

VOL. VII. No. 76.

THE MARINE OBSERVER.

APRIL, 1930.

TABLE OF PRINCIPAL CONTENTS.

	PAGE.	Lithographic Illustrations after page 98 :—
Notification of the Classification of Meteorological Logs, etc.	77	Ships' Wireless Weather Signals, Chart V.
Marine Observer's Log (with illustrations)	78	Wind and Fog Roses, S.W. Approaches to Great Britain and Ireland and Approaches to Table Bay— April .
Ice in the Western North Atlantic (with illustrations) ...	84	Mean Sea Surface Temperature Charts, Mediterranean— April .
Weather Signals:—		Cyclone Tracks of the South Indian Ocean during the years 1886-1917— April .
List of Wireless Stations detailed to receive Routine Coded Weather Reports from "Selected Ships" ...	93	Charts A, B, C and D—"Ice in the Western North Atlantic."
France	94	

NOTIFICATION OF THE CLASSIFICATION OF METEOROLOGICAL LOGS, &c.

Up to the time when the first number of THE MARINE OBSERVER was published, Meteorological Logs were acknowledged by letter, the Commanders returning them being informed of their classification. This involved a great deal of correspondence, so much in fact, that the important work of obtaining results from the data collected was seriously hindered. Since THE MARINE OBSERVER was published, all Logs, Registers and Forms have been acknowledged monthly therein in the Fleet List and a letter also sent to the Captain notifying the classification obtained by the Logs or Registers; and in the June number each year special mention has been made in a list of those securing excellent awards.

The splendid work now done at sea with such regular return of Logs, Forms and Registers has increased the work of the Marine Division to such an extent that it is necessary to relieve the strain wherever possible. In the circumstances it is found necessary to substitute for the letters sent hitherto a printed post card by which to inform the Commanders of regular observing ships of the classification of their returns.

With the pending appointment of a Port Meteorological Officer for the Port of London, the assistance of Lieutenant Commander CRESSWELL, R.N.R., at Liverpool and that of the Agents at other ports, as much desired advice as possible will be given verbally.

These gentlemen are in constant touch with the Marine Division; each is responsible for the conduct of the work at his port and Captains and officers will greatly assist by referring to them in all matters appertaining to Marine Meteorology. By so doing they will help to relieve the strain which excessive correspondence involves and which tends to reduce the output of the information which is necessary for the use of the whole Corps of Voluntary Marine Observers and to navigators generally.

MARINE SUPERINTENDENT.

London.

Feb. 10th, 1930.

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.

Talisei Island, Molucca Strait.

THE following is an extract from the Meteorological Log of S.S. *Changte*, Captain F. C. GAMBRILL, Hong Kong to Melbourne.

"April 22nd, 1929, at 3.55 a.m. Vessel on sighting Talisei Island Lt. was found set N. 41° E. (T) 7 miles in 15 hours 45 minutes—Calm weather previously.

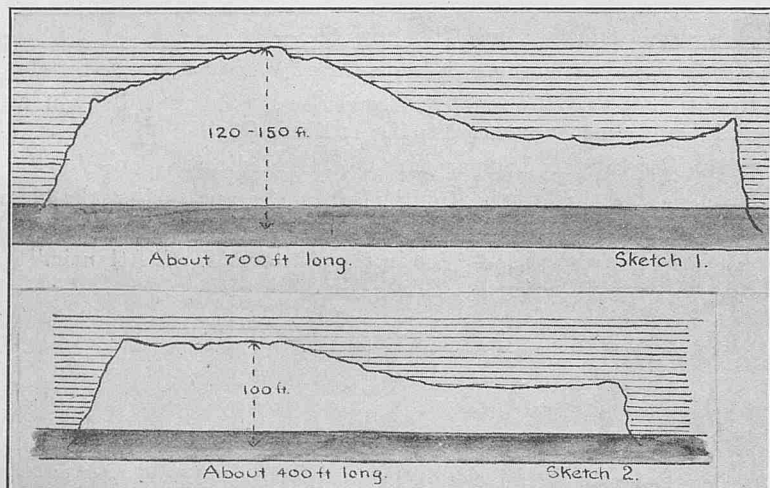
"At 8.47 p.m., Latitude $0^{\circ} 57'$ S., Longitude $126^{\circ} 27'$ E. Very conspicuous tide rips setting N. 22° W. (T)."

ICEBERGS.

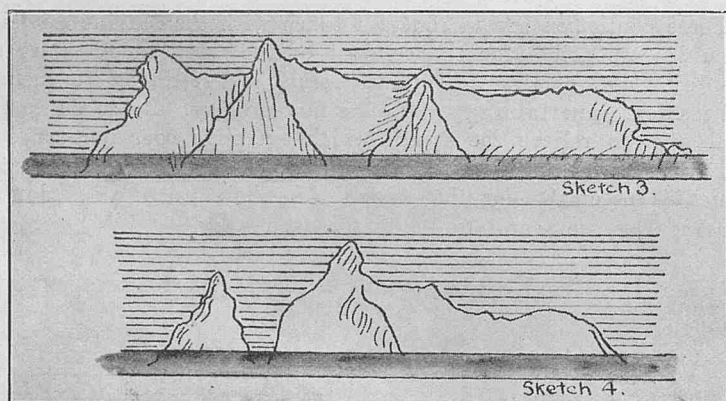
Southern Ocean.

THE following is an extract from the Meteorological Report of S.S. *Deucalion*, Captain C. F. MELLING, Cape Town to Fremantle via Prince Edward, Marion, Crozets and Kerguelen Islands. Observer Mr. R. T. DRYDEN, 3rd Officer.

"16th April, 1929. 0335 G.M.T. about 6.05 a.m. A.T.S. Vicinity Marion Island, ship in approximately Latitude $46^{\circ} 58'$ S., Longitude $37^{\circ} 20'$ E. with Marion Island bearing Eastwards distance about 16 miles, sighted two icebergs. One bore from the ship W.S.W. distant about 20 miles and was about 100 feet high. The other bore South about 15 miles and was approximately 120 to 150 feet in height. The distance between the two bergs was roughly 20 miles and they bore from each other N.W.-S.E. direction. These were the only bergs seen on passage from Cape Town to the Islands. Sketches 1 and 2.

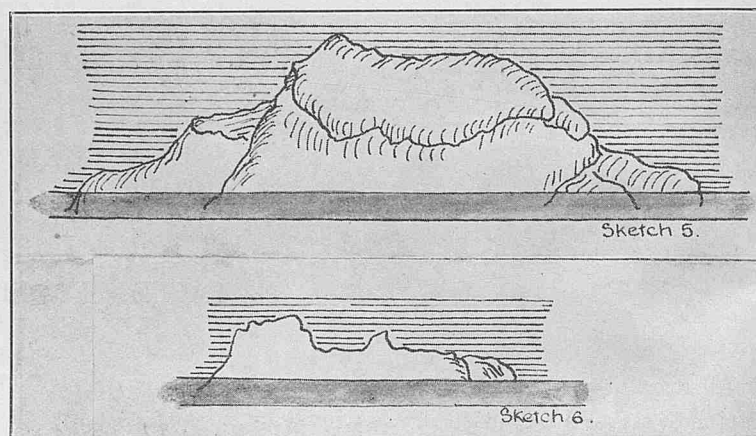


"17th April, 1929. About 4.30 p.m. A.T.S., in Latitude $46^{\circ} 44'$ S., Longitude $37^{\circ} 53'$ E. Observed the larger of the two icebergs seen yesterday about 15-20 miles away and bearing from the ship S. by E. The approximate drift of this berg to the Eastward was about 28 miles in $34\frac{1}{2}$ hours. No sign was seen of the other berg.

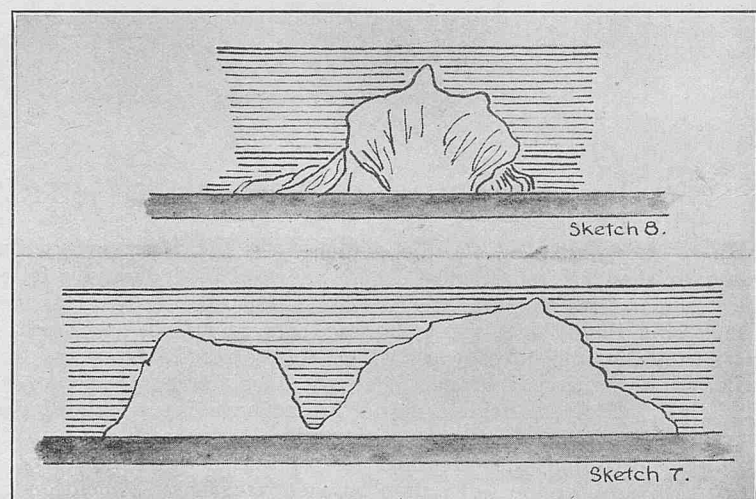


"20th April, 1929. 0430 G.M.T. About 7.50 a.m., Latitude $46^{\circ} 03'$ S., Longitude $49^{\circ} 30'$ E., to Westward Hog Is., passed large iceberg bearing South $2\frac{1}{2}$ miles about 300-400 feet high and 1,000 feet in length. Several growlers were in the vicinity of Hog Island. Sketch 3. 0741 G.M.T., about 11.00 a.m. Latitude $46^{\circ} 20'$ S., Longitude $50^{\circ} 20'$ E. to Eastward of island large iceberg South 8 miles. It appeared as two distinct portions probably joined under water. About 200 feet high and 600 feet long. Sketch 4.

"22nd April, 1929. 0312 G.M.T. about 6.45 a.m., Latitude $46^{\circ} 37'$ S., Longitude $51^{\circ} 55'$ E., about 14 miles S.S.E. Possession Island passed large berg 500-600 feet high and about 1,000 feet long bearing N.E. 4 miles. Sketch 5. 1030 G.M.T. About 2.04 p.m. A.T.S. Position $1\frac{1}{2}$ miles North East Island N.E. Point passed iceberg about 40 feet high and 200 feet long aground $\frac{1}{2}$ mile off Point. 2 Growlers about 30 feet high and 40 feet long were ashore closer to the beach. Probably remains of larger berg. Sketch 6. 3.30 p.m.



A.T.S. Iceberg bearing S.S.W. 10 miles off East Island. Position of berg about Latitude $46^{\circ} 35'$ S., Longitude $52^{\circ} 20'$ E. Height about 250 feet and 1,000 feet long. Sketch 7. 4.00 p.m. A.T.S. Iceberg 5 miles W.S.W. East Island about 100 feet high and 150 feet long. Sketch 8. Icebergs observed on 20th April onwards were apparently all aground."



PATCHES OF CALM WATER.

North Atlantic Ocean.

