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AN APPEAL TO MARINE OBSERVERS FOR SPECIAL OBSERVATIONS.

The Hydrometer in Port.

DURING the last year or two, requests have been received for information of the specific gravity of water at loading ports abroad and we have not been able to provide it.

Some years ago consideration was given as to whether the Hydrometer should retain its place in the instrumental equipment of Meteorological Log keeping ships. It won, because we pointed out that though observations of the specific gravity of sea water had been taken all over the oceans for many years, this instrument was useful to the master and officers of ships to determine the specific gravity at loading berths so that they could make the correct allowance for change of draught.

The recording of Hydrometer observations at sea has continued satisfactorily and no doubt many ships supplied with this instrument observe the specific gravity for the purpose of the ship's draught in port but they do not enter the observations taken in port in the Meteorological Log.

In view of the need for information of the specific gravity of water in harbours and ports in all parts of the world marine observers are asked when in port, to observe and record once daily the specific gravity of the water. These observations may be conveniently entered at the end of the log. The date, time, port and berth should be given, also the state of the tide, together with information of freshets or other conditions which may temporarily affect the density of the water.

Measurements of Sea and Swell.

In July, 1925, we published an appeal for special observations of sea and swell, along with an article summarising all available information and giving suggestions for measuring the height, length, period and velocity of ocean waves. Since then advice for making these measured observations has been included in THE MARINE OBSERVER'S HANDBOOK together with Admiral DOUGLAS' sea and swell scale which was the best of a number of scales suggested by Marine Observers. This scale was included for information but not for general use in routine observation.

In an early number next year we propose to revise the information published in the July, 1925, number and to see what can be done with the measurements received.

Up to the present very few measurements of sea and swell have been received and we appeal again to all members of the British Corps of Voluntary Marine Observers to make every possible effort to return these observations for which purpose Forms are being sent to every ship on the list, with this number. These observations are not only required in the Marine Division for giving average dimensions for the Douglas scale—which, by the way, has been passed to the International Maritime Meteorological Commission for their consideration as being suitable for general use—but they have been asked for by Naval Architects who require them for improving ships' design.

Measurements of sea and swell made in all parts of the world and under all conditions of weather are much needed and we ask the British Corps of Voluntary Marine Observers to rise to the occasion and supply them.

MARINE SUPERINTENDENT.

London,
2nd August, 1929.

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.

CURRENTS NEAR CAPE GUARDAFUI.

Arabian Sea.

THE following is an extract from the Meteorological Log of S.S. *Astronomer*, Captain J. RICHARDS, Suez to Calcutta. Observer Mr. E. B. STEPHENS.

"12th November, 1928, exceptional current was found between Cape Guardafui and The Brothers. Position was fixed at 11.30 p.m. A.T.S. in Latitude $12^{\circ} 03' N.$, Longitude $51^{\circ} 17\frac{1}{2}' E.$, and course was set 100° to pass 15' off Abd-al-Kuri.

"At 3.15 a.m. the vessel was found to be in Latitude $12^{\circ} 02' N.$, Longitude $52^{\circ} 6\frac{1}{2}' E.$ D.R. position being Latitude $11^{\circ} 53' N.$, Longitude $52^{\circ} 12' E.$, having been set 323° , 2.45 knots.

"Streaks of luminescence were observed lying across vessel's track in a N.N.W. and S.S.E. direction. Both positions were reliable, Ras Alula and Guardafui lights being visible at 10.30. Compass error carefully checked by Stellar observations.

"Reverse current to that indicated by Admiralty Chart for this locality. Wind, calm. Sky clear, Air $77^{\circ}.5 F.$, Sea $76^{\circ} F.$ "

NOTE. Charts of the Currents on the Tracks Cape Leeuwin to Perim direct and via Colombo will be published in THE MARINE OBSERVER for 1930. It is hoped that investigation of the currents from the observations now available will result in a better knowledge of the abnormalities of current experienced in the Indian Ocean.

CURRENTS OFF CAPE BON.

Mediterranean Sea.

THE following is an extract from the Meteorological Log of S.S. *Astronomer*, Captain J. RICHARDS, Liverpool to Port Said. Observer Mr. E. B. STEPHENS.

"2nd November, 1928, at 1.20 a.m. in the vicinity of Cape Bon (westward) an abnormal current was experienced. The vessel was found to be set 38° at the rate of 4 knots.

"Wind south, force 3-4, sky clear. Temperature, Air $70^{\circ} F.$, Sea $67^{\circ} F.$ After passing Cape Bon, current set 250° at the rate of 3 knots.

"These currents were ascertained by reliable cross bearings of Cape Bon and Zambretta Lights. Compass error being carefully checked by Stellar observations."

TIDE RIPS.

In Sulu Sea.

THE following is an extract from the Meteorological Log of S.S. *Arafura*, Captain A. S. GORDON, Hong Kong to East Indies. Observer Mr. C. STRATFORD, 2nd Officer.

"11th November, 1928, between Jolo and North Ubian Islands ran through a tide or current rip extending as far as the eye could see, in a N.N.E. and S.S.W. direction, and about 200 feet in width. From reliable cross bearings, ship set $S. 15^{\circ} W.$ (T), 2 miles, between 0500 and 0600 G.M.T. Sea smooth, with light airs from S.W.

"When in Pangutarang Passage, experienced numerous rips, setting in various directions, causing a very disturbed sea. Ship steering badly but making good course.

"0700 G.M.T. North Ubian Lighthouse abeam, bearing $S.37^{\circ} W.$ (T), distant 3 miles."

DISCOLOURED WATER.

South Atlantic Ocean.

THE following is an extract from the Meteorological Report of S.S. *Arundel Castle*, Captain S. H. OWEN, Cape Town to Southampton. Observer Mr. S. E. ALDAM, 4th Officer.

"12th November, 1928, at 1.50 p.m. A.T.S., in Latitude $20^{\circ} 03' S.$, Longitude $5^{\circ} 19' E.$ Observed three to four parallel streaks (of what appeared to be muddy water) which were about 3 to 4 feet in width and between 8 to 12 feet apart and in the same direction as the wind which was S.E. by E., force 4. The length of the longest streak was about 1 mile."

PHOSPHORESCENCE.

Off Minikoi Island Light.

THE following is an extract from the Meteorological Report of S.S. *Otaki*, Captain R. McNISH, Suez to Colombo, Observer Mr. G. DIBLEY, 3rd Officer.

"November 5th, 1928, about 1800 G.M.T. in position Latitude $8^{\circ} 18' N.$, Longitude $72^{\circ} 43' E.$, course 105° , speed $12\frac{1}{4}$ knots. Observed numerous remarkable patches of phosphorescence in vicinity of vessel. These appeared suddenly and radiating outwards from the point of their first appearance with great rapidity, until within ten seconds they covered an area of approximately one to two hundred feet in diameter. Subsequently they gradually faded, so that within the minute from the time that the first glimpse was seen, no trace of them remained. These patches appeared all around the vessel and both near to and far away from her. The interval of time from when the first was observed until the last was seen was about twelve minutes. Those near to the ship did not have the appearance of being caused by fish. The wind was N.E., force 1-2, sea smooth, slightly easterly swell, temperature air $82^{\circ} F.$, sea $83^{\circ} F.$ "

China Sea.

THE following is an extract from the Meteorological Log of S.S. *Naldera*, Captain G. G. RANDELL, London to China and Japan, via Suez, Observer Mr. M. F. SHUTE.

"19th November, 1928, 1.35 a.m., 1835 G.M.T., Latitude $3^{\circ} 20' N.$, Longitude $105^{\circ} 35' E.$ (approximate). Observed bars or waves of phosphorescence travelling at great speed at intervals of about 3 per second, from N.E. to S.W. About 7 minutes later came from Eastward for about 4 minutes, then from E.S. Eastward and became fainter and died away. Sky cloudy (Cu-Nb. Nb.). Wind N.N.E., force 2. Heavy rain squalls from N.N.E. followed. Wind then became variable and frequent heavy rain squalls arrived from N.E. quadrant. There were several periods of calm.

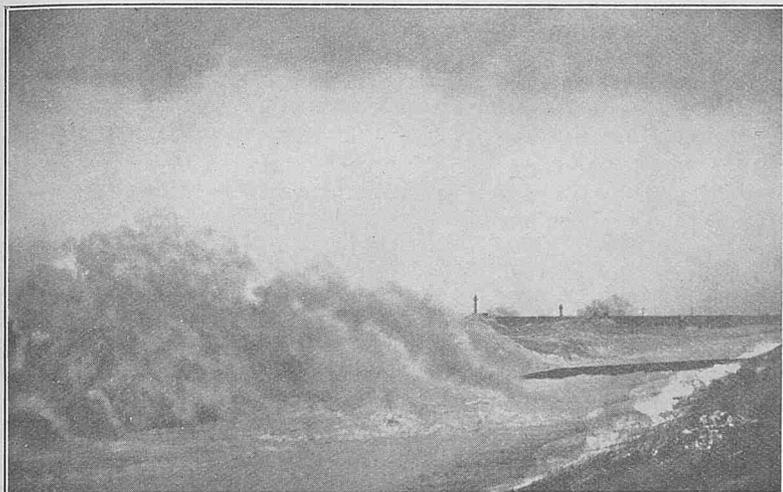
"No small clusters of phosphorescence were visible either between or in the beams, and no illuminated bow wave was seen either in or between beams.

"Phosphorescence was not seen before or after occurrence. Duration about 15 minutes."

NOTE.—A report of a similar phenomenon by Mr. L. J. STEVENSON, S.S. *Chak Lang*, appeared in THE MARINE OBSERVER for November, 1927, page 209.

HEAVY SEA AT DIEPPE.

The accompanying photograph has been received from Captain S. MARMERY, S.S. *Worthing*, Cross Channel Packet service, Newhaven to Dieppe.



The photograph was taken on the front at Dieppe showing the piers looking N.E. on November 27th, 1928. There was a N.W. gale at the time.

TYPHOON.

China Sea.

The following is an extract from the Meteorological Log of H.M.S. *Iroquois*, Captain J. D. NARES, D.S.O., R.N., Observer Lieutenant A. B. FOULERTON, R.N.

" 22nd-29th November, 1928—On passage from Sandakan to Hong Kong.

" November 21st. After leaving Sandakan and on entering the Mallawalle Channel, a wind of N.W. force 4 was felt; this gradually backed round to W. in the evening, when the ship anchored for the night.

" November 22nd. Ship weighed and proceeded up the Palawan Passage, where the wind held from W.S.W. all day till the evening, when it veered to N.W., force 3, the barometer keeping its normal level. At 2100 a weather report received gave a typhoon situated about 200 miles S.E. of Manila.

" November 23rd. In the forenoon the wind varied between N. and N.W., force about 4, settling to N.W., force 4, after mid-day. The barometer started falling, but kept its diurnal range quite distinctly. At noon a weather report was received from Kavite placing the typhoon centre near the St. Bernardino Straits at 0800 this morning, moving westwards. The typhoon was reported as being very severe, and as keeping on our present course of 029° would mean running straight into the centre of the storm, the ship accordingly altered course 180° and ran south to keep well clear.

" At 1300 the D'Aguilar weather report gave the centre to be over the Visaya Islands. Ship held on south, wind steady at N.W.

" At 2130 the ship was in Latitude 9° 15' N. and altered course to 029°, the wind backed to N.W. by W., force 4, the barometer level falling slightly, diurnal range still distinct.

" November 24th. A.M. Barometer falling and range flattening slightly. Frequent rain squalls and the wind freshening to W.N.W., force 6. A heavy N.N.W. swell started running. Kavite weather report gave the centre as being close west of Mindoro at 0600. This meant that the typhoon was moving slower than first reported, and that the centre was still on the starboard bow—as was also indicated by the direction of the wind and the falling barometer. At 1130 the ship hove to prevent running closer to the centre. In position 10° 32' N., 118° 05' E.

" During the afternoon the wind backed to W. by N. and freshened to 7-8. Frequent rain squalls during the evening. At 2015 the wind backed and eased to 6, and a slight improvement in the weather took place, accompanied by a small rise in barometer level. D'Aguilar weather report placed the centre 60 miles S.W. of Manila at 1800, with a W.N.W. track. Ship remained hove to for the night.

" November 25th. During the morning watch the wind backed further to W. by S. and eased to force 5. Barometer level showed a distinct rise; light rain showers, but the sky was clearing considerably.

" At 1000 the ship proceeded north for Hong Kong. A heavy sea and swell were running.

" Total barometer drop was not more than 5 mb. and the nearest approach to the typhoon centre was about 200 miles.

" The sea eased slightly during the day. The wind eased and backed to S.W. Very showery.

" November 26th. The 1100 weather report placed the typhoon centre in 17° N. and 116° E. at 0600. The typhoon was slowing down and showing a distinct curve to the North. Later a Kavite report gave roughly the same position for 1200 and reported the centre as being stationary. The barometer, which was still fairly low, showed signs of dropping again; the wind backed round to S.S.E., remaining at force 4. Sea varied between 6 and 4 with a moderate S.W. swell.

" November 27th. The wind backed further to S.E. during the morning watch and freshened to 5. At 0730 the typhoon was reported still in the same position as last night, stationary and still severe. Barometer dropping. Our course now brings us towards the centre of the typhoon but to the North of it.

" Further weather reports gave the typhoon as stationary in 17°N. 115°-116° E. At 1400 the wind backed to N.E. and freshened to 6, and again at 1515 to force 8, when it started to rain continuously.

" The barometer lost nearly all signs of diurnal range and at 1600 dropped to 1000.1 mb. The sea went round to N.E. and became heavy. 1900, wind freshened to 9. Rain throughout first watch. Barometer starting to rise.

" November 28th. The middle watch was very squally, wind reaching force 10 at times. Seas very heavy, about 30 feet. Barometer rising fast. The ship must now be drawing away from the centre, the wind backing to N.E. by N. Showery.

" During the morning watch the sea eased considerably, with a temporary lull in the wind (to 7), which, however, freshened to 9 at 0800. Stopped raining at 0730.

" The wind eased to 6 during the forenoon and veered to N.E. Probably the wind experienced from 0400 onwards was chiefly N.E. monsoon, strengthened by the position of the typhoon centre.

" Drop in barometer level on this second approach to the typhoon was 7-8 mb., and the nearest distance about 110 miles.

" At 1900 the wind eased to 4 and the sky started to clear, by which time the barometer had risen to normal level. A weather report received from D'Aguilar stated that the typhoon had started to move in a N.E. direction.

" Later the sky cleared right over, except for a few cumulus clouds. Wind eased to 3.

" November 29th. Hong Kong. All trace of typhoon disappeared as regards local weather. Report to-day gives typhoon travelling N.E. and approaching Balintang Channel."

The following are extracts from a report received from S.S. *Talamba*, Commander H. F. MINETT, R.D., R.N.R., Singapore to Hong Kong.

" This vessel left Singapore at 4 p.m. on the 21st November, 1928, draught fore 24' 05" aft 26' 07", about 1,400 deck passengers were accommodated on the shade deck, in the upper deck space, also in Nos. 3 and 5 'tween decks, usual N.E. monsoon weather conditions for the first 24 hours, a swell from N.N.E. made it advisable to reduce speed from 12½ to 10 knots, at 5 p.m. next day 23rd, increased swell necessitated reduction to about 8½ knots and 7½ knots, wind having increased to strong monsoon with increased sea, at 6 p.m. deck passengers from fore shade deck were removed and transferred to 2nd class deck as vessel was taking more water thrown up forward,

hatches were on and secured with the iron locking bars, a few passengers remained on No. 3 hatch, but next day they were removed for safety and all forward canvas removed, weather conditions became heavier. During the 24th and 25th heavy adverse weather conditions increased, vessel laboured and shipped water forward occasionally, at 7 p.m. 25th the wireless weather reports of approaching typhoon made it appear inadvisable to proceed on our course, it appeared wiser to keep to the south of its track which was N.N.W'ly. Course was altered to N. 60° E. and speed again increased, wind and sea being aft, the vessel laboured less and shipped less water. At 9 a.m., 26th, speed was reduced to about 2 knots and ship 'hove to' to watch weather conditions as the typhoon from my observations did not appear to be moving as informed, more deck passengers were also removed to one side of 1st saloon deck for protection and later to both sides of 1st saloon deck.

"At 2.25 p.m. 26th, there was no indication of W'ly progression of typhoon, barometer falling, and it seemed inadvisable to attempt to pass west of Macclesfield Bank in case typhoon did continue westerly as we might then approach Paracel Islands (which are about 68 miles to westward) we were then about 50 miles S.E. of the Bank, estimated, as no sights for position had been obtained. At noon on the 26th, strong winds with hard squalls, heavy confused seas were experienced, no heavy rain was experienced throughout but light drizzle at times. The procedure of decks and boats inspection was maintained throughout the bad weather hourly by a member of the crew and frequently by an officer in addition to the routine inspection at end of watch. At 2.25 p.m. 26th, it was decided to run to south of the typhoon and speed was again increased, course N. 60° E. again, with wind and sea aft the vessel rode easier and was dry except for a few light sprays. It was considered advisable to keep behind the typhoon and although a more E'ly course might have been preferable this was not possible in view of the uncertain position of the vessel and the necessity of giving the Scarborough Shoal as wide a berth as possible, speed was increased to full and best available was 13 to 14 knots. At 12 p.m. hauled up to N. 50° E. to give the Shoal a wider berth, wind hauled round from W. by N. to W, by S. between 2 p.m. and 12 p.m. At 4 a.m. 27th, wind had hauled round to S.W. and course was altered to N. 40° E., barometer reached its lowest 4 to 5 a.m. when it was 29.53 in. (uncorrected). At 6 a.m. altered course to North, barometer rising, wind of typhoon gale force was experienced throughout with a heavy confused sea but the vessel was taking the seas easier, by this time it seemed the typhoon was still remaining stationary, my hourly barometer readings were of great assistance and am convinced my estimates of the position of the typhoon centre, Lat. 16° 45' N., Long. 116° 10' E. were fairly accurate, also that the wisest procedure to avoid same were taken, the fact that the typhoon might move off anywhere between W.N.W., N. or even round to N.N.E. was not ignored and allowance made. From 4 to 6 a.m., 27th, the wind shifted from S.W. to S. thence to S.E. by S. and S.E. by E. at 8 a.m., by this time it appeared obvious that we had crossed to the East of the typhoon and course was altered to N. 30° W., barometer 29.53 in. From this time the barometer continued to rise which showed we were moving away from the typhoon. As we drew away out in the N.E. quadrant the N.E. monsoon wind came in with gale force, it was not considered wise to slow down from the 14 knots being made because of the possibility of typhoon recurving and thus overtaking the vessel, this recurving it was found later did occur. Noon approximate ship's position on 27th was Latitude 17° 29' N. and Longitude 117° 15' E., at 7 p.m. it was considered possible to reduce speed as barometer had risen to 29.79 in., this eased matters considerably and reductions were made until down to 7 knots, from 8 a.m. of the 26th to 4 a.m. of the 27th, considerable water and sprays were thrown up from the beam sea, fortunately the closed weather shade plate openings held and thus kept the seas from coming inboard, although very high seas were running they were not confused. By 8 a.m. on the 28th barometer had risen to 29.96 in. and there was very considerable weather improvement which continued, unfortunately it was by then not possible to increase speed sufficient to arrive at Hong Kong that evening before dark, speed was therefore kept reduced to about 7 knots to arrive at daylight 29th. At 7.23 a.m. 28th, we were able to obtain a wireless D/F cross of Hong Kong and Pratas Island, this being our first obtained ship's position since Noon of the 25th, no sights being available, frequent attempts were made to obtain wireless D/F positions or bearings while in vicinity of typhoon, but it was not possible owing to signals being too weak.

A wireless D/F bearing of Manilla which was only just over 200 miles away at 2 a.m. on the 27th, would have been useful to clear Scarborough Shoal but apparently Manilla is a C/W (continuous wave) station and this cannot be used with our D/F set. Throughout we were sending hourly wireless weather reports to Hong Kong Observatory which apparently were appreciated.

"Although we have had a most unpleasant experience, we have been fortunate in having only slight damage, the labouring and rolling has been heavy at times, a little canvas, two awning spars and several boat chocks have been damaged but not the boats themselves, repairs can to a great extent be carried out by the crew.

"We were in company with the Blue Funnel S.S. *Glaucus* throughout although we were not actually in sight any time, this vessel rounded the typhoon inside of us and she also by wireless reports was having a thin time of it. At about 2 a.m. on 27th being in touch with *Fooksang* which had left Hong Kong for Singapore a few hours before I informed him by wireless that the typhoon was in my opinion stationary and had been so for 12 hours or more, on my information he apparently altered his course from S.E. to S.W. and thus went nearly on his course down southward and cleared the typhoon.

"The wireless weather reports that the typhoon was progressing W.N.W'ly for some time after it had actually remained stationary undoubtedly complicated matters but I am convinced that we were fortunate in being able to take the best action that was possible and advisable under the circumstances, all is well that ends well, but we had a deuced unpleasant time of it.

"Certain conditions while in the vicinity of this typhoon were unusual, there was at no time any heavy rain, such rain as we had was never more than light and thin, although sky was overcast, the moon came out fairly clear for some considerable time, around this was a wide and well marked halo. The wind although strong hardly exceeded a force of 7, except during the hard squalls as they passed, some of these hard squalls probably reached force 9, our strongest winds were experienced after having cleared from the winds of the typhoon itself."

STORMS IN THE RED SEA.

The following is an extract from the Meteorological Log of S.S. *Khiva*, Captain P. O. BRITEN, Colombo to Suez, Observer Mr. H. B. WILLIAMSON, 4th Officer.

"Midnight, November 16th, 1928. Latitude 21° 47' 30" N. Longitude 37° 52' 30" E. Barometer 1008.0 mb. Wind S.E. by S., force 4. Cloud Ci/Ci-Cu. amount 3. Hygrometer Dry 85° F. Wet 79° F. Lightning to N.W. 1.30 a.m. Barometer 1008.0 mb. Flat calm cloud Ci/Cu/Cu-Nb. Amount 5 Lightning increasing in intensity, sheet all round horizon, fork to N.W. Lower fork lightning vertical. Upper fork lightning travelling across the sky from West to East, accompanied by light thunder.

"2.00 a.m. Heavy Nimbus coming up from N.W. Lightning of exceptional brilliancy with heavy thunder. Light rain drops. Latitude 22° 11' 00" N., Longitude 37° 38' 00" E. 2.09 a.m. Wind came away from West without warning at force 6, accompanied with torrential rain, heavy thunder and brilliant lightning. Wind increasing to force 9 at height of storm. Ship's speed eased. 2.30 a.m. Storm passed away to S.E. wind veered to N.N.W. force 3 and remained constant. Cirrus cloud in the zenith. Roll cumulus around horizon amount 4. Barometer 1009.1 mb. Hygrometer Dry 73° F. Wet 69°.5 F. Visibility 9. Latitude 22° 14' 00" N. Longitude 37° 36' 00" E.

"4.00 a.m. Fine clear weather. Barometer 1010.9 mb. Wind N.N.W. force 3 steady. Cloud Ci/St. amount 2. Hygrometer Dry 77° F. Wet 72° F. Latitude 22° 02' 00" N., Longitude 37° 28' 00" E."

THE following is an extract from the Meteorological Report of S.S. *Telamon*, Captain J. H. WILLCOX, Shanghai to Liverpool, Observer Mr. F. A. BROWN, 3rd Officer.

"18th November, 1928, approaching Port Sudan in Latitude 19° 20' N., Longitude 38° 21' E. Course 307°. Speed 10½ knots At 0 hrs. A.T.S. a violent electric storm, visible since dark to Westward, rapidly approaching the ship, Wind E.S.E. force 3. 0.20 a.m. Ship in centre of storm, blinding flashes of forked and sheet lightning. Wind E.S.E. force 3. 0.25 a.m. Sudden heavy

squall from Westward, accompanied by torrential rain. Wind W. force 6-7. 0.50 a.m. Rain ceased, lightning working away to Eastward. Wind W. force 3-4. No change in barometer which stood at 29.82 in. throughout.

"During the height of the storm, which was of exceptional severity, the periods of darkness between flashes were apparently equalled by those of light. Very little thunder accompanied the storm, and no disturbance of the compass could be observed."

LINE SQUALL.

South Indian Ocean.

THE following is an extract from the Meteorological Report of S.S. *Benalla*, Captain J. S. SHEEPWASH, Australia to London, via Cape of Good Hope, Observer Mr. J. E. HILLS, 4th Officer.

"3rd November, 1928, about 0935 G.M.T. observed a heavy bank of Nimbus extending from about N.W. to S.W. points of the horizon. The barometer was 29.91 in. Temperature dry bulb 64° F., wet bulb 62° 5 F., wind steady N.N.W. force 4-5, slight N.N.W. swell and sea. At 1145 G.M.T. in Latitude 31° 34' S., and Longitude 89° 14' E. passed under this bank of cloud which had a perfectly level base extending in a 340° and 160° direction, the whole moving slowly to the eastward. The barometer fell to 29.88 in. temperature dry bulb 62° F., wet bulb 62° 5 F., and light rain fell. When passing under there was a dead calm for several minutes and then the wind backed suddenly to W.S.W. force 2. The sky was now overcast but several more similar banks of cloud could be seen through the rain, a slight confused S.W. and N.N.W. swell being experienced, which produced a cross sea. By 1335 G.M.T. the rain had ceased, barometer 29.91 in. Temperature dry bulb 58° F., wet bulb 57° F., wind steady in S.W. force 4 and a long S.W. swell was experienced, sky still overcast in one dense layer. At 1835 G.M.T. wind was N.W. by W. force 4, barometer 29.93 in. and rising fairly fast, air temperature 59° F., slight N.W. sea, no swell and observed signs of breaking sky."

NOTE.—The above observation shows a variation from the typical form of line squall, the rise of pressure being delayed. An article on squalls will be published in a forthcoming number of THE MARINE OBSERVER, in which some of the chief types of squalls encountered at sea will be referred to.

CLOUD CAPS ON HILL AND SQUALLS.

St. Helena Bay, Cape Colony.

THE following is an extract from the Meteorological Log of H.M.S.A.S. *Protea*, Lieutenant Commander J. DALGLEISH, S.A.N.S., Observer Lieutenant F. J. DEAN, S.A.N.S.

"6th November, 1928. As indicated by the log the wind has freshened from the S.W. at 3.00 p.m. and steadily freshened till at 8.00 p.m. it was blowing Force 7.

