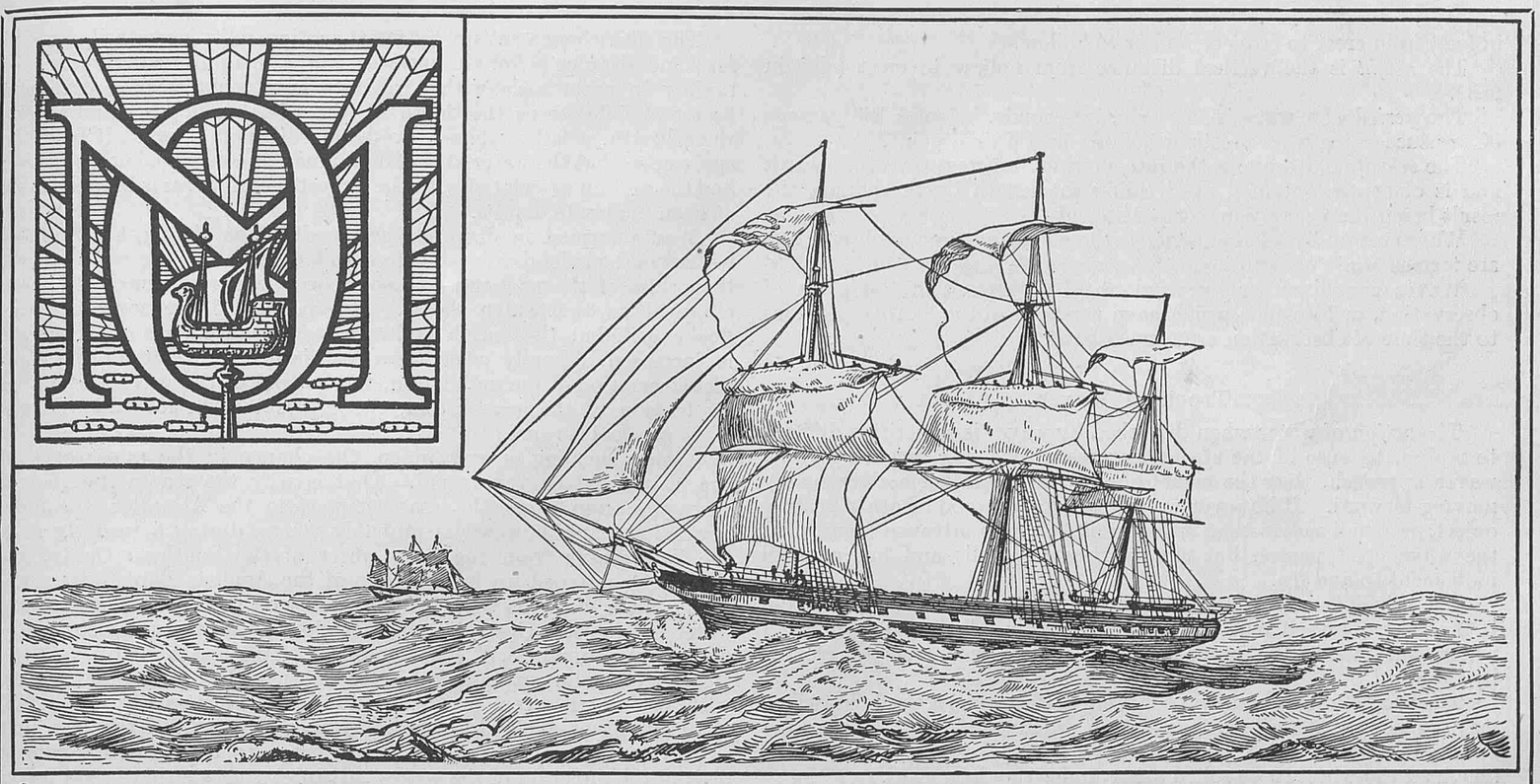

VOL. II. No. 19. THE MARINE OBSERVER. JULY 1925.

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## SPECIAL OBSERVATIONS OF SEA AND SWELL.

Some years ago before we had this Journal as a means of communicating requests generally to Marine Observers, a letter was circulated asking a large number of members of our corps for their views upon scales for routine observation of sea and swell. There was a good response, the outcome of which is the subject of the following article. Marine Observers are generally invited to take measurements of seas and swells in all parts of the world, not only when they are heavy, but under all conditions and to return them with their Logs, Registers and Reports in order that the admirable suggestion of an old Marine Observer, now Hydrographer of the Navy, may be completed to aid routine observation of the future.

Marine Superintendent.

## SEA AND SWELL.

Prepared in the Marine Division by H. Keeton, Principal Clerical Assistant.

In Chapter XII of "Wireless and Weather, an Aid to Navigation," which appeared in the December 1924 number of this Journal, it was remarked that naval architects had recently drawn attention to the importance of statistical information of sea and swell for research work in connection with the form of hull for obtaining sea-kindliness and small resistance; and attention was drawn to the necessity of careful observations of sea disturbance with a view to its correlation with wind force, which would be useful for many purposes.

The following article is therefore written with the object of stimulating interest in this subject, in which little progress has been made of recent years.

The following definitions are given of terms which will be frequently used.

The *length* of a wave is the horizontal distance (usually expressed

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in feet) from crest to crest or hollow to hollow.

The *height* is the vertical distance from hollow to crest (also in feet).

The *period* of a wave is the time, in seconds, between the passage of two succeeding wave crests or hollows past a *fixed* point.

The *velocity* of a wave is the rate at which its crest travels forward, and is of course obtained by dividing the length by the period, the result being the velocity in feet per second.

Waves set up by wind existing at the place and time of observation are termed *sea.*

Waves caused either by wind at a distance from the place of observation, or by winds which have persisted in the locality previous to the time of observation are termed *swell.*

## Trochoid Waves.

The action of water when disturbed by waves is sometimes difficult to realise, because of the strong impression one gets, when watching waves approach, that the crests of the waves are themselves bodily moving forward. If however we watch a log of wood or other floating object, we shall notice that it makes little or no advance forward as the wave crest passes, but simply rises and falls and has a small movement to and fro.

The principle underlying the formation of deep sea waves therefore is that the observed motion is not the bodily advance of a mass of water, but merely the propagation of energy or movement created by the wind.

The profile of an ocean wave is a curve known as a trochoid, which may be simply described as a curve which would be traced on a bulkhead by a marking point fixed to the spoke of a wheel, if we imagined the wheel to be rolled along under the deck head.

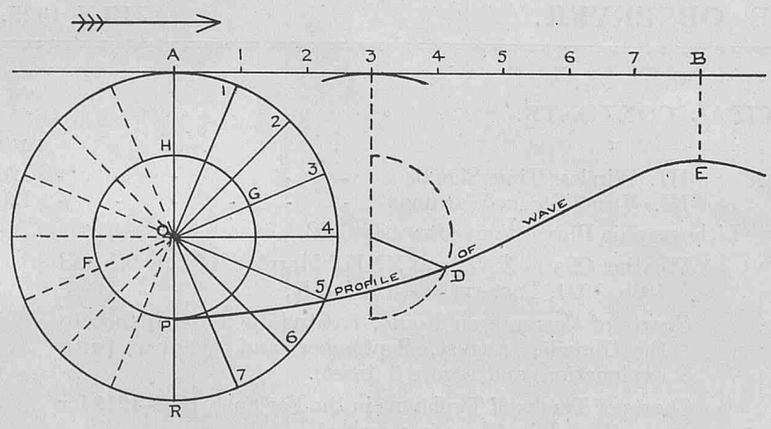



**Figure 1.**

In the above figure, the large circle represents the wheel, and P the marking point on a spoke, OP (the distance from the axle) being called the tracing arm. The arrow shows the direction in which the circle rolls and the wave is supposed to be travelling. AB is the base, *i.e.*, the straight line under which the circle is to roll, the length AB being equal to the half circumference of the wheel AR. Now as the circle rolls, when 3 of the circle reaches 3 of the base, the semicircle FPG will be in the position shown by the dotted semicircle; and the marking point P will coincide with the point D, having described part of a trochoid PD. When the circle has completed half a revolution, the marking point P will coincide with E, having described the trochoid curve PDE, which is half a wave length; the diameter POH represents the height of the wave. The nearer the marking point is to the axle of the wheel, the flatter will be the trochoid.

Accepting the condition that the profile of an ocean wave is a trochoid the motion of the particles requires to be noticed.

Each particle revolves with uniform speed in a circular orbit, perpendicular to the wave ridge (the diameter of the orbital circles being the height of the wave) and completes a revolution in the same time as the wave takes to advance its own length.

At the wave crest the motion of the particles is wholly horizontal, advancing in the same direction as the wave; at mid-height on the front slope, it is wholly upwards; in the hollow it is again horizontal but in the opposite direction to the travel of the wave, and at mid-height on the back slope it is wholly downwards.

The disturbance set up by wave motion must necessarily extend for some distance below the surface; but its magnitude decreases very rapidly in accordance with a definite law, the trochoids becoming flatter and flatter as the depth increases. At a depth equal to one wave length, it is less than a five-hundredth part of what it is at the surface, so that the water at that depth may be considered undisturbed; and the motion associated with the largest ocean waves is inappreciable at even moderate depths.

Waves formed in deep sea are modified as they get into shoal water. When the depth is reduced to less than half the wave length, the orbits of the particles commence to become flattened and more elliptical as the water shoals. The period of the wave remains unchanged, but the length and speed are reduced, while the height is increased. Finally when the depth is not sufficient for the complete formation of the undulation, the bottom of the wave is retarded by friction of the sea bottom, the top is thrown forward and the wave breaks into surf.

Where shoaling is very steep, the change in the appearance of the waves will be very rapid. That is why the sea in the Bay of Biscay is often worse than farther west in the Atlantic; the most marked example however is probably where, during a westerly gale, the long waves from the deep water of the Southern Ocean, are suddenly shortened up by the edge of the Agulhas Bank. Here the sea is much worse on the edge than either on the bank or in the deep water outside it. Of course this notoriously steep sea is also largely due to the action of S.W. wind against the Agulhas current.

The foregoing explanation of the structure of trochoidal waves, with a smooth even profile, closely approximates to the actual observations of swell observed in the open ocean; but the fact that a ship rolling amongst waves is subjected to a certain amount of drift in the direction of the waves' advance, suggests that ocean waves do not conform *entirely* to this pattern. This subject however requires further investigation before a definite explanation can be given.

## Relation between Length, Period and Velocity.

Certain relations have been established between the length and the period and velocity of trochoidal waves, the principal of which are as follows :—

$$\text{Length} = \text{Velocity} \times \text{Period}.$$
$$\text{Period} = \text{Velocity} \div 5\tfrac{1}{8}.$$
$$\text{Period} = \sqrt{\text{Length} \div 5\tfrac{1}{8}}.$$

By the use of these formulæ, if any one of the above wave elements is measured, the other two can be calculated, but for the convenience of observers the following table is given :—

| Wave Length in Deep Sea. | Wave Period. | Velocity of Transmission of *Individual Waves* in Deep Sea. | | Velocity of Transmission of the *Groups of Waves* in Deep Sea. | |
|---|---|---|---|---|---|
| Feet. | Seconds. | Feet per Second. | Nautical Miles per Hour. | Feet per Second. | Nautical Miles per Hour. |
| 25 | 2·2 | 11·3 | 6·7 | 5·7 | 3·4 |
| 50 | 3·1 | 16·0 | 9·5 | 8·0 | 4·8 |
| 75 | 3·8 | 19·6 | 11·6 | 9·8 | 5·8 |
| 100 | 4·4 | 22·6 | 13·4 | 11·3 | 6·7 |
| 150 | 5·4 | 27·7 | 16·4 | 13·9 | 8·2 |
| 200 | 6·3 | 32·0 | 19·0 | 16·0 | 9·5 |
| 300 | 7·7 | 39·2 | 23·2 | 19·6 | 11·6 |
| 400 | 8·9 | 45·2 | 26·8 | 22·6 | 13·4 |
| 500 | 9·9 | 50·6 | 30·0 | 25·3 | 15·0 |
| 600 | 10·9 | 55·4 | 32·8 | 27·7 | 16·4 |
| 700 | 11·8 | 59·8 | 35·4 | 29·9 | 17·7 |
| 800 | 12·6 | 63·8 | 37·8 | 31·9 | 18·9 |
| 900 | 13·3 | 67·7 | 40·1 | 33·9 | 20·1 |
| 1,000 | 14·1 | 71·4 | 42·3 | 35·7 | 21·2 |

Waves at sea are observed to occur generally in series or groups, the region between successive groups consisting of *comparatively* calm water. If we follow the motion of the first wave of the group, we shall find that it dies out, and that the wave next behind takes the lead. If on the other hand we watch the last wave of the group

we shall see that another one appears behind it. The new waves constantly arise in the rear as rapidly as those in front die out, so that the general appearance of a group of waves remains unchanged. The group *as a whole* has a definite velocity of propagation, which has been found to be half of that of the individual waves comprising the group, as shown in the table given above.

### Connection between Ocean Waves and Wind.

There can be, of course, no question that waves result from the action of wind upon the sea, and that there must be some connection between the direction and speed of the wind, and the dimensions and periods of the resulting waves. It is not proposed here to trace the action of wind in the actual formation of waves, but to deal simply with the effects produced by the wind.

At present we know comparatively little of precise numerical relations between the dimensions of waves and the force of the wind which produces them. Apart from the scarcity and incompleteness of measured observations, there is the fact that the waves observed from a ship at any given time are not wholly caused by the wind then actually prevailing, but also depend on the previous direction, force, and duration of the wind at that particular spot or at a distance.

From actual observations made by several investigators, the following facts emerge with respect to the effect of wind upon waves :—

The length of waves is increased when the length of the sheet of water to windward is increased. This explains why the waves in enclosed or narrow seas fail to attain such dimensions as those in the open oceans.

The wave raising power of the wind is much greater when operating upon water already in waves than upon smooth or nearly smooth water.

The height of a wave increases somewhat rapidly with an increase of wind, and soon attains its maximum height for any given wind velocity; it also diminishes more rapidly than any other element of wave motion, when the wind drops. Thus during a squall the height of the waves is seen to increase quite appreciably, and to drop quickly as the squall passes away. The length of waves increases much more slowly, but much more persistently, and with a constant wind may take four days or more to reach its maximum development.

During the years 1867–70 a French naval officer, Lieutenant A. PARIS, recorded a succession of carefully made observations upon the state of the sea, while serving on board the corvette *Dupleix* and the frigate *Minerve* during a passage to the Far East and while cruising in the China Seas and Western Pacific.

Lieutenant PARIS mentions that the relation of the speed of the wind to that of the wave increases fairly rapidly in proportion to the strength of the breeze; and he bases his conclusions in this connection upon the results of observations of waves that for the most part were unaffected by preceding wind or by local conditions, all records of swell and of deep sea waves having been discarded for this purpose.

| Assignment of speed in metres and feet per second. | Average speed of the Waves. | | Average relation of the speed of the Wind to that of the Wave. | Average relation by square root of the speed of the Wind to the speed of the Wave. | Number of Days of observations forming each group. |
|---|---|---|---|---|---|
| | Metres per sec. | Feet per sec. | | | |
| Speed of waves included between 8 and 11 metres (26·25 and 36·09 feet). | 9·6 | 31·5 | 0·63 | 0·25 | 8 |
| Speed of waves included between 11 and 14 metres (36·09 and 45·93 feet). | 12·5 | 41·0 | 0·99 | 0·27 | 8 |
| Speed of waves included between 14 and 15 metres (45·93 and 49·22 feet). | 14·6 | 47·9 | 1·26 | 0·29 | 8 |
| Speed of waves above 15 metres (49·22 feet). | 16·4 | 53·8 | 1·32 | 0·28 | 7 |

The reliable data remaining after these eliminations—in all only thirty-one observations—were arranged in four groups and the average speed of the wind and that of the wave was ascertained for each group.

The results are shown in the foregoing table in reference to which the author expresses the opinion that these indicate that in the open sea the speed of the wave is proportionate to the square root of that of the wind.

Dr. VAUGHAN CORNISH, who has spent many years in the study of waves, put forward in a lecture before the Royal Society of Arts in 1912 as a result of his observations, the following table for calculating the length and height of waves *finally* produced in the open sea, far from sheltering land, by the action of winds of the different Beaufort forces 6 to 12.

| WIND. | | | WAVES. | | | |
|---|---|---|---|---|---|---|
| Seaman's Description of Wind. | Force by Beaufort Scale. | Velocity, miles per hour (nautical). | Period in Seconds. | Length in Feet. | Height in Feet. | Length ÷ Height. |
| Strong breeze - | 6 | 24 | 7·2 | 262 | 17·5 | 15·0 |
| Moderate gale - | 7 | 30 | 8·9 | 404 | 21·7 | 18·6 |
| Fresh gale - | 8 | 37 | 10·6 | 575 | 25·9 | 22·2 |
| Strong gale - | 9 | 44 | 12·6 | 813 | 30·8 | 26·4 |
| Whole gale - | 10 | 52 | 15·2 | 1180 | 37·1 | 31·8 |
| Storm - - | 11 | 60 | 18·3 | 1720 | 44·8 | 38·4 |
| Hurricane - | 12 | Above 65 | 22·0 | 2489 | — | — |

The figures are for average waves. When their speed is equal to that of the wind, there is not the great variation in height which occurs when the wind has a velocity less than that of the swell left by a preceding storm.

Dr. CORNISH anticipated that some seamen would object that the wave lengths given in the table exceed their experience of the apparent length of waves, and this point will be dealt with later in the paragraphs on methods of observation.

Dr. CORNISH has since continued his investigations, and the following abstract from a paper read by him before the British Association meeting at Toronto in August 1924, published in " Lloyd's List " will be of interest.

" During a voyage from Southampton to Trinidad and back by the *Oruba*, the author took the period of the waves several times daily, from which their speed was calculated. The speed of the wind was ascertained by means of a Robinson anemometer (kindly lent by the Meteorological Office), due allowance being made for the speed of ship and direction of wind.

" The water is very deep from a short distance beyond Ushant, and free from strong currents as far as Barbados. The speed of the wind ranged from 13·9 to 23·6 statute miles per hour. That of the waves was in all cases less, the difference ranging from 1·0 mile an hour to a little more than 8·0 miles an hour. The latter is sufficient to keep a light flag flying. Anything less than one mile an hour is reckoned a calm. The difference was not proportional to the speed of the wind; nevertheless a relationship emerges when account is taken of the observations which were made simultaneously of the swell of the sea. When swell and wave ran precisely in the same direction (as sometimes occurred in the region of the trade winds) and on one day when no swell was recorded, the speed of the wave was so nearly equal to that of the wind that the breeze blowing over the ridges was only equal to the ' light air ' which barely suffices to give steerage way to a fishing smack. Such a light air would be detected on land by drift of smoke, but would not move a wind-vane. Thus there was no longer a battle between wind and wave.

" When the swell followed but crossed the wave the difference in speed of wind and wave was greater, and this difference increased rapidly when the crossing swell was meeting, instead of following, the wave. When the waves were much slower than the wind their height was always small, and sometimes their fronts were short and irregular. It was evident that the growth of waves in both length and height was much hindered

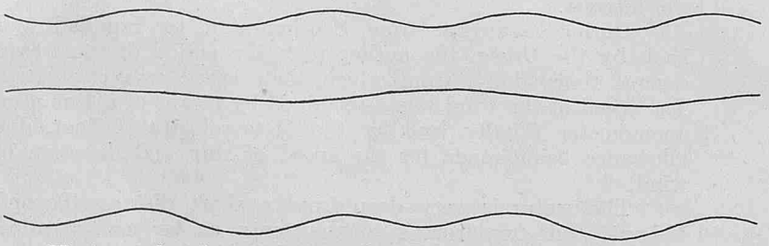
by a crossing swell, and it can be safely inferred that the general absence of swell is a sufficient reason for the rapid rise of waves upon enclosed seas. When a wind comes on to blow in the direction of the ocean swell with a speed greater than that of the swell, the growth of large, steep, waves is very rapid (doubtless even more rapid than their growth from smooth water), but this occurrence is relatively rare in the North Atlantic.

"The author found that the direction of the breaker out at sea was intermediate between that of wave and swell (the breaker being formed when they override) so that the practice of observing the direction of 'the curl on the water' as a method of determining the direction of the wind gives an erroneous result whenever there is a crossing swell, which is the usual condition upon the oceans. The general run of the waves, on the contrary, shows the direction of the wind reliably."

## Swell.

When wave motion is once set up in the ocean, it continues for a considerable time after the originating cause has ceased or passed away; persisting until the energy imparted to the wave is absorbed by the effect of gravity, friction, &c. Series of waves thus travelling away beyond the limits of the wind which raised them, retain their direction unchanged so long as they travel in deep water. The height will rapidly diminish, but the length and velocity will remain the same, and they assume the appearance of long low regular undulations of the water known as swell; and may ultimately appear as rollers or breakers on shores far distant from their place of origin.

The swell often observed at sea even during calm weather frequently has a length far in excess of the waves observed during a storm. When the storm waves travel away from their source of origin, there is no reason why they should increase in length, and we can only suppose that these waves of extreme length are actually present during the storm, but that they are masked by the dominant and steeper storm waves. FIGURE 2, taken from Dr. CORNISH'S "Waves of the Sea and Other Water Waves," illustrates the fact that a swell, 20 ft. in height and 1,150 ft. long may be practically invisible when combined with a storm wave 30 ft. high, and 600 ft. in length. The upper curve represents a wave of the given dimensions, and the middle curve the swell; the lower line represents a combination of the two. No datum line is drawn, as in actual conditions at sea, there is no fixed object to supply one.



Horizontal scale 1 in. = 400 ft. Vertical scale 1 in. = 200 ft.

**Figure 2.**

## Wave Development in Cyclonic Gales.

In northern latitudes the greatest development of waves takes place in the right hand rear quadrant of a depression or hurricane, as illustrated in the accompanying diagram, indicating the area covered by a depression. The long arrow shows the usual direction of advance of the depression, though this may often vary.

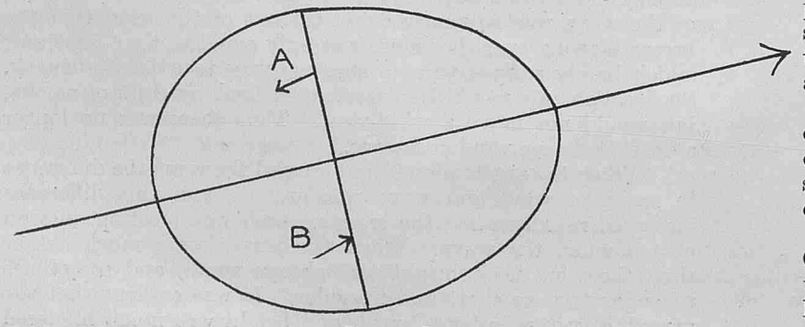



**Figure 3.**

In the position marked A the direction of the wind is opposite to that of the travel of the depression; consequently the depression is continually receding from the waves which its winds create, and we should not, therefore, expect any prolonged development of waves in this quadrant, even if the winds were strong, provided of course that the depression is moving East.

On the other hand, at B, the waves whose direction approximates to that of the advance of the storm, will remain under the influence of the wind for a much longer period, and will obviously attain much greater proportions with a given wind force than at A. Moreover the strongest winds in a cyclone are usually developed in rear of the trough, and thus will add still further to the waves of this area.

It is usually found, therefore, in reports of abnormal seas, that they have occurred in the right hand rear quadrant of a cyclone; or if in the Southern Hemisphere, in the left hand rear quadrant.

From the foregoing, it follows that another important factor in wave development is not only the direction and force of the wind, and direction of the storm, but the *rate of progression* of the storm.

It is clear that waves which are slower than the travelling storm are being left behind all the time. On the other hand, waves whose velocity is greater than that of the storm's progression, run ahead of it as *swell* and beyond the influence of the winds which raised them.

The waves whose velocity is identical with that of the travelling storm will be *continuously* subject to the action of the wind; and such conditions are, therefore, specially favourable for exceptional development of waves.

## Abnormal Seas.

Remarkably high seas were encountered in the right-hand rear quadrant of a deep depression in December 1922 by R.M.S. *Majestic*, Commodore Sir B. F. HAYES, K.C.M.G., D.S.O., R.D., R.N.R. Lieut. F. BUTCHER, R.N.R., 5th Officer, in his account of the storm, states that the seas were mountainous, estimated by observers to be about 80 feet.

Lieut. J. A. HEENAN, 4th Officer, made the following report regarding these seas :—

"About 10 p.m. on December 29th in Latitude 48° 30′ N., Longitude 21° 50′ W., the wind blowing W. to N.N.W. increased to hurricane force and the seas developed to a great height. Several of the Officers tried to estimate the height of the waves from the bridge, this being the only position possible owing to the great length of the vessel. The bridge is 90 feet above the waterline and the crow's nest on the foremast about 20 or 30 feet higher. The waves appeared to rise level with the crow's nest, and assuming that the fore part of the ship dipped as much as 30 feet on the back of a wave, which would probably bring the propellers out of the water—an incident which did not occur—a moderate estimate of the height of the waves would be between 80 and 90 feet.

"During this time the *Majestic* was travelling at about 3 knots, just sufficient to keep her head on."

In his long career in the Atlantic it is understood that Sir BERTRAM HAYES has never seen such precipitous seas.

Dr. VAUGHAN CORNISH, in a letter to the Editor of "Lloyd's List," commenting on the waves experienced by the *Majestic* remarked that the fundamental observation was that the oncoming waves were commonly in a line with the crow's nest. Mr. HEENAN judged 30 feet to be the greatest dip of the bow consistent with the fact that the propellers did not come out of the water. Dr. CORNISH got practically the same result from a consideration of the known steepness of waves in storms of this character, and the fact that the ship, being almost stationary and riding easily, would be taking approximately the average slope of the water.

He considered that the observations made by Mr. HEENAN and other officers of the *Majestic* were consistent with a height of wave of 80 feet, and had never met with any other account of waves of such a great height taken under conditions so favourable for observation.

More recently, according to press reports, Commodore Sir J. T. W. CHARLES, K.B.E., C.B., R.D., R.N.R., of the R.M.S. *Aquitania*, which arrived at Southampton, February 27th from New York, reports he encountered one of the worst gales he has ever experienced. Two days before reaching Southampton heavy seas swept the ship. An

officer said that one sea came up on " D " deck, smashed a window of the promenade deck, carried away a locker on the bridge, and smashed three sextants and a chronometer.

The White Star liner *Olympic*, Captain W. MARSHALL, D.S.O., R.D., R.N.R., outward bound from Southampton to New York (where she arrived 20 hours late) apparently encountered the same gale, and on February 27th was struck by a 70-feet wave, which seemed suddenly to have arisen out of the sea, and which badly damaged the navigation bridge.

Yet another recent example of big waves is recorded in "Lloyd's List," taken from the "Washington Hydrographic Bulletin." On January 8th last the American liner *President Jackson* was in Latitude 52° 48′ N., Longitude 159° 34′ W., the wind blowing W. to W. by S. force 11 to 12, with extremely high seas. The bridge of this vessel was 62 feet and the crow's nest 78 feet above the water line. Several of the officers on the bridge observed an occasional wave rise to the level of the crow's nest. The vessel was practically hove to, making only two to three knots, so the seas passed without damage. Assuming that the fore part of the steamer dipped 20 feet on the back of a sea, it was estimated that the highest waves were between 50 and 55 feet in height.

Some years ago the *Brandenburg*, steaming 7 knots, in Latitude 42° N. Longitude 25° W.; shipped " a tremendously high wave of extraordinary dimensions." It was estimated to have had a height of at least 65 feet and a length of 350 feet. The crow's nest, 50 feet above sea level, of quarter-inch steel plating, was stove in and her bridge, deck house, life-boats, and deck gear were all considerably damaged or washed overboard.

In 1904 the S.S. *Menominee*, Captain E. G. CANNONS, was struck by a wave 60 feet high, which broke over her, while crossing the North Atlantic; and in 1905 a wave 50 feet high washed overboard the officer of the watch from the bridge of the S.S. *Manningtry*.

The Hon. RALPH ABERCROMBY in July, 1885, on board S.S. *Tongariro* in the South Pacific Ocean observed waves 46 feet high during a hard S.W. gale in Latitude 55° S. Longitude 105° W.; using a very sensitive aneroid to measure the lift of the ship in passing from trough to crest of the waves.

The late Admiral R. FITZROY has left on record that he actually measured seas that were 60 feet in height. In 1875 the late Captain KIDDLE of the White Star liner *Celtic* determined a height of 70 feet for several waves in Mid-Atlantic from good measurements; and the late Admiral Sir W. J. L. WHARTON expressed his opinion that seas of 90 feet may be experienced, although the most probable maximum is 50 to 60 feet.

### Solitary Waves.

Huge solitary waves (commonly but erroneously called " tidal waves ") are occasionally met with at sea, often in otherwise perfectly calm water, which have caused both loss of life and damage to several ships. There is a strong probability that such waves are due to submarine seismic disturbances, and are similar to the " earthquake " waves which do an enormous amount of damage when breaking on the coast. The following are some examples of solitary abnormal seas :—

In 1881 the barque *Rosina*, on a voyage to New York, was struck by a solitary wave, which swept away all hands on deck. In the same year the *Rosina* encountered another solitary wave, which swept the vessel while the crew were shortening sail, and every man was carried away except a sick seaman lying in his bunk, who was eventually rescued by a passing steamer.

In 1882, off the Cape of Good Hope, the *Loch Torridon*, four-masted barque, was struck by a fearful and unexpected sea, the master, the second mate and the whole of the watch being carried away.

In March, 1893, when 300 miles east of Charleston, S.C., the barque *Johann Wilhelm* was struck by a solitary sea which swept overboard all her crew, except one man, and threw the vessel on to her beam-ends. The sole survivor was rescued by the S.S. *Electrician*.

The S.S. *Rheinland*, Captain RANDLE, was nearly sunk by one some years ago while crossing the North Atlantic. Her commander, from his elevated position on the bridge, observed an enormous wave coming towards the steamer with great velocity; took precautions for ensuring a maximum of safety; and leaped from the bridge to a more lofty position. Soon the sea so completely submerged the steamer, from stern to stem, that Captain RANDLE, from his coign of vantage, could only distinguish her funnel and foremast. Her whole hull was completely under water for a short interval. One man was washed overboard; the second mate, the carpenter, and the other members of the watch suffered from broken limbs; every boat disappeared; and the engine-room was almost full of water. In 1896, the S.S. *Thermopylae*, 800 miles west of Cape Leeuwin, shipped three heavy seas over the bows, although all around the sea was comparatively smooth. Nearly two years later, almost in the same position, the S.S. *Wooloomooloo* had four men washed overboard, and her upper work damaged, by a sea which advanced like a wall upon the steamer quite unexpectedly.

### Swell Originating in a Tropical Hurricane.

The action of the violent sustained winds in the right-hand rear quadrant of a hurricane in the Northern Hemisphere (or the left-hand rear quadrant in the Southern Hemisphere) blowing mainly in direction of the line of advance of the hurricane, develops large waves, which pass on beyond the limits of the storm as swell. This swell is carried to great distances, and as it travels at a much greater velocity than the hurricane, an observer may be forewarned of the existence of the latter by as much as 2 to 3 days. Thus the swell, which comes approximately from the direction of the storm centre, frequently gives the *first warning* of a hurricane, and its bearing, before the indications of wind, barometer or cloud are sufficiently definite to act upon.

Captain C. W. BREBNER, Master of the S.S. *Secunder*, who has navigated the South Indian Ocean for upwards of 30 years, when describing a cyclone he encountered on a voyage from Mauritius to Rodrigues in December, 1911, says :—" At noon on the 12th December, the *Secunder's* position was Latitude 19° 56′ S., Longitude 59° 52′ E., steering a little north of east, In this position I first encountered storm waves (Swell) and knew at once that a storm was at some distance to the N.N.E., the barometer then standing at 30·07 ins.; the wind was moderate in force, 4 to 5. On the 13th December the storm waves had risen to about " force 7," which was not in proportion to the height and steadiness of the barometer and the force of the wind. In this instance wave studies were of importance; *there was no other guide, meteorological or otherwise, but the waves*, and by their trend, height, and velocities, I knew that the distant storm was a severe one. A violent revolving storm can always be fairly judged by the storm waves encountered."

During the passage of two West India Hurricanes in September, 1921, the observations of swell reported were in some cases not as detailed as could be wished; but another instance of the usefulness of swell as a guide to the existence of cyclonic disturbances is afforded by the observations in the meteorological log of S.S. *Carmarthenshire*, Captain E. C. WAKEMAN.

*Carmarthenshire*, bound from Hull to Galveston, at 8 a.m. on 9th September, 1921, was in Latitude 29° 01′ N., Longitude 63° 23′ W. The barometer was normal for time of year and conforming to diurnal range, wind S.S.E. light, with a moderate swell from S.E. By 10 p.m. in Latitude 28° 14′ N., Longitude 66° 52′ W., the swell had become heavy from south; the barometer had fallen slightly but the wind remained light from S.S.E., and the weather fine. The swell was, therefore the only reliable indication that there was heavy weather to the southward. *Carmarthenshire* had received a W/T message from Bermuda at 8 p.m. of 9th saying that a tropical hurricane had been reported in the Caribbean Sea (No. II. Hurricane, FIGURE 4) but even if the swell from this disturbance could clear the islands, it could not have reached *Carmarthenshire* in the time, as it was known that No. II. Hurricane had advanced from the E.S.E.

There is little doubt, therefore, that the swell originated in No. I Hurricane the centre of which was then (10 p.m., 9th September) about 150 miles S. by W. of *Carmarthenshire's* position.

To seamen navigating in tropical latitudes during the hurricane season, the importance of swell observation will be apparent. It would be well, however, to call attention to the fact that the direction of the hurricane swell may be modified or confused if it meets with obstacles, such as land or shoal water.