THE following is an extract from the Meteorological Report of S.S. *Dunluce Castle*, Captain C. R. JACKSON, Cape Town to London. Observer Mr. H. COLWILL, 3rd Officer.

"26th April, 1929, in Latitude $24^{\circ} 53'$ N., Longitude $16^{\circ} 20'$ W., Barometer 29.81 in., temperature air 71° F., sea 60° F., wind N.W.

force 6, sea north 5, swell N.W. 4, visibility 9. Vessel passed through long lanes or channels of smooth water though the sea was rough on either side of the calm belts; in Latitude 25° N. and Longitude $16^{\circ} 14'$ W. the conditions were again normal.

"The calm patches extended 12 to 15 miles in length and always North and South in direction."

TIDE RIPS.

South Pacific Ocean.

THE following is an extract from the Meteorological Report of S.S. *Lochkatrine*, Captain O. V. SCHLANBUSCH, West Coast North America to Rotterdam. Observer Mr. D. R. MALLINSON, Cadet.

"On April 15, 1929, noticed strong tide rips throughout the day over smooth sea, more or less in patches and long lines. Ship's steering was quite considerably affected at times. Position at Noon Latitude $10^{\circ} 16'$ N., Longitude $87^{\circ} 58'$ W. Course S. 63° E., speed 10.5 knots. N.W'y current $1\frac{1}{2}$ knots. Light airs throughout the day and S.E. force 1 later."

Off Coast of Sumatra.

THE following is an extract from the Meteorological Report of S.S. *Glengarry*, Captain J. ANGIER, Far East to United Kingdom. Observer Mr. D. C. EVANS, 3rd Officer.

"April 13th, 1929. During forenoon watch, off Pulo Wey, N. Sumatra. Experienced moderate to strong tide or current rips. Eastwards of Pulo Rondo bearing 186° distant 12 miles, general direction of rips were W. by N. but westward of above position direction altered to North and rips increased in apparent velocity. Rates of same were judged to be approximately 2 and 3 knots respectively.

"Peculiar phenomenon observed was that although rips appeared to set W. by N., vessel's course 'made good' was 273° ; course steered being 276° . When within the influence of the Northerly rips a N.W. by W. set was experienced, which persisted.

"Weather during watch was clear and cloudy; sea slight (excepting current rips). Temperature air 83° F. sea 84° F. Wind E.S.E. force 2."

BROKEN WATER.

North Atlantic Ocean.

THE following is an extract from the Meteorological Report of S.S. *Walmer Castle*, Captain W. MORTON BETTS, Cape Town to Southampton. Observer Mr. G. H. PICKERING, 3rd Officer.

"April 1st, 1929, at 10.05 to 10.12 a.m. passed through patches of broken water, the sea breaking from a West direction. The extent of the whole was about $1\frac{1}{2}$ miles long by quarter to half mile broad. Wind was North, force 4, sea and swell North, amount 4. Air temperature 69° F., sea 67° F. Latitude $15^{\circ} 36'$ N., Longitude $17^{\circ} 46'$ W."

DISCOLOURED WATER.

Fiji Islands.

THE following is an extract from the Meteorological Log of M.V. *Karama*, Captain A. McINTOSH, Balboa to Suva and Port Chalmers. Observer Mr. K. D. FISHER, 2nd Officer.

"April 11th, 1929. Whilst passing through the Nanuku Passage and Koro Sea, the vessel was constantly passing through large floating patches of seedlike matter. It was of a greenish brown colour and floating in long ribbons streaked in the direction of the tide eddies. These ribbons while in the smooth water were visible for a considerable distance. They had patches of apparently oily water between them and could easily be mistaken for coral reefs, particularly by moonlight. Later the rotator of the patent log was found to be deeply scored, apparently from towing through this matter.

"April 18th, 1929. 0400 G.M.T. Latitude $22^{\circ} 17'$ S., Longitude $178^{\circ} 52'$ E. Vessel for the last four hours passing through thin lines of floating matter similar to above, streaked E. and W. with the wind. No more was seen of it after this. Wind West, force 4,

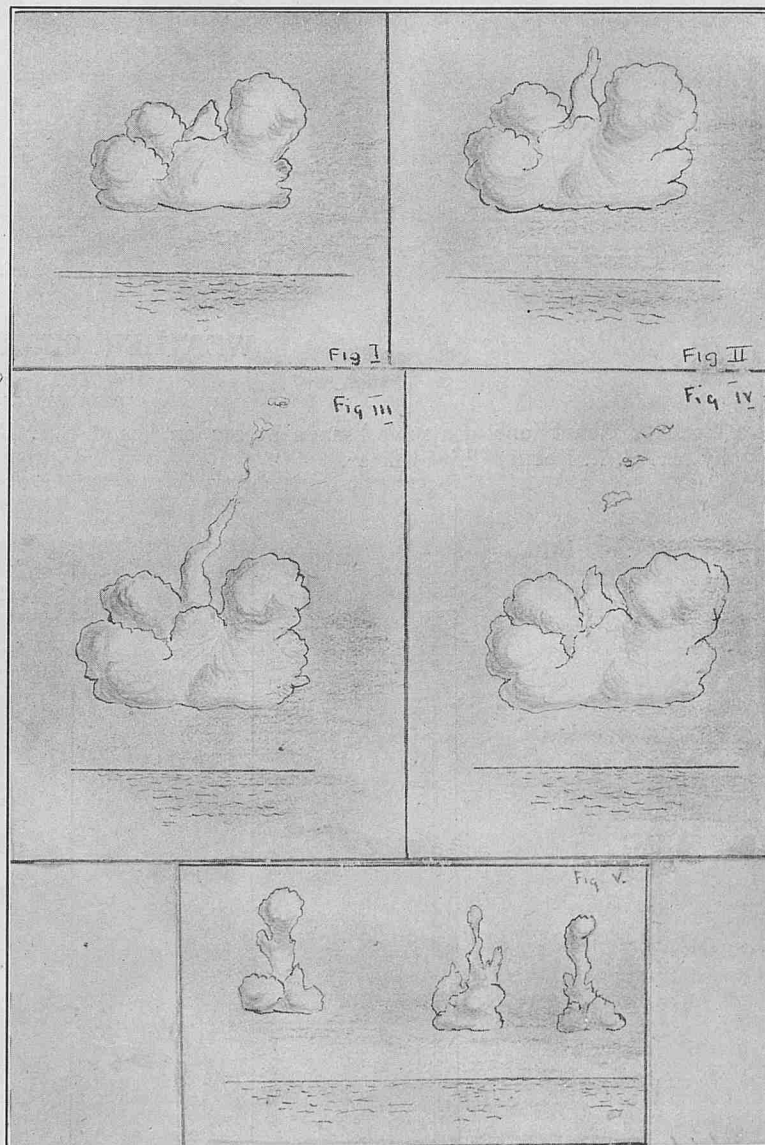
sea slight, sea temperature 78° F. Whilst the vessel was in Suva, information was received from the harbour master and other reliable sources regarding this flotsam. It is pumice-like matter thrown up by the various submarine volcanoes in the vicinity of the Islands, and is at times met with as much as 2 feet in depth, when it materially impedes the progress of small steam vessels. These patches are being constantly mistaken for coral reefs, even by experienced Island traders and are doubtless responsible for a great many of the Vigias reported in these waters."

CLOUD PHENOMENON.

South Pacific Ocean.

THE following is an extract from the Meteorological Log of M.V. *Karama*, Captain A. McINTOSH, Balboa to Suva. Observer Mr. K. D. FISHER, 2nd Officer.

"April 5th, 1929. 4.00 p.m. (0208 G.M.T.). Latitude $13^{\circ} 23'$ S., Longitude $152^{\circ} 38'$ W. Course 206° , 15 knots. Flat calm in glassy sea. Barometer 1009.3 mb. bc. Cu-Nb/West, Temperatures, Dry Bulb $84^{\circ}.5$ F., Wet Bulb $76^{\circ}.5$, sea $84^{\circ}.5$ F. Massive flat-bottomed Cu-Nb. apparently moving slowly from West, mainly due to ship's course and speed. Many of these clouds were observed to suddenly throw up 'pillars' as in Fig. II. These pillars would rapidly increase in height until they finally burst, emitting a fine plume of cloud somewhat resembling a puff of smoke, Fig. III. The cloud



would then rapidly resume its natural formation, the plume becoming a small cloud on its own, Fig. IV. The whole operation would not take longer than about 10 minutes from start to finish. In some cases one cloud would erect several such 'pillars' at once, while in others the whole cloud would become vertically elongated, Fig. V. This phenomenon was observed to be taking place until sunset when the clouds became taller and more loosely packed."

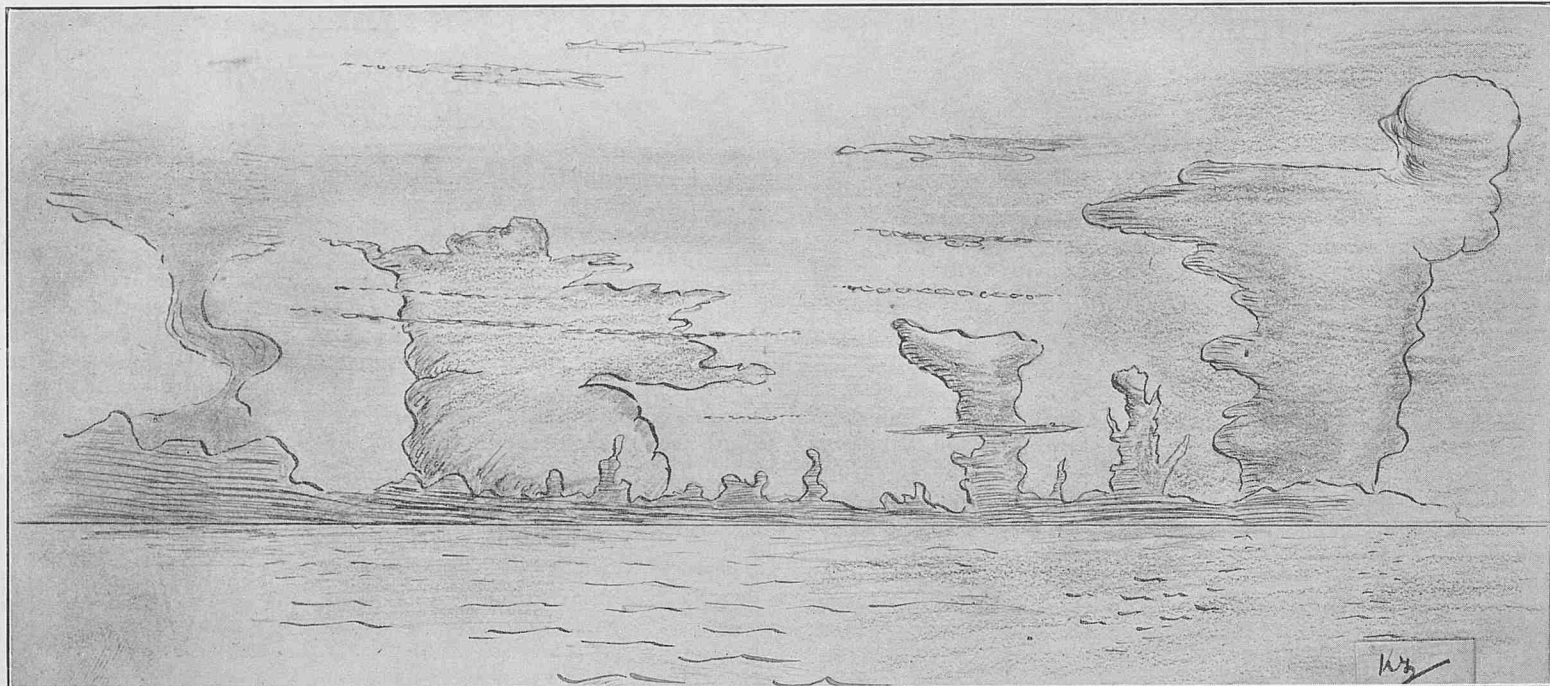
CLOUD FORMATION.