"At 8.30 p.m. a remarkable phenomenon took place. The wind came in frequent gusts of Force 8 and a heavy cloud of stratus set in suddenly on the top of Titus Klip a 700 ft. hill 1½ miles west of the ship's anchorage. At the same time a quick increase in pressure was indicated by the barograph and the wind became more gusty.

"At 10.30 p.m. during a violent squall the stratus cloud on Titus Klip lifted showing the hill in sharp outline. As this cloud reached the zenith the wind dropped suddenly to a dead calm for two minutes and then came away again from S.W. (Force 7) but commenced moderating.

"At 11.00 p.m. Barometer ceased to rise as indicated by the barograph. At 11.40 p.m. Wind fell away completely."

HAIL.

Mediterranean Sea.

THE following is an extract from the Meteorological Report of S.S. *Glan Macnaughton*, Captain A. W. SIMPSON, Port Said to Oran, Observer Mr. A. H. HERSEE, 2nd Officer.

"29th November, 1928, at 6.29 a.m. A.T.S. in a position 10 miles North of Cape Bougaroni, ship steering West. Observed right ahead what appeared to be smoke rising out of the water, which on closer

observation turned out to be a column of hailstones. The column was of small diameter and travelled to the S.S.E. at a rapid speed. The weather at the time was dull and overcast, with a wind various in strength and direction. At 6.40 a.m. ship ran into heavy thunder storm, with hailstones of an unusually large size. Further thunder storms of less intensity occurred throughout the day."

LINEAR NIMBUS CLOUD WITH RAIN.

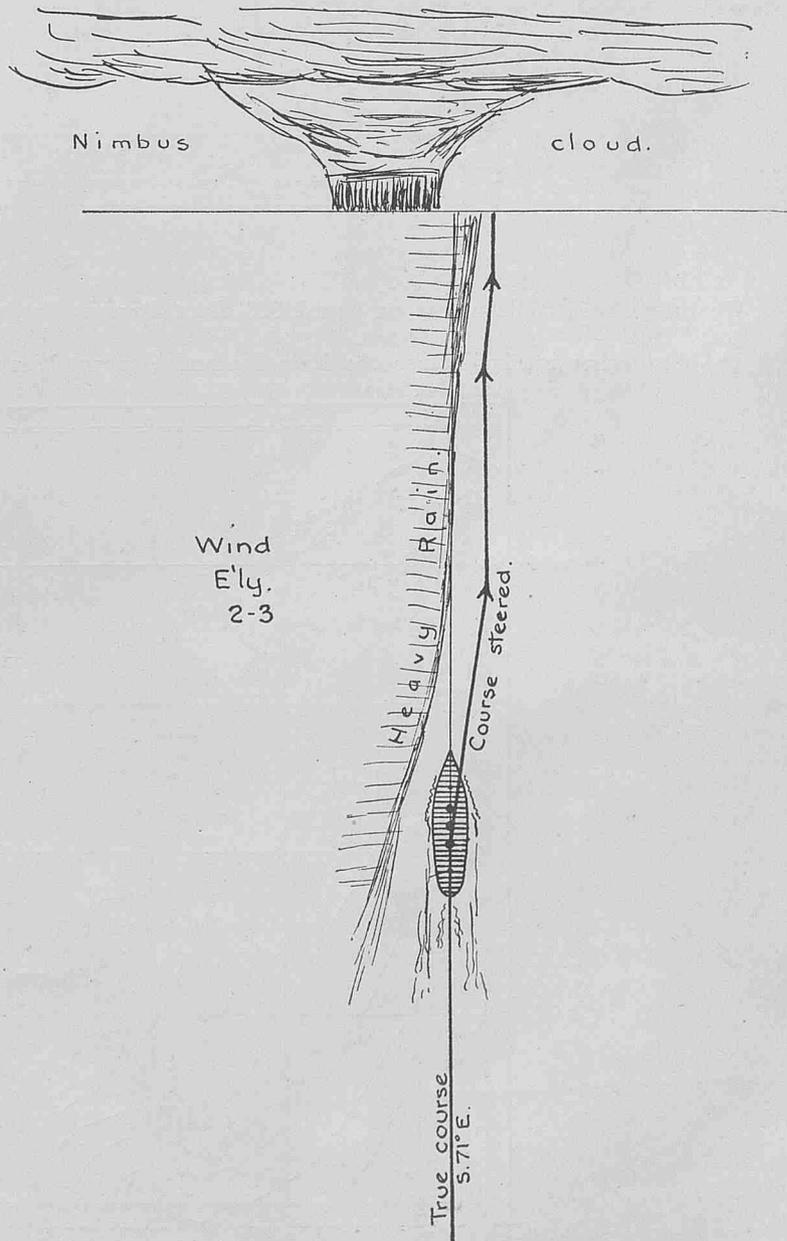
Strait of Bab-el-Mandeb.

THE following is an extract from the Meteorological Log of S.S. *Naldera*, Captain G. G. RANDELL, London to China and Japan via Suez, Observer Mr. D. MEIKLE.

"0400 G.M.T. (7 a.m.) 4th November, 1928, in Latitude 12° 31' N., Longitude 43° 41' E. Ship passed under a long ridge of Nimbus Clouds coinciding with the course line, and terminating with a well defined wall-like appearance at the horizon of short length.

"The course was altered ten degrees to avoid the rain, and subsequently altered back again after a few drops of rain were experienced, the rain being plainly visible at a distance of about a quarter of a mile in a line parallel to the course. This continued for an hour and a half during which time occasional heavy rumbles of thunder were heard.

"At 7.50 a.m. the course was again altered five degrees which enabled the ship to just skirt the line of rain; at 8.10 a.m. the original course was maintained, and at 9.15 a.m. the clouds gradually moved to the Northward and finally passed over the land."

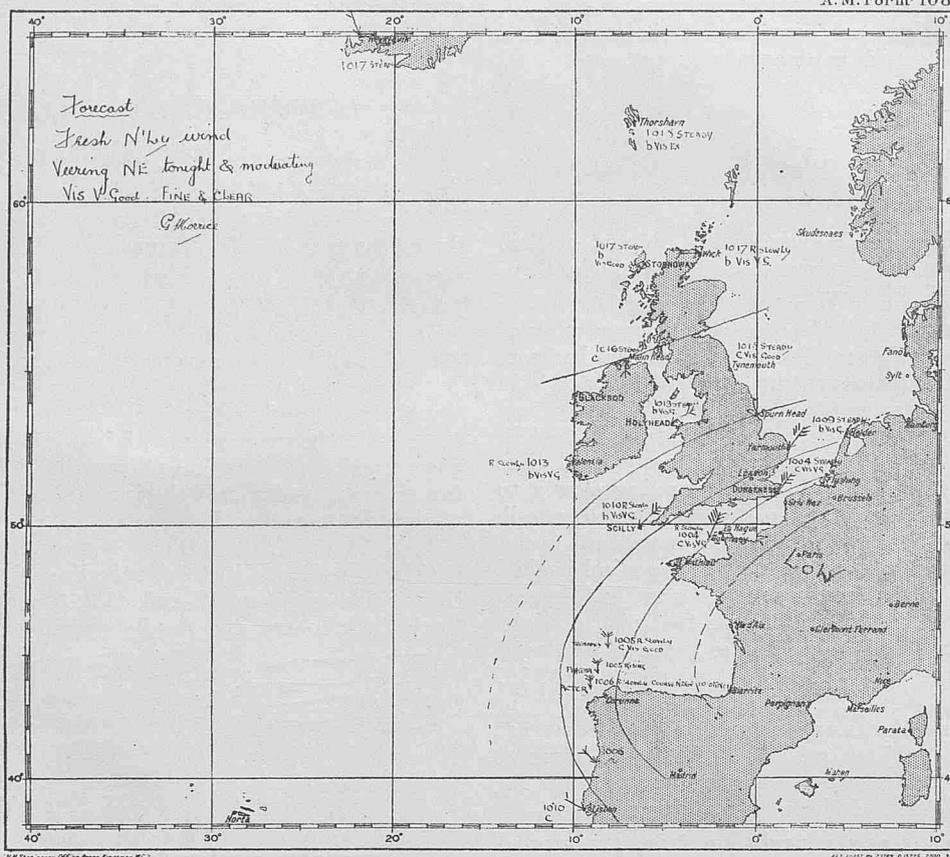


WEATHER CHARTS MADE AT SEA.

North Atlantic Ocean.

Weather Chart made at sea on board S.S. Actor, Captain E. HAYLETT, Colombo to London, by Mr. G. MORRICE, 3rd Officer.
0700 G.M.T. 8th Nov. 1928

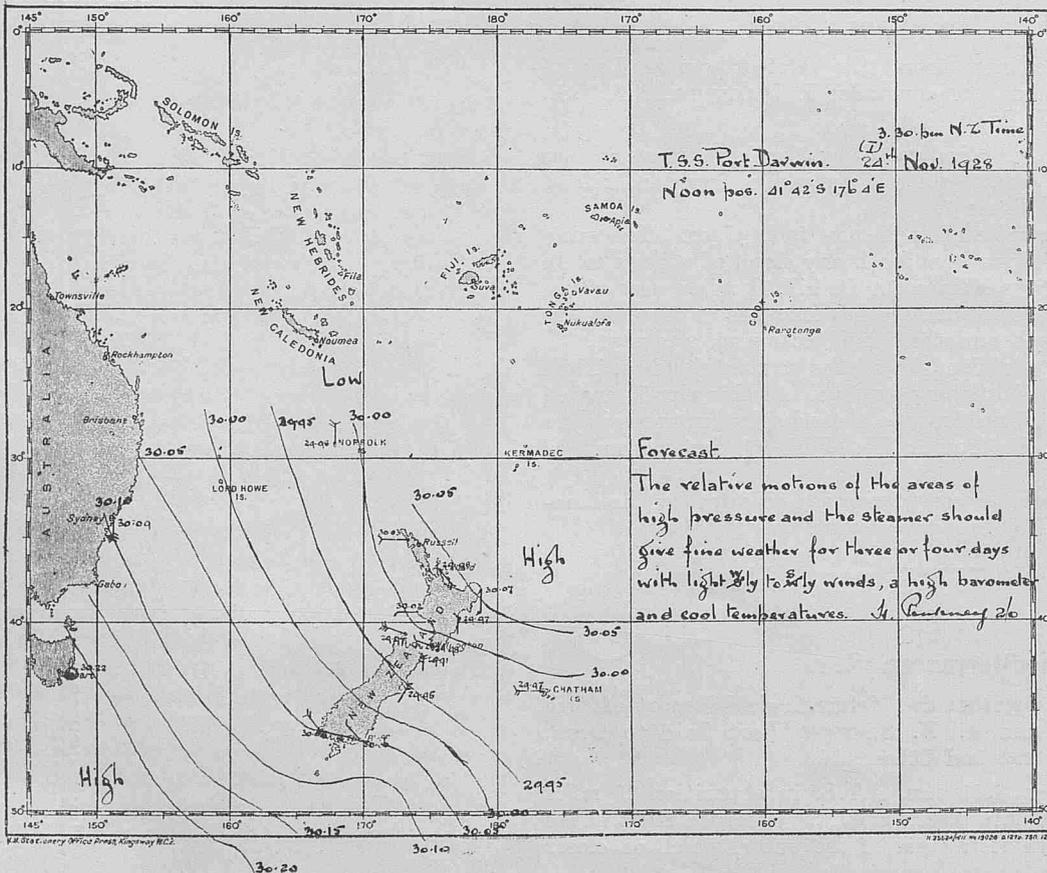
A.M. Form 1089.



South Pacific.

Weather Chart made at sea on board S.S. Port Darwin, Captain I. R. SAWBRIDGE, Wellington to Panama, by Mr. H. PINKNEY, 2nd Officer.
The first chart received since the New Zealand General Weather Bulletin has been issued.

A.M. Form 1253



VISIBILITY.

Cape St. Vincent.

THE following is an extract from the Meteorological Report of S.S. *Deseado*, Captain F. S. HANNAM, Liverpool to Buenos Aires, Observer Mr. V. SCOTT, 3rd Officer.

"1st November, 1928, 2020 G.M.T. in Latitude 38° 22' N., Longitude 9° 42' W. Course 209°, speed 13.4 knots. Observed loom of Cape St. Vincent light bearing S. 26½° E. True, distant 75 miles. At time of this observation sky was completely overcast (Cu-Nb). Cumulus clouds bearing from South to East with heavy nimbus approaching from the West bringing heavy rain. This loom was observed for ten minutes when heavy rain set in and obliterated it. During the period that this loom was visible it appeared quite distinctly, the flash easily being counted without the aid of glasses."

MIRAGE.

St. Helena Bay, Cape Colony.

THE following is an extract from the Meteorological Log of H.M.S.A.S. *Protea*, Lieutenant Commander J. DALGLEISH, S.A.N.S., Observer Lieutenant F. J. DEAN, S.A.N.S.

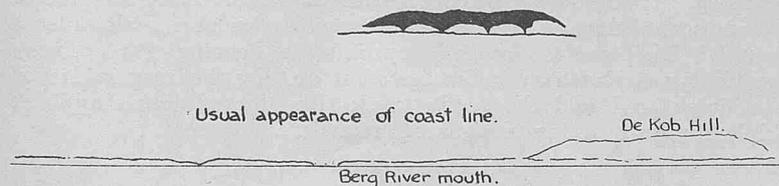
"27th November, 1928, Weather at 8.00 a.m. Calm. Dry bulb 57° F., Wet bulb 55° F. Weather fine and clear with parallel lines of perfect roll cumulus clouds to the S.W.

"At 9.20 a.m. a light air (Force 1) came away from W. by S.; the temperature having become higher. Dry bulb 59° F., Wet bulb 56° F.

"At 9.25 mirage appeared along the southern shores of the bay, giving the coast line the appearance of steep cliffs with the small single storey white houses having the appearance of tall sky scrapers. At 9.30 a.m. a decided drop in temperature was noticed and the air as indicated by the hygrometer nearly reached a point of saturation. Dry bulb 55° F., Wet bulb 54° F. At this time (9.30 a.m.) the mirage effect moved slowly north along the east coast of the bay giving the sand hills the appearance of steep cliffs and any outstanding trees a very elongated appearance.

"As the mirage effect became less intense on the southern coast of the bay, so it increased on the north coasts. The effect in fact seemed to move along the coast from the southern end of the bay to the north.

Mirage effect on De Kob Hill at 9.35 AM.



"At 10.00 a.m. Baboon Point the northern extremity of the bay was still lifted by mirage effect, but the rest of the coast line was exceptionally clear.

"No mirage was observed to seaward at all, and the ships 'Egria' floating beacons would undoubtedly give any indication if there had been.

"Except at one place none of the mirage was of an inverted character, but over the Berg river mouth the effect was very remarkable. The land back from the shore being lifted in a most peculiar manner, giving the appearance of a small dark cloud, which changed its form to a rounded appearance and passed away as the mirage effect moved northward."

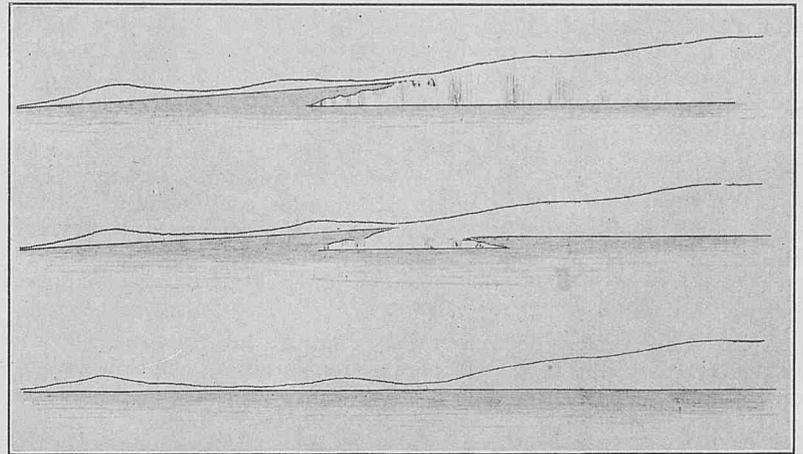


"No attempt has been made in the second sketch to show the mirage effect on the sand hills fronting the coast, but only the remarkable effect over Berg River Mouth."

Off Geraldton.

THE following is an extract from the Meteorological Log of S.S. *Gascoyne*, Captain L. JOHNSON, Fremantle to Singapore. Observer Mr. J. S. MCBRYDE.

"9th November, 1928, at 3.0 p.m. mirage observed. 1000 Foot Hill. Sketches show changes in 10 minutes. Latitude 26° 53' S., Longitude 113° 47' E.

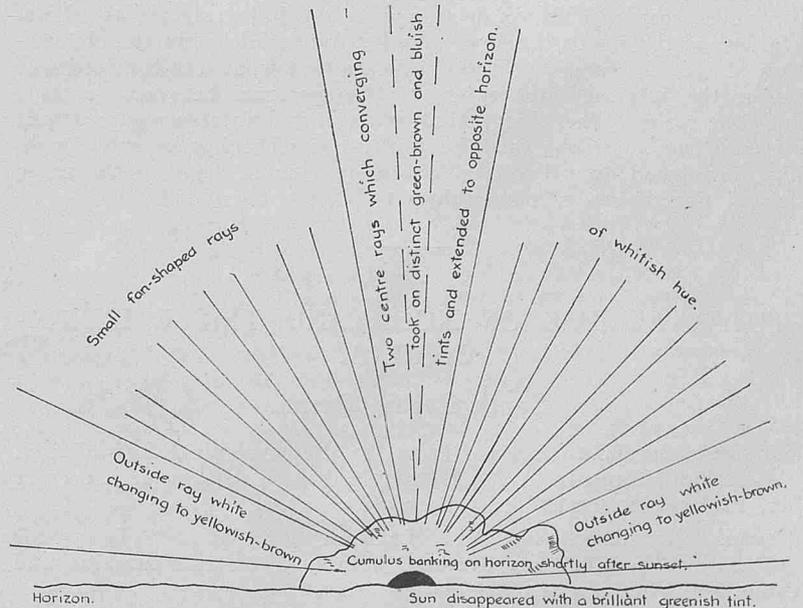


"Meteorological Observations: Noon wind N.E. 4; Air 80° F.; Wet bulb 66° F. b. 4 p.m. Wind S.W. 3; Air 77° F.; Wet bulb 69° F. b."

GREEN RAY AND CREPUSCULAR RAYS AT SUNSET.
North Atlantic Ocean.

THE following is an extract from the Meteorological Log of S.S. *Cumberland*, Captain T. McMILLAN, Liverpool to Colon. Observer Mr. P. L. SHAKESPEARE, 3rd Officer.

"8th November, 1928, Latitude 19° 50' N., Longitude 65° 50' W. Experienced practically cloudless sky throughout day until 4.00 p.m. when rain squall lasting 10 minutes passed over. Visibility from then excellent and few detached Cumulus clouds standing out prominently on horizon. Sun set at 5.33 p.m. with a peculiar green tint as upper segment dipped, and at 5.45 p.m. four well-defined and broad rays appeared above horizon. Shortly after the two centre rays converged and assumed distinct green-brown and bluish tints which stretched across the sky as far as Jupiter rising in the East, and at an altitude of about 16 degrees. In the meantime heavy Cumulus had banked on Westerly horizon and numerous smaller and regular fan-shaped rays of whitish hue appeared on either side of centre ray to an altitude of 30 degrees only. This phenomenon lasted until 6.10 p.m. when the small fan-shaped rays first disappeared and centre and outside rays turned yellowish-brown tint, gradually fading as night set in."



LUNAR RAINBOW.

North Atlantic.

THE following is an extract from the Meteorological Report of S.S. *Abinsi*, Captain H. E. MILLSON, Liverpool to West Coast of Africa. Observer Mr. G. M. DE LA COUR, 3rd Officer.

"2nd November, 1928, at 11.15 p.m. A.T.S., 2340 G.M.T., in Latitude 42° 44' N., Longitude 10° 18' W. Observed the beginning of a perfect form of—I can only describe it as a rainbow—caused by the moon shining through rain against a background of inky black Nimbus cloud. By 11.20 p.m. it had formed into a perfect semicircle of white over an arc of the horizon from W.S.W. to N.W. its zenith being about 22° of altitude, above that of the moon, which was then rising. The light S.W'ly wind freshened to fresh, sea was smooth with moderate N.W'ly swell. Barometer 29.68 in., temperature 52°, and a large patch of cumulus and cumulus-nimbus was moving from S.W. By 11.25 p.m. the rainbow had disappeared, and was followed by a heavy shower lasting till 11.30 p.m. Are these kind of rainbows uncommon, as I have never observed one before?"

NOTE.—Observations of lunar rainbows are rather infrequent owing to the fact that only in favourable circumstances is moonlight bright enough to render them visible. Lunar rainbows showing colour are still rarer.

SOLAR HALO.

Indian Ocean.

THE following is an extract from the Meteorological Log of S.S. *Empress of France*, Captain E. GRIFFITHS, Bombay to Singapore. Observer Mr. E. ROBERTS.

"19th November, 1928, 0.30 p.m., Latitude 5° 52' N., Longitude 92° 22' E. Observed well-defined solar halo—diameter 45°. Inner ring golden, centre ring white, outer ring mauve. 1.15 p.m. halo disappeared.

"The outer ring was of a distinct light violet hue and mauve. This is contrary to THE MARINE OBSERVER'S HANDBOOK, page 57, line 3."

NOTE.—Halo phenomena are of such infinite variety and of such complex origin that it is quite possible for a careful observer to see something which has never been seen before or at any rate which has been seen so rarely that any records made have been overlooked. The space available for description of these phenomena in THE MARINE OBSERVER'S HANDBOOK permits only a simple description of the more frequently observed types. By the theory of refraction violet light should be formed at the outer edge of the halo of diameter 45°, and its invisibility is due to the faintness of the light or, rather, to its lack of contrast with the whitish haze of the general sky in the vicinity. It is probable that a full violet colour has never been seen in connection with the halo referred to above. The use of the words "mauve" and "light violet" in the observation of S.S. *Empress of France* indicate that what was observed was rather the intermediate region of the spectrum between the blue and the violet. The observation is rare and interesting and will serve to emphasise the fact that marine observers, generally speaking, have good opportunities for observation of some of the rarer optical phenomena of meteorology.

TOTAL ECLIPSE OF MOON AND TRIPLE LUNAR CORONA.

South Pacific Ocean.

THE following is an extract from the Meteorological Log of S.S. *Cumberland*, Captain T. McMILLAN, Balboa to Auckland. Observer Mr. P. L. SHAKESPEARE, 3rd Officer.

"26th November, 1928, in Latitude 30° 29' S., Longitude 140° 08' W., 8 p.m., sky overcast with heavy Strato-cumulus and Cumulo-nimbus clouds.

"9 p.m. Breaks occurred in overcast in near vicinity of moon revealing upper clouds of remarkably well-defined appearance. Moon of exceptional brilliance against background of Cirro-stratus, with Cirrus and Cirro-cumulus (having the appearance of grained marble) moving slowly to southward across face of moon.

"10.25 p.m. (0738 G.M.T.). Eastern segment of moon commenced to eclipse. Lower clouds cleared just before commencement of eclipse and triple corona visible for duration of about three minutes (colours as stated of great brilliance and well defined) before moon was again obscured by Strato-cumulus clouds which came up rapidly from the northward. Sky remained overcast and at 11 p.m. wind veered N.E. by E. attaining force 6. Heavy Cumulo-nimbus clouds banking on the N.E. horizon. Barometer now 1010.8 mb. Dry Bulb 68.5° F. Wet Bulb 68° F.

"11.03 p.m. (0816 G.M.T.). Moon was observed through several small breaks in overcast sky to be almost totally eclipsed. Wind increasing to force 7.

"11.53 p.m. (0906 G.M.T.). Observed total eclipse, moon appearing a dark coppery colour. Wind squally, force 8, and backing to N.N.E. Rain Showers to Northward. Immediately after eclipse sky completely covered with heavy rain clouds and drizzling rain set in. Moon was not again observed, and weather very dirty until 6.0 a.m. when wind dropped to light variable airs before suddenly shifting to the Southward at 6.30 a.m.

"Colour sequence of triple corona observed during moon's eclipse:—

"Bluish-white inner field—brownish-red inner ring. Purple, green, orange, brownish-red, purple-green outer ring merging into orange, with third brownish-red outer ring.

"The clouds just before the eclipse were the most clear cut plain Ci-Cu. and Cirrus that I have even seen."

METEORS.

North Atlantic Ocean.

THE following is an extract from the Meteorological Log of S.S. *Port Dundee*, Captain F. FARMAR, Colon to London. Observer Mr. H. M. POST.

"12th November, 1928, 2.37 a.m. A.T.S. (0449 G.M.T.), in Latitude 39° 35' N., Longitude 36° 57' W. Exceptionally brilliant meteor observed which lit up the whole horizon as much as a big flash of lightning. It started just above Sirius at approximate altitude of 40° and came down quite slowly, disappearing at an altitude of about 7° in Stratus clouds. Approximate bearing 180° (True). The light was bluish white at first, but on disappearing it turned to a bright red and the red track (like forked lightning) was visible for quite a few seconds afterwards."

South Atlantic Ocean.

THE following is an extract from the Meteorological Report of S.S. *Herschel*, Captain W. W. WATSON, Rio de Janeiro to Liverpool. Observer Mr. J. T. MAWREY.

"16th November, 1928, at 3.55 a.m. A.T.S., Latitude 11° 24' S., Longitude 36° 40' W. Observed meteor crossing the heavens from East to West. The intense light was visible about 3 seconds, but its path could be plainly seen 4 minutes afterwards when it gradually widened and lost its intense brilliancy. It was still visible in the form of a dull white patch until 4.20 a.m. when it finally disappeared. Weather at time: Sky b., visibility 8; Barometer 29.92 in.; Sea 5, Swell 5 from N.E."

NOTE.—The duration of the visible track of this meteor was exceptionally long (25 minutes) and while it is by no means the longest on record such persistence is unusual.

THE WIND SYSTEMS OF THE ARCTIC AND THE ANTARCTIC.

PREPARED IN THE MARINE DIVISION BY E. W. BARLOW, SENIOR PROFESSIONAL ASSISTANT.

