of at least 70 fms., unless the present lagoon of 20-25 fms. is a quite modern formation, indeed a lagoon in process of formation.

I leave the question thus, having attempted to indicate the chief theories and difficulties relating to these wonderful structures, in the hope that navigators of all races and of all ships may be stimulated to supply the theorists with more and more of the facts they require and also themselves to become speculators, theorists as well as practical men. All knowledge different from or not represented in the charts is valuable, but facts must be accurately ascertained, particularly those relating to depths, to angles of slopes and to currents.

A Reappearing Volcanic Island in the South Pacific.

Extract from Despatch of 13th October, 1927, from the Agent and Consul, Tonga, to the High Commissioner for the Western Pacific, forwarded by the Colonial Office.

* * * * *

"I was fortunate, on the return voyage to Nukualofa, to witness Falcon Island in active eruption. H.M.S. *Laburnum* cruised around the island, taking observations, and in my telegram, dated the 9th instant, I informed Your Excellency that the island had reappeared. A brief history of the island, based on information contained in the Pacific Islands Pilot, may here be conveniently recorded. It was first seen as a breaking reef in 1865; in 1877 smoke was observed issuing from the sea; in 1885 it appeared as an island.

In 1889 Falcon was $1\frac{1}{4}$ miles long north and south, 1 mile wide and 153 feet high; in 1894 it was 3 miles long, $1\frac{1}{2}$ miles broad, and 50 feet high; in 1898 it had disappeared, and though it showed again in 1900, it disappeared altogether 14 years ago. It was reported by a Tongan cutter to be in eruption again on the 1st instant and when observed on the 7th instant it was 1,730 yards long, north and south, 1,430 yards broad, east and west, and 305 feet high. The sight of the volcano, which played for one minute every twenty minutes, was indescribably grand. It commenced to play in the middle and then ejected smoke and vapour from end to end, being finally enshrouded in an enormous bank of smoke which rose to a height of over 4,000 feet. The eruption is, on occasion, visible at Nukualofa, which is 45 miles distant from the island. I am informed that no unusual disturbance was noticed at Nukualofa when the island first erupted."

* * * * *

Extract from Despatch of 5th November from the same source.

* * * * *

"Falcon Island, on the eruption of which I reported in my despatch of the 13th ultimo, was not sighted during my tour, though it was passed at a distance of 17 miles off. Visibility, however, was poor. There has been an apparent connection between the eruptions of Falcon and volcanic activity at Niuafoou and I requested the Master of the *Tofua* to inform me by wireless of the present condition of Niuafoou which has suffered severely in the past. The Master has reported that the island is at present normal."

* * * * *

ABNORMAL RISE OF THE RIVER THAMES, JANUARY, 1928.

PREPARED IN THE MARINE DIVISION BY J. HENNESSY, SENIOR NAUTICAL ASSISTANT.

In the early hours of January 7th an abnormal rise of the Thames occurred, when the tidal reaches of the river attained their highest level for at least fifty years. The river overflowing its banks in the lower lying districts flooded the basements of living houses, and warehouses, causing the loss of 14 lives and doing great damage to property and merchandise.

During the night of December 25th, 1927, and throughout the 26th and 27th snow fell heavily over south-eastern England. The snow was accompanied with a north-easterly gale which caused deep drifting especially on high ground. On January 1st, 1928, the thaw became general and with the melting of the snow and subsequent heavy rains the Thames was already in a swollen condition when on the 6th a depression moving in a south-easterly direction over the British Isles brought westerly winds rising to gale force in the English channel followed by strong northerly winds down the East Coast.

This caused the water to pile up at the mouth of the Thames and these conditions coinciding with High Water Springs at 0115 on the 7th appear to be responsible for the severity of the Flood.

Weather Charts for the mornings of January 4th to 7th and that for the evening of January 6th are made from data contained in the British and Swedish "Weather Shipping" Bulletins and from Meteorological logs and reports of ships in the Observing Fleet. They show the meteorological condition prevailing at the time of the Floods and on the days immediately preceding.

WEATHER CHART I, MORNING OF JANUARY 4th shows a depression to be centred north of Thorshavn and causing strong west to south-west winds over the British Isles.

WEATHER CHART II, MORNING OF JANUARY 5th shows the depression shown on yesterday's chart, to have moved slowly eastward and is now centred over Scandanavia. Strong N.W. to west winds are general over the British Isles.

WEATHER CHART III, MORNING OF JANUARY 6th shows a deep secondary depression to be centred over northern Scotland, causing west or west-south winds reaching gale force in places, over the southern half of the British Isles.

THE EVENING CHART IV, for this day shows the secondary to be centred over Denmark having moved throughout the day in a south-easterly direction, causing the strong northerly winds in rear of centre, reaching gale force in places to blow over the North Sea, combining with the westerly winds in the Channel to pile the water at the Thames entrance.

WEATHER CHART V, MORNING OF JANUARY 7th shows the secondary to have passed while a large depression centred south of Iceland is causing south-westerly winds to blow over the British Isles and the North Sea, and it is no doubt due to these south-westerly winds driving the water away that prevented a repetition of the flooding at the succeeding high water in the Thames.

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

Year.	Day.	Position of Ice.		Description.	Remarks.	Name of Ship reporting.
		Latitude.	Longitude.			
1923	29	62° 02' S.	102° 35' W.	Growler .. .. .	.. .. .	S.S. <i>Devon</i> .
1924	6 9	51° 04' S. 50° 35' S.	97° 08' E. 99° 30' E.	Large berg Small piece of ice	Bearing S. 14° E. (True) distance 14 miles approximately	do. S.S. <i>Lygnern</i> .
1925	7	43° 38' S.	25° 20' E.	8 bergs	Length from 300 to 1,500 feet, height from 50 to 150 feet ..	Ship <i>Hamburg</i> .
	7	43° 58' S.	35° 02' E.	2 bergs		
1927	17	48° 05' S.	59° 25' W.	Large berg .. .. .	.. .. .	M.V. <i>Handicap</i> .
	31	49° 10' S.	59° 04' W.	Long low berg	Many peaks	M.V. <i>Gentoo</i> .
	31	48° 15' S.	59° 00' W.	Berg .. .. .	.. .. .	do.
	31	48° 40' S.	58° 51' W.	Small berg	Approximate height 90 feet	do.
	17	47° 41' S.	58° 50' W.	Large berg .. .. .	.. .. .	M.V. <i>Handicap</i> .
	17	47° 31' S.	58° 50' W.	Berg .. .. .	.. .. .	do.
	17	48° 01' S.	58° 50' W.	Berg .. .. .	.. .. .	do.
	17	47° 10' S.	58° 01' W.	1 large berg, 4 small	.. .. .	do.
	29	44° 30' S.	57° 30' W.	Large flat-topped berg..	Approximate height 400 feet	M.V. <i>Gentoo</i> .
	31	44° 22' S.	56° 34' W.	2 bergs .. .. .	.. .. .	S.S. <i>Orduna</i> .
	28	42° 20' S.	56° 30' W.	Berg .. .. .	.. .. .	M.V. <i>Gentoo</i> .
	31	44° 00' S.	56° 30' W.	Berg	Estimated 250 feet high	S.S. <i>Orduna</i> .
	31	44° 00' S.	56° 25' W.	Growler .. .. .	.. .. .	do.
	31	44° 18' S.	56° 24' W.	Berg	300 feet high, measured by sextant	do.
	31	43° 21' S.	56° 19' W.	Berg	180 feet high, measured by sextant	do.
	31	42° 22' S.	56° 16' W.	Berg	130 feet high, measured by sextant	do.
	28	41° 33' S.	56° 16' W.	Small berg, 2 more to eastward	.. .. .	M.V. <i>Gentoo</i> .
	31	43° 22' S.	55° 59' W.	Berg	400 feet high, measured by sextant	S.S. <i>Orduna</i> .
	31	43° 34' S.	55° 49' W.	Berg .. .. .	.. .. .	do.
	28	41° 00' S.	55° 45' W.	Berg .. .. .	.. .. .	M.V. <i>Gentoo</i> .
	27	39° 50' S.	55° 15' W.	Berg of considerable size	.. .. .	do.
	15	47° 28' S.	52° 54' W.	Large berg	About 300 feet high, 1,000 feet long	M.V. <i>Lobos</i> .
	19	44° 18' S.	52° 48' W.	2 large bergs, several small ones	.. .. .	M.V. <i>Handicap</i> .
	19	42° 15' S.	49° 20' W.	Large berg .. .. .	.. .. .	do.
	16	42° 54' S.	48° 28' W.	Small berg .. .. .	.. .. .	M.V. <i>Lobos</i> .
	16	42° 32' S.	48° 05' W.	Large berg .. .. .	.. .. .	do.
	20	54° 36' S.	39° 14' W.	Several bergs in sight .. .. .	.. .. .	R.S.S. <i>William Scoresby</i> .
	21	54° 26' S.	39° 06' W.	Several bergs in sight .. .. .	.. .. .	(In the vicinity of S. Georgia.)
	21	54° 17' S.	38° 59' W.	Several bergs in sight .. .. .	.. .. .	do.
	9	54° 33' S.	38° 57' W.	Several bergs in sight .. .. .	.. .. .	do.
	21	54° 08' S.	38° 52' W.	Ice sighted .. .. .	.. .. .	do.
	9	54° 23' S.	38° 47' W.	20 to 30 bergs in sight, also growlers, numerous bergs and growlers in this vicinity during the night.	.. .. .	do.
	21	54° 02' S.	38° 43' W.	Ice sighted .. .. .	.. .. .	do.
	9	54° 31' S.	38° 41' W.	Numerous bergs and growlers in sight ..	.. .. .	do.
	10	In the vicinity of		Several bergs and bergy bits sighted ..	.. .. .	do.
	21	54° 03' S.	38° 35' W.	2 bergs in vicinity .. .. .	.. .. .	do.
	9	53° 49' S.	38° 34' W.	Numerous bergs and growlers in sight ..	.. .. .	do.
	20	54° 28' S.	38° 22' W.	Several small bergs and bergy bits in sight	.. .. .	do.
	20	54° 30' S.	38° 20' W.	Several small bergs and bergy bits in sight	.. .. .	do.
	9	(approx.)		Many icebergs in sight .. .. .	.. .. .	do.
	9	54° 24' S.	38° 09' W.	17 bergs in sight .. .. .	.. .. .	do.
	18	54° 22' S.	37° 50' W.	3 small bergs .. .. .	.. .. .	do.
	18	53° 20' S.	37° 50' W.	3 small bergs .. .. .	.. .. .	do.
	23	(approx.)		Ice sighted all the way .. .. .	.. .. .	do.
	19	From Coal Harbour, near Undini, to Grytviken.		3 small bergs in the harbour .. .. .	.. .. .	do.
	8	54° 20' S.	37° 32' W.	Ice sighted .. .. .	.. .. .	do.
	8	54° 39' S.	37° 31' W.	14 bergs, numerous growlers and ice debris in sight.	.. .. .	do.
	23	In the vicinity of Cape Buller ..		A few bergs in sight .. .. .	.. .. .	do.
	11	Close in to Cape Crewe		3 bergs in sight .. .. .	.. .. .	do.
	12	53° 29' S.	37° 14' W.	1 berg .. .. .	.. .. .	do.
	12	53° 15' S.	37° 14' W.	Ice sighted .. .. .	.. .. .	do.
	8	55° 06' S.	36° 57' W.	14 bergs and 28 growlers	.. .. .	do.
	7	54° 54' S.	36° 51' W.	Several bergs and growlers in sight	.. .. .	do.
	17	53° 37' S.	36° 51' W.	A few bergs .. .. .	.. .. .	do.
	8	54° 48' S.	36° 49' W.	Over 30 bergs in sight	All of irregular shape	do.
	7	54° 33' S.	36° 44' W.	Ice sighted .. .. .	.. .. .	do.
	23	In the vicinity of Cape Saunders		A few bergs close by .. .. .	.. .. .	do.
	28	Do.		4 bergs .. .. .	.. .. .	do.
	27	Within sight of Cumberland Bay		15 bergs .. .. .	.. .. .	do.
	15	Off Larsen Pt.		Ice sighted	Thick fog off Larsen Pt.	do.
	12	Off Merton Rocks		3 large bergs in sight	Moderate fog	do.
	14	Near Merton Rocks		3 bergs sighted (probably same as above)	.. .. .	do.
	6	Off Fritjof Nansen Bank		A few bergs sighted .. .. .	.. .. .	do.
	7	55° 08' S.	35° 58' W.	3 large tabular bergs	From 1-2 miles in length and about 100 feet in height	do.
	28	53° 56' S.	35° 58' W.	20 small bergs in sight .. .. .	.. .. .	do.
	14	Off Cape Charlotte		A few bergs in sight .. .. .	.. .. .	do.
	14	Off Drygalski Fjord and in the vicinity.		Several bergs in sight .. .. .	.. .. .	do.
	29	Vicinity of Candlemas Island ..		Several bergs, bergy bits and glacier debris.	.. .. .	do.
	24	55° 17' S.	35° 50' W.	Wide belt of drifting icebergs .. .. .	.. .. .	S.S. <i>Busen 7</i> (South Georgia to South Sandwich Is. and return).
	24	58° 38' S.	28° 44' W.	Barrier of drifting ice and pack ice .. .. .	.. .. .
	26	Vicinity of Candlemas Island ..		Floating ice .. .. .	.. .. .
1928	7	41° 45' S.	50° 55' E.	Berg, several growlers	About 75 feet high, 400 feet long	M.V. <i>Panama</i> .
	29	35° 05' S.	129° 55' E.	Growler	4 to 6 feet above water, 30 feet surface circumference	S.S. <i>Tymeric</i> .
	1	36° 58' S.	54° 28' W.	Berg	About 225 feet high	S.S. <i>Atto</i> .
	1	36° 13' S.	53° 43' W.	Large berg .. .. .	.. .. .	do.
	2	34° 35' S.	52° 54' W.	3 large bergs .. .. .	.. .. .	do.
	6	35° 02' S.	52° 40' W.	Large berg .. .. .	.. .. .	S.S. <i>West Keene</i> .
	14	34° 55' S.	52° 39' W.	Berg	About 150 feet long	S.S. <i>Peterton</i> .
	14	43° 46' S.	52° 29' W.	Berg .. .. .	.. .. .	M.V. <i>Loriga</i> .
	15	43° 38' S.	52° 21' W.	Berg and 4 small growlers	180 feet high, 490 feet long	do.
		41° 53' S.	51° 08' W.	Berg and 1 small growler .. .. .	.. .. .	do.
		39° 59' S.	50° 17' W.	Berg .. .. .	.. .. .	do.
		40° 19' S.	50° 08' W.	Berg, numerous small growlers	240 feet high, 570 feet long	do.
		40° 05' S.	49° 57' W.	Berg, numerous small growlers	.. .. .	do.
		40° 08' S.	49° 52' W.	Berg, numerous small growlers	250 feet high, 925 feet long	do.
		40° 12' S.	49° 46' W.	Berg, numerous small growlers	.. .. .	do.
		39° 47' S.	49° 42' W.	Berg, numerous small growlers	.. .. .	do.
		39° 26' S.	49° 42' W.	Berg .. .. .	.. .. .	do.
		40° 18' S.	49° 39' W.	Berg, numerous small growlers	.. .. .	do.
		39° 46' S.	49° 39' W.	Berg .. .. .	.. .. .	do.
		40° 14' S.	49° 37' W.	Berg	310 feet high, 450 feet long	do.

Year.	Day.	Position of Ice.		Description.	Remarks.	Name of Ship reporting.		
		Latitude.	Longitude.					
1928	15	40° 13' S.	49° 36' W.	Berg	M.V. <i>Loriga</i> .		
		39° 43' S.	49° 36' W.	Berg .. .. .	.. .. .		
		39° 17' S.	49° 36' W.	Berg .. .. .	.. .. .		
		39° 40' S.	49° 34' W.	Berg .. .. .	.. .. .		
		39° 31' S.	49° 32' W.	Berg, numerous small growlers	.. .. .		
		39° 46' S.	49° 30' W.	Berg .. .. .	.. .. .		
		39° 44' S.	49° 27' W.	Berg .. .. .	.. .. .		
		39° 03' S.	49° 22' W.	Berg .. .. .	.. .. .		
		39° 35' S.	49° 20' W.	Berg .. .. .	.. .. .		
		38° 58' S.	49° 15' W.	2 bergs and 1 growler	.. .. .		
		38° 45' S.	48° 36' W.	Berg .. .. .	.. .. .		
		37° 49' S.	48° 09' W.	Berg .. .. .	.. .. .		
		14 to 15	From 47° 00' S.	48° 00' W.	Over 50 big icebergs and numerous growlers.		Biggest bergs measured approximately 350 feet high and one-third mile long.	M.V. <i>Inverbank</i> .
			to 47° 00' S.	40° 00' W.				

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

WEATHER SIGNALS.

UNDER Weather Signals it is intended to publish particulars and concise descriptions of Signals and Codes used for reporting Weather, Ice, and Time in four sections.

- I. Ships' Wireless Weather Signals.
- II. Wireless Weather Signals made from the shore to ships and Wireless Weather Signals made ashore which may be useful to ships. (Bulletins, Wireless storm, and ice warnings.)
- III. Wireless Time Signals.
- IV. Visual Weather Signals made at the Coast. (Gale and hurricane warnings.)

Sections II, III, and IV will be published as far as possible in geographical order, so that the most used of these signals for all parts of the world may be as complete as possible in each year's Numbers of THE MARINE OBSERVER.

The decode tables of the International Code are printed altogether on pp. 22-25.

Decode tables which are not International Code will be given as necessary with the description of the Weather Signals of the particular country.

Request for Information to Meteorological Services of Maritime Countries.

Invitation is hereby given to send concise descriptions of Weather Signals made for the information of shipping and seamen in all parts of the World, with a view to publication in the appropriate number of "The Marine Observer." Only limited space is available.

Request for Information to the Weather Services of British Dominions and Colonies desiring British Ships' Wireless Weather Reports in plain language in Standard form.

Meteorological Services within the British Empire desiring to intercept weather reports made by "selected ships" with mercurial barometers, in the Fleet List in this Journal, addressed to "all ships" are invited to forward the following information in order that it may be made more generally known:—

(1) The name of the receiving W/T Station, with call sign, latitude, and longitude.

(2) The times at which the station will look out for these messages.

(3) The telegraphic address of the service desiring to receive these ships' reports.

The reports referred to are described below, they are made for the purpose of the practical application at sea of Wireless and Weather as an Aid to Navigation and are of high order of accuracy, only those ships which have mercurial barometers being invited to make them.

With regard to (2), with a view to possible extended organisation the proposed times given in the note "Intelligence of Weather, Tides, Current and Ice and Safety of Life at Sea," pages 197 to 199 of Vol. V, No. 58 of this Journal are suggested for universal adoption.

I. SHIPS' WIRELESS WEATHER SIGNALS.

WEATHER Reports between ships at sea and from ships to Weather offices are of three kinds:—

(1) Those which give information of conditions experienced during a passage or part of a passage with conditions prevailing at the time the message was drafted, no attempt being made to synchronise with other observations.

(2) Those which are based upon observations made at arranged times so that they provide synchronised data in a standard form but *not* in code.

(3) Those which are based upon observations made at arranged times so that they provide synchronised data *in code*.

(2) and (3) are essential for the system which is explained in "Wireless and Weather an Aid to Navigation."