### Storm Swells of Temperate Latitudes.

Much can be learned from observation of the swells set up by ordinary gales in the temperate latitudes. While a heavy swell does not necessarily indicate a coming storm, the seaman, by noting the

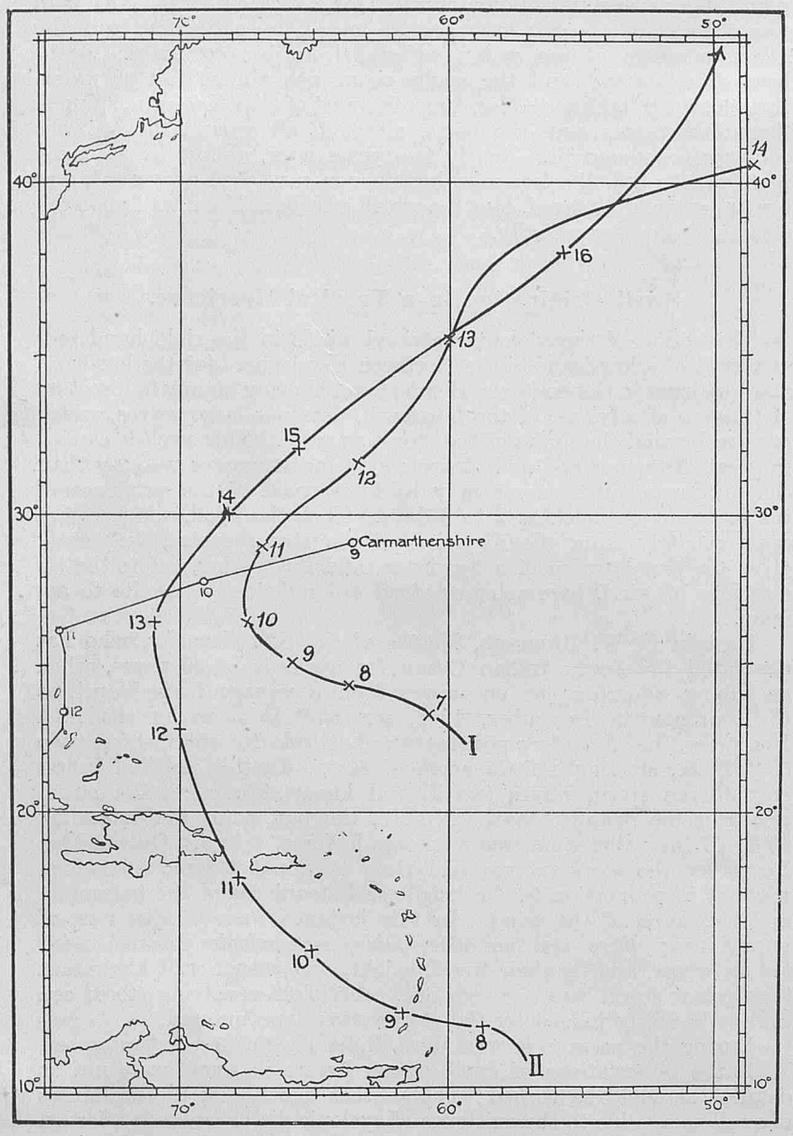



**Figure 4.—Tracks of September Hurricanes.**

changes in its direction and intensity as the ship continues her passage, can obtain a very fair idea of what weather changes are taking place.

An example is given below from observations contributed by Captain J. S. LEDSOME, S.S. *Lexington*, while in the North Atlantic, homeward bound, in November, 1919.

At 10 a.m., 25th November, in 48° 54′ N., 29° 04′ W., the *Lexington* observed a heavy swell coming from N.W. by W.

The approximate height of the swell was 15 ft. to 18 ft., and the period 10 seconds. This indicates that a considerable strength of wind from between N.W. and W.N.W. had prevailed somewhere on a line drawn N.W. by W. from the ship. The rate of travel of waves of this period is 15 miles per hour, or 360 miles per day; judging by its steepness the swell had not travelled far from its place of origin, and it is probable that the gale causing it had occurred the previous day in about 53° N. 37° W. Presuming the wind to be of a cyclonic character, the centre of the disturbance would be the north-eastward of this position.

The *Lexington* was steering a N. 70° E. course, and two hours later (Noon, 25th) reported the swell as changing more northerly.

At 8 p.m. in 49° 13′ N., 27° 49′ W., the swell was very heavy from the north, but appeared to be moderating. The inference to be drawn from these changes of direction of the swell is that the depression had moved rather rapidly in an easterly direction, its centre being ahead but to northward of the ship.

At 10 a.m., on the 26th, in 49° 40′ N., 23° 57′ W., the swell was recorded as coming from N.N.E., period 11 seconds, and height 15 ft. to 19 ft. This points to gales from N.N.E. at some distance N.N.E. of the ship; these gales would be blowing on the N.W. side of a depression, and having regard to the fact that the barometer had fallen 7·4 millibars during the preceding 24 hours, it seems to show that the depression had changed its course to S. or S.E.

At 10 a.m., 27th, in 50° 43′ N., 19° 37′ W., the swell was coming from N. 50° E., and had a period of 8·5 seconds, with a height of 10 ft. to 12 ft. The barometer had meanwhile fallen a further 9·1 mb., and the wind at ship had veered to N.N.E. and increased to force 4–5. It seems evident, therefore, that the ship was coming under the influence of the depression whose centre had continued to move S. or S.E. and which was now to the E. or E.S.E. of the ship. These inferences are confirmed by subsequent reference to Daily Weather Reports and observations from other ships; and working on these lines, much useful information may sometimes be gleaned from swell observations. FIGURE 5 illustrates the observations reported by Captain LEDSOME.

**Swell in North Atlantic, November, 1919.**

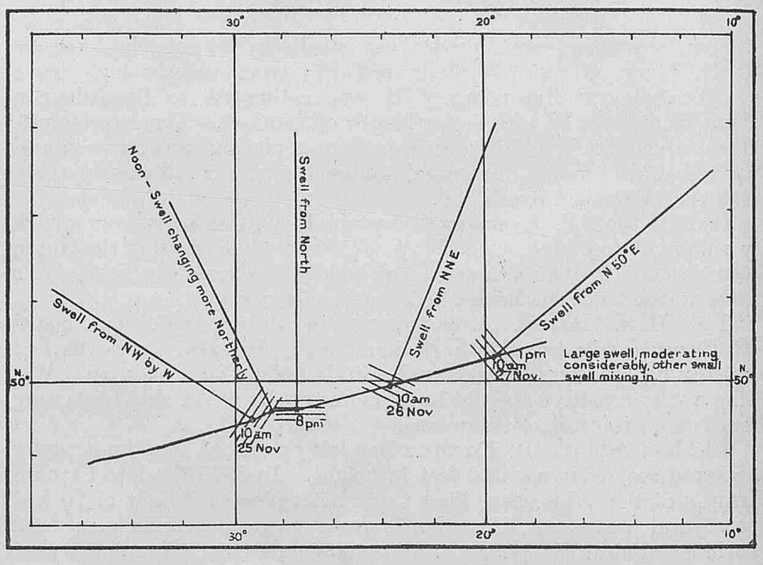



**Figure 5.**

## Coastal Swell.

Many of the islands and shores of the Atlantic Ocean are subject to periodical or permanent swells, some of which assume the nature of Rollers; the best known of which are perhaps the rollers of Ascension and St. Helena, of which an account is given below.

At Ascension, which is in the heart of the S.E. Trades, the rollers break with great violence on the lee side of the island, and arrive without any apparent warning. Their origin has been the subject of much discussion; and they have been attributed to various causes including earthquakes, submarine volcanoes, and the return of the waters after having been heaped up by the trade winds. It is now generally agreed that they are caused by distant gales of wind, either in the North or South Atlantic, blowing in the direction of the island.

The heaviest rollers are those caused by the swell from the North-West gales in the North Atlantic, which occur in the winter and spring of the year, from November to April. The south-easterly direction of this swell brings it to the island without any break.

From June to September the direction of the rollers is from S.W., from the storms prevailing in the Southern Hemisphere during that period.

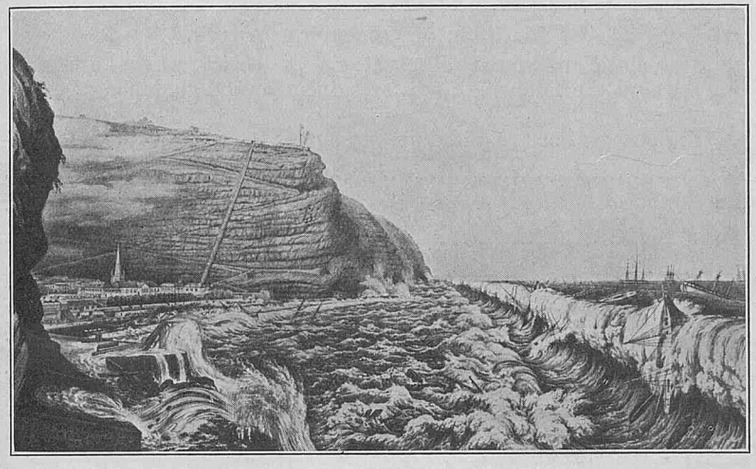
St. Helena experiences similar rollers to those of Ascension These rollers usually set in from the N.N.W. and are most prevalent during the months of January and February. During their continuance landing is extremely dangerous and can only be effected by watching for the intervals between the groups of rollers.

Many lives have been lost in consequence of boats being capsized, and in February, 1846, 13 vessels moored near the shore were driven from their moorings and totally wrecked, while the shore works also

suffered considerable damage. The picture below, from an old print in the Marine Division illustrates that occurrence.

The following table gives the average number of days for each month during which the sea was as described in column headings. It is compiled from records taken at the St. Helena landing place from 1891 to 1898.

| Month. | Calm. | Slight swell. | Heavy swell. | Rollers. |
|---|---|---|---|---|
| January - - - | 6·1 | 13·6 | 6·5 | 4·8 |
| February - - - | 4·0 | 10·0 | 9·0 | 5·0 |
| March - - - - | 11·8 | 13·0 | 5·0 | 1·2 |
| April - - - - | 11·0 | 13·5 | 5·0 | 0·5 |
| May - - - - | 13·0 | 12·0 | 3·7 | 2·3 |
| June - - - - | 9·5 | 17·0 | 2·5 | 1·0 |
| July - - - - | 11·0 | 15·5 | 3·5 | 1·0 |
| August - - - | 15·7 | 10·0 | 3·5 | 1·8 |
| September - - - | 10·0 | 16·0 | 3·4 | 0·6 |
| October - - - | 8·0 | 15·0 | 7·0 | 1·0 |
| November - - - | 10·0 | 9·6 | 8·4 | 2·0 |
| December - - - | 6·1 | 14·7 | 6·8 | 3·4 |



**"Rollers," St. Helena.**

The following extract is taken from the Meteorological Log of cable ship *Britannia*, Captain H. G. E. Wightman, D.S.C., Observer, Mr. H. Lawrence, 3rd Officer.

Notes on " Rollers " at St. Helena and Ascension Islands.

" During the vessel's stay at the above islands (February 7th to March 11 1923) opportunity was taken to note the conditions with regard to ' rollers.' These are huge ' tidal waves ' which can be seen at a considerable distance to the north-west rolling towards the beach in a contrary direction to the prevailing wind, and eventually breaking on the foreshore with terrific violence, and occasionally with thunderous noise. With ' moderate ' rollers landing was extremely difficult at either of the islands, and was not attempted except by native boats and crews. ' Heavy ' rollers made landing impossible.

" Throughout the stay at St. Helena, ' heavy ' rollers were experienced only once (February 8th) but during the stay at Ascension, especially on February 22nd and 23rd, the ' heavy ' variety were often experienced, at which time the ship rolled heavily at her anchorage. They approached with very short warning and seemed to be heaviest when the off shore breeze was fresh. No meteorological data or observations could be connected with the phenomena, although from members of the E.T.C. staff stationed on the island, they confirm the previous observations which stated the rollers were heaviest at full and change of moon. This was also noticed by the *Britannia* on February 16th when ' double ' rollers were heavy, the moon one day old. It was regretted that the observations were over so short a period."

Though the full and change of the moon may often coincide with rollers we have no evidence that these are connected, and probably observers who have noted the coincidence were influenced in their deductions by statements which have appeared in old Sailing Directions.

## The Resaca of Rio de Janeiro.

The great wave storms, locally called " Resacas " which occasionally visit the Bay of Rio de Janeiro and the adjacent coasts, afford another interesting example of swell travelling for long distances, and its conversion from long smooth undulations of the water into leaping and destructive waves. The following account is extracted from an article by R. Ryves, appearing in " The Engineer " for 11th April, 1924.

These waves originate in the travelling storms of the South Atlantic Ocean, in a similar manner to those of St. Helena and Ascension. Such waves may, of course, arrive at the coast on a windless day. If there is a wind which produces local waves, the latter may act independently or intensify the effect of the swells.

In Rio Bay (a gulf with a very narrow entrance) (*see* Figures 6 and 7), the waves have only a narrow passage, little more than a mile wide, by which to enter, with a deep water channel of 10 fathoms or more. The area in which the shore effects of the waves are most marked is that between the entrance and the points B and L, Figure 7. On passing the entrance the waves fan out and approach the shores parallel to them, the fanning out in Botofogo Bay (F) being so complete that the waves become parallel to the shore at all points.

**Sketch Plans of the Bay of Rio de Janeiro.**

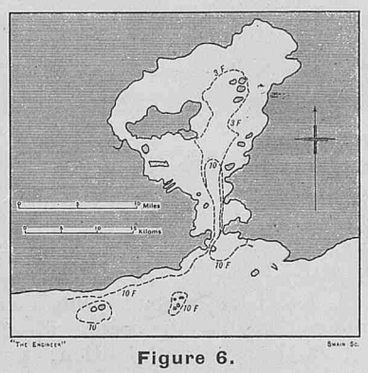



**Figure 6.**

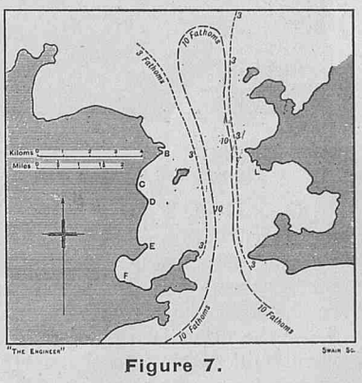



**Figure 7.**

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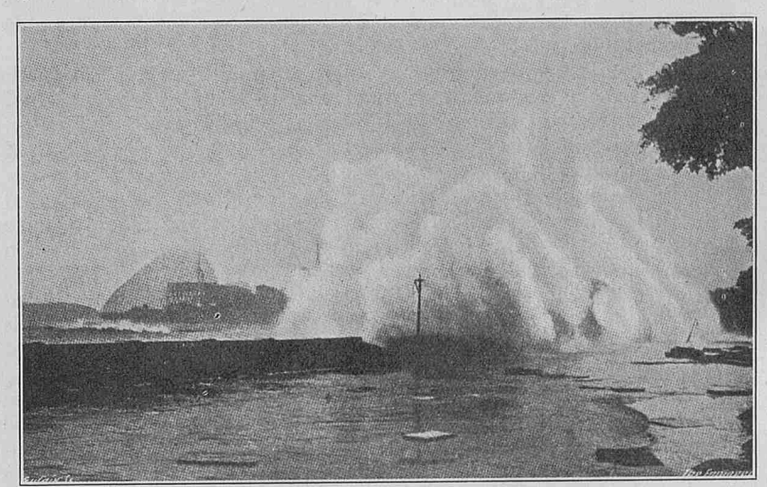
The shores are protected by a granite wall 10–12 feet high from the beach to the roadway, the depth of water at the foot of the wall hardly anywhere attaining 7 feet at high tide. The height to which the waves leap on striking the wall is remarkable as will be seen by the illustrations below. Not every wave leaps thus, since the shallowness of the water and the position of the retiring water of the previous wave may combine to alter the nature of the advancing wave so that it breaks, or churns up, or crashes against the wall without leaping. The waves that reach the wall without interference leap to great heights, often 60–70 feet, and sometimes to 100 feet. The leap is not merely the throwing up of spray, but a continuous wall of water.

The heights of waves approaching ED and CB, judged by the eye, seem to be seldom as much as 5 feet, but the wave lengths are very great in proportion to the heights.



**Destructive Resaca.**

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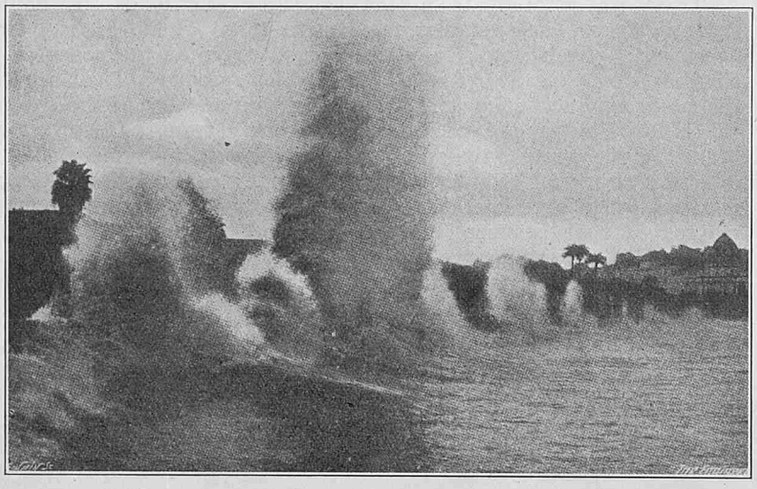
Within the Bay, the damage done by a resaca, unaccompanied by wind, is small; but the shore promenades on the Atlantic coast suffer considerably. When, however, the resaca within the Bay is accompanied by an onshore wind, the damage is sometimes considerable. In this case the waves take high leaps over the parapet, flooding the roadway. The impact on the wall is much heavier in which breaches are sometimes made, and granite coping stones weighing ¾ ton are hurled across the roadway.



**Windless Resaca.**

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Coastal swell has of course a considerable influence on the design and construction of breakwaters, harbour works, etc.

For instance, in Colombo Harbour before the North and Island breakwaters were built, the coaling wharfs were situated further to the southward, and were under the lee of the original breakwater. After the other two breakwaters were constructed, the coaling wharfs were built further to the northward, in their present position; and it was found they were much affected by swell entering the western entrance during the S.W. Monsoon. Largely for this reason a protecting arm was built on to the South-West breakwater, which now completely shelters the coaling wharfs.

## Wave Motion as affecting Stability of Ships.

While a full explanation of the effect of waves on the stability of ships would be out of place in an article of this kind, being more within the province of the naval architect, attention is nevertheless briefly directed to this aspect of the subject, which is of the greatest importance to the seaman in the navigation of his ship; and in which he can assist by providing data regarding waves which will be of use to ship designers.

First as regards the rolling of a ship in a seaway, which has a great bearing on her safety and behaviour. Every ship has her own period of rolling in still water (the *period* is the time taken to complete a *single* oscillation, *i.e.*, from port to starboard, or vice versa), and it is important to know this period in order to predict her probable behaviour at sea.

Where the still water period of a ship is small in comparison with the half period of the waves, she will tend to keep her masts normal to the effective wave slopes; her motions will be rapid and jerky, and in stormy weather she may suffer violent and heavy rolling, and excessive straining.

When the still water period is long compared with the half period of the waves, the ship is likely to be a slow roller and is less able to follow the angle of the waves; and she will incline only through moderate angles from the upright.

A critical case arises where the ship's still water period synchronises with the half period of the waves, to which she is exposed broadside on. In this case a ship will exhibit her heaviest possible rolling, which may at times assume dangerous proportions.

Of course, where a ship is rolling excessively on account of synchronism, the effective wave period relative to the ship's period will be altered by the captain by changes of course or speed; but in any case where there is synchronism, a ship of long period is better situated than one of short period, as in the former case the waves keeping time are longer and less steep.

Were all sea waves of the same length, period, and height, it would be quite possible to design ships, whose equipped conditions are unvarying, of a rolling period which would give great steadiness amongst waves. This would be more difficult for a merchant ship on account of the effect on her behaviour of the nature and stowage of her varying cargoes.

Sea waves, however, at different times and places, vary greatly in their dimensions, and an analysis of carefully kept records of such dimensions would doubtless yield much information of value to the designer.

A Japanese professor (K. SUYEHIRO) has recently demonstrated from model experiments in a tank, that rolling induces "drift," which reaches a maximum when synchronism is present. He states that with a wave slope of 2½° synchronous rolling, of itself, will produce a drifting force corresponding to that of a moderate breeze, while with storm waves having a maximum slope of 9° or so, the drifting force would be enormous. Whether these experimental conclusions can be applied to the conditions affecting a ship in a gale and a heavy sea, has yet to be proved. Seamen have experienced this drift, which they call the "scend of the sea," to distinguish it from the effect of ocean current; but it is doubtful whether the "scend" experienced has been so great as Professor SUYEHIRO arrives at from his model. In any case, he has indicated another reason for reducing rolling as much as possible.

## Methods of Observing Waves.

Systematic measured observations of ocean waves are much wanted and the following notes are given for the guidance of marine observers.

The observations required are set out in the form given below :—

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

Observer.....

From..... To.....

---

Date.....

Time of Observation.....

Latitude.....

Longitude.....

True Course.....

Speed in Knots.....

If hove to, True Direction of Ship's Head.....

Wind at time of observation—True Direction.....

Force by Beaufort Scale.....

Depth of Water in Fathoms (Approx.).....

Element observed, Sea or Swell?.....Very important.

Height of Waves in Feet.....

Length of Waves in Feet.....

Period, True.....seconds.

Velocity, True.....

True Direction from which the waves come.....

**General State of Sea**—True Direction.....

Amount of Disturbance by Scale.....

**General State of Swell**—True Direction.....

Amount of Disturbance.....

**Remarks** (including methods of measurement adopted, degree of reliability, number of waves actually measured, variability of dimensions, etc.).....

.....

.....

.....

**Note.**—Only *actual measured observations* should be entered.

On board a moving ship, the measurement of the dimensions of waves frequently presents serious difficulty. The sea is often in a very confused state, owing to the crossing of waves from different directions, and the combination of different series of waves travelling in similar directions; and it is almost hopeless to attempt any measure-

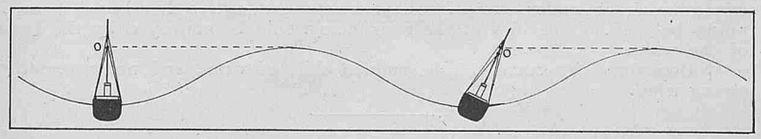
ment in these cases. Only those seas, in which well defined ridges of water follow one another with some approach to uniformity should be selected for measurement.

**Estimates,** particularly those of wave lengths, are of little value for the purposes of investigation, for unless special precautions are taken, or the circumstances are specially favourable, even the practised eye of the seaman may be completely deceived in judging the distance between 2 wave crests as viewed from on board ship. The error is least when the height of eye above the waves is large, but even then, the estimates of independent observers may differ considerably.

**Height.**—No really accurate means of measuring height has yet been introduced. The most usual method is for the observer to climb the rigging or otherwise place himself at a height above the deck, sufficient for his eye to be just in line with the advancing wave crest and the horizon, when the ship is in the hollow. The height of eye above the ship's water line would then be the height of the oncoming wave. The nearer the observer is to an amidships position, the less chance will there be of the measurement being vitiated by pitching. If the ship rolls heavily, he should allow for this as accurately as possible by judging the amount of heel, or endeavour to make his observation at the moment when the ship is upright in the hollow. Exaggeration of estimates of wave heights is mostly attributable to the error caused by pitching and rolling. *See* FIGURE 8. When the ship is rolling (*b*) the observer O. has to take up a *higher* position to get a line on the horizon than when she is upright (*a*).

While the above method is, with reasonable care, sufficiently accurate for large waves, the observer may not be able to take up a position low enough for the observation of the smaller waves, especially in modern liners; and the heights of these may often only be roughly estimated.

Another source of error may arise from the fact that the length of the ship will perhaps considerably exceed that of the wave, and not permit her to lie completely in the trough. In this case the ship may be buoyed up on two waves, and the height of the oncoming crest will consequently be underestimated.

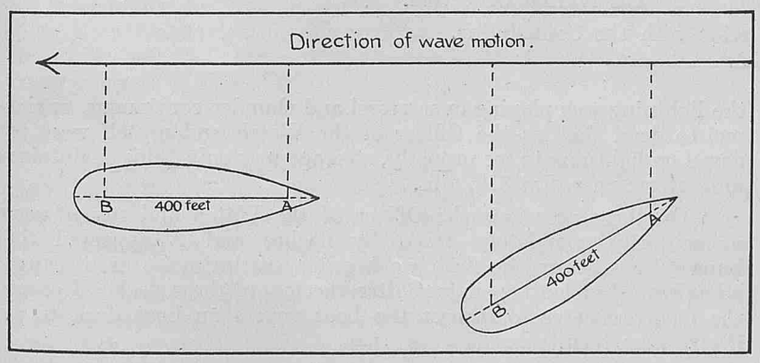



(*a*) (*b*)

**Figure 8.**

**Length, Period and Velocity.**—It is evident that the simplest conditions for observing the lengths and periods of waves are when the ship is stem on to the waves, and is stationary. The true period and true speed of the waves can then be obtained by direct observation, and the length calculated. The following simple and effective methods of determining length, period and velocity of waves are those advocated by Captain J. F. RUTHVEN in his book " Take care of the Ship."

Imagine a fore and aft base line (AB) say 400 feet long, at each end of which a pair of battens is erected, parallel to the wave crests (and at right angles to the ship's keel) to be used as sights.




(*a*) (*b*)

**Figure 9.**

Observers at both stations note, by watches previously compared, the instant when a wave crest crosses their line of sight; they also note how long an interval elapses before the next wave crosses their observation station. Comparing their records, they determine the time, say 8 seconds, occupied by the waves in traversing the length AB, while the interval between successive waves is say 10 seconds; the *speed* of the waves is obviously then 50 feet per second, and as they pass the observation points at 10 second intervals, this is the period and gives a wave *length* of $50 \times 10 = 500$ feet.

If the ship's keel makes an angle with the waves as in (*b*) we can still use the same base line, and train our battens parallel with the wave crests. The new or virtual base for our calculations will be the perpendicular distance between AB which will vary with the angle of the ship's fore and aft line and is obtained by multiplying the base AB, 400 feet, by the cosine of the angle between ship's keel and wave direction; or with Traverse Table, distance between sights as *distance*, angle between wave direction and ship's course as *course*, then *D. Lat.* = distance travelled by wave crest.

When the ship is steaming, allowance has to be made for the ship's direction and speed in relation to that of the waves, and the following imaginary examples are worked out as simply as possible without the use of algebraic formulæ, for the guidance of observers.

(1) Suppose the ship steaming head to sea, when she will meet the waves sooner than when at rest. Let the time occupied by the wave travelling along the base line of 400 ft. be 6·2 seconds (called the *speed interval*), and that between the passage of successive wave crests (called the *length interval*) be 7·7 seconds. The speed of the ship is 15 feet per second.

In the first interval, the ship will have travelled $15 \times 6{\cdot}2 = 93$ feet, and the *speed* of the wave will therefore be

$$\frac{400 - 93}{6{\cdot}2} = 50 \text{ feet per second.}$$

Now as the wave is travelling 50 feet per second, and the ship 15 feet per second, they will be approaching one another at the rate of 65 feet per second, and in the length interval, 7·7 seconds, will cover $65 \times 7{\cdot}7 = 500$ feet which is the length of the wave. The *true period* is *length* divided by *speed* $= 500 \div 50 = 10$ seconds.

(2) Suppose the ship to be travelling in *same direction as waves*, at a speed of 30 feet per second. Let the *speed interval*, *i.e.*, time occupied by wave traversing the base line, be 20 seconds, whilst the length interval was 25 seconds. In the first named interval the ship would have travelled $30 \times 20 = 600$ feet, and the wave speed would therefore be $\frac{600 + 400}{20} = 50$ feet per second.

As the wave is travelling 20 feet per second faster than the ship, this multiplied by the length interval, 25 seconds, will be the length of the wave = 500 feet.

The period is, of course, the same as before.

(3) Suppose the ship steaming at 15 feet per second *against the waves*, but making an angle of 26° with their direction.

The *virtual base* = 400 feet × Cos. 26°
= 400 feet × ·9 = 360 feet.

Component of ship's speed (at right angle), *towards the wave* = 15 × Cos. 26° = 15 × ·9 = 13·5 feet.

The observed *speed interval* was 5·67 seconds and *length interval* 7·9 seconds.

During the speed interval the ship will have travelled to meet the wave $13{\cdot}5 \times 5{\cdot}67 = 77$ feet, and the speed of the wave will therefore be $\frac{360 - 77}{5{\cdot}67} = 50$ feet per second.

As the wave is travelling 50 feet per second and the ship is approaching it at 13·5 feet per second, they will be closing at 63·5 feet per second, which when multiplied by the length interval, 7·9 gives 500 feet as the length of the wave.

(4) The last example is that of the ship *steaming with the waves* at 30 feet per second but at an angle of 18° with their direction.

In this case the *virtual base* will be
400 feet × Cos. 18° = 400 × ·95 = 380 feet.

Component of ship's speed *away from the wave* = 30 × Cos. 18° = 30 × ·95 = 28·5 feet.

The observed *speed* and *length* intervals were respectively 17·8 and 23·2 seconds. During the speed interval, the ship will run

away from the wave 28·5 × 17·8 = 507 feet. This has to be added to the virtual base to get the distance the wave travels in that period, viz., 507 + 380 ÷ 17·8, which gives the wave speed of 50 feet per second.

The wave is travelling at 50 feet per second, that is 21·5 feet per second (50 — 28·5) faster than the ship; this multiplied by the length interval, 23·2 gives the length of the wave, viz., 21·5 × 23·2 = 500 feet.

Another easy method of measuring wave lengths is to tow astern a buoy or other mark, paying out sufficient line so that when a wave crest passes the stern, the buoy is on the crest of the next wave. The length of line run out gives the apparent wave length; if waves and ship are travelling in the same or opposite direction, apparent length = true length; if ship's course makes an angle (B) with wave's course, the true length is simply obtained thus :—

True length = Apparent length × Cos. B.

### Revision of Scales of Sea and Swell Disturbance.

The Marine Superintendent a few years ago issued a circular to the Captains of log keeping and W/T reporting ships, inviting opinions and suggestions as to scales for sea and swell.

Many interesting and useful replies were received from Captains, but that forwarded by Captain H. P. Douglas, C.M.G., R.N., H.M.S. *Mutine*, now Hydrographer of the Navy, appears to be the most practicable suggestion as it provides a scale both for logging the observations and making coded W/T reports, and is attractive to seamen.

This scale was published exactly as originally drawn up by Captain Douglas in the Monthly Charts of the North Atlantic Ocean in October 1922 and again in October 1923. The scale with slight modification to meet the views of Meteorologists and with Captain Douglas' approval has been circulated (with further alteration of arrangement) by the International Hydrographic Bureau to all the great maritime nations, inviting their opinion on its suitability for ultimate adoption as an international scale.

Favourable replies have been received, but as the matter is still under International consideration, we cannot make any change in the scales for observation.

However, there is no doubt that the Douglas scale would be more useful if average lengths could be allotted to the different descriptions of swell.

It is therefore hoped that within the next few years, sufficient observations of the length, period and height of swell will be forthcoming, to enable dimensions, corresponding to these short descriptions, to be given for guidance in routine observation for both log and W.T. reports. Marine observers are therefore asked to obtain these measurements in order that this nautical scale may be completed with the aid of nautical experience.

**Douglas Sea and Swell Scale.**

| SEA. | | SWELL. | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Low. | | Moderate. | | | Heavy. | | | |
| | | No swell. | Short or Average. | Long. | Short. | Average. | Long. | Short. | Average. | Long. | Confused. |
| | | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 0 | Calm | 00 | 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 |
| 1 | Smooth | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |
| 2 | Slight | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 |
| 3 | Moderate | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 |
| 4 | Rough | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 |
| 5 | Very Rough | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 |
| *6 | High | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 |
| *7 | Very High | 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 |
| *8 | Precipitous | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 |
| †9 | Confused | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 |

Note.—In this scale a new departure has been introduced in that length of swell and height of swell are from the point of view of observations, considered separately and then combined together for coding.

A *Short Swell* means a Swell where the length or distance between each successive top of swell is small.

A *Long Swell* means a Swell where the length or distance is large.

A *Low Swell* means a Swell where the height between the lowest and highest part of the swell is small.

A *Heavy Swell* means a Swell where the height is great.

* These are considered to represent seas which occur with a swell or in the open ocean, for instance the highest sea recorded in sheltered waters would be 5, or under exceptional circumstances (*e.g.*, a hurricane) 6 or 7 might be used. The idea of the roughness would be conveyed by the force of the wind.

† Occasioned by current, tide, sudden shift of wind, and not necessarily strong wind.

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The following publications have been used in the preparation of this article :—

"Waves of the Sea and other Water Waves," by Dr. Vaughan Cornish.
"Manual of Naval Architecture," by W. H. White.
"Take Care of the Ship," by Captain J. F. Ruthven.
"Ship Construction and Calculations," by George Nicol.

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## 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.

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### ELECTRIC STORM.

The following is an extract from a letter received from Captain J. Burton Davies, S.S. *Hurunui*, concerning an electric storm he experienced in the Atlantic on July 30th, 1921, when in command of the S.S. *Whakatane*. Unfortunately the full report which he sent at the time of the occurrence never reached this Office and the following is compiled from his personal log.

"S.S. *Whakatane* left Newport News, Va., for London at 6.15 p.m. July 29th, passing buoy off Cape Henry at 9.50 p.m. Noon 30th in Lat. 37° 18′ N. Long. 73° 15′ W., wind variable about S.S.W. 4–6, barometer 29·98. At 10 p.m. that night wind became very fitful, and lightning, which had been occasional since dark, became intense.

"From then until 3.45 a.m. 31st, a terrific electric storm was playing about ship with torrential rain falling continuously. By midnight the lightning was playing over vessel and thunder continuous, engines put to dead slow as the Officer of the Watch and myself were too dazed by lightning to see properly, steerage way only being maintained until storm passed at 3.45 a.m.

"On three occasions the Officer of the Watch and myself were momentarily completely dazed by flashes and it appeared that immediately before the flash we heard a tearing noise as of canvas being ripped violently; in fact after the first of these flashes I caused the Quartermaster to inspect the boat covers on boat deck to see if any were torn.