South Pacific Ocean.

THE following is an extract from the Meteorological Log of M.V. *Karamea*, Captain A. McINTOSH, Balboa to Suva. Observer Mr. K. D. FISHER, 2nd Officer.

"April 6th, 1929. During the latter part of the passage from Balboa to Suva most amazing cloud formations were frequently

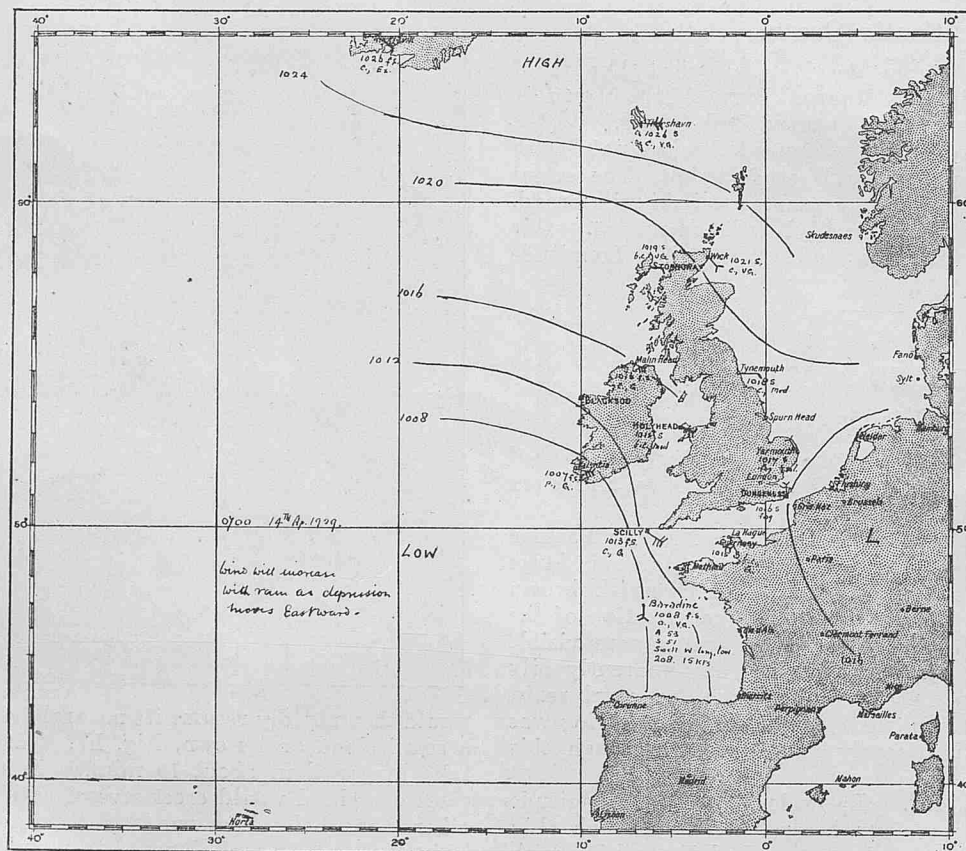
observed. The accompanying very crude sketch was made on the evening of the 6th April just before sunset in Latitude $14^{\circ} 25' S.$, Longitude $153^{\circ} 52' W.$ For all its obvious failings it is certainly correct as to the cloud shapes, and the display was even more spectacular than depicted. The cloud on the left, already in the shadow, was exactly like a smoking volcano and very gloomy in appearance."



WEATHER CHARTS MADE AT SEA.

Eastern North Atlantic.

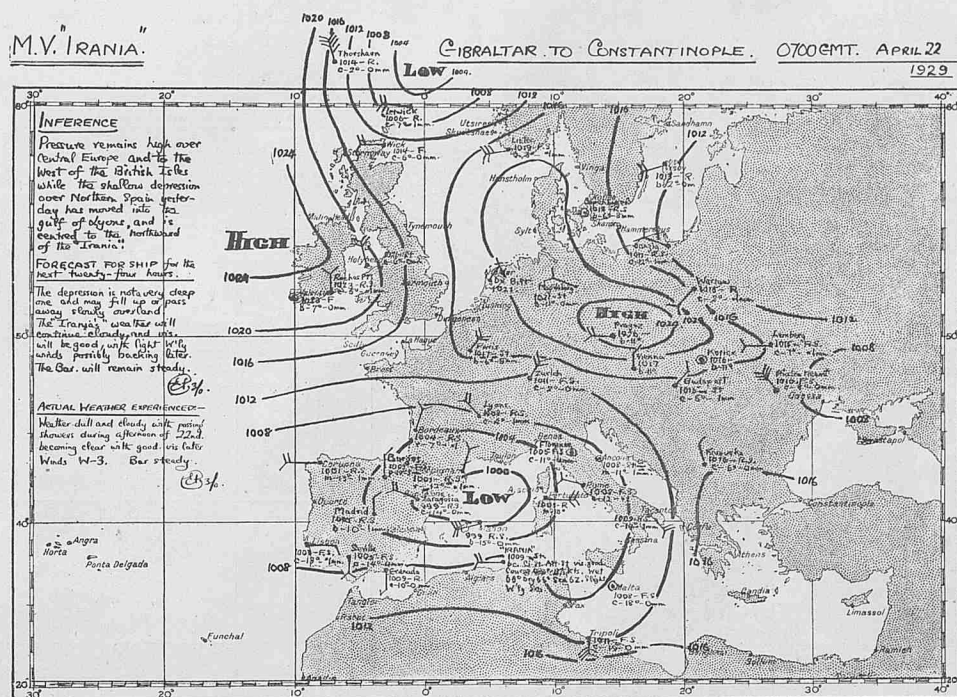
Weather Chart (one of a series) made at sea on board S.S. *Baradine*, Captain C. H. C. ALLIN, London to Australia via Suez, by Mr. C. B. ROCHE, Chief Officer.



According to *Baradine's* Meteorological Log the wind increased to force 6 at noon. Weather o.r.q.

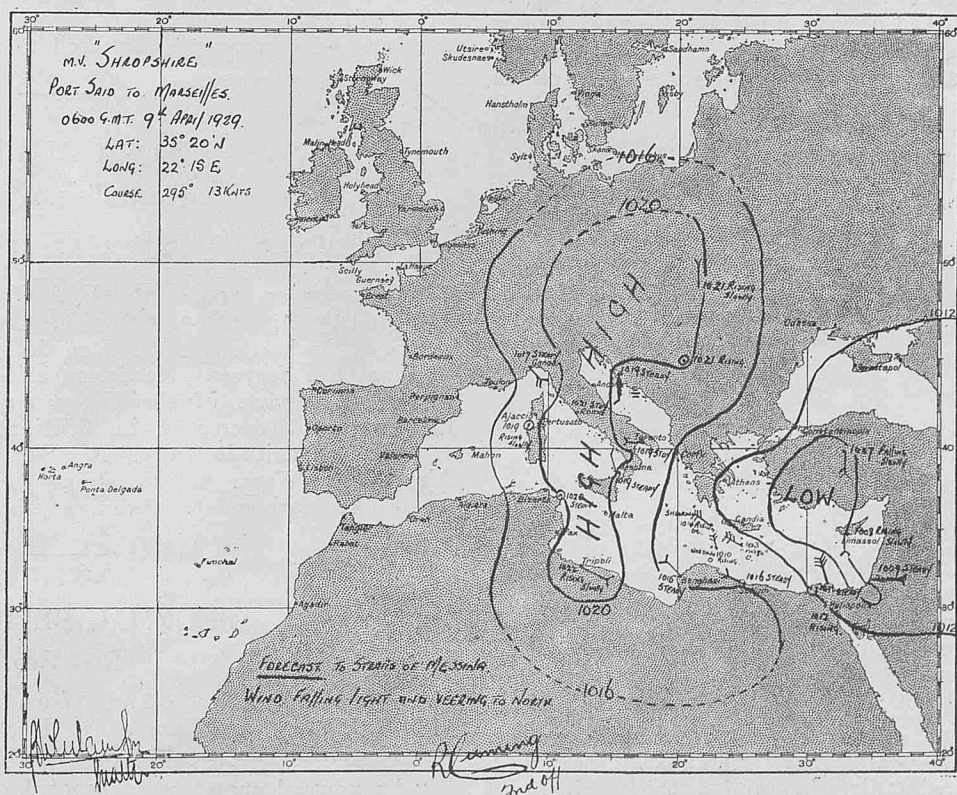
Western Mediterranean.

Weather Chart (one of a series) made at sea on board S.S. *Irania*, Captain P. A. ADAMS, Gibraltar to Constantinople, by Mr. E. ALLEN, 3rd Officer.



Eastern Mediterranean.