In order that synchronised data may be available over ocean areas, observations made for the purpose of Wireless Weather Reports should be taken at the same time as those of the nearest land weather service. These times are given upon the accompanying Chart of the

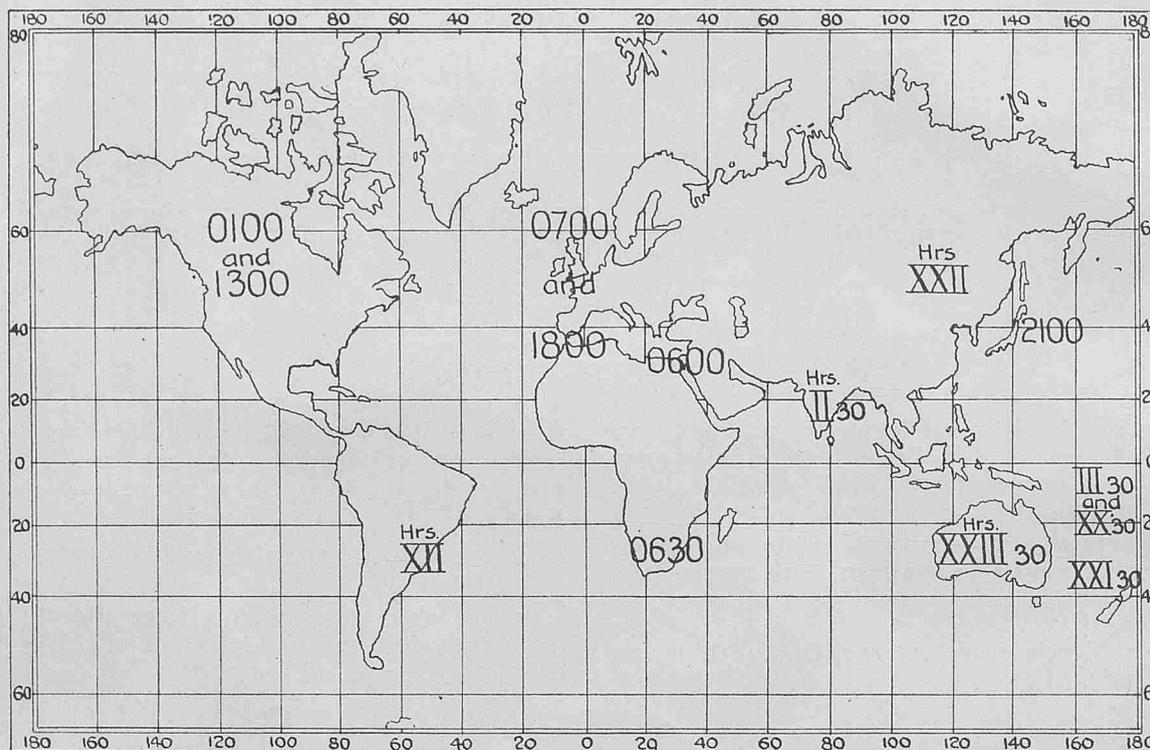
World and in the Table below.

In May 1928 a Sub-Commission on Ships' Weather Telegraphy, of the International Meteorological Committee, recommended that the following universal observation times should be

used in all parts of the world:—0000, 0600, 1200 and 1800 G.M.T.

It may be some time before these are generally adopted, and until further notice the times given below should be adhered to.

Chart showing Greenwich Mean Times of Shore Observations.



The Arabic figures represent Greenwich mean time at which observations are taken for Daily Weather Reports. Where observations for these reports are timed by local time, the approximate Greenwich mean time is given in Roman figures.

The Greenwich Times at which Weather observations are taken in the different countries, of which reports for coast stations may be transmitted for the information of seamen are as follows, and observing ships are advised to take their observations for sending reports to all ships at the same time within the approximate limits suggested:—

G.M.T. of Shore Observations.	Suggested approximate limits for observation times by regular voluntary observers making reports to "All Ships."
British Isles and Europe. 0700 and 1800	From Longitude 40° W. in the Atlantic Ocean to the west and north coasts of Europe to the Equator including the Mediterranean to Longitude 20° E.
Egypt ... 0600	In the Mediterranean Eastward of Longitude 20° E. and in the Red Sea.
India ... 0230	Arabian Sea, Persian Gulf, Bay of Bengal and Indian Ocean north of the Equator.
China ... 2200	China Sea.
Japan ... 2100	From the east coast of Japan in the Pacific Ocean to Longitude 180° E., north of the Equator.
North America 0100 and 1300	From Longitude 40° W. in the Atlantic to the east coast of North America north of the Equator. From Longitude 180° W. in the Pacific to the West Coast of America north of the Equator.
South Africa ... 0630	From Longitude 20° W. to the African Coast in the Atlantic Ocean south of the Equator. From Longitude 80° E. to the African Coast in the Indian Ocean south of the Equator.

G.M.T. of Shore Observations.	Suggested approximate limits for observation times by regular voluntary observers making reports to "All Ships."
Australia ... 2330	From Longitude 80° E. to the Australian Coast in the Indian Ocean south of the Equator. From Longitude 160° E. to the Australian Coast in the Pacific south of the Equator.
New Zealand ... 2130	From Longitude 160° E. to Longitude 130° W. south of Latitude 30° S.
Fiji ... 0330 and 2030	From Longitude 160° E. to Longitude 130° W. between the Equator and Latitude 30° S.
South America 1200	From Longitude 130° W. to the American Coast in the Pacific south of the Equator. From Longitude 20° W. to the American Coast in the Atlantic south of the Equator.

In order to ensure a regular service of reports which all ships may receive, each of the ships whose names appear in the list of Regular Observing Ships as "Selected Ships" given at the end of each Number of this Journal is invited to make the report described in (2) below daily and to enter it in her Meteorological Log or Meteorological Report, Form 911.

Thus ships on the list with the letters M.L., M., and W.T., after their names are "Selected Ships" and upon them the efficiency of this voluntary service mainly depends.

It is hoped that in the near future there will be 1,000 "Selected Ships" of all nations. See page 199 of Vol. V., No. 58.

(2) Standard Form not in Code.

TIMES of observation must not be confused with times of transmission of reports. So long as the observations are taken at these fixed times transmission of reports may follow as convenient. The reports should be addressed to "All Ships," and made on the wavelength which the Captain considers most efficient for the purpose, usually 600 m. spark or 2,100 m. C.W.

Wireless Weather Reports should always contain—

- The position at which the observations were taken,
- The corrected barometric reading.
- The direction and force of the wind,
- The present weather,*
- The Greenwich mean time of observation,
- The date and name of ship sending.

Other information will usually be desired by receiving ships in the following order of importance:—

- Course and speed of ship during last two, three or four hours,
- Tendency or change of the barometer in the last two, three or four hours,
- Current found with latitude and longitude of positions From and To,
- Temperature of the air,
- Temperature of the sea surface,
- Swell and its direction,
- Past weather.

Without using a code, messages may be conveniently framed giving these elements briefly and concisely with sufficient standardisation to enable them to be easily read.

For this purpose the following scales are recommended:—

The Beaufort Scale of Wind Force.

Admiral Beaufort's numbers.	Seamen's description of wind.	Admiral Beaufort's numbers.	Seamen's description of wind.
0	Calm.	7	Moderate gale.
1	Light air.	8	Fresh gale.
2	Light breeze.	9	Strong gale.
3	Gentle breeze.	10	Whole gale.
4	Moderate breeze.	11	Storm.
5	Fresh breeze.	12	Hurricane.
6	Strong breeze.		

The Beaufort Notation of Weather.

(It is best to write words in the Message.)

b Blue sky.	p Passing showers.
c Cloudy.	q Squalls.
d Drizzle.	r Rain.
e Wet air.	rs Sleet.
f Fog.	s Snow.
fe Wet fog.	t Thunder.
g Gloomy.	tl Thunderstorm.
h Hail.	u Ugly.
kq Line squall.	v Unusual visibility.
l Lightning.	w Dew.
m Mist.	z Dust haze.
o Overcast sky.	

* For the purpose of Aircraft it is important that exact information of cloud types and amount should be given.

The direction of movement of the Upper Clouds is of great importance.

The International Weather Telegraphy Barometric Tendency Table.

Barometer steady. (The barometer has not fallen or risen more than 1/4 millibar in 3 hours).	Do. rising slowly. (The barometer has risen 1 to 1 1/2 mb. ('03-'04 in.) in last 3 hours).
Do. rising. Do. do. 2 to 3 1/2 " ('06-'10 in.) do.	Do. rising quickly. Do. do. 4 to 6 " ('12-'18 in.) do.
Do. rising very rapidly. Do. do. over 6 " ('18 in.) do.	Do. falling slowly. Do. fallen 1 to 1 1/2 " ('03-'04 in.) do.
Do. falling. Do. do. 2 to 3 1/2 " ('06-'10 in.) do.	Do. falling quickly. Do. do. 4 to 6 " ('12-'18 in.) do.
Do. falling very rapidly. Do. do. over 6 " ('18 in.) do.	

Example of Plain Language Wireless Weather Report in standard form, not in code, recommended.

To CQ.

Weather 3045N 6146W Barometer corrected 3009 ENE3 Cloudy CiStr 8 1300 GMT Twenty Eight May Course N49E 13 Steady Current WSW 3/4 Knot From 28N 65W to 30N 61W Air 73 Sea 74 Cristales.

NOTE.—The date appears in the middle of this message, the most important elements appearing before it. If abbreviation is desired omit all after date.

(3) North Atlantic "Decode."

THE main groups of the code used by a limited number of ships for reporting to the Meteorological Office having been internationalised, the following Decode is published for the information of ships who are able to intercept these reports.

The reports are addressed to *Weather London* (Meteorological Office, London) and to *Government Observer, Washington, D.C.* (United States Weather Bureau). Those addressed to *Weather London* are made to Portishead W/T Station, call sign GKU, the ship reporting first calling Portishead on the wavelength of 2,013 metres (C.W.), unless otherwise instructed by Portishead, and passing her report on the wave length designated by Portishead. Those addressed to *Government Observer, Washington, D.C.*, are made to any of the following U.S. Navy radio stations at Bar Harbour, Me., call sign NBD, New York, N.Y., call sign NAH, Norfolk, Va, call sign NAM, or Charleston, S.C., call sign NAO, on a wavelength of 2,100 metres (C.W.). The respective transmissions take place as soon as possible after observation time.

Observations made between the 100-fathom line, British Isles, and 40° W. Longitude are reported to *Weather London*.

Observations made between Longitude 40° W. and a line, Belle Isle—Virgin Rocks—Sable Island—Cape Hatteras are reported to *Government Observer, Washington, D.C.*

The times of observation are:—

European *land* 0100, 0700, 1300 and 1800, G.M.T.
 American *land* 0100, G.M.T. = 8 p.m. 75th Meridian Time.
 and 1300, G.M.T. = 8 a.m. 75th Meridian Time.

Ships at Sea from the 100-Fathom Line British Isles to 40° W. Longitude.

0700 and 1800, G.M.T.

Ships at Sea from Longitude 40° W. to a Line Belle Isle—Virgin Rocks—Sable Island—Cape Hatteras.

0100 and 1300, G.M.T.

ADDITIONAL reports may be made to *Weather London* eastward of Longitude 40° W., containing observations made at 0100 and 1300 G.M.T.

A message consisting of figures addressed to *Weather London* or *Government Observer, Washington D.C.*, may be decoded as follows:—

As the first four groups are international, these groups, in weather reports transmitted by wireless telegraphy to weather offices of maritime countries by ships of all nations, may usually be decoded in the same manner.

Rule up a form, a sample of which is given over leaf, and write the groups of figures and words, in the order received, in the spaces.

DECODE FORM.

Code.	Code Figures.					Distinguishing Letter.	Number of Group.	Name of Element and how to decode the Figures.	Message decoded.
	Column Numbers.								
	1	2	3	4	5				
							Addressed to “	”.	
International Weather.	4	*	*	*	*	P	1	Day of Week, Table I *	Wednesday.
	*	1	*	*	*	Q		Name of Latitude and Longitude, Table II.	North and West.
	*	*	4	5	*	LL		Latitude, degrees.	45°.
	*	*	*	*	8	L		Latitude, approx. minutes (multiply code fig. by 6).	48'
	3	0	*	*	*	ll	2	Longitude, degrees.	33°.
	*	3	8	*	*	l		Longitude, approx. minutes (multiply code fig. by 6).	48'.
	*	*	*	0	7	GG		Greenwich Mean Time to nearest hour.	07.
	2	4	*	*	*	BB	3	Barometer, prefix 9 or 10 to code figures and, if desired, convert to inches. (See Special Table XXIII, p. 25.)	1024mb.
	*	*	1	6	*	DD		Wind direction true, Table III.	South.
	*	*	*	*	2	F		Wind force, Table IV.	2.
	1	1	*	*	*	ww	4	Present weather, Table V.	No change, Cloudy.
	*	*	4	*	*	v		Visibility. Table VI.	Very good.
*	*	8	0	*	K	Swell. Table VII.		Slight.	
*	*	*	*	4	d	Swell—direction from, Table VIII.		South.	
Check.	0	*	*	*	*	x	5	Sum of Column 1, less tens.	
	*	9	*	*	*	x		Sum of Column 2, less tens.	
	*	+3	1	*	*	x		Sum of Column 3, less tens.	Check corrected.
	*	*	+4	1	*	x		Sum of Column 4, less tens.	
	*	*	*	*	1	x		Sum of Column 5, less tens.	
	2	*	*	*	*	y	6	Sum of Group 1, less tens.	
	*	1	*	*	*	y		Sum of Group 2, less tens.	
	*	+3	5	*	*	y		Sum of Group 3, less tens.	Check corrected.
	*	*	*	4	*	y		Sum of Group 4, less tens.	
	*	*	*	+4	2	y		Sum of Group 5, less tens.	
British M.O. Weather.	6	*	*	*	*	C	7	Cloud predominating, Table IX.	Strato-Cumulus.
	*	7	*	*	*	N		Cloud amount, Table X.	Seven-tenths.
	*	*	1	*	*	W		Past weather, Table XI.	Cloudy.
	*	*	*	0	*	U		Unusual phenomena. (See Special Table XXII, p. 25.)	None.
	*	*	*	*	4	y	Sum of Group 7, less tens.	Group correct by check.	
	6	8	*	*	*	TT	8	Air temperature, degrees.	68° F.
	*	*	6	9	*	tt		Sea temperature, degrees.	69° F.
	*	*	*	*	1	y		Sum of Group 8, less tens.	An error in this group.
Space for word if wind force greater than 9.									

The message now reads—Wednesday, Latitude 45° 48' N., Longitude 33° 48' W., G.M.T. 07 hours, Barometer 1024mb, Wind south force 2, Cloudy weather, Visibility very good, slight swell from south (column check corrected) (Group check corrected), Cloud St.-Cu, amount $\frac{7}{10}$ ths; past weather, cloudy; No unusual phenomena; (Group correct by check) Air temperature 68° F., Sea temperature 69° F. (An error in group).

* Tables I—XXI (International Code) will be found on pp. 22-25.

To save space, the groups of figures and their meanings have been inserted in the sample decode form, in *italics*.

Example:—The following message intercepted: *Weather London* 41458 30807 24162 11404 09111 21542 67104 68691.

These figures having been written in the appropriate spaces, errors made in transmission may be checked by adding together the figures in each *column* of the first four groups, *neglecting the tens*. If the message has been correctly transmitted, the sums of the columns will agree with the corresponding figures of Group 5. If the sums differ, write down (under the original figures in Group 5) the numbers which must be *added* to make them agree.

NOTE.—In all adjustments of check figures, tens and carrying figures must be disregarded entirely; thus for purposes of the check system $9 + 4 = 3$, not 13.

Next add together the figures in each group 1 to 5, separately (neglecting tens). These sums should agree with the figures from

left to right in Group 6. If they differ, write down (under the original figures in Group 6) the numbers which must be *added* to make them agree.

Group 5 now indicates the *columns* in which there are errors with the numbers to be added to the figures which are in error.

Group 6 indicates the *groups* in which these errors occur.

In the example given we find that 0 in the second column of Group 2 should be 3, and that 4 in the third column of Group 4 should be 8.

In the remaining groups of the message a *double* check is not provided, but the fifth figure in each group will represent the sum of the first four figures, neglecting tens, and if it does not agree it will be known that one or more figures are in error.

The message is next decoded by means of the Tables and Instructions given on the Decode Form.

In publishing "Weather Signals" in the Numbers which follow throughout the year for the Maritime countries of the world every endeavour will be made to make the information accurate and up to date, at the same time giving it as tersely and conveniently as possible for mariners from the many available sources.

Every effort will be made to guard against error, and Marine Observers are asked to write in and point out any errors which may appear to them.

For general guidance in the use of Wireless Weather Signals at sea "Wireless and Weather, an Aid to Navigation," may be obtained from H.M. Stationery Office, price 5s.

ABRIDGED KEY TO THE INTERNATIONAL CODE.

In view of the extension in the use of the International Code by weather services, the descriptions (where the International Code is used) are now published in a concise form by using key letters. Those used for marine work are given below with the necessary decode tables. Where the International Code is *not* used each group will be described in detail.

THE KEY LETTERS AND THEIR MEANINGS.

- A = Form of *predominating cloud lowest* in the Table of cloud forms.
- a = Form of *predominating cloud highest* in the Table of cloud forms when more than one type of cloud exists.
- BBB = Pressure in millibars and tenths (initial 9 or 10 omitted), or millimetres and tenths (initial 7 omitted). The values refer to sea level and include all corrections for index error, temperature and gravity.
- BB = Pressure in whole millibars or whole millimetres (initial 9; 10 or 7 omitted).
- b = Amount of barometric tendency during the three hours preceding the time of observation expressed in half-millibars or half-millimetres. For tendencies 10–19 the *second* figure only is reported and 33 is added to the wind direction number (DD). For tendencies 20–29 the *second* figure only is reported and 67 is added to the wind direction number. Tendencies greater than 29 are reported as 29.
- bb = Amount of barometric tendency during the three hours preceding the time of observation expressed in half-millibars or half-millimetres.
- C = Form of predominating cloud, according to the Table of cloud forms, when only one form is reported, as from ships at sea. (See Table IX.)
- c = Characteristic of barometric tendency during the period of three hours preceding the time of observation. (See Table XIII.)

- DD = Direction of the wind (True) near the surface. (See Table III.)
- d = Direction (True) from which swell comes. (See Table VIII.)
- d_s = Direction of Ship's movement on scale (0–8) in which 2 = E, 4 = S, &c.
- F = Force of the wind on the Beaufort Scale. (Forces above 9 are reported as 9, with the actual force in a word at the end. (See Table IV.)
- GG = Greenwich Mean Time of observation (01 = 1 a.m., 12 = noon, 13 = 1 p.m., &c.)
- H = Relative humidity of the air. (See Table XIX.)
- h = Height of base of lower predominating cloud present. (See Table XXI.)
- I_n I_n = Index number of station.
- jj = Meaning varies according to time of observation and between inland and coastal stations, as follows:—
- | | Inland
Stations. | Coastal
Stations. |
|--------------------|---------------------|----------------------|
| At 0700 G.M.T. ... | jj = mm | jj = SV _s |
| At 1800 G.M.T. ... | jj = MM | jj = SV _s |
- K = The characteristic of the swell *in the open sea*. (See Table VII.)
- K' = Amount and characteristic of barometric tendency expressed by a single figure. (See Table XII.)
- L = Amount of sky (scale 0–10) covered by cloud form A and all forms of the same layer (*i.e.*, low, medium or high) as A, if "a" refers to a different layer.
- LLL = Latitude in degrees and tenths, the tenths being obtained by dividing the number of minutes by 6 and *neglecting the remainder*.
- lll = Longitude in degrees and tenths, the tenths being obtained as for latitude LLL.

MM = Maximum temperature in the interval of 11 hours ending at 18 h. G.M.T. (or at one of the hours 1 h., 7 h., 13 h., 18 h. G.M.T., following not less than 4 hours after noon, local time).

mm = Minimum temperature in the interval of 13 hours ending at 7 h. G.M.T. (or at the hour 13 hours after the time of reporting the maximum temperature).

N = Total amount of sky covered with cloud. (See Table X.)

P = Day of the week. (See Table I.)

Q = Quarter of globe in which ship is situated. (See Table II.)

RR = Rainfall (at 7 a.m. for preceding 13 hours and at 6 p.m. for preceding 11 hours). (See Table XVII.)

R = Amount of rainfall for the preceding 24 hours. (See Table XVI.)

r = Time of commencement of precipitation. (See Table XVIII.)

S = State of the sea and swell (coast stations). (See Table XX.)

TT = Temperature of the air in whole degrees Fahrenheit or Centigrade (50 added to negative values).

tt = Temperature of the sea (surface water) in whole degrees.

TTT = Temperature of air in degrees and tenths Fahrenheit or Centigrade (500 added to negative values).

ttt = Temperature of the sea (surface water) in degrees and tenths.

V = Visibility or distance at which objects can be seen in daylight (or at which lights can be seen at night). (See Table XIV.)

v = Visibility at sea from ships at sea. (See Table VI.)

V_s = Visibility towards the sea (from coast stations). (See Table XIV.)

W = Past weather—the weather in the interval preceding the time of observation. This interval is 5, 6, or 7 hours for reports at 1h., 7h., 13h., and 18h., G.M.T. (See Table XI.)

ww = The actual weather at the time of observation with which is combined, whenever possible, the general character of the weather. (See Table V.)

w₁ = The initial figure of the code ww, thus indicating the general state of the weather. (See Table XV.)

YY = Day of month.

INTERNATIONAL CODE, WEATHER TELEGRAPHY TABLES.

Table I.

P.—Day of the Week.

Code Figure.	Code Figure.
1 = Sunday.	5 = Thursday.
2 = Monday.	6 = Friday.
3 = Tuesday.	7 = Saturday.
4 = Wednesday.	