"This noise interested me very much.

"The 2nd Officer's watch was magnetized and stopped about the time of these flashes and he never got it going again.

"The lightning continued in a mild form all day 31st, Noon Lat.

38° 35′ N. Long. 68° 38′ W., wind S.S.W. 5, weather O.C.L., barometer 29·92, sky had a *very* thundery appearance and atmosphere *felt* thundery and oppressive.

"At 10 p.m. that night conditions were similar until 2 a.m. to those of the night before but storm did not pass directly over vessel and no dazzling flashes were experienced. During this storm the wind veered right round the compass and increased to force 7 W.S.W. and at noon 1st was W.N.W. 5 barometer 30·25.

"I have never encountered such an intense storm, or seen lightning so vivid, neither had any of my officers."

## CURRENT.

THE following is an extract from the Meteorological Log of S.S. *Makambo*, Captain T. M. BROWN, Sydney, N.S.W., to New Hebrides. Observer, Mr. F. C. REE, 2nd Officer.

Midnight position, Latitude 33° 07′ S., Longitude 152° 46′ E.

Current N. 77° W. 31 miles in 24 hours.

"July 2nd—3rd, 1924.—Vessel left Sydney Heads Noon 2nd, steering to make 71° true allowing 2° for southerly set off the coast, sea smooth with slight southerly swell. Light northerly breeze, but for the previous week or ten days vessels arriving at Sydney reported exceptionally heavy gales from the south and south-west.

"The currents between Lord Howe Island, Norfolk Island and Sydney, N.S.W. we find to be very erratic, both in direction and force, having experienced as much as 92 miles of easterly set in 24 hours, also when nearing Lord Howe Island been set as much as 25 miles to the northward."

The following extract from Remark Book of H.M.S. *Hawkins*, Captain W. M. JAMES, C.B., R.N., Navigating Officer, Commander E. COLLINS, R.N., has been forwarded by the Hydrographer of the Navy.

### Yellow Sea—Current.

"As a general rule I have found after considerable experience in these waters that when making passages across the Yellow Sea the currents experienced are very slight despite the strong tidal streams in the immediate vicinity of the adjacent coasts. The occurrence of typhoons in the northern portion of the China Sea and off the mouth of the Yangtse may however apparently cause currents of considerable velocity to be generated, the effect of which would appear to last for some days.

"On Thursday July 27th, 1922, H.M. Ships *Hawkins* and *Durban* left Wei hai wei for Gensan passing the Shantung Promontory about 2.0 p.m. (Standard Time). I shaped a course to pass about 3–4 miles S. Westward of Modeste Island about an hour after daylight the following morning, and on making our landfall at 5.15 on Friday, July 28, we found we had been set *about* 12 miles in an E.N. Easterly direction (for actual details *see* Log of H.M.S. *Hawkins*). I passed this information by W/T to H.M.S. *Carlisle*, which ship was following a day later, her navigating officer (Lt. G. CURTEIS) informed me that they were set 10·5 miles 060° on the same run across from the Promontory to Modeste I.

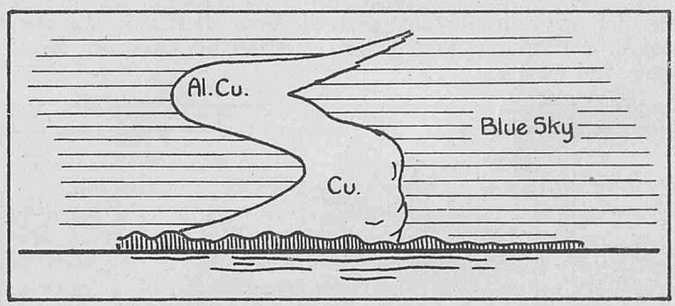
### Korea Strait—Fogs and Temperatures. Tidal Streams.

"A curious phenomenon when passing amongst the islands off the south and S.W. Coasts of Korea is the not infrequent occurrence of very dense local fogs of remarkably pronounced strata. Thus, on three occasions in the vicinity of the Myangoru Pass, I distinctly recollect seeing the trucks and hulls of small fishing junks when the sails or centres of the masts were quite obscured even at 100 yards distance, very marked changes in surface and sub-surface temperatures occur with great suddenness and the engineer officers of H.M.S. *Hawkins* informed me that the condenser inlet temperatures have varied as much as 12° in a very few minutes."

## CLOUD FORMATION.

THE following is an extract from the Meteorological Log of H.M.S. *Ormonde*, Commander C. H. KNOWLES, D.S.O., R.N., at Brighton, Trinidad, Observer, Lieutenant A. M. HUGHES, R.N.

"1st July, 1924. 6.0 p.m. Two similar clouds Cu. verging into Al. Cu. on getting higher were observed bearing due north, wind at Brighton W.N.W.2. As shown by the shape of the clouds the difference of direction of wind at different altitudes was very marked."




## SPECIFIC GRAVITY.

THE following is an extract from the Meteorological Log of C.S. *Cambria*, Captain H. G. E. WIGHTMAN, cable work off West Coast of Africa, based on Cape Town, Observer Mr. E. N. L. STAPLES.

"21st July. 4 p.m. Latitude 5° S. Longitude 11° E. Specific Gravity 18 was observed when ship was 75 nautical miles east of the Congo River. Water blackish in colour."

## SOUTH WEST MONSOON.

THE following remarks received in 1923 with the Meteorological Report of S.S. *Rialto*, Captain J. A. MORDUE, Colombo to Perim, were not published in the article on the "Steamship Route from Colombo and the East to Perim during the S.W. Monsoon," but are of such interest that they are reproduced this year.

"Our total distance made from Colombo to Perim was 2,407 miles. This is some 20 miles more than I made in June last year (1922), when I followed practically the same track. Most of this extra distance was made on account of passing about 30 miles North of Ihavandiffulu Atoll at night, whereas on the previous voyage we were passing it in the middle of the day, and steering down from Colombo, rounded it at a distance of 3 miles.

"On that voyage we experienced much the same winds and weather as this time, except that the currents, although running in roughly the same directions, were not so strong.

"By keeping well to the westward before turning north, the strength of the Monsoon was avoided until it could be brought well abaft the beam, and for the last few hundred miles before rounding Socotra the current was also more or less favourable. This voyage, unfortunately, our wireless did not seem to be working very well, and I could get no communication with any steamer coming across at the same time, but on a more northerly track, with which to compare winds and currents. Last year I was in touch with several large powerful steamers who favoured the northerly (almost direct) route, and whilst we were making to the westward at 7 to 8 knots, they, about 200 miles north of us, were struggling along at 4 to 5 knots.

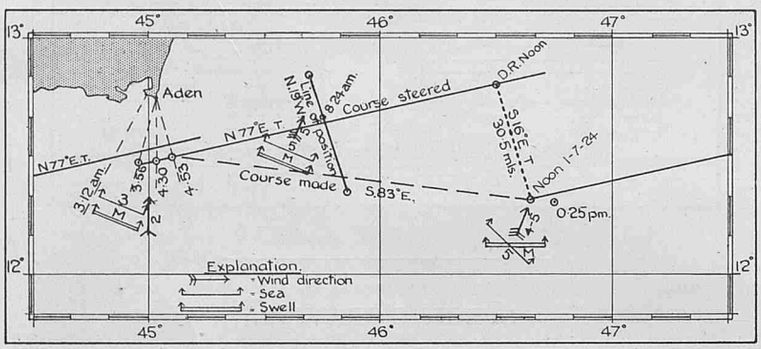
"I do not know whether you received any log from the S.S. '————' but we were within about 50 miles of her on the 29th of July (1923). Whilst we steered N.N.W. for Socotra, the '————' made across for Cape Guardafui. She is a steamer who, I should say, is 2 knots faster than ourselves, but when approaching Aden on the evening of August 2nd, she came up astern of us. We exchanged our daily positions, currents, etc., since the 29th, and I found he had come right across the bad square '94' experiencing an easterly set of 105 miles on that day, and besides

heading a gale of wind, had also had adverse currents on two other days of 68 miles and 77 miles respectively. There is thus little room for doubt as to the better of the two tracks on this occasion.

"I may add that the weather during the whole passage across the Arabian Sea and in the Gulf of Aden was remarkably clear for the Monsoon season."

## STRONG SOUTHERLY CURRENT IN THE GULF OF ADEN.

The following has been received from H.M.P.S. *Frankenfels*, Captain G. E. CARTMER, Port Said to Persian Gulf, Observer, Mr. L. M. BURFITT, 2nd Officer.




"At 7.54 p.m. on the 30th June, 1924, Perim High Light was abeam, bearing N. 50° E. true at 4½ miles, position being 12°–36½′ N., 43°–22½′ E. Course was then altered to make S. 72° E. true, to a position in 12°–20′ N., 44°–10′ E. At 0.30 a.m. on the 1st July, having run 49 miles on this course, the course was altered to make N. 77° E. true, and to pass off Ras Marshag Light, Aden in position 12°–33½′ N., 45°–05½′ E. At 3.12 a.m. Elephant Back Light, Aden, was seen bearing N. 28° E. true, shortly afterwards Ras Marshag Light was seen and bearings were taken and laid on the chart as per tracing. At 4.52 a.m. Ras Marshag Light was abeam at 15½ miles, position 12°–30′ N., 45°–06½′ E., having been set since leaving Perim S. 21° E. true 4 miles. At 8.24 a.m. sights were obtained, the vessel having run N. 77° E., true 42 miles since Ras Marshag was abeam. The D.R. being 12°–39½′ N., 45°–48½′ E., Longitude by observation being 45°–45½′ E., Position Line N. 19° W. From sights to noon a N. 77° E. true course was steered and distance made 43 miles, which made the D.R. Latitude 12°–49′ N., Long. Obs. 46°–28½′ E. for noon. The Meridian Altitude placed the ship 29½ miles to the southward of D.R. in Latitude 12°–19½′ N., the resultant noon position being Latitude 12°–19½′ N., Longitude 46°–39′ E. From Ras Marshag vessel had steered N. 77° E. true and made 84 miles, and had made S. 83° E. true 91 miles, the vessel having been set S. 16° E. true 30½ miles in 7 hours 7 mins. or 4 miles per hour. Being doubtful of the Noon Position it was assumed that abnormal refraction existed, a check on the position was taken at 0.25 p.m. and crossed with the 8.24 a.m. sights which gave the position as 12°–18½′ N., 46°–45′ E. At 3.21 p.m. another sight was taken for a check and crossed with the 0.25 p.m. sight, and gave position 12°–23′ N., 47°–14½′ E. Still being in doubt as to the Noon Position it was decided to wait for stellar observations, but unfortunately the sky was overcast, and none obtained. At 0.30 a.m. on July 2nd, having run N. 77° E. 148 miles since the preceding noon, course was altered to make N. 67° E. true. At 5.16 a.m. the vessel having run 52 miles on this course stellar observations placed her in 13°–04′ N., 49°–56′ E., the D.R. Position since noon being 13°–13′ N., 49°–56′ E., having been set S. true 9 miles. Thus these observations made the previous Noon Position fairly reliable. At 6.16 a.m. having run 12 miles on this course it was altered to N. 61° E. true. After running 24 miles on the new course, sights were taken at 8.28 a.m., making the D.R. 13°–20′ N., 50°–28½′ E. Long. Obs. 50°–35′ E., Position Line N. 19½° W. From 8.28 a.m. to noon the course was N. 61° E. 41 miles when the observed position was 13°–42′ N., 51°–13′ E., vessel having been set N. 75° E. 6¾ miles, D.R. Position being 13°–40½′ N. 51°–05′ E. Stellar observations were obtained at 6.50 p.m., the position being 14°–17½′ N., 52°–26¾′ E. From noon to 6.50 p.m. the vessel steered N. 61° E. true 79 miles, the D.R. being 14°–19½′ N., 52°–21′ E., having been set S. 70° E., 6 miles."

## SCIROCCO.

BY W. A. HARWOOD, D.Sc., SUPERINTENDENT OF THE METEOROLOGICAL OFFICE, MALTA.

THE term "scirocco," meaning "southeast" (Italian), originally used in Italy in its literal sense, referring to the southeast wind, has long spread all over the Mediterranean area and beyond. In the process the literal meaning of the word has been lost sight of, and it has now come to signify winds of particular characteristics, instead of winds from a particular direction. The process also has led to much confusion, for the southeast wind in Italy has considerably different characteristics according to locality and apparently its borrowers have associated with the name the characteristics of the wind in the particular locality with which they were acquainted. North Sicily and partly, also, south Italy, experience a hot, very dry, strong, dusty wind from the southeast, which has given its name to winds of similar character, but not necessarily from the southeast, in various parts of the Mediterranean region and in France. On the other hand, the Adriatic has a characteristic southeast wind which, while also being unpleasantly hot, owes this feature to its moist sultriness instead of to extremely high temperature and dust. This in its turn has passed on its name to similar winds elsewhere, and its victims seem to have been the more numerous; for the scirocco is now authoritatively described as everywhere a warm and mostly moist wind.

The dry scirocco occurs chiefly over the land in the south Mediterranean. It is experienced in north Sicily, south Italy, Palestine, Sinai, and the countries of the north African coast. The Levante of west Greece, the samum of north Africa and Syria, the khamsin of Egypt, the chihili of south Algeria and the leveche of south Spain are of the same nature. It is, in its full development, hot, very dry, and mostly a strong, dusty wind which may give temperatures considerably above 100° F. even at midnight. The air is thick, the sky yellow or leaden, and the sun hardly visible or entirely hidden. The extraordinary dryness shrivels leaves and blossom and sometimes destroys entire crops of grapes and olives. It is unhealthy, exhausting and oppressive to men and animals. In certain regions it may, exceptionally, bring isolated torrents of rain, and it frequently drops, with or without rain, a fine, mostly red, dust, which is partly of local origin, but in many cases is derived from the Sahara. It may extend with little change of character for considerable distances out to sea. The south coast of Spain is subject to such winds which have crossed the sea from Morocco; occasionally similar winds reach Malta from south Tunis and Tripoli; and through similar agency Madeira and the Canaries receive deposits of dust from the mainland of north Africa, accompanied by high temperature and low humidity. In most of the places mentioned the scirocco is a southerly wind, but it varies between southwest and east. No month of the year is free from its visitations; it may occur in January with the same characteristics as in July, but it is most frequent during the Spring, in April.

The moist scirocco occurs on the northern shores and in the islands of the Mediterranean, but in many of these places any warm southerly wind is called scirocco, whether it is moist or dry. Its character varies in some respects from place to place, but it is always enervating and sultry. In the south Ægean it is responsible for eighty per cent. of the strong winds of the year and gives rain along the eastern shore. More generally, however, it is not a strong wind (at Malta it rarely exceeds force 2), and, though often so saturated with moisture as to give extremely heavy dews and much low cloud,

especially in the early morning, it is very stable and does not give rain unless forced to ascend over an obstructing coast. In its most unpleasant and unhealthy form it is most frequent in the Autumn months of September and October. No month of the year is, however, entirely free from it and its relaxing effects, but the latter vary a good deal in intensity. This scirocco has often been assumed to be the continuation of a dry scirocco from north Africa, which has picked up vapour rapidly from the sea. This is by no means certainly the case; hot air from Africa may remain surprisingly dry for days over the sea, even in Autumn.

In addition to the southerly scirocco of the Mediterranean there are other winds to which the name has been applied and which should be mentioned for the sake of completeness. The north coast of Spain and southwest France have a dry hot wind, the temperature of which may rise above 100° F. with humidity below 40 per cent. This is the continuation of southwest winds from the Atlantic, which have crossed the high land of Spain and dropped their moisture there as rain. At Innsbruck there is a warm north wind from the mountains, known as scirocco; and at times also on the south side of the Alps, in the north Italian Lakes, similar dry warm scirocco winds from the north are experienced. Owing to their warmth, people have regarded them as southerly warm winds deflected (as it were, reflected) by the Alps.

The explanation of these winds has changed considerably since they were first described. In the early days the scorching hot dry scirocco with its thick atmosphere and deposits of dust was generally regarded as a wind of desert origin, owing to its characteristic qualities to the intense dry heat of the land where it came from. Quite early, however, it was observed in Sicily that the hot dry scirocco was specially marked on the north coast, not on the south, and that scirocco occurred at Palermo when there was nothing abnormal at stations on the south and southeast coasts. Similar observations applied to the hot winds of north Spain and southwest France. From that to its interpretation as a wind warmed (and consequently dried) by descent from the upper levels in the lee of mountains was a short step. The much discussed warm winds, called "föhn," in the Alpine valleys had already been explained in this way. Clearly, however, the desert effect is not excluded. The khamsin of Egypt is presumably a wind owing its characteristics purely to heating over the desert; the scirocco of Tunis, Algeria and Morocco and probably also those of Sicily and south Italy combine the effects of desert heating with those of descent from the mountains; while the scirocco of north Spain and southwest France, Innsbruck and north Italy are pure "föhn" winds. This type of scirocco is evidently essentially of land origin, though, as previously mentioned, it may extend for considerable distances out to sea.

The moist scirocco is of a different nature. It owes its character essentially to sea influences. It is most effective at the time of year when the sea is warmest and when the sea temperature changes most rapidly from south to north. Moving, as it does, from regions of high sea surface temperature towards regions of lower temperature, there is no tendency for convection to occur, and the vapour which it has collected remains in the surface layer of air which steadily becomes more saturated as it gradually cools in its progress. Its usual gentle movement is in marked contrast to the strong gusts of the dry scirocco, and when it does become strong and unstable under the influence of some unusually situated depression, it brings rain and its enervating properties are diminished.

Both types of scirocco are associated with the east sides of depressions in the Mediterranean. The pressure distribution produces the wind; but the character of the wind is determined by the nature of the country or of the sea where it comes from or which it passes over in its course.

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## WEATHER CHARTS IN INTRODUCTION TO THE STUDY OF CLOUDS.

Last year Mr. Clarke gave us the benefit of his knowledge of the clouds in general, their origin, description and height. This year we have asked him to give us advice of a more practical nature and in order that he may be quite at home with us we ask him to imagine that he is with us on July 9th and 10th, 1924, on board S.S. *Olympia*, Captain A. R. Duncan, from Bombay to Liverpool.

Now we will first draw weather charts with reports from other ships and the British Wireless "Weather Shipping" Bulletin, and say what wind we expect as we proceed upon our course and then ask Mr. Clarke to tell us what the clouds tell. We shall, of course, record upon the chart the clouds reported both at sea and at the ten British coast stations each morning for his information and supply him with extracts from the logs and reports of the ships shown upon our charts giving all cloud information.

Chart XXII, Morning of July 9th, 1924.

Tells us in *Olympia* that there is a large depression centred near Latitude 51° N. and Longitude 38° W.; a wedge or anti-cyclone extends northward from S.W. of our position to the S.W. coast of Ireland and over the British Isles pressure is fairly even and intermediate.

Allowing for course and speed, the barometer tendencies of ships under the influence of the depression indicate that it is moving in a north-easterly direction and the winds reported by *Dorington Court*, *Baltic* and *Assyria* lead us to think that the squall line may be fairly well defined.

The barometer tendencies of ships within the area covered by the wedge of high pressure and those at southern stations indicate that the wedge is intensifying.

We shall expect as we proceed at 11 knots, course N. 16° E., that the wind will be light and variable, possibly later as the depression moves N.E. we shall come within its wind circulation in the S.E. quadrant, when it will come from between south and south-west.

Twenty-four hours later we make Chart XXIII, Morning of July 10th, 1924.

It indicates that the depression has moved to the N.E. and is now centred in approximately Latitude 53° N., Longitude 32° W. and the anti-cyclone developed, is centred over the Bay of Biscay. The barometer tendencies of ships under the influence of the depression, allowing for course and speed, and those reported at N.W. stations, indicate that the depression is probably continuing in a N.E. direction. It has probably filled in a little and the squall line is less pronounced.

The barometers at coast stations indicate that the anti-cyclone is nearly stationary.

We shall expect that the wind, now S.S.W. a moderate breeze, will be nearly steady in direction, freshening a little later as we converge with the depression.

Mr. Clarke, with his specialised knowledge acquired by observation of clouds over the land and by cloud photography and study for many years, will now take up the thread where we left off on both mornings.

Marine Superintendent.

## WHAT THE CLOUDS TOLD US IN "OLYMPIA" ON JULY 9th AND 10th, 1924.

G. Auborne Clarke.

On the morning of July 9th, even had we had no weather chart for our guidance, we should have known, from the fact that the barometer was high and practically steady, that we were situated somewhere within a region where anti-cyclonic conditions prevailed. Weather Chart No. XXII. shows that we were within a *wedge* of high pressure. As a rule such a region is characterised by fine quiet weather and clear or slightly-clouded skies.

At the 4 a.m. observation that day the sky was nearly half-covered with rather large cumulus cloud, of a type verging towards the Cu-Nb. form. But by 8 a.m. these clouds had diminished in quantity, and were apparently of a more definitely normal cumulus type, such as are shown in Figure 1. Nor did their quantity increase during the forenoon. Now the usual characteristic behaviour of cumulus clouds is towards a gradual increase in size and quantity during the forenoon up to a maximum in the early afternoon, and then a gradual dispersal till sunset-time. The fact that, on the day in question, the cumulus remained sparse and small, would indicate that conditions were very stable, and that the weather would remain very fine until such time as some change in the cloud conditions occurred.

But we have some doubt of it remaining fine for, as the Marine Superintendent has stated, as we proceed on our course and the depression moves N.E. we shall come under its influence. Our first thought without this knowledge gained from barometer tendencies reported would probably be "Will this depression, with its high winds or gales and rain, pass over us, or will it take some other course?" Let us see what the subsequent clouds observed might have told us.

A clear and cloudless night was followed early on the morning of the 10th of July, 1924, by a sky characterised by the presence of flotillæ of the high flaked or dappled clouds, known as Alto-cumulus and Cirro-cumulus ("mackerel-sky") and also by some rather heavy cumulus; these clouds were moving from between S. and S.W. Such a sky is shown in Figure 2. Systematic study of cloud-distribution has shown that this association of cloud types is of common occurrence on the *lateral* margins of depressions, beyond the actual rainfall regions. We should, therefore, be justified in assuming that the depression was moving on a course somewhat parallel to our own, that its central area was more or less abeam, and that we should therefore not experience any heavy rainfall. We certainly might have slight occasional rain or drizzle, but not the long-continued heavy rain which usually is the chief feature of the passage of a depression over a ship or station.

Throughout the whole of the 10th July cloud was observed in *Olympia* at several levels, from the Ci-Cu. down to the St-Cu., together with some Cu., and the quantity of the cloud present varied rather considerably, from nine-tenths during the greater part of the day, to as low as two-tenths at 8 p.m., but increasing again to completely overcast at midnight. This variation in amount would likewise corroborate our knowledge from the weather chart that we were situated on the flank of the depression for, had we been in front of its advance, there would have been no such irregularity,—this will be explained later.

To recapitulate, then, we have seen that the cloud forms and their changes during the 9th and 10th July were such as would indicate that our ship was situated on the outer right flank of a depression which was moving to the north-north-eastward, in a direction nearly parallel to our own course.

Let us now consider what the cloud-forms and changes would have been, supposing that the depression had been moving directly towards us, that is to say, in an easterly direction.

It is commonly supposed that the first indication of the proximity of a depression is the appearance in the sky of the highest form of cloud—the delicate thread-like Cirrus, often referred to as "Mares-tails." But this supposition must be qualified somewhat, because Cirrus may be found even in the central regions of an anti-cyclone, quite far removed from any depression. Such Cirrus is generally found in small detached tufts and wisps, not arranged in lines or bands or grouped in any decided pattern, but quite irregularly scattered, and more or less widely separated from each other. An example of this type of Cirrus is shown in Figure 3. But Cirrus in front of a depression first appears in tufts or threads which lie parallel to each other or which are arranged in some regular order. And when we look towards that point of the horizon whence they proceed, we shall notice that the Cirrus is denser in that direction. In Figure 4 we have an example of this type of Cirrus. We are looking westward, and, passing across our field of view from left to right is the advancing edge of Cirrus that forms the front of a depression to the southward. It shows quite clearly how the cirrus threads lie in the same direction; in the present case the threads are simple, but frequently they are tufted and wispy, though the same orderly arrangement is evident amongst them. In this illustration it will likewise be noted that, to the left of the picture, that is to say, in the direction where the depression is, the Cirrus coalesces into a nearly uniform white sheet. The change from Cirrus thread to Cirrus sheet (Cirro-stratus) is in this instance much more rapid than is usually the case, but the illustration was chosen to show this change.

It is usually a matter of only a few hours from the first appearance of the Cirrus before the whole sky becomes covered with a more or less tenuous veil of Cirro-stratus and as time goes on the veil becomes denser and less translucent. It is also important to note that the veil is perfectly complete, there are no open areas of blue sky within its borders. While the veil is still of the Cirro-stratus type, there is almost always to be seen in it the appearance shown if Figure 5, a circle (or portion of a circle) of 22 degrees radius surrounding the disc of the sun. This is a "solar halo" and it owes its presence to the tiny ice crystals of which that particular cloud is formed. These crystals act like prisms, and bend towards our eyes some rays of light which otherwise would not reach them, thereby increasing the brilliance of the cloud's light along the circle. Sooner or later, however, the bright Cirro-stratus becomes denser and duller, the halo disappears, and the sun becomes visible merely as a bright blur in a greyish cloud sheet such as is shown in Figure 6. This cloud is much denser and lower than the previously mentioned veil, and is known as Alto-stratus. It indicates that the depression is now very near at hand, and the Alto-stratus is soon followed by the appearance beneath it of broken ragged dark cloud which rapidly increases, and rain soon begins to fall—the steady persistent moderate rain which characterises a depression.

The essential difference between the clouds we should experience if a depression passes over us, and those we should find if a depression were moving parallel to our course, but at some considerable distance away, is that, in the first case we should have a definite gradual increase of cloud from the high feathery Cirrus to the dense Alto-stratus and Nimbus, whereas in the second case the clouds would be of mixed types, and would show no such regular progression in density; they would also be more or less discontinuous. This could perhaps be made clearer by the diagram Figure 7. In the diagram the hatched area D represents the central rainy area of a depression which is moving forward in the direction of the arrow. F is the front sector in which the cloud is A-St. immediately in front of the rain, thinning out to Ci-St. and finally to Ci. at the extreme front. This cloud distribution, which has been fully described above, is very easy to distinguish and to remember, and, as has been already remarked, the cloud layer within this sector is always complete and unbroken.

On either side of the central area lie two lateral sectors L.M. and R.M.; these are the left and right margins. Within these areas the cloud is found in detached sheets or banks, and thins out at the extreme margins. Very common combinations of types found in these regions are banks or flotillæ of Ci-Cu and A-Cu, and patches of A-St., with some detached Cu. or broken stratiform cloud below. St-Cu. is also of frequent occurrence, particularly in the left margin, and some isolated Ci. is not uncommon. Rapid alternations in the quantity of cloud present is also a distinctive feature, the sky may be overcast for considerable intervals, and then may clear almost entirely. The detached cloud sheets themselves may fuse together

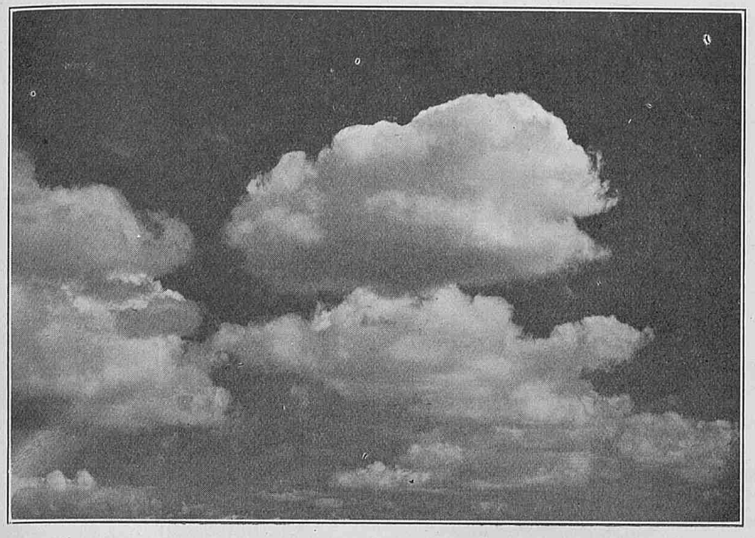

Figure 1.

Figure 2.

Figure 3.

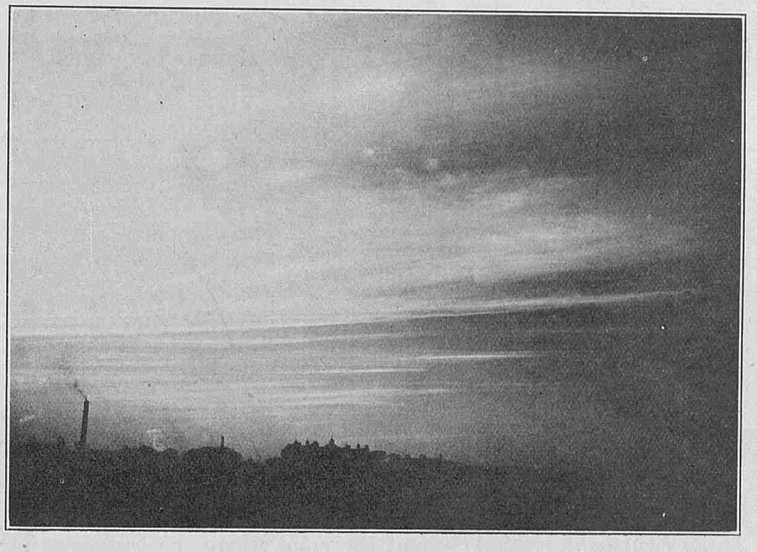

Figure 4.

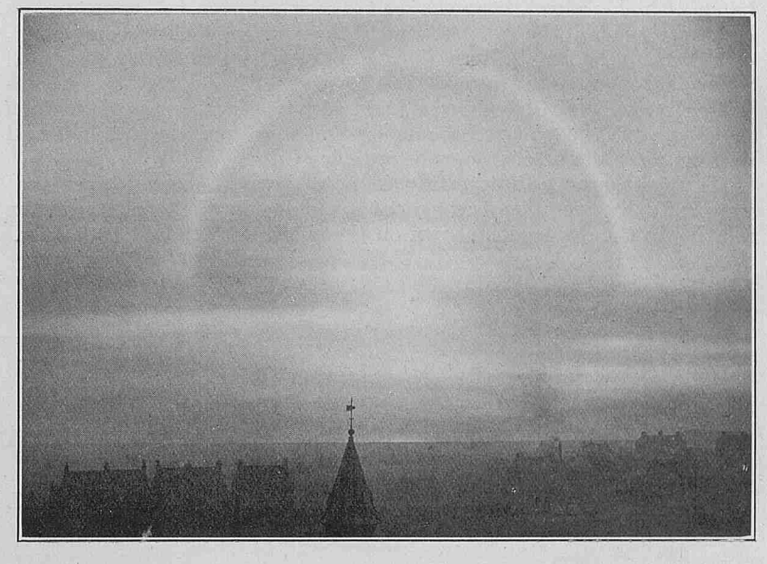

Figure 5.

Figure 6.

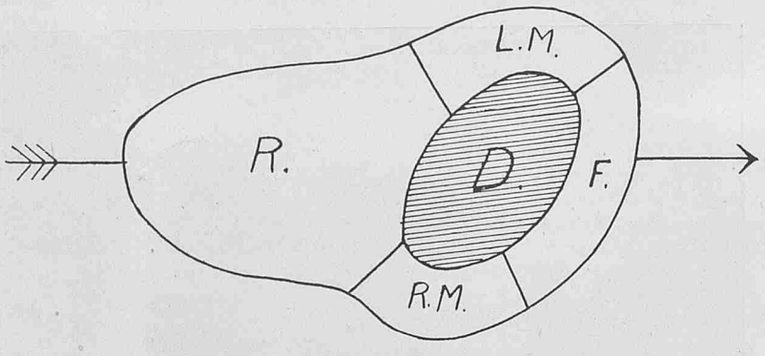


Figure 7.

into a layer resembling dense A-St., and, when this happens, some slight rain may fall. In short, the clouds in these marginal areas constitute a " transitional " type of sky which indicates the proximity of bad weather, but not its immediate presence.

Within the sector marked R we have the rear of the depression. In its right-hand section, just at the point where the barometer has commenced to rise again, we often find the " squall-line," along which there occurs the sudden veer of the wind accompanied by a long transverse bank of cumuliform cloud, and sometimes also a band or bands of higher cloud, from the former of which rain falls more or less heavily. Behind the " squall-line," the sky may clear completely, or there may be rapid alternations from clear sky to cloudy intervals, when the types found are usually massive Cu. and Cu-Nb., accompanied occasionally by showers, and also St-Cu. As the depression moves away, the clouds become less massive and threatening, and partake more of the character of ordinary Cu.

It might now be interesting to note down the cloud-types that were actually recorded throughout by ships in the various sectors relative to the depression shown on the charts for 9th and 10th July.

On the 9th July, 1924 :—

(1) FRONT SECTOR.
- S.S. *Manchester Corporation* - Nb. with rain.
- S.S. *Assyria* - - - - Nb. with rain.

(2) RIGHT MARGIN.
- S.S. *Verentia* - - - St. and Nb. with drizzle, A-Cu later.
- S.S. *Scottish Borderer* - - Clear sky, A-Cu. later.
- S.S. *Baltic* - - - - Cu-Nb. and Ci-Cu.
- S.S. *Patia* - - - - Clear sky, Ci. later.
- S.S. *Hubert* - - - - Cu.
- S.S. *Olympia* - - - Cu.

(3) REAR SECTOR (NEAR " SQUALL LINE.")
- S.S. *Dorington Court* - - Cu-Nb.

On the 10th July, 1924 :—

(1) FRONT SECTOR.
No observations.

(2) RIGHT MARGIN.
- S.S. *Verentia* - - - Ci-St. and St., Nb. later with drizzle.
- S.S. *Scottish Borderer* - - Cu. and A-Cu.
- S.S. *Patia* - - - - Nb. with rain, St-Cu. later.
- S.S. *Hubert* - - - - St-Cu.
- S.S. *Olympia* - - - St-Cu., A-Cu., A-St., and Ci-Cu.