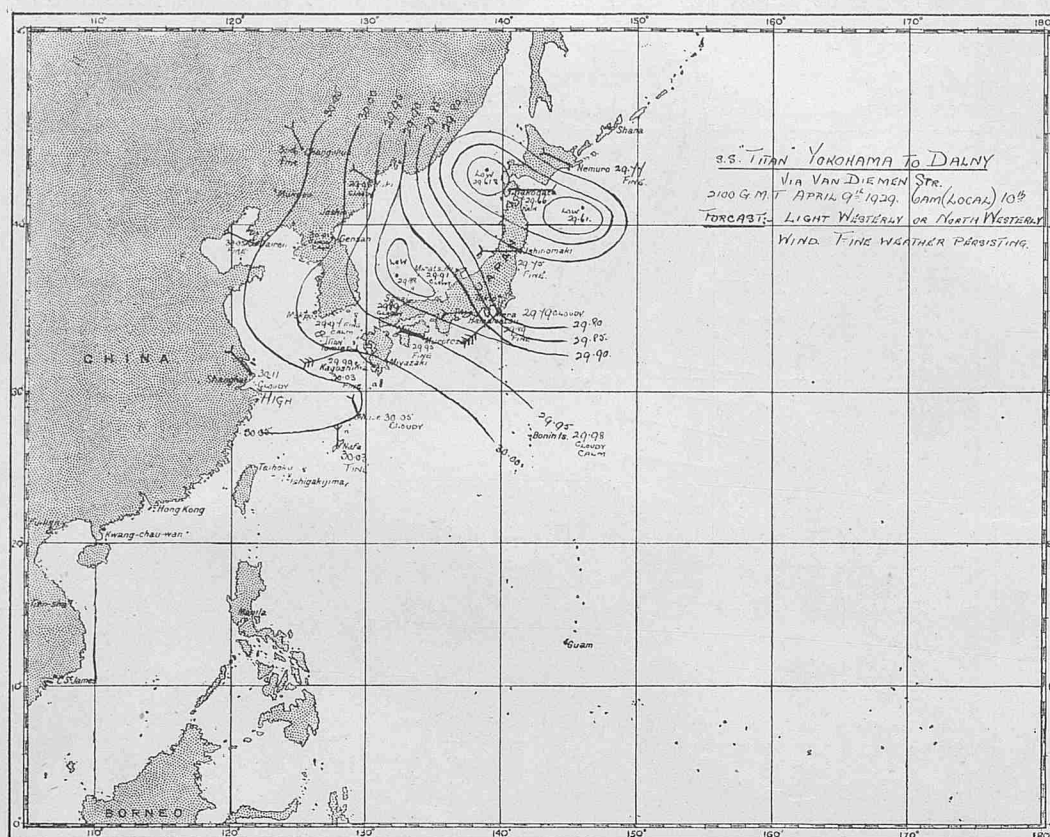
Weather Chart (one of a series) made at sea on board M.V. *Shropshire*, Captain B. W. ADAMSON, Rangoon to London, via Suez, by Mr. R. CUMING, 2nd Officer.



According to *Shropshire's* Meteorological Log the wind veered to North at 2.30 p.m. falling to force 2.

China Sea.

Weather Chart (one of a series) made at sea on board S.S. *Titan*, Captain J. POWER, Yokohama to Dalny.



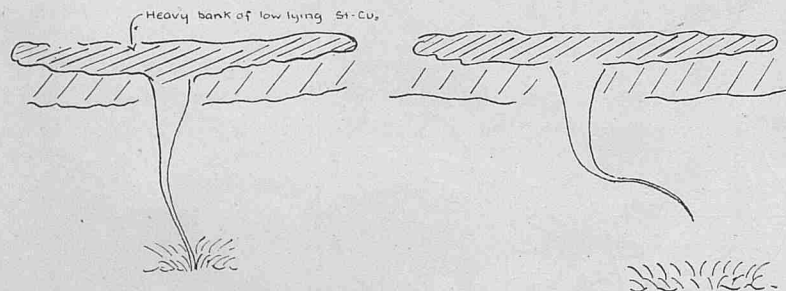
According to *Titan's* Meteorological Log the wind was N.W.'ly, force 2, weather fine.

WATERSPOUT.

Sulu Sea.

THE following is an extract from the Meteorological Log of S.S. *Arafura*, Captain A. S. GORDON, Australia to East Indies. Observer Mr. F. R. MILLER, Chief Officer.

"On April 8th, 1929, at 6.41 a.m., in the Moluca passage off the Sulu Islands a very distinct waterspout was observed, particularly noticeable on account of the large splash at the sea surface. It only lasted for about three minutes. It became rapidly bent and seemed to lose connection with the sea surface although the splash was still very noticeable."



North Atlantic Ocean.

THE following is an extract from the Meteorological Log of S.S. *Northumberland*, Commander H. L. UPTON, D.S.C., R.D., R.N.R., Cristobal to London. Observer Mr. W. J. GLASSBOROW.

"April 11th, 1929, 10.45 a.m., in Latitude 42° 50' N., Longitude 30° 18' W. Observed about 1/4 mile distant on starboard bow, patch of sea lashed to milky white fury. This patch took on a swirling motion in a clockwise direction and a thick column of spray appeared to ascend. A few seconds later, this column united

with a tongue of cloud pendant from Nimbus and, becoming one, travelled rapidly across vessel's bow in the form of a large waterspout—finally dissolving in the distance on port bow some three minutes later. Barometer 997.3 mb., wind S. by W. force 7/8. After this phenomenon, wind veered to S.W. with signs of clearing weather and barometer commenced to rise."

AURORA AUSTRALIS.

Australian Waters.

THE following is an extract from the Meteorological Report of S.S. *Port Wellington*, Captain C. N. JONES, Suez to Melbourne. Observer Mr. L. J. SKAILES, 3rd Officer.

"April 16, 1929, 1320-1340 G.M.T. Observed Aurora Australis over an arc of the horizon of about ten degrees and attaining an altitude of about five degrees. Maximum brilliancy approximated that of the brighter parts of the Milky way. Phenomenon continually increased and decreased in brilliancy while visible. Latitude 38° 12' S., Longitude 138° 58' E. Barometer 30.09 in. Temperature Air 62° F., Water 61° F. Wind N.N.W. force 4. Clouds nil. Atmosphere rather dry. Stars very bright."

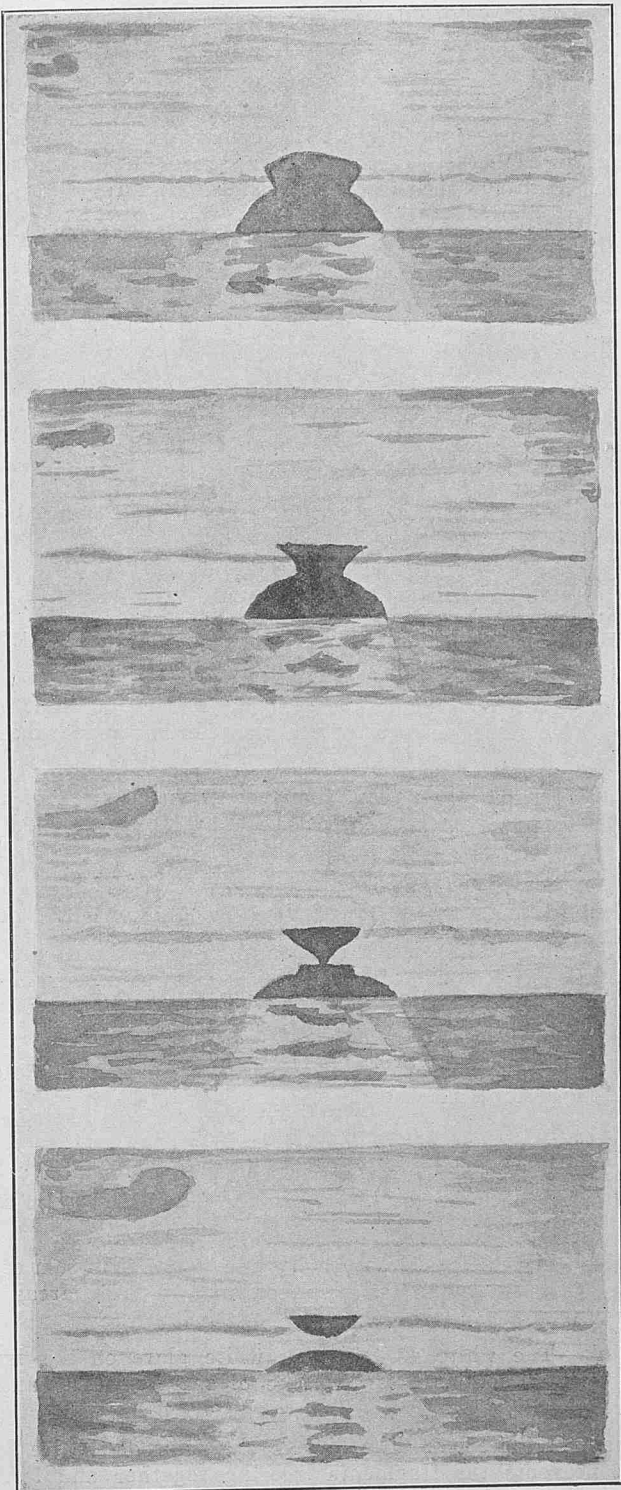
ABNORMAL REFRACTION.

Red Sea.

THE following is an extract from the Meteorological Log of H.M.S. *Endeavour*, Commander E. F. B. LAW, R.N. Observer Sub-Lieutenant M. B. THOMAS, R.N.

"An unusual sunset was observed on April 3rd, 1929. Position Latitude 14° 50' N., Longitude 42° 25' E. Wind S.S.E. force 2.

Barometer 1010.2 mb. Temperatures dry 81° F., wet 79° F. Sea 81° F. Zone time of sunset 1823."



MIRAGE.

North Atlantic Ocean.

THE following is an extract from the Meteorological Report of S.S. *Pennland*, Captain V. L. MAKING, Southampton to Halifax, N.S. Observer Mr. C. J. MURRAY, 3rd Officer.

"19th April, 1929, 10.0 a.m. ship's time in Latitude 46° 30' N., Longitude 49° 10' W. Icebergs could be seen reflected in the sky at a distance of 17 miles and some considerable time before they were discernable above the horizon—cloudless sky. Barometer 29.96 in. Air 36° F., Sea 32° F. Wind S—force 4.

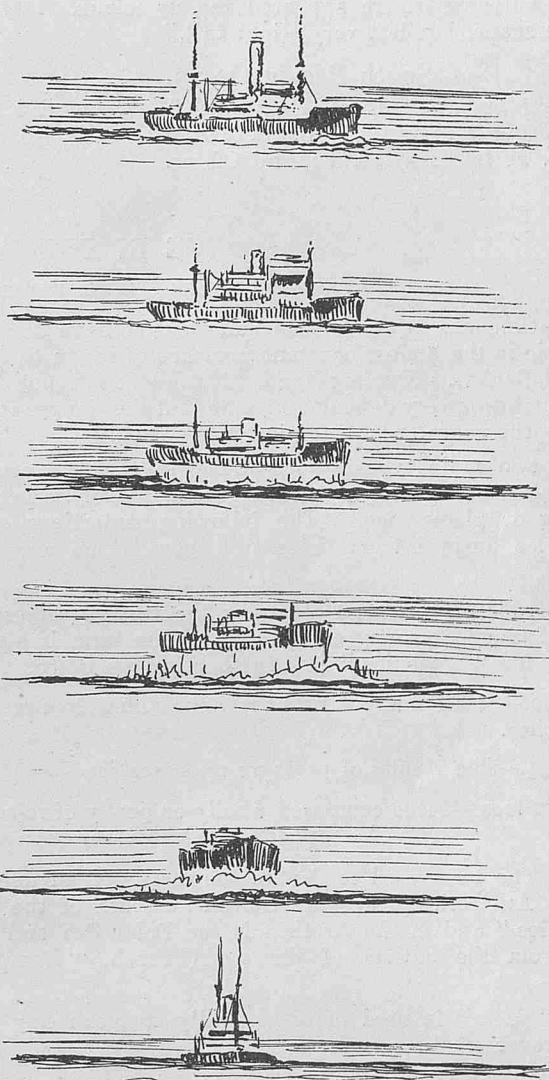
"Images were inverted and single."