Table II.

Q.—Quarter of the Globe.

Code Figure.	Lat.	Long.	} Barometer in millibars.
1	N.	W.	
2	N.	E.	
3	S.	W.	
4	S.	E.	} Barometer in millimetres.
5	N.	W.	
6	N.	E.	
7	S.	W.	
8	S.	E.	

Table III.

DD.—Two Figure Compass. True (to nearest point).

Code Figures.	Code Figures.	Code Figures.
00 Calm.	11 S.E. by E.	22 W.S.W.
01 N. by E.	12 S.E.	23 W. by S.
02 N.N.E.	13 S.E. by S.	24 W.
03 N.E. by N.	14 S.S.E.	25 W. by N.
04 N.E.	15 S. by E.	26 W.N.W.
05 N.E. by E.	16 S.	27 N.W. by W.
06 E.N.E.	17 S. by W.	28 N.W.
07 E. by N.	18 S.S.W.	29 N.W. by N.
08 E.	19 S.W. by S.	30 N.N.W.
09 E. by S.	20 S.W.	31 N. by W.
10 E.S.E.	21 S.W. by W.	32 N.

Table IV.

F.—Wind Force.

Code Figure.	Beaufort Number.	Code Figure.	Beaufort Number.
0 = Calm ...	... Nought.	7 = Moderate gale ...	Seven.
1 = Light air ...	One.	8 = Fresh gale ...	Eight.
2 = Light breeze ...	Two.	9 = Strong gale ...	Nine.
3 = Gentle breeze ...	Three.	9 = Whole gale ...	Ten.
4 = Moderate breeze	Four.	9 = Storm ...	Eleven.
5 = Fresh breeze ...	Five.	9 = Hurricane ...	Twelve.
6 = Strong breeze ...	Six.		

When force 10, 11 or 12, figure 9 transmitted, words "gale," "storm" or "hurricane" respectively, added at end of the message.

Table V.

ww.—Present Weather Scale.

THE figures are grouped to refer to particular phenomena, for example 20 to 29, Fog or mist. In making these observations the following instruction is given to the observer:—

In selecting the appropriate number for reporting the general character of the weather, no account should be taken of phenomena which occurred more than one hour before the time of observation, but only of phenomena which occurred during the interval of one hour preceding the fixed time of observation.

In deciding on the appropriate term, observers should not be restricted to the difference between the conditions at the instant and the conditions one hour before, but should choose the term to give the best information of the changes taking place.

Code Figures.	Table V—continued.
00	Cloud has decreased.
01	No apparent change.
02	Cloud has increased.
03	Precipitation within sight.
04	With solar or lunar halo.
05	After fog or mist or dust storm.
06	After rain or drizzle.
07	After snow, sleet or hail.
08	With or after thunder and lightning in
09	After thunderstorm. [neighbourhood.
10	Cloud has decreased.
11	No apparent change.
12	Cloud has increased.
13	Precipitation within sight.
14	With solar or lunar halo.
15	After fog or mist or dust storm.
16	After rain or drizzle.
17	After snow, sleet or hail.
18	With or after thunder and lightning in
19	After thunderstorm. [neighbourhood.
20	But clear in zenith - } Just begun.
21	And apparently overcast
22	But clear in zenith - } Intermittent.
23	And apparently overcast
24	But clear in zenith - } For some time.
25	And apparently overcast
26	But clear in zenith - } Has become thinner.
27	And apparently overcast
28	But clear in zenith - } For some time.
29	And apparently overcast } Has become thicker.
30	Slight, of rain.
31	„ „ hail or rain and hail.
32	„ „ sleet.
33	„ „ snow.
34	Heavy, of rain ; has become better.
35	„ „ rain.
36	„ „ rain ; has become worse.
37	„ „ hail or rain and hail.
38	„ „ sleet.
39	„ „ snow.
40	Slight occasional.
41	„ continuous.
42	„ but has increased.
43	Moderate but has decreased.
44	„ occasional.
45	„ continuous.
46	„ but has increased.
47	Thick but has decreased.
48	„ occasional.
49	„ continuous.
50	Slight occasional.
51	„ continuous.
52	„ but has increased.
53	Moderate but has decreased.
54	Moderate occasional.
55	„ continuous.
56	„ but has increased.
57	Heavy but has decreased.
58	„ occasional.
59	„ continuous.
60	Slight occasional.
61	„ continuous.
62	„ but has increased.
63	Moderate but has decreased.
64	„ occasional.
65	„ continuous.
66	„ but has increased.
67	Heavy but has decreased.
68	„ occasional.
69	„ continuous.

Code figures.	Table V.—continued.
70	Slight occasional.
71	„ continuous.
72	„ but has increased.
73	Moderate but has decreased.
74	„ occasional.
75	„ continuous.
76	„ but has increased.
77	Heavy but has decreased.
78	„ occasional.
79	„ continuous.
80	Slight occasional.
81	„ continuous.
82	„ but has increased.
83	Moderate but has decreased.
84	„ occasional.
85	„ continuous.
86	„ but has increased.
87	Heavy but has decreased.
88	„ occasional.
89	„ continuous.
90	Slight thunderstorm without hail.
91	„ „ with hail.
92	Moderate thunderstorm without hail.
93	„ „ with hail.
94	Heavy thunderstorm without hail } without
95	„ „ with hail } gale.
96	„ „ without hail } with gale.
97	„ „ with hail }
98	Line squall without hail.
99	„ „ with hail.

Table VI.

Code Figure.	v.—Visibility from Ships at Sea.
0	Dense fog Objects not visible at 50 yards.
1	Thick fog „ „ „ 1 cable.
2	Fog „ „ „ 2 cables.
3	Moderate fog „ „ „ ½ mile (nautical).
4	Mist or haze, or very poor visibility. „ „ „ 1 mile (nautical).
5	Poor visibility „ „ „ 2 miles (nautical).
6	Moderate visibility „ „ „ 5 miles (nautical).
7	Good visibility „ „ „ 10 miles (nautical).
8	Very good visibility „ „ „ 30 miles (nautical).
9	Excellent visibility Objects visible at more than 30 miles (nautical).

Table VII.

Code Figure.	K.—Swell.
0	No, or slight swell
1	Moderate swell
2	Heavy swell
3	Long low swell
4	Confused swell
5	No, or slight swell
6	Moderate swell
7	Heavy swell
8	Long low swell
9	Confused swell

} and sea smooth to moderate.
} and sea rough or above.

Table VIII.

Code Figure.	d.—One figure compass. (True.)	Code Figure.	Code Figure.
0 = No Swell.		3 = S.E.	6 = W.
1 = N.E.		4 = S.	7 = N.W.
2 = E.		5 = S.W.	8 = N.

Table IX.

C.—Cloud Predominating.	
Code Figure.	
1—Cirrus	Ci.
2—Cirro-Stratus	Ci.-St.
3—Cirro-Cumulus	Ci.-Cu.
4—Alto-Cumulus	A.-Cu.
5—Alto-Stratus	A.-St.
6—Strato-Cumulus	St.-Cu.
7—Nimbus	Nb.
8—Cumulus or Fracto-Cumulus	Cu. or Fr.-Cu.
9—Cumulo-Nimbus	Cu.-Nb.
0—Stratus or Fracto-Stratus	St. or Fr.-St.

Table X.

N.—Cloud Amount.	
Code Figure.	Code Figure.
0 = No cloud.	6 = Sky 6/10ths covered.
1 = Sky 1/10th covered.	7 = " 7/10ths "
2 = " 2/10ths "	8 = " 8/10ths "
3 = " 3/10ths "	9 = " 9/10ths "
4 = " 4/10ths "	0 = " overcast.
5 = " half "	

The weather reported by Table V, will indicate which 0 applies here.

Table XI.

W.—Past Weather.	
Code Figure.	
Without precipitation	0 = Blue sky or blue sky and part cloudy (b or bc).
	1 = Cloudy.
	2 = Overcast continuously.
	3 = Fog or mist.
With precipitation	4 = Thick fog.
	5 = Passing showers.
	6 = Rain or drizzle.
	7 = Snow or sleet.
	8 = Hail or rain and hail.
9 = Thunderstorm.	

Table XII.

K'.—Barometric Tendency.	
Code Figure.	
0	Barometer steady. (The barometer has not fallen or risen more than 1/2 millibar in 3 hours.)
1	Do. rising slowly. (The barometer has risen 1 to 1 1/2 mb. (.03-.04 in.) in last 3 hours.)
2	Do. rising. Do. do. 2 to 3 1/2 (.06-.10 in.) do.
3	Do. rising quickly. Do. do. 4 to 6 (.12-.18 in.) do.
4	Do. rising very rapidly. Do. do. over 6 (.18 in.) do.
5	Do. falling slowly. Do. do. fallen 1 to 1 1/2 (.03-.04 in.) do.
6	Do. falling. Do. do. 2 to 3 1/2 (.06-.10 in.) do.
7	Do. falling quickly. Do. do. 4 to 6 (.12-.18 in.) do.
8	Do. falling very rapidly. Do. do. over 6 (.18 in.) do.

Table XIII.

c.—Characteristic of Barometric tendency during last 3 hours.	
Code Figure.	
0 = 0 or +	Steady or rising
1 = + 0	Rising then steady
2 = + -	Rising then falling
3 = - + or 0 +	Falling or steady then rising
4 = Unsteady +	Unsteady but rising
5 = -	Falling
6 = - 0	Falling then steady
7 = - +	Falling then rising
8 = 0 - or + -	Steady or rising then falling.
9 = Unsteady -	Unsteady but falling

The barometer is now higher than, or the same as, 3 hours ago.

The barometer is now lower than 3 hours ago.

Table XIV.

V and V _s —Visibility.	
Code Figure.	
0 =	Objects not visible at 50 metres (55 yards).
1 =	" " " 200 metres (220 yards).
2 =	" " " 500 metres (550 yards).
3 =	" " " 1,000 metres (1,100 yards).
4 =	" " " 2,000 metres (1 1/4 miles).
5 =	" " " 4,000 metres (2 1/2 miles).
6 =	" " " 10,000 metres (6 1/4 miles).
7 =	" " " 20,000 metres (12 1/2 miles).
8 =	" " " 50,000 metres (31 1/4 miles).
9 =	Objects visible at 50,000 metres or more.

Table XV.

w ₁ .—General state of the weather (abridged).	
Code Figure.	Code Figure.
0—Cloud amount 0-5.	5—Rain.
1—Cloud amount 6-10.	6—Snow or Hail and Snow.
2—Fog or mist.	7—Sleet or Rain and Snow.
3—Passing showers.	8—Hail or Rain and Hail.
4—Drizzle.	9—Thunderstorm.

Table XVI.

R.—Rainfall during preceding 24 hours.	
Code Figure.	Code Figure.
0 = No rain.	5 = 11-15 mm.
1 = Trace or 0.1 mm.	6 = 16-20 mm.
2 = 0.2-2 mm.	7 = 21-30 mm.
3 = 3-5 mm.	8 = 31-50 mm.
4 = 6-10 mm.	9 = above 50 mm.

Table XVII.

RR.—Amount of Rainfall.	
Code Figures.	Meaning.
91	0.1 mm.
92	0.2 "
93	0.3 "
94	0.4 "
95	0.5 "
96	0.6 "
97	Some rain, but not measurable.
98	More than 90 millimetres.
99	Measurement impossible or unreliable.

Amounts of 0.7 mm. or more are coded as whole millimetres, e.g., 17.2 mm. coded as 17.

Table XVIII.

r.—Time of commencement of precipitation.	
Code Figure.	
0	No rain.
1	0 to 1 hour before time of observation.
2	1 to 2 hours before time of observation.
3	2 to 3 " " "
4	3 to 4 " " "
5	4 to 5 " " "
6	5 to 6 " " "
7	6 to 8 " " "
8	8 to 10 " " "
9	Above 10 hours before time of observation.
-	No observation.

Table XIX.

H.—Relative humidity.

Code Figure.	0	95 to 100 per cent.
9	90 „ 94 „	
8	80 „ 89 „	
7	70 „ 79 „	
6	60 „ 69 „	
5	50 „ 59 „	
4	40 „ 49 „	
3	30 „ 39 „	
2	20 „ 29 „	
1	10 „ 19 „	

Table XX.

S.—State of Sea and Swell (Coast Stations).

Code Figure.	0	No swell	} Calm or slight sea.
1	Moderate swell		
2	Heavy swell	} Moderate sea.	
3	No swell		
4	Moderate swell	} Moderate sea.	
5	Heavy swell		
6	Rather rough sea.		
7	Rough sea.		
8	Very rough sea.		
9	Mountainous sea.		

Table XXI.

h.—Height of base of lower predominating cloud present.

Code Figure.	Metres.	Feet.
0	0 to 50	0 to 150
1	50 „ 100	150 „ 300
2	100 „ 200	300 „ 600
3	200 „ 300	600 „ 1,000
4	300 „ 600	1,000 „ 2,000
5	600 „ 1,000	2,000 „ 3,000
6	1,000 „ 1,500	3,000 „ 5,000
7	1,500 „ 2,000	5,000 „ 6,500
8	2,000 „ 2,500	6,500 „ 8,000
9	No low cloud.	No low cloud.

SPECIAL WEATHER TELEGRAPHY TABLES,
NOT INTERNATIONAL CODE.

Table XXII.

U.—Unusual Phenomena.

Code Figure.	0 = None of the following remarks appropriate.
1	= Appearances indicate that a tropical storm has formed.
2	= Appearances indicate that a tropical storm is forming.
3	= Heavy squalls during last three hours.
4	= Squally weather.
5	= Barometer <i>falling</i> very rapidly (more than 2 millibars an hour).
6	= Barometer <i>rising</i> very rapidly (more than 2 millibars an hour).
7	= Wind has <i>increased</i> decidedly during the last hour.
8	= Wind has <i>decreased</i> decidedly during the last hour.
9	= Unusually red sunset (or sunrise).

Table XXIII.

Conversion of Millibars to Inches.

Equivalent in Mercury Inches at 32°, and Latitude 45° of Millibars.

Mb.	In.	Mb.	In.	Mb.	In.	Mb.	In.	Mb.	In.	Mb.	In.	Mb.	In.
925	27.32	940	27.76	960	28.35	980	28.94	1000	29.53	1020	30.12	1040	30.71
926	27.35	941	27.79	961	28.38	981	28.97	1001	29.56	1021	30.15	1041	30.74
927	27.38	942	27.82	962	28.41	982	29.00	1002	29.59	1022	30.18	1042	30.77
928	27.41	943	27.85	963	28.44	983	29.03	1003	29.62	1023	30.21	1043	30.80
929	27.44	944	27.88	964	28.47	984	29.06	1004	29.65	1024	30.24	1044	30.83
930	27.46	945	27.91	965	28.50	985	29.09	1005	29.68	1025	30.27	1045	30.86
931	27.49	946	27.94	966	28.53	986	29.12	1006	29.71	1026	30.30	1046	30.89
932	27.52	947	27.97	967	28.56	987	29.15	1007	29.74	1027	30.33	1047	30.92
933	27.55	948	28.00	968	28.59	988	29.18	1008	29.77	1028	30.36	1048	30.95
934	27.58	949	28.03	969	28.62	989	29.21	1009	29.80	1029	30.39	1049	30.98
935	27.61	950	28.05	970	28.65	990	29.24	1010	29.83	1030	30.42	1050	31.01
936	27.64	951	28.08	971	28.67	991	29.26	1011	29.86	1031	30.45	1051	31.04
937	27.67	952	28.11	972	28.70	992	29.29	1012	29.89	1032	30.48	1052	31.07
938	27.70	953	28.14	973	28.73	993	29.32	1013	29.92	1033	30.51	1053	31.10
939	27.73	954	28.17	974	28.76	994	29.35	1014	29.94	1034	30.53	1054	31.13
		955	28.20	975	28.79	995	29.38	1015	29.97	1035	30.56		
		956	28.23	976	28.82	996	29.41	1016	30.00	1036	30.59		
		957	28.26	977	28.85	997	29.44	1017	30.03	1037	30.62		
		958	28.29	978	28.88	998	29.47	1018	30.06	1038	30.65		
		959	28.32	979	28.91	999	29.50	1019	30.09	1039	30.68		

Special Notices Regarding Personnel.

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

Obituary.

The death of Commander C. A. SMITH, C.B.E., R.D., R.N.R., is noted with regret. Captain SMITH retired from the CUNARD COMPANY about five-and-a-half years ago, after having spent nearly thirty years in their service. His last ship was the *Berengaria*, to which vessel he was appointed in command when, as the *Imperator*, she was taken over from Germany after the war.

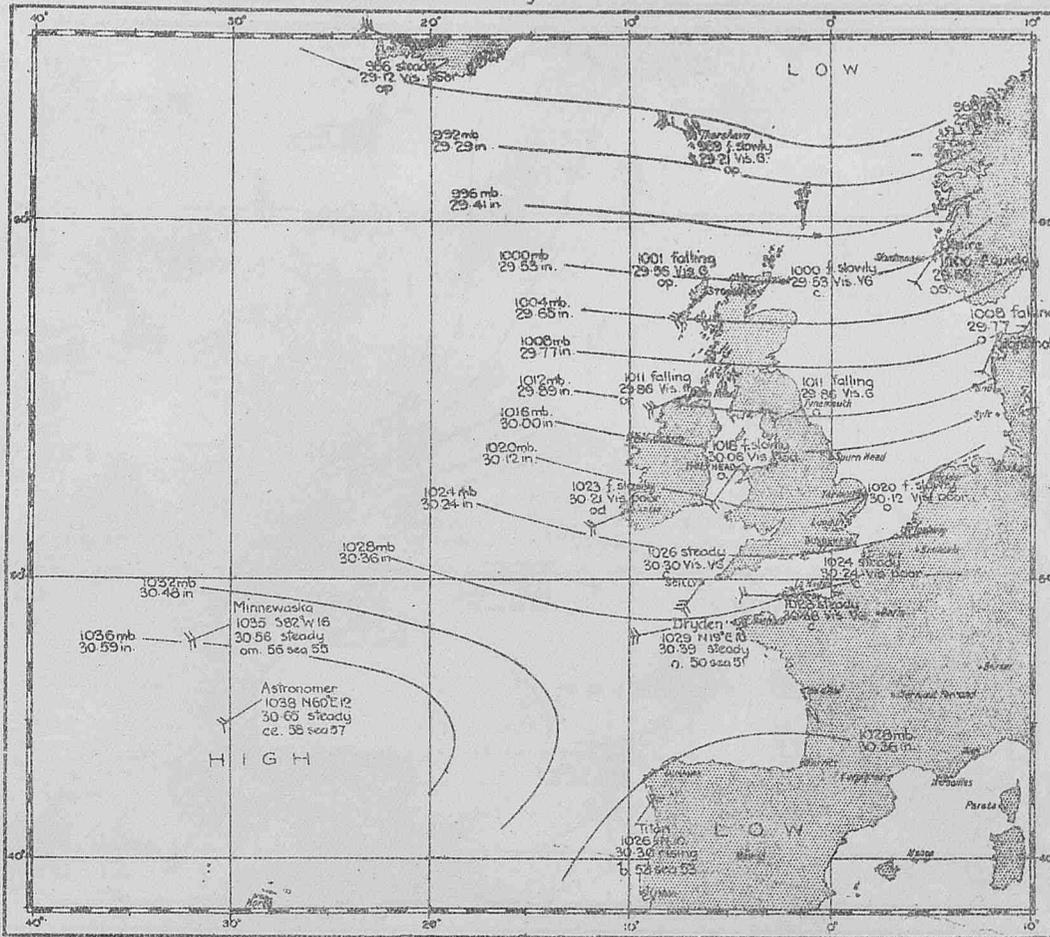
Captain SMITH, the son of a Master Mariner, served his apprenticeship in the ships of Messrs. W. H. Ross & Co., and remained in the same employ until he obtained his Master's certificate. In 1886 he joined the ALLAN LINE, transferring to the CUNARD Service in 1894, when he was appointed a junior officer of the old *Lucania*. Passing through the successive grades he obtained command in 1905, his first ship being the *Pavia*.

At the outbreak of hostilities he commanded the *Caronia*, and when his ship was taken over by the Admiralty as an auxiliary cruiser he was appointed to her as Navigating Commander. On the *Caronia* paying off, Captain SMITH commanded the *Aquitania*. In her he saw service both as a troopship and as a hospital ship. It was largely due to his recommendation that the system of zigzagging in dangerous waters was perfected. For his war service he was awarded the C.B.E.

Captain SMITH was a regular member of the Corps of Voluntary Marine Observers.