In this, the concluding article of the series on the winds of the oceans which have appeared in *THE MARINE OBSERVER*, we have to deal with the least known portions of the earth's surface, those lying between Latitude 60° and the Poles. As is well-known the unexplored region of the Antarctic is much larger than that of the Arctic and may be taken to be about two and a half times as great. In the northern hemisphere there is much permanently inhabited land poleward of Latitude 60°; in the southern hemisphere practically none. Antarctic exploration has, however, been actively continued since the beginning of the present century and we have therefore a fair knowledge of the meteorological conditions of the Southern Ocean south of Latitude 60° S. Observations made on the Antarctic Continent indicate the general features of pressure and wind in the coastal regions. It is therefore possible to write about the wind systems of both the Arctic and Antarctic with an assurance that the general outline is essentially correct, though details are to a great extent lacking.

The Arctic—Historical.—The history of polar exploration is outside the scope of this article and it would not be possible within the limits of the space to follow in detail the meteorological work of expeditions and shore stations which has led to our present knowledge. It is, however, interesting to note a few landmarks on the journey. PYTHEAS of Massilia in the fourth century B.C. is regarded as the first Arctic explorer although his Thule is believed to be Norway and it is probable that he did not cross the Arctic Circle. Arctic exploration from the sixteenth century to the beginning of the nineteenth century was dominated by a purely commercial motive, that of finding a North-West passage or a North-East passage from the Atlantic to the Pacific in order to render the rich products of the East more accessible. In 1633 seven sailors of the Dutch whaling fleet volunteered to winter in Jan Mayen with a view of testing its habitability for the development of the industry. A journal of winds and weather was kept by them from 26th August, 1633, to April 30th, 1634, about which time the last of the party died, only a month before the arrival of the Dutch fleet. This journal was published in CHURCHILL'S "Collection of Voyages and Travels," Vol. ii, 1732, and is perhaps the earliest account of daily Arctic weather that we possess. Our knowledge of Arctic meteorology really dates from the early nineteenth century. In 1820 Captain W. SCORESBY, Jun., published his "Account of the Arctic Regions, with a History and Description of the Northern Whale-Fishery," in which, Chapter V of Volume I is headed:—"Observations on the Atmospherology of the Arctic Regions; Particularly Relating to Spitsbergen and the Adjacent Greenland Sea." Captain SCORESBY made numerous whaling voyages to the Greenland Sea and was in addition a diligent meteorological observer during the period 1804-1817. The chapter referred to provides an excellent treatise founded on these observations, together with the general knowledge of the time, and is accompanied by tables.

Two quotations from this work are given below:—"In the frigid zone in general, as well as in icy regions without the Arctic Circle, winds blowing from the ice towards the open sea, are the most prevalent. In Hudson's Bay, westerly winds blow for three-fourths of the year; at Kamtchatka the prevailing winds are from the westward; in Greenland northerly winds occur during seven months in the winter; and in a similar proportion nearly in Spitsbergen, Jan Mayen and Novaia Zembla, as far as the observations of the adventurers who have occasionally wintered in these desolate countries can testify." The second quotation gives a graphic account of the irregularity and local nature of Arctic winds:—"Advancing towards the polar regions, we find the irregularities of the winds increased, and their locality more striking—storms and calms repeatedly alternate, without warning or progression—forcible winds blow in one place, when at the distance of a few leagues, gentle breezes prevail;—a storm from the south, on one hand, exhausts its impetuosity upon the gentle breeze, blowing from off the ice, on the other, without prevailing in the least;—ships within the circle of the horizon may be seen enduring every variety

of wind and weather at the same moment; some under close-reefed topsails, labouring under the force of a storm; some becalmed and tossing about by the violence of the waves; and others plying under gentle breezes, from quarters as diverse as the cardinal points."

Other extensive series of meteorological observations were those of Captain Sir W. E. PARRY during the years 1819 to 1825, in the course of his discoveries among the Canadian Arctic Archipelago, and those made by the many search expeditions to the same region sent out about the middle of the century for the relief of the FRANKLIN expedition, which had set out in 1845 in H.M.S. *Erebus* and H.M.S. *Terror*. It is interesting to note that what is believed to be the first upper air observation over the sea was made on PARRY'S second voyage in the winter of 1822 to 1823. With the assistance of the Rev. G. FISHER he raised registering thermometers by means of kites to the height of 400 ft. In 1886 R. E. PEARY commenced the series of explorations which culminated with his final journey to the North Pole in 1909. Valuable meteorological work was done in the *Fram* during her famous 35 months' drift from the New Siberian Islands to Spitsbergen, the highest latitude attained by NANSEN'S vessel being 85° 57' N. in October, 1895. Further work was done by AMUNDSEN in the similar drift of the *Maud* in 1918 to 1925. In conclusion R. E. BYRD'S seaplane flight in 1926 from Spitsbergen to the Pole and back and the still more recent flights of the airships *Norge* and *Italia* should be mentioned.

A meteorological station was maintained by the Swedes on Spitsbergen for the period 1882 to 1883. The present Norwegian meteorological and radio station was established in 1911. A Norwegian station was established on Jan Mayen in 1921. There are Danish stations in Western Greenland and Russian ones on Novaia Zemlya and on the northern coasts of Siberia.

The Antarctic. Historical.—From the time of the Greeks a belief in the existence of extensive land in the south persisted. When VASCO DE GAMA rounded Africa in 1497 he dispelled PTOLEMY'S conception of a continent joining Asia and Africa. Even when MAGELLAN in 1520 discovered the well-known strait bearing his name he believed that Tierra del Fuego was a part of the great southern continent. The progress of geographical exploration gradually destroyed these ideas, though the belief in a restricted Antarctic land area persisted until its first positions were discovered. Captain COOK was the first explorer to cross the Antarctic Circle, which he did twice between 1772 and 1775, during his circumnavigation of the globe in high southerly latitudes. He never got further south than latitude 71° 10' and saw no sign of the southern continent. Early in the nineteenth century the sealers continued the work of exploration. Two of their discoveries may be mentioned here. In 1820 E. BRANSFIELD, an Irish master mariner, discovered the Antarctic Continent, making his landfall on part of Graham Land. J. WEDDELL, of Leith, navigated in 1823 as far south as Latitude 74° 15' through the sea which now bears his name. The American expedition under WILKES and the British Government expedition in H.M.S. *Erebus* and H.M.S. *Terror* under Sir J. G. ROSS in 1839 independently discovered the fact that, contrary to previous belief, barometric pressure at sea level in all parts of the globe had not nearly the same value, about 30 inches. As ROSS said:—"Our barometrical experiments appear to prove that the atmospheric pressure is considerably less at the equator than near the tropics; and to the south of the tropic of Capricorn, where it is greatest, a gradual diminution occurs as the latitude is increased." The observations of these two expeditions therefore laid the foundation of the modern mean pressure charts of the globe. The ROSS expedition was sent out primarily for magnetic work and secondarily for geographical exploration. The discovery of the volcanoes Erebus and Terror and the great ice barrier at the head of the Ross Sea may be mentioned here. The second half of the nineteenth century was a barren period in Antarctic research and the modern era opened with the *Belgica* expedition in 1898. This expedition was the first to winter in the Antarctic and made the first series of long-continued meteorological observations in high

southern latitudes. Since that time some 14 expeditions organized by various countries have wintered, mainly on the coasts of the Ross and Weddell Sea areas, and extensive meteorological work has been carried out. We may refer here specially to Captain SCOTT'S expedition in the *Discovery* in 1901-4, which reached Latitude $82^{\circ} 16' S.$, and his expedition in the *Terra Nova*, 1910-1913. Captain SCOTT reached the Pole on 17th January, 1912, only to find that AMUNDSEN on the *Fram* expedition had arrived there a month previously, on 14th December, 1911. The deaths of Captain SCOTT and the whole polar party on their return journey form the outstanding tragedy of Antarctic exploration. Dr. G. C. SIMPSON, C.B., F.R.S., now the Director of the Meteorological Office, was the meteorologist on board the *Terra Nova* during the first voyage of the expedition and his published results deal not only with the observations made but also with the theory of the Antarctic pressure system. The first aeroplane flights over Antarctica were made by the expedition under the leadership of Sir H. WILKINS towards the end of 1928 and interesting geographical discoveries resulted.

There is only one permanent meteorological observatory in the south polar regions, at Scotia Bay, South Orkneys, started in 1903 by W. S. BRUCE and now in the possession of the Argentine Government. Observations during the whaling season are made at South Georgia.

Pressure and Winds—Arctic.—The old conception was that the polar area was a region of low pressure. Observation has however shown that this is not the case, the cooling of the air by the vast surfaces of snow and ice, producing anticyclonic conditions in moderate degree. The mean pressure of the Arctic never rises as high as those of Siberia and North America in winter, but it is always higher than the mean pressures of the North Atlantic and the North Pacific Oceans, as shown by the Icelandic and Aleutian areas of low pressure, and it is also higher than the mean summer pressures of the continents. It is not possible to give accurate charts of mean Arctic pressure, but the area of highest mean annual pressure is centred between Northern Greenland and Alaska, the value for the year being probably about 1015 mb. (30.0 in.) The extent of the high pressure area varies, being reduced in size, if not in intensity, in summer but in the actual polar basin there is little seasonal change.

Light easterly winds prevail generally over the Arctic Ocean, indicating a general drift of air from east to west in all longitudes round the high-pressure area above referred to. It should, however, be noted that the high-pressure area is not centred at the Pole, but at a point distant 7 to 10 degrees of latitude. The lightness of Arctic winds in general indicates gentle pressure gradients. During the drift of the *Fram* the mean wind force was 3.5 on the Beaufort Scale with little variation in the mean of successive months.

The Atlantic side of the Arctic Ocean is under the influence of the northern part of the Icelandic low-pressure area, with prevailing east winds, but with occasional interruptions due to the passage of weak barometric depressions. The northern coasts of Siberia are under the influence of the great seasonal pressure changes of the continent, the Siberian anticyclone producing southerly winds in winter and the Asiatic low-pressure system easterly winds in summer. In the New Siberian Islands, which lie further north, easterly winds predominate though there is considerable variation of direction. On the north coast of Alaska easterly winds prevail throughout the year.

TABLE I gives the mean wind frequency at several stations and also during the drift of the *Fram*.

Table I.—Percentage Wind Frequencies in the Arctic.

	N	NE	E	SE	S	SW	W	NW	Calm
Bear Island	10	21	16	12	8	11	11	9	2
Novaia Zemlya (Malme Karmakouly).	10	7	19	19	11	8	6	8	12
Franz Josef Land	9	11	19	9	2	3	7	13	27
<i>Fram</i> Drift	9	11	15	17	15	11	10	10	2
Sagastyr, Siberia:									
October to March	2	5	12	18	20	16	15	8	4
April to September	6	10	25	17	7	10	15	9	1
New Siberian Islands:									
April to November	9	13	16	12	11	12	10	7	10

Depressions enter the Arctic Ocean between Iceland and Spitsbergen, travelling north-eastward. Their normal track is thus to the northward of Spitsbergen in Latitude $82^{\circ} N.$ to $84^{\circ} N.$ and hence the winds of Spitsbergen are easterly and westerly in about equal frequency. According to the *Fram* observations there are about 24 of these depressions in a year, of which two-thirds occur in the winter season, October to March. Depressions also travel occasionally northward through the Bering Strait. Arctic depressions are rarely accompanied by strong winds, the highest recorded speed being only 40 miles per hour, but they bring a marked rise of temperature. It is interesting to note that owing to the greater amount of water vapour present in the air during the summer season, cloudiness and precipitation is greater than it is during the winter, although as we have seen the latter is the period of most frequent passage of depressions. The south-east and south-west coasts of Greenland are subject at times to winds which have passed up over the high plateau of the interior and so have become relatively warm and dry. These winds are chiefly observed during the passage of depression along these coasts and are analogous to the Föhn winds of the northern Alpine valleys.

Pressure and Winds. Southern Ocean.—The Ocean between Latitude $60^{\circ} S.$ and the Antarctic continent has been explored chiefly by polar expeditions outward and homeward bound in the summer months. A few voyages of circumnavigation have, however, been made. In the belt of the Roaring Forties the isobars run at all seasons approximately parallel to the circles of latitude round the entire globe, the mean pressure decreasing with increasing south latitude. In the neighbourhood of Latitude $60^{\circ} S.$ the mean pressure reaches a minimum value of about 982 mb. (29.0 in.) so that further south it begins to rise again. The lowest pressure recorded by the *Terra Nova* in the summers of 1911 to 1912 and 1912 to 1913 was 959 mb. (28.32 in.) in Latitude $64^{\circ} S.$ In the month of April, 1903, in Latitude $65^{\circ} S.$, the same pressure was recorded by the *Gauss* expedition, this being also the lowest observed. On the circumnavigation of the magnetic research ship *Carnegie* from December, 1915, to April, 1916, pressure was observed on the occasion of a snowstorm to fall to 957 mb (28.26 in.). Owing to the storminess, the frequent and intense precipitation and fogs, together with a high degree of cloudiness, the climate of the region of low pressure is one of the most unpleasant known.

Southward of the region of minimum pressure easterly winds predominate and these may be as strong and persistent as the westerlies to the northward. They are in fact the winds on the south side of the same depressions which give rise to the westerlies of higher latitudes. As we saw in the article on The Brave West Winds and the Roaring Forties these depressions travel from west to east round the globe in nearly unbroken succession. After the *Discovery* expedition in 1901 to 1904 a series of synoptic charts was drawn as a result of international co-operation. These charts were for the period October, 1901, to March, 1904, and covered the whole region from Latitude $30^{\circ} S.$ to the Antarctic continent. Investigation of the charts showed the average path of the centres of the depression to have been about Latitude $52^{\circ} S.$ The tracks were more scattered during the autumn and winter months than in spring and summer in all parts of the Southern Ocean. The average rate of travel of those depressions which could be traced for several successive days was found to be 300 miles a day. These results must not be accepted as final statements of fact because the material on which the charts were based was naturally scanty particularly in high southern latitudes. It is probable that the average tracks of the centre of depressions lies somewhat further south since presumably the region of lowest mean pressure is the region most frequently affected by the centres of depressions. It has been suggested that the path of maximum frequency of depressions may vary from year to year in accordance with the considerable variation in the extent and distribution of pack ice which is known to occur.

It should be emphasised that while the Roaring Forties is well known as a region of violent winds and boisterous weather, the parallels of the fifties and the sixties are considerably worse and the region is literally a "belt of raging winds and storm-tossed seas." The voyage of the *Carnegie*, above referred to, was along the 60th parallel in the South Pacific, about the 55th parallel over most of the South Atlantic, and approximately along the 50th parallel over most of the South Indian Ocean. Winds of force 7 or above were encountered on 52 out of 120 days, and gales of force 9 to 11 on 26 days.

Pressure and Winds. The Antarctic Continent.—The dominating factors in the climate of the Antarctic Continent are the high plateau, of which more than half the area is believed to consist, and the glaciated surface. The air in contact with this surface is subjected to intense cooling and becomes so dense relatively to that over the surrounding ocean that an anticyclonic circulation is set up round the continent. The tendency for the cooled air to flow down from the high plateau may reinforce the anticyclonic circulation under suitable conditions so as to produce persistent winds of gale force. The observations of several expeditions taken in localities near the outer coasts or on the shores of the Ross and Weddell Seas, varying in latitude from 64° S. to 78° S., agree sufficiently well to show an average annual pressure of about 990 mb. (29.2 in.) with a maximum of about 1025 mb. (30.3 in.) and a minimum of about 940 mb. (27.8 in.). The probable mean surface pressure, taken from Dr. SIMPSON'S discussion of Antarctic meteorology "British Antarctic Expedition, 1910-1913: Meteorology, Vol. I" is shown in Figure 2 of the article on Ice in the Southern Hemisphere, page 225 of the October, 1929, number of THE MARINE OBSERVER. It will be seen that the pressure is not entirely symmetrical but that the low pressure areas are of more southerly extent in the region of the Ross and Weddell Seas. The high pressure area, on the other hand, extends northward as a tongue over Graham Land. The dotted lines represent the conjectured distribution over the area for which there are no observations.

Combined observations from neighbouring stations in McMurdo Sound, the only region where observations extending over a series of years have been made, show that pressure varies considerably in the same months from year to year. It is also shown that pressure in the Ross Sea area is lowest in the coldest months. This has been

shown to be due to the effect of local topography on the air motion. Pressure data for the polar plateau are not numerous enough to enable any generalisation to be made. The depressions of the surrounding ocean occasionally impinge upon, but are never able to invade, the continent. Dr. SIMPSON has shown that the normal pressure distribution of the continent has superimposed upon it a series of pressure waves moving radially outward from a centre situated in about Latitude 80° S., Longitude 120° W. He states his results as follows:—"On these normal fine weather conditions are superimposed a series of pressure waves which travel more or less radially outwards from the centre of the continent. These waves alter the surface pressure distribution and cause air motion which is frequently, and especially over the west of the Barrier, accompanied by forced ascending currents. The abnormally cold surface air is forced upwards in these currents, rapidly cooled in the ascent, and the water contained is precipitated as snow, which when combined with the high surface winds produces the typical Antarctic blizzard."

In accordance with the dominating anticyclonic wind circulation, prevailing winds are usually E. or S.E. in the outer parts of the continent. Under the influence of local conditions, however, the prevailing direction may change towards N.E. or S.W. In the Antarctic generally there is a less definite relation between barometric fluctuation and gales than in temperate latitudes; severe storms may occur without much variation of the barometer and more frequently, considerable variation of pressure may be experienced without much accompanying wind. The wind velocity is known to vary considerably from year to year. Generally speaking winds are fairly strong with maximum strength in winter, the average velocity for the whole year being 10 to 15 miles per hour. Calms and light winds are, however, frequent, exceeding 20 per cent.

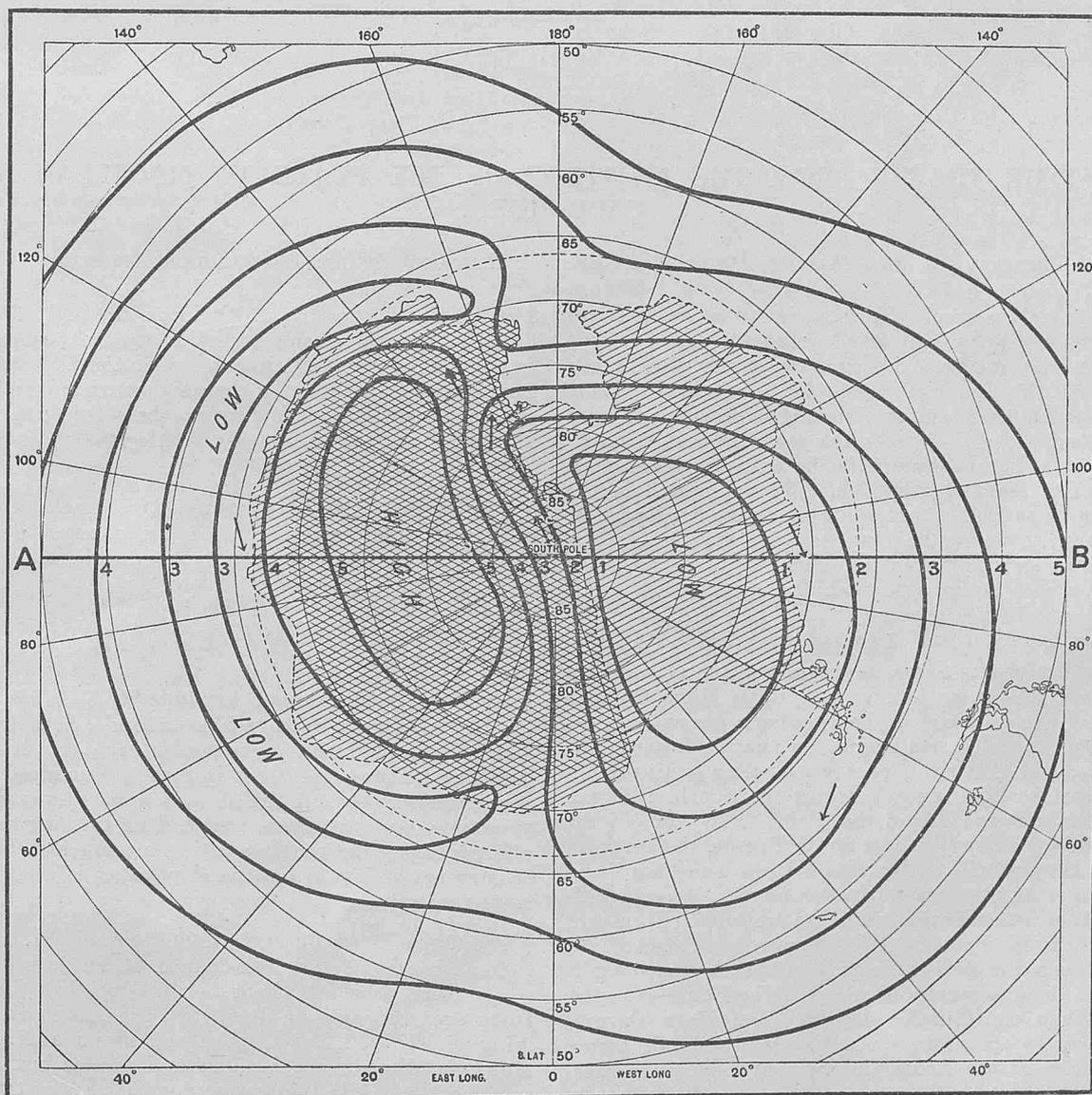


Figure 1.—Probable Pressure Distribution at 10,000 feet over the Antarctic.

at all stations and amounting to 72 per cent. at Cape Adare in 1911 to 1912. The relatively high wind velocity is therefore made up by the prevalence of strong winds and gales at other times. The majority of gales are of the blizzard type, but they do not appear to extend far out into the ocean. Thus both in the ocean and on the continent Antarctic winds are stronger than those of the Arctic. The local nature of Arctic winds commented upon by Captain SCORESBY finds its parallel also in the south. Thus in 1902 at the winter quarters of the *Discovery* a gale was experienced while 12 miles away it was calm. On one occasion at Cape Evans observers in a calm area watched a blizzard raging less than half a mile away. The wind conditions experienced by MAWSON'S expedition in Adelie Land were much more severe, the average velocity for the year being 50 miles per hour. In one month the average velocity reached 63 miles per hour with gusts of over 180 miles per hour. These violent winds are the result of the normal circulation being reinforced by the air flowing downhill over a long ice-covered slope. Their direction is almost invariably from S.S.E.

Upper Air.—In the fourth article on the Trade Winds, dealing with the General Circulation, we saw how the atmospheric circulation becomes simpler with increasing height above the surface finally resolving itself at a height of about 30,000 feet into two great low-pressure areas, one centred on each pole, with westerly winds, and a belt of easterly winds over equatorial regions. Upper air observations are scanty for both Arctic and Antarctic areas, but some information has also been got from observations of cloud motion, and in the case of the Ross Sea area of the Antarctic the smoke of Mount

Erebus is a useful indication of wind at the height of 13,000 to 16,000 feet. The general conditions of air circulation over the Antarctic have been summarised by Dr. G. C. SIMPSON as follows:—“Above each anticyclone a cyclone forms on account of the relatively rapid vertical pressure change caused by the cold dense air. These cyclones convey air from higher latitudes over the Polar region and supply the air which passes outward near the surface. In the normal steady state the air circulation takes place slowly, and the descending air is warmed up dynamically, so dissolving cloud and giving clear cloudless skies, thus accounting for the decreasing cloud amounts observed as one penetrates the Antarctic.

“The clear skies in their turn facilitate radiation, as also does the small absolute humidity of the air. In consequence the air and the snow surface become abnormally cold, and there is a great tendency to the formation of temperature inversion, especially in the lower atmosphere.” FIGURE 1 shows the probable pressure at a height of 10,000 feet over the Antarctic as drawn by Dr. SIMPSON. Only the general run of the isobars is given: it is not possible to give numerical values corresponding to them, nor are the gradients, as indicated by the closeness of the isobars, necessarily correct. The figure indicates low pressure systems covering all but the high plateau area where pressure is anticyclonic. It should, however, be noted that it is really the surface conditions of the plateau that are represented in this figure, for its height in the neighbourhood of the South Pole is only just under 10,000 feet. Probably in a similar way the pressure at relatively small heights above the Arctic anticyclone is also cyclonic.

CURRENTS ON THE TRACKS FROM THE LATITUDE OF THE PLATE TO MAGELLAN STRAITS AND CAPE HORN.

PREPARED IN THE MARINE DIVISION BY E. W. BARLOW, SENIOR PROFESSIONAL ASSISTANT.

The charts of current on the tracks from the latitude of the Plate to Cape Horn, which are being published in the present volume of THE MARINE OBSERVER, have been drawn from observations made during the years 1910-1927. The method employed in the construction of the charts showing the resultant current direction and also those giving the current roses is exactly the same as that adopted for the charts of the Atlantic and South Pacific Oceans published in previous volumes of THE MARINE OBSERVER. It was stated in the articles accompanying these charts that while the method adopted of giving both roses and arrows is the best way of representing the information that we possess, due caution must be exercised with regard to the use of a rose or an arrow which depends on a small number of observations. On the present charts there are a number of instances of arrows based on only 3 to 5 observations.

These MARINE OBSERVER charts cover the region of the Cape Horn and Falkland Currents. As is well-known the Cape Horn Current is the name given to that portion of the Southern Ocean General Drift, or Antarctic Drift, which sets round the islands forming the extreme south of the South American peninsula. This peninsula in fact forms the only serious land obstacle which the Southern Ocean Drift encounters in its passage round the globe. In each of the oceans, South Atlantic, South Indian and South Pacific, the northern part of the Southern Ocean Drift inclines to the north-eastward and forms the southern part of the circulation round the oceanic anticyclone, passing without interruption into the well-defined current which flows in a northerly direction up the western coast of the continent. In each ocean the northerly part of the Southern Drift is therefore known as the Connecting Current. The South Atlantic Connecting Current is a continuation of the Cape Horn Current flowing north-eastwards to the east of the Falkland Islands thence along the southern edge of the South Atlantic high-pressure area, finally merging into the Benguela Current. The Connecting Current lies mainly outside the area covered by the MARINE OBSERVER Charts but a small portion of it may be seen on one of the four Charts.

The Falkland Current, which forms the main feature of the charts, flows in a north-easterly direction up the west side of the Falkland Islands. The point of divergence of the Falkland Current and the Connecting Current is in the neighbourhood of Staten Island. The general trend of current over the whole region covered by the MARINE OBSERVER Charts is similar to that shown by the older current charts.