Off Cape Colony.

THE following is an extract from the Meteorological Report of S.S. *Saxon*, Captain P. G. SHILSTON, Cape Town to Algoa Bay. Observer Lieutenant E. QUICKENDEN, R.N.R., Sketches by Lieutenant C. H. WILLIAMS, R.N.R.

"24th April, 1929, on passage from Cape Town to Algoa Bay. Throughout the day exceptional refraction was observed, the horizon all round being distorted, having in some places the appearance of a waterfall. The clouds were high cirro-stratus moving slowly from the Northward.

"Mountains from 50 to 100 miles distant were well defined. The S.S. *Calumet*, with whom we were in company, was distorted in an extraordinary manner, her apparent shape changing completely sometimes in a few minutes as shown in the enclosed sketches. At 6.47 p.m. L.S.T. Cape St. Francis Light was observed, distant 41 miles."



Chas. H.
Williams. 1929.

METEOR.

North Atlantic Ocean.

THE following is an extract from the Meteorological Report of S.S. *Scholar*, Captain A. G. PETERKIN, Durban to Liverpool. Observer Mr. G. BAKER, 3rd Officer.

"April 3rd, 1929, at 2118 G.M.T., Latitude 1° 25' N., Longitude 11° 45' W. (D.R.). Observed passage of a brilliant meteor commencing in Gemini, between Mars and Pollux and travelling in a S. Easterly direction disappearing to the westward of Capella. The time of flight was about three seconds, the speed appearing slow. The meteor was of a great magnitude (similar to that of Venus) and

illuminated the greater part of the vaults of the heavens. The remarkable feature was its varied colours. For the first second it appeared of a rich topaz, it was then transformed into a brilliant emerald and faded with the tints of a turquoise. Sky St. 1. Visibility 7. At 2343 G.M.T. and 2347 G.M.T. two more incandescent aerolites of inferior brilliancy. The first of about one second duration passing through Canopus and the second appearing near Procyon."

Mediterranean Sea.


THE following is an extract from the Meteorological Report of S.S. *Orford*, Captain A. L. OWENS, R.D., R.N.R., Port Said to U.K. Observer Mr. R. GALPIN.

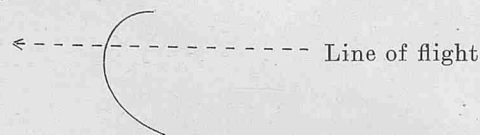
"28th April, 1929, at 2042 G.M.T., when in Latitude 32° 30' N., Longitude 29° 30' E., clear and cloudless sky, an exceptionally large and bright meteor was observed. It travelled from the Zenith to about 30° altitude in a S. Easterly direction and burnt as a greenish white light, while its centre appeared red in colour. It appeared to be oval in shape, but left very slight tail."

South Pacific Ocean.

THE following is an extract from the Meteorological Log of S.S. *Clan Malcolm*, Captain L. S. GEORGE, Apia to Panama Observer Mr. F. B. FAIRWEATHER, 2nd Officer.

"April 9, 1929, 12.20 a.m. A.T.S. Latitude 3° 00' S., Longitude 154° 50' W. In cloudless sky observed exceptionally bright meteor illuminating the whole of the heavens. Appearing about 10° S.S.E. of Vega, its flight, which lasted about three seconds, terminated in the vicinity of Mizar (Ursa Major), subtending an angle of about 55°.

"In magnitude it was equal to at least three times that of Venus, as seen on a clear night. Its colour was of a bluish tinge throughout. The trail which first appeared in a straight line having an angular measurement of approximately 25°, slowly altered shape to  and on its disappearance 17 mins. after the flight thus



also the approximate direction of wind."

ICE IN THE WESTERN NORTH ATLANTIC.

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

The greatest menace to the safe navigation of ships in the Western North Atlantic is the almost constant presence of ice in the vicinity of the Grand Banks of Newfoundland. The ice acted upon by wind and current makes it very difficult to locate and the danger is greatly intensified by the prevalence of fog in these waters.

There are two main types of ice found in the Western North Atlantic constituting a danger to navigation, namely, pack or sea ice and berg or glacier ice. The following definitions correctly describe all ice derived from these two types which may be met with at sea.

Slush or Sludge.—The initial stages in the freezing of sea water when it is of gluey or soupy consistency. The term is also occasionally used for "brash ice" still further broken down.

Pancake Ice.—Small floes of new ice approximately circular and with raised rims.

Hummocking.—The results of pressure upon sea ice.

Hummocky Floes.—Floes composed wholly or partly of re-cemented pressure ice.

The Pack.—The term used to denote the main belt of derived ice which in the Antarctic girdles the Continent south of the zone of the "westerlies" and in the Arctic fills the Polar Sea and escapes southward from the outlets of the sea (French, "Banquise de derive").

The term "pack" is used more generally to mean any area of pack ice however small.

Close Pack.—Pack is composed of floes mainly in contact.

Open Pack.—The floes for the most part do not touch.

Drift Ice.—Loose very open pack where water predominates over ice.

Brash.—Small fragments and rounded nodules the wreck of other kinds of ice.

Berg.—A large mass of glacier ice.

Bergy Bits.—Medium sized pieces of glacier ice or of heavy floes or hummocky-pack washed clear of snow (typical bergy bits have been described as about the size of a cottage).

Growlers.—Similar pieces of ice to the above, but so small as barely to show above sea level.

Rotten Ice.—Floes which have become much honey-combed in course of melting or which appear black through saturation with water (thin sheets of newly formed very thin ice also appear black and may easily be confused with the last type when met in the pack).

Level Ice.—All unhummocked ice, no matter of what age or thickness, which has platy structure and fibrous appearance when broken.

Fast Ice.—Sea ice while remaining fast in the position of growth. True fast ice is only met along coasts where it is attached to the shore or over shoals where it may be held in position by islands or stranded icebergs.

Pack Ice.—Sea ice which has drifted from its original position.

A Floe.—An area of ice other than fast ice whose limits are within sight. Floes up to two feet in thickness may for convenience of description be termed "light floes"; floes thicker than this "heavy floes."

A Field.—An area of pack ice of such extent that its limits cannot be seen from a ship's masthead.

A Crack.—Any fracture or rift in sea ice.

A Lead or Lane.—A navigable passage through pack ice.

A Pool.—Any enclosed water area in the pack other than a crack or a lead or lane.

Water Sky.—Dark streaks on the sky due to the reflection of water spaces or the open sea in the neighbourhood of large areas of sea ice.

Ice Blink.—The white or yellowish white glare on the sky produced by the reflection of large areas of sea ice. (The antithesis of water sky).

Movement of the Pack.—The diverse character of the ice forming the pack prevents the fragments freezing together and forming a solid mass during the polar winter. It is this characteristic which permits the free movement of the pack, otherwise the ice would not be navigable and would probably become permanent by addition of snow.

Formation and Drift of Sea Ice.—Towards the end of autumn, in the Arctic Sea and on the coasts of Labrador and Newfoundland, owing to the fall in temperature, the surface cooling of the sea causes numberless small ice plates called frazil crystals to form. During calm weather these crystals collect and form a thin scum on the surface which at first has little stiffness owing to heat conduction from the water below, preventing the brine remaining between the crystals which are themselves fresh from freezing. As the season progresses the sheet of ice and brine thickens, the temperature being reduced to a sufficient extent to allow the brine to freeze, when the whole becomes a rigid sheet of ice. During the summer much of the Arctic pack ice is set free, and drifting southward, arrives off the N.E. coast of Labrador in November at the same time as sludge ice is forming there. By the end of

Field Ice, Gulf of St. Lawrence.



November the waters around the whole Labrador coast have generally frozen over and the whole pack drifts south arriving off the east coast of Newfoundland about the end of January.

When clear of the Newfoundland coast the ice spreads east and west forming fields and floes which may be met with north of the 43rd parallel, between the 45th meridian and the east coast of Nova Scotia. Off the Newfoundland coast, ice fields may be met with late in summer, but further south it quickly melts, rarely existing south of Newfoundland after the early part of May.

The thickness of pack ice ranges from about 15 feet in the Arctic to about 6 feet on the coast of Newfoundland, but these thicknesses may be greatly exceeded owing to the interposals of capes in the way of moving ice-fields, and to the unequal movement between the floes exerting pressure on the ice, causing it to hummock. Navigation within the Gulf of St. Lawrence is completely suspended, usually from the beginning of December to the end of April. During the winter months the ice increases rapidly forming extensive sheets. These are, however, frequently broken across by the wind, leaving leads of open water between the separated parts. At other times the wind presses the sheets of ice together forming a close pack extending for many miles.

At the break-up of winter conditions, towards the end of April, the ice commences to move out of the Gulf sometimes causing a block between St. Paul Island and Cape Ray. This block, known as "the Ridge," sometimes continues for three weeks completely closing the Cabot Straits to navigation. On leaving the Gulf, the movement of the ice is chiefly dependent on the prevailing winds, but if the winds are light or variable the movement is affected by current alone, and it will move in the direction of the Banquereau Bank, where it quickly melts under the influence of the sun and warm winds.

Formation of Land Ice and Calving of Icebergs.—Research on the formation of glaciers by the scientific staff of Scott's last Antarctic expedition, shows that ice is formed entirely by the growth and modification of snow crystals. The larger crystals grow at the expense of the smaller and tend to unite by a kind of distillation in which water molecules leave small crystals and join large crystals. The growth of the large and diminution of the small crystals permits them to pack more closely under pressure. When closely packed the crystals still remain distinct, being separated by air spaces at their boundaries. Snow in this condition is known as *nêvé*. The subsequent change from *nêvé* to ice takes place in

exactly the same manner as the change from snow to *nêvé*. In the course of time the crystals grow so as to include the air cavities, which in the form of *nêvé* marked the boundaries between them.

The rate of change from snow to ice depends upon the temperature and pressure being quicker at high, than at low temperatures, and when subject to great pressure the crystals come in closer contact, allowing direct movement of the water molecules between them.