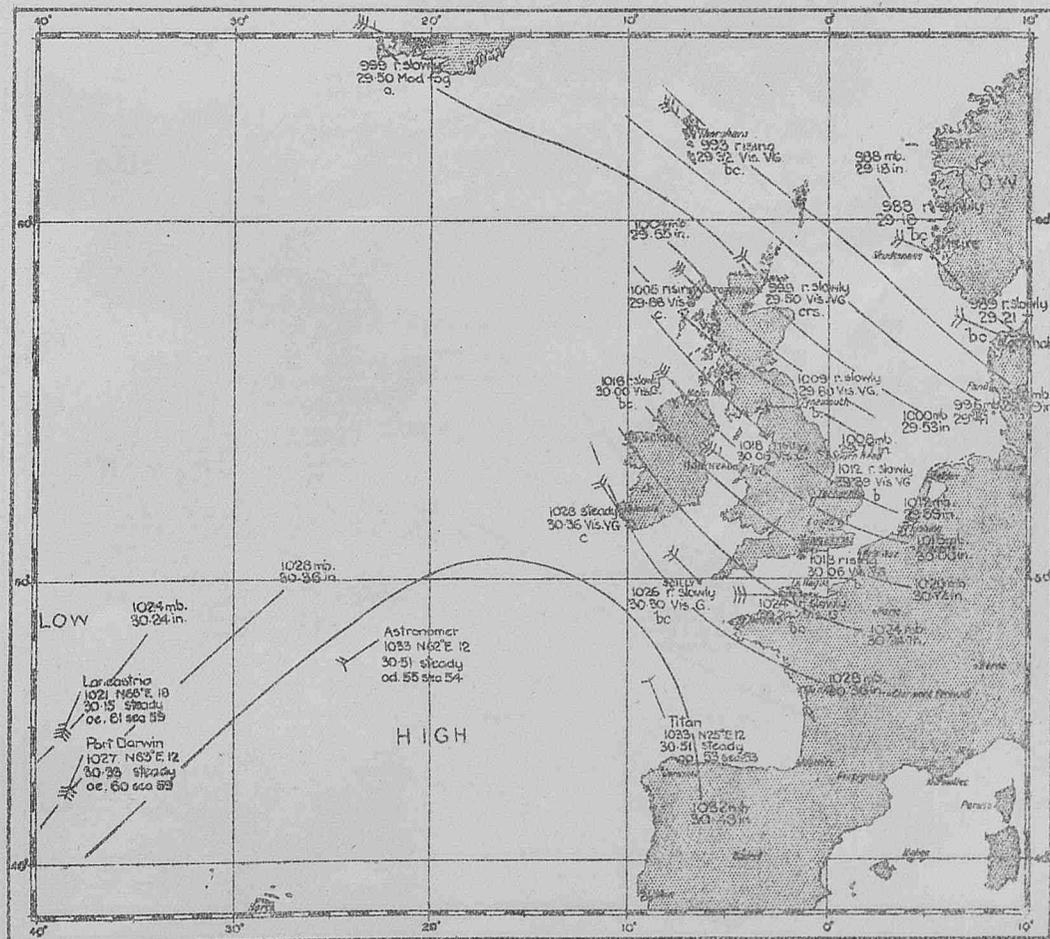
Faint, illegible text and a large table structure are visible on the page. The table appears to have multiple columns and rows, but the content is too faded to transcribe accurately.

MORNING OF JANUARY 4TH. 1928.

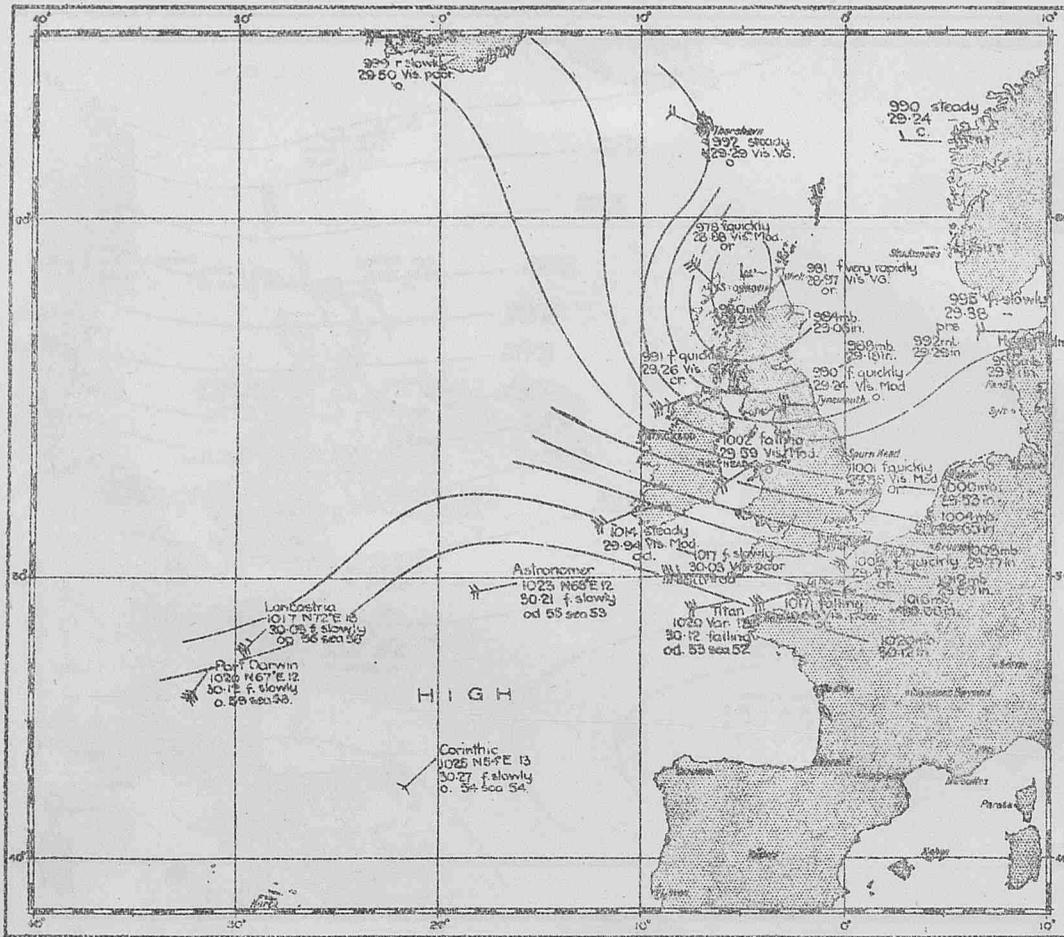


Weather Chart I.

MORNING OF JANUARY 5TH. 1928.

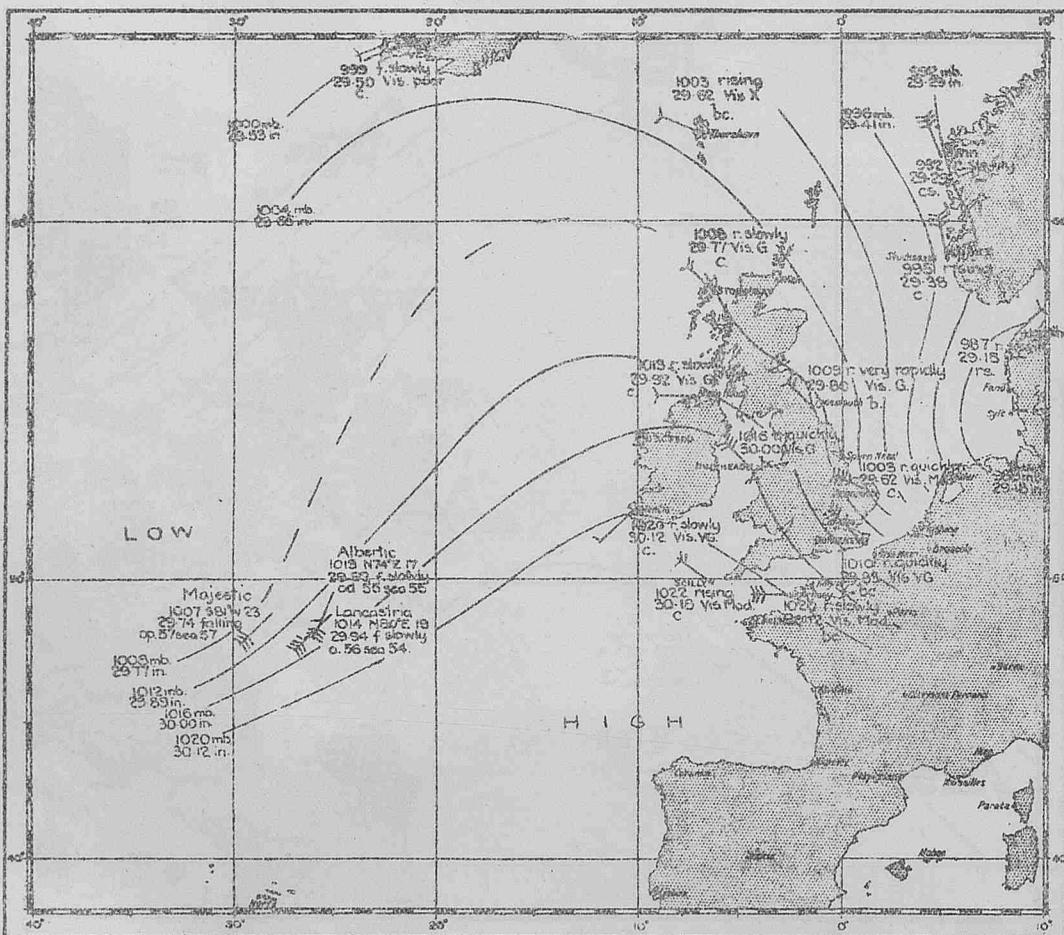


MORNING OF JANUARY 6TH. 1928.



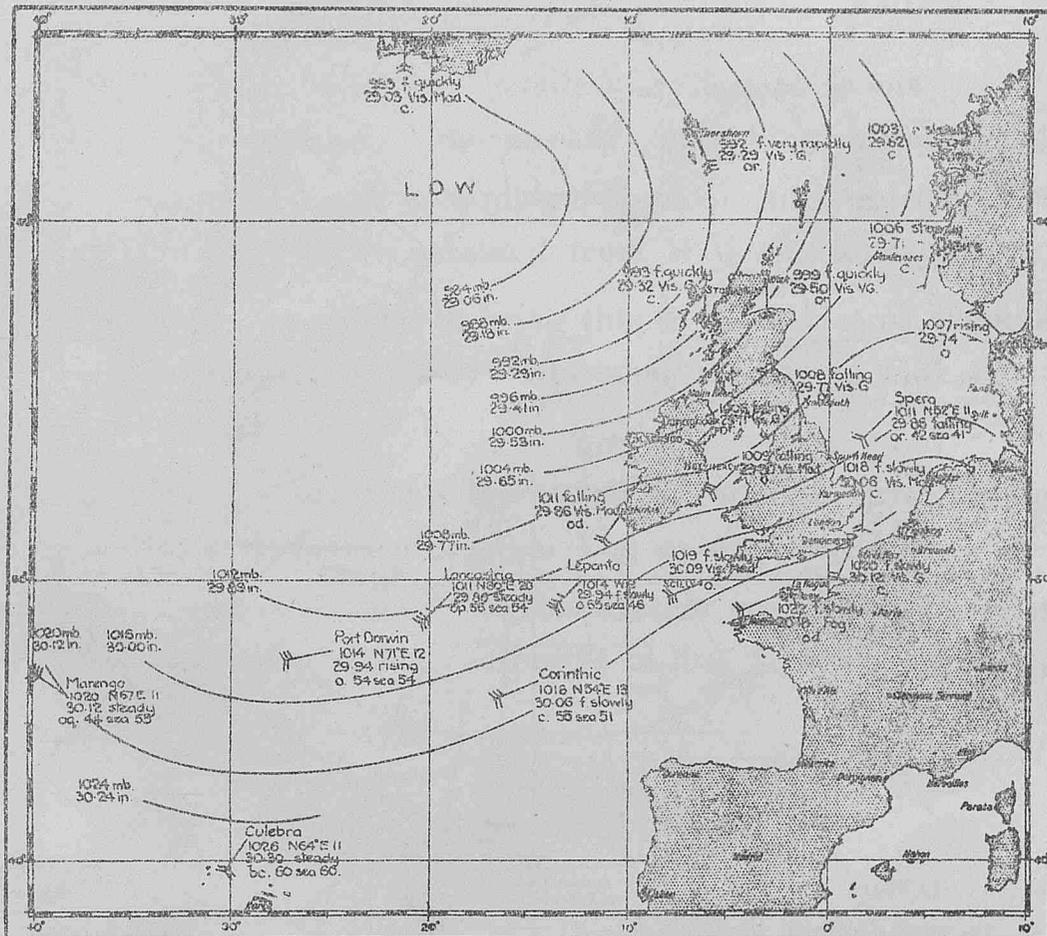
Weather Chart III.

EVENING OF JANUARY 6TH. 1928.

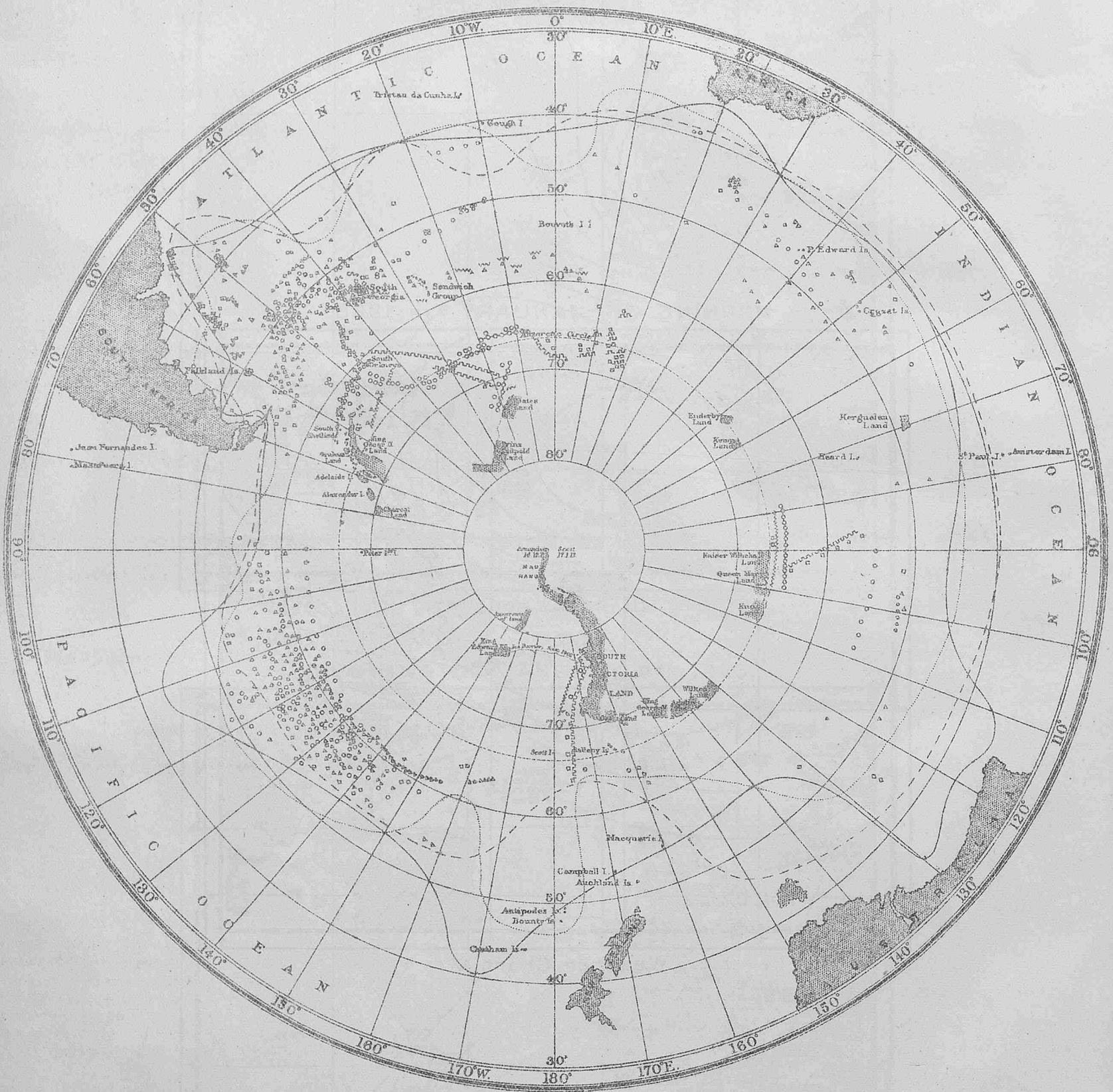


Weather Chart IV.

MORNING OF JANUARY 7TH, 1928.



Weather Chart V.



ICE CHART OF THE SOUTHERN HEMISPHERE, 1902—1928.
JANUARY, FEBRUARY and MARCH.

EXPLANATION.

The symbols used to distinguish the records of each of the three months represented during the period 1902—1928, are as follows:—January, bergs Δ , pack ice ~~~~~ ; February, bergs \square , pack ice ~~~~~ ; March, bergs \circ , pack ice oooo . Extreme limits are given thus:—January, ----- ; February, ----- ; March, ----- ; these include ice reported since 1772.

A list of Southern Ice Reports during the years 1917—1923 for the month of January will be found on p 15 of this Number.

Similar lists for the months of February and March will be published in the appropriate issues, Numbers 62 and 63 of this Volume.

NOTICES.

WIRELESS AND WEATHER AN AID TO NAVIGATION.

The Commanders of the ships whose names appear in the list at the end of THE MARINE OBSERVER with the letters M.L., M. or W.T. in the fourth column are "selected ships" and they are invited to make plain language reports in a standard form, containing observations taken at the same Greenwich Time as those of the Weather Telegraphy Stations of the nearest coast, to "all ships." A sample message is given in "Weather Signals" on page 19 in this number.

"Selected ships" by making these reports regularly once or twice daily will be making information available which will be valuable to all shipping.

When within range of Stations known to be detailed to receive reports for Meteorological Centres in the Dominions and Colonies, these reports may be made to the station as well as to C.Q. with advantage. One message may then perform two or more services.

For complete information and general guidance on this subject "Wireless and Weather an aid to Navigation," may now be obtained from H.M. Stationery Office, price 5/-.

Marine Observers are requested to bring this to the notice of Commanders and Officers of ships not on our list, so that they may know what reports to look out for and how to use them to the best advantage.

Marine Observers in "selected ships" are requested to enter routine messages sent to "all ships" at the end of the Meteorological Log or on Form 911.

The development and maintenance of this system is mainly dependent upon the Corps of Voluntary Marine Observers and great credit is due to them for the progress made last year.

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., e/o the owners, and captains are requested to make their own arrangements for forwarding.

BRITISH WEATHER SHIPPING BULLETIN.

A trial commenced on November 19th, 1928, of the 0900 G.M.T. broadcast of the "Weather Shipping" Bulletin on a new set from Air Ministry W/T Station G.F.A., wavelength 4,100 metres C.W.

During the trial this message is also broadcast simultaneously on short wave, 40.43 metres.

The Captains of Observing Ships are asked to send in to the Marine Superintendent their remarks with regard to the reception of the "Weather Shipping" Bulletin during the above trial.

ICE CHART. WESTERN NORTH ATLANTIC.

LETTERS OF TRANSATLANTIC TRACKS INDICATE.

- (C) From 1st September to 31st January, inclusive.
 - (E) From 1st December to 14th February, inclusive.
- These routes are liable to alteration when, owing to abnormal ice conditions, it is considered advisable by the steamship lines who are parties to the Track agreement.

ROUTE NOTICES.

For latest information re Tracks see pages 73-4, Vol. V, No. 52 of this Journal.

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.	Remarks.
		Lat. Long.	
Jan. 14, 1836	H.M.S. Cove...	60°56' N. 5°50' W.	2 bergs.
" 9, 1913	S.S. Oriflamme	48°37' N. 34°42' W.	Berg 40ft. high, 400 ft. long.
" 27, 1916	S.S. Rio Verde	33°34' N. 70°32' W.	Hummock 2 ft. high, 30 ft. in circumference.

Reports of Ice sighted between November 1st and November 30th, 1928, which have been received by the Meteorological Office, are shown by the Symbols plotted in position reported, the figures indicating the day of the month.

LATEST ICE REPORT FROM CANADA.

The following cablegram, dated 12th November, 1928, was received from the Superintendent, Canadian Signal Service, Quebec:—

"Belle Isle Strait few bergs, other points, no ice in sight."