(3) REAR SECTOR.
- S.S. *Dorington Court* - - St.
- S.S. *Orduna* - - - Nb. with rain.

Though the observations in the front and rear sectors are not very numerous, those within the marginal areas of the depression bear out very well the generalisations that have been made in this short paper. It would be too much to hope that the facts would always agree with the expectations in so fickle a subject as the weather.

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## NOTES UPON AVERAGE CONDITIONS IN THE INDIAN OCEAN,

## NORTH OF LATITUDE 35° S.

### VII. July.

THE area of lowest barometer situated over N.W. India 998 mb. (29·47 in.) reaches a minimum in this month. From this area pressure increases in a southerly direction over the whole of the Indian Ocean to the centre of the high pressure system 1,024 mb. (30·24 in.) which reaching its western limit is centred in about Latitude 32°S., Longitude 45° E.

The normal range in pressure over the North Indian Ocean is 12 mb. (·35 in.) and over the South Indian ocean 14 mb. (·41 in.), so that a ship bound from a South African port to the head of the Arabian Sea would experience, under normal conditions, a steady fall in her barometer of 26 mb. (0·77 in.).

In the North Indian Ocean the trend of the isobars are in a general E. by N. direction, causing the S.W. monsoon to blow steadily over the whole area, north of the Equator.

Just north of the Equator, west of the 75th meridian the wind is more southerly than elsewhere. In the west of the Arabian Sea, the wind comes from S.W. but draws more to the westward in the centre of the Sea, while off the west coast and south of the Indian Peninsula the wind may come from the northward of west.

In the Bay of Bengal, the general direction of the wind is from S.W.

The monsoon blows strongest north of the 5th parallel and west of the 60th meridian, where the normal force varies between 4 and 7 but forces of 8 and above are frequently experienced. Over the centre of the Arabian Sea the normal force varies between 3 and 6, and off the west coast of the Peninsula the average force is 4.

Over the Bay of Bengal the force of the monsoon is steadier than in the Arabian Sea, being between 4 and 5 but may occasionally rise to force 8. Between the Equator and latitude 5° N. the monsoon is light to moderate in strength.

In the South Indian Ocean the Trade winds blow steadily between the parallels of 25° and 5° S. West of the 70th meridian the trades blow home to the Equator where they change into the S.W. monsoon. The normal strength of the trades varies between forces 3 and 5, but south of Latitude 10° S. they occasionally reach force 8 more especially on the eastern side of the Ocean.

East of the 70th meridian, between the Equator and Latitude 5° S. there is a belt of light to moderate variable winds, south-easterly winds predominating.

In the Mozambique Channel the southern monsoon blowing with moderate force comes chiefly from a south to S.E. direction.

South of the trade wind zone, is a belt of variable winds which south of the 30th parallel frequently blow with gale force generally from a direction between N.W. and S.W.

**Cyclonic Storms.**—During the years 1890–1912 only three storms in the Arabian Sea are recorded in this month giving a percentage frequency of 7 per cent. The three storms were of slight intensity and originated in the N.E. of the Sea moving in a north or N.W.

direction.

In the Bay of Bengal cyclonic storms are frequent. Seventy-one storms are recorded for this month in the years 1877–1923, giving a percentage frequency of 18 per cent. The storms all originate in the northern half of the Bay and travel in a north-westerly direction. They are generally of slight intensity. See Chart giving tracks in Vol. 1, No. 7 of this Journal.

**South Indian Ocean.**—No cyclonic storm has been reported in the South Indian Ocean during the month of July in recent years.

**Air Temperature.**—On the eastern side of the Arabian Sea the normal air temperature for the month ranges from 83° F. in the north to 81° F. in the south. Over the centre of the Sea the range is between 84°·5 F. in the north and 81° F. in the south, while on the western side the average temperature is about 78° F. In the Bay of Bengal the normal air temperature ranges from about 83°·5 F. in the north to 82° F. in the south of the Bay. The temperature on the eastern side is generally lower than in the central and western parts of the Bay.

Between Latitude 10° N. and the Equator, east of the 60th meridian the normal air temperature is 82° F. West of the 60th meridian it ranges between 79° and 76° F. From the Equator southward temperature gradually decreases and is about 60° F. in Latitude 35° S.

**Sea Surface Temperature.**—Over the central and eastern parts of the Arabian Sea the normal sea surface temperature is between 81° and 82° F. but over the western part of the Sea the temperature is very irregular, varying between 85° F. and 71° F.

In the Bay of Bengal the normal sea surface temperature is 84° F. in the north, decreasing to 82° F. in the south of the Bay.

Between Latitude 10° N. and the Equator east of the 60th meridian the normal temperature is about 82° F. West of the 60th meridian to the African coast it is irregular, ranging between 82° and 74° F. From the Equator, southward, sea surface temperature gradually decreases with increased latitude, being about 60° F. in Latitude 35° S.

**Currents.**—In the South Indian Ocean between the parallels of 35° and 25° S. west of the 50th meridian the currents are irregular, but tend to set in a north-westerly direction.

The S.E. trade drift flowing in a general westerly direction between Latitude 25° and 8° S. separates when to the west of Mauritius and flows to the north and south of Madagascar.

The stream running to the north of Madagascar branches in a N.W. and S.W. direction off Cape Delgado. The S.W. stream running parallel with the African coast sets down the western side of the Mozambique Channel and joining with the stream flowing south of Madagascar off Delagoa Bay continues around the Cape forming the Agulhas current. In the centre of the Mozambique Channel the current sets to the northward while on the eastern side of the Channel it sets south following the west coast of Madagascar. Between Latitude 8° S. and Latitude 2° N. east of the 50th meridian the currents are variable. West of the 50th meridian the S.E. trade drift follows the African coast to the northward.

**North Indian Ocean.**—The north-easterly set flowing up the African coast when north of Sokotra, combines with the current setting out of the Gulf of Aden and spreading, flows in a N.E. to E. direction over the whole of the western and central parts of the Arabian Sea. East of the 70th meridian the current changing to S.E., flows down the western side of the Indian Peninsula and rounding Ceylon, sets N.E. across the southern part of the Bay of Bengal. Over the northern and central parts of the Bay the currents are irregular and complicated. Between Latitudes 10° N. and 2° N. an offshoot from the African coast current turns to the east and S.E. between the 50th and 60th meridians, and flows in a direction between these points across the Ocean to the 80th meridian, when turning to the E.N.E., it sets across the south of the Bay.

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# WEATHER SIGNALS.

## II.—WIRELESS WEATHER BULLETINS.

### ARABIA.

**Aden W/T Station,** approximate Latitude 12° 49′ N., Longitude 45° 02′ E., call sign **BZF**, broadcasts weather bulletins, *en clair*, at 0945 and 1745 G.M.T. daily, on a wave length of 2,000 metres (I.C.W.). The bulletins refer to the weather conditions in the eastern portion of the Arabian Sea and are prefixed by the words " East Arabian Sea." They are specified as " daily one " and " daily two " respectively. (*See* " Note," opposite, and under W/T Storm Warnings.)

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

0030 G.M.T.; by Karachi, and Calcutta W/T Stations.
0100 G.M.T.; by Bombay, Madras, and Rangoon W/T Stations.

The foregoing messages are also supplemented when necessary by further reports specified as " Storm " during stormy weather. (*See* " Note " below and under W/T Storm Warnings.)

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### BRITISH INDIA.

Meteorological messages are broadcast *en clair* from stations in British India at the following times. The transmitting station will signal the " All Station " call five times before sending the messages, so that ships can correctly adjust their instruments.

| Time G.M.T. | Stations. | Position (approx.) Lati-tude. | Position (approx.) Longi-tude. | Call Sign. | Wave-length Metres. (spark) | — |
|---|---|---|---|---|---|---|
| 0830 and 1630 | Karachi - | 24° 51′ N | 67° 03′ E | VWK | 600 | Specified as " Daily." |
| | Calcutta* - | 22° 34′ N | 88° 20′ E | VWC | 2,000 | |
| 0900 and 1700 | Bombay - | 18° 57′ N | 72° 54′ E | VWB | 2,000 | Specified as " Daily." |
| | Madras - | 12° 59′ N | 80° 11′ E | VWM | 1,000 | |
| | Rangoon - | 16° 46′ N | 96° 12′ E | VTR | 1,200 | |

* After the time signal.

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### CEYLON.

**Matara W/T Station,** approximate Latitude 5° 59′ N., Longitude 80° 32′ E., call sign **BZE**, broadcasts weather bulletins, *en clair*, at 0145 and 1345 G.M.T. daily, on a wave length of 2,000 metres (I.C.W.). They are specified as " daily one " and " daily two " and refer to the Bay of Bengal and Arabian Sea, being prefixed accordingly. (*See* " Note " below and under W/T Storm Warnings.)

**Colombo W/T Station,** approximate Latitude 6° 55′ N., Longitude 79° 53′ E., call sign **VPB**, broadcasts local weather reports, after the time signals at 0500 and 1700 G.M.T. on a wave length of 600 metres (spark), and at 0600 and 1800 G.M.T. on a wave length of 2,300 metres (C.W.).

NOTE.—The bulletins broadcast by Aden, British Indian Stations, Matara and Rangoon emanate in the first place from the Indian Meteorological Department, Simla. Frequently the phrase " Weather normal " is used in the bulletins, and may be preceded by " Arabian Sea " or " Bay," according to which is referred to. It means " as far as coast observations and available ships' reports indicate, there is no reason for thinking that a storm has formed or is forming."

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## WIRELESS STORM WARNINGS.

### ARABIA.

**Aden W/T Station,** call sign **BZF**, broadcasts a report specified as "extra," at 0145 G.M.T. on a wave length of 2,000 metres, only when disturbed or stormy weather is expected. Occasionally a special report specified as "immediate" is broadcast on 2,000 metres wave length immediately on receipt, from Simla. The warnings refer to the East Arabian Sea.

### BRITISH INDIA.

The following stations broadcast messages containing cyclone warnings specified as "Storm," each transmission being preceded by the W/T Danger Signal (TTT). Wave length used, 600 metres spark in all cases :—

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

### CEYLON.

**Matara W/T Station,** call sign **BZE**, broadcasts a report specified as "Extra" at 0145 and 1345 G.M.T. on a wave length of 2,000 metres, only when disturbed or stormy weather is expected. Occasionally a report specified as "immediate" is broadcast on 2,000 metres wave length immediately on receipt from Simla. Storm warnings refer to the Bay of Bengal and Arabian Sea.

## III.—WIRELESS TIME SIGNALS.

### BRITISH INDIA.

| Station. | Call Sign. | Wave length. metres. | G.M.T. of Time Signal. | System. |
|---|---|---|---|---|
| Calcutta. | | | | |
| Lat. 22° 33′ 34″ N. | VWC | 2,000 sp. | 0827–0830 | New International. |
| Long. 88° 20′ 14″ E. | | | 1627–1630 | New International. |

NOTES.—(1) Preliminary signals sent two minutes before transmission of T.S. proper, call (— • — • — •) repeated three times, the words "ordinary time signals," and the signal "wait" (• — • • •); all these signals are sent by hand.

(2) Signals automatically controlled from Alipore Observatory, Calcutta.

(3) T.S. accurate to within 0·2 sec.

(4) Should there be any inaccuracy, the T.S. is followed by the "erase" signal and the words "signal failed."

### CEYLON.

**Colombo W/T Station,** approximate Latitude 6° 55′ N., Longitude 79° 53′ E., call sign **VPB**, broadcasts time signals four times daily, based on the International system. The actual time signals will be automatically controlled from Colombo Observatory, the remaining signals being sent by hand.

The times of transmission and wave lengths employed are as follows :—

| G.M.T. | Wave length. (metres.) | G.M.T. | Wave length. (metres.) |
|---|---|---|---|
| h. m. s. | | h. m. s. | |
| 4 57 00 to 5 00 00 | 600 (spark) | 5 57 00 to 6 00 00 | 2,300 (C.W.) |
| 16 57 00 to 17 00 00 | 600 (spark) | 17 57 00 to 18 00 00 | 2,300 (C.W.) |

Method of procedure is given below :—

| Time—G.M.T. | Signal. | Signification. |
|---|---|---|
| h. m. s. h. m. s. | | |
| 4, 5, 16, 17 } 55 00 to 4, 5, 16, 17 } 57 00 | CQ de VPB (repeated 3 times) Time Sig. Wait (• — • • •) | Preparative sig. |
| 57 55 ,, 58 00 | 55 56 — 57 58 — 59 00 | Time sigs. |
| 58 08 ,, 58 10 | 08 09 — 10 • | |
| 58 18 ,, 58 20 | 18 19 — 20 • | |
| 58 28 ,, 58 30 | 28 29 — 30 • | |
| 58 38 ,, 58 40 | 38 39 — 40 • | |
| 58 48 ,, 58 50 | 48 49 — 50 • | |
| 58 55 ,, 59 00 | 55 56 — 57 58 — 59 00 | |
| 59 06 ,, 59 10 | 06 07 — 08 09 — 10 • | |
| 59 16 ,, 59 20 | 16 17 — 18 19 — 20 • | |
| 59 26 ,, 59 30 | 26 27 — 28 29 — 30 • | |
| 59 36 ,, 59 40 | 36 37 — 38 39 — 40 • | |
| 59 46 ,, 59 50 | 46 47 — 48 49 — 50 • | |
| 4, 5, 16, 17 } 59 55 ,, 5, 6, 17, 18 } 00 00 | 55 56 — 57 58 — 59 00 | |

## IV.—VISUAL STORM WARNINGS.

### BRITISH INDIA.

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

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

### General System.

#### Distant Signals.

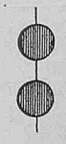
To indicate danger to vessels after they have left the harbour :

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

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

**II. Warning.**—A storm has formed.

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



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

## Local Signals.

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

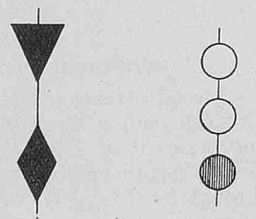
Day. Night.

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

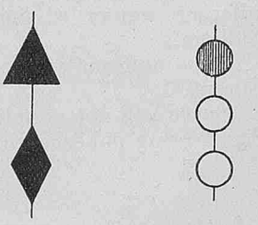
**IV. Warning.**—The port is threatened by a storm, but it does not appear that the danger is as yet sufficiently great to justify extreme measures of precaution.

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

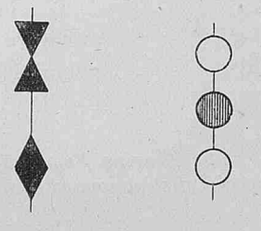
**V. Danger.**—The port will experience severe weather from a storm of slight or moderate intensity that is expected to cross the coast to the south of the port (or to the east in the case of Veraval, the Húgli ports, Diamond Island, Bassein, Rangoon, and the Andamans).



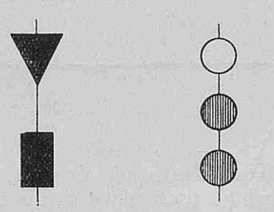
**VI. Danger.**—The port will experience severe weather from a storm of slight or moderate intensity that is expected to cross the coast to the north of the port (or to the west in the case of the Húgli ports, Chittagong, Rangoon, Moulmein, Karachi, and the Andamans).



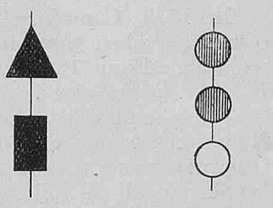
**VII. Danger.**—The port will experience severe weather from a storm of slight or moderate intensity that is expected to cross over or near to the port.



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



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



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

Day. Night.

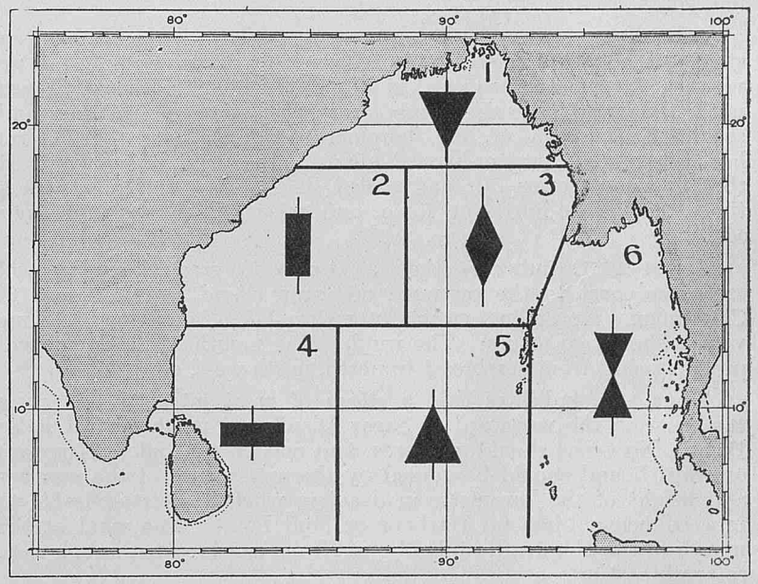
**XI. Failure of Communications.**—Communication with the Meteorological headquarters has broken down and the local officer considers that there is danger of bad weather.

## General System with Additional Signals, Bay of Bengal.

It is possible to locate an area of bad weather in the Bay of Bengal with some degree of certainty, even though it may be far from the coast. At various ports a " Section " signal for the area affected, as shown on the chartlet, is hoisted *under* the " distant cautionary " or " distant warning " signals (Signals I and II of the " general system ").

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

**Chartlet showing " section " storm signals, Bay of Bengal.**




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

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

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

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

This system is in force at the following ports :—

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

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

## Brief System.

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

Signal No. III. Cautionary
Signal No. IV. Warning
Signal No. VII. Danger
Signal No. X. Great Danger

} Meaning day and night signals as in the General System.

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

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

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

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

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

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

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

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

The above signals are exhibited at Barisal, Goalunda, Noakhali, Narayanganj, Chandpur, Khulna, Sagar Island, Mud Point, Diamond Harbour, Calcutta (Port Commissioner's Office), Kidderpur Docks (Clock Tower), Budge Budge (Assistant Harbour Master's House).

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

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### Supplementary to Ships' Wireless Weather Signals, Vol. II, No. 13, and to Wireless Weather Bulletins, France, Vol. II, No. 16.

#### Occasional North Atlantic Wireless Link.

The 120 fully-equipped British observing ships which were invited in the December Number 1924 (Vol. I, No. 12, p. 162) to set an example in the use of wireless telegraphy in making weather reports to " all ships " will on occasions in the North Atlantic be able to contribute to Part II of the Eiffel Tower messages, p. 61, Vol. II, No. 16, without any additional effort or transmission through the good offices of the French steamship *Jacques Cartier*, call sign FTJ.

The French S.S. *Jacques Cartier* is operated by the Compagnie Generale Transatlantique, and usually trades between Havre and Gulf of Mexico ports. She has been used as a training ship for the French Merchantile Marine and is specially equipped for wireless telegraph long range communication. She transmits weather reports received or intercepted from other ships to Paris and also broadcasts weather information.

The code messages made by regular reporting British North Atlantic liners to *Weather London*, through Devizes W/T Station and *Government Observer, Washington, D.C.*, through Bar Harbour, Me., New York, N.Y., Norfolk, Va., or Charleston, S.C. W/T Stations, may be received on occasions by *Jacques Cartier* and re-transmitted through Paris; but it is necessary that direct transmission of these reports from ships at sea should be maintained as laid down in the Register, and described on p. 13 of Vol. II, No. 13 of this Journal. They are re-transmitted through the Air Ministry W/T Station for the benefit of all European Weather Services.

#### Sweden.

#### Amendment to Pages 44 and 47, Vol. II, No. 15.

Special attention is invited to " Admiralty Notice to Mariners " for week ending April 9th, 1925, and amendment of May 2nd, 1925, and " Board of Trade Notice to Mariners " for April, 1925, to the new " Weather Shipping " Bulletin issued by the Swedish service through Karlsborg W/T Station.

The arrangement of this Bulletin for the Swedish coasts and adjacent waters is similar to the British " Weather Shipping " Bulletin.

Thus uniformity is obtained for mariners on the coasts of N.W. Europe.

Space will not permit of the full description of this new Weather Signal being published in " The Marine Observer " until next year.

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### Special Notices regarding Personnel.

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

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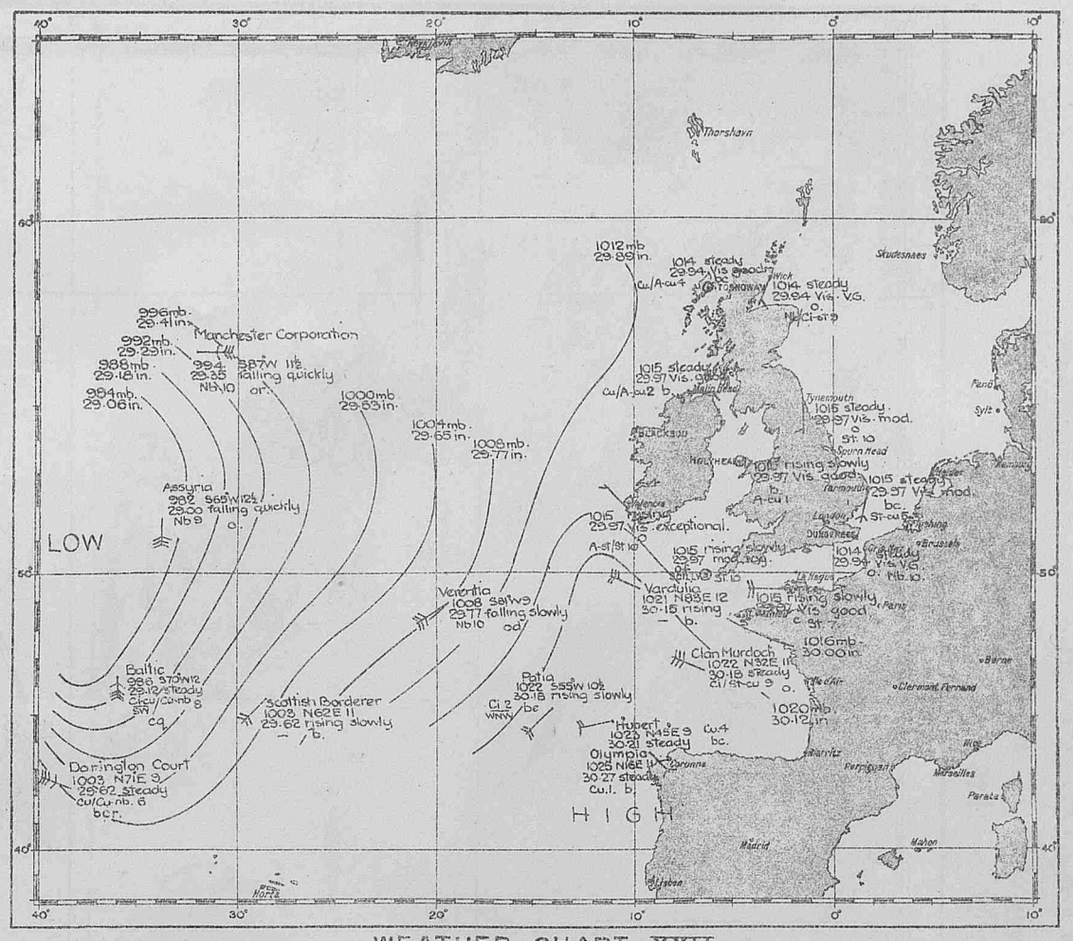
### OBITUARY.

The death of Captain Alfred Carpenter, D.S.O., R.N. (ret.) which took place at his residence at Sanderstead at the age of 77 on the 30th April, is noted with regret.

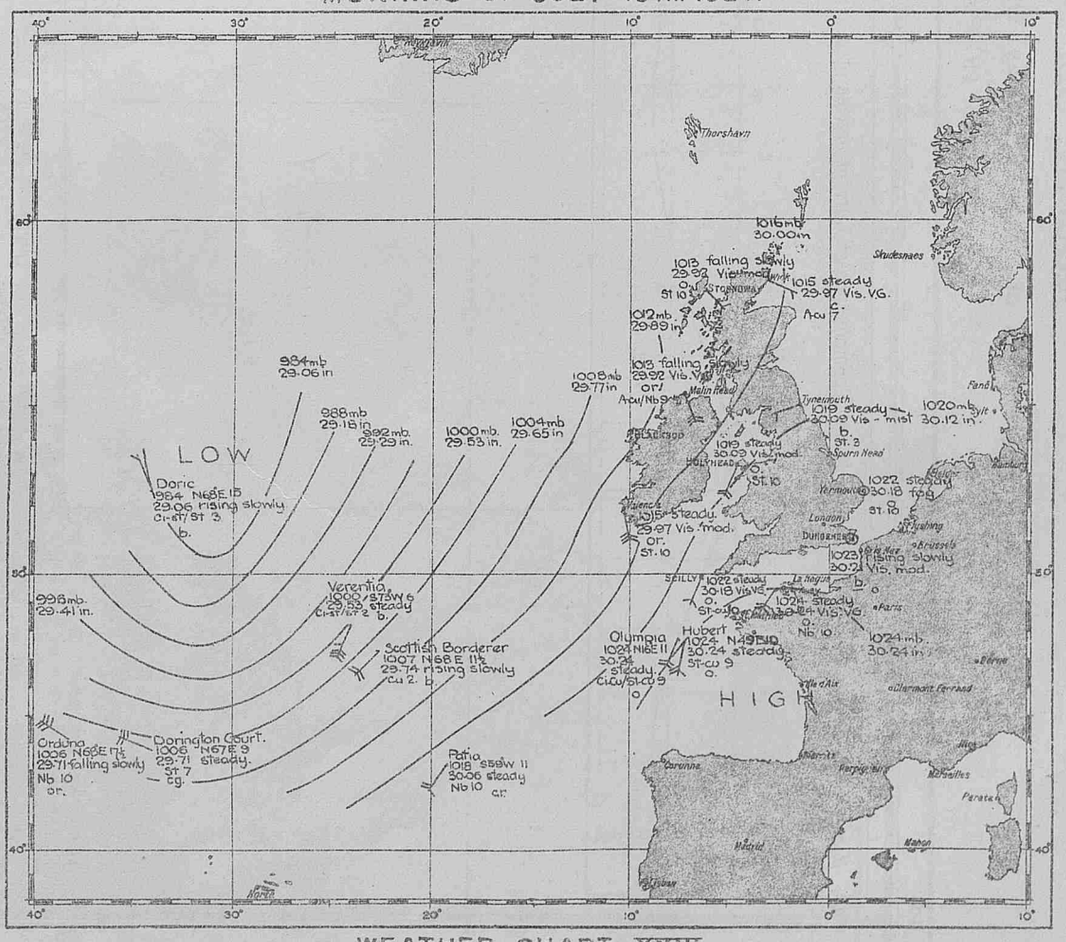
In 1875, Captain Carpenter served as Lieutenant in H.M.S. *Challenger* when that ship was detailed for oceanic exploration and research. From 1877 to 1883, when serving first as Lieutenant in H.M.S. *Nassau* and later in command of H.M.S. *Magpie* surveying the China and Japan Seas, and again in 1884, when commanding H.M.S. *Myrmidon* employed on surveying in the Red Sea, Captain Carpenter was a regular marine observer for the Meteorological Office, keeping in all 20 full logs, of which no fewer than 19 were classed " Excellent."

MORNING OF JULY 9TH. 1924.




WEATHER CHART XXII.

MORNING OF JULY 10TH. 1924.



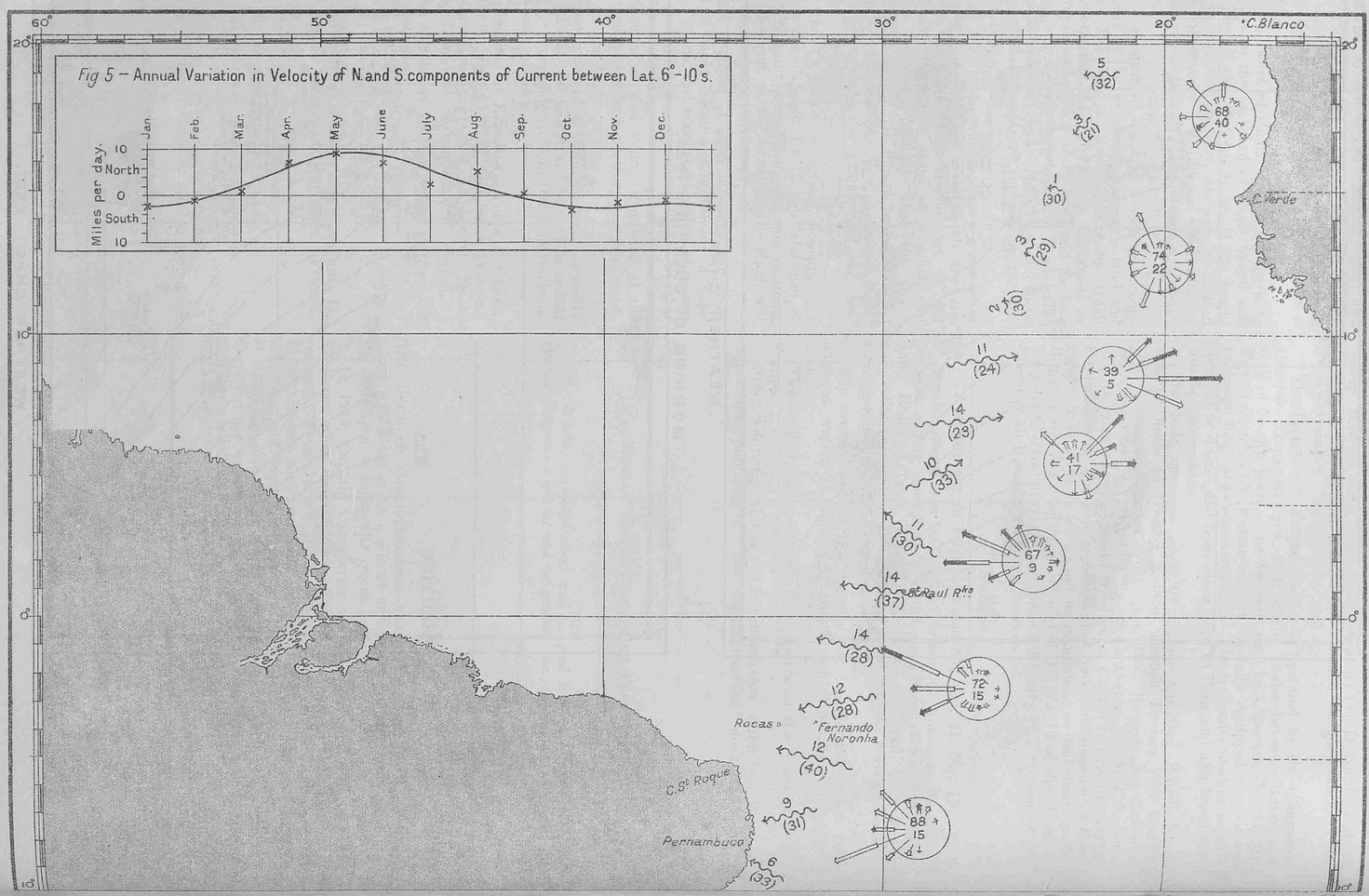

WEATHER CHART XXIII.

# Currents on Route, Latitude of Cape Blanco to the Brazils.

## August, September, October.

Observations of Ships Regularly Observing for the Meteorological Office.

1910 to 1914 and 1920 to 1923.




### EXPLANATION.

The current roses are drawn for each 5 degrees of latitude, except in the region of meeting currents where smaller intervals are used.

The roses are displaced to the right in order not to clash with the resultant arrows, but they refer to the same track.

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

6–12 miles per day

13–24 ,,

25 and over ,,

Distance from tail of arrow to circle represents 5 %.

Scale :— 0 10 20 30 40 50 60 70 80 90 100%

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

Waved arrows represent the resultant current for 2° of latitude

The figure above the arrow shows velocity in miles per day, the figure below in brackets, the number of observations.

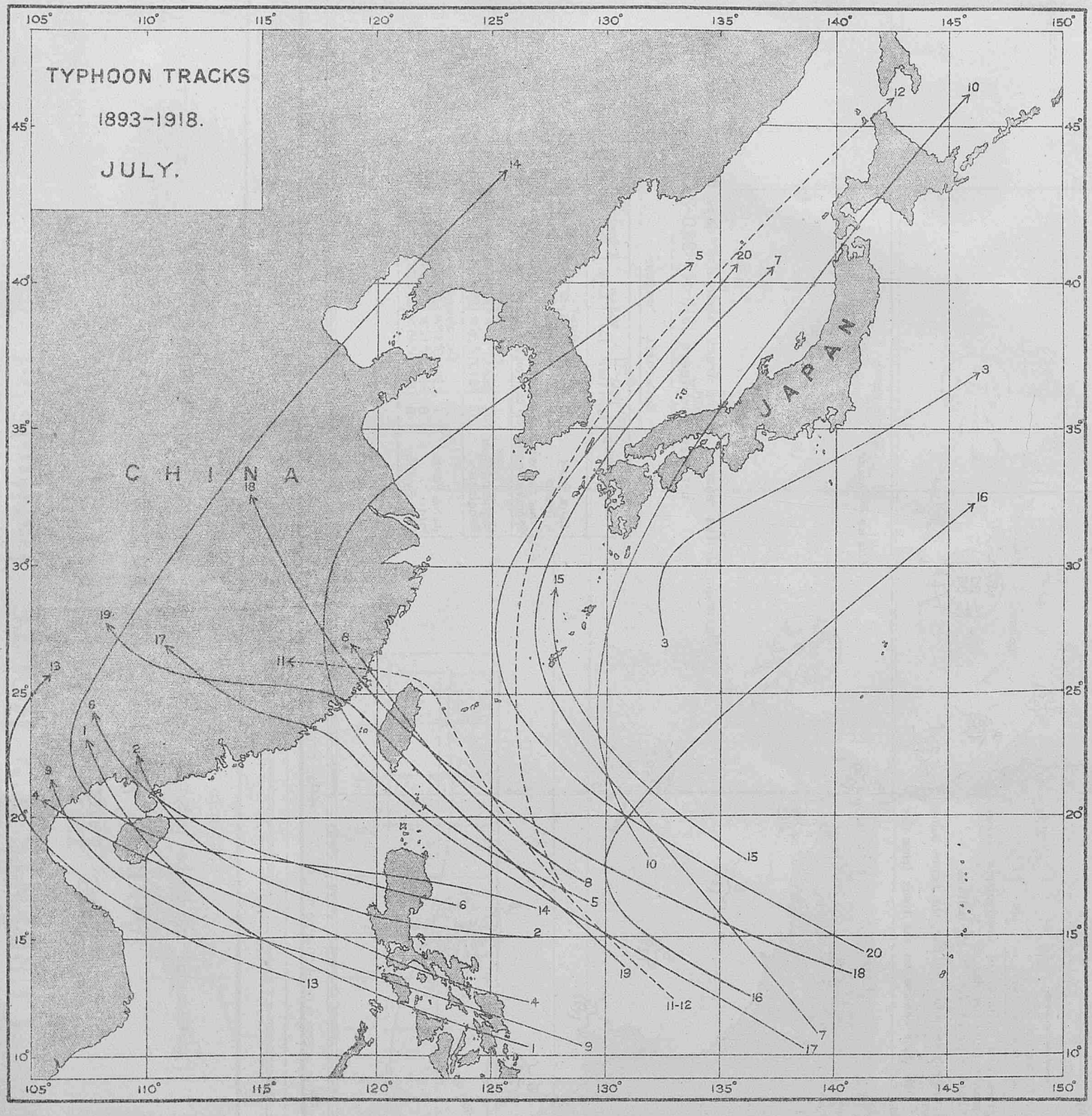
The resultant arrows are drawn with their centres on the track from the latitude of Cape Blanco to the Brazils.