In the interior of Greenland, owing to the low temperature, one layer of snow cannot melt before the next falls, there is, therefore, a huge accumulation of snow which, in the course of time is changed into ice in the manner described, thus forming a massive ice sheet known as the "Greenland ice cap." From this cap the ice, subject to enormous pressure, flows outwards in all directions but mainly where its motion is least obstructed. The chief flow is therefore down the sloping valleys towards the sea.

When the ice of a glacier reaches the coast it continues to move seawards, its weight being taken by the ocean bed until the water deepens sufficiently to make the ice buoyant, when it becomes water-borne. Such an extension of glacier ice from the shore, seaward, is termed an "Ice Tongue."

The bergs which menace the shipping lanes of the North Atlantic are huge masses of ice which are broken off from the ice tongues of the Greenland glaciers, chiefly through the undermining action of the surface sea water and the formation and development of cracks and crevices in the ice tongue, due to the strain exerted by the action of tides, heavy swell and wind pressure.

Colour of Ice.—The white light of the sky, reflected from numberless facets of the snow crystals when separated by the included air gives snow its white appearance. In the case of ice formed directly from a snow drift falling upon ice, the direction or growth of the crystals is upwards from the ice upon which the snow falls, so that the air is able to escape from between the crystals as they join up, thereby forming clear air-free ice which at great thicknesses appears blue.

Most glacier ice, however, contains air which is included in the crystals themselves in the form of small spherical bubbles, and this gives to the ice a whitish opaque appearance. Many crevices in the glaciers become filled with sand and debris blown down from the surrounding land, thus forming silt bands in the ice which greatly discolour it.

Density and Size of Bergs.—The density of ice in icebergs is variable. In some the snow is not so completely transformed into ice as in others, while some carry appreciable loads of rock material. An iceberg, if composed of pure ice only, would float with approximately one-ninth of its mass above water, the weight of a cubic foot of sea water being 64 lbs., and that of a cubic foot of ice 57 lbs. Recent research into the density of Greenland Bergs by Professor H. T. BARNES, D.Sc., F.R.S., records that from one-sixth to one-tenth of the volume of an iceberg consists of air, causing it to displace less water than ordinary ice. It was found that many bergs float with as much as one-third of their mass out of water.

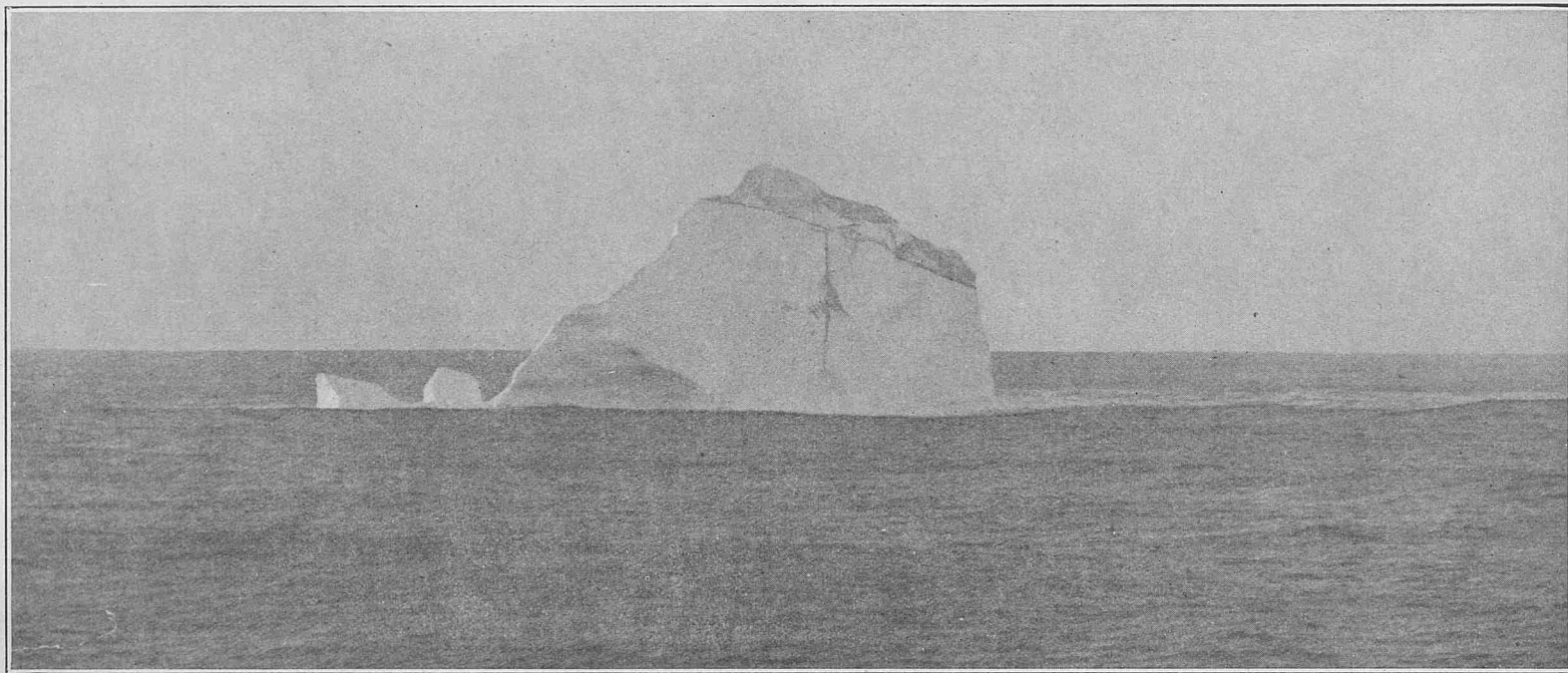
Professor E. VON DRYGALSKI measured 87 bergs shortly after calving from the Greenland glaciers and found the highest to be 449 feet above the surface. He found that their height decreases rapidly with the length of time that elapses after their formation, a difference of 13 feet being noticed in one instance after an interval of one week and in another a decrease of 76 feet in about eight weeks.

and joins the Labrador current flowing down the west side of the Strait.

The Labrador Current.—Ice bearing currents of polar origin setting out of Smith and Lancaster Sounds unite and set south on the western side of Baffin Bay and Davis Strait. Entering the Atlantic, it continues south along the coasts of Labrador and Newfoundland. It expands over the northern part of the Great Bank and divides into two branches. One branch setting S.W., flows through the deep water channel south-eastward of Cape Race, while the other flows south along the eastern edge of the Great Bank until it meets the northern edge of the Gulf Stream, forming what is known as the "cold wall."

The Gulf Stream, flowing out of the Straits of Florida, follows the United States coast northward, to the Latitude of Cape Hatteras, when its width rapidly expands and its course gradually inclines to the eastward. On arriving in the vicinity of the Grand Banks of Newfoundland its course is east. During the winter, it flows to the southward of the Bank, but during the summer, creeps north flowing

Iceberg in Western North Atlantic.



The highest berg measured by the International Ice Patrol was 248 feet above water while the longest berg measured 1,690 feet from end to end. During the 1928 season ships steaming on the Belle Isle tracks reported many bergs of such dimensions as have hitherto been thought to exist only in Southern waters. One berg reported was of tabular form approximately 100 feet in height and six and a half miles in length.

Drift of Icebergs.—The movements of icebergs are mainly controlled by the set of prevailing currents. The direct effect of wind upon their drift is negligible owing to the immersion of so great a proportion of their mass. The effect of the wind, however, indirectly plays an important part by its action on the retardation or acceleration of the currents which govern the movement of the bergs.

There are three currents, two cold water and one warm water, chiefly concerned in causing the ice menace to Atlantic shipping. The East Greenland and Labrador currents bring the ice south from their place of calving, while the Gulf Stream determines the southern limit of their drift, and is responsible for the disintegration and melting of the bergs.

The East Greenland current flows south from the East Greenland Sea in the vicinity of Spitzbergen. Converging towards Denmark Strait, it passes between Iceland and the mainland, whence it follows the East Greenland coast to Cape Farewell. Its course is then diverted northward by the pressure of water setting northward from the Atlantic, and, rounding Cape Farewell, it proceeds up the west coast of Greenland. In about Latitude 63° North, a branch of the main stream shoots westward across Davis Strait

over the Tail of the Bank. The "cold wall" is the line of demarcation between the cold water of the Labrador current and the warm water of the Gulf Stream.

From observations obtained by the Ice Patrol Cutters, the movement of the currents which determine the drift of bergs around the Tail of the Bank are now fairly established. Lieutenant-Commander E. H. SMITH, U.S.C.S., Oceanographer to the International Ice Patrol, states:—"The Labrador current impinges itself at the Tail of the Bank on the northern edge of the Gulf Stream. At times the push is strong enough to split the Labrador current into an east and west branch. In this case the stronger branch determines the berg drift, the relative strength of the branches probably depending to a great extent on the angle of impingement of the Labrador current, against the Gulf Stream. The conflict of the two currents together with the position of the Bank, produces a frictional arresting of the Gulf Stream on its northern edge, which in turn swings it in sharply to the north and north-west immediately after passing the Tail. The inshore westward swirl of frictional bands of the Gulf Stream sets up an interlacing movement of the two waters." In the vicinity of the Tail the surface temperature of the Labrador current during April is 32° to 34° Fahr., in May its temperature is 36° to 38° Fahr., and in June, its temperature rises to 40° to 44° Fahr.

At the break-up of the Arctic winter in the Spring of the year, the bergs calved from the glaciers on the east coast of Greenland drift south in the East Greenland current, arriving off Cape Farewell in early summer. Continuing in the current, they round Cape Farewell and drift north to about the 63rd parallel, where they are caught in the westerly branch of the current and drift into the centre of the Davis Strait. In the centre of the Strait the water is comparatively warm and the majority of these bergs disintegrate, very few of them

reaching the Labrador current on the western side of the Strait. The majority of the bergs which reach the Grand Banks are calved from the ice tongues of the glaciers on the west coast of Greenland, north of the 68th parallel. The bergs are carried up the west coast of Greenland to the head of Baffin Bay where they are caught in the southerly drift setting out of Smith Sound down the western side of Baffin Bay.

The Labrador current in the higher latitudes is to a large extent caused by the action of north and north-easterly winds. Such winds are predominant in spring when the current attains its maximum velocity. It is also at this time that the break-up of the ice occurs, so that large quantities drift down from Baffin Bay through Davis Strait and along the coast of Labrador and Newfoundland, to the Tail of the Bank, where they finally disintegrate under the influence of the Gulf Stream.

In the vicinity of the Grand Banks the average hourly drift of icebergs increases as the season advances owing to the strengthening of the Labrador current. Observations carried out by the Patrol show that in March the average drift of bergs is from 0.0 to 0.3 knots, while in April the Patrol observed a berg drifting along the east side of the Grand Banks at the rate of 1.5 knots. The average drift of bergs, however, around the Tail of the Bank in the mixed waters is 0.4 to 0.7 knots and when in the water of the northern edge of the Gulf Stream 0.8 to 1.4 knots.