MARINE METEOROLOGY.

Co-operation of Shipowners, Masters and Mates.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

For sample weather report message see Chapter I. of "Wireless and Weather an Aid to Navigation," page 6, and page 19 of this Number.

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

NOTICES.

LATE PRESS.

DERELICTS AND FLOATING WRECKAGE.

Date.	Position.		Description.
	Latitude.	Longitude.	
NORTH SEA.			
20.11.28	54°46'N.	0°50'W.	Can buoy adrift, black and white vertical stripes, staff and cage, marked <i>Bar Buoy</i> , looks like Tees Bar Buoy.
BALTIC.			
10.11.28	59°22'N.	20°48'E.	Abandoned Schr. <i>Arija</i> .
21.11.28	54°28'N.	11°46'E.	Wreckage projecting 3 feet out of water.
22.11.28	57°56'N.	10°47'E.	Drifting wreck.
IRISH SEA.			
17.11.28	52°17'N.	5°50'W.	Waterlogged small ship's boat about 18 feet long, varnished wood, girded with white fenders.
ENGLISH CHANNEL.			
3.11.28	Bearing 111° from Niton,	distance 14 miles.	Small empty boat, apparently from yacht.
16.11.28	49°30'N.	3°37'W.	3 lifeboats (lost from S.S. <i>Falgore</i>).
21.11.28	50°12'N.	2°08'W.	Lifeboat floating full of water, painted white, bottom black, name illegible.
NORTH ATLANTIC.			
2.11.28	31°38'N.	78°32'W.	A derelict barge.
2.11.28	42°37'N.	59°57'W.	Spherical buoy about 8 feet high with staff, ball top mark and lantern, light not burning, lower half of buoy red, upper half black and white vertical stripes, marked 3.
3.11.28	37°17'N.	73°27'W.	Piece of wreckage about 30 feet long, 10 feet wide, evidently part of a wooden vessel.
12.11.28	33°57'N.	74°43'W.	Derelict dismasted schooner <i>Jacob W. Hook</i> .
14.11.28	44 m. 353° (T.) from Chesapeake Lt. V.		Flat bottomed capsized boat about 30 feet long.
14.11.28	37°48'N.	73°25'W.	Bell buoy.
15.11.28	22°33'N.	74°27'W.	Large upright spar showing about 6 feet out of water.
15.11.28	40°10'N.	70°—'W.	Large light and bell buoy painted red, marked 2, light not functioning.
22.11.28	40°13'N.	9°39'W.	Floating log, dangerous to navigation.
NORTH PACIFIC.			
7.11.28	42°56'N.	124°46'W.	Heavy tree trunk, about 50 feet long, from 5 to 7 feet in diameter.
9.11.28	48°23'N.	134°06'W.	Black spar showing about 10 feet out of water, apparently attached to submerged wreckage.

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.: <i>Holborn 3434 Extension 421</i>). Nearest station <i>Temple</i> , District Railway. Mr. W. T. GRIEVES, Visiting Officer for the Port of London.		Agents (<i>contd.</i>)
LIVERPOOL	Lieut. Commander M. CRESSWELL, R.N.R., Port Meteorological Officer, Dock Office. (Telephone No.: <i>Bank 3959</i>).	HONG KONG, China.	Lieut. Commander J. H. DRUMMOND, D.S.C., R.N., Superintendent, Admiralty Chart and Chronometer Depot, H.M. Dockyard.
BELFAST	Captain J. MCINTYRE, Harbour Master, Harbour Office. (Telephone No.: <i>Belfast 4090</i>).	HULL	Captain A. M. BROWN, Ellerman Wilson Line.
CARDIFF	Captain T. JOHNSTON, Technical College, Cathays Park. (Telephone No.: <i>Cardiff 6813</i>).	LEITH	Captains G. BLACK and C. G. BONNER, V.C., D.S.C., Leith Salvage and Towage Co., Ltd., 2, Commercial Street.
CLYDE	Captain M. C. CORRANCE, Board of Trade Sur- veyor's Office, 73, Robertson Street, Glasgow. (Telephone No.: <i>Central 2283-4</i>).	SOUTHAMPTON	Captain D. FORBES, Nautical Academy, 1, Albion Place.
FREMANTLE, W. Australia.	Captain J. J. AIREY, Deputy Director of Naviga- tion, Customs House. (Telephone No.: <i>B 1391</i>).	SYDNEY, New South Wales.	Commander G. D. WILLIAMS, D.S.O., R.D., R.N.R., Deputy Director of Navigation. Captain C. LINDBERGH. Customs House. (Telephone No.: <i>B6421</i>).
		TYNE	Captain J. J. McEWAN, Marine School, South Shields.
		VANCOUVER, British Columbia.	Mr. T. S. H. SHEARMAN, 61, Exchange Building, 553, Granville Street. (Telephone No.: <i>Seymour 3309</i>).

THE MARINE OBSERVER

Name of Vessel.	Captain.	Observing Officers.	Official Meteorological Equipment.	Line	Last Log, Register, or Report Contributed. Received up to 16.11.28.	Date Received.
<i>Atrous</i> ...	Rundle, G. G. ...	H. Nicholas ...	No. A.	A. Holt ...	Form 911 19.7.28 to 28.9.28 ...	2.10.28
<i>Atsuta Maru</i> ...	Narui, N. ...	Y. Osada ...	" A.	Nippon Yusen Kaisha	" 18.5.28 to 18.9.28 ...	24.9.28
<i>Auditor</i> ...	Owen, W. T. ...	" ...	" M.	Harrison ...	" 15.5.28 to 10.8.28 ...	23.8.28
<i>Autolytus</i> ...	Dunlop, J. K. ...	" ...	" A.	A. Holt ...	" 26.7.28 to 11.8.28 ...	24.9.28
<i>Avon</i> ...	Spriddell, F. G., R.D., Commr., R.N.R.	R. H. East ...	" M.	R.M.S.P. ...	" 17.2.28 to 28.3.28 ...	29.3.28
<i>Balmoral Castle</i> ...	Chave, Sir B., K.B.E.	" ...	" A.	Union Castle ...	" 6.4.28 to 23.4.28 ...	24.4.28
<i>Balranald</i> ...	Townshend, W. P., Capt., R.N.R.	H. Stinn, G. Owen, F. Ward,	M.L.	P. & O. Branch	Met. Log. 31.3.28 to 5.8.28 ...	16.8.28
<i>51 Baltic</i> ...	Binks, J. W., R.D., Lt.-Commr., R.N.R.	T. F. Pratt, A. C. l'Anson ...	W.T.	White Star ...	W.T. Reg. 1.10.28 to 20.10.28... Form 911 1.10.28 to 20.10.28...	24.10.28 25.10.28
<i>Bampton Castle</i> ...	Hutchings, A. H. ...	E. Hamlyn ...	No. A.	Union Castle ...	" 28.4.28 to 4.8.28 ...	23.8.28
<i>Banffshire</i> ...	Wynne, R. H. ...	W. D. E. Campbell ...	" A.	Turnbull Martin	" 3.7.28 to 22.7.28 ...	25.8.28
<i>Baradine</i> ...	Rollo, W. ...	C. B. Roche, B. H. Pollitt, D. F. Lambard, G. C. Case.	M.L.	P. & O. Branch	Met. Log. 26.1.28 to 1.6.28 ...	4.6.28
<i>Barpeta</i> ...	Chandler, H. V. ...	B. R. Faithfull ...	No. M.	British India ...	Form 911 26.9.28 to 12.10.28...	5.11.28
<i>Barrabool</i> ...	Rhodes, H. R. ...	T. G. Davies ...	" M.	P. & O. Branch	" 26.9.28 to 20.10.28...	25.10.28
<i>Baychimo</i> ...	Cornwall, S. A. ...	" ...	" A.	Hudson's Bay Co.	" 7.7.28 to 20.9.28 ...	19.10.28
<i>59 Belgenland</i> ...	Morehouse, W. A. ...	F. Good, W. Hesketh, C. H. Otterson.	W.T.	Red Star ...	W.T. Reg. 14.10.28 to 3.11.28... Form 911 24.6.28 to 9.8.28 ...	5.11.28 13.8.28
<i>Beltana</i> ...	Allin, C. H. C. ...	" ...	No. M.	P. & O. Branch	" 26.8.28 to 30.9.28 ...	12.11.28
<i>Benalder</i> ...	Fairweather, J. J. ...	L. A. Sayers ...	" A.	Ben Line ...	" 28.9.28 to 19.10.28...	2.11.28
<i>Benalla</i> ...	Sheepwash, J. ...	J. E. Hills ...	" M.	P. & O. Branch	" 26.8.28 to 14.9.28 ...	22.10.28
<i>Bendigo</i> ...	Nicholl, R. N. C. ...	G. G. Mason ...	" M.	" ...	" 9.8.28 to 28.9.28 ...	3.10.28
<i>Benefactor</i> ...	Jones, C. W. ...	" ...	" M.	Harrison ...	" 25.4.28 to 26.5.28 ...	14.6.28
<i>Benlogie</i> ...	McCorquodale, A. ...	G. Davidson ...	" A.	Ben Line ...	" 11.4.28 to 21.5.28 ...	8.6.28
<i>31 Berengaria</i> ...	Rostron, Sir A. H., K.B.E., R.D., Capt. R.N.R.	J. A. Myles, W. C. A. Robson, S. A. T. Bullock.	W.T.	Cunard ...	W.T. Reg. 21.10.28 to 6.11.28...	9.11.28
<i>Berrima</i> ...	Short, C. E. ...	G. H. Durrant ...	No. M.	P. & O. Branch	Form 911 25.5.28 to 3.6.28 ...	27.8.28
<i>Brenda</i> ...	Lamont, A. ...	N. Ross ...	" A.	Scottish Fishery Brd.	" 3.9.28 to 28.9.28 ...	8.10.28
<i>Brighton</i> ...	Hill, A. ...	Mr. Munton ...	C.C.	Southern Railway ...	Telegraphic Report 3.10.28...	3.10.28
<i>British Colonel</i> ...	Taylor, R. J. ...	F. W. Sherlock ...	No. M.	British Tankers ...	Form 911 29.6.28 to 27.9.28...	5.10.28
<i>British Consul</i> ...	Putt, R. O. ...	C. H. Humphries ...	" M.	" ...	" 29.6.28 to 16.7.28 ...	20.7.28
<i>Bronte</i> ...	Crappier, J. S. ...	J. B. Scott ...	" A.	Lampport & Holt ...	" 25.3.28 to 26.4.28 ...	8.6.28
<i>Bruyere</i> ...	Birch, A. ...	" ...	" A.	" ...	" 12.7.28 to 1.8.28 ...	23.8.28
<i>Bulysses M.V.</i> ...	Head, B. P. ...	A. J. Clatworthy ...	" M.	Anglo-Saxon Petroleum Co	" 23.9.28 to 31.10.28...	14.11.28
<i>65 Calgaric</i> ...	Western, W. ...	" ...	W.T.	White Star ...	" ...	" ...
<i>Cambria</i> ...	Copland, C. P. ...	O. W. Ll. Jones ...	C.C.	L.M. & S. Rly ...	Telegraphic Report 15.11.28...	15.11.28
<i>Cameronia</i> ...	Gemmell, W. ...	D. Chamberlain ...	M.L.	Anchor ...	Met. Log. 28.4.28 to 15.9.28...	6.11.28
<i>Camito</i> ...	Forrester, W. T., O.B.E.	H. H. Dunning, W. E. Grant, G. M. Roberts.	"	Elders & Fyffes	" 5.6.28 to 3.10.28 ...	9.10.28
<i>Canadian Importer</i> ...	Forson, A. ...	" ...	No. A.	Canadian Gov. Mercantile Marine.	Form 911 2.8.28 to 2.9.28 ...	14.9.28
<i>Canadian Winner</i> ...	McConehy, W. G. ...	J. M. Lang ...	" M.	Furness Houlder ...	" 8.9.28 to 15.9.28 ...	3.10.28
<i>Canonesa</i> ...	Brodie, W. H. ...	T. Wetherall ...	" M.	" ...	" 13.2.28 to 3.4.28 ...	11.4.28
<i>Cape of Good Hope</i> ...	Lamont, J. ...	W. S. Bartlett ...	No. A.	Lyle S.S. Co. ...	" 19.8.28 to 22.9.28 ...	19.10.28
<i>35 Carmania</i> ...	Brown, F. G., R.D., Capt., R.N.R.	W. M. Stewart, E. R. Taylor, E. Gleave.	W.T.	Cunard ...	W.T. Reg. 1.10.28 to 19.10.28...	22.10.28
<i>Carnarvon Castle</i> ...	Stanley, W. F., R.D., Commr., R.N.R.	W. G. Smith, T. C. Goldstone, J. B. McReynolds.	M.L.	Union Castle ...	Met. Log. 9.3.28 to 1.7.28 ...	17.7.28
<i>34 Caronia</i> ...	Hossack, W. H., R.D., Capt., R.N.R.	H. G. Hayward, T. Parry, J. Chapman.	W.T.	Cunard ...	W.T. Reg. 15.10.28 to 2.11.28... Form 911 15.10.28 to 2.11.28...	7.11.28 7.11.28
<i>Casanare</i> ...	Browne, S. ...	H. N. Tilley ...	No. A.	Elders & Fyffes ...	" 26.8.28 to 11.11.28...	14.11.28
<i>Cavina</i> ...	Riseley, A. D. ...	R. L. Stevenson ...	" A.	" ...	" 7.10.28 to 11.11.28...	14.11.28
<i>52 Cedric</i> ...	Smith R. G. ...	W. Walker, N. E. Banks, D. W. Chamberlain.	W.T.	White Star ...	W.T. Reg. 8.10.28 to 27.10.28... Form 911 7.10.28 to 28.10.28...	30.10.28 31.10.28
<i>53 Celtic</i> ...	Berry, G. ...	J. Law, D. K. Crawford, A. R. Stevens.	"	" ...	W.T. Reg. 22.10.28 to 11.11.28... Form 911 21.10.28 to 11.11.28...	15.11.28 14.11.28
<i>Centaur</i> ...	Rose, A. F. ...	A. Bowl, N. L. Thompson, J. Cockburn.	M.L.	A. Holt & Co. ...	Met. Log. 14.2.28 to 15.7.28 ...	29.10.28
<i>Ceramic</i> ...	Ward Hughes, J. ...	" ...	"	" ...	" ...	" ...
<i>Change</i> ...	Musgrave, T. ...	H. A. R. Daman ...	No. A.	White Star ...	Form 911 20.8.28 to 20.9.28 ...	12.11.28
<i>Changuinola</i> ...	Gambrill, F. C. ...	— Thomas, — Tyer, — Allan.	M.L.	Yuill & Co. ...	Met. Log. 16.12.27 to 6.4.28 ...	16.5.28
<i>Chindwin</i> ...	Thorburn, R. A., R.D., Commr., R.N.R.	W. G. Chanter ...	No. A.	Elders & Fyffes ...	Form 911 5.10.28 to 6.11.28 ...	10.11.28
<i>Chinkiang</i> ...	Paterson, G. ...	" ...	" A.	Henderson ...	" 18.7.28 to 17.10.28...	3.11.28
<i>Chirripi</i> ...	Stringer, C. B. L. ...	R. J. Powerie ...	M.L.	China Navigation Co	Met. Log. 10.4.28 to 29.7.28 ...	6.9.28
<i>City of Baroda</i> ...	McColm, F. ...	" ...	No. A.	Elders & Fyffes ...	Form 911 20.8.28 to 20.9.28 ...	27.9.28
<i>City of Benares</i> ...	McMillan, J. ...	A. Beaton, T. C. Hodgkinson.	M.L.	Ellerman ...	Met. Log. 5.3.28 to 20.5.28 ...	6.6.28
<i>City of Brisbane</i> ...	Anderson, W. W. ...	F. Forsyth ...	No. A.	" ...	Form 911 15.3.28 to 16.4.28 ...	19.4.28
<i>City of Bristol</i> ...	Seaborne, F. O., D.S.C	R. Jones ...	" A.	" ...	" 3.2.28 to 1.4.28 ...	10.4.28
<i>City of Canterbury</i> ...	Jenkins, D. ...	" ...	" M.	" ...	" ...	" ...
<i>City of Carlisle</i> ...	Oleson, E. ...	R. H. Hodgson ...	" A.	Ellerman ...	Form 911 25.7.28 to 10.10.28...	13.10.28
<i>City of Chester</i> ...	Mordue, J. A. ...	" ...	" A.	" ...	" 4.10.28 to 22.10.28...	9.11.28
<i>City of Edinburgh</i> ...	Letton, F. W. ...	C. C. Duncan, A. J. Barnett, R. Mowbray.	M.L.	" ...	Met. Log. 31.3.28 to 27.8.28 ...	30.8.28
<i>City of Hong Kong</i> ...	Wyper, J. ...	G. H. Hummell ...	No. M.	" ...	Form 911 18.5.28 to 6.6.28 ...	27.8.28
<i>City of London</i> ...	Walton, H. L., O.B.E., R.D., Commr., R.N.R.	H. Saunders ...	" A.	" ...	" 31.8.28 to 10.9.28 ...	17.9.28
<i>City of Osaka</i> ...	Parker, F. W., R.D., Commr., R.N.R.	H. H. Asher ...	No. A.	" ...	Form 911 4.2.28 to 22.4.28 ...	27.4.28
<i>City of Rangoon</i> ...	Smith, W. H. ...	R. K. Walker ...	No. M.	" ...	" 10.8.28 to 2.9.28 ...	10.10.28
<i>City of Venice</i> ...	Jones, P. ...	E. R. Wildermuth, R. H. Stewart, F. E. Broadbent.	M.L.	" ...	Met. Log. 28.3.28 to 9.7.28 ...	1.8.28
<i>City of Yokohama</i> ...	Lee, A. ...	" ...	No. A.	" ...	Form 911 18.2.28 to 1.3.28 ...	12.3.28
<i>Clan Alpine</i> ...	Singleton, J. G. ...	R. Willott Leese ...	" A.	Ellerman ...	" 23.8.28 to 3.10.28 ...	9.11.28
<i>Clan Kenneth</i> ...	Lyall, A. B. ...	P. Sargent ...	" A.	Clan ...	" 23.9.28 to 14.10.28...	12.11.28
<i>Clan Lamont</i> ...	Young, A. H., Commr., R.D., R.N.R.	F. H. Turton ...	" A.	" ...	" 1.8.28 to 4.10.28 ...	8.10.28
<i>Clan Lindsay</i> ...	Urquhart, P., D.S.C.	P. de Gruchy ...	" A.	" ...	" 25.1.28 to 27.4.28 ...	8.5.28
<i>Clan MacBean</i> ...	Giles, H. J., R.D., Commr., R.N.R.	E. P. Smith ...	" A.	" ...	" 8.6.28 to 26.8.28 ...	3.9.28
<i>Clan Macbeth</i> ...	Worthington, J. H. ...	J. E. Clayton ...	" A.	" ...	" 5.8.28 to 1.8.28 ...	4.9.28
<i>Clan Macbeth</i> ...	Horn, R. ...	T. A. Watkinson ...	" A.	" ...	" 1.4.28 to 7.4.28 ...	21.5.28