Maximum Drifts reported on the Track, latitude of Cape Blanco to the Brazils between the Years 1910-14, 1920-23.

Equatorial Current.

| Name of Ship | Date Day | Date Year | Middle Lat. | Middle Long. | Current Set | Drift | Wind Dir | Force |
|---|---|---|---|---|---|---|---|---|
| **August.** | | | | | | | | |
| Julia Park | 3 | 1913 | 3° 55' N | 29° 35' W | N 53° W | 69 | S.E. | 4* |
| Hillfern | 6 | 1912 | 0° 44' S | 31° 20' W | N 82° W | 41 | S.S.E. | 4 |
| *This current was observed during a period of 7 hours for the 24 hours from Noon to Noon, the current was N 53° W 50 miles. | | | | | | | | |
| **September.** | | | | | | | | |
| Highland Piper | 11 | 1923 | 1° 37' N | 29° 36' W | N 38° W | 32 | S.S.E. | 3 |
| Peerless | 12 | 1910 | 1° 28' N | 29° 38' W | S 75° W | 32 | S.S.E. | 4 |
| **October.** | | | | | | | | |
| Julia Park | 1 | 1912 | 0° 37' N | 30° 53' W | N 88° W | 25 | E.S.E. | 4 |
| Ionic | 8 | 1910 | 1° 17' N | 27° 26' W | S 65° W | 24 | S/E | 2 |
| Port Sydney | 6 | 1922 | 1° 49' N | 29° 50' W | N 39° W | 24 | S.E/E. | 3 |

# TYPHOONS IN THE FAR EAST DURING 26 YEARS.

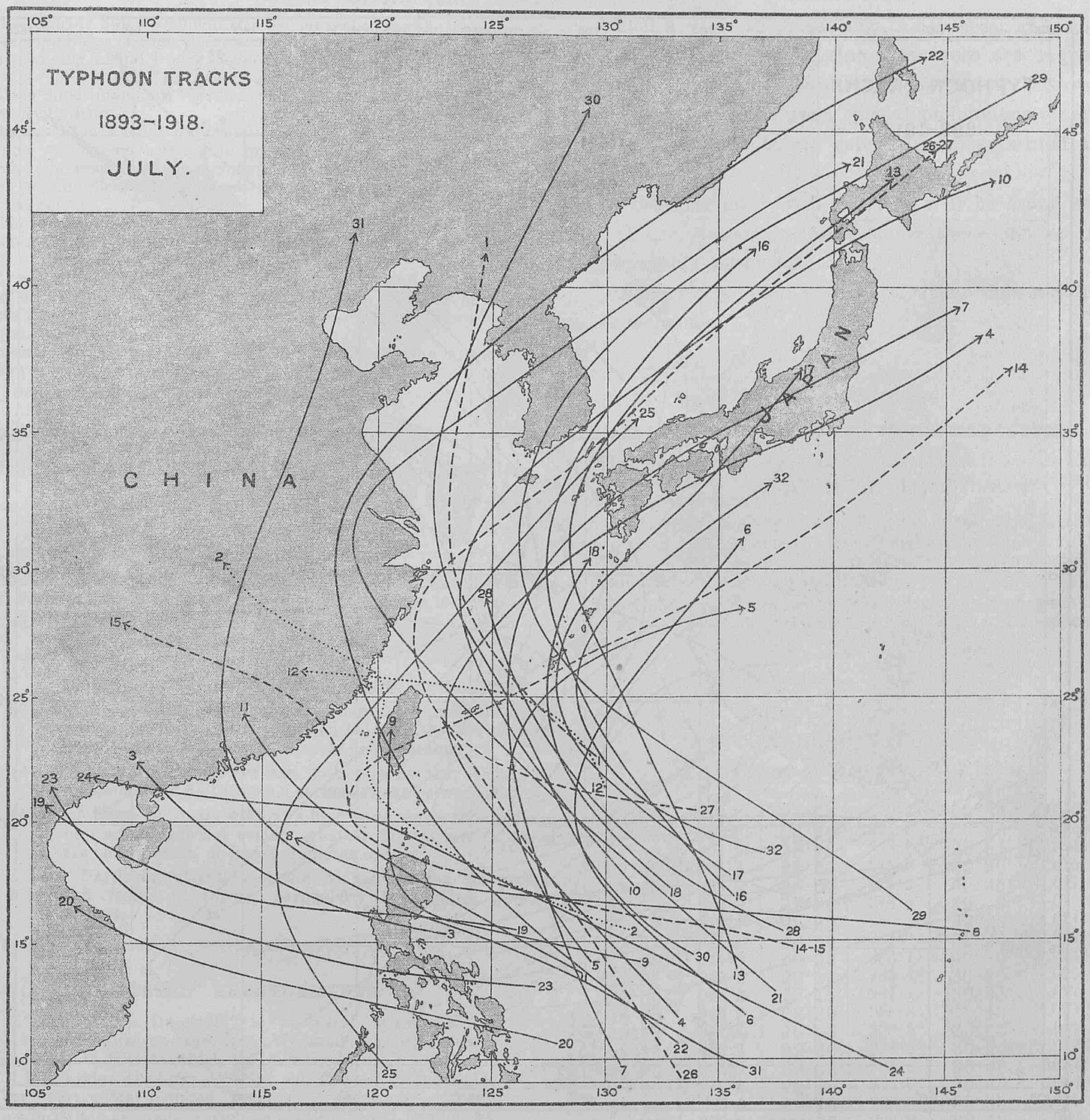



JULY. — *Three charts : 90 tracks; three or four instances every year.*

First decade: *July 1-10. — 20 tracks. — If we draw out these tracks to their beginning, we find that they mostly converge to one same spot, between the occidental Carolines and the southern Marianas, about latitude 10°, between Yap and Guam. Starting thence, they form three bundles distinctly separated from each other: the first one runs towards W.N.W, crosses the Philippines and the China Sea, between the 15th and the 20th parallels and lands between Kwangtung and Annam, with a marked preference for the Gulf of Tongking. The second group travels straight towards the N.W, across Formosa, and strikes the coast between Swatow and Foochow: both are usually seen to fill up on land, without returning to the Sea. The third cluster, the eastern one, follows at first a path parallel to the second one, then recurves towards the N.E., when crossing the Loochoos, and goes to sweep over the Japan Sea and Archipelago. It is very rare, during the beginning of July, to receive these dreaded visits between Chusan Is., Korea and the Gulf of Pechihli.*

*[From Atlas of the Tracks of 620 Typhoons, 1893-1918, by Louis Froc, S.J. Director Zi-ka-wei Observatory, Zi-ka-wei-Chang-hai, 1920].*

## TYPHOONS IN THE FAR EAST DURING 26 YEARS.



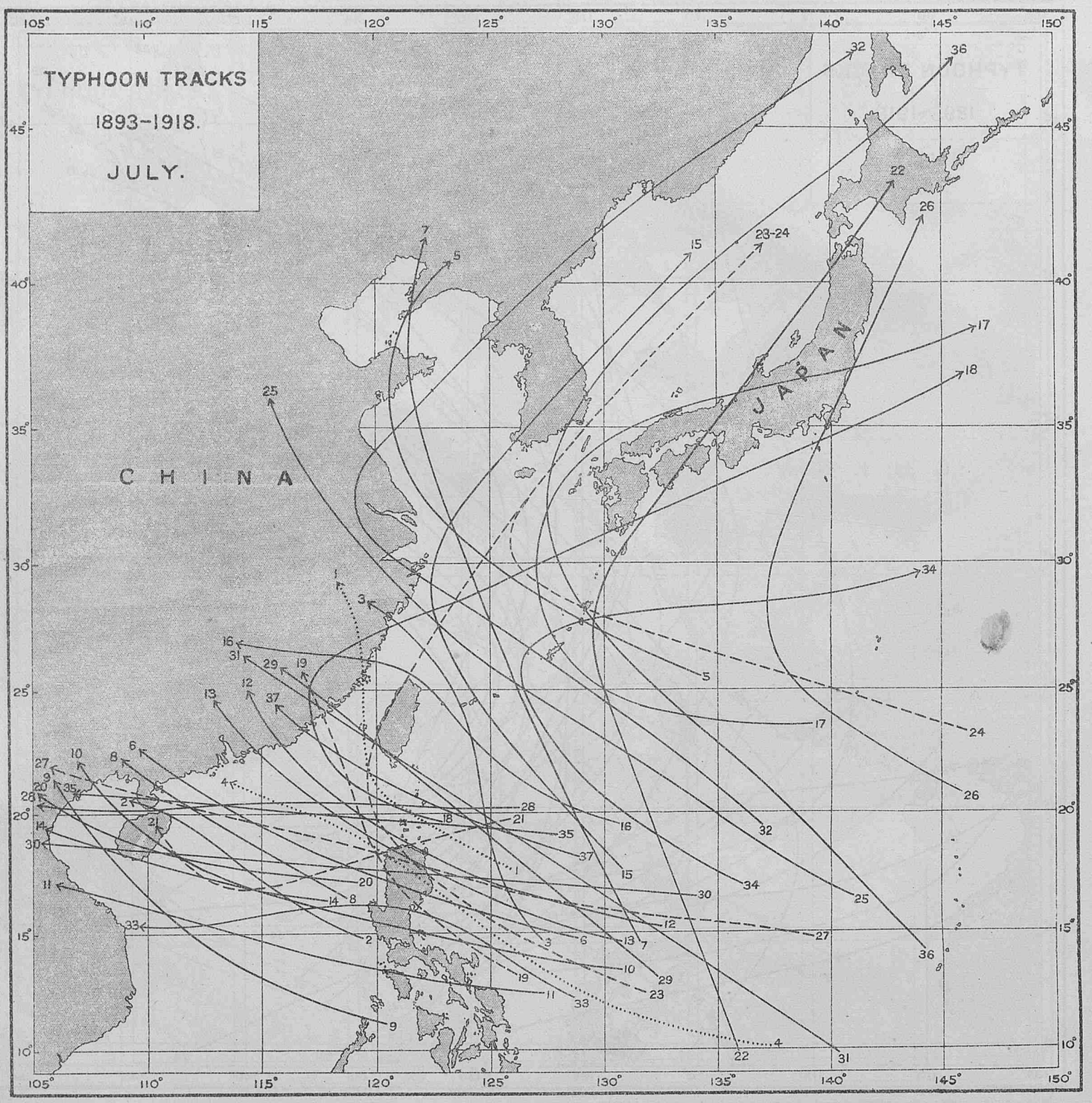

JULY. — *Three charts: 90 tracks; three or four instances every year.*

Second decade: *July 11-20. — 32 tracks. — The more we advance into the typhoon season, the greater is the number of the storms; the three bundles, separated during the first period of the month, are coming close together, and their lines cover a kind of fan, the handle of which is seen resting broadly between Yap and Guam, while the extreme edges or leaves lie down, on one side along the Loochoos and the S coast of Japan, on the other across the China Sea, from Palawan to the coast of Annam.*

*Henceforth no place on the coasts of China and Japan is under shelter: at the same time there is a remarkable immunity for the China Sea, below the 15th parallel, and the Pacific between the Marianas, the Bonin group and the neighbourhood of Tôkyô. The turning point of the "parabolas" is found, more and more frequently, in the surroundings of the Loochoos, and farther North, between the 125th and the 130th meridians. The focus of the origin rests roughly at the same place as before, between the Carolines and the Marianas.*

*[From Atlas of the Tracks of 620 Typhoons, 1893-1918, by Louis Froc, S.J, Director. Zi-ka-wei Observatory, Zi-ka-wei-Chang-hai, 1920].*

# TYPHOONS IN THE FAR EAST DURING 26 YEARS.




JULY. — *Three charts: 90 tracks; three or four instances every year.*

Third decade: *July 21-31. — 37 storms — The most striking feature of this period, is the obstinacy with which the typhoons come repeatedly to hit Haïnan island and the Gulf of Tongking. At a time when the storms have diminished in Japan, the straight trajectories are seen to gather, to follow each other on both sides of the 20th parallel, and running as a rule towards W.N.W, strike the coast between Kwang-chow-wan and Vinh in the South of the Gulf. The China Sea, to the South of the Paracels remains clear of typhoons during the middle of the month, and the Pacific, between the N. Marianas and the SE corner of Japan is remarkably free too.*

*Some great typhoons trace now very large paths on the Eastern and the Yellow Seas: they may recurve off the Saddles, and even farther West, across the Blue River, near Nanking and Chinkiang. Let us observe that a relatively small number of them draw the so called "parabola"; the very great majority come to land without recurving and disappear on the Continent between Thibet and the western provinces of China. A fact, rare as it may be, must not pass unnoticed: on the China Sea a few tracks are traced due West, or even in a WSW direction. (No. 21).*

*[From Atlas of the Tracks of 620 Typhoons, 1893-1918, by Louis Froc, S.J, Director. Zi-ka-wei Observatory, Zi-ka-wei-Chang-hai, 1920].*

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

Ps 2361/1113. Wt. 145 A. D.10194/PF.1286. 1300. 5/25.

# NOTICES.

## INVITATION TO MARINE OBSERVERS.

The Marine Superintendent will be pleased to see the Captains of Observing Ships or their Observing Officers when they are in London, between 10 a.m. and 4 p.m. at Room 319, Adastral House, Kingsway, W.C.2. Telephone No., Regent 8000, Extension 421. Telegrams, Marine Superintendent, Weather, London. (Nearest Station, Temple, District Railway.)

Personal touch is not only conducive to efficient work, but by this means we may be better able to advance upon lines which will further the practice of Meteorology in Navigation and at the same time provide the most suitable data for the general needs of Meteorological Science.

Those Marine Observers who do not come to London wishing to discuss matters connected with Marine Meteorology, are asked to consult the Agents at the Ports.

The Marine Agencies in Great Britain and Ireland are visited at least once a year by the Marine Superintendent, and it is hoped by these means to further promote voluntary co-operation between ships at sea, and with the Meteorological Office.

Usually the Marine Superintendent visits the Marine Agencies as follows :—

Southampton and Cardiff, first week of March.
Liverpool, last week of May.
Dublin and Glasgow, mid October.
Leith, North Shields and Hull, mid November.

Marine Agencies are given about two weeks notice of exact dates.

## CLOUD OBSERVATION.

**Marine Observers are requested to enter in the Meteorological Log and Form 911 types as follows unless a specific reason is given:—**

**(1) In the column for upper clouds.**
**Ci., Ci-St., Ci-Cu., A-St., A-Cu.**

**(2) In the column for lower clouds.**
**Cu, St., Nb., St-Cu., Cu-Nb., Fr-Nb., Fr-Cu., Fr-St.**

**(3) A compound name such as Strato-Cumulus should always be written as St-Cu, with a hyphen between the two parts to distinguish it from St/Cu, Stratus and Cumulus.**

**(4) If Stratus and Cumulus are both present they should be denoted thus St/Cu with a vertical stroke between them.**

**(5) Such terms as St. Cu without a hyphen or stroke should never be used as it is not evident whether Stratus and Cumulus are both present, or Strato-Cumulus only.**

**Particular attention should be paid to the observation and record of Cirrus, particularly in Tropical Cyclone regions.**

## 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 Office the particulars required hereunder, endeavour will be made as far as mails permit to post the latest number for use on their homeward passage.

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

*Port of Call*.....

*Date of Homeward Departure*.....

*Postal Address*.....

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

## IMPORTANT.

**With a view to promoting the interest and usefulness of this Journal, Marine Observers are requested to send in when possible accounts of interesting experiences, remarks upon special phenomena observed, and matters of interest, especially those which affect navigation.**

**A page for additional remarks will be found at the end of the Meteorological Log, or these can be made separately in manuscript.**

**Photographs, sketches and weather charts will be most welcome.**

## ILLUSTRATIONS FOR THE MARINE OBSERVER.

When making sketches, charts or plans, Marine Observers will give us great assistance if they will give consideration to reproduction in "The Marine Observer."

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

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

## CONVERSION TABLE.

To Convert Inches into Millibars.

| Inch. | mb. | Inch. | mb. | Inch. | mb. |
|---|---|---|---|---|---|
| 27·50 | 931·2 | 28·65 | 970·2 | 29·85 | 1,010·8 |
| 27·55 | 932·9 | 28·70 | 971·9 | 29·90 | 1,012·5 |
| 27·60 | 934·6 | 28·75 | 973·6 | 29·95 | 1,014·2 |
| 27·65 | 936·3 | 28·80 | 975·3 | 30·00 | 1,015·9 |
| 27·70 | 938·0 | 28·85 | 976·9 | 30·05 | 1,017·6 |
| 27·75 | 939·7 | 28·90 | 978·6 | 30·10 | 1,019·3 |
| 27·80 | 941·4 | 28·95 | 980·3 | 30·15 | 1,021·0 |
| 27·85 | 943·1 | 29·00 | 982·0 | 30·20 | 1,022·7 |
| 27·90 | 944·8 | 29·05 | 983·7 | 30·25 | 1,024·4 |
| 27·95 | 946·5 | 29·10 | 985·4 | 30·30 | 1,026·1 |
| 28·00 | 948·2 | 29·15 | 987·1 | 30·35 | 1,027·7 |
| 28·05 | 949·9 | 29·20 | 988·8 | 30·40 | 1,029·4 |
| 28·10 | 951·6 | 29·25 | 990·5 | 30·45 | 1,031·1 |
| 28·15 | 953·2 | 29·30 | 992·2 | 30·50 | 1,032·8 |
| 28·20 | 954·9 | 29·35 | 993·9 | 30·55 | 1,034·5 |
| 28·25 | 956·6 | 29·40 | 995·6 | 30·60 | 1,036·2 |
| 28·30 | 958·3 | 29·45 | 997·3 | 30·65 | 1,037·9 |
| 28·35 | 960·0 | 29·50 | 999·0 | 30·70 | 1,039·6 |
| 28·40 | 961·7 | 29·55 | 1,000·7 | 30·75 | 1,041·3 |
| 28·45 | 963·4 | 29·60 | 1,002·4 | 30·80 | 1,043·0 |
| 28·50 | 965·1 | 29·65 | 1,004·0 | 30·85 | 1,044·7 |
| 28·55 | 966·8 | 29·70 | 1,005·7 | 30·90 | 1,046·4 |
| 28·60 | 968·5 | 29·75 | 1,007·4 | 30·95 | 1,048·1 |
| | | 29·80 | 1,009·1 | | |

## CARE OF INSTRUMENTS.

Marine Observers are earnestly requested to exercise every precaution in the care of instruments lent by the Meteorological Office.

It is requested that the Captains and Officers will give the Port Meteorological Officers assistance when they visit the ship, by having all instruments accessible for their inspection.

In the event of breakages or losses, the broken parts should be handed to the Port Meteorological Officer or Agent at the ports, with a brief and clear account of how the breakage or loss occurred.

# ICE CHART.

## WESTERN NORTH ATLANTIC.

LETTERS OF TRANSATLANTIC TRACKS INDICATE

(A) Eastbound. From 25th March to 7th July, inclusive.

(B) Westbound. From 1st July to 31st August, inclusive.
Eastbound. From 8th July to 31st August, inclusive.

(F) From 16th May to the opening of Belle Isle route.
Westbound, on approaching Cape Race steer a course to pass 10 miles S. of Cape Race.
Eastbound, steer from position 25 miles S. of Cape Race.

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

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

### ROUTE NOTICES.

For latest information *re* Tracks *see* pages 35–36, March, 1925, "Marine Observer."

### 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.

Clarke City VCK · Belle Isle VCM · L'Anse au Loup VCL · C. Norman · Anticosti · Heath Pt. Lt. V. VCI · Fame Pt. VCG · Father Pt. VCF · GULF OF ST. LAWRENCE · NEWFOUNDLAND · Magdalen Is. · Grindstone I. VCN · St. Paul · Quebec VCD · Grosse I. · St. Pierre HYS. · Prince Edward Is. · Cape Breton Is. · Sydney VCO · Montreal · St. John VAR · NOVA SCOTIA · Halifax VCS · VCT. Sable Is. · Lurcher Lt.V. VDR · C. Sable VCU · Boston NAD. · New York NAH. · Nantucket Lt.V.

### PHENOMENAL DRIFTS OF ICE.

| Date. | Ship or Source of Report. | Position. Lat. | Long. | Remarks. |
|---|---|---|---|---|
| July, —, 1890 | S.S. Slavonia ... | 48°53′N. | 24°11′W. | Last remnants of berg. |
| „ —, 1902 | 2 reports by Fishermen. | 56°30′N. approx. | 6°30′W. | 40 to 50 ft. long, 15 ft. wide, 2 ft. 6 in. out of water. |
| „ 31, 1909 | S.S. Shimosa ... | 36°56′N. | 30°01′W. | 25 ft. long, 3 to 8 ft. wide. |
| „ 10, 1913 | S.S. Lothian ... | 37°27′N. | 26°48′W. | Piece 6 ft. high, 50 ft. in cir. |
| „ 18, 1916 | U.S. Hydrographic Bulletin. | 32°00′N. | 54°26′W. | Piece of berg 3 or 4 ft. out of water. |
| „ 23, 1916 | S.S. San Giorgio ... | 42°09′N. | 63°24′W. | Berg, 60 ft. long. |
| „ 23, 1918 | U.S. Hyd. Bulletin... | 44°25′N. | 35°01′W. | Large berg. |
| „ 18, 1921 | Do. ... | 44°30′N. | 39°26′W. | Small berg about 15 ft. sq |
| „ 21, 1921 | Do. ... | 39°09′N. | 40°39′W. | Berg. |
| „ 31, 1921 | Do. ... | 37°37′N. | 27°29′W. | Berg. |

Reports of Ice sighted between May 1st and May 31st, 1925, Meteorological Office, are shown which have been received by the position reported, the figures by the Symbols plotted in the indicating the day of the month.

### LATEST ICE REPORT FROM CANADA.

The following cablegram, dated 12th May, 1925, was received from the Superintendent, Canadian Signal Service, Quebec :—

"Strait of Belle Isle occasional bergs and some field ice, all other points no ice."

Steamers keep {10'N of this track Westbound. / 10'S of this track Eastbound.} (G) (G)

Steamers keep {10'N of this track Westbound. / 10'S of this track Eastbound.} (G) (F)

Steamers keep {10'N of this track Westbound. / 10'S of this track Eastbound.} (F)

Steamers keep {10'N of this track Westbound. / 10'S of this track Eastbound.} (F) (F)

Limit of ice reported to Meteorological Office 1901 – 1924.

(B) (B) (B) (A) (B) (A) (A)

Virgin Rocks · St. John's VCE

Ps 2361/1113. Wt. 145A. D10194/PF1286. 1125. 5/25.

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

# NOTICES.

## 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, Ships 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.

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.

Masters who wish to assist in developing the rapid interchange of Meteorological information and Weather Forecasting at sea can do so by using the standard form, not in code, of W/T Weather Report suggested in "Weather Signals," given in this Journal, January, 1925 Number (*see* pages 11 and 12). For this purpose a mecurial barometer of which the index error has been ascertained is essential.

The Marine Observer is sent monthly to all ships regularly contributing Logs, Forms and W/T Registers to the Meteorological Office. It is hoped that each ship will preserve *all* her copies. Personal copies of Numbers are sent to those whose special contributions are published in them.

## Marine Agencies and Port Meteorological Officers.

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

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

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

## LATE PRESS.

## DERELICTS AND FLOATING WRECKAGE.

| Date. | Position. Latitude. | Position. Longitude. | Description. |
|---|---|---|---|
| | **BALTIC.** | | |
| 1.5.25 | 57°— N. | 17°— E. | Wreck, 50 ft. in length, drifting bottom up. |
| 7.5.25 | 59°29′N. | 22°59′E. | Drifting large red and white spar buoy, dangerous to navigation. |
| | **NORTH SEA.** | | |
| 4.5.25 | 54°54′N. | 0°54′W. | Large log, dangerous to navigation. |
| 4.5.25 | Off West Hinder Lt. V. | | Two pieces of wreckage, masts or derricks, projecting out of water. |
| 7.5.25 | 51°22′N. | 2°33′E. | Upright spar, projecting about 4 ft. above water, apparently attached to submerged wreckage. |
| 16.5.25 | 54°30′N. | 2°52′E. | Mast projecting 6 ft., apparently attached to submerged wreckage. |
| 16.5.25 | 4 m. S. (mag.) from Maas Lt. V. | | Red conical buoy adrift, no marks. |
| 22.5.25 | 4½ m. N. by E. of Rattray Head. | | Small boat, partly submerged. |
| | **ENGLISH CHANNEL.** | | |
| 1.5.25 | 50°32′N. | 1°13′W. | Submerged object. |
| 18.5.25 | 49°27′N. | 3°25′W. | Black conical buoy. |
| 22.5.25 | 49°24′N. | 5°40′W. | Round blue painted buoy with white spot, also cable attached. |
| | **NORTH ATLANTIC.** | | |
| 1.5.25 | 51°21′N. | 10°58′W. | Large spar awash, with marine growth, dangerous to navigation. |
| 1.5.25 | 46°50′N. | 5°11′W. | Fishing vessel *Marie Rose*, dismasted. |
| 2.5.25 | 43°55′N. | 64°35′W. | Schooner *Cape d'or*, bottom up. |
| 4.5.25 | 44°12′N. | 44°48′W. | Large gas buoy with high superstructure. |
| 5.5.25 | 41°25′N. | 43°15′W. | Conical iron buoy, 5 ft. high. |
| 6.5.25 | 40°20′N. | 73°32′W. | Large piece of wreckage about 20 ft. square. |
| 7.5.25 | 45°38′N. | 30°20′W. | Dangerous derelict, partly submerged, one mast above sea. |
| 8.5.25 | 43°22′N. | 37°40′W. | Large framework buoy. |
| 8.5.25 | 39°— N. | 73°49′W. | Mast or spar, projecting about 15 ft. out of water in an upright position. |
| 14.5.25 | 36°05′N. | 10°47′W. | Big cylindrical buoy, dangerous to navigation, apparently having been adrift for considerable time. No marks seen. |
| 14.5.25 | 51°32′N. | 11°35′W. | Black spherical buoy, with staff light broken off top, marked *CV*. |
| 17.5.25 | 47°55′N. | 8°28′W. | Large iron buoy, painted red, in good condition, floating bottom up. Letters seen *S* on one side, *OWN* then *Company* with *No. 21* over it on other side. Dangerous to navigation. |
| 18.5.25 | 42°30′N. | 33°07′W. | Large spherical buoy. |
| 19.5.25 | 47°48′N. | 8°03′W. | Buoy. |
| 23.5.25 | 36°56′N. | 8°57′W. | Floating spar 20 ft. long, 3 ft. diameter, dangerous to navigation. |
| | **GULF OF MEXICO.** | | |
| 5.5.25 | 29°45′N. | 85°51′W. | Four masted schooner on fire, fore and aft, no persons on board, no boats or rafts in the vicinity. |

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

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

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

Only in special cases will individual letters be sent.

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

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

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

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

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

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

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

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

No. = Keeps Ship's Meteorological Report Form 911 with ship's instruments.

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

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

| Name of Vessel. | Captain. | Observing Officers. | Official Meteorological Equipment. | Line. | Last Log, Register, or Report Contributed. Received up to 16.5.25. | Date Received. |
|---|---|---|---|---|---|---|
| *Aba* ... ... | Hughes, J. ... | G. Pugh Williams ... ... | M.L. | Elder Dempster ... | Form 911 11.12.24 to 15.1.25 ... | 21.1.25. |
| *Abinsi* ... ... | Wright, J. B. ... | W. Borrows ... ... | No. | Elder Dempster ... | ,, 18.2.25 to 28.3.25 ... | 14.4.25. |
| *Actor* ... ... | Haylett, E. ... | W. Rennie ... ... | ,, | Harrison ... ... | ,, 22.8.24 to 6.9.24 ... | 7.10.24. |
| *Adda* ... ... | Toft, J. T. ... ... | J. E. Wood, E. H. Gatward | ,, | Elder Dempster ... | ,, 12.6.24 to 18.7.24 ... | 21.7.24. |
| 50 *Adriatic* ... | Beadnell, F. E., Commr., R.N.R. | J. Collins, A. C. I. Anson, L. G. A. Farmer, W. W. Pearson. | W.T. | White Star ... ... | W.T.Reg. 29.12.24 to 25.4.25... | 29.4.25. |
| | | | | | Form 911 5.4.25 to 25.4.25 ... | 29.4.25. |
| *Agapenor* ... | Ramsay, J. ... | J. P. Makepeace ... ... | No. | A. Holt ... ... | ,, 4.2.25 to 21.4.25 ... | 29.4.25. |
| *Alban* ... ... | Torrible, R. H. ... | G. E. Freeman ... ... | ,, | Booth ... ... | ,, 20.3.25 to 31.3.25 ... | 8.4.25. |
| *Albania* ... | Gronow, S. ... ... | E. W. Connell ... ... | ,, | Cunard ... ... | ,, 4.12.24 to 17.3.25 ... | 1.4.25. |
| *Algerian Prince* ... | Shaw, D. C. ... | G. Potts ... ... ... | ,, | Prince ... ... | ,, 17.3.25 to 31.3.25 ... | 6.4.25. |
| *Alipore* ... | Gordon, L. M., R.D., Commr., R.N.R. | F. R. W. Page ... ... | ,, | P. and O. ... ... | ,, 15.2.25 to 3.3.25 ... | 23.3.25. |
| *Almanzora* ... | Mackenzie G. A. ... | A. P. Portsmouth ... ... | ,, | R.M.S.P. ... ... | ,, 6.2.25 to 23.3.25 ... | 26.3.25. |
| *Alondra* ... | J. J. Prendergast ... | H. Peters ... ... | ,, | Yeoward ... ... | ,, 11.4.25 to 3.5.25 ... | 5.5.25. |
| *Ampetco* ... | Verstichelen, A. ... | E. Smet... ... ... | ,, | American Petroleum... | ,, 31.1.25 to 1.3.25 ... | 3.4.25. |
| *Anglia*... ... | Sorge, P.... ... | W. H. Hughes ... ... | C.C. | L.M. & S. Rly. ... | Telegraphic Report 11.4.24 ... | 11.4.24. |
| *Antilochus* ... | Wilkinson, H. ... | A. C. D. Howes ... ... | No. | A. Holt ... ... | Form 911 30.3.25 to 19.4.25 ... | 28.4.25. |
| *Aorangi* ... | Crawford, R. ... | R. B. Denniston ... ... | M.L. | Canadian-Australasian | ... ... ... ... ... | ... |
| *Appam* ... | Yardley, H. A. ... | B. Holt, J. Doyle, P. Marriott | M.L. | Elder Dempster ... | Met. Log. 9.7.24 to 21.12.24 ... | 29.12.24. |
| 30 *Aquitania* ... | Charles, Sir J. T. W., K.B.E., C.B., R.D.,Commodore, R.N.R. | J. L. Croasdaile, P. O. Davis, J. Locke. | W.T. | Cunard ... ... | W.T. Reg. 19.4.25 to 4.5.25 ... | 6.5.25. |
| *Arafura* ... | Gordon, A. S. ... | R. Lloyd Harry ... ... | No. | Eastern and Australian | Form 911 17.8.24 to 18.10.24... | 15.12.24. |
| *Archimedes* ... | Taylor, F. C. ... | S. C. Smith, H. A. Bolding ... | ,, | Lamport & Holt ... | ,, 15.3.25 to 17.4.25 ... | 20.4.25. |
| *Armadale Castle*... | Millard, L. A. ... | M. M. Tomkins ... ... | ,, | Union Castle ... | ,, 2.1.25 to 18.1.25 ... | 10.2.25. |
| *Arracan* ... | Willis, M. ... ... | McInnes, M. S. Stuart, A. McCullum, R. Morrison. | M.L. | P. Henderson ... | Met. Log. 27.9.24 to 7.2.25 ... | 25.2.25. |
| *Arundel* ... | Short, H. ... ... | Mr. Hill ... ... ... | C.C. | Southern Rly. ... | Telegraphic Report 15.5.25 ... | 15.5.25. |
| *Arundel Castle* ... | Hague, J. W., Commr., R.N.R. | G. Blaiklock, C. Williams, F. Granger. | M.L. | Union Castle ... | Met. Log. 12.9.24 to 4.1.25 ... | 12.1.25. |
| *Assyria* ... | Erskine, R. ... | R. L. A. Hamilton ... | No. | Anchor ... ... | Form 911 24.1.25 to 25.2.25 ... | 26.3.25. |
| *Astronomer* ... | Booth, W. M. ... | L. Harriman, H. Thomas, E. Shatton. | M.L. | Harrison ... ... | Met. Log. 11.11.24 to 8.2.25 ... | 18.2.25. |
| *Athenic* ... | Davies, E. ... ... | W. Hill ... ... ... | No. | White Star ... ... | Form 911 14.3.25 to 28.3.25 ... | 15.4.25. |
| *Atreus* ... ... | Salter, G. H. ... | ... ... ... ... ... | ,, | A. Holt ... ... | ... ... ... ... ... | ... |
| *Atsuta Maru* ... | Furuhashi, M. ... | S. Mizogucki ... ... | ,, | Nippon Yusen Kaisha | ,, 1.4.25 to 1.5.25 ... | 7.5.25. |
| *Auditor* ... | Owen, W. F. ... | T. E. Steel ... ... ... | ,, | Harrison ... ... | ,, 1.4.25 to 23.4.25 ... | 27.4.25. |
| *Auldmuir* ... | Ramsay, J. D. ... | J. A. S. Adams ... ... | ,, | Glen & Co. ... ... | ,, 11.10.24 to 27.10.24 | 11.11.24. |
| *Ausonia* ... | Gibbons, G., R.D., Commr., R.N.R. | A. T. Hamer ... ... | ,, | Cunard ... ... | ,, 21.2.25 to 16.3.25 ... | 20.3.25. |
| *Avon* ... ... | Matthews, J. E. P. | ... ... ... ... | No. | R.M.S.P. ... ... | Form 911 ... ... ... ... | ... |
| 51 *Baltic* ... | A. Holme ... ... | E. A. A. Crowley, J. Law, F. Patchett. | W.T. | White Star ... ... | W.T. Reg. 20.4.25 to 9.5.25 ... | 13.5.25. |
| | | | | | Form 911 19.4.25 to 9.5.25 ... | 13.5.25. |
| *Bambra* ... | Wyles, W. S. ... | G. Buckeridge, H. W. Norris, W. Walters, V. Denton, G. Simpson. | M.L. | State Service, Australia | Met. Log. 12.11.24 to 28.2.25... | 16.4.25. |
| *Bampton Castle* ... | Swiney, W. A. ... | A. E. Benn, D. Campbell, S. E. Aldam. | ,, | Union Castle ... | ,, 28.11.24 to 25.2.25... | 17.3.25. |
| *Banbury Castle* ... | ... ... ... | C. C. Page ... ... | No. | ,, ... | ... ... ... ... ... | ... |
| *Banffshire* ... | Wynne, R. H. ... | J. M. Bowie ... ... | ,, | Turnbull Martin ... | Form 911 20.2.25 to 27.3.25 ... | 6.4.25. |
| *Barambah* ... | Daniel, F. ... ... | ... ... ... ... | ,, | Commonwealth Govt. | ,, 26.3.25 to 6.5.25 ... | 14.5.25. |
| *Baron Cawdor* ... | Baillie, T. ... ... | A. Campbell ... ... | ,, | Hogarth & Sons ... | ,, 15.8.24 to 28.8.24 ... | 16.10.24. |
| *Barpeta* ... | Beedle, T. S. ... | W. G. E. Rawlingson ... | ,, | British India ... | ,, 11.3.25 to 10.4.25 ... | 4.5.25. |
| *Beaufort* ... | Rice, W. V., D.S.O., D.S.C., Commr., R.N. | H. M. S. Forbes ... ... | M.L. | His Majesty's Ship ... | Met. Log. 28.7.24 to 3.11.24 ... | 28.11.24 |
| 59 *Belgenland* ... | Bradshaw, J. ... | C. J. Murray, J. M. Appleby, W. E. Hesketh. | W.T. | Red Star ... ... | W.T. Reg. 24.11.24 to 28.4.25... | 30.4.25. |
| | | | | | Form 911 5.12.24 to 14.4.25 ... | 30.4.25. |
| *Benalder* ... | Cole J. H. D.S.C.... | W. M. Webster ... ... | No. | Ben Line ... ... | ,, 13.4.25 to 25.4.25 ... | 5.5.25. |
| *Bendigo* ... ... | Furlong, G. H. S. ... | C. E. Arundel... ... ... | ,, | P. & O. Branch ... | ... ... ... ... ... | ... |
| *Bengloe* ... | McCorquodale, A. ... | G. M. Duff ... ... | ,, | Ben Line ... ... | ,, 25.11.24 to 13.12.24 | 20.12.24. |