The following tables compiled from the records of the United States Hydrographic Office and those of the International Ice Patrol, for the years 1900-1926, show the average number of bergs that drift south of the 48th parallel during each month of the year.

NORMAL NUMBER OF ICEBERGS SOUTH OF THE 48TH PARALLEL
(menace to the Cape Race Tracks).

Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
3	10	36	83	130	68	25	13	9	4	3	2

NORMAL NUMBER OF ICEBERGS SOUTH OF THE 43RD PARALLEL
(menace to the United States to Europe Tracks).

Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
0	1	4	9	18	13	3	2	1	0	0	0

The International Ice Patrol has found that an average sized berg, drifting in the mixed waters south of the Tail of the Bank, takes from 12 to 14 days to disintegrate during April, May or June. In July, August and September the time is shortened to from 10 to 12 days. The life of a similar sized berg actually located within the Gulf Stream is about seven days. Bergs grounded on the south-west slope of the Grand Banks may last for a month or six weeks.

CHART A shows the general drift of ice in the ice bearing currents, and the position of the glaciers in Greenland from which the majority of the bergs which reach the Grand Banks of Newfoundland are calved. CHART B shows the actual drift of bergs in the vicinity of the Grand Banks as compiled by the International Ice Patrol in the years 1914-1926.

North Atlantic Limits of Ice.—The southern and eastern limits of ice in the Western North Atlantic vary considerably from month to month and from year to year.

CHART C shows the monthly limits within which reports of ice have been received by the Meteorological Office during the year 1929 also the monthly limits reached by ice over the period 1901-1929. It must be understood that the limits defined on this CHART are obtained from reports of ice sighted by vessels, the majority of which are following tracks specially laid down to avoid ice; it is therefore possible that ice may exist outside these limits. The following list gives the particulars of all reported ice which has made phenomenal drifts. It is not possible to indicate, even approximately, the drift followed by the ice. The position of this ice, when reported, is shown on CHART D.

Phenomenal positions of ice.

No.	Date.	Source of Report.	Position of ice.		Remarks.
			Latitude N.	Longitude W.	
1	14.1.1886	H.M.S. <i>Cove</i> ...	60° 55'	5° 50'	Two bergs.
2	9.1.1913	S.S. <i>Oriflamme</i> ...	48° 37'	34° 42'	Berg 40 ft. high, 400 ft. long.
3	27.1.1916	S.S. <i>Rio Verde</i> ...	33° 34'	70° 32'	Hummock 2 ft. high, 30 ft. in circumference.
4	3.2.1922	S.S. <i>Weehawken</i> ...	41° 42'	58° 59'	Ice (sustained bow damage).
5	24.3.1913	S.S. <i>Floride</i> ...	46° 21'	34° 05'	Berg 60 ft. high, 200 ft. long.
6	20.3.1915	S.S. <i>Wanaby</i> ...	36° 55'	48° 32'	Piece; supposed portion of a berg, 5 ft. high, 60 ft. long.
7	21.3.1920	U.S. Hyd., Bulletin	38° 02'	40° 38'	3 ft. high, 30 ft. long.
8	21.3.1921	S.S. <i>Hollandia</i> ...	37° 50'	47° 23'	Berg.
9	6.4.1909	S.S. <i>Trafalgar</i> ...	35° 54'	31° 47'	Two pieces 18 ins. in diameter.
10	11.4.1914	S.S. <i>Erodiade</i> ...	32° 55'	62° 11'	Apparently river ice about the size of a lifeboat.
11	24.4.1916	S.S. <i>Communipaw</i>	49° 05'	36° 48'	4 ft. high, 50 ft. wide, and 100 ft. long.
12	4.4.1921	S.S. <i>Hollandia</i> ...	43° 35'	35° 57'	Large berg.
13	16.4.1926	Trawler <i>Orizaba</i> ...	61° 03'	10° 30'	Floating ice about 40 ft. long, and 3 ft. high.
14	20.5.1907	S.S. <i>Lord Landsdowne</i> .	31° 00'	38° 00'	Two small pieces 6 ft. by 6 ft. and 12 ft. by 4 ft. out of water.
15	6.5.1908	S.S. <i>Oceano</i> ...	150-200 miles North of Bermuda.		Pieces.
16	27.5.1909	S.S. <i>Reventazon</i>	32° 28'	44° 10'	60 ft. long, 10 ft. high.
17	15.5.1911	S.S. <i>Camillo</i> ...	10 miles East of Nantucket Shoal Lt.-V.		Small berg.
18	11.5.1914	S.S. <i>Indradeo</i> ...	42° 18'	62° 43'	Large slabs of field ice and growlers 100-150 ft. long, 5 ft. out of water.
19	17.5.1915	S.S. <i>Pola</i> ...	38° 16'	61° 50'	Some field ice.
20	15.5.1920	U.S. Hyd., Bulletin	45° 11'	36° 42'	Berg.
21	25.6.1886	Brig. <i>Blanch</i> ...	48° 40'	15° 22'	Large berg.
22	5.6.1907	S.S. <i>Kingswell</i> ...	32° 37'	64° 25'	Several bergs.
23	-6.1907	Bque. <i>Silverstream</i>	80 miles West of Fastnet.		Berg.
24	11.6.1912	S.S. <i>Valetta</i> ...	37° 30'	74° 24'	Three pieces of ice.
25	7.6.1913	S.S. <i>Holtby</i> ...	39° 35'	64° 50'	Berg 10 ft. high, Small piece.
26	27.6.1915	S.S. <i>Stella</i> ...	36° 28'	57° 45'	Berg 10 ft. high.
27	30.6.1921	U.S. Navy Dept....	33° 20'	49° 16'	Growler.
28	16.6.1924	S.S. <i>West Irmo</i> ...	38° 03'	63° 20'	Large piece about 30 ft. long and 15 ft. wide, showing about 3 ft. above water.
29	25.6.1926	S.S. <i>Baxtergate</i> ...	30° 20'	62° 32'	Last remnants of berg.
30	-7.1890	S.S. <i>Slavonia</i> ...	48° 53'	24° 11'	40-50 ft. long, 15 ft. wide, 2 ft. 6 ins. out of water, 25 ft. long, 3 to 8 ft. wide.
31	-7.1902	Two reports by fishermen.	56° 30' (appx.).	6° 30'	Piece, 6 ft. high, 50 ft. in circumference.
32	31.7.1909	S.S. <i>Shimosa</i> ...	36° 59'	30° 01'	Piece of berg, 3 or 4 ft. out of water.
33	10.7.1913	S.S. <i>Lothian</i> ...	37° 27'	36° 48'	Berg 60 ft. long.
34	18.7.1916	U.S. Hyd., Bulletin	32° 09'	54° 26'	Large berg.
35	23.7.1916	S.S. <i>San Giorgio</i> ...	42° 09'	63° 24'	Small berg about 15 ft. square.
36	23.7.1918	U.S. Hyd., Bulletin	44° 25'	35° 01'	Berg.
37	18.7.1921	" "	44° 30'	39° 26'	Berg.
38	21.7.1921	" "	39° 09'	40° 39'	Berg.
39	31.7.1921	" "	37° 37'	27° 29'	Two pieces of ice.
40	10.7.1926	S.S. <i>Chelatro</i> s ...	42° 42'	36° 45'	Piece, 3 ft. high, 40 ft. long.
41	12.8.1903	S.S. <i>Saxon Prince</i>	37° 52'	71° 30'	Two pieces, 10 ft. square, and 15 ft. square.
42	7.8.1908	S.S. <i>Caronia</i> ...	50° 31'	18° 55'	Piece, 18 ft. by 5 ft., 2 ft. out of water.
43	2.8.1909	S.S. <i>Shimosa</i> ...	37° 16'	42° 06'	Piece.
44	14.8.1912	S.S. <i>Ulstermore</i> ...	43° 55'	39° 16'	50 ft. square, 4 ft. out of water.
45	27.8.1912	S.S. <i>Lux</i> ...	42° 30'	15° 26'	Berg.
46	10.8.1915	S.S. <i>St. Louis</i> ...	41° 02'	48° 00'	Berg.
47	16.8.1915	S.S. <i>St. Leonards</i>	41° 09'	56° 43'	Berg.
48	21.8.1915	S.S. <i>Strathgarry</i> ...	40° 46'	68° 20'	Growler.
49	-8.1915	" "	39° 00'	46° 20'	Piece, 20 ft. long, 4 ft. high.

Phenomenal positions of ice—contd.

No.	Date.	Source of Report.	Position of ice.		Remarks.
			Latitude N.	Longitude W.	
50	29.8.1920	U.S. Hyd., Bulletin	40° 30'	47° 52'	Berg.
51	2.9.1883	Bque., <i>Olivette</i> ...	35° 40'	30° 00'	Lump of ice.
52	-9.1895	S.S. <i>Gulf of Taranto</i>	36° 35'	71° 36'	Two bergs 30 ft. high, 300-400 ft. long, and much field ice over two miles area.
53	19.9.1906	S.S. <i>Lord Landsdowne</i> .	54° 20'	22° 00'	Small berg 20 ft. by 6 ft.
54	10.9.1908	S.S. <i>Deutschland</i>	45° 28'	27° 18'	Two small bergs and one large.
55	6.9.1920	U.S. Hyd., Bulletin	47° 10'	38° 04'	Bergs.
56	2.9.1922	S.S. <i>Hallgjerd</i> ...	50° 00'	40° 05'	Berg.
57	15.9.1922	S.S. <i>Empress of Britain</i> .	52° 52'	40° 12'	Large berg.
58	3.9.1923	S.S. <i>Djambi</i> ...	40° 10'	31° 36'	Piece of ice about 30 ft. long, 1½ ft. out of water.
59	15.10.1883	S.S. <i>Elenora</i> ...	37° 00'	18° 00'	Piece ice.
60	8.10.1912	S.S. <i>Putney Bridge</i>	35° 15'	44° 50'	Small berg 35 ft. long, 6 ft. high.
61	27.10.1916	S.S. <i>Montreal</i> ...	51° 17'	41° 17'	Small berg.
62	2.10.1918	U.S. Hyd., Bulletin	50° 10'	40° 50'	Large berg.
63	19.10.1920	" "	45° 22'	40° 09'	Berg.
64	19.10.1920	" "	45° 24'	40° 07'	Berg.
65	17.10.1921	S.S. <i>Mount Vernon</i>	48° 23'	42° 19'	Berg about 70 ft. high, 400 ft. long.
66	6.10.1922	S.S. <i>Christian Krogh</i>	50° 43'	40° 42'	Berg 60 ft. high.
67	7.10.1923	S.S. <i>Eastern Dawn</i>	40° 46'	65° 54'	Large growler about 100 ft. square.
68	23.10.1927	Trawler, <i>Grecian Empire</i> .	30 miles E.S.E. of the Outer Skerries, Shetland Islands.		Piece of ice 100 ft. long, 6 ft. above water.
69	7.11.1922	Cape Race, W/T Station.	47° 38'	40° 04'	Berg and growlers.
70	-12.1903	S.S. <i>Lord Antrim</i>	42° 00'	55° 00'	Ice.
71	22.12.1915	S.S. <i>Carolyn</i> ...	42° 53'	57° 39'	Large berg.
72	16.12.1920	S.S. <i>Oriana</i> ...	43° 53'	44° 39'	Berg.
73	16.12.1927	S.S. <i>Ascania</i> ...	47° 52'	40° 50'	Four large bergs. (approximate).