The Marine Observer Charts.—These charts have been published in the usual order, starting with the quarter February, March and April. As the charts are for the Southern Hemisphere the order of publication by seasons is Autumn, Winter, Spring and Summer and the quarters will be referred to in this manner. For convenience in describing the charts the region is subdivided as stated in the following paragraphs.

The Cape Horn Current, Latitude 54° S. to 58° S. Longitude 70° W. to 80° W.—The current in this latitude, between longitudes 80° W. and 70° W., is rather weak and irregular with a general easterly tendency. The easterly set is most pronounced in Spring and the current is weakest in the Winter. No currents exceeding 13 to 24 miles per day, have been reported in this region during the period referred to by the charts and in Autumn and Winter the frequency of currents of less than 6 miles per day is as high as 43 and 46 per cent. respectively.

The Cape Horn Current, Longitude 70° W. to 60° W.—Here the current is strong and well-defined at all seasons but unfortunately the number of observations is small so that the rose for the Cape Horn area can only be drawn for the Autumn quarter. The region lying closely N.E. of Cape Horn shows a N.E. current, drift 22 miles per day during autumn and winter but observations are insufficient to enable the arrows for the rest of the year to be drawn. In the region to westward of Cape Horn, mean drifts of 8 or 9 miles per day are shown in all but the Winter quarter which is blank.

While the mean sets of Spring and Autumn are E.N.E., that of Summer is S.E., but this change should not be accepted as a definite fact, in view of the scarcity of observations. East of Staten Island the mean current is shown to be strongest in Spring, 17.3 miles per day, but there is no arrow for the Summer quarter and the same caution must be exercised.

The Falkland Islands Region. Latitude 50° S. to 54° S., Longitude 56° W. to the South American Coast.—Over this and the remaining part of the MARINE OBSERVER Charts discussed below the number of observations is much more satisfactory. Almost the only exceptions to this statement are to be found in the areas lying away from the main stream of the Falkland Current. In the region of the Falkland Islands the mean currents are generally weak, the greatest drifts being 8 or 9 miles per day. In using the roses for the area south-west of the Falkland Islands it must be remembered that they include the currents in the section of the Cape Horn Current east of Staten Island, dealt with in the last paragraph. Also it should be noted that the rose for Summer is based only upon 10 observations so that a length on an arrow representing 10 per cent., as for example the thickened portion of the N.W. arrow, is given by a single observation of the corresponding drift. The conditions of actual current in this region appear to be (i) a high percentage of drifts of less than 6 miles per day, especially in Autumn and Winter, (ii) the Falkland Current, N. to N.E. sets, with drifts up to 24 miles per day, in all seasons save Autumn when the drifts do not exceed 12 miles. (iii) A considerable proportion of variable current of similar strength. The combined effect of those conditions is that the mean drift in the direction of the Falkland Current is relatively weak, as shown by the arrows.

In one quarter, Spring, the Falkland Current is not indicated by the mean arrows. These have a westerly set in the region of Latitude 52° to 54° S., Longitude 57° to 65° W. The more easterly of these arrows however depends on only 3 observations and the westerly one is largely influenced by an observation of current setting S. 78° W., at the rate of 55 miles, by S.S. *Whakatane* on October 27th, 1922, in Latitude 53° 25' S., Longitude 62° 56' W. It must not therefore be assumed that there is any real interruption of the general flow of the Falkland Current during this season. In Spring also we have the only indication on the charts of the South Atlantic Connecting Current in Latitude 50° to 52° S., Longitude 56° to 60° W., closely east of the Falkland Isles.

The Falkland Current. Latitude 50° S. to River Plate.—This current is well shown on the chart for each season, flowing with a mean set of from N. to N.E. The strongest part of the current is between Latitude 42° S. and 44° S., with mean drifts of 13 to 16 miles per day. The Falkland Current between Latitudes 38° S. and 50° S. is strongest in Autumn and weakest in Summer, the approximate values of the mean drift over the whole area being 11 miles per day in Autumn, 10 miles in Winter and Spring and 8 miles in Summer. The roses indicate that the current is on the whole steady, westerly and southerly sets being infrequent and mainly weak.

It will be found on referring to the charts of Currents on Route, Latitude of Cape Blanco to the Brazils, published in MARINE OBSERVER, Vol. II, 1925, that indications of the Falkland Current are found as far north as Latitude 30° S., just north of the Rio Grande, in all quarters except Summer. In this region, Latitude 30° S. to 36° S., the flow of the Falkland Current may be seen by the set of some of the arrows, particularly in those of Winter and the current is conspicuous on the roses, with the exception of that for Summer. This agrees well with the conclusions drawn from the present charts, for as we have seen the Falkland Current is weakest in Summer. In the region between the Rio Grande and the Plate both the Falkland and the Brazil Currents are represented. The Brazil Current also continues further south, as indicated by the present charts, in all quarters except Winter when there is no information. The two very strong mean currents of the Autumn Quarter between Latitudes 36° S. and 40° S. at once catch the eye and demand some explanation. The mean drift of 29.7 miles depends chiefly upon an observation of current at the rate of 79 miles per day, S. 27° W., made by S.S. *Tuscanstar*, Captain R. J. THOMAS, Hull to Punta Arenas, on 3rd March, 1922, the actual current observed being 24.7 miles, S. 27° W., from Noon to 7.20 p.m. between Latitude 36° 31' S., Longitude 53° 21' W. and Latitude

37° 56' S., Longitude 54° 26' W. From 7.20 p.m. to Noon on the 4th the current was only 4 miles, S. 19½° W. A note in this report says:—"The remarkable set to the S.W. after the **strong easterly gale** will be noticed. Stellar observations. The current from Noon set at the rate of 3.39 miles per hour." This gale blew S.E., force 8, on the evening of February 28th, and E.S.E., force 8, on the morning of March 1st, gradually moderating until the 3rd. While this is an interesting example of a temporary current produced by a gale, the mean drift of 29.7 miles shown on the chart is obviously not the true value for this season, only two other observations being included. The region Latitude 38° to 40° S., Longitude 51° to 55° W., shows a mean current of 16.8 miles per day based on 5 observations, but this is also largely influenced by one observation so that the same remark applies in this case. The Brazil current between the Rio Grande and the Plate is strongest in Summer and weakest in Winter.

Currents between the Coast of South America and the Falkland Current.—Counter currents are shown here in all seasons, mostly southerly or offshore, but the observations are insufficient to draw reliable conclusions. Between Latitude 40° S. and the Straits of Magellan the older charts show occasional stretches of current, mostly setting to the southward.

General Remarks.—The general flow of current over the region is in accordance with that shown on the older charts, but we have been able to derive more definite information from the present charts in spite of the partial lack of observations. On the whole, the Winter quarter is weakest in this respect. The present investigation was initiated by a suggestion made by Lieutenant Commander W. P. CLIFTON MOGG, R.N.R., commanding S.S. *Pakeha*, published in "The Marine Observer's Log," in Vol. V, 1928, page 150, and referred to by the MARINE SUPERINTENDENT in his note on THE MARINE OBSERVER, 1929, page 2 of the present volume.

Both the Cape Horn and the Falkland Currents are cold currents. The Cape Horn Current west of Cape Horn is weak as compared with the general flow of the Southern Ocean Drift but in the neighbourhood of Cape Horn it is very much stronger. The Falkland Current is shown by the charts as flowing up the edge of the 100 fathom line. This is because the mean positions of the observing ships happen to lie along that line. It is nevertheless probable, on the analogy of the Gulf Stream and other previously investigated currents, that the strongest drift is in the neighbourhood of the 100 fathom line. We have seen that the Falkland Current is strongest between Latitude 40° and 46° S. It shows a high degree of steadiness in this region. Between Staten Island and the Falkland Islands it is least steady. The current is strongest in Autumn and weakest in Summer. Excluding short-period currents the maximum drifts observed are between 30 and 45 miles per day for the Falkland Current and 50 miles per day for the Cape Horn Current.

Notes on Weather.—The notes given below are taken from the Atlas of Wind Charts for the South Atlantic Ocean for the middle months of the quarters represented by THE MARINE OBSERVER current charts. For the general winds over the southern part of the region, reference should be made to the article on "The Brave West Winds and the Roaring Forties," page 179 of the present volume of THE MARINE OBSERVER. The local winds of the region are described in the article on "Local Winds, Atlantic Ocean," in MARINE OBSERVER, Volume IV, 1927, page 160. An article on "Ice of the Southern Ocean" will be found on page 221 of the present volume.

Weather in March.—River Plate, Easterly winds prevail, N.E. in the offing. Gales frequent at night. Bad weather with northerly winds. Lightning frequent. Considerable refraction. Coast south to Magellan, S.E. gales cause thick weather and high seas. N.E. winds sometimes bring rain. Squalls occasionally severe. Ocean, Latitude 38° S., Longitude 52° W. to Latitude 46° S., Longitude 60° W., dense fogs with moderate N.W. winds clearing with shift to S. of W. At the Falkland Islands gales commence N.W. and veer S.W. Squalls sudden and severe. Nights less windy than days.

Weather in June.—River Plate, winds in offing variable with squalls, calms and rain. The Pampero or S.W. gales most prevalent. Coast north of Latitude 45° S., thick rainy weather with

Year.	Day.	Position of Ice.		Description.	Remarks.	Name of Ship reporting.
		Latitude.	Longitude.			
1926	8	61° 00' S.	55° 15' W.	Ice pack, small bergs .. .. .	.. .. .	S.S. Southern Queen.
	19	61° 00' S.	54° 40' W.	Ice .. .. .	.. .. .	do.
	20	61° 00' S.	54° 40' W.	Loose ice .. .. .	.. .. .	do.
	6	60° 35' S.	54° 15' W.	Ice	Steadily packing together in a strong wind	do.
	3	59° 58' S.	53° 57' W.	Large berg	Edge of pack ice in sight	do.
	4	60° 38' S.	53° 50' W.	Ice pack	Drifting in a clearing.. .. .	do.
	7	61° 00' S.	53° 50' W.	Ice pack .. .. .	.. .. .	do.
	17	61° 00' S.	53° 10' W.	Ice floes	Drifting among ice	do.
	28	57° 05' S.	51° 55' W.	Berg	Flat sided with rugged peaked top	S.S. Orient City.
	29	57° 04' S.	48° 15' W.	Berg	Steep sided with peaked top numerous floe bergs in vicinity.	do.
	29	57° 03' S.	47° 38' W.	Ice island	Steep sides and flat top, about 3 miles long	do.
	13	59° 38' S.	47° 10' W.	Pack ice .. .. .	.. .. .	S.S. Orwell.
	14	59° 38' S.	47° 10' W.	Pack ice .. .. .	.. .. .	do.
	15	59° 42' S.	47° 10' W.	Pack ice .. .. .	.. .. .	do.
	12	59° 09' S.	46° 16' W.	Pack ice .. .. .	.. .. .	do.
	18	59° 58' S.	45° 38' W.	Pack ice .. .. .	.. .. .	do.
	29	56° 48' S.	45° 37' W.	Ice island	Steep sides and flat snow top, about 5 miles long and 400 feet high, and with an ice reef about a mile long, with a piece of ice emerging at its extremity which appeared like a floe berg.	S.S. Orient City.
	16	59° 38' S.	45° 01' W.	Pack Ice .. .. .	.. .. .	S.S. Orwell.
	17	59° 58' S.	45° 54' W.	Pack Ice .. .. .	.. .. .	do.
	19	60° 00' S.	44° 42' W.	Pack Ice .. .. .	.. .. .	do.
30	56° 45' S.	44° 41' W.	Ice island	Flat top and steep sides	S.S. Orient City.	
11	58° 19' S.	44° 20' W.	Pack Ice .. .. .	.. .. .	S.S. Orwell.	
24	59° 53' S.	43° 50' W.	Pack Ice .. .. .	.. .. .	do.	
22	59° 54' S.	43° 42' W.	Pack Ice .. .. .	.. .. .	do.	
30	56° 40' S.	43° 33' W.	Large berg	Rugged and peaked	S.S. Orient City.	
20	59° 50' S.	43° 29' W.	Pack Ice .. .. .	.. .. .	S.S. Orwell.	
23	59° 55' S.	43° 29' W.	Pack Ice .. .. .	.. .. .	do.	
21	59° 50' S.	43° 22' W.	Pack Ice .. .. .	.. .. .	do.	
30	60° 39' S.	42° 50' W.	Pack Ice .. .. .	.. .. .	do.	
		56° 29' S.	41° 18' W.	3 ice islands .. .. .	.. .. .	S.S. Orient City.
		56° 19' S.	39° 08' W.	Large berg .. .. .	.. .. .	do.
25	Near Cape Saunders			11 bergs .. .. .	.. .. .	R.R.S. William Scoresby.
26	Near Prince Olaf			7 bergs	Some bergs seen yesterday still in sight and probably aground.	do.
26	Close to Larsen Pt.			2 bergs	Probably aground	do.
30	Off Larsen Pt.			1 small berg .. .. .	.. .. .	do.
	Within Grytviken harbour and East Cumberland Bay.			Glacier debris	Ice in both places, only a few hours, never stays for long	do.
8	54° 18' S.	36° 14' W.		4 bergs, several bergy-bits, small growlers and ice.	.. .. .	do.
7	54° 18' S.	36° 23' W.		Berg	Large tabular	do.
	54° 19' S.	36° 20' W.		3 bergs	1 large and 2 small tabular	do.
	54° 18' S.	36° 14' W.		Loose ice and 3 growlers	Bergs sighted on 6th still in sight	do.
	54° 18' S.	36° 14' W.		Quantity of small ice .. .. .	.. .. .	do.
28	53° 52' S.	36° 00' W.		Berg and growlers	Several in vicinity	do.
6	54° 00' S.	35° 50' W.		5 bergs .. .. .	.. .. .	do.
28	53° 45' S.	35° 48' W.		2 bergs .. .. .	.. .. .	do.
	53° 57' S.	35° 38' W.		4 bergs, 3 growlers	Bergs weathered	do.
30	53° 28' S.	35° 35' W.		2 small bergs, 1 growler .. .. .	.. .. .	do.
6	53° 58' S.	34° 32' W.		9 bergs	Small berg, then 8 bergs and several small bergy bits	do.
	53° 58' S.	34° 13' W.		Berg	Small weathered	do.
	53° 58' S.	34° 08' W.		Berg	Small and very weathered	do.
5	53° 54' S.	32° 50' W.		6 bergs	Sea much clearer of ice	do.
	53° 50' S.	31° 58' W.		185 bergs	Vessel surrounded by bergs and bergy bits. One very large and tabular berg 5 to 6 miles long on one side and about 9 miles on its longest side, probably 30 square miles in area. Average height about 100 feet. Very weathered, having regularly spaced caverns at short intervals for most of its visible length. Ice of different height and formation joined to this large mass suggested that it had been surrounded by pack ice at some previous time. This berg was probably over 1 year old.	do.
	53° 48' S.	31° 20' W.		63 bergs	Many large tabular bergs	do.
	53° 35' S.	30° 30' W.		Berg	Lanes of bergs all the watch. Horizon and surrounding sea covered with bergs and bergy bits.	do.
4	53° 36' S.	30° 08' W.		25 bergs .. .. .	.. .. .	do.
	53° 24' S.	29° 26' W.		Numerous bergs, growlers and loose ice	Including 5 large tabular bergs, 1 being about 5 miles in length and of an unweathered appearance.	do.
	53° 21' S.	29° 10' W.		25 bergs	5 tabular, 2 peaked; numerous growlers	do.
	53° 20' S.	29° 00' W.		7 medium sized bergs .. .. .	.. .. .	do.
	53° 12' S.	28° 22' W.		8 irregular bergs	Necessitated an alteration of course to the northward for a distance of about 10 miles. Made up of bergs, growlers and other ice, and stretched as far as the eye could see in a southerly direction.	do.
	53° 08' S.	28° 00' W.		Large field of pack ice	A yellowish light just above the horizon to the southward suggested large quantities of ice in that direction. Various shapes and sizes, weathered and unweathered, including one particular large tabular berg about 2 miles long. Numerous growlers and berg debris in vicinity.	do.
	53° 08' S.	27° 40' W.		12 bergs	Large tabular and small irregular, followed by a quantity of debris.	do.
	53° 05' S.	27° 13' W.		2 bergs .. .. .	.. .. .	do.
3	52° 55' S.	25° 34' W.		Small growlers	Domed and peaked shaped respectively	do.
	52° 54' S.	25° 26' W.		2 large bergs .. .. .	.. .. .	do.
	52° 50' S.	25° 16' W.		Small growlers .. .. .	.. .. .	do.
	52° 52' S.	25° 08' W.		Berg	Large low flat topped	do.
	52° 47' S.	25° 00' W.		Small growler .. .. .	.. .. .	do.
	52° 45' S.	24° 50' W.		Small growler .. .. .	.. .. .	do.
	52° 42' S.	24° 20' W.		Berg large tabular	About 3 miles long—unweathered	do.
	52° 39' S.	24° 00' W.		4 bergs	One being tabular and unweathered	do.
	52° 33' S.	23° 38' W.		Small berg .. .. .	.. .. .	do.
	52° 29' S.	23° 07' W.		Small berg .. .. .	.. .. .	do.
30	51° 58' S.	22° 42' W.		Berg and bergy bits	Oblong—flat top	do.
2	52° 03' S.	21° 38' W.		Berg	1 small berg (decayed) and large number of various sized pieces.	R.R.S. Discovery.
29	51° 26' S.	20° 04' W.		Bergy bit (small, two pieces)	Regular and unweathered, tabular, 1 to 2 miles in length and about 700 feet in height.	R.R.S. William Scoresby.
2	51° 46' S.	20° 58' W.		2 small bergs	Peaked and tabular	R.R.S. Discovery.
	51° 24' S.	19° 50' W.		Berg	Medium sized, oblong flat topped	R.R.S. William Scoresby.
	51° 22' S.	19° 15' W.		Small berg debris	In direct line of 0810 berg (51° 24' S., 19° 10' W.), showing definite effect of wind on the greater mass.	do.
	51° 24' S.	19° 10' W.		Berg	Large peaked	do.
	51° 16' S.	19° 08' W.		Berg	Large tabular	do.
28	51° 12' S.	17° 04' W.		Bergs and growlers	1 Medium tabular, 1 large pinnacle, 1 large and 1 small growler.	R.R.S. Discovery.
1	50° 28' S.	16° 22' W.		Small berg .. .. .	.. .. .	R.R.S. William Scoresby.
	50° 21' S.	15° 30' W.		Berg	One large dome shaped, of dark colouration and having 1 pinnacle.	do.
27	51° 15' S.	15° 28' W.		Bergs	2 large tabular	R.R.S. Discovery.

Year.	Day.	Position of Ice.		Description.	Remarks.	Name of Ship reporting.
		Latitude.	Longitude.			
1926	1	50° 08' S.	15° 08' W.	3 bergy bits .. .. .	.. .. .	R.S.S. <i>William Scoresby</i> .
		49° 50' S.	15° 12' W.	Berg	Small, peaked	do.
	25	50° 58' S.	10° 38' W.	Bergs and growlers	1 tabular berg and 1 glacier and 4 growlers	R.R.S. <i>Discovery</i> .
	24	51° 12' S.	8° 59' W.	Berg, growler and bergy bit	1 medium size berg, 2 large growlers and 1 bergy bit	do.
	23	51° 14' S.	6° 41' W.	Bergs.. .. .	3 very large, two tabular and one glacier	do.
	22	51° 44' S.	5° 19' W.	Bergs, growlers and bergy bits	4 bergs, including 1 very large tabular and 1 small (very blue), 2 medium size growlers and numerous bergy bits.	do.
	21	52° 33' S.	3° 42' W.	Bergs.. .. .	2 large tabular	do.
19	53° 05' S.	1° 35' W.	Bergs, growlers and bergy bits	9 bergs sighted during day, including 1 very large tabular, numerous growlers and bergy bits.	do.	
1927	26	37° 27' S.	54° 25' W.	Large berg	About 250 feet high by 800 feet long	M.V. <i>Leda</i> .
	4	38° 36' S.	50° 57' W.	2 large bergs	About 300 feet high, 800 feet long, 8 miles apart	S.S. <i>Glenshane</i> .
		38° 23' S.	49° 50' W.	1 large berg.. .. .	.. .. .	do.
	5	38° 07' S.	49° 05' W.	1 large berg.. .. .	About 200 feet high by 500 feet long (sighted 20 miles away—full moon).	do.
		38° 03' S.	48° 50' W.	1 large berg.. .. .	About 400 feet high and 1,000 feet square (sighted 20 miles away—full moon).	do.
		38° 20' S.	48° 43' W.	2 large bergs .. .. .	.. .. .	do.
		38° 08' S.	48° 00' W.	23 large bergs and about 30 floe-bergs and growlers.	All within a ten mile radius of ship, largest berg sighted about 400 feet high and 2,000 feet square.	do.
	6	37° 45' S.	44° 03' W.	1 large berg.. .. .	.. .. .	do.
		37° 40' S.	43° 08' W.	9 large bergs	All within a ten mile radius of ship, largest about 400 feet high and 2,000 feet square.	do.
		37° 46' S.	42° 21' W.	1 large berg.. .. .	300 feet high and 1,500 feet long	do.
		37° 16' S.	42° 10' W.	2 large bergs	The largest was about 500 feet high and 2,000 feet to 3,000 feet long—cone shaped.	do.
3	36° 48' S.	41° 30' W.	Large number of bergs.. .. .	Part of a large field (see Oct. 30th)	<i>Barque Winterhude</i> .	

* Position of ship.

SUPPLEMENTARY.
During the Year 1914.
November.

Year.	Day.	Position of Ice.		Description.	Remarks.	Name of Ship reporting.
		Latitude.	Longitude.			
1914	13	60° 24' S.	129° 20' W.	2 pieces of ice	About 20 feet square and 10 feet high	S.S. <i>Pakeha</i> .
	17	60° 22' S.	91° 12' W.	Small berg	100 feet long, 40 feet high	do.
		60° 22' S.	89° 23' W.	Berg	250 feet long, 60 feet high	do.
	18	60° 22' S.	85° 02' W.	Piece of ice.. .. .	20 feet long, 4 feet high	do.
		60° 22' S.	82° 32' W.	Berg	700 feet long, 140 feet high	do.
		60° 22' S.	82° 02' W.	Small berg	40 feet long, 20 feet high	do.
		60° 33' S.	79° 26' W.	Berg	350 feet high, 10' to Northward	do.
	19	60° 49' S.	74° 13' W.	Several large and 1 small berg	Several large bergs to Northward and passed 2' N of small berg 150 feet long, 50 feet high.	do.
		60° 52' S.	71° 22' W.	Berg	300 feet long, 50 feet high	do.
		60° 53' S.	70° 48' W.	Small berg	300 feet long, 100 feet high	do.
		60° 53' S.	70° 36' W.	2 bergs .. .. .	.. .. .	do.
		60° 52' S.	70° 18' W.	Small berg .. .. .	.. .. .	do.
	20	60° 53' S.	68° 39' W.	Small berg .. .. .	.. .. .	do.
		60° 54' S.	66° 40' W.	Passed numerous bergs	Some very large, say 6 miles long. Ice pack visible along Southern horizon as far as eye could see.	do.
		From 60° 55' S.	65° 13' W.	Numerous bergs and ice floe .. .. .	.. .. .	do.
		to 60° 55' S.	64° 25' W.			
		From 60° 55' S.	64° 25' W.			
		to 59° 00' S.	62° 00' W.	Numerous bergs, ice pack and floe ice, and several large bergs in sight to Southward.	.. .. .	do.
	21	58° 27' S.	61° 28' W.	Small berg and 1 large berg .. .. .	.. .. .	do.
22	56° 00' S.	56° 40' W.	2 very large bergs .. .. .	.. .. .	do.	
	55° 40' S.	55° 52' W.	Large berg .. .. .	.. .. .	do.	
	55° 30' S.	55° 26' W.	Berg and some pieces of ice .. .. .	.. .. .	do.	
	54° 39' S.	53° 29' W.	Large berg 1,600 feet long by 150 feet high	.. .. .	do.	

NOTE.—This report was received in the Marine Division too late for inclusion in Statement of Ice published on the back of the Monthly Meteorological Chart of the East Indian Seas, October, 1917, No. 138.

Reports of ice previous to October, 1917, will be found on the back of the Monthly Meteorological Chart of the East Indian Seas, October 1917, No. 138.

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

WEATHER SIGNALS.

II.—WIRELESS WEATHER SIGNALS.

WIRELESS WEATHER BULLETINS.

The Key and Decode Tables of the International Weather Telegraphy Code will be found on pages 21 to 25 of Volume VI No. 61. (The January, 1929, Number.)

The method of decoding station weather reports made in code was described in the British "Weather Shipping" Bulletin, on pages 45 to 47 of Volume VI No. 62. (The February, 1929, Number.)

The same method of decoding weather reports applies in all cases where the International Code is used.

The letters given in the descriptions which follow give the key to the tables for decoding the figures.

Where *other* than International code tables are used they are published along with the signals described and an explanation is given.

SOUTH-WEST AFRICA, UNION OF SOUTH AFRICA, AND PORTUGUESE EAST AFRICA.

(Spark and C.W. Issues.)

REPORTS of weather conditions at 0630 G.M.T. at South African ports are broadcast daily by Coast W/T Stations, mostly in International Code, expressed by Key letters as follows:—

I_n BBBSB_r DDFww VNR_{RR}

I_n = Indicator letters of observation station (generally the station's W/T call signal).

B_r = Only used for Capetown, Mossel Bay, East London, Durban, Lourenço Marques,* Beira and Mossoril,† (for other stations a dash will be sent). It represents the following:—

At Capetown ... Run, or undertow in docks, Table LIII.

At Mossel Bay ... Instructions regarding anchorage, Table LIV.

At East London, Durban, Lourenço Marques, Beira, and Mossoril. } State of bar. Table LV.

RRR = Rainfall in whole millimetres.

The remaining Key letters are International Code.

Barometric pressure is given in mbs. and tenths. (To convert to inches, see Table LVI.)

A dash (—) will be sent should any portion of a report not be available. In the absence of a complete report from any station the station's indicator letters followed by the words "not received" will be transmitted.

Details of Reports.

1. Transmitting station ... **Walvis Bay** (Latitude 22° 58' S.; Longitude 14° 30' E., approx.).

Call signal ... **ZSV.**

Messages directed to ... CQ.

Wave length ... 630 m. I.C.W.