| Name of Vessel. | Captain. | Observing Officers. | Official Meteoro-logical Equipment. | Line. | Last Log, Register, or Report Contributed. Received up to 16.5.25. | Date Received. |
|---|---|---|---|---|---|---|
| 31 *Berengaria* ... | Irvine, W. R. D., R.D. Capt., R.N.R. | R. F. Bovey, J. A. Myles, S. A. T. Bullock, A. J. Denby, W. C. A. Robson. | W.T. | Cunard ... | W.T. Reg. 5.4.25 to 20.4.25 ... | 24.4.25. |
| | | | | | ,, 26.4.25 to 11.5.25 ... | 13.5.25. |
| *Bernini* ... | Evans, W. ... | H. L. Rudd ... ... | No. | Lamport & Holt ... | Form 911 21.11.24 to 31.1.25... | 16.2.25. |
| *Berrima* ... | Townshend, W. P. | H. C. Slinn ... ... | ,, | P. & O. Branch ... | ,, 14.3.25 to 1.4.25 ... | 20.4.25. |
| *Bogota* ... | Dunn, R. E., O.B.E. | T. R. Thomas ... ... | ,, | R.M.S.P. Co. ... | ,, 11.2.25 to 11.3.25 ... | 14.4.25. |
| *Bolingbroke* ... | Stewart, A. ... | C. E. Duggan ... ... | M.L. | Canadian Pacific ... | Met. Log. 25.8.24 to 23.9.24 ... | 2.10.24. |
| *Borda* ... ... | Holland, R. ... | ... ... ... ... | No. | P. & O. Branch ... | Form 911 4.9.24 to 15.1.25 ... | 6.2.25. |
| *Bothwell* ... | Murray, M. F. ... | S. W. Keay ... ... | ,, | Canadian Pacific ... | ,, 19.3.25 to 17.4.25 ... | 21.4.25. |
| *Brandon* ... | Mc. Combie, G. F. G. | W.J.P.Roberts, G.B.Marriott | ,, | ,, ,, ... | ,, 22.12.24 to 24.1.25... | 30.1.25. |
| *Brecon* ... | J. Newman... ... | J. Mackenzie, H. C. Waters, T. J. Webster, D. Durin, N. B. Goater, T. Golby. | M.L. | ,, ,, ... | Met. Log. 2.12.24 to 24.2.25 ... | 4.3.25. |
| *Brenda* ... | Murdoch, R. G. ... | F. R. Ness ... ... | No. | Scottish Fishery Board | Form 911 1.4.25 to 30.4.25 ... | 4.5.25. |
| *Brighton* ... | Hill, A. ... ... | Mr. Munton ... ... | C.C. | Southern Railway ... | Telegraphic Report 14.5.25 ... | 14.5.25. |
| *British Advocate* | Taylor, R. J. ... | ... ... ... ... | No. | British Tankers ... | ... ... ... ... ... | ... |
| *British Engineer*... | T. W. Joures ... | M. J. Grieves ... ... | No. | ,, ,, ... | Form 911 13.2.25 to 26.4.25 ... | 1.5.25. |
| *Browning* ... | Connorton, C. A. ... | W. E. Johnston ... ... | ,, | Lamport & Holt ... | ,, 17.11.25 to 6.2.25 ... | 23.2.25. |
| *Bruyere* ... | Denson, W. ... | C. E. Legg ... ... | ,, | ,, ,, ... | ,, 27.2.25 to 21.3.25 ... | 14.4.25. |
| *Cambria C.S.* ... | Wightman, H. G. E., D.S.C. | E. N. L. Staples ... ... | M.L. | Eastern Tel. Co. ... | Met. Log. 8.7.24 to 5.10.24 ... | 27.1.25. |
| *Cambria* ... | ... ... ... | V. S. Phillips ... ... | C.C. | L.M. & S. Rly. ... | Telegraphic Report 12.5.25 ... | 12.5.25. |
| *Camito*... ... | Scudamore, J. H. H., D. S. C., R. D., Commr., R.N.R. | D. A. Jack, R. M. Cossantine, S. Borrie, S. Ray. | M.L. | Elders & Fyffes ... | Met. Log. 8.7.24 to 13.12.24 ... | 19.12.24. |
| *Canada* ... | Jones, T. ... ... | A. Thompson ... ... | No. | White Star-Dominion | Form 911 5.4.25 to 25.4.25 ... | 30.4.25. |
| *Canadian Importer* | ... ... ... | K. Macleod ... ... | ,, | Canadian Govt. Mercantile Marine. | ,, ... ... ... ... | ... |
| *Canadian Raider* | Dixon, C. C. ... | C. J. Carp ... ... | ,, | Canadian Govt. Merchant Marine. | ,, 16.3.25 to 22.4.25 ... | 5.5.25. |
| *Canadian Scottish* | Forson, A. ... | S. Fieldhouse ... ... | ,, | ,, ,, ,, | ,, 8.1.25 to 24.1.25 ... | 9.2.25. |
| *Canadian Skirmisher.* | Millar, W. H. ... | C. W. Crofts ... ... | ,, | ,, ,, ,, | ,, 17.3.25 to 28.3.25 ... | 18.4.25. |
| *Canadian Winner* | Hocking, N. P. ... | R. D. Ranns ... ... | ,, | ,, ,, ,, | ,, 2.2.25 to 5.3.25 ... | 30.3.25. |
| *Carlow Castle* ... | Whitfield, G. J. ... | L. H. Stevens ... ... | ,, | Union Castle ... | ,, 21.8.24 to 3.1.25 ... | 6.1.25. |
| 35 *Carmania* ... | McNeil, S. G. S., R.D., Capt., R.N.R. | S. Scholfield, W. M. Stewart, T. A. O. Ellis. | W.T. | Cunard ... ... | W.T. Reg. 20.4.25 to 10.5.25 ... | 11.5.25. |
| | | | | | Form 911 18.4.25 to 10.5.25 ... | 12.5.25. |
| 34 *Caronia* ... | Hossack, W. H., R.D., Capt., R.N.R. | J. A. Quarrie, P. Clarke, D. M. MacLean. | W.T. | Cunard ... ... | W.T. Reg. 29.3.25 to 19.4.25 ... | 28.4.25. |
| | | | | | Form 911 30.3.25 to 19.4.25 ... | 27.4.25. |
| *Cassandra* ... | Mitchell, W. E. ... | G. M. Sime ... ... | No. | Anchor Donaldson ... | Form 911 8.10.24 to 16.12.24... | 18.12.24. |
| 52 *Cedric* ... | Hickson, V. W. ... | A. E. Weller, G. T. Kavanagh, W. A. Calway. | W.T. | White Star ... ... | W.T. Reg. 16.3.25 to 4.4.25 ... | 8.4.25. |
| | | | | | Form 911 15.3.25 to 5.4.25 ... | 8.4.25. |
| 53 *Celtic* ... | Berry, G. ... | R. S. Walker, R. H. Shaw, J. W. Allingham. | W.T. | ,, ,, ... ... | W.T. Reg. 30.3.25 to 19.4.25 ... | 23.4.25. |
| | | | | | Form 911 29.3.25 to 19.4.25 ... | 22.4.25. |
| *Centaur* ... | Rose, A. F. ... | L. Johnstone ... ... | No. | A. Holt & Co. ... | ,, 29.1.25 to 19.3.25 ... | 20.4.25. |
| *Ceramic* ... | Summers, F. F. ... | E. E. Burt ... ... | ,, | White Star ... ... | Form 911 12.11.24 to 16.12.24 | 29.12.24. |
| *Changsha* ... | Gambrill, F. C. ... Thomas, R. D. ... | A. M. Frame, F. G. Stratford, H. Lishman, L. A. Bailie, W. Bailley. | M.L. | Yuill & Co.... ... | Met. Log. 25.4.24. to 2.10.24... | 10.3.25. |
| *China* ... ... | King, A., D.S.C. ... | E. Cox Walker ... ... | No. | P. & O. ... ... | Form 911 9.4.24 to 20.5.24 ... | 26.5.24. |
| *Chindwara* ... | Brisley, P. L. ... | F. O. Copeland ... ... | ,, | British India ... | ,, 7.3.25 to 31.3.25 ... | 4.5.25. |
| *Chindwin* ... | Esslemont, C. ... | J. Summers, W. Wilson, J. G. Walker. | M.L. | P. Henderson ... | Met. Log. 28.12.24 to 12.3.25... | 27.3.25. |
| *City of Alexandria* | Bedford, G. B. ... | T. Tellesson ... ... | No. | Ellerman ... ... | Form 911 14.3.25 to 7.4.25 ... | 5.5.25. |
| *City of Baroda* ... | Houghton, W. ... | A. D. Henderson, H. N. Jones, G. S. Gaylard. | M.L. | ,, ... ... | Met. Log. 18.11.24 to 15.4.25... | 17.4.25. |
| *City of Batavia* ... | Nancollas, H. E. ... | S. J. Nash ... ... | No. | ,, ... ... | Form 911 27.12.24 to 25.1.25... | 9.3.25. |
| *City of Benares* ... | Wyper, J. ... | A. A. Fullerton, C. G. Inglis | ,, | ,, ... ... | ,, 14.2.25 to 24.3.25 ... | 24.4.25. |
| *City of Brisbane*... | Seaborne, F. O. ... | W. E. Fletcher ... ... | ,, | ,, ... ... | ,, 29.12.24 to 28.1.25... | 2.2.25. |
| *City of Canterbury* | Macdonald, K., O.B.E. | A. M. Hamilton ... ... | ,, | ,, ... ... | ,, 3.9.24 to 9.11.24 ... | 14.11.24. |
| *City of Chester* ... | Letton, F. W. ... | F. C. Wilson, E. Garner, D. B. Carson, J. Shearer. | M.L | ,, ... ... | Met. Log. 4.12.24 to 27.4.25 ... | 4.5.25. |
| *City of Edinburgh* | Spencer, H. ... | E. V. Henday ... ... | No. | ,, ... ... | Form 911 31.8.24 to 30.9.24 ... | 16.10.24. |
| *City of London* ... | Martin, D. ... | J. J. McTigue ... ... | ,, | ,, ... ... | ,, 20.3.25 to 11.4.25 ... | 27.4.25. |
| *City of Marseilles* | Brown, G. ... | W. J. Nixon ... ... | ,, | ,, ... ... | ,, 5.12.24 to 28.12.24... | 6.1.25. |
| *City of Rangoon*... | Williams, T. L. ... | W. Ibbotson, S. L. Hoare, T. A. Dexter. | M.L. | ,, ... ... | ... ... ... ... ... ... | ... |
| *City of Valencia*... | Williamson, W. A., R.D., Lieut.-Commr. R.N.R. | C. C. Duncan ... ... | No. | ,, ... ... | Form 911 14.11.24 to 4.2.25 ... | 20.2.25. |
| *City of Yokohama* | McDonald, W. D. ... | R. Moloney ... ... | ,, | ,, ... ... | ,, 11.1.25 to 18.2.25 ... | 6.4.25. |
| *Clan Cumming* ... | McLean, J. G. ... | S. M. Werrey Easterbrook ... | ,, | Clan ... ... | ,, 25.12.24 to 29.1.25... | 9.3.25. |
| *Clan Lindsay* ... | Worthington, C. D. | G. K. Johnson ... ... | ,, | ,, ... ... | Form 911 8.10.24 to 13.11.24... | 19.11.24. |
| *Clan Macbeth* ... | Young, A. H., R.D., Lieut.-Commdr., R.N.R. | T. Lund ... ... ... | ,, | ,, ... ... | ,, 27.2.25 to 26.3.25 ... | 2.4.25. |
| *Clan Macgillivray* | West, W. F. ... | P. G. de Gruchy ... ... | ,, | ,, ... ... | ,, 19.2.25 to 6.3.25 ... | 30.3.25. |
| *Clan Macindoe* ... | Miller, W. ... | F. G. Darnborough ... | ,, | ,, ... ... | ,, 24.9.24 to 27.11.24... | 3.12.24. |
| *Clan Mackellar* ... | Scotland, A. ... | A. V. Howard ... ... | ,, | ,, ... ... | ,, 25.2.25 to 9.3.25 ... | 14.4.25. |
| *Clan Mackenzie*... | Young, G. ... | W. G. Arthur, F. B. Fairweather. | ,, | ,, ... ... | ,, 7.11.24 to 21.11.24... | 12.12.24. |
| *Clan Mackinnon* | Mackie, R. W. ... | T. V. Wilson, C. Jones, W. F. Isaac. | M.L. | ,, ... ... | Met. Log. 27.1.25 to 9.5.25 ... | 15.5.25. |
| *Clan Macphee* ... | Gourlay, J. B. ... | W. D. E. Campbell, F. Buckley, E. C. Carter. | M.L. | ,, ... ... | Met. Log. 13.6.24 to 26.12.24... | 2.3.25. |
| *Clan Macnaughton* | W. Thomson ... | A. J. Storkey, F. Barnes ... | No. | ,, ... ... | Form 911 22.3.25 to 10.4.25 ... | 12.5.25. |
| *Clan Mactaggart*... | Gray, J. N. ... | T. Walls, W. J. Henderson... | ,, | ,, ... ... | ,, 5.4.25 to 9.5.25 ... | 12.5.25. |
| *Clan Macvicar* .. | Phillips, G. P ... | L. S. Murrin ... ... | ,, | ,, ... ... | ,, 2.4.25 to 18.4.25 ... | 12.5.25. |
| *Clan Malcolm* ... | Higgins, C. J. ... | T. G. Young, R. F. Buckley | M.L. | ,, ... ... | Met. Log. 6.10.24 to 30.3.25 ... | 6.4.25. |
| *Clan Morrison* ... | Porterfield, W. M.... | G. Morren ... ... | No. | ,, ... ... | Form 911 24.3.25 to 20.4.25 ... | 22.4.25. |
| *Clan Murdoch* ... | Pagan, J. C. ... | C. W. Thomas ... ... | ,, | ,, ... ... | ,, 10.1.25 to 5.2.25 ... | 2.3.25. |
| *Clan Ranald* ... | Openshaw, L. G. ... | W. H. D. Stephen ... | ,, | ,, ... ... | ,, 8.2.25 to 28.3.25 ... | 3.4.25. |
| *Clan Ross* ... | Jones, R. C. ... | G. Short... ... ... | ,, | ,, ... ... | ,, 12.2.25 to 15.4.25 ... | 4.5.25. |
| *Clan Sinclair* ... | Neill, G. A. ... | F. B. Parker ... ... | ,, | ,, ... ... | ,, 21.12.24 to 31.1.25... | 5.2.25. |
| *Clan Stuart* ... | Stenson, F. J., R. D., Commr. R.N.R. | R. Silk ... ... ... | ,, | ,, ... ... | ,, 30.1.25 to 25.2.25 ... | 17.3.25. |
| *Clan Urquhart* ... | Gibb, A. F. W. ... | R. H. Law ... ... | ,, | ,, ... ... | ,, 23.1.25 to 1.3.25 ... | 3.3.25. |
| *Colonia*, C.S. ... | Campos, V., O.B.E., Lt.-Commdr., R.N.R. | S. A. Garnham, A. S. Muir, J. M. Matthews, W. Sangwine. | M.L | Telegraph Construction & Maintenance. | Met. Log. 4.10.24 to 21.1.25 ... | 30.1.25. |
| *Colonial* ... | Barrow, R. K. ... | D Wolstenholme ... ... | No. | Harrison ... ... | Form 911 3.1.25 to 2.4.25 ... | 15.4.25. |
| *Colonian* ... | Gittins, R. P. ... | W. R. Vaughan ... ... | ,, | Leyland ... ... | ,, 16.1.25 to 12.2.25 ... | 20.2.25. |
| *Columbia* ... | Gemmell, W. ... | J. K. Macmillan ... ... | ,, | Anchor ... ... | ,, 5.4.25 to 26.4.25 ... | 29.4.25. |

| Name of Vessel. | Captain. | Observing Officers. | Official Meteoro-logical Equipment. | Line. | Last Log, Register, or Report Contributed. Received up to 16.5.25. | Date Received |
|---|---|---|---|---|---|---|
| *Concordia* ... | Lowson, P.... ... | ... ... ... ... | M.L. | Anchor Donaldson ... | Met. Log. ... ... ... ... | ... |
| *Comino* ... | Nuttall, E. L. ... | J. Woodward ... ... | No. | Furness Withy ... | Form 911 7.1.25 to 4.4.25 ... | 20.4.25. |
| *Cooee* ... ... | Festa, M. ... | C. Keen ... ... ... | ,, | Commonwealth Govt. | ,, 9.8.24 to 29.8.24 ... | 7.10.24. |
| *Corinthic* ... | Hart, F. ... ... | F. Kean, W. Fitzgerald, F. G. Rogers, | M.L. | White Star ... | Met. Log. 28.11.24 to 17.3.25... | 26.3.25. |
| *Cornwall* ... | Haines, F. P. ... | Mr. Maltby, Mr. Ray ... | No. | Dowie, J., & Co. ... | Form 911 4.1.25 to 26.1.25 ... | 23.3.25. |
| *Crawford Castle* ... | Morgan, A. O., R.D., Commr. R.N.R. | G. Montgomery ... ... | ,, | Union Castle ... | ,, 10.3.25 to 26.3.25 ... | 8.4.25. |
| *Culebra* ... ... | Mackay, A. S. ... | C. Wolfenden, J. W Duncan. R. Hocken. | M.L. | R.M.S.P. Co. ... | Met. Log. 10.11.24 to 10.4.25... | 4.5.25. |
| *Cuthbert* ... | Reynolds, W. H. B. | K. S. Monro, J. Watson ... | No. | Booth ... ... | Form 911 10.3.25 to 30.3.25 ... | 1.4.25. |
| *Cyclops* ... | Cosker, W. ... | R. W. Ellis ... ... | ,, | A. Holt ... ... | ,, 5.12.24 to 27.2.25 ... | 3.3.25. |
| *Dardanus* ... | Shaw, A. T. ... | ... ... ... ... | No. | A. Holt ... ... | ,, 9.2.25 to 25.4.25 ... | 7.5.25. |
| *Darian*... ... | Masters, W. ... | A. S. Holland ... ... | ,, | Leyland ... ... | ,, 24.4.25 to 4.5.25 ... | 14.5.25. |
| *Darro* ... ... | Smith, W. E., D.S.O., R.D.,Capt., R.N.R. | W. H. Fowler ... ... | ,, | R.M.S.P. Co. ... | ,, 7.2.25 to 5.4 25 ... | 17.4.25. |
| *Daytonian* ... | Walker, C. J., D.S.C. | W. T. Godwin ... ... | ,, | Leyland ... ... | ,, 1.2.25 to 4.3.25 ... | 13.3.25. |
| *Delta* ... ... | Brooks, C., D.S.O. R.D.,Commr..R.N.R. | J. O. V. Young ... ... | ,, | P. & O. ... ... | ,, 28.6.24 to 8.8.24 ... | 13.8.24. |
| *Demerara* ... | Willan, F. C. L. ... | E. Hewitt ... ... | ,, | R.M.S.P. Co. ... | ,, 21.3.25 to 8.4.25 ... | 4.5.25. |
| *Demosthenes* ... | Williams, W. J. ... | R. A. Alcock ... ... | ,, | Aberdeen ... ... | ,, 20.2.25 to 9.3.25 ... | 20.4.25. |
| *Deseado* ... | Hannam, F. S. ... | F. G. Dawson, A. H. Phillipson | ,, | R.M.S.P. Co. ... | ,, 26.2.24 to 17.4.25 ... | 21.4.25. |
| *Desna* ... ... | Huff, G. F. ... | A. Hambly ... ... | ,, | ,, ... | ,, 8.3.25 to 2.5.25 ... | 6.5.25. |
| *Deucalion* ... | Findlay, J. ... | P. W. Savery, F. W. Duffy... | ,, | A. Holt ... ... | ,, 4.3.25 to 22.3.25 ... | 4.5.25. |
| *Devon* ... ... | Gardner, H. W. ... | A. Bell ... ... ... | ,, | New Zealand S.S. Co. | ,, 20.12.23 to 11.5.24... | 4.6.24. |
| *Dieppe*... ... | Marmery, S. ... | Mr. Parsons ... ... | C.C. | Southern Railway ... | Telegraphic Report 19.4.25 ... | 19.4.25. |
| *Digby* ... ... | Westgarth, W.A., D.S.C. Chambers, F. W. D.S.C. | J. Pascoe, J. W. Murphy, W. P. Paterson. | M.L. | Furness Withy ... | Met. Log. 17.4.24 to 9.11.24 ... | 26.11.24. |
| *Dimboola* ... | Roy, C. M. ... | F. L. Heppell ... ... | No. | Melbourne S.S. Co. ... | Form 911 14.2.25 to 7.4.25 ... | 12.5.25. |
| *Discoverer* ... | Ling, J. T. ... | J. Richardson ... ... | ,, | Harrison ... ... | ,, 30.11.24 to 9.3.25 ... | 11.3.25. |
| *Dogra* ... ... | Hartock, L. ... | E. C. Akers ... ... | ,, | Asiatic S.N. Co. ... | ,, 27.12.24 to 12.1.25... | 2.2.25. |
| *Domala*, M.V. ... | Buswell, W. ... | C. E. Merchant ... ... | ,, | British India ... | ,, 13.2.25 to 13.4.25 ... | 28.4.25. |
| *Doric* ... ... | S.Bolton,D.S.C.,R.D., Commr., R.N.R. | D. W. Chamberlain ... | ,, | White Star ... | ,, 12.4.25 to 4.5.25 ... | 6.5.25. |
| *Doric Star* ... | Thomas, R. T. ... | T. Williams ... ... | ,, | Blue Star ... ... | Form 911 28.2.25 to 11.3.25 ... | 23.3.25. |
| *Dorington Court*... | Isaacs, W. A. ... | E. V. Quickenden ... ... | ,, | Haldin & Co. ... | ,, 17.8.24 to 8.9.24 ... | 18.9.24. |
| *Dorset* ... ... | Kettlewell, C. R. ... | F. G. Capon, L. Cann, D. M. Lambert. | M.L. | New Zealand S.S. Co. | Met. Log. 24.11.24 to 20.4.25... | 27.4.25. |
| *Dromore Castle* ... | Vincent, E. S., R.D., Commr. R.N.R. | S. S. Smith ... ... | No. | Union Castle ... | Form 911 17.2.25 to 4.3.25 ... | 23.3.25. |
| *Dryden* ... | Knight, R. A. ... | G. D. Oldfield ... ... | ,, | Lamport & Holt ... | ,, 28.9.24 to 7.12.24 ... | 6.1.25. |
| *Dundrum Castle*... | Kershaw, H. J. ... | R. May ... ... ... | ,, | Union Castle ... | ,, 7.2.25 to 7.3.25 ... | 30.3.25. |
| *Duendes* ... | Pape, E. R. ... | D. P. Morgan ... ... | ,, | Pacific S.N. Co. ... | ,, 22.11.24 to 24.12.24 | 29.12.24. |
| *Duffield* ... ... | King A. ... ... | T. S. Robertson ... ... | ,, | Hunting & Sons ... | ,, 10.11.24 to 9.12.24... | 16.12.24. |
| *Duquesa* ... | Ellis, F. ... ... | C. P. Lane, W. Thornton ... | ,, | Furness Withy ... | Form 911 18.1.25 to 21.3.25 ... | 26.3.25. |
| *Durenda* ... | Wilson, W. ... | W. H. Creese ... ... | ,, | British India ... | ,, 31.1.25 to 28.4.25 ... | 12.5.25. |
| *Edinburgh Castle* | Strong, H., R.D., Commr., R.N.R. | C. S. Kean ... ... | M.L. | Union Castle ... | Met. Log. 24.10.24 to 19.4.25... | 23.4.25. |
| *Eemland* ... | Van Noppen, C. D. | J. G. Sander ... ... | No. | Holland Lloyd ... | Form 911 27.11.24 to 4.2.25 ... | 10.3.25. |
| *El Cordobes* ... | Noton, F. G. ... | J. W. Ekins ... ... | ,, | British & Argentine S.N. Co. | ,, 17.3.25 to 12.4.25 ... | 20.4.25. |
| *Elmina* ... | Millson, H. E. ... | R. Wilkinson, C. Cryer, R. Griffiths. | M.L. | Elder Dempster ... | Met. Log. 10.10.24 to 21.2.25... | 11.3.25. |
| *El Paraguayo* ... | Ellis, F., D.S.C. ... | W. E. Williams ... ... | No. | Houlder Bros. ... | Form 911 8.11.24 to 8.1.25 ... | 16.1.25. |
| *Elpenor* ... | T. W. Hannay ... | P. E. Wright, W. T. Pennington. | M.L. | A. Holt ... ... | Met. Log. 3.11.24 to 18.2.25 ... | 23.2.25. |
| *Empress of Asia*... | Douglas, L. D., R.D., Lt. - Commr., R.N.R. | G. H. Blyth. A. M. Barff, D. Smith, L. Johnston ... | M.L. | Canadian Pacific ... | Met. Log. 25.9.24 to 26.1.25 ... | 3.3.25. |
| *Empress of Australia.* | Hailey, A. J. ... | C. Critchley, R. A. Leicester, A. B. Smith | M.L. | ,, ,, ... | ,, 24.4.24 to 28.10.24... | 24.11.24. |
| *Empress of Canada* | Robinson, S., C.B.E., R.D., Commr., R.N.R. | W. S. Halliday, L. C. Barry.. | M.L. | ,, ,, ... | Met. Log. 19.6.24 to 13.11.24... | 29.12.24. |
| *Empress of France* | Griffiths, E. ... | O. Pennington, E. Roberts, A. W. Patrick. | M.L. | ,, ,, ... | ,, 7.6.24 to 11.11.24 ... | 18.11.24. |
| *Empress of Russia* | Hosken, A. J. ... | — Reid ... ... ... | M.L. | ,, ,, ... | ,, 28.8.24 to 8.12 24 ... | 26.1.25. |
| *Empress of Scotland* | Gillies, J., C.B.E. ... | B. Grant, S. C. Fox, D. Loram, L. W. Akerman, W. J. Phillips. | M.L. | ,, ,, ... | Met. Log. 26.4.24 to 29.10.24... | 11.12.24. |
| *Endeavour* ... | Commr. S. A. Geary-Hill, D.S.O., R.N. | M. L. Harrison, E. V. B. Baker, E. H. B. Baker. | M.L. | His Majesty's Ship ... | Met. Log. 2.10.24 to 29.1.25 ... | 3.3.25. |
| *Essequibo* ... | Duncan, E. E. ... | G. Pattison ... ... | No. | R.M.S.P. Co. ... | Form 911 2.1.25 to 13.4.25 ... | 15.5.25. |
| *Eumaeus* ... | Read, J. W. ... | E. R. Pritchard, M. B. Glasier | ,, | A. Holt ... ... | ,, 18.2.25 to 4.3.25 ... | 4.4.25. |
| *Euripides* ... | Collins, P. J., O.B.E. | H. S. Cox, G. R. Fisher, F. Fuller. | M.L. | Aberdeen ... ... | Met. Log. 10.10.24 to 2.2.25 ... | 9.2.25. |
| *Eurybates* ... | Lloyd, R. ... | J. J. Goldsmith ... ... | No. | A. Holt ... ... | Form 911 5.3.25 to 17.3.25 ... | 19.3.25. |
| *Explorer* ... | Lamont, A. ... | Scientific Staff ... ... | M.L. | Scottish Fishery Board | Met. Log. 20.6.24 to 27.9.24 ... | 24.10.24. |
| *Fitzroy*... ... | Silk, H. V., Lt.-Commr, R.N. | C. W. Sabine ... ... | M.L. | His Majesty's Ship ... | ,, 24.7.24 to 31.10.24... | 11.11.24. |
| *Flandria* ... | Veldkamp, G. J. ... | T. Doornbosch ... ... | No. | Holland Lloyd ... | Form 911 20.2.25 to 11.4.25 ... | 14.4.25. |
| *Flinders* ... | Henderson, D A., Lt.-Commr., R.N. | K. F. Boxall ... ... | M.L. | His Majesty's Ship ... | Met. Log. 26.7.24 to 30.10.24... | 18.11.24. |
| *Francisco* ... | Wilkins, J., O.B.E. | C. Leonard ... ... ... | No. | Ellerman Wilson ... | Form 911 22.3.25 to 28.4.25 ... | 4.5.25. |
| *Frankenfels* ... | Cartmer, G. E., O.B.E. | L. M. Burfitt, J. H. A. Mackie, J. Garmory. | M.L. | India Office Shipping | Met. Log. 1.11.24 to 5 2.25 ... | 14.2.25. |
| *Freienfels* ... | Cleugh, J. W. ... | C. H. Porter, V. R. Watkins, H. Wilson. | ,, | ,, ,, ,, ,, | ,, 7.9.24 to 7.12.24 ... | 17.12.24. |
| *Freya* ... ... | Angus, W. ... .. | J. H. Hennessey ... ... | No. | Scottish Fishery Board | Form 911 29.3.25 to 22.4.25 ... | 25.4.25. |
| *Gallic* ... ... | Summers,F. F., R.D., Commr. R.N.R. | W. G. O. Jones ... ... | ,, | White Star ... | Met. Log. 3.8.24 to 9.12 24 ... | 12.12.24. |
| *Galtymore* ... | Ledsome, J. S. ... | N. Goubrough ... ... | ,, | Furness Withy ... | Form 911 5.3.25 to 15.3.25 ... | 18.3.25. |
| *Garoet* ... ... | Visser, C. W. ... | C. J. Vandenboom ... | ,, | Rotterdam Lloyd ... | ,, 7.3.25 to 21.3.25 ... | 27.4.25. |
| *Gascoyne* ... | Mills, A. ... ... | P. G. Collins ... ... | ,, | Dalgety & Co. ... | ,, 21.10.24 to 1.2.25 ... | 9.3.25. |