LIST OF VOLUNTARY OBSERVING SHIPS

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Name of Vessel.	Captain.	Observing Officers.	Official Meteorological Equipment.	Line.	Last Log, Register, or Report Contributed. Received up to 16.11.28.	Date Received.
<i>Clan Macfadyen</i> ...	Laird, C. ...	R. L. Smallbone ...	No. A.	Clan ...	Form 911 12.10.28 to 20.10.28 ...	12.11.28
<i>Clan Macfarlane</i> ...	Redford, L. F. ...	T. A. Pearson ...	" A.	" ...	" 4.8.28 to 3.10.28 ...	6.10.28
<i>Clan Macgillivray</i> ...	Mackinlay, A. ...	J. Garis ...	" A.	" ...	" 19.7.28 to 23.8.28 ...	20.9.28
<i>Clan Macindoe</i> ...	Holman, W. G. ...	" ...	" A.	" ...	" 17.8.28 to 19.9.28 ...	26.9.28
<i>Clan Mackellar</i> ...	Smith, W. P. ...	A. Woodrow ...	" A.	" ...	" 14.8.28 to 24.10.28 ...	3.11.28
<i>Clan Macphee</i> ...	Gourlay, J. B. ...	G. Short, B. Edgar, E. Mowatt.	M.L.	" ...	Met. Log. 21.11.27 to 18.4.28 ...	17.5.28
<i>Clan Macnaughton</i> ...	Simpson, A. W. ...	J. A. Watkinson ...	No. A.	" ...	Form 911 21.8.28 to 18.9.28 ...	8.10.28
<i>Clan Macquarrie</i> ...	West, W. F. ...	T. P. Cranwill ...	" A.	" ...	" 16.9.28 to 11.10.28 ...	5.11.28
<i>Clan Mactaggart</i> ...	Makepeace, F. ...	E. A. Hewson ...	" A.	" ...	" 1.9.28 to 19.9.28 ...	15.10.28
<i>Clan Macwhirter</i> ...	Waterhouse, J. ...	W. A. Robbie, E. A. Brown, S. W. Brown.	M.L.	" ...	Met. Log. 1.10.27 to 26.4.28 ...	30.4.28
<i>Clan Malcolm</i> ...	George, L. S. ...	R. L. Ranford, J. F. Hubbard, P. Evans.	"	" ...	" 23.2.28 to 9.6.28 ...	29.6.28
<i>Clan Morrison</i> ...	Porterfield, W. M. ...	H. R. Crosscombe ...	No. A.	" ...	Form 911 24.6.28 to 26.7.28 ...	25.8.28
<i>Clan Murdoch</i> ...	Neill, G. A. ...	W. J. Jones ...	" A.	" ...	" 7.8.28 to 24.8.28 ...	8.9.28
<i>Clan Ranald</i> ...	Fraser, R. K. ...	K. G. Tucker ...	" A.	" ...	" 29.9.28 to 12.10.28 ...	22.10.28
<i>Clan Ross</i> ...	Openshaw, L. G. ...	D. de Vall ...	" A.	" ...	" 6.9.28 to 28.9.28 ...	5.11.28
<i>Clan Sinclair</i> ...	Taylor, P. V. ...	J. H. Dennis ...	" A.	" ...	" 18.10.28 to 8.11.28 ...	12.11.28
<i>Clan Urquhart</i> ...	Baker, E. W. ...	J. O. H. Kirkwood ...	" A.	" ...	" 26.10.28 to 7.11.28 ...	14.11.28
<i>Colonial</i> ...	Worthington, B. ...	" ...	" M.	T. & J. Harrison ...	" ...	"
<i>Comorin</i> ...	Borland, J. McI., C.B., D.S.O., R.D., Capt., R.N.R.	E. C. White ...	" M.	P. & O. ...	" 5.9.28 to 19.10.28 ...	29.10.28
<i>Corinthic</i> ...	Freeman, C. P. ...	E. M. Burt, M. Bennett, I. A. Macnaughton.	M.L.	White Star ...	Met. Log. 21.7.28 to 2.10.28 ...	12.11.28
<i>Cornwall</i> ...	Wilde, H. J. ...	H. M. Knight ...	No. A.	Federal ...	Form 911 27.3.28 to 9.5.28 ...	15.5.28
<i>Crawford Castle</i> ...	Morgan, A. O., R.D., Commr., R.N.R.	J. A. Wilson ...	" A.	Union Castle ...	" 30.10.27 to 1.12.27 ...	15.12.27
<i>Culebra</i> ...	Goble, C. J., R.D., Commr., R.N.R.	K. Paterson, R. N. Fletcher, W. S. Thomas.	M.L.	R.M.S.P. Co. ...	Met. Log. 20.7.28 to 19.9.28 ...	25.9.28
<i>Cumberland</i> ...	Macmillan, D. ...	G. C. Saul, P. Shakespear, J. Marks.	"	Federal ...	Form 911 29.4.28 to 30.8.28 ...	24.9.28
<i>Cyclops</i> ...	Cosker, W. ...	K. A. Owens ...	No. A.	A. Holt ...	" 27.6.28 to 30.8.28 ...	4.9.28
<i>Daga</i> ...	Wiles, N. ...	A. Olding ...	No. M.	P. Henderson ...	" 2.8.28 to 11.9.28 ...	9.11.28
<i>Dakotian</i> ...	Robb, J. ...	" ...	" A.	Leyland ...	" 3.8.28 to 30.9.28 ...	8.11.28
<i>Dardanus</i> ...	Clarke, J. W. ...	" ...	" A.	A. Holt ...	" 6.8.28 to 2.9.28 ...	2.11.28
<i>Darro</i> ...	Matthews, G. P. ...	" ...	" M.	R.M.S.P. Co. ...	" 9.8.28 to 25.9.28 ...	1.10.28
<i>Delphic</i> ...	Evans, W. ...	N. Williams ...	" M.	White Star ...	" 9.9.28 to 28.9.28 ...	23.10.28
<i>Demerara</i> ...	Willan, F. G. L., R.D., Capt., R.N.R.	F. Jeyes ...	" M.	R.M.S.P. Co. ...	" 9.7.28 to 13.9.28 ...	18.9.28
<i>Demosthenes</i> ...	Ogilvy, A. ...	H. Phillips ...	" M.	Aberdeen ...	" 25.9.28 to 11.11.28 ...	14.11.28
<i>Demis</i> ...	Harris, F. C. P. ...	A. Blewett ...	" A.	Booth ...	" 7.8.28 to 28.8.28 ...	30.8.28
<i>Deseado</i> ...	Buret, T. ...	" ...	" M.	R.M.S.P. Co. ...	" 18.8.28 to 13.10.28 ...	15.10.28
<i>Desna</i> ...	Green, J. ...	L. T. Peterson ...	" M.	" ...	" 3.9.28 to 24.10.28 ...	12.11.28
<i>Deucalion</i> ...	Melling, C. F. ...	R. F. Dryden ...	" A.	A. Holt ...	" 23.9.28 to 4.10.28 ...	10.10.28
<i>Devon</i> ...	Kinnell, G. ...	D. Clegg ...	" M.	F. d'eral ...	" 26.8.28 to 18.9.28 ...	29.10.28
<i>Dieppe</i> ...	Marmery, S. ...	Mr. Parsons ...	C.C.	Southern Railway ...	Telegraphic Report 15.11.28 ...	15.11.28
<i>Dimboola</i> ...	Brotherton, R. W. ...	H. L. Price ...	No. A.	Melbourne S.S. Co. ...	Form 911 22.7.28 to 15.8.28 ...	24.9.28
<i>Domala, M.V.</i> ...	Kitson, A. G. ...	H. Robertson ...	" M.	British India ...	" 19.4.28 to 26.5.28 ...	26.6.28
<i>Dominia, C.S.</i> ...	Campos, V., O.B.E., Lt.-Commr., R.N.R.	H. Hutchins, T. J. C. Dexter, J. Dyer.	M.L.	Telegraph Construction & Maintenance.	Met. Log. 4.1.28 to 24.1.28 ...	1.3.28
<i>Dominic</i> ...	Saxton, C. ...	J. A. Moon ...	No. A.	Booth ...	Form 911 14.3.28 to 1.5.28 ...	8.5.28
<i>61Doric</i> ...	Jones, W. H. ...	G. T. Kavanagh ...	W.T.	White Star ...	" 21.10.28 to 10.11.28 ...	14.11.28
<i>Dorington Court</i> ...	Clarke, E. J. ...	P. Jones ...	No. A.	Haldin & Co. ...	Form 911 28.6.28 to 6.7.28 ...	16.8.28
<i>Dromore Castle</i> ...	MacMahon, J., R.D., Commr., R.N.R.	J. A. Sowden ...	" A.	Union Castle ...	" 11.9.28 to 9.10.28 ...	9.11.28
<i>Dryden</i> ...	Major, T. W. ...	" ...	" M.	Lampert & Holt ...	" 3.6.28 to 7.9.28 ...	18.9.28
<i>Dunaff Head</i> ...	Milner, T. F., R.D., Lt.-Commr., R.N.R.	S. Duff ...	" A.	Ulster S.S. Co. ...	" 18.7.28 to 7.9.28 ...	8.9.28
<i>Dundrum Castle</i> ...	Goodacre, R. W., R.D., Commr., R.N.R.	A. R. J. Tilston ...	" A.	Union Castle ...	" 13.4.28 to 11.5.28 ...	21.5.28
<i>Dunluce Castle</i> ...	Morgan, A. O. ...	F. O. Wilbraham ...	" A.	" ...	" 19.8.28 to 7.9.28 ...	11.9.28
<i>Dunrobin</i> ...	Ramsay, J. D. ...	C. H. Kendall ...	" A.	Glen & Co. ...	" 17.9.28 to 13.10.28 ...	10.11.28
<i>Duquesa</i> ...	Owen, R. ...	" ...	" M.	Furness Withy ...	" 18.7.28 to 11.9.28 ...	29.9.28
<i>Durenda, M.V.</i> ...	Beeching, P. H. ...	F. E. Liles ...	" M.	British India ...	" 21.6.28 to 22.7.28 ...	7.8.28
<i>Edinburgh Castle</i> ...	Gardner, G. F., O.B.E., Lt.-Commr., R.N.R.	" ...	" A.	Union Castle ...	" 21.9.28 to 11.11.28 ...	14.11.28
<i>Egori</i> ...	Sola, P., D.S.O. ...	R. W. Pattinson ...	" A.	Elder Dempster ...	" 17.8.28 to 6.10.28 ...	18.10.28
<i>Eldon Park</i> ...	Burns, R. ...	" ...	" M.	Denholm S.S. Co. ...	" ...	"
<i>Ellora</i> ...	Baird, S. K. ...	W. M. Bain ...	" M.	British India ...	" 21.9.28 to 10.10.28 ...	5.11.28
<i>El Paraguayo</i> ...	Fletcher, G. ...	F. F. Feint, D. Murray ...	" M.	Houlder Bros. ...	Form 911 23.10.27 to 15.12.27 ...	20.12.27
<i>Elpenor</i> ...	Gordon, A. L. ...	C. Kavanagh, J. E. Hiff ...	M.L.	A. Holt ...	Met. Log. 7.7.28 to 2.11.28 ...	7.11.28
<i>Elysta</i> ...	Duncan, A. R. ...	D. Blair, G. S. Sinclair, W. Black.	"	Anchor ...	" 11.8.28 to 11.10.28 ...	31.10.28
<i>Empress of Asia</i> ...	Hailey, A. J., Lt.-Commr., R.N.R.	L. C. Hogg ...	"	Canadian Pacific ...	" 25.2.28 to 15.6.28 ...	14.7.28
<i>Empress of Canada</i> ...	Robinson, S., C.B.E., R.D., Commr., R.N.R.	A. G. Simmons ...	"	" ...	" 17.3.28 to 28.6.28 ...	15.8.28
<i>Empress of France</i> ...	Griffiths, E. ...	O. F. Pennington, E. Roberts, L. Outram.	"	" ...	" 19.5.28 to 4.9.28 ...	1.10.28
<i>Empress of Russia</i> ...	Hosken, A. J. ...	L. C. Barry, R. A. Leicester, J. S. Clarke, J. H. Reid.	"	" ...	" 7.4.28 to 19.7.28 ...	13.9.28
<i>Endeavour</i> ...	Law, E. F. B., Commr., R.N.R.	C. S. E. Lansdown, P. Barlow, W. H. Dickinson.	"	His Majesty's Ship ...	" 14.3.28 to 11.7.28 ...	16.7.28
<i>Essequibo</i> ...	Kirkwood, J. H. ...	J. H. E. Evans ...	No. M.	R.M.S.P. Co. ...	Form 911 17.5.28 to 2.7.28 ...	28.7.28
<i>Eumæus</i> ...	Read, J. W. ...	" ...	" A.	A. Holt ...	" 5.9.28 to 8.10.28 ...	22.10.28
<i>Euryades</i> ...	Findlay, J. ...	W. K. Holt ...	No. A.	A. Holt ...	" 17.9.28 to 26.9.28 ...	22.10.28
<i>Explorer</i> ...	Ling, J. T. ...	H. W. Gostage ...	" M.	Harrison ...	" 27.4.28 to 25.8.28 ...	28.8.28
<i>Explorer</i> ...	Allan, J. ...	A. Stout, F. O. Sheehy ...	" A.	Scottish Fishery Board.	" 3.10.28 to 11.10.28 ...	2.11.28
<i>Ferdale</i> ...	Thompson, W. ...	R. S. Hartwick ...	No. M.	Aberdeen Commonwealth.	" 7.7.28 to 5.8.28 ...	23.8.28
<i>Flandria</i> ...	Maars, L. ...	S. R. Hemmes ...	" M.	Holland Lloyd ...	" 31.8.28 to 16.10.28 ...	22.10.28
<i>Fordsdale</i> ...	Richardson, A. V. ...	" ...	" M.	Aberdeen Commonwealth.	" 25.7.28 to 13.8.28 ...	4.9.28

Name of Vessel.	Captain.	Observing Officers.	Official Meteorological Equipment.	Line.	Last Log, Register, or Report Contributed. Received up to 16.11.28.	Date Received.
Francisco	Scales, H.	F. Elgin	No. A.	Ellerman Wilson	Form 911 30.8.28 to 4.10.28	10.10.28
Freya	Angus, W.	W. Pirrie	" A.	Scottish Fishery Board.	" 1.9.28 to 30.9.28	5.10.28
Garth Castle	Linklater, H. ... ..	...	" A.	Union Castle	Met. Log. 12.7.28 to 25.9.28	31.10.28
Gascoyne	Johnson, L.	W. J. Macphedran, C. Melson, J. S. Macbryde.	M.L.	A. Holt & Co.	Met. Log. 21.5.28 to 6.9.28	29.10.28
Galia	Veldkamp, C. J.	A. J. H. Schöler	" M.	Holland Lloyd	Form 911 15.9.28 to 7.10.28	3.11.28
Glamorganshire	Purvis, A.	E. A. E. Littlewood	" M.	R.M.S.P. Co.	" 17.9.28 to 19.10.28	25.10.28
Glenamoy, M.V.	Homah, C. E.	R. H. Bishop, R. W. Emerson, F. S. Howell.	M.L.	Glen Line	Met. Log. 5.12.27 to 16.4.28	29.5.28
Glenapp	Ingram, T. F. ... ..	...	No. A.	...	...	...
Glengarry	Angier, J.	F. C. White	" M.	...	Form 911 27.8.28 to 23.9.28	23.10.28
Glenthue	Kennett, W. H.	H. B. Porter	" A.	...	" 26.9.28 to 30.10.28	12.11.28
Glenshane	Kersley, L. W.	A. C. Radley	" A.	...	" 21.8.28 to 23.9.28	29.10.28
Glenhworth	Kilgour, H. A.	A. N. Storm	No. A.	R. S. Dalgleish	" 25.9.28 to 1.11.28	9.11.28
Gloucestershire	Robin, E. ... ..	...	" A.	Bibby	" 25.8.28 to 4.11.28	13.11.28
Halesius	Samuels, C.	N. MacLeod	" A.	R. P. Houston	" 30.8.28 to 29.9.28	31.10.28
Haliartius	Felton, W. J.	C. C. Reeder	" A.	...	" 5.9.28 to 6.10.28	8.10.28
Harmonides	Hughes, W. F.	K. T. Roper	" A.	...	" 30.7.28 to 18.8.28	26.9.28
Hatimura	Dawes, H. F. C.	L. E. Heath	" M.	British India	" 5.10.28 to 2.11.28	5.11.28
Hauraki, M.V.	Norton, A. T.	T. Marshall, R. B. Denniston, F. C. Cochran.	M.L.	Union S.S. Co., N.Z.	Met. Log. 29.11.27 to 5.3.28	1.6.28
Henry G.S. Holmes,	Bicker Caarten, A.	M. A. Green	No. M.	W. I. & Panama Telegraph Co.	Form 911 3.9.28 to 12.10.28	2.11.28
Herald	Haselfoot, F.E.B., Capt. D.S.O., R.N.	D. G. V. Williams, W. H. Martin.	M.L.	His Majesty's Ship	Met. Log. 13.3.28 to 10.7.28	22.8.28
Heredfordshire	Lyon, H.	M. D. Louttill	No. A.	Bibby	Form 911 11.8.28 to 18.10.28	22.10.28
Herminius	Roberts, T. V.	D. W. MacGregor	" A.	Shaw, Savill & Albion	" 13.7.28 to 22.8.28	10.10.28
Herschel	Watson, W. W.	J. F. Maurey	" A.	Lampport & Holt	" 27.5.28 to 24.8.28	31.8.28
Hertford	Kettlewell, C. R.	J. R. Ricketts	M.L.	Federal ... ..	...	...
Hibernia	Roberts, W. Ivor, M.B.E.	R. Woodall, A. Marsh	C.C.	L.M. & S. Railway	Telegraphic Report 26.10.28	26.10.28
Highland Laddie	Jones, T. J.	E. F. Smart	No. A.	Nelson	Form 911 22.4.28 to 12.6.28	9.7.28
" Piper	Collings, D.	R. G. Owen, A. Southgate	M.L.	...	Met. Log. 1.12.27 to 22.6.28	7.8.28
" Pride	Robinson, R. H.	F. Quelch	No. A.	...	Form 911 8.9.28 to 3.11.28	7.11.28
" Prince	Davis, J.	J. Harrison	" A.	...	" 13.5.28 to 25.5.28	8.6.28
" Rover	Ashby Graves, F.	N. F. Seaton	" A.	...	" 17.28 to 17.8.28	8.9.28
Hilabrand	Peregrine, D. ... ..	...	" A.	Booth	" 21.9.28 to 28.10.28	5.11.28
Hobson's Bay	Kydd, O. J.	R. Pearce, J. Worrall, D. Horn, J. D. Loughnan.	M.L.	Aberdeen Commonwealth.	Met. Log. 14.6.28 to 22.9.28	9.10.28
Holbein	Gough, W. A.	F. Delaney	No. A.	Lampport & Holt	Form 911 10.6.28 to 29.6.28	11.9.28
54 Homeric	White, E. R., R.D., Commr. R.N.R.	H. G. Morgan, S. B. Morfee, W. T. Poustie.	W.T.	White Star	W.T. Reg. 11.10.28 to 26.10.28	29.10.28
Hororata	Holland, E.	A. E. Bamforth	No. A.	New Zealand S.S. Co.	Form 911 26.3.28 to 10.7.28	14.7.28
Hubert	Briceoe, W.	G. G. Westhorp	" A.	Booth	" 13.7.28 to 23.8.28	8.9.28
Huntingdon	Ashworth, W.	H. G. Lettis	" A.	Federal	" 30.6.28 to 23.7.28	30.8.28
Huntsman	Russell, H.	J. Richardson	" M.	Harrison	" 13.4.28 to 15.8.28	3.9.28
Hydaspes	Williams, P. E.	P. McMillan	No. M.	R. P. Houston	Form 911 13.6.28 to 9.7.28	7.8.28
Ingoma	Brown, A. P.	W. P. Baker	" M.	Harrison	Form 911 5.8.28 to 17.9.28	27.9.28
Inkum	Meethan, J. H. ... ..	...	" A.	J. H. Welsford	" 10.10.28 to 24.10.28	3.11.28
Iris, C.S.	Hughes, H. R.	L. V. Vicker, D. MacDonald	M.L.	Pacific Cable Board	Met. Log. 25.8.27 to 3.10.27	21.3.28
Iroquois	Nares, J. D., D.S.O., Capt. R.N.	A. B. Foulerton	" A.	His Majesty's Ship	" 27.4.28 to 31.8.28	6.10.28
Ixion	Reed, G. C. ... ..	...	No. A.	A. Holt	Form 911 25.6.28 to 6.8.28	17.9.28
Javanese Prince	Marshall, F.	J. B. Morrison	" A.	Prince	" 7.8.28 to 31.10.28	8.11.28
Servis Bay	Chaplin, W. R.	R. W. Laycock	" M.	Aberdeen Commonwealth.	" 20.12.27 to 23.4.28	14.5.28
Justin	Bush, H.	L. G. McMillan	" A.	Booth	" 15.8.28 to 27.8.28	2.11.28
Kaiser-i-Hind	Manley, G.	R. H. Hand	" M.	P. & O.	" 1.9.28 to 24.10.28	26.10.28
Kalyan	Cornwall Jones, B.	W. R. B. Noel	" M.	P. & O.	" 3.10.28 to 22.10.28	10.11.28
Kamo Maru	Enya, S.	S. Maruyama	" A.	Nippon Yusen Kaisha	" 22.7.28 to 21.8.28	20.9.28
Kangaroo	Norris, H. C.	E. Hutchinson, J. Edward, H. Reynolds.	M.L.	State Service Australia.	Met. Log. 2.4.28 to 1.8.28	29.10.28
Karamea	McIntosh, A. ... ..	...	" M.	Shaw, Savill & Albion	Form 911 2.9.28 to 11.10.28	5.11.28
Karapara	Miller, A. C.	J. Smail	No. M.	British India	" 23.8.28 to 9.9.28	1.10.28
Kashmir	Mallaloe, R., R.D., Lt.-Commr. R.N.R.	W. C. Riley	" M.	P. & O. ... ..	...	...
Kent	Matthews, C.	W. C. Wilkinson	No. A.	Federal	Form 911 21.12.27 to 24.1.28	31.1.28
Khiva	Stringer, R. H., O.B.E., R.D., Commr. R.N.R.	G. W. Wood, D. Meakle, V. A. Nicolls, A. Robson.	M.L.	P. & O.	Met. Log. 13.10.27 to 14.4.28	23.4.28
Khyber	Hester, C. W., R.D., Commr. R.N.R.	C. G. R. Fleming	"	P. & O.	" 3.5.28 to 14.8.28	11.9.28
Knight Companion	Davis, A. L.	J. H. Isherwood	No. M.	A. Holt	Form 911 15.9.28 to 6.10.28	12.11.28
Koolinda, M.V.	Buckeridge, J. ... ..	...	" M.	State Service, Australia.	" 24.7.28 to 6.9.28	15.10.28
Kovno	Kavanagh, J. ... ..	...	" M.	...	...	...
...	Dossor, W. A.	F. Barnard, S. Butcher	M.L.	Ellerman Wilson	Met. Log. 24.12.27 to 2.7.28	6.7.28
37 Laconia	Doyle, M.	E. W. Connell, A. B. Fasting, F. G. Russell	W.T.	Cunard	W.T. Reg. 15.10.28 to 4.11.28	7.11.28
Laguna	Mander, T. ... ..	...	" M.	...	Form 911 15.10.28 to 4.1.28	7.11.28
Lahore	Gordon, L. M., R.D., Commr. R.N.R.	E. B. Elcoate	No. A.	Pacific S.N. Co.	Form 911 21.2.28 to 14.3.28	20.6.28
Lalande	Hamill, H.	A. E. Warburton	" M.	P. & O.	" 15.5.28 to 29.6.28	12.7.28
Lancashire	Crumplin, W. E.	R. Allen	No. A.	Lampport & Holt	Form 911 7.8. 8 to 11.9.28	27.9.28
36 Lancastria	Townley, J. C., R.D., Commr. R.N.R.	L. R. Sharp, G. Overton, P. L. Williams	" A.	Bibby	" 8.6.28 to 11.8.28	14.8.28
Laomedon	Hatfield, E.	R. L. Haldstock	No. A.	Cunard	W.T. Reg. 10.10.28 to 26.10.28	29.10.28
La Paz, M.V.	Morgan, D. R.	J. D. Richards	" M.	...	Form 911 7.10.28 to 27.1.28	29.10.28
55 Lapland	Harvey, H.	B. Harries, L. A. Williams, J. C. Flett.	W.T.	Red Star	W.T. Reg. 1.10.28 to 19.10.28	23.10.28