Times of transmission:—

0850 G.M.T. (observations at following stations at 0630 G.M.T.).

1230 G.M.T. (forecast for coast in plain language).**

1955 G.M.T. (forecast for coast in plain language).**

2. Observation stations, 0850 report:—

Indicator		Position (approx.)	
Letters.	Station.	Lat. S.	Long. E.
ZSC	Capetown...	33° 56'	18° 29'
ZST	Port Nolloth ...	29° 14'	16° 51'
ZSV	Walvis Bay ...	22° 58'	14° 30'
CRU	Mossamedes ...	15° 12'	12° 09'
CRR	Loanda ...	8° 49'	13° 13'

1. Transmitting station ... **Capetown** (Latitude 34° 09' S.; Longitude 18° 19' E., approx.).

Call signal ... **ZSC.**

Messages directed to ... CQ.

Wave length ... 625 m. I.C.W.

Times of transmission:—

0830 G.M.T. (observations at following stations at 0630 G.M.T.).

1220 G.M.T. (forecasts for coasts in plain language).**

2. Observation stations, 0830 report:—

Indicator		Position (approx.)	
Letters.	Station.	Lat. S.	Long. E.
ZSA	East London ...	33° 02'	27° 55'
ZSQ	Port Elizabeth ...	33° 59'	25° 37'
ZSM	Mossel Bay ...	34° 11'	22° 09'
ZSC	Capetown ...	33° 56'	18° 29'
ZST	Port Nolloth ...	29° 14'	16° 51'
ZSV	Walvis Bay ...	22° 58'	14° 30'

1. Transmitting station ... **Port Elizabeth** (Latitude 33° 57' S.; Longitude 25° 35' E. approx.).

Call signal ... **ZSQ.**

Messages directed to ... CQ.

Wave length ... 600 m. spk.

Times of transmission:—

0820 G.M.T. (observations at following stations at 0630 G.M.T.).

1250 G.M.T. (forecast for coasts in plain language).**

2. Observation stations, 0820 report:—

Indicator		Position (approx.)	
Letters.	Station.	Lat. S.	Long. E.
ZSD	Durban ...	29° 52'	31° 03'
ZSA	East London ...	33° 02'	27° 55'
ZSQ	Port Elizabeth ...	33° 59'	25° 37'
ZSM	Mossel Bay ...	34° 11'	22° 09'
ZSC	Capetown ...	33° 56'	18° 29'

1. Transmitting station ... **Durban** (Latitude 29° 49' S.; Longitude 31° 01' E. approx.).

Call signal ... **ZSD.**

Messages directed to ... CQ.

Wave length ... 625 m. I.C.W.

Times of transmission:—

0810 G.M.T. (observations at following stations at 0630 G.M.T.).

1205 G.M.T. (forecast for coasts in plain language).**

2. Observation stations, 0810 report:—

Indicator		Position (approx.)	
Letters.	Station.	Lat. S.	Long. E.
CQA	Beira ...	19° 50'	34° 51'
CQE	Lourenço Marques ...	25° 58'	32° 36'
ZSD	Durban ...	29° 52'	31° 03'
ZSA	East London ...	33° 02'	27° 55'
ZSQ	Port Elizabeth ...	33° 59'	25° 37'

1. Transmitting station ... **Lourenço Marques, Polana** (Latitude 25° 58' S.; Longitude 32° 36' E. approx.).

Call signal ... **CRAP.**

Messages directed to ... CQ.

Wave length ... 2,400 m. c.w.

Time of transmission:—

0800 G.M.T. (observations at following stations at 0630 G.M.T.).

2. Observation stations, 0800 report:—

Indicator		Position (approx.)	
Letters.	Station.	Lat. S.	Long. E.
ZSA	East London ...	33° 02'	27° 55'
ZSD	Durban ...	29° 52'	31° 03'
CQE	Lourenço Marques ...	25° 58'	32° 36'
CQA	Beira ...	19° 50'	34° 51'
CQF	Mozambique ...	15° 02'	40° 45'

* Refers to the bar near Inyack Island.

† Refers to the bar at the Mozambique Port.

** Sundays and holidays excepted.

- Transmitting station ... **Mozambique** (Latitude 15° 02' S.; Longitude 40° 45' E. approx.)
 Call signal ... **CQ.G.**
 Messages directed to ... **CQ.**
 Wave length ... 600 m. spk.
 Time of transmission:—
 0900 G.M.T. (observations at following stations at 0630 G.M.T.)

2. Observation stations 0900 report:—

Indicator	Station.	Position (approx.)	
		Lat. S.	Long. E.
CQF	Mozambique (Mossoril) ...	14° 57'	40° 40'
CQA	Beira ...	19° 50'	34° 51'
CQE	Lourenço Marques ...	25° 58'	32° 36'

Madagascar.

Spark Issues.

The following W/T Stations broadcast, *en clair*, information concerning weather in Madagascar and a weather forecast for the day on 600 metres (spark) in each case:—

W/T Station.	Call Sign.	Position.	Times of Transmission.
Majunga ...	FIO	15° 43' S. 46° 20' E.	0900 G.M.T.
Diégo Suarez ...	FIL	12° 15' S. 49° 23' E.	0830 „
Tamatave ...	FIS	18° 08' S. 49° 26' E.	0800 „

These stations also transmit weather reports taken at 0400 G.M.T. at the undermentioned stations:—

W/T Station.	Call Sign.	Time of Transmission.	Observation Stations.	Positions (approx.)	
				Lat. S.	Long. E.
Majunga ...	FIO	0500 G.M.T.	Helleville (Nossi Bé)	13 24	48 17
			Zaudzi ...	12 47	45 16
			Diégo Suarez ...	12 15	49 23
			Majunga ...	15 43	46 20
Diégo Suarez ...	FIL	0430 „	Helleville (Nossi Bé)	13 24	48 17
			Diégo Suarez ...	12 15	49 23
			St. Mary ...	17 00	49 54
Tamatave ...	FIS	0415 „	Tamatave ...	18 09	49 26

Form of Message.

Name of Station—BBB F DD S' TTT W Houle (swell).

Code.

BBB = Barometric pressure in millimetres and tenths (to convert to inches or mb. see Table LVII).

F = Wind force (Beaufort scale 0-12).

DD = Direction of wind (by letters).

S' = State of sea (see Table LVIII).

TTT = Air temperature (centigrade degrees and tenths). (To convert centigrade to Fahrenheit see Table LIX).

W = State of sky (Beaufort Notation).

Houle = Direction and characteristic of swell (*en clair*).

Ships can obtain on request any weather information in the possession of the above stations.

Mauritius.

Spark Issues.

Mauritius W/T Station, approximate Latitude 20°23'S., Longitude 57°35'E., call sign **VRS**, 600 m. spk. When a cyclone is known to exist this station transmits at irregular times to all ships (or on request), an *en clair* message in English giving as far as is known the position of the cyclone, with the direction and rate of its movement, also the weather conditions at Mauritius.

I. SHIPS' WIRELESS WEATHER SIGNALS.

"Selected Ships," *i.e.*, ships in the Fleet List with the letters W.T., M.L., or M. appearing in the equipment column, when at sea in the vicinity of Mauritius and Madagascar, are invited to make their routine wireless weather reports to "All Ships" as usual, and when within range of **Mauritius, Majunga, Diégo Suarez** or **Tamatave W/T Stations** they should also address their reports to **VRS, FIO, FIL** or **FIS**, whichever station is nearest.

The Times for Wireless Weather Observations for all parts of the world, together with the form of message, are given on pages 17-19 of the January, 1929, **MARINE OBSERVER**.

Any ship at any time observing the formation of a dangerous Tropical Revolving Storm should report to "All Ships" and the appropriate wireless station, and continue to report at intervals of 3 hours so long as the ship remains under the influence of the storm.

SPECIAL WEATHER TELEGRAPHY TABLES, NOT INTERNATIONAL CODE. (SOUTH AFRICA).

Table LIII.

Run or Undertow (at Table Bay Docks).

Code figure.	Meaning.
0	No run.
1	Slight run.
2	Moderate run.
3	Heavy run.

NOTE.—"Run" is a local term for the undertow, due to a heavy swell in the Bay, which causes vessels to range so heavily along the quays that it is difficult to hold them.

Table LIV.

Instructions regarding Anchorage at Mossel Bay.

Code figure.	Meaning.
1	It is recommended that vessels should anchor well up the Bay towards Seal Island in not less than 9 fathoms of water, and veer plenty of cable.
5	It is recommended that vessels should take up ordinary anchorage with beacons in line in about 7 fathoms.

Table LV.

State of bar (at East London, Durban, Lourenco Marques, Beira and Mossoril).

Code figure.	Meaning.
1	Bar smooth.
2	„ breaking slightly.
3	„ rough.
4	„ breaking heavily.
5	„ dangerous.
6	„ impassable.

NOTE.—At East London the use of 1, 2, and 3 also implies that work with lighters is possible, and 4, 5, and 6, that it is impossible.

Table LVI.

Conversion of Millibars to Inches.

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

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

Table LVII.

Conversion of Millimetres into Millibars and Inches.

Mm.	Mb.	In.	Mm.	Mb.	In.	Mm.	Mb.	In.
695	926.6	27.37	743	990.6	29.25	759	1011.9	29.88
700	933.2	27.56	744	991.9	29.29	760	1013.2	29.92
705	939.9	27.76	745	993.2	29.33	761	1014.6	29.96
710	946.6	27.95	746	994.6	29.37	762	1015.9	30.00
715	953.2	28.15	747	995.9	29.41	763	1017.2	30.04
720	959.9	28.35	748	997.2	29.45	764	1018.6	30.08
725	966.6	28.54	749	998.6	29.49	765	1019.9	30.12
730	973.2	28.74	750	999.9	29.53	766	1021.2	30.16
735	979.9	28.94	751	1001.2	29.57	767	1022.6	30.20
736	981.2	28.98	752	1002.6	29.61	768	1023.9	30.24
737	982.6	29.02	753	1003.9	29.65	769	1025.2	30.28
738	983.9	29.06	754	1005.2	29.69	770	1026.6	30.32
739	985.2	29.10	755	1006.6	29.73	775	1033.2	30.51
740	986.6	29.13	756	1007.9	29.76	780	1039.9	30.71
741	987.9	29.17	757	1009.2	29.80	785	1046.6	30.91
742	989.2	29.21	758	1010.6	29.84			

Table LVIII.

S'—State of Sea.

- | | |
|----------------------|-----------------------|
| 0 = Sea calm. | 5 = Sea rather rough. |
| 1 = Sea very smooth. | 6 = Sea rough. |
| 2 = Sea smooth. | 7 = Sea high. |
| 3 = Sea slight. | 8 = Sea very high. |
| 4 = Sea moderate. | 9 = Sea phenomenal. |

Table LIX.

Conversion of Centigrade Temperatures to Fahrenheit.

Cent.	Fahr.	Cent.	Fahr.	Cent.	Fahr.	Cent.	Fahr.
		0	32	10	50	21	70
-1	30	1	34	11	52	22	72
-2	28	2	36	12	54	23	73
-3	27	3	37	13	55	24	75
-4	25	4	39	14	57	25	77
-5	23	5	41	15	59	26	79
-6	21	6	43	16	61	27	81
-7	19	7	45	17	63	28	82
-8	18	8	46	18	64	29	84
-9	16	9	48	19	66	30	86
				20	68		

WIRELESS STORM WARNINGS.

Madagascar.

(Spark Issues.)

CYCLONE warnings are broadcast when necessary by the following stations on a wave length of 600 metres (spark), in each case:—

Zaudzi (Mayotta I.): Latitude 12° 47' S., Longitude 45° 16' E., Call Sign **FIM**.

Majunga: Latitude 15° 43' S., Longitude 46° 20' E., Call Sign **FIO**.

Diégo Suarez: Latitude 12° 15' S., Longitude 49° 23' E., Call Sign **FIL**.

Tamatave: Latitude 18° 08' S., Longitude 49° 26' E., Call Sign **FIS**.

The warning, originating from the observatory at Antananarivo, will be broadcast at every even hour during the probable passage of the cyclone when within the range of the W/T stations, by Majunga W/T station in the case of a cyclone affecting the Mozambique Channel, and alternately by Diégo Suarez and Tamatave W/T stations in the case of a cyclone affecting the area north-east and east of Madagascar.

The warning will be preceded by the Safety Signal **TTT (- - -)** repeated ten times at short intervals on full power. The warning will be broadcast one minute after the Safety Signal, and will be repeated three times at intervals of ten minutes.

If the Safety Signal *only* is broadcast it will indicate, in the absence of precise information, that there is reason to expect the passage of a cyclone.

During the whole period of this service Diégo Suarez and Tamatave W/T stations will remain permanently on watch.

Mauritius.

Spark Issues.

Mauritius W/T station, call sign **VRS**, broadcasts, during the cyclone season (1st November to 15th May), on a wavelength of 600 metres spark, at irregular intervals to all ships when it is known that a cyclone is in existence, the latest weather information *immediately* this information is received at the W/T station from Mauritius Observatory.

Requests from ships for further information will be forwarded at once to the Observatory.

Continuous watch will be kept at the W/T station.

III. WIRELESS TIME SIGNALS.

Union of South Africa.

I.C.W. Issue.

TIME signals actuated automatically from the Royal Observatory at the Cape by direct land line are broadcast by **Cape Town W/T station**, call sign **ZSC**, Latitude 34° 09' S., Longitude 18° 19' E. (approx.), on a wavelength of 625 metres (I.C.W.).

The time signals are broadcast according to the New International System of W/T time signals and the procedure is as follows:—

G.M.T.

h. m. s.	h. m. s.	
20 56 05 to	20 56 50	— — — repeated 5 times at 10 second intervals.
57 00	57 50	— • • — repeated 10 times at 5 second intervals.
57 55	58 00	{ 55 56 57 58 59 60 • • • • • Time Signal.
58 08	58 10	— •
58 18	58 20	— •
58 28	58 30	— •
58 38	58 40	— •
58 48	58 50	— •
58 55	59 00	{ 55 56 57 58 59 60 • • • • • Time Signal.
59 06	59 10	— — •
59 16	59 20	— — •
59 26	59 30	— — •
59 36	59 40	— — •
59 46	59 50	— — •
20 59 55	21 00 00	{ 55 56 57 58 59 60 • • • • • Time Signal.

Portuguese East Africa.

Spark and C.W. Issues.

DELAGOA BAY.—LOURENÇO MARQUES. W/T time signals are transmitted automatically by means of the pendulum clock at Campos Rodrigues Observatory.

The transmission of the signals is made simultaneously by **Ponta Vermelha W/T station**, Lat., 25° 58' 05" S., Long., 32° 35' 39" E., call sign **CQE**, wave length 600 metres (spk.) and **Polana W/T station**, Lat., 25° 57' 40" S., Long., 32° 35' 59" E., call sign **CRAP** wave length 2,400 metres, C.W., and the new International system of W/T time signals is used.

The transmitting times are:—

G.M.T.							
	h.	m.	s.	h.	m.	s.	
From	7	57	00	to	8	00	00
„	18	57	00	„	19	00	00

The procedure as regards each series of signals is as follows:—

G.M.T.				Signal.					
h.	m.	s.	h.	m.	s.				
7	57	00	to	7	57	50	Prevenção. Sinais feitos à mão (Prepare. Time signal coming).		
57	55	„	58	00	58 00	55 56 57 58 59 60	Time signal.		
58	08	„	58	10	58 10	58 10	Time signal.		
58	18	„	58	20	58 20	58 20	Time signal.		
58	28	„	58	30	58 30	58 30	Time signal.		
58	38	„	58	40	58 40	58 40	Time signal.		
58	48	„	58	50	58 50	58 50	Time signal.		
58	55	„	59	00	59 00	55 56 57 58 59 60	Time signal.		
59	06	„	59	10	59 10	59 10	Time signal.		
59	16	„	59	20	59 20	59 20	Time signal.		
59	26	„	59	30	59 30	59 30	Time signal.		
59	36	„	59	40	59 40	59 40	Time signal.		
59	46	„	59	50	59 50	59 50	Time signal.		
7	59	55	to	8	00	00	55 56 57 58 59 60	Time signal.	

Note.—The error of the Observatory clock is stated never to exceed a few hundredths of a second.

IV.—VISUAL STORM WARNINGS.

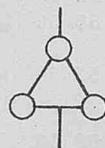
Mozambique.

STORM signals are displayed at Sebastian fort on receipt of information by cable from Mojanda in Madagascar. They consist of warning signals which are as follows:—

By day.



By night.



The lights displayed in the night signal are white.

The cone is hoisted at the Northern yardarm and the lights on the same mast.

Madagascar.

SIGNALS indicating the localities threatened by a cyclone are exhibited at the following ports: Tamatave, Andovoranto, Vatomandri, Mahanoro Mananjari, Farafangana, Fort Dauphin, Tuléar, Ambohibé, Morondava, Maintirano, Namela, Majunga, Analalava, Nossi Bé, Diégo Suarez, Vohemar, Maroantsetra, Zaudzi, and St. Mary.

The signals, which are made from a flagstaff by a black cylinder and black cones, are as follows:—

Signal.

Locality threatened.



Between Diégo and Antálaha.

Between Antálaha and St. Mary.

Between St. Mary and Vatomandri.

Between Vatomandri and Mananjari.

Between Mananjari and Farafangana.

Between Farafangana and Fort Dauphin.

Between Diego and Nossi Bé.

Between Nossi Bé and Majunga.

Between Majunga and Maintirano.

Between Maintirano and Morondava.

Between Morondava and Tuléar.

Between Tuléar and Fort Dauphin.

Reunion Island.

CYCLONE signals are displayed at Port des Galets, St. Denis, St. Paul, and St. Pierre signal stations, and also on the Vigie flagstaff, St. Denis, to indicate the probable approach and general track of cyclones in the vicinity of Reunion. The signals are to be taken as a general guide only, for the assistance of mariners as to the best way of avoiding cyclones.

The symbols employed (*black*) and their meanings are as follows:—

Signal.	By Day.	Meaning.
		Cyclone expected.
		Cyclone approaching from the north-eastward.
		Cyclone appears likely to pass at a <i>considerable</i> distance northward of the island.
		Cyclone appears likely to pass a <i>short</i> distance northward of the island.
		Cyclone appears likely to pass southward of the island, travelling from north-eastward to south-westward.
		Cyclone appears likely to pass southward of the island, travelling from north-westward to south-eastward.
		Cyclone appears likely to pass westward of the island, travelling from northward to southward.
		Cyclone appears likely to pass eastward of the island.
		Cyclone, which had already passed in a northerly direction, appears to have recurved, and is again approaching the island, travelling from N.W. to S.E.
		Barometer rising ; all danger over.

Mauritius.

Storm Signals.

DURING the cyclone season, from 1st November to 15th May, annually, a storm signal is hoisted daily, between 1 p.m. and 2 p.m., at the Port office at Port Louis, to indicate the weather conditions prevailing in the *vicinity* of Mauritius. The storm signal consists of four International Code flags and a cone.

- The upper flag refers to the quadrant from east to north.
- The second " " " north to west.
- The third " " " west to south.
- The fourth " " " south to east.

(The flags are placed vertically.)

When the signal is headed by a ball the information refers to the area within a circle with a radius of 300 miles.

When the answering pennant is hoisted below the fourth flag it indicates that no information has been received, and that the signal refers to the previous day.

Signification of Flags.

- A. There are no indications of disturbed weather.
- B. Weather is unsettled, but there are no indications of a cyclonic storm.
- C. Weather is unsettled, and may lead to the formation of a cyclonic storm.
- D. There are indications that a cyclonic storm is forming.
- E. There is distinct evidence of the existence of a cyclonic storm.
- F. The disturbed weather is apparently due to an extra tropical storm to the southward, " Southerly buster."
- G. The weather is clearing, but the sea may still be heavy.
- H. The cyclonic storm is moving south-westward.
- I. The cyclonic storm is moving southward.
- J. The cyclonic storm is moving south-eastward.
- K. The cyclonic storm is moving westward, northward of Mauritius.
- L. The cyclonic storm is moving eastward, southward of Mauritius.
- M. Strong trades which may be followed by cyclonic storm in next few days.
- N. Heavy swell may be encountered, indications of cyclonic storm beyond 300 mile limit.
- O. Heavy swell may be encountered, indications of cyclonic storm beyond 300 mile limit travelling on S.W. track.
- P. Heavy swell may be encountered, indications of cyclonic storm beyond 300 mile limit travelling on S. track.
- Q. Heavy swell may be encountered, indications of cyclonic storm beyond 300 mile limit travelling on S.E. track.
- Z. No information available.

Local Storm Signals.

When bad weather is approaching and precautions are not immediately necessary in the harbour, the following International Storm signals are made to vessels in the harbour and roadstead from the flagstaff of the Port office, Port Louis, at the head of the harbour.

Signal.	Signification: Gale probably commencing at
	North-West.
	South-West.
	North-East.
	South-East.

When bad weather is approaching and precautions are necessary in the harbour, the following cyclone signals are made to vessels in

the harbour and roadstead from the flagstaff of the Port office, Port Louis, at the head of the harbour.

Vessels are required to answer the signals by hoisting their national ensign at the main.

Signal.	By Day.	Meaning.	Signal.	By Night.	Meaning.
 and gun fired		Send down top-gallant yards and prepare for bad weather. The masters of all ships and vessels in this port are required immediately to repair on board their respective vessels, and half the crew should be kept on board; vessels at the Light Buoy ought to proceed to sea.	 and gun fired		Vessels at the Light Buoy to proceed to sea forthwith, and vessels in the port to make every preparation for bad weather.
 and gun fired		Vessels in the port are to strike lower yards and topmasts.	 Blue	 Red	 Black.

Special Notices Regarding Personnel.

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

Captain J. J. Cameron.

Captain J. J. CAMERON of R.M.S. *Remuera* has recently retired. Captain CAMERON served his time as apprentice and as 3rd and 2nd mate in the clipper ships of Messrs. THOMAS LAW & Co. He was chief mate of the ship *Mobile Bay* for a year before going into steam. In 1895 he obtained his extra masters certificate, a commission as Sub-Lieutenant in the Royal Naval Reserve and was appointed fourth officer in the NEW ZEALAND SHIPPING COMPANY'S mail steamship service. In 1901 he performed a year's naval training as Lieutenant R.N.R. in H.M.S. *Brilliant*. Promoted to master in 1906 he has commanded *Rimutaka*, *Waimate*, *Opawa*, *Ruapehu*, *Hororata*—the latter during the Great War was employed as a transport—and *Remuera*.

Captain CAMERON is a Younger Brother of Trinity House, a foundation member of the Honourable Company of Master Mariners, holds the rank of Lieutenant Commander R.N.R. on the retired list and has been a member of the Corps of Voluntary Marine Observers since 1906.

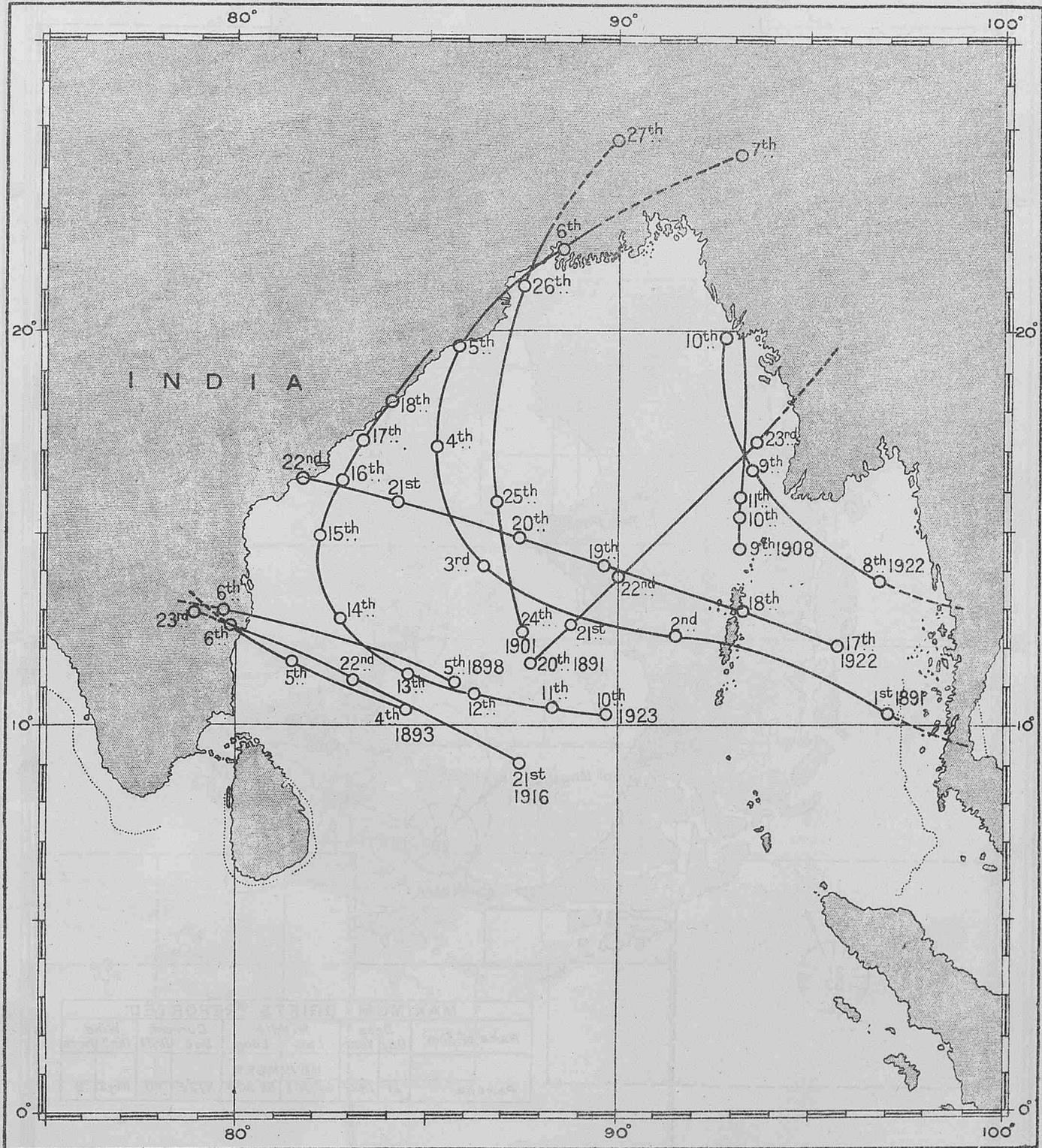
The Corps of Voluntary Marine Observers and Marine Division wish him many years of health and happiness ashore in his well earned retirement.

Obituary.