| Name of Vessel. | Captain. | Observing Officers. | Official Meteoro-logical Equipment. | Line. | Last Log Register, or Report Contributed. Received up to 16.5.25. | Date Received. |
|---|---|---|---|---|---|---|
| *Gelria* ... ... | Kolkman, J. M. ... | F. J. de Visser ... ... | No. | Holland Lloyd ... | Form 911 6.2.25 to 20.3.25 ... | 30.3.25. |
| *Glenamoy*, M.V. ... | Angier, J. ... | R. H. Bishop ... ... | ,, | Glen Line ... ... | ,, 21.3.25 to 24.3.25 ... | 17.4.25. |
| *Glenapp*, M.V. ... | Griffith, J. E. ... | F. Poate ... ... ... | ,, | ,, ... ... | ,, 17.12.24 to 28.12.24 | 8.1.25. |
| *Glenluce*, M.V. ... | Barkley, E. ... | J. D. Richards ... ... | ,, | ,, ... ... | ,, 22.2.25 to 24.3.25 ... | 30.3.25. |
| *Glenshane* ... | Roberts, W. E. ... | R. A. Dale ... ... | ,, | ,, ... ... | ,, 27.2.25 to 11.3.25 ... | 19.3.25. |
| *Gloucestershire* ... | Robin, E. ... | T. E. Field ... ... | ,, | Bibby ... ... | ,, 3.1.25 to 13.3.25 ... | 16.3.25. |
| *Gorgon*... ... | Hughes, J. W. ... | W. E. Crompton ... ... | ,, | A. Holt & Co. ... | ,, 28.12.24 to 19.2.25... | 30.3.25. |
| *Gourko*... ... | Montgomery, H. ... | N. J. Donovan ... ... | M.L. | Ellerman Wilson ... | Met. Log. 12.11.24 to 2.4.25 ... | 24.4.25. |
| *Haliartus* ... | Marsh, L. V. ... | W. H. Upton ... ... | No. | R. P. Houston ... | Form 911 15.2.25 to 10.3.25 ... | 14.4.25. |
| *Harmonides* ... | Hughes, W. J. ... | D. L. Roberts ... ... | ,, | ,, ... | ,, 1.3.25 to 16.3.25 ... | 30.4.25. |
| *Harmony*, Auxy. | Jackson, J. C. ... | A. W. Bush ... ... | ,, | Moravian Mission ... | ,, 4.12.24 to 20.12.24... | 6.1.25. |
| *Hatarana* ... | Woodget, H. T. ... | J. L. Durkee, F. Wells, H. Harrison, H. J. O'Donohoe. | M.L. | British India ... | ,, 7.10.24 to 22.4.25 ... | 4.5.25. |
| *Hauraki*, M.V. ... | Frew, J. D. ... | E. A. Buckingham ... | No. | Union S.S. Co., N.Z.... | ,, 10.11.24 to 1.12.24... | 12.1.25. |
| *Henry Holmes*, C.S. | Bicker Caarten, A. | E. S. C. Hale ... ... | ,, | W. I. & Panama Telegraph Co. | ,, 17.2.25 to 28.3.25 ... | 5.5.25. |
| *Herald*... ... | Harvey, J. R., O.B.E., Commr., R.N. | W. C. Jenks ... ... | M.L. | His Majesty's Ship ... | Met. Log. 4.10.24 to 31.1.25 ... | 7.4.25. |
| *Herefordshire* ... | Stanley, W. ... | R. C. Leitch, G. Whitworth, P. S. Cooper, H. G. Walton | ,, | Bibby ... ... | ,, 13.9.24 to 26.2.25 ... | 23.3.25. |
| *Herschel* ... | Carey, W. J. ... | A. N. Blundell ... ... | No. | Lamport & Holt ... | Form 911 2.2.25 to 7.4.25 ... | 14.4.25. |
| *Hibernia* ... | Tanner ... ... | R. Woodall ... ... | C.C. | L.M. & S. Rly. ... | Telegraphic Report. 2.5.25 ... | 2.5.25. |
| *Highland Enterprise* | Pond, R. H. ... | J. H. Titton ... ... | No. | Nelson | Form 911 31.1.25 to 26.4.25 ... | 12.5.25. |
| ,, *Glen* ... | Jones, T. J. ... | C. M. Best ... ... | ,, | ,, ... ... | ,, 14.12.24 to 2.1.25 ... | 16.1.25. |
| ,, *Heather* | Powell, G. A. ... | ... ... ... ... | M.L. | ,, ... ... | ... ... ... ... ... | ... ... |
| ,, *Laddie*... | Alford, C. ... | G. L. Goodman ... ... | No. | ,, ... ... | Form 911 16.9.24 to 8.11.24 ... | 22.12.24. |
| ,, *Piper* ... | Collings, D. ... | A. S. Jones, J. S. Collins, G. E. Leech. | M.L. | ,, ... ... | Met. Log. 21.7.24 to 8.12.24 ... | 17.12.24. |
| ,, *Pride* ... | Robinson, R. H. ... | H. McKinnon, F. Falconer, R. R. Soanes, G. E. Leech. | ,, | ,, ... ... | ,, 25.9.24 to 17.2.25 ... | 3.3.25. |
| ,, *Rover* ... | Ashby Graves, F. ... | F. W. Harvey, H. Thomas, F. Abbott. | ,, | ,, ... ... | ,, 15.1.25 to 19.3.25 ... | 1.4.25. |
| ,, *Warrior* | Davies, G. O. ... | G. I. Evans ... ... | No. | ,, ... ... | Form 911 6.3.25 to 2.5.25 ... | 8.5.25. |
| *Hildebrand* ... | Maddrell, J. ... | R. S. H. Goodier ... ..... | ,, | Booth ... ... | ,, 18.3.25 to 1.5.25 ... | 4.5.25. |
| *Hobsons Bay* ... | Kydd, O. J. | J. E. Williams, O. J. Edwards, M. P. Pearce. | M.L. | Commonwealth Govt. | Met. Log. 2.12.24 to 12.3.25 ... | 8.4.25. |
| *Holbein* ... | Gough, W. A. ... | G. P. Kitto, D. B. Woods ... | No. | Lamport & Holt ... | Form 911 8.12.24 to 27.12.24... | 16.2.25. |
| 54 *Homeric* ... | Roberts, J., C.B.E., D.S.O., R.D., Capt. R.N.R. | H. Clark, H. Yates, A. Griffiths. | W.T. | White Star ... ... | W.T. Reg. 16.4.25 to 1.5.25 ... | 4.5.25. |
| *Honorius* ... | Samuels, C. ... | J. E. Martin, W. G. Iddes ... | No. | R. P. Houston ... | Form 911 5.1.25 to 2.2.25 ... | 9.2.25. |
| *Hororata* ... | Haines, F. P. ... | ... ... ... ... | ,, | New Zealand S.S. Co. | ... ... ... ... | ... |
| *Huanchaco* ... | Redyard, A. ... | A. G. Litherland ... ... | ,, | Pacific S.N. Co. ... | ,, 15.7.24 to 5.8.24 ... | 15.8.24. |
| *Hubert*... ... | Jones, W. C. H. ... | S. G. Edwards ... ... | ,, | Booth ... ... | ,, 7.12.24 to 21.2.25 ... | 24.2.25. |
| *Hurunui* ... | Burton Davies, J. ... | P. McCallum, C. D. Watt, L. A. Beale. | M.L. | New Zealand S.S. Co. | Met. Log. 29.3.24 to 24.10.24... | 29.10.24. |
| *Ibex* ... ... | Langdon, C. ... | ... ... ... ... | C.C. | G.W. Railway ... | Telegraphic Report. 19.3.25 ... | 19.3.25. |
| *Iceland, Auxy. Brigantine.* | Worsley, F.A., D.S.O., O.B.E., Commr., R.N.R. | ... ... ... ... ... | M.L. | Algarsson Polar Expedition. | ... ... ... ... ... ... | ... |
| *Ikala* ... ... | Meetham, J. T. ... | E. Lightfoot ... ... | No. | J. H. Welsford & Co. | Form 911 8.11.24 to 24.11.24... | 15.12.24. |
| *Intaba* ... ... | Gibbings, W. A. ... | ... ... ... ... | ,, | Harrison ... ... | ,, 7.2.25 to 26.3.25 ... | 1.4.25. |
| *Intombi* ... | Sawyer, E. I. ... | J. Richardson ... ... | ,, | ,, ... ... | ,, 3.8.24 to 19.10.24 ... | 22.10.24. |
| *Iroquois* ... | Tinson, C. W., O.B.E., Commr., R.N. | G. A. R. J. Leslie, R. H. Lucy, G. A. Gould. | M.L. | His Majesty's Ship ... | Met. Log. 15.7.24 to 7.11.24 ... | 3.2.25. |
| *Ixion* ... ... | Carnon, C. G. ... Reed, G. C. ... | A. R. Cook ... ... | No. | A. Holt ... ... | Form 911 12.2.25 to 20.4.25 ... | 12.5.25. |
| *John Pender*, C.S. | Smythe, T. W., O.B.E. | A. G. Watts ... ... | No. | Eastern Tel. Co. ... | ,, 1.4.25 to 30.4.25 ... | 4.5.25. |
| *Junin* ... ... | Benson, C. W. ... | A. Beharrel ... ... | ,, | Pacific S.N. Co. ... | ,, 21.3.25 to 30.3.25 ... | 29.4.25. |
| *Kaikoura* ... | Downton, M. ... | H. E. Reilly, F. T. Bisley, G. T. Webb, F. Vesington. | M.L. | New Zealand S.S. Co. | Met. Log. 15.7.24 to 19.12.24... | 29.12.24. |
| *Kaisar-i-Hind* ... | Manley, G. ... | G. R. Baker ... ... | No. | P. & O. ... ... | Form 911 21.3.25 to 9.4.25 ... | 4.5.25. |
| *Kamo Maru* ... | Okano, Y. ... | F. Takaku ... ... ... | ,, | Nippon Yusen Kaisha | ,, 2.3.25 to 2.4.25 ... | 14.4.25. |
| *Kangaroo* ... | Norris, H. C. ... | C. M. C. Clayton, R. J. Sinclair F. Humble. | M.L. | State Service Australia | Met. Log. 26.2.24 to 14.8.24 ... | 17.10.24. |
| *Karroo*... ... | Robinson, T. ... | H. J. Perrett ... ... | No. | Ellerman Bucknall ... | Form 911 2.6.24 to 16.6.24 ... | 25.6.24. |
| *Kashmir* ... | Stringer, R. H., O.B.E., R.D., Commr. R.N.R. | F. Hopkins ... ... | ,, | P. & O. ... ... | ,, 24.8.24 to 8.9.24 ... | 18.11.24. |
| *Kellett* ... ... | Haselfoot, F. E. B., D.S.O., Commr., R.N. | E. H. B. Baker, R. A. Stephens | M.L. | His Majesty's Ship ... | Met. Log. 30.7.24 to 15.10.24... | 20.10.24. |
| *Kenilworth Castle* | Millard, L. A. ... George J., O.B.E. | A. E. Denn, W. M. Tomkins — May. | M.L. | Union Castle ... | ,, 16.5.24 to 25.1.25 ... | 6.2.25. |
| *Khiva* ... ... | Randall, H.W., R.D., Capt., R.N.R. | L. Fraser, K. H. Cummins, G. K. Fox. | M.L. | P. & O. ... ... | ,, 24.10.24 to 31.1.25... | 5.2.25. |
| *Khyber*... ... | Collyer, R. M. M., R.D., Commr., R.N.R. | J. C. Davies ... ... | No. | ,, ... ... | Form 911 25.3.25 to 10.5.25 ... | 14.5.25. |
| *Kia Ora* ... | McIntosh, A. ... | J. C. Kelly Rogers ... | ,, | Shaw Savill & Albion | ,, 25.12.24 to 31.1.25... | 5.2.25. |
| *Kildonan Castle*... | Wilford, T.H. ... | R. S. W. Harris, N. P. Curtoys | ,, | Union Castle ... | ,, 19.12.24 to 12.4.25... | 14.4.25. |
| *Kitano Maru* ... | Gotoh, M. ... ... | R. Nakane ... ... | ,, | Nippon Yusen Kaisha | ,, 11.2.25 to 7.3.25 ... | 13.3.25. |
| *Knight Companion* | Beale, H. E. ... | J. Pobjoy ... ... | ,, | A. Holt ... ... | ,, 7.2.25 to 5.3.25 ... | 6.4.25. |
| *Koranna* ... ... | Mordue, J. A. ... | ... ... ... ... | ,, | Ellerman Bucknall ... | ... ... ... ... ... | ... |
| *Kovno* ... | Casson, D. H., R. D. Brown, A. M., Commr., R.N.R. | L. Griffiths, J. Sanders, J. Marshall, T. Tindell, N. W. Glendinning, F. T. Shaw. | M.L. | Ellerman Wilson ... | Met. Log. 26.7.24 to 20.4.25 ... | 24.4.25. |
| *Kyogle*... ... | Coalstad, C. ... | C. B. Odman, E. W. Hughes | No. | Commonwealth Lighthouse Service. | Form 911 13.11.24 to 13.12.24 | 19.1.25. |
| *Lady Denison Pender*, C.S. | West, G. W. ... | F. Lawrence ... ... | ,, | Eastern Tel. Co. ... | ,, 5.3.25 to 24.3.25 ... | 27.4.25. |
| *Laguna* ... | Pape, E.. R. ... | W. P. Boon ... ... | ,, | Pacific S.N. Co. ... | ,, 26.3.25 to 10.4.25 ... | 4.5.25. |
| *Lalande* ... | Bambra, W. A. ... | H. Phillips ... ... | ,, | Lamport & Holt ... | ,, 8.3.25 to 29.3.25 ... | 15.4.25. |
| *Lancashire* ... | Beckett, F. W. ... | W. M. S. Higginson ... | ,, | Bibby ... ... | ,, 31.1.25 to 10.4.25 ... | 17.4.25. |
| *Lavmedon* ... | Smith, A. H. ... | A. J. Barclay ... ... | ,, | A. Holt ... ... | ,, 19.11.24 to 23.12.24 | 5.1.25. |
| *La Paz*, M.V. ... | Ross, J. ... ... | S. T. Gale ... ... | ,, | Pacific S.N. Co. ... | ,, 29.3.25 to 16.4.25 ... | 5.5.25. |
| *Laplace* ... | Davies, G. W. ... | W. Boyde, R. B. Langley ... | ,, | Lamport & Holt ... | ,, 13.12.24 to 30.3.25... | 3.4.25. |
| 55 *Lapland* ... | Howell, T. ... | W. N. Jenkins, B. T. Harries. | W.T. | Red Star ... ... | W. Reg. 30.4.25 to 5.5.25 ... | 7.5.25. |
| | | | | | Form 911 15.4.25 to 6.5.25 ... | 9.5.25. |
| *Lassell*, M.V. ... | Hickman, V. T. ... | H. G. Cuthill ... ... ... | No. | Lamport & Holt ... | ,, 3.11.24 to 28.11.24... | 19.12.24. |
| *Leicestershire* ... | English, G. L. ... | W. Whiteside, P. H. Potter, D. Sharrock, W.H.Muirhead. | M.L. | Bibby ... ... | Met. Log. 6.12.24 to 12.2.25 ... | 18.2.25. |

| Name of Vessel. | Captain. | Observing Officers. | Official Meteoro-logical Equipment. | Line. | Last Log, Register, or Report Contributed. Received up to 16.5.25. | Date Received. |
|---|---|---|---|---|---|---|
| *Leitrim* ... | Robertson, A. ... | E. F. C. Higgins ... ... | No. | Dowie, J., & Co. ... | Form 911 24.3.25 to 24.4.25 ... | 5.5.25. |
| *Llanstephan Casile* | Owen, S. H. ... | J. B. M. Reynolds... ... | ,, | Union Castle ... | ,, 20.9.24 to 25.11.24... | 29.11.24. |
| *Loch Katrine* ... | Matthews, G. P. ... | C. Noakes ... ... | ,, | R.M.S.P. Co. ... | ,, 9.11.24 to 6.2.25 ... | 13.3.25. |
| *London Commerce* | Young, H. J., D.S.C. | P. G. Leverett ... ... | No. | Furness Withy ... | ,, 29.3.25 to 28.4.25 ... | 6.5.25. |
| *Loreto* M.V. ... | Barkley, E. ... | F. Binnion ... ... | ,, | Pacific S.N. Co. ... | ,, 18.5.24 to 7.6.24 ... | 12.6.24. |
| *Losada* M.V. ... | Meldrum, G. W. ... | A. H. Turner ... ... | ,, | ,, ,, ... | ,, 16.12.24 to 22.3.25... | 26.3.25. |
| *Macedonia* ... | Potter, H. W., R.D., Commr., R.N.R. | E. R. Bodley ... ... | No. | P. &"O. " ... ... | ,, 22.3.25 to 5.4.25 ... | 1.5.25. |
| *Macharda* ... | Cochran, G. ... | W. Moore ... ... | ,, | Brocklebank ... | ,, 6.9.24 to 24.11.24 ... | 5.12.24. |
| *Mahana* ... | Kershaw, W. A. R. | F. Gilroy ... ... | ,, | Shaw Savill & Albion | ,, 21.12.24 to 2.2.25 ... | 9.2.25. |
| *Maharaja* ... | Perry, C. R. ... | C. B. Miller ... ... | ,, | Asiatic S.N. Co. ... | ,, 15.2.25 to 20.3.25 ... | 14.4.25. |
| *Maihar* ... | Rowe J. P. ... | C. Shaw, H. T. Scoins, R. G. Widdon. | M.L. | Brocklebank ... | Met. Log. 15.8.24 to 29.4.25 ... | 7.5.25. |
| *Maimyo* ... | Richardson, T. ... | P. Yates ... ... ... | No. | ,, ... | Form 911 9.3.25 to 15.4.25 ... | 4.5.25. |
| *Maine* ... ... | Seymour, H. ... | S. C. Skinner ... ... | ,, | Atlantic Transport ... | ,, 23.2.25 to 5.4.25 ... | 14.4.25. |
| 58 *Majestic* ... | Metcalfe, G. R. ... | L. Thompson, A. H. Young, W. T. Poustie, J. A. Macnaughton. | W.T. | White Star ... ... | W.T. Reg. 23.4.25 to 6.5.25 ... | 9.5.25. |
| | | | | | Form 911 9.12.24 to 22.12.24... | 29.12.24. |
| *Makambo* ... | Brown, T. M. ... | F. C. Ree, H. Mann, D. G. Irvine, D. Wilson, J. Abbot, K. Thompson. | M.L. | Burns Philp ... | Met. Log. 13.2.24 to 28.8.24 ... | 2.12.24. |
| *Makura* ... ... | Mawson, J. ... | J. D. Lundie, G. H. Kime, N. Archibald, A. R. Noble. | M.L. | Canadian-Australasian | ,, 23.10.24 to 6.3 25 ... | 30.3.25. |
| *Malancha* ... | Whitham, F. ... | A. Hill ... ... ... | No. | Brocklebank ... | Form 911 12.3.25 to 8.4.25 ... | 27.4.25. |
| *Malda* ... ... | Gray, T. N. ... | W. E. Murphy ... ... | ,, | British India ... | ,, 16.1.25 to 20.2.25 ... | 24.2.25. |
| *Manchester Corporation.* | Everest J. E. ... | W. L. Lavers ... ... | ,, | Manchester Liners ... | ,, 14.4.25 to 23.4.25 ... | 25.4.25. |
| *Manchester Importer* | Riley, J. E. ... | ... ... ... ... ... | ,, | ,, ,, ... | ... ... ... ... ... ... | ... |
| *Manchester Mariner.* | Riley, J. E. ... Dormer, A E. ... | C. E. Stocker, J. F. Fisher, W. H. Downing. | M.L. | ,, ,, ... | Met. Log. 23.3.24 to 25.11.24... | 5.12.24. |
| *Manchester Merchant.* | Barclay J. ... | R. A. Walker ... ... | No. | ,, ,, ... | Form 911 16.4.25 to 27.4.25 ... | 30.4.25. |
| *Mandasor* ... | Kershaw, R. W. ... | W. Baxter ... ... | ,, | Brocklebank ... | ,, 29.12.24 to 9.3.25 ... | 18.3.25. |
| *Manhattan* ... | Hutchison J. G. ... | R. Day ... ... ... | ,, | Atlantic Transport .. | ,, 10.11.24 to 18.12.24 | 22.12.24. |
| *Manipur* ... | Scurr T. W. ... | G. W. Barker ... ... | ,, | Brocklebank ... | ,, 16.2.25 to 11.5.25 ... | 15.5.25. |
| *Manistee* ... | Isaacson, J. M. ... | S. Browne, J. Blower, F. R. Inch. | M.L. | Elders & Fyffes ... | Met. Log. 26.7.24 to 7.12.24 ... | 16.12.24. |
| *Manzanares* ... | Henderson, J. N. ... | H. E. Lees ... ... | No. | ,, ,, ... | ... ... ... ... ... | ... |
| *Marella* ... | Mortimer S. ... Donaldson, A. ... | D. Pemberton, W. McBride, A. M. Hill, A. Campbell, W. Middleton. | M.L. | Burns Philp ... | Met. Log. 18.4.24 to 18.2.25 ... | 11.5.25. |
| *Marengo* ... | Bean, A. ... ... | L. T. Hale, F. Elgin, J. E. Stott, W. G. Pearce, E. Wood. | ,, | Ellerman Wilson ... | ,, 12.9.24 to 21.2.25 ... | 25.2.25. |
| *Margha* ... | Milne, A. R., R.D., Commr., R.N.R. | J. Strachan, P. Wright, H. E. Evans. | ,, | British India ... | ,, 25.10.24 to 4.1.25 ... | 21.1.25. |
| *Marglen* ... | Griffiths, J. N. ... | E. Eastley ... ... | No. | Canadian Pacific ... | Form 911 19.2.25 to 9.4.25 ... | 14.4.25. |
| 27 *Marloch* ... | Hamilton, G. ... | H. W. G. Coughlan, E. V. Glennie, W. S. Gowan. | W.T. | ,, ,, ... | W.T. Reg. 23.3.25 to 10.4.25 ... | 20.4.25. |
| | | | | | Form 911 9.11.24 to 28.11.24... | 5.12.24 |
| *Maryland* ... | Hutt, F. C. ... | A. C. Clay ... ... | No. | Atlantic Transport ... | ,, 16.1.25 to 18.2.25 ... | 24.2.25 |
| *Masirah* ... | Thowless, E. ... | R. C. Baker ... ... | ,, | Brocklebank ... | ,, 4.4.24 to 25.4.24 ... | 26.5.24 |
| *Massilia* ... | Henderson, J. L. ... | E. Richardson ... ... | ,, | Anchor ... ... | ,, 12.9.24 to 20.9.24 ... | 22.9.24. |
| *Matakana* ... | Bosdet, V. J. ... Kenworthy, V. ... | A. Chrystal, D. N. MacGregor. | ,, | Shaw, Savill & Albion | ,, 5.7.24 to 25.11.24 ... | 10.12.24. |
| *Mataram* ... | Williams, D. J. ... | E. H. Doughty ... ... | ,, | Burns Philp & Co. ... | ,, 6.1.25 to 3.2.25 ... | 23.3.25. |
| *Matheran* ... | Columbine, F. F. ... | J. A. Embley, J. Robertson, S. C. Cramb. | M.L. | Brocklebank ... | Met. Log. 18.11.24 to 16.2.25... | 23.2.25. |
| *Mathura* ... | Hanna, R. G. ... | H. H. Armstrong ... ... | No. | ,, ... | Form 911 3.4.25 to 13.4.25 ... | 22.4.25. |
| *Matiana* ... | Langlands, D. H. ... | B. Paul ... ... ... | ,, | British India ... | ,, 28.2.25 to 19.3.25 ... | 14.4.25. |
| *Maunganui* ... | Worrall, L. C. H. ... | D. M. Todd ... ... | ,, | Union S.S. Co. of N.Z. | ,, 1.1.25 to 19.2.25 ... | 15.4.25. |
| 32 *Mauretania* ... | Rostron, A. H., C.B.E., R.D., A.-d.-C., Capt., R.N.R. | F. A. York, R. Allen, A. Mackellar.. | W.T. | Cunard ... ... | W.T. Reg. 13.4.25 to 27.4.25 ... | 29.4.25. |
| | | | | | ,, 22.3.25 to 6.4.25 ... | 9.4.25. |
| *Media* ... ... | Maughan ... ... | ... ... ... ... | No. | T. & J. Brocklebank... | ... ... ... ... | ... |
| 56 *Megantic* ... | White, E. R., R.D., Commr., R.N.R. | J. A. Heenan, R. Conway, J. Clarke. | W.T. | White Star ... | W.T. Reg. 20.4.25 to 10.5.25 ... | 13.5.25. |
| 22 *Melita* ... ... | Clews, A. H. ... | W. E. Bacon, J. McLennan, D. Dunn. | W.T. | Canadian Pacific ... | ,, 5.4.25 to 23.4.25 ... | 25.4.25. |
| | | | | | Form 911 5.4.25 to 23.4.25 ... | 25.4.25. |
| *Memnon* ... | Salter, G. H. ... | E. D. Potts ... ... | No. | A. Holt ... ... | ,, 3.10.24 to 19.10.24... | 21.10.24. |
| *Menominee* ... | Pollard, W. F., D.S.O., R.D., Capt. R.N.R. | C. F. Hicks ... ... | ,, | Atlantic Transport ... | ,, 14.2.25 to 19.3.25 ... | 23.3.25. |
| *Mercian* ... | Gardner, J. ... | R. Hughes ... ... | ,, | Leyland ... ... | ,, 16.3.25 to 26.4.25 ... | 1.5.25. |
| 21 *Metagama* ... | Henderson, W. ... | W. F. Reid, F. McIlroy, A. M. Watt. | W.T. | Canadian Pacific ... | W.T. Reg. 8.3.25 to 27.3.25 ... | 30.3.25. |
| *Miami* ... ... | Makepeace, S. ... | H. H. Dunning ... ... | No. | Elders & Fyffes ... | Form 911 24.3.25 to 26.4.25 ... | 30.4.25. |
| *Michigan* ... | Tribe, A. E. ... | L. A. Williams ... ... | ,, | Atlantic Transport ... | ,, 11.6.24 to 20.6.24 ... | 25.6.24. |
| *Minderoo* ... | Richardson, E. ... | B. J. Bennie, W. J. McPhedron, J. H. Oxton. | M.L. | West Australia Nav. Co. | Met. Log. 13.6.24 to 26.11.24... | 4.3.25. |
| *Minna* ... | Mackenzie, G. G. ... | D. Rattray ... ... | No. | Scottish Fishery Board | Form 911 9.4.25 to 24.4.25 ... | 12.5.25. |
| 23 *Minnedosa* ... | Notley, A. H., R.D., Commr., R.N.R. | R. Antrobus ... ... | W.T. | Canadian Pacific ... | W.T. Reg. 29.3.25 to 15.4.25 ... | 20.4.25. |
| | | | | | Form 911 6.9.24 to 24.9.24 ... | 26.9.24. |
| *Minnetonka* ... | Gates, T. F. ... | H. E. McCartney ... ... | No. | Atlantic Transport ... | ,, 16.2.25 to 7.3.25 ... | 10.3.25. |
| *Minnewaska* ... | Claret, F. ... | W. S. Mackie ... ... | ,, | ,, ,, ,, ... | ,, 13.4.25 to 2.5.25 ... | 5.5.25. |
| *Mirror*, C.S. ... | Gibson, L. ... ... | C. E. F. St. John ... ... | ,, | Eastern Tel. Co. ... | ,, 19.11.24 to 17.1.25... | 19.2.25. |
| *Mississippi*, M.V. | Wylie, J. T. J. ... | H. K. Cockerill ... ... | ,, | Atlantic Transport ... | ,, 12.2.25 to 19.3.25 ... | 24.3.25. |
| *Moena* ... | Morzer Bruyns, M. F. | G. H. Vander Roest ... | ,, | Nederland ... ... | ,, 18.12.24 to 6.2.25 ... | 10.2.25. |
| *Moldavia* ... | Burleigh, C. W., D.S.O., Capt., R.N.R. | D. C. S. Cook ... ... | ,, | P. & O. ... ... | ,, 21.11.24 to 25.2.25... | 2.3.25. |
| *Mongolian Prince* | Durrant, G. D. ... | P. F. Owens ... ... | ,, | Prince ... ... | ,, 22.2.25 to 11.4.25 ... | 15.4.25. |
| *Monkbarns*, Ship | Davies, W. ... | R. Baise, J. Williams ... | ,, | J. Stewart & Co. ... | ,, 10.10.24 to 26.11.24 | 5.2.25. |
| 24 *Montcalm* ... | Sibbons, H. ... | H. McFadyen ... ... | W.T. | Canadian Pacific ... | W.T. Reg. 19.4.25. to 8.5.25 ... | 11.5.25. |
| 25 *Montclare* ... | Webster, G. S., R.D., Commr., R.N.R. | R. Fegan, W. Phillips, H. S. Knight. | ,, | ,, ,, ... | ,, 29.3.25 to 17.4.25 ... | 23.4.25. |
| | | | | | Form 911 28.3.25 to 17.4.25 ... | 22.4.25. |
| *Montlaurier* ... | Henderson, W. ... | F. E. Williams ... ... | No. | ,, ,, ... | W.T. Reg. 26.1.25 to 12.2.25 ... | 17.2.25. |
| *Montoro* ... ... | McInnes, J. ... | T. W. Burdis ... ... | ,, | Burns, Philp & Co. ... | Form 911 6.1.25 to 16.2.25 ... | 12.5.25. |
| 26 *Montrose* ... | Landy, E. ... | T. Beck, C. Clarke, A. Watt | W.T. | Canadian Pacific ... | W.T. Reg. 5.4.25 to 23.4.25 ... | 27.4.25. |
| | | | | | Form 911 3.4.25 to 24.4.25 ... | 27.4.25. |
| 20 *Montroyal* ... | Latta, R. G. ... Turnbull, J., C.B.E., R.D., R.N.R. | J. H. Tudor, J. R. Briggs, D. I. C. Robertson, A. K. Benham. | ,, | ,, ,, ... | ,, 10.4.25 to 17.4.25 ... | 4.5.25. |
| | | | | | W.T. Reg. 4.1.25 to 29.4.25 ... | 4.5.25. |