LIST OF VOLUNTARY OBSERVING SHIPS

Name of Vessel.	Captain.	Observing Officers.	Official Meteorological Equipment.	Line.	Last Log, Register, or Report Contributed. Received up to 16.11.28.	Date Received.
Largs Bay ...	Clifford, —	...	No. M.	Aberdeen Common-wealth.	...	...
64 <i>Laurentic</i> ...	Trant, E. L., R.D., Commr. R.N.R.	J. W. Peters, R. Hawkyns	"	White Star ...	W.T. Reg. 14.10.28 to 2.11.28... Form 911 14.10.28 to 3.11.28...	7.11.28 5.11.28
<i>Lautaro</i> , M.V. ...	Leyne, R. W. ...	J. T. Denley ...	No. M.	Pacific S.N. Co. ...	12.5.28 to 15.8.28 ...	8.9.28
<i>Leicestershire</i> ...	de Legh, P. ...	R. S. Evans, H. G. Walton, C. F. Hicks, A. Thomson.	M.L.	Bibby ...	Met. Log. 14.7.28 to 22.9.28 ...	26.9.28
<i>Leighton</i> , M.V. ...	Lindesay, J. M. ...	...	No. A.	Lamport & Holt ...	Form 911 1.5.28 to 20.5.28 ...	19.6.28
<i>Leitrim</i> ...	Robertson, A. ...	S. J. Woodhouse ...	" A.	Dowie, J., & Co. ...	4.8.28 to 22.9.28 ...	25.9.28
<i>Limerick</i> ...	Molyneux, P. L. ...	F. J. Schibild ...	" M.	Federal... ..	" 10.5.28 to 5.7.28 ...	11.9.28
<i>Llandaff Castle</i> ...	Gilbert, E. F. ...	R. Bayer ...	" A.	Union Castle ...	19.4.28 to 8.5.28 ...	9.6.28
<i>Llandovery Castle</i> ...	Stuart, C. E., R.D., Capt. R.N.R.	C. H. Williams, G. Moon, P. Clissold.	M.L.	" " ...	Met. Log. 26.7.28 to 4.10.28 ...	6.10.28
<i>Lobos</i> , M.V. ...	Pape, E. R. ...	S. E. Ayland ...	No. M.	Pacific S.N. Co. ...	Form 911 6.10.28 to 23.10.28...	10.11.28
<i>Loch Katrine</i> ...	Schlanbusch, O. V. ...	D. A. Mallinson ...	No. A.	R.M.S.P. Co. ...	" 18.6.28 to 15.9.28 ...	17.9.28
<i>Logician</i> ...	Gibbins, W. ...	A. G. S. Madrell ...	No. M.	Harrison ...	22.6.28 to 15.10.28...	19.10.28
<i>London Importer</i> ...	Fowler, W. H. ...	F. F. Feint, J. H. Metcalfe, J. G. Freeman.	M.L.	Furness Withy ...	Met. Log. 8.1.28 to 31.3.28 ...	14.4.28
<i>Lord Antrim</i> ...	Jarvis, F. E. ...	...	No. A.	Ulster S.S. Co. ...	Form 911 23.8.28 to 5.9.28 ...	17.9.28
<i>Loriga</i> , M.V. ...	Clapham, E. C. ...	D. P. Morgan ...	" A.	Pacific S.N. Co. ...	" 6.9.28 to 24.9.28 ...	10.10.28
<i>Losada</i> , M.V. ...	Ross, J. ...	D. Beamer ...	" M.	" " ...	" 15.8.28 to 31.8.28 ...	18.9.28
<i>Macedonia</i> ...	Harrison, R. ...	C. J. L. Hayward ...	" M.	P. & O. ...	" 9.9.28 to 18.9.28 ...	27.9.28
<i>Macharda</i> ...	Hanna, R. G. ...	T. Johnston ...	" M.	Brocklebank ...	" 25.6.28 to 9.8.28 ...	21.8.28
<i>Mahrona</i> ...	Addy, M. J. ...	J. Kettlewell ...	No. M.	" " ...	" 18.8.28 to 13.9.28 ...	22.10.28
<i>Maihar</i> ...	Charlton, W. L. ...	J. W. B. Robertson, C. Cad- wallader, S. S. Slade.	M.L.	" " ...	Met. Log. 27.1.28 to 21.4.28 ...	7.6.28
<i>Maimoa</i> ...	Johnson, J. W. ...	...	" A.	Shaw, Savill & Albion	Brocklebank ...	7.8.28
<i>Maimyo</i> ...	Smith, G. C. ...	H. M. Drummond ...	No. A.	Brocklebank ...	Form 911 5.11.27 to 15.6.28 ...	7.8.28
58 <i>Majestic</i> ...	Marshall, W. C.E., D. S. O., R. D., Commodore R.N.R.	W. W. Pearson, J. Clarke, W. T. Fitz Gerald, A. H. Young.	W.T.	White Star ...	W.T. Reg. 18.10.28 to 1.11.28...	3.11.28
<i>Makalla</i> ...	Maugham, J. W. ...	J. B. Newman ...	No. M.	Brocklebank ...	Form 911 4.8.28 to 8.9.28 ...	15.10.28
<i>Makambo</i> ...	Middleton, J. ...	...	M.L.	Burns Philp ...	Met. Log. 1.2.28 to 22.6.28 ...	25.9.28
<i>Makura</i> ...	McLean, J. ...	...	"	Canadian- Australasian	" 26.1.28 to 11.5.28 ...	11.7.28
<i>Malabar</i> , M.V. ...	Donaldson, A. ...	K. Morris ...	"	Burns, Philp & Co. ...	" 28.12.27 to 13.4.28...	4.7.28
<i>Malakuta</i> ...	Adamson, F. L. ...	N. Grayson ...	No. M.	Brocklebank ...	Form 911 23.5.28 to 20.6.28 ...	17.7.28
<i>Malancha</i> ...	Whitham, F. ...	R. Humble, F. Moore ...	" M.	" " ...	" 3.4.28 to 19.6.28 ...	30.6.28
<i>Malda</i> ...	Gray, T. N. ...	S. G. James ...	" M.	British India ...	" 25.6.28 to 5.7.28 ...	1.8.28
<i>Maloja</i> ...	Browning, J. B., R.D., Commr. R.N.R.	A. D. Dennis ...	" M.	P. & O. ...	" 21.9.28 to 11.10.28...	5.11.28
<i>Malwa</i> ...	Norman, W. A. ...	G. C. Case ...	" M.	" " ...	" 21.7.28 to 13.9.28 ...	21.9.28
<i>Manchester Brigade</i> ...	Stott, C. H. ...	W. S. Eustace, E. E. Bonnaud, W. R. Cullen.	M.L.	Manchester Liners ...	Met. Log. 3.3.28 to 14.8.28 ...	29.8.28
<i>Manchester Corporation</i> ...	Makin, T. ...	...	No. A.	" " ...	Form 911 18.9.28 to 26.10.28...	8.11.28
<i>Manchester Hero</i> ...	Riley, J. E. ...	H. Anderton, J. H. Emmett, H. Dobson, A. Ricketts, A. Grant.	M.L.	" " ...	Met. Log. 24.3.28 to 12.10.28...	19.10.28
<i>Manchester Producer</i> ...	Struss, F. D. ...	J. W. Moss ...	No. A.	" " ...	Form 911 8.9.28 to 7.10.28 ...	22.10.28
<i>Manchester Regiment</i> ...	Foale, J. R. ...	P. D. Barr ...	" A.	" " ...	" 4.2.28 to 9.3.28 ...	14.3.28
<i>Manipur</i> ...	Cochran, G. N. ...	R. Penston, G. B. Falconer ...	No. M.	Brocklebank ...	" 9.9.28 to 5.10.28 ...	5.11.28
<i>Manistee</i> ...	Edwards, A. E. ...	J. D. Patterson, A. Sandham, W. E. A. Duff.	M.L.	Elders & Fyffes ...	Met. Log. 17.6.28 to 20.7.28 ...	9.8.28
<i>Manora</i> ...	Hudson, H. T., R.D., Commr. R.N.R.	W. H. Cruise ...	No. M.	British India... ..	Form 911 29.4.28 to 13.7.28 ...	21.8.28
<i>Mantua</i> ...	Davis, H. C., D.S.C., Commr. R.N.R.	...	" M.	P. & O. ...	" 5.8.28 to 26.9.28 ...	6.10.28
<i>Marella</i> ...	Mortimer, S. ...	A. G. Hill, C. Edmonds, A. G. Thomas.	M.L.	Burns Philp ...	Met. Log. 3.2.28 to 2.6.28 ...	5.10.28
<i>Marengo</i> ...	Curle, J. ...	H. Bryan, J. Ford, F. Barnard, S. Butcher.	"	Ellerman Wilson ...	" 27.3.28 to 30.6.28 ...	6.7.28
<i>Maresfield</i> ...	Berry, V. ...	T. Connolly ...	No. A.	Woods, Tyler & Brown	Form 911 3.5.28 to 19.5.28 ...	9.6.28
<i>Martha</i> ...	Hughes, C. G. ...	P. Wright, B. Ludgate ...	M.L.	British India... ..	Met. Log. 15.7.28 to 5.10.28 ...	12.10.28
<i>Marquesa</i> ...	Smiles, R. S. ...	L. Owen ...	No. M.	Furness Houder ...	Form 911 29.7.28 to 28.9.28 ...	2.10.28
<i>Marstina</i> ...	Williams, G. E. ...	J. C. Reid ...	No. A.	Burns' Philp & Co. ...	" 14.8.28 to 10.9.28 ...	15.10.28
<i>Matakana</i> ...	Thurston, H. P. ...	J. J. Finn, J. Dickson, C. E. Mayer.	M.L.	Shaw, Savill & Albion	Met. Log. 31.3.28 to 7.8.28 ...	10.8.28
<i>Matarani</i> ...	Vay, W. ...	R. M. Blunt ...	No. A.	Burns, Philp & Co. ...	Form 911 21.7.28 to 7.9.28 ...	15.10.28
<i>Mataroa</i> ...	Kershaw, W. A. R. ...	...	M.L.	" " ...	" " " " " " " " " " " "	" " " " " " " " " " " "
<i>Matheran</i> ...	Ison, W. A. ...	J. Richardson ...	No. M.	Brocklebank ...	Form 911 25.9.28 to 15.10.28...	3.11.28
<i>Matiana</i> ...	Green, F. V. ...	W. McInnes ...	" M.	British India... ..	" 4.8.28 to 23.10.28 ...	29.10.28
<i>Mabra</i> ...	Cornish, N. P. ...	W. Gibson, Hodgson, G. G. ...	" M.	Brocklebank ...	" 22.8.28 to 29.9.28 ...	13.10.28
<i>Maunganui</i> ...	Toten, A. T. ...	C. R. Carlyon, A. J. Herbert	" M.	Union S.S. Co. of N.Z	" 28.4.28 to 7.7.28 ...	23.7.28
32 <i>Mauretania</i> ...	Aldwell, B. M. ...	...	W.T.	Cunard ...	W.T. Reg. 7.10.28 to 22.10.28...	24.10.28
<i>Megantic</i> ...	McNeil, S.G.S., R.D., Capt. R.N.R.	R. H. C. Crawford, C. B. Os- borne B. J. P. Tuck.	W.T.	White Star ...	Form 911 16.7.28 to 2.8.28 ...	13.8.28
22 <i>Melita</i> ...	Kearney, J. ...	F. E. Patchett ...	No. A.	Canadian Pacific ...	W.T. Reg. 9.9.28 to 27.9.28 ...	1.10.28
<i>Memnon</i> ...	Stewart, A. ...	J. Shearer, T. Gillette ...	W.T.	A. Holt... ..	Form 911 9.9.28 to 24.9.28 ...	12.11.28
21 <i>Metagama</i> ...	Watson, C. J. ...	J. A. C. McGregor ...	No. A.	Canadian Pacific ...	W.T. Reg. 1.9.28 to 19.9.28 ...	24.9.28
<i>Middlesex</i> ...	McQueen, D. S. ...	A. Watt, J. Harrison ...	W.T.	Federal... ..	Form 911 5.7.28 to 24.7.28 ...	18.9.28
<i>Minna</i> ...	Wilde, H. ...	D. J. Murray ...	No. M.	Scottish Fishery Brd.	" 8.10.28 to 2.11.28 ...	13.11.28
23 <i>Minnesota</i> ...	Mackenzie, G. G. ...	A. M. Campbell ...	W.T.	Canadian Pacific	" " " " " " " " " " " "	" " " " " " " " " " " "
<i>Minnetonka</i> ...	Finch, E., R. D., Commr. R.N.R.	...	No. M.	Atlantic Transport ...	Form 911 6.8.28 to 26.8.28 ...	29.8.28
<i>Minnewaska</i> ...	Gates, T. F., C.B.E. ...	L. C. Hill ...	" M.	" " ...	" 8.10.28 to 27.10.28...	31.10.28
<i>Mirror</i> , C.S. ...	Claret, F. H., C.B.E., Commr. R.N.R.	F. J. Mummery ...	" M.	" " ...	" 24.9.28 to 28.10.28...	14.11.28
<i>Mississippi</i> ...	Jones, T. M.B.E. ...	J. G. West ...	" M.	Eastern Tel. Co. ...	" 13.2.28 to 18.3.28 ...	10.4.28
<i>Modasa</i> ...	Wylie, J. T. J. ...	...	No. A.	Atlantic Transport ...	" 20.10.28 to 30.10.28 ...	2.11.28
<i>Moeraki</i> ...	Gilchrist, J. W. ...	A. E. Baker, E. Crozier ...	" M.	British India ...	" 10.6.28 to 28.8.28 ...	18.9.28
<i>Moldavia</i> ...	Day, P. H. ...	...	No.	Union S.S. Co. of N.Z.	" " " " " " " " " " " "	" " " " " " " " " " " "
<i>Mongolia</i> ...	Stringer, R.H., O.B.E., R.D., Commr. R.N.R.	C. B. Holmes ...	No. M.	P. & O. ...	Form 911 23.7.28 to 4.10.28 ...	11.10.28
	Furlong, G. H. S., R.D., Capt. R.N.R.	A. H. Cole ...	" M.	" " ...	" 8.8.28 to 17.9.28 ...	24.9.28