The death of Commander H. C. DAVIS, D.S.C., R.D., R.N.R., Master of the P. & O. R.M.S. *Mantua* which took place suddenly at sea when on passage from London to Hong Kong is noted with regret.

Captain DAVIS had held command of several of the P. & O. Fleet and had been a keen member of the Voluntary Corps of Marine Observers since 1924.

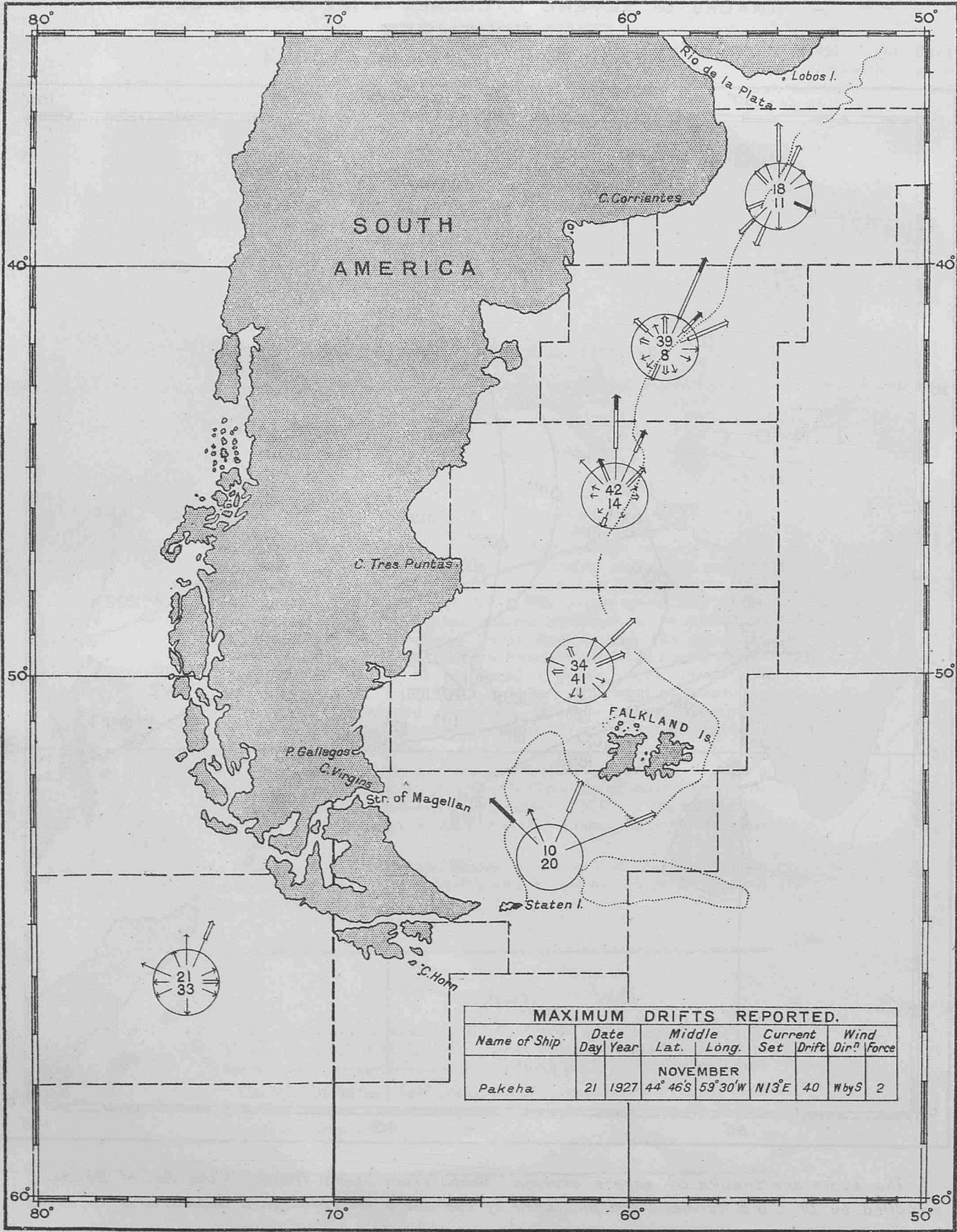
TRACKS OF SEVERE CYCLONES IN THE BAY OF BENGAL
NOVEMBER,
 DURING THE YEARS 1891-1923.



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

CURRENTS ON THE TRACKS FROM THE LATITUDE OF THE PLATE
TO MAGELLAN STRAITS AND CAPE HORN,
NOVEMBER, DECEMBER AND JANUARY.

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

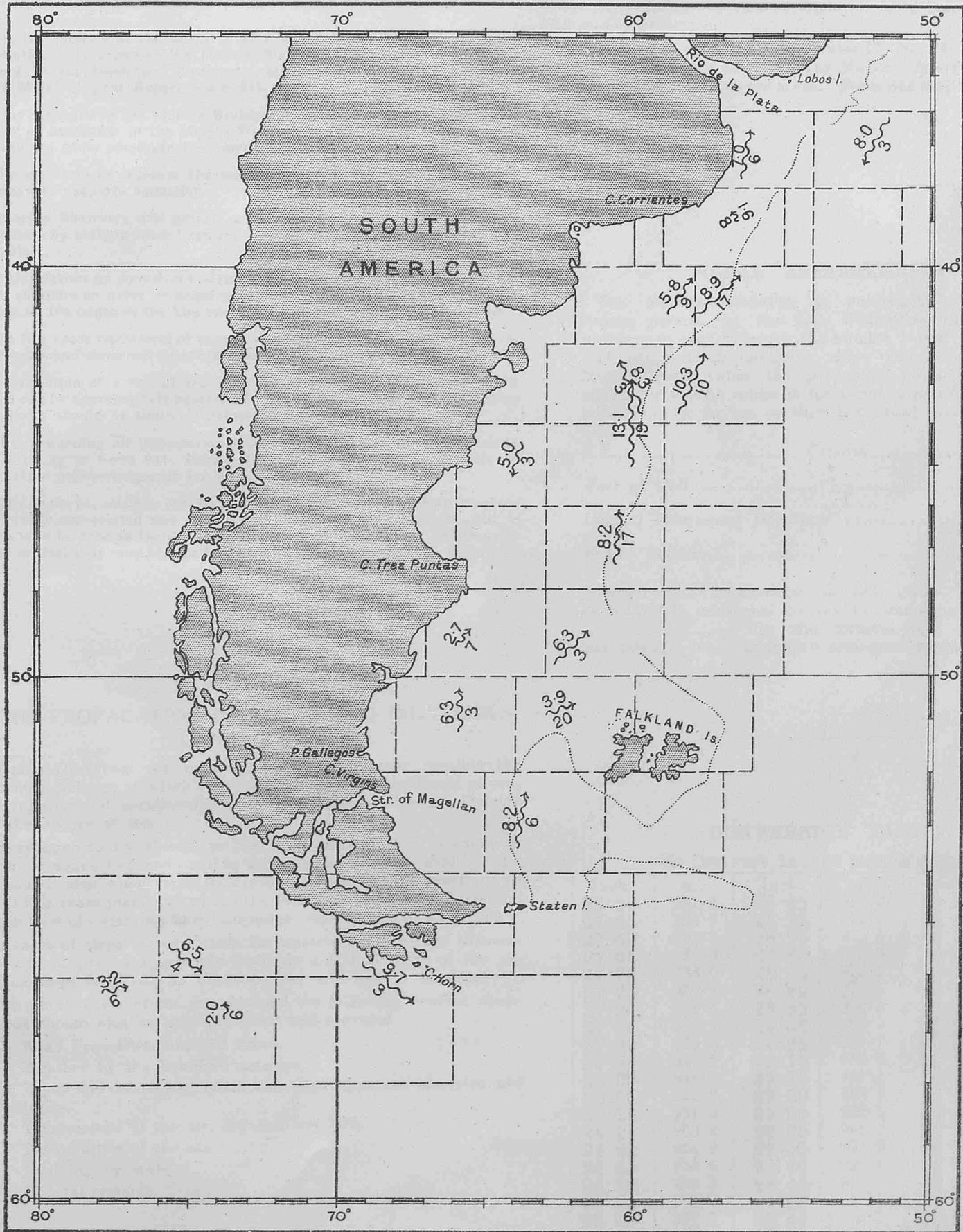


EXPLANATION OF CURRENT ROSES.

The current roses are drawn from observations within the packed lines.
Arrows flow with the current, length represents frequency, thickness strength.
Distance from tail of arrow to circle represents 5%. Scale 0 10 20 30 40 50%
The upper figure in centre of rose gives total number of observations, the lower figure the percentage frequency of currents less than 6 miles per day.

CURRENTS ON THE TRACKS FROM THE LATITUDE OF THE PLATE
TO MAGELLAN STRAITS AND CAPE HORN,
NOVEMBER, DECEMBER AND JANUARY.

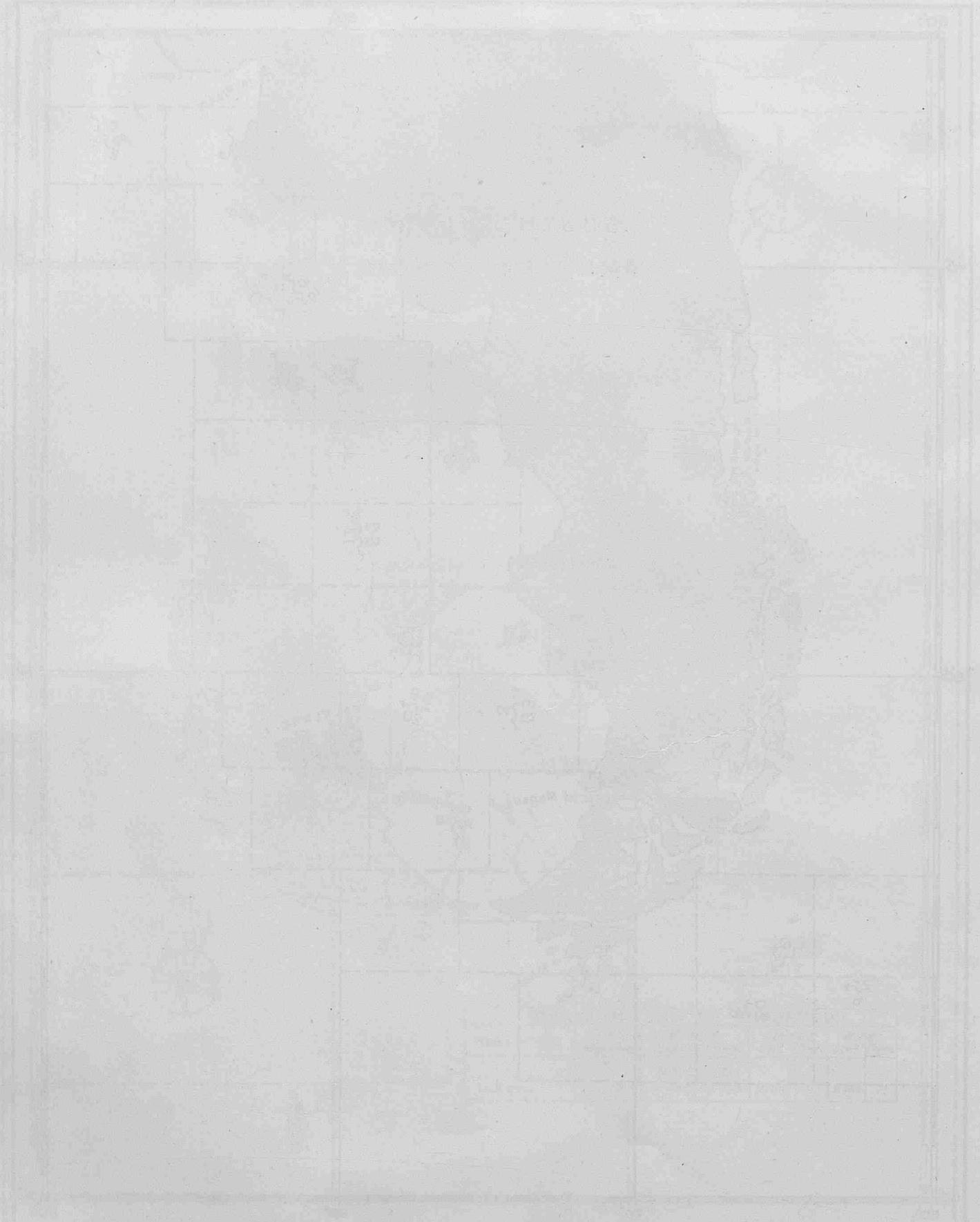
Observations of ships regularly observing for the British Meteorological Office 1910-1927



EXPLANATION OF CURRENT ARROWS.

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

CURRENTS ON THE BACKWATER OF THE EASTERN BAY OF BENGAL
TO MAJOR STRAITS AND GULFS
NOVEMBER, DECEMBER AND JANUARY
Scale of Distances in 1000 Yards



Scale of Distances in 1000 Yards
The currents are shown by arrows and labels, indicating the direction and strength of the flow. The map is titled "CURRENTS ON THE BACKWATER OF THE EASTERN BAY OF BENGAL TO MAJOR STRAITS AND GULFS NOVEMBER, DECEMBER AND JANUARY" and includes a scale of distances in 1000 yards.

IMPORTANT.

Request to return Additional Remarks and supplementary documents with the Meteorological Log and Form 911.

As the interest of the Corps of Marine Observers increases, so more information is returned to the Marine Division, and there is a tendency to send in supplementary documents to the Meteorological Log and Ship's Meteorological Report Form 911.

The strength of the Marine Division is constant, that is to say, the number of assistants in the Marine Division to handle the data received remains the same whatever the amount.

To maintain or increase the output of published information it is necessary to regulate collection.

Marine Observers will greatly assist, and in so doing, help towards publication by making their Logs and Reports when returned as complete as possible.

Information or considered views in reply to the Marine Superintendent's circulars or notes of enquiry in this Journal may be conveniently written on the pages in the Log and Form 911 for "Additional Remarks."

In this space narratives of experiences in storms, accounts of unusual phenomena and abnormal currents experienced should be entered.

A selection of a few of the best weather charts made during the voyage can be appropriately attached to the fly-leaf of the Log. Sketches and photos should be similarly attached.

By forwarding all information which it is intended to return, along with the Log or Form 911, Marine Observers will make it possible to give better acknowledgment for work well done.

The remarks, weather charts, sketches and photos, now being received are greatly appreciated and it is hoped that these may increase, but if justice is to be done to them, it is necessary that they should be properly placed so that they may receive the greatest possible amount of attention.

THE PROPAGATION OF SOUND AND WEATHER CONDITIONS.

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

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

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

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

- Wind True Direction and Force.
- Weather by the Beaufort notation.
- Types and amount of cloud and their apparent direction and velocity.
- Temperature of the air, dry and wet bulb.
- Temperature of the sea.
- Visibility by scale.
- General remarks.

SEA AND SWELL MEASUREMENTS.

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

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

POSTAL ARRANGEMENTS.

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

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

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

Port of Call.....

Date of Homeward Departure.....

Postal Address.....

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

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		

ICE CHART. WESTERN NORTH ATLANTIC.

LETTERS OF TRANSATLANTIC TRACKS INDICATE

- (C) From 1st September to 31st March, inclusive.
- (F) From 16th May to Opening of Belle Isle route, and to 30th November when not using the Belle Isle route.
- (G) Westbound, on approaching Cape Race steer a course to pass 10 miles S. of Cape Race. Eastbound, steer from position 25 miles S. of Cape Race.
- (H) From the opening of the Straits of Belle Isle to 14th November.

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

SYMBOLS USED ON THE CHART.

- ▣ Iceberg.
- △ Floeberg.
- ▭ Growler.
- Field Ice, Floe Ice, Pack Ice.
- Hammocky Ice, Bay Ice.
- Drift Ice, Brash Ice, Sludge Ice.
- Pancake Ice.
- ⊕ Indicates W/T Ice Warning Station.

PHENOMENAL POSITION OF ICE.

Date.	Ship or Source of Report.	Position.		Remarks.
		Lat.	Long.	
Nov. 7, 1922	Cape Race W/T Stn.	47°38' N.	40°04' W.	Berg and growlers.

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

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

ICE IN GREENLAND WATERS.

SUMMARY OF INFORMATION FROM CABLEGRAM RECEIVED FROM DANISH METEOROLOGICAL INSTITUTE, COPENHAGEN.

- September 20 "Free of ice in JULIANEHAAB BAY."
- "Free of ice 20 miles off Cape Farewell."
- "Icebergs met with in Longitude 41°W."

Co-operation of Shipowners, Masters and Mates.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

LIVERPOOL Lieut. Commander M. CRESSWELL, R.N.R., Port
Meteorological Officer, Dock Office.
(Telephone No.: Bank 3959).

Agents.

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

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

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

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

HONG KONG, China. Lieut. Commander R. G. H. MILLIGAN, R.N.,
Superintendent, Admiralty Chart and Chrono-
meter Depot, H.M. Dockyard.
(Telephone No.: 108 Dockyard).

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

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

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

SYDNEY, New South Wales. Captain C. LINDBERGH.
Commander C. D. MATHESON, R.D., R.N.R.,
Acting Deputy Director of Navigation.
Customs House.
(Telephone No.: B6421).

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

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

LATE PRESS.

DERELICTS AND FLOATING WRECKAGE.

Date.	Position.		Description.
	Latitude.	Longitude.	
NORTH SEA.			
10.9.29	52°40'N.	2°00'E.	"Horse" boat floating bottom up, nearly submerged, dangerous to navigation.
11.9.29	53°02'N.	4°20'E.	Two heavy logs of timber, each about 10 ft. long, dangerous to navigation.
ENGLISH CHANNEL.			
6.9.29	50°30'N.	2°12'W.	Black and white chequered buoy marked 7 <i>HMCS kil.</i>
NORTH ATLANTIC.			
1.9.29	40°28'N.	73°36'W.	Piece of timber 60 ft. long, 4 ft. wide.
2.9.29	47°58'N.	5°—'W.	Red conical buoy marked 3 <i>Egypt</i> , dangerous to navigation.
4.9.29	44°05'N.	9°05'W.	Red conical buoy marked <i>Telegraph G.V.</i> , dangerous to navigation.
5.9.29	36°21'N.	75°—'W.	Spar 50 ft. long and 2 ft. diameter.
6.9.29	44°52'N.	61°07'W.	Sighted a deckhouse painted grey.
7.9.29	44°23'N.	50°09'W.	Sinking schooner <i>Santa Quiteria</i> abandoned.
8.9.29	36°32'N.	47°39'W.	Large can buoy marked 39.
9.9.29	37°50'N.	74°24'W.	Red buoy with skeleton wooden structure, painted white, marked <i>Dog USSRE.</i>
9.9.29	25°23'N.	67°42'W.	Black gas buoy about 6 ft. high, red lantern, light not burning.
10.9.29	47°22'N.	6°35'W.	Red spherical buoy, white letters <i>SSW</i> , red and black flag.
12.9.29	40°07'N.	12°40'W.	Floating gas whistle buoy, red, no marks, whistle working.
13.9.29	N. of Tearaght Is. Lt. H.		Large spar 50 ft. long, 1½ ft. diameter.
NORTH PACIFIC.			
1.9.29	32°46'N.	124°03'W.	Log 20 ft. long, 2 ft. diameter.
1.9.29	36°38'N.	122°27'W.	Apparently a sunken schooner with two masts and bowsprit projecting out of water.
2.9.29	32°15'N.	121°22'W.	Heavy log 25 ft. long, 3 ft. diameter.
5.9.29	37°01'N.	122°22'W.	Wreckage drifting ESE at about 2 knots.

Name of Vessel.	Captain.	Observing Officers.	Meteoro-logical Equipment.	Line.	Last Log, Register, or Report Contributed. Received up to 13.9.29	Date Received.
*† Australia ...	Scutt, W. ...	...	M.L.	British India ...	...	...
Autolytus ...	Dunlop, J. K. ...	...	No. A.	A. Holt... ...	Form 911 25.10.28 to 11.11.28 ...	28.11.28
Balmoral Castle ...	Barron, A. ...	C. C. Page ...	" A.	Union Castle ...	" 13.7.29 to 2.9.29... ...	5.9.29
Bairnald ...	Nicholl, R. N. C. ...	A. H. G. Storrs ...	" M.	P. & O. Branch ...	" 13.5.29 to 14.8.29 ...	28.8.29
†51 Baltic ...	Kearney, J. Lt-Commr. R.N.R.	R. S. Walker, A. C. T'Anson...	W.T.	White Star ...	W.T. Reg. 12.8.29 to 31.8.29 ...	3.9.29
Bampton Castle ...	James, J. S., D.S.C.	W. A. Cooke ...	No. A.	Union Castle ...	Form 911 11.8.29 to 31.8.29 ...	3.9.29
Banffshire ...	Westropp, T. G. ...	A. Mc L. Pilcher ...	" M.	Turnbull Martin ...	" 5.7.29 to 18.8.29 ...	30.8.29
*† Baradine ...	Allin, C. H. C. ...	C. B. Roche, B. W. Pollitt, P. Haworth, L. A. Hill.	M.L.	P. & O. Branch ...	Met. Log. 14.7.29 to 24.7.29 ...	1.8.29
*† Barpeta ...	Rudge, J. G. ...	J. F. B. Hore ...	No. M.	British India ...	Form 911 12.4.29 to 18.7.29 ...	19.7.29
*† Barrabool ...	Rhodes, H. R. ...	T. G. Davies ...	" M.	P. & O. Branch ...	" 18.7.29 to 14.8.29 ...	2.9.29
*† Barranca ...	Edwards, A. C. ...	...	M.L.	Elders & Fyffes ...	" 11.1.29 to 28.1.29 ...	5.3.29
Baychimo ...	Cornwall, S. A. ...	...	No. A.	Hudson's Bay Co. ...	" ... ...	...
†59 Belgenland ...	Morehouse, W. A. ...	C. H. Otterson, W. F. Jackson	W.T.	Red Star ...	W.T. Reg. 28.4.29 to 6.6.29... ...	22.7.29
*† Bellana ...	Rollo, W. ...	G. V. Legassick ...	No. M.	P. & O. Branch ...	Form 911 11.8.29 to 31.8.29 ...	3.9.29
Benalder ...	Fairweather, J. J. ...	D. T. McCullum ...	" A.	Ben Line ...	" 11.8.29 to 31.8.29 ...	2.9.29
†† Bendigo ...	Wyatt ...	G. V. Regassick ...	" M.	P. & O. Branch ...	" 2.3.29 to 12.6.29... ...	19.6.29
*† Benefactor ...	Jones, C. W. ...	S. M. Smith, R. Huntingdon.	" M.	Harrison ...	" 8.7.29 to 25.7.29 ...	20.8.29
††31 Berengaria ...	Rostron, Sir A. H., K.B.E., R.D., Capt., R.N.R.	S. A. T. Bullock, F. P. Collins, W. C. Robson.	W.T.	Cunard ...	W.T. Reg. 15.4.29 to 13.5.29 ...	23.5.29
Brenda ...	Lamont, A. ...	N. Ross ...	No. A.	Scottish Fishery Brd.	Form 911 1.8.29 to 30.8.29... ...	3.9.29
Brighton ...	Hill, A. ...	Mr. Munton ...	C.C.	Southern Railway ...	Telegraphic Report 11.5.29 ...	11.5.29
*† British Dominion, M.V.	Taylor, R. J. ...	H. B. Phillips ...	No. M.	British Tankers ...	Form 911 8.6.29 to 4.7.29 ...	8.7.29
*† British Merchant	Putt, R. O. ...	C. Low ...	" M.	"	" 27.6.29 to 7.8.29 ...	26.8.29
Bryere ...	Birch, A. ...	...	" A.	Lampport & Holt ...	" 27.11.28 to 24.2.29 ...	4.3.29
*† Bulyses M.V.	Head, B. P. ...	A. J. Clatworthy ...	" M.	Anglo-Saxon Petroleum Co.	" 16.7.29 to 19.8.29 ...	28.8.29
*† Buteshire ...	Page, W. J. ...	...	M.L.	Turnbull Martin ...	...	...
††65 Calgarc ...	Binks, J. W., R.D., Lt-Commr. R.N.R.	G. Kavanagh, A. Thompson, E. P. Hughes.	W.T.	White Star ...	W.T. Reg. 10.8.29 to 31.8.29 ...	2.9.29
Cambria ...	Foy, C. A. ...	...	No.	W.I. and Panama Telegraph Co.	Form 911 12.8.29 to 29.8.29 ...	2.9.29
Cambria ...	Copland, C. P. ...	O. W. Ll. Jones ...	C.C.	L.M. & S. Rly ...	Telegraphic Report 7.9.29 ...	7.9.29
*† Cambridge ...	Williams, R. ...	J. V. Williams, H. M. Knight, H. C. Walker, R. A. Belfield.	M.L.	Federal ...	Met. Log. 6.3.29 to 27.7.29 ...	31.7.29
†† Cameronia ...	Gemmell, W. ...	J. Herbert, D. C. Shedden ...	"	Anchor ...	Met. Log. 27.1.29 to 17.6.29 ...	24.6.29
†† Camilo ...	Forrester, W. T., O.B.E.	H. H. Dunning, G. M. Roberts, M. H. Thomson.	"	Elders & Fyffes ...	" 14.3.29 to 10.7.29 ...	22.7.29
Canadian Importer	Forson, A. ...	C. Williams ...	No. A.	Canadian Gov. Mercantile Marine.	Form 911 4.7.29 to 4.8.29 ...	15.8.29
** Canadian Winner	McConechy, W. G. ...	J. M. Lang ...	" M.	"	" 17.9.28 to 13.10.28 ...	27.11.28
*† Canonesa ...	Brodie, W. H. ...	T. Wetherall ...	" M.	Furness Houlder ...	" 25.2.29 to 25.3.29 ...	4.4.29
Cape of Good Hope	Jacobson, T. A. ...	W. S. Bartlett ...	" A.	Lyle S.S. Co. ...	" 27.3.29 to 14.6.29 ...	15.7.29
††35 Carmania ...	Brown, F. G., R.D., Capt., R.N.R.	E. R. Taylor, E. Gleave, P. O. Davis.	W.T.	Cunard ...	W.T. Reg. 19.8.29 to 6.9.29... ...	11.9.29
†† Carnarvon Castle M.V.	Stanley, W. F., R.D., Commr. R.N.R.	H. L. Shaw, G. D. Pennick, S. S. Smith.	M.L.	Union Castle ...	Met. Log. 19.1.29 to 12.5.29 ...	23.5.29
††34 Caronia ...	Hossack, W. H., R.D., Capt., R.N.R.	T. Parry, E. R. B. Freeman, S. E. Clowser.	W.T.	Cunard ...	W.T. Reg. 5.8.29 to 23.8.29... ...	27.8.29
Casanare ...	Browne, S. ...	W. Hannah ...	No. A.	Elders & Fyffes ...	Form 911 4.8.29 to 23.8.29... ...	28.8.29
†† Cathay ...	Griffin, R. H., O.B.E., R.D., Capt. R.N.R.	R. A. C. Beeching ...	" M.	P. & O ...	" 8.7.29 to 11.8.29... ...	14.8.29
Cavina ...	Risley, A. D. ...	R. C. Harradon... ...	" A.	Elders & Fyffes ...	" 29.7.29 to 2.8.29... ...	26.8.29
††52 Cedric ...	Smith, R. G. ...	W. Nicoll, J. Law, J. G. Wallace.	W.T.	White Star ...	W.T. Reg. 1.7.29 to 2.8.29 ...	7.8.29
*† Centaur ...	Sturrock, R. G. ...	N. L. Thompson, J. Cockburn, B. L. Brind.	M.L.	A. Holt & Co. ...	Form 911 5.8.29 to 25.8.29... ...	27.8.29
Ceramic ...	Musgrave, T. ...	H. A. R. Daman ...	No. A.	White Star ...	Met. Log. 23.12.28 to 20.4.29 ...	29.8.29
*† Changte ...	Gambrill, F. C. ...	D. Tyer, R. Baigent, D. N. Hulton, J. McLeod.	M.L.	Yuill & Co. ...	Form 911 13.4.29 to 20.5.29 ...	22.5.29
Changuinola ...	Thorburn, R. A., R.D., Commr. R.N.R.	B. R. Coe... ...	No. A.	Elders & Fyffes ...	Met. Log. 18.1.29 to 10.6.29 ...	23.7.29
Chindwin ...	Paterson, G. ...	...	" A.	Henderson ...	Form 911 26.7.29 to 27.8.29 ...	30.8.29
*† Chitripo ...	Sapsworth, S. A. ...	W. F. Phillips ...	" A.	Elders & Fyffes ...	" 16.3.29 to 28.5.29 ...	24.6.29
*† City of Baroda ...	McMillan, J. ...	J. E. Jenkins, W. Faichney, F. T. Mallett.	M.L.	Ellerman ...	" 15.7.29 to 17.8.29 ...	27.8.29
City of Benares ...	Wyper, J. ...	R. W. Kellie ...	No. A.	"	Met. Log. 1.1.29 to 22.4.29... ...	30.4.29
*† City of Bombay ...	Brown, O. C. ...	E. H. Roberts ...	" M.	"	Form 911 31.7.29 to 16.8.29 ...	9.9.29
*† City of Bristol ...	Jenkins, D. ...	K. G. Crockett ...	" M.	"	" 27.6.29 to 23.8.29 ...	31.8.29
City of Canterbury	Stanley, A. ...	R. H. Hodgson ...	" A.	"	" 11.11.28 to 1.12.28 ...	7.1.29
City of Carlisle ...	Mordue, J. A. ...	...	" A.	"	" 9.4.29 to 8.5.29 ...	21.5.29
*† City of Chester ...	Letton, F. W. ...	C. C. Duncan, P. C. Arthur, M. J. Mc Nicol.	M.L.	"	" 7.6.29 to 14.7.29... ...	16.7.29
City of Hong Kong	Walton, H. L., O.B.E., R.D., Commr. R.N.R.	H. Saunders ...	No. A.	"	Met. Log. 25.7.29 to 30.8.29 ...	4.9.29
City of Khios ...	Reay, A. S. ...	R. E. Thornton... ...	" A.	"	Form 911 1.5.29 to 25.5.29... ...	31.5.29
City of London ...	Nicoll, L. ...	...	" A.	"	" 19.2.29 to 10.3.29 ...	2.4.29
*† City of Osaka ...	Smith, W. H. ...	G. E. M. Jenkins, A. Niblock	" M.	"	" 2.2.29 to 17.4.29... ...	3.5.29
*† City of Rangoon ...	Jones, P. ...	...	M.L.	"	" 9.6.29 to 4.7.29... ...	6.8.29
*† City of Roubaix ...	Radcliffe, A. V., R.D., Lt-Com., R.N.R.	...	No. M.	"	Met. Log. 6.10.28 to 27.7.29 ...	6.8.29
*† City of Valencia ...	Anderson, W. W. ...	...	" M.	"	...	...
City of Yokohama	Singleton, J. G. ...	H. Nish ...	" A.	"	Form 911 31.5.29 to 20.7.29 ...	12.8.29
Clan Alpine ...	Lyall, A. B. ...	J. O. H. Kirkwood ...	" A.	Clan ...	" 1.6.29 to 23.6.29... ...	6.8.29
Clan Kenneth ...	Young, A. H., Commr. R.D., R.N.R.	H. C. Carter ...	" A.	"	" 21.6.29 to 26.7.29 ...	16.8.29
Clan Lindsay ...	Giles, H. J., R.D., Commr. R.N.R.	...	" A.	"	" ... ...	...
Clan MacBean ...	Boag, J. ...	W. Thompson ...	" A.	"	" 12.6.29 to 27.7.29 ...	8.8.29
Clan Macbeth ...	Hammay, L. G. ...	J. C. Robertson... ...	" A.	"	" 13.7.29 to 30.7.29 ...	2.9.29
Clan Macfarlane ...	Laird, C. ...	G. L. Roe ...	" A.	"	" 19.3.29 to 9.4.29... ...	30.5.29
Clan Macfarlane ...	Redford, L. F. ...	T. A. Pearson ...	" A.	"	" 18.6.29 to 5.7.29... ...	19.8.29
Clan Macgillivray ...	Mackinlay, A. ...	F. H. Thornton ...	" A.	"	" 28.10.28 to 14.12.28 ...	21.1.29
Clan Macindoe ...	Holman, W. G. ...	H. Lockyer ...	" A.	"	" 17.6.29 to 6.7.29... ...	6.8.29
Clan Mackellar ...	Phillips, G. P. ...	...	" A.	"	" 12.7.29 to 8.8.29... ...	20.8.29
*†† Clan Macphee ...	Gourlay, J. B. ...	E. H. Stone, K. C. Simpson, L. R. Legg.	M.L.	"	Met. Log. 30.6.29 to 12.8.29 ...	14.8.29