| Name of Vessel. | Captain. | Observing Officers. | Official Meteoro-logical Equipment. | Line. | Last Log, Register, or Report Contributed. Received up to 16.5.25. | Date Received. |
|---|---|---|---|---|---|---|
| *Morvada* ... | Mills, T. L., O.B.E., R.D., Commr., R.N.R. | J. Norris, C. L. Hazeldine ... | M.L. | British India ... | Met. Log. 13.9.24 to 15.3.25 ... | 9.4.25. |
| *Mulbera* ... | Steadman, W. R. ... | E. Holland, H. W. Norris ... | No. | British India ... | Form 911 30.3.25 to 8.4.25 ... | 16.4.25. |
| *Nagara* ... | Purvis, A. ... ... | H. V. Todd ... ... | ,, | R.M.S.P. Co. ... | ,, 11.3.25 to 7.5.25 ... | 12.5.25. |
| *Nagoya*... ... | Cherry, W. G. W. ... | P. Haworth ... ... | ,, | P. & O. ... ... | ,, 15.3.25 to 26.3.25 ... | 4.4.25. |
| *Nardana* ... | Moth. F. L. ... | S. C. T. Smith ... ... | ,, | British India ... | ,, 17.11.24 to 28.12.24 | 11.2.25. |
| *Nariva*... ... | Buret, T. J. C. ... | B. Y. Vickers, J. S. Scott, R. H. East. | M.L. | R.M.S.P. Co. ... | Met. Log. 25.1.25 to 25.3.25 ... | 2.4.25. |
| *Nascopie* ... | Smellie, T. F. ... | A. S. Watts, T. D. Roseburgh | M.L. | Hudson's Bay Co. ... | ,, 16.6.24 to 17.10.24... | 23.10.24. |
| *Navasota* ... | Willan, F. G. L., R.D. Commr., R.N.R. | W. A. Delap ... ... | No. | R.M.S.P. Co. ... | Form 911 23.6.24 to 20.8.24 ... | 28.8.24. |
| *Nellore*... ... | Murray, F. S., R.D., Lt. - Commr., R.N.R. | G. E. Owen ... ... | ,, | P. & O. ... ... | ,, 5.12.24 to 5.2.25 ... | 13.2.25. |
| *Nestor* ... ... | Owen, R. D., O.B.E. | W. H. Newby, C. J. Beasley, F. J. Silva. | M.L. | A. Holt ... ... | ,, 12.10.24 to 12.2.25... | 20.2.25. |
| *Nevasa*... ... | Swanson, C. J. ... | D. Lorrie ... ... | No. | British India ... | ,, 13.10.24 to 30.12.24 | 6.1.25. |
| *Newby Hall* ... | Kendall, J. W. ... | A. Martin ... ... | M.L. | Ellerman ... ... | Met. Log. 12.9.24 to 10.1.25 ... | 27.1.25. |
| *Niagara* ... | Rolls J. T. ... | R. B. Denniston, T. A. Macpherson, J. V. Bray, J. Dawson. | M.L. | Canadian-Australian... | ,, 19.7.24 to 13.11.24... | 8.12.24. |
| *Ningchow* ... | Wilson, C. A. ... | F. A. Brown ... ... | No. | A. Holt ... ... | Form 911 14.2.25 to 5.3.25 ... | 20.4.25. |
| *Nore* ... ... | Parker, J. W. ... | R. W. Mackie, C. B. Roche, R. H. Turner, G. Haughey. | M.L. | P. & O. ... ... | Met. Log. 6.11.24 to 24.1.25 ... | 29.1.25. |
| *Norman* ... | Morton Betts W. ... | D. A. Hodgson ... ... | No. | Union Castle ... | Form 911 22.3.25 to 10.4.25 ... | 8.5.25. |
| *Norna* ... ... | Wright, J. ... | T. Mather ... ... | ,, | Scottish Fishery Board | ,, 9.4.25 to 30.4.25 ... | 4.5.25. |
| *Norseman*, C.S. ... | W. Douglas ... | ... ... ... ... | M.L. | Western Tel. Co. ... | Met. Log. 16.8.24 to 30.1.25 ... | 3.3.25. |
| *Nortonian* ... | McCormick, J. ... | T. Griffiths ... ... | No. | Leyland ... ... | Form 911 2.8.24 to 30.9.24 ... | 4.10.24. |
| *Nubian* ... | Watmough, T. M. ... | H. R. Gaskill ... ... | ,, | ,, ... ... | ,, 21.12.24 to 2.1.25 ... | 6.1.25. |
| *Nyanza* ... | Carpendale, F. W. J. | G.D. Brown,R.H. Hand, A. L. Hill. | M.L. | P. & O. ... ... | Met. Log. 9.2.25 to 28.4.25 ... | 2.5.25. |
| *Oaklands Grange*... | Routledge, R. ... | E. A. Insley ... ... | No. | Houlder Bros. ... | Form 911 18.10.24 to 2.2.25 ... | 19.2.25. |
| 42 *Ohio* ... | Nicholson, M. S., R.D., Capt., R.N.R. | R. W. Morford, P. M. Burrell, H. F. Woodroffe. | W.T. | R.M.S.P. Co. ... | W.T. Reg. 1.2.25 to 3.4.25 ... / Form 911 28.3.25 to 4.4.25 ... | 7.4.25. / 7.4.25. |
| *Olympia* ... | A. R. Duncan ... | D. R. Urquhart, G. Lynas, C. Mortimer. | M.L. | Anchor ... ... | ,, 29.10.24 to 14.2.25... | 23.2.25. |
| 57 *Olympic* ... | Marshall, W., D.S.O., R.D., Capt., R.N.R. | H. J. C. Day, C. J. Warltire, W. Fitzgerald. | W.T. | White Star ... | W.T. Reg. 9.4.25 to 23.4.25 ... / Form 911 9.4.25 to 24.4.25 ... | 27.4.25. / 27.4.25. |
| *Orama*... ... | Staunton, H. G., C.B.E.,R.D.,Commr, R.N.R. | L. J. Vesty, F. Butler, M. C. Lester, J. S. Metcalf. | M.L. | Orient ... ... | Met. Log. 16.11.24 to 18.2.25... | 20.2.25. |
| *Oranian* ... | Hoskins, W. ... | D. Hewett ... ... | No. | Leyland ... ... | Form 911 4.9.24 to 17.11.24 ... | 24.11.24. |
| *Orari* ... ... | Robinson, F. W. ... | R Newman, T. Breen, F. Longheed, C. Wilkinson, H. Farrant. | M.L. | New Zealand S.S. Co. | Met. Log. 9.8.24 to 20.1.25 ... | 27.1.25. |
| 40 *Orbita* ... | Matthews, G. P. ... | B. C. Dodds, H. G. Whittle, H. M. Rennie, R. Wray Hurt. | W.T. | R.M.S.P. Co. ... | W.T. Reg. 5.4.25 to 26.4.25 ... / Form 911 4.4.25 to 27.4.25 ... | 30.4.25. / 30.4.25. |
| *Orcoma* ... | Dominy, R. H., C.B.E. Commr. R.N.R. | G. B. Wardale, L. Jones, W. Billington. | M.L. | Pacific S.N. Co. ... | Met. Log. 20.11.24 to 4.2.25 ... | 9.2.25. |
| 41 *Orduna* ... | Warner, G. E., R.D., Capt., R.N.R. | R. W. Sumpton, J. Vivian, H. D. Hooper, G. F. Russell. | W.T. | R.M.S.P. Co. ... | W.T. Reg. 11.4.25 to 3.5.25 ... / Form 911 10.4.25 to 3.5.25 ... | 6.5.25. / 6.5.25. |
| *Oriana*... ... | Makin, T. W. ... | R. E. Skellorn, R. D. Eckford, J. Reed. | M.L. | Pacific S.N. Co. ... | Met. Log. 10.2.25 to 25.4.25 ... | 4.5.25. |
| *Orita* ... ... | Splatt, W. A. ... | J. G. Harvey, T. R. Scott, D. W. Hutchinson, C. P. D. Dean. | M.L. | ,, ,, ... | Met. Log. 19.9.24 to 6.12.24 ... | 19.12.24. |
| *Ormonde* ... | Knowles, C. H., D.S.O., Commr., R.N. | A. M. Hughes ... ... | M.L. | His Majesty's Ship ... | Met. Log. 8.11.24 to 6.12.24 ... | 31.12.24. |
| *Ormonde* ... | Shelford, W. S., Lt.-Commr., R.N.R. | N. A. Whinfield, W. A. Wickham, A. H. Dyer. | M.L. | Orient ... ... | Met. Log. 4.1.25 to 7.4.25 ... | 15.4.25. |
| *Ormuz* ... ... | James L. V., D.S.C. | C. Fox, J. C. K. Dowding, H. MacLean, L. A. Keeble, F. S. Shurrock. | M.L. | ,, ... ... | Met. Log. 19.10.24 to 22.1.25... | 28.1.25. |
| *Oronsay* ... ... | Coad, A. J., Commr., R.N.R. ... ... | ... ... ... ... ... | ,, | ,, ... ... | ... ... ... ... ... ... | ... ... |
| *Oroya* ... ... | Pearce, A. ... | S. Lewis ... ... ... | No. | Pacific S.N. Co. ... | Form 911 27.1.25 to 6.4.25 ... | 16.4.25. |
| *Orsova* ... ... | Matheson, C. G., D.S.O., R.D., Commr., R.N.R. | M. J. Sarson, A. J. Croft Cohen, C. V. Dodgson, P. P. Murphy, L. E. Fordham. | M.L. | Orient ... ... | Met. Log. 12.10.24 to 13.1.25... | 19.1.25. |
| *Ortega* ... ... | Pleignier, H. S. ... | C. Leatherbarrow ... ... | No. | Pacific S.N. Co. ... | Form 911 9.12.24 to 16.2.25 ... | 25.2.25. |
| *Orvieto*... ... | Simner, G. L., R.D., Commr., R.N.R. | M. Petit Daun, G. E. Martin | M.L. | Orient ... ... | Met. Log. 9.11.24 to 10.2.25 ... | 14.2.25. |
| *Osterley* ... | Cameron, E. P. ... | E. Hatch, H. Tanner, W. J. Rice. | M.L. | ,, ... ... | ,, 7.12.25 to 10.3.25 ... | 13.5.25. |
| *Othello* ... ... | Pearson, Z. C. ... | J. W. Botheroyd ... ... | No. | Ellerman Wilson ... | Form 911 27.1.25 to 17.3.25 ... | 19.3.25. |
| *Otira* ... ... | Elford, H. E. ... | J. H. Fuller ... ... | ,, | Shaw, Savill & Albion | ,, 5.3.25 to 12.4.25 ... | 18.4.25. |
| *Ovid* ... ... | Groom, A. C. B. ... | ... ... ... ... | ,, | Shakespear Shipping Co. | ,, 7.2.25 to 2.3.25 ... | 30.3.25. |
| *Oxfordshire* ... | Crumplin, W. E. ... | F. C. Brooks ... ... | ,, | Bibby Bros. ... | ,, 26.2.25 to 27.3.25 ... | 2.4.25. |
| *Pacific Shipper*, M.V. | Newman, G. W. A. | R. S. Smith ... ... | ,, | Furness Withy ... | ,, 25.12.24 to 12.1.25... | 14.4.25. |
| *Pakeha* ... | W. P. Clifton Mogg | R. K. Vandervard, E. T. Baker | M.L. | Shaw, Savill & Albion | Met. Log. 7.11.24 to 27.3.25 ... | 30.3.25. |
| *Paparoa* ... | Ashworth, F. ... | C. J. Brewer ... ... | No. | New Zealand S.S. Co. | Form 911 13.3.25 to 23.3.25 ... | 30.3.25. |
| *Pareora* ... | Evans, J. O. ... | R. F. Hillings ... ... | ,, | Hain S.S. Co. ... | ,, 31.12.24 to 6.2.25 ... | 21.2.25. |
| *Paris* ... ... | Cook, C. L. ... | Mr. Biles... ... ... | C.C. | Southern Rly. ... | Telegraphic Report. 19.2.24 ... | 19.2.24. |
| *Patia* ... ... | Bostock, R. J. ... | W. McIlwaine ... ... | No. | Elders & Fyffes ... | Form 911 17.1.25 to 4.2.25 ... | 2.3.25. |
| *Patrol*, S. ... | Welsh, T. K. ... | W. H. S. Clark, H. F. P. Albrecht, W. G. MacBryde, A. T. Morrell. | M.L. | Eastern Extension (A. & C.) Telegraph Co. | Met. Log. 1.10.24 to 12.1.25 ... | 16.4.25. |
| *Persi* ... ... | Davies, E. ... | H. Williams ... ... | No. | White Star ... | Form 911 19.10.24 to 1.12.24... | 3.12.24. |
| *Peshawur* ... | Hester, C. W., R.D., Commr., R.N.R. | D. G. Baillie, E. J. R. North, J. R. Alleyne. | M.L. | P. & O. ... ... | Met. Log. 24.7.24 to 4.12.24 ... | 10.12.24. |
| *Pharos* ... ... | Ewing, T. N. ... | D. Tullock, A. McLachlan ... | No. | Northern Lighthouse Board. | ... ... ... ... ... ... | ... |
| *Philadelphian* ... | Baker, J. A. ... | W. Lawton ... ... | No. | Leyland ... ... | Form 911 2.10.24 to 20.11.24... | 26.11.24. |
| *Polycarp* ... ... | Evans, T. G. ... | ... ... ... ... ... | ,, | Booth ... ... | ... ... ... ... ... ... | ... |
| *Polyphemus* ... | Hatfield, J. ... | R. E. Wilkes ... ... | ,, | A. Holt ... ... | ,, 1.2.25 to 23.2.25 ... | 25.2.25. |
| *Poona* ... ... | Cherry, W. G. W. ... | F. R. W. Page ... ... | ,, | P. & O. ... ... | ,, 21.7.24 to 31.8.24 ... | 15.9.24. |

| Name of Vessel. | Captain. | Observing Officers. | Official Meteorological Equipment. | Line. | Last Log, Register, or Report Contributed. Received up to 16.5.25. | Date Received. |
|---|---|---|---|---|---|---|
| *Port Adelaide* ... | Hayter, S. W. ... | ... ... ... ... | M.L. | Commonwealth & Dominion. | ... ... ... ... ... | ... |
| „ *Albany* ... | Robinson, C. A. ... | A. Jenkyns, A. G. Newbury, G. Lovegrove. | M.L. | „ „ „ | Met. Log. 15.11.24 to 1.4.25... | 9.4.25. |
| „ *Auckland* ... | Durham, R. S. ... | ... ... ... ... ... | No. | „ „ „ | ... ... ... ... ... ... | ... |
| „ *Augusta* ... | Sawbridge, I. R. ... | G. T. C. Harris, R. C. Carter, C. F. Coate. | M.L. | „ „ „ | „ 6.4.24 to 15.10.24... | 7.11.24. |
| „ *Caroline* ... | Renaut, F. A. ... | H. Smith, T. Copeland, E. Fenton, C. Chamberlin. | M.L. | „ „ „ | „ 16.8.24 to 17.12.24... | 22.12.24. |
| „ *Curtis* ... | Van den Bergh, C. | W. H. Miles ... ... | No. | „ „ „ | Form 911 10.11.24 to 21.11.24 | 6.12.24. |
| „ *Darwin* ... | Brown, A. H. ... | E. T. N. Lawrey, E. W. R. Young. | „ | „ „ „ | „ 26.3.25 to 10.5.25 ... | 14.5.25. |
| „ *Denison* ... | Ferris, J. ... | ... ... ... ... | „ | „ „ „ | ... ... ... ... ... | ... |
| „ *Hacking* ... | Williams, R. ... | Rowland Hill ... ... | „ | „ „ „ | „ 3.11.24 to 17.12.24... | 26.1.25. |
| „ *Hunter* ... | Cottell, S. C. ... | A. Cooper, C. F. Post, J. T. Weldin. | M.L. | „ „ „ | Met. Log. 18.10.24 to 2.3.25 ... | 9.3.25. |
| „ *Melbourne* ... | Kearney, F. J. ... | D. G. H. Bradley, J. A. Fairbairn, A. G. Starkey. | M.L. | „ „ „ | „ 10.11.24 to 3.4.25 ... | 8.4.25. |
| „ *Nicholson* ... | Hoad, A. C. ... | E. A. Leavett, C. R. Townshend. G. G. Langford. | M.L. | „ „ „ | „ 12.3.24 to 14.8.24 ... | 9.9.24. |
| „ *Pirie* ... | Higgs, W. G. ... | H. C. Jeffery, W. G. Jones, J. T. Nicholson, E. G. L. Jones. | M.L. | „ „ „ | „ 9.8.24 to 13.12.24... | 19.12.24. |
| „ *Sydney* ... | Lea, W. H. ... | A. W. Sams, C. Groves, A. M. Stanton, G. Freeman-Pannett. | M.L. | „ „ „ | „ 13.6.24 to 15.11.24... | 18.11.24. |
| „ *Victor* ... | Swan, L. H. ... | E. G. Fullick, R. T. R. Tomsett. W. Pickup. | M.L. | „ „ „ | „ 4.10.24 to 9.2.25 ... | 14.2.25. |
| *President Jackson* | Griffith, J. ... | E. E. Henry ... ... ... | No. | Pacific S.S. Co. ... | Form 911 4.1.25 to 24.1.25 ... | 4.3.25. |
| *President Wilson* | Nelson, H. ... | ... ... ... ... ... | „ | Pacific Mail S.S. Co. ... | ... ... ... ... ... ... | ... |
| *Protea*, H.M.S.A.S. | Woodhouse, A. F. B., Lt.-Commr., R.N. | F. J. S. Scott-Stokes ... | „ | South African Naval Service. | „ 1.3.25 to 31.3.25 ... | 27.4.25. |
| *Pyrrhus* ... | Elford, W. J ... | W. Owen ... ... | No. | A. Holt ... ... | „ 16.2.25 to 26.2.25 ... | 26.3.25. |
| *Regina* ... ... | Smith, R. G. ... | A. Hulme, N. E. Banks, W. Daman. | M.L. | White Star-Dominion | W.T. Reg. 25.1.25 to 15.2.25 ... | 23.2.25. |
| | | | | | Form 911 25.1.25 to 14.2.25 ... | 19.2.25. |
| *Reindeer* ... | Mulhall, W. ... | ... ... ... ... | C.C. | G.W. Railway ... | Telegraphic Report. 14 5.25 ... | 14.5.25. |
| *Rhodesian Transport.* | Fowler, W. H. ... | W. Heritage ... ... | No. | Houlder Bros. ... | Form 911 4.11.24 to 27.2.25 ... | 14.3.25. |
| *Rimutaka* ... | Hemming, F. A. ... | H. Horwood, R. S. Cox, O. M. Watts. | M.L. | New Zealand S.S. Co. | Met. Log. 12.10.24 to 1.4.25 ... | 6.4.25. |
| *Risaldar* ... | Park, G. ... ... | H. Gibson, N. W. Heard, T. E. Ward. | „ | Asiatic S.N. Co. ... | „ 8.3.24 to 13.10.24... | 18.11.24. |
| *Romney* ... | Syms, G. ... ... | W. H. Underhill ... ... | No. | Lamport & Holt ... | Form 911 20.3.25 to 20.4.25 ... | 5.5.25. |
| *Rotorua* ... | Winter, — ... ... | ... ... ... ... | „ | N.Z.S. Co. ... | ... ... ... ... ... | ... |
| *Royal Fusilier* ... | Dawson, J. ... | J. Fraser ... ... | „ | London & Edinburgh S.S. Co. | „ 4.4.25 to 30.4.25 ... | 4.5.25. |
| *Royal Transport*... | Dove, J. ... ... | R. Martin ... ... | „ | Houlder Bros. ... | „ 9.4.25 to 10.4.25 ... | 12.5.25. |
| *Ruapehu* ... | McKellar, A. W., R.D., Capt., R.N.R. | P. J. Connolly, T. N. Bennett, F. Cooke. | M.L. | New Zealand S.S. Co. | Met. Log. 25.10.24 to 14.3.25... | 23.3.25. |
| *Sachem*... ... | Westgarth, W. A. ... | C. Waldron, E. Sainty ... | M.L. | Furness Withy ... | Form 911 2.11.24 to 14.12.24... | 15.12.24. |
| *St. Albans* ... | Pilcher, E. ... ... | W. McIntyre ... ... | No. | Eastern and Australian | „ 10.9.24 to 18.11.24... | 19.1.25. |
| *St. George* ... | Blair, D., O.B.E., R.D., Commr., R.N.R. | G. H. Blair, R. A. Edwards | M.L. | Scientific Expeditionary Research Assocn. | Met. Log. 1.5.24 to 10.12.24 ... | 1.4.25. |
| *St. Patrick* ... | Bearpark. E. W. ... | J. Hill ... ... ... | No. | Rankin Gilmour ... | Form 911 2.1.25 to 26.1.25 ... | 27.2.25. |
| *Salaga* ... ... | Sola, P., D.S.O. ... | F. A. Elston ... ... | „ | Elder Dempster ... | „ 6.4.25 to 18.4.25 ... | 21.4.25. |
| *Samaria* ... | Horsburgh, G., O.B.E. | R. P. Cambell ... ... | „ | Cunard ... ... | „ 25.1.25 to 15.2.25 ... | 21.2.25. |
| *Sandown Castle* ... | Jackson, C. R. ... | E. H. de Heaume ... ... | „ | Union Castle ... | „ 9.3.25 to 7.4.25 ... | 28.4.25. |
| 10 *Saturnia* ... | Mitchell, W. ... | D. Macqueen ... ... | W.T. | Anchor Donaldson ... | W.T. Reg. 15.3.25 to 5.4.25 ... | 17.4.25. |
| | | | | | Form 911 15.3.25 to 7.4.25 ... | 16.4.25. |
| *Saxoleine* ... | Biddick, E. ... | R. Atkinson, B. Johnsen ... | No. | Hunting & Son ... | „ 20.2.25 to 12.4.25 ... | 16.4.25. |
| *Saxon* ... ... | Owen, S. H. ... | F. O. Wilbraham ... ... | „ | Union Castle ... | „ 13.3.25 to 3.5.25 ... | 7.5.25. |
| *Saxonia* ... | Jones, R. D. ... | H. A. D. Waterhouse ... | „ | Cunard ... ... | „ 7.9.24 to 7.10.24 ... | 16.10.24. |
| *Scholar* ... | McCullum, J. ... | A. L. Cresswell ... ... | „ | Harrison | „ 1.1.25 to 3.3.25 ... | 20.3.25. |
| *Scientist* ... | Hansen, W. A. ... | D. G. Russell ... ... | „ | „ ... ... | „ 21.5.24 to 9.8.24 ... | 12.8.24. |
| *Scindia* ... | Smart, R. W. ... | H. D. Campsie ... ... | „ | Anchor ... ... | „ 4.10.24 to 17.12.24... | 29.12.24. |
| *Scotia* ... ... | Telfer ... ... | O. W. L. Jones ... ... | C.C. | L.M. & S. Rly. ... | Telegraphic Report 15.5.25 ... | 15.5.25. |
| *Scottish Bard* ... | McDonnell, S. ... | S. W. Watts ... ... | No. | Tankers Ltd. ... | Form 911 29.3.25 to 9.4.25 ... | 27.4.25. |
| *Scottish Borderer* | Thompson, F. ... | G. F. Widger ... ... | „ | „ ... | „ 12.6.24 to 13.7.24 ... | 21.7.24. |
| *Scottish Strath* ... | French, A. L. ... | W. Black ... ... | „ | „ ... ... | „ 9.11.24 to 14.12.24... | 3.1.25. |
| 33 *Scythia* ... | Prothero, W. ... | T. Parry, G. Overton, W. B. Tanner. | W.T. | Cunard ... ... | W.T. Reg. 6.4.25 to 28.4.25 ... | 30.4.25. |
| | | | | | Form 911 20.4.25 to 28.4.25 ... | 30.4.25. |
| *Sheafdart* ... | ... ... ... | T. B. Griffiths ... ... | No. | Kaitan Mining Administration. | ... ... ... ... ... | ... |
| *Sheaf Mount* ... | Groves, C. V. ... | C. A. Goold ... ... | | Souter, W. A. ... | „ 17.8.24 to 26.8.24 ... | 1.9.24. |
| *Sheaf Spear* ... | Whitfield, G. A., O.B.E. | A. E. Harvey, W. H. Grisewood. | M.L. | „ ... | Met. Log. 17.7.24 to 13.11.24... | 1.1.25. |
| *Sicilia* ... ... | Davis, H. C., D.S.C., R.D., Commr., R.N.R. | G. C. Bateman ... ... | No. | P. & O. ... ... | Form 911 17.2.25 to 16.3.25 ... | 21.4.25. |
| *Socrates* ... | James, F. R. ... | E. R. Hartley ... ... | „ | Lamport & Holt ... | „ 11.4.25 to 1.5.25 ... | 12.5.25. |
| *Soekaboemi* ... | Lap, J. ... ... | W. N. de Wijn ... ... | „ | Rotterdam Lloyd ... | „ 26.1.25 to 26.2.25 ... | 23.3.25. |
| *Somerset* ... ... | Barnett, H. ... | J. J. Youngs ... ... ... | No. | N.Z.S. Co. ... ... | Form 911 24.4.25 to 11.5.25 ... | 15.5.25. |
| *Somersetshire* ... | Adamson, B. W. ... | P. Hawkins, J. Cullen, M. Simmons. | M.L. | Bibby ... ... | Met. Log. 9.11.24 to 11.2.25 ... | 6.3.25. |
| *Somme*... ... | Spriddell, F. G. ... Miles, F. R., Commr., R.N.R. ... | K. W. Simpton, H. Chamberlian, V. Hill, C. C. Prosser. | M.L. | R.M.S.P. Co. ... | Met. Log. 16.2.24 to 29.9.24 ... | 18.11.24. |
| *Songster* ... | Thompson, W. ... | W. F. O'Neill ... ... | M.L. | Harrison ... ... | „ 13.10.23 to 5.11.23... | 19.2.24. |
| *Spectator* ... | Richardson, R. ... | D. Fraser, J. G. F. Betson ... | No. | „ ... ... | Form 911 26.1.25 to 9.4.25 ... | 16.4.25. |
| *Spero* ... ... | French, H. E. ... | E. A. Gould, G. Mussared, R. Higginbottom, J. Rutherford. | M.L. | Ellerman Wilson ... | Met. Log. 23.2.24 to 9.8.24 ... | 19.8.24. |
| *Stephan*, C.S. ... | Carlton, G. F., O.B.E., Commr., R.N.R. | F. B. Bolingbroke, W. E. Allen, T. J.Horan. | M.L. | Telegraph Construction & Maintenance | „ 24.2.25 to 7.4.25 ... | 28.4.25. |
| *Stuart Prince* ... | Litchfield, E. ... | G. B. Taylor, W. R. Holt ... | No. | Prince ... ... | Form 911 24.2.25 to 10.3.25 ... | 16.3.25. |
| *Surrey* ... ... | Field, H. E. B. ... | C. P. Jackson, C. H. Landfield. | M.L. | Federal ... ... | Met. Log. 2.11.24 to 28.3.25 ... | 14.4.25. |
| *Sussex* ... ... | Upton, E. C. S. ... | W. A. Ewington ... ... | No. | „ ... ... | Form 911 28.10.24 to 13.11.24 | 15.12.24. |
| *Tainui* ... | Hartman, W. H. ... | P. S. Horwood ... ... | „ | Shaw, Savill & Albion | „ 20.2.25 to 29.3.25 ... | 29.4.25. |
| *Tairoa* ... ... | Summers, W. G. ... | S. A. Bannister ... ... | „ | „ „ „ | „ 2.9.24 to 7.2.25 ... | 23.3.25. |

| Name of Vessel. | Captain. | Observing Officers. | Official Meteorological Equipment. | Line. | Last Log, Register, or Report Contributed. Received up to 16.5.25. | Date Received. |
|---|---|---|---|---|---|---|
| *Tahiti* ... ... | ... ... ... | ... ... ... ... ... | No | Union S.S. Co. of N.Z. | Form 911 ... ... ... ... | ... |
| *Taiyuan* ... | Hamilton, H. E. ... Thomas, R. D. ... | T. M. Young, W. Bailley, A. M. Frame. | M.L. | Yuill & Co. ... | Met. Log. 11.7.24 to 15.12.24 ... | 10.2.25. |
| *Talthybius* ... | Duggan, C. ... | P. Elder ... ... ... | No. | A. Holt ... ... | Form 911 21.2.25 to 5.3.25 ... | 23.3.25. |
| *Tanda* ... ... | Pilcher, E. ... | ... ... ... ... ... | M.L. | E. & A. S.S. Co. ... | Form 911 ... ... ... ... | ... |
| *Tambora* ... | Huisman, N. ... | H. Van Manen ... ... | No. | Rotterdam Lloyd ... | ,, 27.2.25 to 15.4.25 ... | 27.4.25. |
| *Teiresias* ... | Holden, W. R. F. ... | R. S. Young ... ... | ,, | A. Holt ... ... | ,, 8.1.25 to 28.1.25 ... | 2.2.25. |
| *Teucer* ... ... | Hodgson, R. N. ... | G. Lancaster ... ... | ,, | ,, ... ... | ,, 30.1.25 to 9.3.25 ... | 8.4.25. |
| *Themistocles* ... | Jermyn, W. M. ... | W. F. Sargent ... ... | ,, | Aberdeen ... ... | ,, 11.3.25 to 23.4.25 ... | 5.5.25. |
| *Theseus* ... | Batt, A. E. ... | J. T. Fettes ... ... | ,, | A. Holt ... ... | ,, 25.2.25 to 25.4.25 ... | 1.5.25. |
| *Titan* ... ... | Wilkinson, T. G. ... | G. Gow, L. Morton, S. C. Tinmouth, F. D. Lovewell. | M.L. | ,, ... ... | Met. Log. 12.11.24 to 14.3.25... | 11.5.25. |
| *Tolmie*, S.F.Bqtne. | Stewart, J. C. ... | E. F. Collins ... ... ... | No. | B. C. Mills, Tug and Barge Co. | Form 911 1.11.24 to 24.12.24... | 2.3.25. |
| *Tottori Maru* ... | Matsukura, B. ... | S. Ibori ... ... ... | ,, | Nippon Yusen Kaisha | ,, 7.9.24 to 13.10.24 ... | 20.10.24. |
| *Traveller* ... | Worthington, B. ... | A. Robertson ... ... | ,, | Harrison ... ... | ,, 19.6.24 to 18.7.24 ... | 22.7.24. |
| *Trematon* ... | Hicks, F. H. ... Evans, B. ... | J. Christopher, D. Thomas, F. J. Webb, S. Smith, C. Mayberry. | M.L. | ,, ... | Met. Log. 31.3.23 to 24.9.24 ... | 14.10.24. |
| *Tuscania* ... | Bone, D. W. ... | J. W. Cherry ... ... | No. | Anchor ... ... | Form 911 19.4.25 to 10.5.25 ... | 14.5.25. |
| *Tyndareus* ... | Slater, H. N. ... | C. Broad, A. C. H. Jones ... | M.L. | A. Holt ... ... | ,, 13.3.24 to 25.3.24 ... | 20.4.24. |
| *Ulimaroa* ... | Wyllie, W. J. ... | J. Gilbertson ... ... | No | Huddart Parker, Ltd. | ,, 17.10.24 to 23.11.24 | 19.1.25. |
| *Ulysses* ... | McHutcheon, W. ... | T. R. Phillips ... ... | ,, | A. Holt ... ... | ,, 11.3.25 to 23.4.25 ... | 30.4.25. |
| *Umtali* ... ... | Barnes, E. W. ... | W. H. Foster ... ... | ,, | Bullard King ... | ,, 8.12.24 to 8.4.25 ... | 16.4.25. |
| *Valacia* ... | Doyle, M. ... | N. Grayson ... ... ... | ,, | Cunard ... ... | ,, 8.4.25 to 18.4.25 ... | 21.4.25. |
| *Valdura* ... | Mitchell, A. ... | H. J. Maughan, J. Anderson, A. M. S. Well. | M.L. | Gow Harrison ... | Met. Log. 19.6.24 to 20.11.24... | 8.12.24. |
| *Vardulia* ... | Murchie, P. A., R.D., Commr., R.N.R. | J. E. Deans ... ... | No. | Cunard ... ... | Form 911 8.2.25 to 20.2.25 ... | 27.2.25. |
| *Vasconia* ... | Inch F. ... ... | E. Gleave ... ... | ,, | ,, ... ... | ,, 7.1.25 to 21.1.25 ... | 16.2.25. |
| *Vellavia* ... | Fear, E. T. C. ... | J. E. Deans ... ... | ,, | ,, ... ... | ,, 26.3.25 to 6.4.25 ... | 14.4.25. |
| *Ventura de Larrinaga.* | Keay, W. S. ... | H. J. Kay ... ... | ,, | Larrinaga ... ... | ,, 2.10.24 to 4.11.24 ... | 25.11.24. |
| *Verbania* ... | Hatcher, W. H., R.D., Commr., R.N.R. | J. G. Wiseman ... ... | ,, | Cunard ... ... | ,, 17.2.25 to 22.3.25 ... | 24.3.25. |
| *Verentia* ... | Jones, R. D. ... | A. F. Watts ... ... | ,, | ,, ... ... | ,, 6.4.25 to 8.5.25 ... | 12.5.25. |
| *Vigilant* ... ... | Simpson, E. S. S. ... | J. Hunter ... ... | No. | Scottish Fishery Board | Form 911 7.3.25 to 30.3.25 ... | 2.4.25. |
| *Waiotapu* ... | Davey, A. ... | B. S. Cave ... ... | No. | Canadian-Australasian | Form 911 2.10.24 to 22.10.24... | 9.12.24. |
| *Walmer Castle* ... | Stanley, W. P., R.D., Commr., R.N.R. | C. Aylen ... ... ... | ,, | Union Castle ... | ,, 6.3.25 to 27.4.25 ... | 28.4.25. |
| *Wangaratta* ... | Scutt W. ... | T. W. Wordingham, W. C. Cripps, K. M. Morrison. | M.L. | British India ... | Met. Log. 30.6.24 to 26.11.24... | 1.12.24. |
| *Warfield* ... | Steel, R. ... | E. V. Wilkinson ... ... | No. | ,, ,, ... | Form 911 18.11.24 to 12.1.25... | 16.1.25. |
| *War Nizam* ... | Putt, R. O. ... | D. Beaumont ... ... | ,, | British Tankers ... | ,, 12.3.25 to 5.4.25 ... | 15.5.25. |
| *Welshman* ... | Rollerson, W. ... | W. A. Fletcher ... ... | ,, | White Star-Dominion | ,, 29.1.25 to 26.2.25 ... | 6.3.25. |
| *Winifredian* ... | Harrocks W. ... | W. E. Boyle ... ... | ,, | Leyland ... ... | ,, 14.12.24 to 19.1.25... | 2.2.25. |
| *Woodarra* ... | Reilly, J. V. ... | L. D. Graham, A. V. Fisher, L. C. Comber, J. Wallace. | M.L. | British India ... | Met. Log. 3.4.24 to 22.6.24 ... | 2.8.24. |
| *Yorkshire* ... | Millson, G. C. ... | F. C. Holdsworth ... ... | No. | Bibby ... ... | Form 911 26.3.25 to 23.4.25 ... | 4.5.25. |
| *Zeeland* ... | Thomas, A. J. ... | J. Cross ... ... ... | No. | Red Star ... ... | Form 911 27.3.25 to 17.4.25 ... | 20.4.25. |
| *Conway* H.M.S. | Broadbent, H. W., R.D. Capt., R.N.R. | The Senior Cadets... ... | Cadets' M.L. | ... ... ... | Cadets' Met. Log. 25.1.25 to 4.4.25 | 9.4.25. |
| Pangbourne Nautical College. | Tracy, A. F. G., Commr., R.N. | ,, ... ... | ,, | ... ... ... | Cadets' Met. Log. 18.1.25 to 2.4.25 | 7.4.25. |
| *Worcester*, H.M.S. | Sayer M. B., O.B.E., R.D., Capt., R.N.R. | ,, ... ... | ,, | ... ... ... | Cadets' Met. Log. 23.1.25 to 16.4.25 | 20.4.25. |
| *Abaco* ... ... | ... ... ... | The Keepers ... ... | Lighthouse Register. | ... ... ... | Lighthouse Register 7.7.24 to 14.1.25 | 9.3.25. |
| *Cay Lobos* ... | ... ... ... | ,, ... ... | ,, | ... ... ... | Lighthouse Register 1.7.24 to 31.12.24 | 9.3.25. |
| *Double Headed Shot* | ... ... ... | ,, ... ... | ,, | ... ... ... | Lighthouse Register 1.7.24 to 31.12.24 | 9.3.25. |
| *Inagua*... ... | ... ... ... | ,, ... ... | ,, | ... ... ... | Lighthouse Register 11.7.24 to 18.1.25 | 9.3.25. |
| *Sombrero* ... | ... ... ... | ,, ... ... | ,, | ... ... ... | Lighthouse Register 1.7.24 to 31.12.24 | 10.2.25. |
| *Watling Island* ... | ... ... ... | ,, ... ... | ,, | ... ... ... | Lighthouse Register 1.7.24 to 30.12.24 | 9.3.25. |
| *Cape Pembroke* (Falkland Is.). | ... ... ... | ,, ... ... | ,, | ... ... ... | Lighthouse Register 1.7.24 to 31.12.24 | 4.3.25. |

## 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 30.4.25. | Date Received. |
|---|---|---|---|---|---|
| *Denis*... ... ... | Harris, F. C. P. ... | Mr. Heyburn ... ... | Booth ... ... | Water Samples ... ... | 24.2.25. |
| *Hildebrand* ... ... | Maddrell, J. ... ... | R. S. Hulme Goodier ... | ,, ... ... | ,, ,, ... ... | 13.1.25. |
| *Manzanares* ... ... | Henderson, J. N. ... | H. E. Lees ... ... | Elders & Fyffes ... | ,, ,, ... ... | ... |
| *Miami* ... ... | Makepeace, S. ... ... | H. H. Dunning ... | ,, ,, ... ... | ,, ,, ... ... | 29.4.25. |

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