LIST OF VOLUNTARY OBSERVING SHIPS

Name of Vessel.	Captain.	Observing Officers.	Official Meteorological Equipment.	Line.	Last Log. Register, or Report Contributed. Received up to 16.11.28.	Date Received.
<i>Polycarp</i> ...	Jackson, T. H. ...	H. W. Taggart ...	No. A.	Booth ...	Form 911 25.9.28 to 8.10.28 ...	2.11.28
<i>Port Adelaide</i> ...	Swan, L. H. ...	E. N. Rogerson, F. J. Lavers, L. H. Potter.	M.L.	Commonwealth & Dominion.	Met. Log. 3.2.28 to 18.6.28 ...	6.7.28
" <i>Albany</i> ...	Needham, R. ...	...	"	" " "	" 22.1.28 to 4.7.28 ...	11.7.28
" <i>Auckland</i> ...	Durham, R. S., D.S.C.	C. F. Post, E. R. Rowlands, H. E. Braine.	"	" " "	" 16.3.28 to 27.7.28 ...	7.8.28
" <i>Bowen</i> ...	Hearn, G. W. ...	S. Ray ...	No. A.	" " "	Form 911 9.9.28 to 17.9.28 ...	26.10.28
" <i>Campbell</i> ...	Reynolds, P. J. ...	J. G. Thom ...	"	" " "	" 6.1.28 to 13.5.28 ...	18.5.28
" <i>Caroline</i> ...	Brown, A. H. ...	J. B. Bradley, L. M. Bayly, R. Forrest, J. Stannard.	M.L.	" " "	Met. Log. 27.4.28 to 24.9.28 ...	9.10.28
" <i>Darwin</i> ...	Sawbridge, I. R. ...	H. Pinkney, E. M. Fenton, S. Moate, J. Dedman.	"	" " "	" 2.3.28 to 30.6.28 ...	20.7.28
" <i>Denison</i> ...	Ferris, J. ...	E. T. N. Lawrey, L. W. Cady, A. A. Cooper, J. Rowland-Hill.	"	" " "	" 8.3.28 to 5.9.28 ...	11.9.28
" <i>Dunedin, M.V.</i>	Farmar, F. ...	E. G. Jones, H. M. Post, N. M. Muzzell.	"	" " "	" 5.4.28 to 13.7.28 ...	21.7.28
" <i>Fremantle, M.V.</i>	Kearney, F. J. ...	A. G. Rhind ...	No. A.	" " "	Form 911 5.5.28 to 8.6.28 ...	15.6.28
" <i>Gisborne, M.V.</i>	Hayter, S. W. ...	H. Boys-Smith ...	" A.	" " "	" 8.7.28 to 10.11.28 ...	15.11.28
" <i>Hobart, M. V.</i>	Cottell, S. C. ...	R. Carter, L. Copeland, G. G. Langford, C. L. Webb.	M.L.	" " "	Met. Log. 8.6.28 to 4.10.28 ...	9.10.28
" <i>Hunter</i> ...	Cottell, S. C. ...	J. C. Goddard, A. McClounan, J. T. Weldin.	"	" " "	" 7.1.28 to 11.5.28 ...	16.5.28
" <i>Huon</i> ...	Compton, J. E. ...	J. E. Fairbairn ...	No. A.	" " "	Form 911 30.8.28 to 18.10.28...	29.10.28
" <i>Melbourne</i> ...	Kippins, T. ...	A. R. Martin, F. W. Elgar, W. E. Simpson.	M.L.	" " "	Met. Log. 12.5.28 to 8.10.28 ...	22.10.28
" <i>Nicholson</i> ...	Jack, J. ...	J. G. Lewis, G. L. H. Dean, A. G. Newbury, W. B. Hopkins.	M.L.	" " "	Met. Log. 19.2.28 to 28.7.28 ...	17.8.28
" <i>Pirte</i> ...	Hudson, J. J. ...	W. G. Jones, J. F. Martin, A. Brown.	"	" " "	" 26.5.28 to 24.10.28...	10.11.28
" <i>Sydney</i> ...	Higgs, W. G. ...	T. L. Kidwell, E. E. Roswell, K. D. Morgan.	"	" " "	" 30.3.28 to 16.8.28 ...	22.8.28
" <i>Victor</i> ...	Williams, R. ...	R. Stannard, W. B. Craig, C. E. Midwinter.	"	" " "	" 3.2.28 to 9.6.28 ...	27.6.28
" <i>Wellington</i> ...	Jones, C. ...	D. F. Morgan ...	No. A.	" " "	Form 911 18.4.28 to 23.5.28 ...	23.7.28
<i>President Jackson</i>	Griffith, J. ...	J. A. Cartwright ...	" A.	Pacific Mail S.S. Co...	" 26.3.28 to 10.9.28 ...	12.11.28
<i>President Jefferson</i>	Nichols, F. R. ...	C. H. Moen, S. Hansson ...	" A.	Admiral Oriental Line	" 5.1.28 to 29.1.28 ...	20.2.28
<i>Protea, H.M.S.A.S.</i>	Daighesh, J., Lt.-Commr., S.A.N.S.	A. C. Matson ...	M.L.	South African Naval Service.	Met. Log. 1.2.28 to 10.5.28 ...	12.6.28
<i>Protestilus</i> ...	Williams, T. G. ...	R. E. Wilks ...	No. A.	A. Holt ...	" 28.9.27 to 16.5.28 ...	21.6.28
<i>Pyrrhus</i> ...	Elford, W. J. ...	...	No. A.	" " "	Form 911 18.6.28 to 10.8.28 ...	13.8.28
<i>Quiloa</i> ...	Cave, S. ...	...	No. M.	British India...	...	...
<i>Rajputana</i> ...	Cadiz F. G., D.S.C.	...	M.	P. & O. ...	...	...
<i>Rampura</i> ...	King, A. M., D.S.C.	E. J. Spurling ...	No. M.	P. & O. ...	" 17.8.28 to 11.10.28...	18.10.28
<i>Rawalpindi</i>	Thornton, E. J. ...	A. G. Stansfield...	" M.	" " "	" 8.10.28 to 26.10.28...	31.10.28
<i>60 Regina</i> ...	Davies, E. ...	R. S. Walker, E. A. A. Crowley.	W.T.	White Star - Dominion }	W.T. Reg. 7.10.28 to 28.10.28...	30.10.28
<i>Raindeer</i> ...	Pitman, R. R. ...	...	C.C.	G.W. Railway	Telegraphic Report 23.2.28 ...	23.2.28
<i>Remuera</i> ...	Cameron, J. J. ...	H. Harwood ...	M.L.	New Zealand S.S. Co.	Form 911 6.7.28 to 19.10.28 ...	8.11.28
<i>Rhezenor</i> ...	Davies, J. ...	A. Yarwood ...	No. A.	A. Holt...	" 1.10.28 to 17.10.28...	5.11.28
<i>Rhodesian Transport</i>	Bullock, F. W. H. ...	J. G. Freeman ...	" A.	Houlder Bros. ...	" 17.4.28 to 14.8.28 ...	30.8.28
<i>Rimutaka</i> ...	Hemming, F. A. ...	F. Pretty, H. S. Cashmore, F. Cooke, E. Foster.	M.L.	New Zealand S.S. Co.	Met. Log. 13.4.28 to 10.8.28 ...	16.8.28
<i>Ripley Castle</i> ...	Morgan, A. O., R.D., Commr., R.N.R.	T. E. Wilford ...	No. A.	Union Castle ...	Form 911 2.3.28 to 4.5.28 ...	8.5.28
<i>Risalder</i> ...	Matthews, E. G. ...	R. H. Friedlander ...	No. M.	Asiatic S.N. Co. ...	" 4.11.27 to 19.11.27...	12.12.27
<i>Rother</i> ...	Woodhead, T. H. ...	N. Thompson ...	No. A.	Goole Steam Shipping	" 13.9.28 to 27.10.28...	3.11.28
<i>Rotorua</i> ...	Hunter, J. L. B. ...	A. D. Landles, L. Griffiths, T. M. Devitt.	M.L.	New Zealand S.S. Co.	Met. Log. 8.6.28 to 21.9.28 ...	3.10.28
<i>Royal Transport</i> ...	Oliver, R. C. ...	R. Hughes ...	No. A.	Houlder Bros. ...	Form 911 17.6.28 to 15.9.28 ...	21.9.28
<i>Ruapehu</i> ...	McKellar, A. W., R.D., Capt., R.N.R.	S. Butler, L. F. Malcouronne, H. N. Lawson.	M.L.	New Zealand S.S. Co.	Met. Log. 29.6.28 to 15.10.28 ...	17.10.28
<i>St. Albans</i> ...	Smith, G. L., Commr., R.A.N.R.	R. L. Harry, J. Moodie, Heddle, R. S. M. Jones.	"	Eastern and Australian.	" 7.3.28 to 16.7.28 ...	30.10.28
<i>St. Helier</i> ...	...	C. Bell ...	G.C.	G.W. Railway ...	Telegraphic Report 15.11.28...	15.11.28
<i>St. Julien</i> ...	Richardson, L. ...	C. W. Sanderson ...	"	" " "	" 18.10.28 ...	18.10.28
<i>St. Andrew</i> ...	Bearpark, E. W. ...	E. E. Moodie ...	No. A.	Rankin Gilmour ...	Form 911 20.8.28 to 7.9.28 ...	19.9.28
<i>33 Samaria</i> ...	Malin, R. G., Lieut.-Commr., R.N.R.	C. S. Williams, W. B. Tanner, P. G. Britten.	W.T.	Cunard... }	29.7.28 to 18.8.28 ...	22.8.28
<i>Sardinian Prince</i> ...	Brown, J. F. ...	G. A. Davies ...	No. A.	Prince ...	Form 911 22.10.28 to 10.11.28 ...	15.11.28
<i>Saxon</i> ...	Shilston, P. G., R.D., Capt. R.N.R.	R. May ...	" A.	Union Castle ...	Form 911 18.9.28 to 20.10.28...	12.11.28
<i>Scholar</i> ...	Whyte, D. L. ...	...	" M.	Harrison ...	" 27.6.28 to 10.9.28 ...	14.9.28
<i>Scotia</i> ...	Prichard, S. D., M.B.E.	W. L. Hughes ...	C.C.	L.M. & S. Railway ...	Telegraphic Report 10.11.28...	10.11.28
<i>33 Scythia</i> ...	Irving, R. B., O.B.E., R.D., Capt. R.N.R.	R. Sell, G. H. Morris, J. G. Bradley.	W.T.	Cunard... }	W.T. Reg. 1.10.28 to 21.10.28...	25.10.28
<i>Sheaf Mount</i> ...	Groves, C. V. ...	A. Macarthur ...	No. A.	W. A. Souter ...	Form 911 30.9.28 to 22.10.28...	25.10.28
<i>Sheaf Spear</i> ...	Whitfield, G. A., O.B.E.	S. J. Dring, H. Pike ...	"	" " "	" 28.8.28 to 10.10.28...	18.10.28
<i>Shropshire, M.V.</i>	Adamson, B. W. ...	W. L. Whiteside, R. Cuming, W. H. Brittain.	"	Bibby ...	Met. Log. 19.10.27 to 9.2.28 ...	18.10.28
<i>Socrates</i> ...	Taylor, F. C. ...	W. E. Jordan ...	No. A.	Lampart & Holt ...	Form 911 1.10.27 to 21.12.27...	27.1.28
<i>Somerset</i> ...	Howell Price, J. ...	W. Redwood ...	" A.	Federal... }	" 17.5.28 to 26.6.28 ...	30.6.28
<i>Spero</i> ...	Montgomery, H. ...	H. W. Vickers ...	M.L.	Ellerman Wilson ...	Met. Log. 6.1.28 to 17.28 ...	6.7.28
<i>Statesman</i> ...	Mowat, J. ...	R. Letten ...	No. M.	Harrison ...	Form 911 26.7.28 to 23.9.28 ...	6.10.28
<i>Stephen</i> ...	Evans, L. G. ...	N. Caris ...	No. A.	Booth ...	" 18.6.28 to 7.8.28 ...	16.8.28
<i>Stockwell</i> ...	Smith, W. ...	R. A. Kneen ...	" A.	Brocklebank ...	" 19.7.28 to 9.8.28 ...	3.9.28
<i>Surrey</i> ...	Lamb, C. B. ...	...	" A.	Federal... }	" 1.4.28 to 3.5.28 ...	19.9.28
<i>Suwa Maru</i>	Gotoh, M. ...	...	" A.	Nippon Yusen Kaisha	" 28.9.28 to 29.10.28...	2.11.28
<i>Sylvanfield, M.V.</i>	Biddick, E. ...	A. M. Tully ...	" A.	Hunting & Son ...	" 18.6.28 to 25.7.28 ...	27.7.28
<i>Tainui</i> ...	Elford, H. C. ...	L. J. Hopkins ...	" A.	Shaw, Savill & Albion	" 5.7.28 to 9.8.28 ...	16.8.28
<i>Tahiti</i> ...	Aldwell, B. M. ...	C. R. Carlyon ...	" A.	Union S.S. Co. of N.Z.	" 16.5.28 to 3.6.28 ...	7.8.28
<i>Taipung</i> ...	Frame, A. M. ...	F. Stratford, A. C. Kennedy, R. Bargent.	M.L.	Yuill & Co. ...	Met. Log. 15.11.27 to 9.4.28 ...	23.6.28
<i>Takada</i> ...	Lindon, J. ...	...	No. M.	British India ...	...	...
<i>Talhybius</i> ...	Wilson, R. J. ...	W. Alderton ...	" A.	A. Holt ...	Form 911 18.9.28 to 4.10.28 ...	25.10.28
<i>Tamara</i> ...	Hartman, W. H. ...	F. W. Lutyens ...	" M.	Shaw, Savill & Albion	" 9.6.28 to 15.7.28 ...	19.7.28

Name of Vessel.	Captain.	Observing Officers.	Official Meteorological Equipment.	Line.	Last Log, Register, or Report Contributed. Received up to 16.11.28.	Date Received.
<i>Tanda</i> ...	Diamond, S. L. { Pilcher, E. T. Lieut.- Commr., R.N.R.	G. C. Smith, H. Munday, J. W. Kavanagh, H. Nuzum.	M.L.	E. & A. S.S. Co. ...	Met. Log 2.2.28 to 18.6.28 ...	25.9.28
<i>Taranaki, M.V.</i> ...	Wood, C. ...	J. W. Hart, G. Campbell, P. Savill	"	Shaw, Savill & Albion	" 20.5.28 to 19.9.28 ...	27.9.28
<i>Tarantia</i> ...	Munro, D., R.D., Commr. R.N.R.	" " " " " "	No. A.	Anchor ...	Form 911 26.7.28 to 16.10.28...	9.11.28
<i>Tetresias</i> ...	Wilkinson, W. H. ...	C. B. P. Anderson ...	" A.	A. Holt & Co. ...	" 22.9.28 to 25.10.28...	29.10.28
<i>Tekoa</i> ...	Barnett, H. ...	" " " " " "	" M.	New Zealand S.S. Co.	" 10.8.28 to 3.10.28 ...	6.10.28
<i>Telamon</i> ...	Willcox, J. H. ...	F. A. Brown ...	" A.	A. Holt ...	" 14.8.28 to 16.9.28 ...	23.10.28
<i>Tetela</i> ...	Brice, E. H. ...	" " " " " "	" A.	Elders & Fyffes ...	" 8.9.28 to 13.10.28 ...	22.10.28
<i>Teucer</i> ...	Reed, G. C. ...	J. M. Kirk ...	" A.	A. Holt ...	" 22.8.28 to 24.10.28...	29.10.28
<i>Themistocles</i> ...	Young, A. D. ...	H. C. Howe ...	" M.	Aberdeen ...	" 4.2.28 to 22.2.28 ...	16.4.28
<i>Theseus</i> ...	Jones, E. ...	W. A. Fyffe ...	" A.	A. Holt ...	" 10.8.28 to 7.10.28 ...	18.10.28
<i>Tilawa</i> ...	Power, P. W. ...	" " " " " "	" M.	British India...	" 11.9.28 to 24.9.28 ...	15.10.28
<i>Titan</i> ...	Rowe, J. J. ...	G. W. Best, P. Cross, R. A. Shennan.	M.L.	A. Holt ...	Met. Log. 4.3.28 to 15.7.28 ...	18.7.28
<i>Tongariro</i> ...	Burton Davies, J. ...	E. A. Burton, A. E. Williams, E. A. Quick, D. Baldwin.	"	New Zealand S.S. Co.	Met. Log. 4.3.28 to 27.6.28 ...	2.7.28
<i>Transylvania</i> ...	Erskine, R. ...	P. Middleton ...	No. A.	Anchor ...	Form 911 26.8.28 to 15.9.28 ...	20.9.28
<i>Trefusis</i> ...	Cordy, C. ...	" " " " " "	" A.	Hain S.S. Co. ...	" 14.6.28 to 7.8.28 ...	8.8.28
<i>Trematon</i> ...	Evans, E. ...	J. Jenkyn, C. Warren, R. Kitson.	M.L.	Hain S.S. Co. ...	Met. Log. 25.1.28 to 5.5.28 ...	11.5.28
<i>Turakina</i> ...	Field, H. G. B. ...	" " " " " "	No. M.	New Zealand S.S. Co.	Form 911 3.9.28 to 22.9.28 ...	8.11.28
<i>Il Tuscania</i> ...	Rome, W. B. ...	J. Noble ...	W.T.	Anchor ...	W.T. Reg. 22.10.28 to 10.11.28 ...	15.11.28
<i>Tyndareus</i> ...	Christie, W. ...	A. F. Barclay, T. R. Phillips, F. H. Gray.	M.L.	A. Holt ...	Form 911 21.10.28 to 11.11.28 ...	14.11.28
<i>Ultmaroa</i> ...	Wylie, W. J. ...	R. A. Dance ...	No. M.	Huddart Parker, Ltd.	Met. Log. 29.11.27 to 23.4.28...	1.6.28
<i>Ulysses</i> ...	Owen, R. D., O.B.E. ...	C. W. Jones ...	" A.	A. Holt ...	Form 911 31.8.28 to 25.9.28 ...	29.10.28
<i>Umvulosi</i> ...	Barnes, E. W. ...	R. Dyns ...	" A.	Bullard King ...	" 2.9.28 to 21.9.28 ...	8.10.28
<i>Valacia</i> ...	Inch, F. ...	" " " " " "	" M.	Cunard ...	" 21.9.28 to 9.10.28 ...	5.11.28
<i>Vardulia</i> ...	Fear, E. T. O. ...	" " " " " "	" A.	" " " " " "	" 26.3.28 to 13.5.28 ...	17.5.28
<i>Vigilant</i> ...	Simpson, E. S. S. ...	W. H. Barker ...	" A.	" " " " " "	" 17.7.28 to 23.8.28 ...	1.10.28
<i>Waiotapu</i> ...	Todd, D. ...	J. Hunter ...	" A.	Scottish Fishery Board.	" 1.10.28 to 31.10.28...	3.11.28
<i>Wairuna</i> ...	Creese, A. W. ...	F. H. G. Clark ...	" M.	Canadian - Australasian.	" 12.7.28 to 10.8.28 ...	3.9.28
<i>Walmer Castle</i> ...	Jackson, C. R. ...	J. E. Broughton, R. Tulloch, J. Ritchie.	M.L.	Union S.S. Co. of N.Z.	Met. Log. 4.2.28 to 22.5.28 ...	8.8.28
<i>Wangarata</i> ...	Scutt, W. ...	G. H. Pickering... T. W. Wordingham, S. R. Millard, A. G. Brooks, M. Harvey.	No. A. M.L.	Union Castle ... British India ...	Form 911 11.8.28 to 30.9.28 ... Met. Log. 22.4.28 to 1.10.28 ...	3.10.28 6.10.28
<i>Warfield</i> ...	Steel, R. ...	" " " " " "	No. A.	" " " " " "	Form 911 11.5.28 to 27.6.28 ...	17.7.28
<i>War Nizam</i> ...	Moncrieff, T. ...	F. J. Marshall ...	" M.	British Tankers ...	" 5.5.28 to 11.6.28 ...	26.6.28
<i>Westmoreland</i> ...	Gardner, H. W. ...	G. A. Shepherd, K. S. Phillips, R. L. Warren.	M.L.	Federal... ..	Met. Log. 22.1.28 to 2.6.28 ...	7.6.28
<i>William Scoresby, R.S.S.</i>	De la Motte, J. B. B., Lieut., R.N.	" " " " " "	"	Falkland Islands Government.	" " " " " "	"
<i>Windsor Castle</i> {	Morton-Betts, W. { Chave, Sir B., K. B.E. {	A. J. Tweddell, C. Gorringe, R. Tyser.	"	Union Castle ...	" 17.2.28 to 12.8.28 ...	11.9.28
<i>Winifredian</i> ...	Harrocks W. ...	A. Crone ...	No. M.	Leyland ...	Form 911 30.10.27 to 22.12.27 ...	6.1.28
<i>Wonganella</i> ...	Suffern, H. ...	" " " " " "	"	W. Crossby & Sons ...	" 21.8.28 to 30.9.28 ...	9.11.28
<i>Woodarra</i> ...	Reilly, J. V. ...	H. Goater, L. J. C. Simpson, G. F. Alexander J. McPhail.	M.L.	British India...	Met. Log. 1.1.28 to 25.5.28 ...	1.6.28
<i>Zent</i> ...	Roberts, H. ...	R. C. Harradan... ..	No. A.	Elders & Fyffes ...	Form 911 3.9.28 to 5.10.28 ...	10.10.28
<i>Conway, H.M.S.</i> ...	Richardson, F. A., D.S.C., Commr., R.N.	The Senior Cadets ...	Cadets' M.L.	" " " " " "	Cadets' Met. Log. 6.5.28 to 27.7.28...	2.8.28
<i>Pangbourne Nautical College</i>	Tracy, A. F. G., Commr., R.N.	" " " " " "	"	" " " " " "	Cadets' Met. Log. 2.5.28 to 26.7.28...	3.8.28
<i>Worcester, H.M.S.</i>	Sayer, M.B., C.B.E., A.D.C., R.D., Capt., R.N.R.	" " " " " "	"	" " " " " "	Cadets' Met. Log. 4.5.28 to 25.7.28...	1.8.28
<i>Abaco</i> ...	" " " " " "	The Keepers ...	Lighthouse Register.	" " " " " "	Lighthouse Register 1.1.28 to 30.6.28	14.9.28
<i>Cay Lobos</i> ...	" " " " " "	" " " " " "	"	" " " " " "	Lighthouse Register 1.1.27 to 11.7.27	29.9.27
<i>Double Headed Shot</i>	" " " " " "	" " " " " "	"	" " " " " "	Lighthouse Register 4.9.27 to 29.2.28	24.4.28
<i>Inagua</i> ...	" " " " " "	" " " " " "	"	" " " " " "	Lighthouse Register 14.1.28 to 19.7.28	14.9.28
<i>Sombrero</i> ...	" " " " " "	" " " " " "	"	" " " " " "	Lighthouse Register 1.1.28 to 30.6.28	17.8.28
<i>Watling Island</i> ...	" " " " " "	" " " " " "	"	" " " " " "	Lighthouse Register 1.1.28 to 30.6.28	14.9.28
<i>Cape Pembroke (Falkland Is.)</i>	" " " " " "	" " " " " "	"	" " " " " "	Lighthouse Register 1.1.28 to 30.6.28	22.8.28

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

Name of Vessel.	Captain.	Observing Officer.	Line.	Last Case of Water Samples, Reports, etc., received up to 31.10.28.	Date Received.
<i>Antillian</i> ...	Hannaford, W. ...	J. L. Crighton ...	Leyland ...	Water Samples ...	30.7.28
<i>Dakotian</i> ...	Robb, J. ...	W. F. Sloan ...	" " " " " "	" " " " " "	30.6.28
<i>Darro</i> ...	Matthews, G. P. ...	J. Clark ...	R.M.S.P. Co. ...	" " " " " "	5.10.28
<i>Desado</i> ...	Hannan, F. S. ...	J. G. Scott ...	" " " " " "	" " " " " "	18.10.28
<i>Hildebrand</i> ...	Peregrine, D. ...	E. Jones ...	Booth ...	" " " " " "	7.9.28
<i>Oranian</i> ...	Hoskins, W. ...	T. J. Jones ...	Leyland ...	" " " " " "	24.8.28