LIST OF VOLUNTARY OBSERVING SHIPS

Name of Vessel.	Captain.	Observing Officers.	Meteoro-logical Equipment.	Line.	Last Log, Register, or Report Contributed. Received up to 13.9.29.	Date Received.
<i>Clan Macnaughton</i>	Clark, J.	...	No. A.	Clan	Form 911 20.7.29 to 18.8.29	9.9.29
<i>Clan Macquarrie</i>	West, W. F.	E. Gregory	" A.	"	" 10.7.29 to 13.8.29	15.8.29
<i>Clan Macartagart</i>	Higgins C. J.	D. McAllister	" A.	"	" 22.5.29 to 12.6.29	20.6.29
<i>Clan Macwhirter</i>	Low, A.	F. B. Barker, H. M. Watkins	M.L.	"	Met. Log. 16.6.28 to 16.1.29	11.2.29
<i>Clan Malcolm</i>	George, L. S.	F. B. Fairweather, H. E. Luxton, J. F. Hubbard.	"	"	" 18.11.28 to 25.5.29	13.6.29
<i>Clan Morrison</i>	Porterfield, W. M. Lt.-Commr., R.N.R.	L. C. Cuthbert	No. A.	"	Form 911 21.7.29 to 23.8.29	2.9.29
<i>Clan Murdoch</i>	Calderwood, W.	J. B. Davies	" A.	"	" 28.4.29 to 22.5.29	25.5.29
<i>Clan Ranald</i>	Fraser, R. K.	K. G. Tucker	" A.	"	" 10.5.29 to 4.7.29	22.7.29
<i>Clan Ross</i>	Neill, G. A.	A. G. Beynon	" A.	"	" 27.6.29 to 4.9.29	9.9.29
<i>Clan Sinclair</i>	Baker, E. W.	...	" A.	"	" 25.7.29 to 8.8.29	2.9.29
<i>Colonial</i>	Worthington, B.	A. S. Milne	" M.	T. & J. Harrison	" 13.4.29 to 23.6.29	29.6.29
<i>Comorin</i>	Borland, J. McI., C.B., D.S.O., R.D., Capt., R.N.R.	E. C. White	" M.	P. & O.	" 16.4.29 to 30.5.29	15.6.29
<i>Corinthic</i>	Freeman, C. P.	E. M. Burt, M. Bennett, I. A. Macnaughton.	M.L.	White Star	Met. Log. 27.4.29 to 12.8.29	15.8.29
<i>Cornwall</i>	Lamb, C. B.	C. R. Brown	No. A.	Federal	Form 911 10.12.28 to 17.1.29	18.3.29
<i>Crawford Castle</i>	Conley, E. A.	...	" A.	Union Castle	"	"
<i>Culebra</i>	Goble, C. J., R.D., Commr., R.N.R.	H. D. Hooper, H. E. Sang, A. H. Phillipson.	M.L.	R.M.S.P. Co.	Met. Log. 30.6.29 to 26.8.29	11.9.29
<i>Cumberland</i>	Macmillan, D.	P. Shakespear, F. Loughead, T. Shillito, J. Lennox.	"	Federal	" 29.10.28 to 29.3.29	5.4.29
<i>Custodian</i>	O'Connor, T.	...	No. M.	Harrison	"	"
<i>Cyclops</i>	Cosker, W.	C. B. P. Anderson	" A.	A. Holt	Form 911 4.7.29 to 15.8.29	20.8.29
<i>Daga</i>	Wiles, N.	I. B. Campbell	" M.	P. Henderson	" 4.3.29 to 10.6.29	15.6.29
<i>Dakotian</i>	Robb, J.	W. R. Atkinson	" A.	Leyland	" 1.7.29 to 9.8.29	16.8.29
<i>Dardanus</i>	Glossop, S.	R. W. Ellis	" A.	A. Holt	" 17.8.29 to 26.8.29	3.9.29
<i>Darro</i>	Shillito, B.	...	" M.	R.M.S.P. Co.	" 26.7.29 to 7.8.29	28.8.29
<i>Defender</i>	Haylett, E.	...	" M.	T. & J. Harrison	"	"
<i>Delilian</i>	Stewart, G. F.	...	" A.	Leyland	Form 911 9.5.29 to 7.8.29	20.8.29
<i>Delphic</i>	Vaughan, P. R.	E. B. Clark	" M.	White Star	" 4.5.29 to 18.6.29	26.6.29
<i>Delta</i>	Townshend, W. P., R.D., Capt., R.N.R.	D. M. Stafford	" M.	P. & O.	" 24.4.29 to 19.6.29	11.7.29
<i>Demerara</i>	Willan, F. G. L., R.D., Capt., R.N.R.	P. W. Brundell	" M.	R.M.S.P. Co.	" 25.6.29 to 17.8.29	20.8.29
<i>Demosthenes</i>	Ogilvy, A.	S. A. Ferguson	" M.	Aberdeen Commonwealth	" 23.7.29 to 9.8.29	3.9.29
<i>Denis</i>	Harris, F. C. P.	J. H. Stokes	" A.	Booth	" 15.4.29 to 29.4.29	24.6.29
<i>Deseado</i>	F. S. Hannam	A. Barff, E. D. Smith	" M.	R.M.S.P. Co.	" 26.5.29 to 20.7.29	22.7.29
<i>Desna</i>	Green, J.	L. T. Peterson	" M.	"	" 3.9.28 to 24.10.28	12.11.28
<i>Deucalion</i>	Melling, C. F.	R. F. Dryden	" A.	A. Holt	" 28.6.29 to 7.8.29	9.8.29
<i>Devon</i>	Kinnell, G.	G. Chaplin	" M.	Federal	" 25.8.29 to 4.9.29	11.9.29
<i>Dippe</i>	Marmery, S.	Mr. Parsons	" O.C.	Southern Railway	Telegraphic Report 12.9.29	12.9.29
<i>Dimboola</i>	Dawson, J.	...	No. A.	Melbourne S.S. Co.	Form 911 5.7.29 to 30.7.29	9.9.29
<i>Discovery, Auxy. Barque.</i>	King Davis, J.	W. R. Colbeck	M.L.	Douglas Mawson Expedition.	"	"
<i>Domala, M.V.</i>	Kitson, A. G.	H. Robertson	No. M.	British India	" 26.2.29 to 11.5.29	17.6.29
<i>Dominia, C.S.</i>	Campos, V., O.B.E., Lt.-Commr., R.N.R.	S. A. Garnham, A. S. Muir, L. J. Hegarty, W. F. Anderson.	M.L.	Telegraph Construction & Maintenance.	Met. Log. 8.8.28 to 5.12.28	27.12.28
<i>Dominic</i>	Jackson, T. H.	G. H. Clark	No. A.	Booth	Form 911 6.5.29 to 29.7.29	15.8.29
<i>61Doric</i>	Hulme, R.	F. E. Patchett, J. Farrell, S. A. Jones.	W.T.	White Star	" 28.7.29 to 17.8.29	19.8.29
<i>Dorington Court</i>	Clarke, E. J.	...	No. A.	Haldin & Co.	Form 911 10.4.29 to 22.7.29	25.7.29
<i>Dromore Castle</i>	MacMahon, J., R.D., Commr., R.N.R.	J. A. Sowden	" A.	Union Castle	" 15.4.29 to 9.5.29	5.6.29
<i>Dryden</i>	Major, T. W.	...	" M.	Lamport & Holt	" 21.10.28 to 14.1.29	7.2.29
<i>Duchess of Atholl</i>	McQueen, D. S.	A. Mackie	" M.	Canadian Pacific	" 11.8.29 to 27.8.29	31.8.29
<i>Duchess of York</i>	Stuart, R.N., V.C., D.S.O., Commr., R.N.R.	A. Mansey	" M.	"	" 3.8.29 to 20.8.29	26.8.29
<i>Dunaff Head</i>	Butt, H. L., R.D., Lt.-Commr., R.N.R.	D. Martin	" A.	Ulster S.S. Co.	" 22.1.29 to 6.2.29	18.2.29
<i>Dunluce Castle</i>	Jackson, C. R.	C. Loyd	" A.	Union Castle	" 2.8.29 to 21.8.29	27.8.29
<i>Dunrobin</i>	Ramsay, J. D.	W. Martin	" A.	Glen & Co.	" 4.7.29 to 8.8.29	11.9.29
<i>Duquesa</i>	Barker, A. W.	...	" M.	Furness Withy	" 22.4.29 to 28.6.29	3.7.29
<i>Durenda, M.V.</i>	Beeching, P. H.	J. E. Miles	" M.	British India	" 6.3.29 to 24.3.29	19.4.29
<i>Edinburgh Castle</i>	Gardner, G.F., O.B.E., Lt.-Commr., R.N.R.	A. R. J. Tilston	" A.	Union Castle	" 2.8.29 to 18.8.29	9.9.29
<i>Egort</i>	Sola, P., D.S.O.	J. T. Townson	" A.	Elder Dempster	" 2.5.29 to 16.7.29	17.7.29
<i>El Argentino</i>	Ellis, F., D.S.O.	C. H. Hughes	" M.	Houlder	" 12.5.29 to 18.7.29	22.7.29
<i>Eldon Park</i>	Burns, R.	D. Rankine	" M.	Denholm S.S. Co.	" 5.3.29 to 10.5.29	1.6.29
<i>Elmworth</i>	Dick, J.	...	" M.	R. S. Dalglish	"	"
<i>Elpenor</i>	Gordon, A. L.	E. Roberts, A. Pearson, J. E. Iliff.	M.L.	A. Holt	Met. Log. 9.12.28 to 13.4.29	22.4.29
<i>Elstree Grange</i>	St. Pierre, P.	...	No. M.	Houlder	Form 911 10.2.29 to 16.5.29	30.5.29
<i>El Paraguayo</i>	Frost, C. R.	F. J. G. Rice	" M.	"	" 3.6.29 to 7.8.29	26.8.29
<i>El Uruguayo</i>	McNamara, T.	F. E. Hailstone	" M.	"	"	"
<i>Elysia</i>	Duncan, A. R.	D. Blair, G. S. Sinclair, W. Beveridge.	M.L.	Anchor	Met. Log. 1.5.29 to 8.7.29	31.7.29
<i>Empress of Asia</i>	Hailey, A. J., Lt.-Commr., R.N.R.	L. M. Goddard, J. F. Patrick, R. J. Hickey, E. Newell.	"	Canadian Pacific	" 17.2.29 to 31.5.29	19.7.29
<i>Empress of Canada</i>	Douglas, L. D.	C. W. A. G. Hamley	"	"	"	"
<i>Empress of France</i>	Robinson, S., C.B.E., R.D., Commr., R.N.R.	A. G. Simmons	"	"	Met. Log. 9.3.29 to 21.6.29	19.7.29
<i>Empress of Russia</i>	Hosken, A. J.	R. A. Leicester, J. B. Smith, H. B. Metcalf, A. C. Jones.	"	"	" 17.11.28 to 22.3.29	20.4.29
<i>Endeavour</i>	Law, E. F. B., Commr., R.N.	M. B. Thomas	"	His Majesty's Ship	" 15.3.29 to 8.7.29	18.7.29
<i>Enterprise</i>	Pridham-Wippell, H.D., Capt., R.N.	C. W. A. G. Hamley	"	"	" 18.3.29 to 15.7.29	29.8.29
<i>Essequibo</i>	Roberts, E.	L. Marsland	No. M.	R.M.S.P. Co.	Form 911 13.6.29 to 30.7.29	15.8.29
<i>Eumaeus</i>	Read, J. W.	D. W. Stroud	" A.	A. Holt	" 18.5.29 to 31.7.29	3.8.29
<i>Euryades</i>	Ewan, W. B.	W. K. Hole	" A.	A. Holt	" 29.7.29 to 9.8.29	19.8.29
<i>Explorer</i>	Ling, J. T.	A. E. Rogers	" M.	Harrison	" 9.2.29 to 22.5.29	13.6.29
<i>Explorer</i>	Allan, J.	G. Flett, F. O. Sheehy	" A.	Scottish Fishery Board.	" 5.8.29 to 30.8.29	4.9.29

Name of Vessel.	Captain.	Observing Officers.	Meteoro-logical Equipment.	Line.	Last Log, Register, or Report Contributed. Received up to 13.9.29.	Date Received.
*† <i>Fordsdale</i> ...	Richardson, A. V. ...	F. Vaughan ...	No. M.	Aberdeen Common-wealth.	Form 911 22.2.29 to 18.3.29 ...	4.4.29
<i>Francisco</i> ...	Scales, H. ...	B. Scholefield ...	" A.	Ellerman Wilson ...	" 7.6.29 to 19.7.29 ...	24.7.29
<i>Freya</i> ...	Angus, W. ...	W. Pirrie ...	" A.	Scottish Fishery Board.	" 2.8.29 to 31.8.29 ...	3.9.29
<i>Garth Castle</i> ...	Morgan, A.O., R.D., Commr. R.N.R.	F. O. Wilbraham ...	" A.	Union Castle ...	" 24.7.29 to 17.8.29 ...	20.8.29
** <i>Gascoyne</i> ...	Johnson, L. ...	W. J. Macphedran, C. Melson, J. S. Macbryde.	M.L.	A. Holt & Co. ...	Met. Log. 3.3.29 to 15.7.29... ..	28.8.29
*† <i>Glamorganshire</i> ...	Womersley, H. ...	R. E. E. Hadlow ...	No. M.	R.M.S.P. Co. ...	Form 911 13.6.29 to 22.7.29 ...	25.7.29
*† <i>Glenamoy, M.V.</i> ...	Homan, C. E. ...	R. K. Bishop, F. B. C. Wetherley.	M.L.	Glen Line ...	Met. Log. 24.12.28 to 5.5.29 ...	12.6.29
<i>Glenapp</i> ...	Ingram, T. F. ...	" ...	No. A.	" ...	Form 911 19.1.29 to 27.2.29 ...	2.4.29
<i>Glenbeg</i> ...	Newing, L. ...	F. B. Angier ...	" A.	" ...	" 5.3.29 to 9.7.29 ...	11.7.29
*† <i>Glenгарry</i> ...	Angier, J. ...	J. Tyler ...	" M.	" ...	" 4.7.29 to 4.8.29 ...	10.9.29
<i>Glenluce, M.V.</i> ...	Kennett, W. H. ...	H. B. Porter ...	" A.	" ...	" 4.8.29 to 16.8.29... ..	27.8.29
<i>Glenshane</i> ...	Suter, S. C. ...	" ...	" A.	" ...	" 10.11.28 to 1.4.29 ...	6.4.29
<i>Glenworth</i> ...	Kilgour, H. A. ...	W. C. Wright ...	" A.	R. S. Dalgleish ...	" 5.7.29 to 31.7.29... ..	15.8.29
<i>Gloucestershire</i> ...	Robin, E. ...	W. Moore ...	" A.	Bibby ...	" 1.12.28 to 8.2.29... ..	12.2.29
<i>Glocinia</i> ...	Pool, F. G. ...	D. Coughlan ...	" A.	Stag Line ...	" 14.7.29 to 6.9.29... ..	9.9.29
<i>Guildford Castle</i> ...	Attwood, J. ...	" ...	" A.	Union Castle ...	" 8.6.29 to 18.7.29... ..	23.7.29
<i>Halestus</i> ...	Samuels, C. ...	N. MacLeod ...	" A.	R. P. Houston ...	" 5.5.29 to 23.5.29... ..	16.7.29
<i>Haliartus</i> ...	Felton, W. J. ...	F. D. Bonney ...	" A.	" ...	" 13.6.29 to 7.7.29... ..	8.8.29
*† <i>Hardwicke Grange</i> ...	Fowler, W. H. ...	" ...	" M.	" Houlder ...	" 13.4.29 to 3.6.29... ..	19.6.29
<i>Harmonides</i> ...	Elwell, F. R. ...	R. H. Pape ...	" A.	R. P. Houston ...	" 4.5.29 to 1.6.29 ...	5.6.29
*† <i>Hatimura</i> ...	Hemmings, W. H. ...	L. E. Heath ...	" M.	British India ...	" 30.6.29 to 19.7.29 ...	25.7.29
** <i>Hawaki, M.V.</i> ...	Norton, A. T. ...	D. M. McLeish, C. H. George, F. C. Cochran.	M.L.	Union S.S. Co., N.Z. ...	Met. Log. 17.4.28 to 25.10.28 ...	4.1.29
<i>Herald</i> ...	Maxwell, P. S. E., Commr. R. N.	H. J. C. Stokes... ..	M.L.	His Majesty's Ship ...	Met. Log. 1.4.29 to 29.7.29 ...	11.9.29
<i>Herminius</i> ...	Roberts, T. V. ...	D. W. MacGregor ...	No. A.	Aberdeen Common-wealth.	Form 911 9.4.29 to 18.5.29... ..	25.5.29
<i>Herschel</i> ...	Watson, W. W. ...	A. J. Corney ...	" A.	Lamport & Holt ...	" 4.5.29 to 19.7.29... ..	20.7.29
*† <i>Hertford</i> ...	Burton Davies, J. ...	" ...	M.L.	Federal ...	"	"
<i>Hestone</i> ...	McComish, A. B. ...	" ...	No. A.	R. P. Houston ...	Form 911 1.7.29 to 26.7.29... ..	1.8.29
<i>Hiberna</i> ...	Dudgeon, L. T. ...	A. Marsh ...	C.C.	L.M. & S. Railway ...	Telegraphic Report 31.8.29 ...	31.8.29
*† <i>Highland Chieftain, M.V.</i> ...	Robinson, R. H. ...	" ...	No. M.	Nelson ...	Form 911 20.5.29 to 8.7.29 ...	16.7.29
<i>Highland Prince</i> ...	Taylor, F. ...	W. A. Hall ...	" A.	Prince ...	" 30.3.29 to 11.4.29 ...	25.4.29
<i>Rover</i> ...	McKinnon, H. ...	E. Smart ...	" A.	Nelson ...	" 1.1.29 to 18.2.29 ...	11.3.29
<i>Hildebrand</i> ...	Buck, R. H. ...	" ...	" A.	Booth ...	" 16.7.29 to 29.8.29 ...	3.9.29
*† <i>Hobson's Bay</i> ...	Kydd, O. J. ...	J. Worrall, D. Horn, G. Cook	M.L.	Aberdeen Common-wealth.	Met. Log. 6.3.29 to 14.6.29... ..	3.7.29
<i>Hobbin</i> ...	Gough, W. A. ...	F. Delaney ...	No. A.	Lamport & Holt ...	Form 911 2.5.29 to 3.8.29 ...	27.8.29
†† <i>Homeric</i> ...	Warner, G. E., R.D., Capt. R.N.R.	H. G. Morgan, W. T. Poustie, A. E. Dyer.	W.T.	White Star ...	W.T. Reg. 3.8.29 to 23.8.29 ...	28.8.29
<i>Hororata</i> ...	Barnett, H. ...	E. A. Quick ...	No. A.	New Zealand S.S. Co.	Form 911 17.1.29 to 8.2.29 ...	18.3.29
<i>Hubert</i> ...	Furieux, R. B. ...	A. S. Richardson ...	" A.	Booth ...	" 9.7.29 to 20.8.29... ..	27.8.29
<i>Huntingdon</i> ...	Field, H. G. B. ...	N. S. Lesmere ...	" A.	Federal... ..	" 6.3.29 to 19.7.29... ..	29.7.29
*† <i>Huntsman</i> ...	Russell, H. ...	G. R. R. Lettin ...	" M.	Harrison ...	" 28.1.29 to 27.6.29 ...	3.8.29
*† <i>Hydaspes</i> ...	Williams, P. E. ...	J. W. Charles ...	" M.	R. P. Houston ...	" 19.5.29 to 14.7.29 ...	9.9.29
*† <i>Ingoma</i> ...	Gibbings, W. ...	R. J. Weeks ...	" M.	Harrison ...	Form 911 20.7.29 to 28.8.29 ...	3.9.29
<i>Inkum</i> ...	Meethan, J. T. ...	" ...	" A.	J. H. Welsford ...	" 12.7.29 to 27.7.29 ...	8.8.29
<i>Iranla, M.V.</i> ...	Adams, P. A. ...	E. Allen ...	" A.	Iranian Tanker Co. ...	" 13.4.29 to 8.8.29... ..	19.8.29
*† <i>Iris, C.S.</i> ...	Hughes, H. E. ...	" ...	M.L.	Pacific Cable Board... ..	Met. Log. 23.2.29 to 19.3.29 ...	18.7.29
<i>Troquois</i> ...	Nares, J. D., D.S.O., Capt. R.N.	A. B. Foulston... ..	"	His Majesty's Ship ...	" 11.4.29 to 31.7.29 ...	4.9.29
*† <i>Iacon</i> ...	Collins, H. M. ...	D. Law ...	"	A. Holt ...	" 28.11.28 to 18.4.29 ...	28.6.29
<i>Javanese Prince, M.V.</i> ...	Smith, J. ...	J. B. Morrison ...	No. A.	Prince ...	Form 911 19.7.29 to 20.8.29 ...	30.8.29
*† <i>Jeyapore</i> ...	Cooper, C. P., O.B.E., R.D. Capt. R.N.R.	F. M. Squire ...	" M.	P. & O. ...	" 16.6.29 to 2.8.29... ..	7.8.29
<i>Justin</i> ...	Bush, H. ...	J. Stretch... ..	" A.	Booth ...	" 23.4.29 to 15.7.29 ...	22.7.29
†† <i>Katsar-i-Hind</i> ...	Headlam, P. C., R.D., Commr. R.N.R.	W. T. Banks ...	" M.	P. & O. ...	" 27.7.29 to 14.8.29 ...	21.8.29
*† <i>Kalyan</i> ...	Cornwall Jones, B.	W. R. B. Noal ...	" M.	P. & O. ...	" 4.5.29 to 14.6.29... ..	24.6.29
** <i>Kangaroo</i> ...	Norris, H. C. ...	J. Sinclair, J. S. Airey, E. Hutchinson, J. Edward, H. Reynolds, V. L. Gilbert.	M.L.	State Service Aus- tralia.	Met. Log. 3.9.28 to 24.2.29... ..	27.5.29
*† <i>Karamea</i> ...	McIntosh, A. ...	K. D. Fisher, A. C. Jones, J. W. Thompson, H. M. Clark.	"	Shaw, Savill & Albion	" 10.3.29 to 1.7.29... ..	10.7.29
*† <i>Karapara</i> ...	Miller, A. C. ...	J. Smail ...	No. M.	British India... ..	Form 911 5.6.29 to 22.6.29 ...	22.7.29
*† <i>Kashgar</i> ...	Sudell, F., R.D., Commr. R.N.R.	R. P. Eddy ...	" M.	P. & O. ...	" 4.5.29 to 10.8.29 ...	13.8.29
*† <i>Kashmir</i> ...	Mallalue, R., Lt- Commr. R.N.R.	D. S. Charles ...	" M.	P. & O. ...	Form 911 29.6.29 to 18.7.29 ...	13.8.29
*† <i>Khandalla</i> ...	Baird, S.K. ...	F. N. B. Johnson ...	" M.	British India ...	" 1.7.29 to 27.7.29 ...	19.8.29
*† <i>Khiva</i> ...	Britten, P. O. ...	C. E. Arundel, J. A. Ridley, H. V. Williamson.	M.L.	P. & O. ...	Met. Log. 16.5.29 to 26.8.29 ...	2.9.29
*† <i>Knight Companion</i> ...	Davis, A. L. ...	S. R. Evans ...	No. M.	A. Holt ...	Form 911 6.6.29 to 27.7.29... ..	12.8.29
** <i>Koolinda, M.V.</i> ...	Buckeridge, J. ... Kavanagh, J.	" ...	" M.	State Service, Aus- tralia.	" 24.7.28 to 6.9.28... ..	15 10.28
††37 <i>Laconia</i>	Doyle, M. ...	E. W. Connell, A. B. Fasting, F. G. Russell ...	W.T.	Cunard ...	W.T. Reg. 11.8.29 to 31.8.29 ...	4.9.29
<i>Laguna</i> ...	Dunn, R. E., O.B.E. ...	R. W. Hanson ...	No. A.	Pacific S.N. Co. ...	Form 911 11.8.29 to 1.9.29... ..	4.9.29
*† <i>Lahore</i> ...	Charters, W. ...	N. Bell ...	" M.	P. & O. ...	" 9.4.29 to 28.4.29 ...	1.5.29
<i>Lalande</i> ...	Hamill, H. ...	" ...	" A.	" 28.5.29 to 22.7.29 ...	"	26.7.29
<i>Lancashire</i> ...	Foster, W. J. ...	" ...	" A.	Lamport & Holt ...	Form 911 30.10.28 to 27.1.29 ...	7.2.29
††36 <i>Lancastria</i> ...	Townley, J. C., R.D., Commr. R.N.R.	W. H. Campe ... G. Overton, P. L. Williams, J. W. Caunce.	W.T.	Bibby ...	" 13.7.29 to 10.8.29 ...	2.9.29
<i>Laomedon</i> ...	Hatfield, F. ...	O. P. H. Wynne... ..	No. A.	Cunard ...	W.T. Reg. 12.8.29 to 31.8.29 ...	4.9.29
				A. Holt... ..	Form 911 11.8.29 to 31.8.29 ...	3.9.29
					" 25.7.29 to 8.8.29... ..	2.9.29

LIST OF VOLUNTARY OBSERVING SHIPS

Name of Vessel.	Captain.	Observing Officers.	Meteoro-logical Equipment.	Line.	Last Log Register, or Report Contributed. Received up to 13.9.29.	Date Received.
*† La Paz, M.V. ...	Benson, C. W. ...	E. Hicks ...	No. M.	Pacific S.N. Co. ...	Form 911 4.5.29 to 12.7.29...	15.7.29
†55 Lapland ...	Park, P. B. ...	J. C. Flett, J. Gladstone ...	W.T.	Red Star ...	W.T. Reg. 29.7.29 to 16.8.29 ...	19.8.29
*† Largs Bay ...	Jenkyn, W. M. ...	... ..	No. M.	Aberdeen Common-wealth. Houlder ...	Form 911 28.7.29 to 16.8.29 ...	19.8.29
*† La Rosarina ...	Webb, C. ...	R. Hawkins, R. Conway, A. R. Stevens.	" M.	White Star ...	W.T. Reg. 18.8.29 to 6.9.29... ..	10.9.29
†64 Laurentic ...	Trant, E. L., R.D., Commr., R.N.R.	... ..	W.T.	... ..	Form 911 17.8.29 to 7.9.29... ..	10.9.29
*† Lautaro, M.V. ...	Leyne, R. W. ...	J. T. Denley ...	No. M.	Pacific S.N. Co. ...	" 25.2.29 to 14.6.29 ...	19.6.29
*† Leicestershire ...	English, G. L. ...	W. Walton, E. D. Brand, A. Thomson.	M.L.	Bibby ...	Met. Log. 18.5.29 to 27.7.29 ...	31.7.29
*† Limerick ...	Molyneux, P. L. ...	G. Chaplin ...	No. M.	Federal... ..	Form 911 18.1.29 to 24.2.29 ...	18.3.29
† Llandaff Castle ...	Gilbert, E. F. ...	S. Drew, — Bayer, — Denn, W. Forsyth.	M.L.	Union Castle ...	Met. Log. 24.5.29 to 30.7.29 ...	1.8.29
*† Llandoverly Castle ...	Stuart, C. E., Capt. R.N.R.	C. H. Williams, G. Moon, P. Clissold.	"	" " ...	" 15.11.28 to 21.1.29 ...	1.2.29
† Llanstephan Castle ...	Whitfield, G. J. ...	... ..	No. A.	" " ...	Form 911 15.6.29 to 2.7.29 ...	6.7.29
*† Lobos, M. V. ...	Pape, E. R. ...	S. E. Ayland ...	" M.	Pacific S.N. Co. ...	" 22.5.29 to 9.6.29 ...	12.6.29
*† Loch Katrine ...	Schlanbusch, O. V. ...	L. H. Smith ...	" A.	R.M.S.P. Co. ...	" 28.5.29 to 23.8.29 ...	27.8.29
*† Logician ...	Herschel, R. F. ...	A. G. S. Madrell ...	" M.	Harrison ...	" 23.2.29 to 18.4.29 ...	30.4.29
*† London Importer ...	Nuttall, E. L. ...	F. F. Feint, J. H. Metcalfe, J. G. Freeman.	" M.	Furness Withy ...	... ..	...
† Lord Antrim ...	Jarvis, F. E. ...	... ..	" A.	Ulster S.S. Co. ...	Form 911 7.8.29 to 17.8.29... ..	20.8.29
† Loriga, M. V. ...	Large, E. H. ...	... ..	" A.	Pacific S.N. Co. ...	" 28.6.29 to 16.7.29 ...	37.8.29
*† Losada, M. V. ...	Ross, J. ...	D. Beamer ...	" M.	" " ...	" 15.8.29 to 3.9.29... ..	10.9.29
† Macedonia ...	Morton, A. J. ...	... ..	" M.	P. & O. ...	" 5.7.29 to 22.8.29... ..	26.8.29
*† Macharda ...	Hanna, R. G. ...	A. C. Hocking ...	" M.	Brocklebank ...	" 19.6.29 to 28.6.29 ...	8.7.29
*† Macquarie ...	Heyen, G. H. ...	... ..	No.	On Chang & Co. ...	... ..	...
*† Maharaja ...	Elliott, G. F. ...	... ..	" M.	Asiatic S.N. Co. ...	" 6.3.29 to 24.4.29... ..	10.6.29
*† Mahronda ...	Sharpe, G. ...	L. Lee ...	" M.	Brocklebank... ..	" 30.5.29 to 5.8.29... ..	15.8.29
*† Mahsud ...	Kershaw, R. W. ...	B. K. Ward ...	" M.	" " ...	" 29.7.29 to 3.9.29... ..	7.9.29
*† Maidan ...	Robertson ...	... ..	" M.	" " ...	" 1.5.29 to 3.6.29 ...	11.6.29
*† Maihar ...	Charlton, W. L. ...	J. W. B. Robertson, C. Cadwallader, A. D. Spring.	M. L.	" " ...	Met. Log. 12.4.29 to 6.7.29... ..	12.8.29
*† Maimoa ...	Johnson, J. W. ...	J. H. Fuller, P. Savill, H. G. Withell.	"	Shaw, Savill & Albion	" 28.4.29 to 23.8.29 ...	26.8.29
† Maimyo ...	Smith, G. C. ...	J. L. Rodgers ...	No. A.	Brocklebank ...	Form 911 17.6.29 to 7.8.29... ..	18.8.29
†58 Majestic ...	Marshall, W., C.B., D.S.O., R.D., Commadore, R.N.R.	A. Fisher, W. T. Fitz Gerald, A. H. Young, W. F. Denison.	W.T.	White Star ...	W.T. Reg. 18.5.29 to 28.8.29 ...	2.9.29
*† Makalla ...	Maughan, J. W. ...	A. L. Harrop ...	No. M.	Brocklebank ...	Form 911 25.3.29 to 2.5.29 ...	10.5.29
*† Makambo ...	Williams, D. J. ...	R. Perry, R. A. Williams S. Sandison.	M.L.	Burns Philp ...	Met. Log. 24.11.28 to 9.4.29 ...	22.6.29
*† Makura ...	Brown, J. F. S. ...	W. A. Todd, J. Billingham, G. Edwards, D. A. Menlove.	"	Canadian-Australasian Burns, Philp & Co. ...	" 21.2.29 to 9.6.29... ..	2.9.29
*† Malabar, M.V. ...	Donaldson, A. ...	... ..	" M.	Burns, Philp & Co. ...	" 10.11.28 to 21.4.29 ...	28.6.29
*† Malakuta ...	Adamson, F. L. ...	A. Horspool ...	No. M.	Brocklebank ...	Form 911 22.7.29 to 10.9.29 ...	13.9.29
*† Malancha ...	Whitham, F. ...	R. Humble ...	" M.	" " ...	" 4.8.29 to 14.8.29... ..	28.8.29
*† Malda ...	Wright, J. ...	E. H. Lidstone ...	" M.	British India ...	" 21.4.29 to 9.7.29 ...	15.7.29
† Maloja ...	Browning, J. B., R.D., Commr. R.N.R.	A. D. Dennis ...	" M.	P. & O. ...	" 4.7.29 to 10.8.29... ..	13.8.29
† Malwa ...	Stringer, R. H., O.B.E., R.D., Commr. R.N.R.	F. D. Shaw ...	" M.	" " ...	" 16.6.29 to 5.7.29 ...	29.7.29
*† Manchester Brigade ...	Stott, C. H. ...	J. H. Round, H. Boyce, E. E. Bonnaud.	M.L.	Manchester Liners ...	Met. Log. 19.2.29 to 31.8.29 ...	5.9.29
*† Manchester Hero ...	Riley, J. E. ...	H. Anderton, J. H. Emmett, H. Dobson, A. Ricketts, A. Grant.	"	" " ...	" 24.3.28 to 12.10.28 ...	19.10.28
† Manchester Producer ...	Struss, F. D. ...	T. J. Boyd ...	No. A.	" " ...	Form 911 10.8.29 to 8.9.29... ..	10.9.29
*† Manela ...	Maples, S. H. ...	P. D. Browning, J. H. Heath	" M.	British India... ..	" 26.7.29 to 13.8.29 ...	9.9.29
*† Mangalore ...	Mulchay, G. ...	J. A. Leitch ...	" M.	Brocklebank ...	" 12.4.29 to 9.6.29 ...	15.6.29
*† Manipur ...	Cochran, G. N. ...	R. Penston, G. B. Falconer ...	" M.	Brocklebank ...	" 3.7.29 to 30.7.29... ..	19.8.29
*† Manistee ...	Pengelly, J. ...	... ..	" M.	Elders & Fyffes ...	... ..	...
*† Manora ...	Hudson, H. T., R.D., Commr., R.N.R.	... ..	" M.	British India... ..	Form 911 30.12.28 to 28.3.29 ...	2.4.29
† Mantua ...	Davis, H. C., D.S.C., Commr., R.N.R.	... ..	" M.	P. & O. ...	" 10.6.29 to 1.8.29... ..	8.8.29
*† Marella ...	Mortimer, S. ...	A. G. Hill, F. Vogelmann, B. Helen.	M.L.	Burns Philp ...	Met. Log. 19.11.28 to 28.3.29 ...	22.6.29
*† Marengo ...	Curle, J. ...	H. Bryan, G. W. Revell, F. Foyal, S. Butcher.	"	Ellerman Wilson ...	" 18.7.28 to 6.1.29... ..	22.1.29
† Margha ...	Hughes, C. G. ...	P. Wright, H. Watkins ...	"	British India... ..	" 7.4.29 to 2.7.29 ...	8.7.29
† Marquesa ...	Smiles, R. S. ...	L. Owen... ..	No. M.	Furness Houlder ...	Form 911 28.4.29 to 4.7.29 ...	11.7.29
*† Marsina ...	Mitchie, W. ...	... ..	" A.	Burns, Philp & Co. ...	" 2.5.29 to 2.6.29 ...	15.7.29
*† Matakana ...	Thurston, H. P. ...	E. Davies, B. Forbes-Moffatt, A. P. Winton, A. G. Collins.	M.L.	Shaw, Savill & Albion	Met. Log. 30.3.29 to 30.7.29 ...	3.8.29
† Mataram ...	Voy, W. ...	R. M. Blunt ...	No. A.	Burns, Philp & Co. ...	Form 911 29.5.29 to 29.6.29 ...	6.8.29
† Mataroa ...	Kershaw, W. A. R. ...	F. Eadon, J. J. Nicoll, C. Meyer.	M.L.	Shaw, Savill, & Albion	Met. Log. 1.2.29 to 15.5.29 ...	21.5.29
*† Matheran ...	Ison, W. A. ...	J. Richardson ...	No. M.	Brocklebank ...	Form 911 6.11.28 to 18.11.28 ...	23.11.28
*† Matiana ...	Green, F. V. ...	W. Mortimer ...	" M.	British India... ..	" 16.3.29 to 4.6.29 ...	10.6.29
*† Matra ...	Cornish, N. P. ...	W. Gibson, R. V. Andrew ...	" M.	Brocklebank ...	" 21.4.29 to 13.7.29 ...	17.7.29
*† Maungani ...	Martin, W. ...	G. H. Edwards ...	" M.	Union S.S. Co. of N.Z.	" 10.7.29 to 31.7.29 ...	9.9.29
*†32 Maurerania ...	McNeil, S. G.S., R.D., Capt., R.N.R.	J. L. Croasdaile, R. H. C. Crawford, C. B. Osborne, B. J. P. Tuck.	W.T.	Cunard ...	W.T. Reg. 4.8.29 to 20.8.29... ..	24.8.29
†66 Megantic ...	Frank, F. A., D.S.O., R.D., Commr., R.N.R.	A. E. Dyer, J. F. Waltire, A. H. H. Griffiths.	W.T.	White Star ...	" 3.6.29 to 20.6.29 ...	25.6.29
†22 Melita ...	Stewart, A. ...	W. W. J. Ewens ...	W.T.	Canadian Pacific ...	" 4.8.29 to 24.8.29... ..	29.8.29
† Mennon ...	Watson, C. J. ...	J. A. C. McGregor ...	No. A.	A. Holt... ..	Form 911 12.1.29 to 23.1.29 ...	28.1.29
†21 Metagama ...	Carr-Jones, D. T. ...	J. Hewson, J. H. Tudor, H. Benedictus.	W.T.	Canadian Pacific ...	W.T. Reg. 3.8.29 to 21.8.29 ...	26.8.29
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*† Minna ...	Mackenzie, G. G. ...	A. M. Campbell ...	" A.	Scottish Fishery Brd.	" 5.8.29 to 29.8.29... ..	11.9.29
†23 Minnedosa ...	McCombie, G. F. R. D., Commr. R.N.R.	C. D. Watt, W. J. P. Roberts, H. M. Sanders.	W.T.	Canadian Pacific ...	W. T. Reg. 18.8.29 to 7.9.29... ..	10.9.29
† Minnesota ...	Finch, E., R. D., Commr. R.N.R.	L. C. Hill... ..	No. M.	Atlantic Transport ...	Form 911 17.8.29 to 7.9.29 ...	11.9.29
† Minnetonka ...	Gates, T. F., C.B.E. ...	J. H. Kenworthy ...	" M.	" " ...	" 28.7.29 to 17.8.29 ...	27.8.29
			" M.	" " ...	" 5.8.29 to 24.8.29... ..	28.8.29

LIST OF VOLUNTARY OBSERVING SHIPS

Name of Vessel.	Captain.	Observing Officers.	Meteoro-logical Equipment.	Line.	Last Log, Register, or Report Contributed. Received up to 13.9.29.	Date Received.
*† Port Auckland ...	Durham, R. S., D.S.O	J. G. Lewis, E. R. Rowlands, P. S. Ball, E. W. Dingle.	M.L.	Commonwealth & Dominion.	Met. Log. 1.4.29 to 13.8.29 ...	7.9.29
*† " Bowen ...	Hearn, G. W. ...	S. Ray ...	No. A.	" " "	Form 911 9.9.28 to 17.9.28...	26.10.28
*† " Campbell ...	Enright, W. J. ...	J. G. Thom, J. C. Goddard, H. B. Walker.	M.L.	" " "	Met. Log. 26.2.29 to 5.7.29...	11.7.29
*† " Caroline ...	Brown, A. H. ...	J. B. Bradley, G. Langford, J. Stannard, L. J. Brice ...	"	" " "	" 26.10.28 to 3.4.29 ...	8.4.29
*† " Darwin ...	Sawbridge, I. R. ...	H. Pinkney, N. Muzzell, A. McClouman.	"	" " "	" 31.1.29 to 11.7.29 ...	25.7.29
*† " Denison ...	Ferris, J. ...	L. W. Cady, A. A. Cooper, E. Beard, J. Rowland-Hill.	"	" " "	" 10.10.28 to 14.3.29 ...	1.4.29
" Dunedin, M.V.	Farmar, F. ...	H. M. Post, V. G. Battle, W. Hopkins.	"	" " "	" 19.12.28 to 15.4.29 ...	23.4.29
" Fremantle, M.V.	Gilling, W.	No. A.	" " "	Form 911 18.6.29 to 2.7.29...	2.9.29
" Gisborne, M.V.	Hayter, S. W. ...	H. Boys-Smith ...	" A.	" " "	" 2.1.29 to 1.5.29 ...	11.5.29
*† " Hobart, M. V.	Cottell, S. C. ...	L. Copeland, R. D. Chamberlain, G. J. O. Jinman, W. B. Craig.	M.L.	" " "	Met. Log. 24.4.29 to 15.8.29 ...	21.8.29
*† " Hunter ...	Robinson, C. A. ...	R. B. Stannard, A. McClouman, J. T. Weldin.	"	" " "	" 1.8.28 to 23.12.28 ...	31.12.28
*† " Huon ...	Compton, J. E.	No. A.	" " "	Form 911 22.5.29 to 26.6.29 ...	29.7.29
*† " Melbourne ...	Kippins, T. ...	W. G. Jones, F. W. Elgar, W. E. Simpson.	M.L.	" " "	Met. Log. 23.11.28 to 21.4.29 ...	25.4.29
*† " Nicholson ...	Jack, J. ...	H. S. Datson, E. E. Roswell, J. H. Sloan, J. A. D. Fisher.	"	" " "	" 28.3.29 to 3.8.29...	8.8.29
*† " Pirie ...	Hudson, J. J. ...	E. H. Rogerson, A. Cooper, A. Brown.	"	" " "	" 26.11.28 to 22.4.29 ...	3.5.29
*† " Sydney ...	Higgs, W. G. ...	E. E. Roswell, F. R. Gorman, R. D. Chamberlain	"	" " "	" 25.9.28 to 29.1.29 ...	8.2.29
*† " Victor ...	Williams, R. ...	H. G. Newbury, R. D. Elson, C. E. Midwinter.	"	" " "	" 5.2.29 to 14.6.29 ...	22.7.29
" Wellington ...	Jones, C. N. ...	L. J. Skails ...	No. A.	" " "	Form 911 5.6.29 to 6.9.29 ...	11.9.29
" Protea, H.M.S.A.S.	Dalglish, J., Lt.-Commr., S.A.N.S.	F. J. Dean ...	M.L.	South African Naval Service.	Met. Log. 3.3.29 to 16.5.29 ...	3.7.29
*† Protesilaus ...	Quirk, T. W. ...	J. Milhench, A. E. Martin, E. A. H. Gepp.	"	A. Holt ...	" 20.11.28 to 24.4.29 ...	14.5.29
" Pyrrhus ...	Elford, W. J. ...	C. W. Copelin ...	No. A.	" " "	Form 911 4.6.29 to 12.6.29...	15.6.29
*† Quiloa ...	Cave, S. G. ...	W. Welch ...	" M.	British India...	" 17.3.29 to 14.4.29 ...	9.7.29
†† Rajputana ...	Cadiz, F. G., D.S.C. ...	R. E. Tucker ...	" M.	P. & O. ...	" 22.4.29 to 24.7.29 ...	30.7.29
†† Ranchi ...	Brooks, C., D.S.O., R.D., Commr., R.N.R.	B. P. Skinner ...	" M.	P. & O. ...	" 3.5.29 to 23.5.29...	28.5.29
†† Rampura ...	Furlong, G. H. S., R.D., Capt. R.N.R.	C. H. Hand ...	" M.	P. & O. ...	" 10.7.29 to 21.8.29 ...	28.8.29
†† Razmak ...	Harrison, R., D.S.O., R.D., Capt. R.N.R.	...	" M.	P. & O. ...	" 15.5.29 to 3.7.29 ...	6.7.29
††60 Regina ...	Davies, E. ...	J. H. Walker, R. Crangle, C. W. R. Campbell.	W.T.	White Star - Dominion	" 11.8.29 to 31.8.29 ...	3.9.29
*† Remuera ...	McKellar, A. W., R.D., Capt. R.N.R.	E. H. Hopkins, T. S. Marchington, R. C. Aldridge.	M.L.	New Zealand S.S. Co.	W.T. Reg. 11.8.29 to 31.8.29 ...	4.9.29
" Rhexenor ...	Stout, G. L. ...	W. E. Barrett ...	No. A.	A. Holt...	Met. Log. 12.4.29 to 28.7.29 ...	15.8.29
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*† Rimutaka ...	Holland, E. A. ...	F. Pretty, F. Cooke, E. Foster	M.L.	New Zealand S.S. Co.	" 2.2.29 to 6.6.29 ...	24.6.29
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" Rother ...	Woodhead, T. H. ...	N. Thompson ...	" A.	Goole Steam Shipping	Form 911 8.6.29 to 27.6.29...	22.7.29
*† Rotorua ...	Hunter, J. L. B. ...	L. Griffiths, H. Cockerill, E. A. Burton, A. L. Nelson.	M.L.	New Zealand S.S. Co.	Met. Log. 6.6.29 to 28.7.29...	9.8.29
" Royal Transport ...	Bowen, A. C. ...	G. R. Thomas ...	No. A.	Houlder Bros. ...	Met. Log. 16.3.29 to 4.7.29...	11.7.29
*† Ruapehu ...	Hunter, J. L. B., Robinson, F. W. ...	H. N. Lawson, H. D. Horwood, T. S. Farrar.	M.L.	New Zealand S.S. Co.	Form 911 7.2.29 to 12.5.29...	17.6.29
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** St. Albans ...	Diamond, S. L. ...	R. L. Harry, J. D. Kavanagh, F. O. Colvin, H. G. Stratford.	"	Eastern and Australian.	" 29.3.29 to 3.7.29...	24.8.29
" St. Helier ...	Richardson, L. ...	C. Bell ...	C.C.	G.W. Railway ...	Telegraphic Report 7.9.29...	7.9.29
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" St. Andrew ...	Bearpark, E. W. ...	J. Meade ...	No. A.	Rankin Gilmour ...	Form 911 16.6.29 to 27.8.29 ...	30.8.29
††38 Samaria ...	Malin, R. G., Lieut.-Commr., R.N.R.	F. D. Thomas, D. MacMillan, P. G. Britten.	W.T.	Cunard ...	W.T. Reg. 5.8.29 to 24.8.29...	28.8.29
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††33 Scythia ...	Irving, R. B., O.B.E., R.D., Capt. R.N.R.	R. Sell, G. H. Morris, J. G. Bradley.	W.T.	Cunard ...	W.T. Reg. 29.7.29 to 17.8.29 ...	21.8.29
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