Detection of Ice.—Up to the present there has been no means devised whereby the presence of ice can be detected in the dark hours, or during fog. Experiments carried out by the Ice Patrol during past years have shown that seamen can depend upon no forewarning of a berg beyond the limit of their visibility. No reliance can be attached to echoes from the steam whistle or syren giving a warning of ice, nor does the presence of a berg have any appreciable effect on the temperature of the air or water, but it has been found that when navigating in the vicinity of the Grand Banks, if the temperature of the sea remains at or about 60° Fahr. the chances of meeting ice are greatly reduced. The approximate temperature of the warm water abutting the cold wall is as follows:—

Throughout the winter and up to April, 54°, April 54°-56°, May 58°-60°, and from June throughout the summer to November, 61°-63°, when it falls to a minimum in February. On ordinary clear days the average berg can be picked up by the masthead look-out when 18 miles distant and will be seen from the bridge when between 12 to 15 miles away. On a cloudy day with good visibility deduct about 2 miles from the foregoing:—

In clear weather with hazy horizon the tops of bergs have been observed 11 miles. During light fog or drizzling rain, bergs are visible at from 2 to 3 miles. In light low fogs bergs are generally picked up by the look-out aloft before observed from the bridge.

In dense fog a berg cannot be seen more than 200 yards ahead of ship, when, if the sun is shining, it appears as a luminous white mass. With no sun it first appears close aboard as a dark mass. In dense fog the bow look-out will probably first detect the ice as the first visible sign is the wash and breaking of the sea on the base of the berg.

On a clear dark starlight night a berg will not be seen with the naked eye further than one-quarter of a mile, but should the bearing be known it may be picked up with glasses when 1 mile distant.

The distance that a berg may be seen on a clear moonlight night depends upon (a) the altitude and age of the moon, and (b) the relative position of moon, berg and ship.

A berg placed between a ship and the moon when low is the most difficult to observe.

With a full moon at not less than 35° in altitude covered by a thin film of Cirro-Stratus clouds, a berg is visible to the naked eye at a distance of 5 miles, irrespective of the relative position of moon, berg and ship.

Observations carried out in the vessels of the Ice Patrol Service show the following average frequency of fog and low visibility experienced in the vicinity of the Grand Banks:—

MONTH.	PERCENTAGE OF FOG.	PERCENTAGE OF FOG AND LOW VISIBILITY.
April ...	29	50
May ...	27	39
June ...	44	53

International Ice Patrol.—Arising out of the loss of the R.M.S. *Titanic* through striking a berg in 1912, an International Conference for Safety of Life at Sea was held in London in 1913. At this Conference it was decided to establish and maintain a regular patrol during the ice season of each year, the United States being asked to organise and manage the Service. Since 1914 the patrol has been entrusted to the United States Coast Guard, who each year detail two Coast Guard Cutters to cruise in the vicinity of the Grand Banks of Newfoundland, there to locate and watch the movement of ice and ascertain its limits for the guidance of navigators.

The Patrol also carries out oceanographical and meteorological research into the conditions governing the movement of ice and drift of currents.

The practical utility of the work carried out by the Patrol has reduced the danger of ice to vessels trading between European and United States ports to a minimum, so much so that ice is rarely seen by these vessels throughout the year.

Commanders of ships are earnestly asked to co-operate in the work of the Patrol by reporting their position, course, and speed, and sea surface temperature every four hours when navigating in the area bounded by the 39th and 48th parallel of Latitude, and the 44th and 52nd meridians of Longitude. By this means the Patrol are able to keep track of all vessels within the danger zone, and are able to warn any vessel standing into danger.

Gulf of St. Lawrence Ice Patrol.—From the opening of navigation in the spring until the route is clear of ice an Ice Patrol is maintained by the Canadian Government in the Gulf of St. Lawrence between Cape Ray and Heath Point.

A regular message embodying ice conditions from Cape Race to Quebec and recommendations as to route to be followed is compiled by the Ice Patrol every four hours commencing at 0500 G.M.T. and kept for immediate transmission by W/T to ships upon request. Similar information is also broadcast four times daily.

Commanders of incoming ships are requested to facilitate the work of the Patrol by supplying information regarding ice in their vicinity.

Descriptions of particulars of ice warning messages broadcast by the Ice Patrol Vessels are published on the back of the Ice Chart in *THE MARINE OBSERVER* as soon as available each year.

Ice Warnings from Shore Stations.—The following W/T shore stations issue Ice Warnings to shipping during the ice season as follows:—

Station.	Latitude N.	Longitude W.	Call Sign.	Wave length (Metres).	G.M.T. of issue.
Norfolk ...	36° 50'	76° 18'	NAM	2,458 (I.C.W.)	0400 0900 2100
Washington (Arlington).	38° 52'	77° 05'	NAA	2,653 (C.W.)	0200 1700
New York...	40° 42'	73° 59'	NAH	2,939 (C.W.)	1530 2130
Boston ...	42° 23'	71° 03'	NAD	2,939 (C.W.)	1600 2200
St. John, N.B. ...	45° 15'	66° 01'	VAR	600 (Spk.)	On request.
Lurcher L.-V. ...	43° 48'	66° 32'	VGA	600 (Spk.)	On request.
Yarmouth...	43° 46'	66° 07'	VAU	600 (Spk.)	0200 1400

Station.	Latitude N.	Longitude W.	Call Sign.	Wave Length (Metres).	G.M.T. of issue.
Chebucto Head ...	44° 30'	63° 31'	VAV	600 (I.C.W.)	0130 1330
Sable Island ...	43° 56'	60° 02'	VCT	600 (Spk.)	On request.
North Sydney ...	46° 13'	60° 15'	VCO	600 (Spk.)	On request.
Grindstone Island ...	47° 24'	61° 51'	VCN	600 (Spk.)	On request.
Fame Point ...	49° 07'	64° 36'	VCG	600 (Spk.)	0145 1345
Father Point ...	48° 31'	68° 28'	VCF	600 (Spk.)	0200 1400
Heath Pt. L.-V....	49° 03'	61° 30'	VGH	600 (Spk.)	On request.
Cape Race ...	46° 39'	53° 04'	VCE	600 (Spk.)	0215 1415
Pt. Amour ...	51° 27'	56° 52'	VCL	600 (Spk.)	On request.
Belle Isle ...	51° 53'	55° 22'	VCM	600 (I.C.W.)	0230 1430
Louisburg... ..	46° 09'	59° 57'	VAS	2,804 (C.W.)	0400 1600
Sambro (Outer Bank L.V.).	44° 22'	63° 26'	VGX	435 (I.C.W.)	1200 1730

North Atlantic Tracks.

Owing to the risk of collision and the danger of ice the CUNARD STEAM SHIP COMPANY in 1875 laid down specified routes both East and West bound which their ships were ordered to follow. On the recommendation of the United States Hydrographic Office these routes were amended in 1891 and seven years later the Trans-Atlantic Track Conference was formed.

The Conference is formed of the principal International Shipping Companies engaged in the Trans-North Atlantic trade and they, working in conjunction with the United States Coast Guard who operate the International Ice Patrol Service, revise the tracks from time to time as ice conditions necessitate during the different seasons of the year.

The Tracks are shown on Admiralty Route Charts published in two sections:—

Chart No. 2058b showing Lane Routes South of Ireland and English Channel.*

Chart 2058c showing Lane Routes North of Ireland.

The section of the routes running through the ice region in operation for the month is shown on the Ice Chart published with each number of THE MARINE OBSERVER.

The tracks were revised in January, 1930, full particulars of which are as follows:—

North Atlantic Lane Routes—United States.

Track "A" (Extra Southern).

Westbound.—Will only be brought in operation when necessity arises.

Steer from Fastnet or Bishop Rock on Great Circle course, but nothing South to cross the meridian of 40° 00' West in Latitude 40° 30' North, thence by either rhumb line or Great Circle to *Boston Light Vessel* or to a position South of *Nantucket Light Vessel*.

Eastbound.—Will only be brought into operation when necessity arises.

From the position 70° 00' West and 40° 10' North or from Boston steer by rhumb line to cross the meridian of 47° 00' West in Latitude 39° 30' North, and from this last position nothing North of the Great Circle to Fastnet or Bishop Rock.

Track "B" (Southern).

Westbound.—From April 1st to August 31st (both days inclusive) except when ice conditions necessitate the use of "A" Track.

Steer from Fastnet or Bishop Rock on Great Circle course, but nothing South to cross the meridian of 47° 00' West in Latitude 41° 30' North, thence by either rhumb line or Great Circle to *Boston Light Vessel* or to a position South of *Nantucket Light Vessel*.

Eastbound.—From April 1st to August 31st (both days inclusive) except when ice conditions necessitate the use of "A" Track.

From the position 70° 00' West and 40° 10' North or from Boston steer by rhumb line to cross the meridian of 47° 00' West in Latitude 40° 30' North and from this last position nothing North of the Great Circle to Fastnet or Bishop Rock.

Track "C" (Northern).

Westbound.—From September 1st to March 31st (both days inclusive) except when ice conditions necessitate the use of "B" Track.

Steer from Fastnet or Bishop Rock on Great Circle course, but nothing South to cross the meridian of 50° 00' West in Latitude 43° 00' North, thence by either rhumb line or Great Circle to *Boston Light Vessel* or to a position South of *Nantucket Light Vessel*.

Eastbound.—From September 1st to March 31st (both days inclusive) except when ice conditions necessitate the use of "B" Track.

From the position of 70° 00' West in 40° 10' North or from Boston steer by rhumb line to cross the meridian of 50° 00' West in Latitude 42° 00' North, and from this last position nothing North of the Great Circle to Fastnet or Bishop Rock.

General Instructions.

Vessels bound to or from United States ports calling at Halifax have the option of following the Canadian or United States Seasonal tracks to or from that port, passing 40 miles South of Sable Island Westbound and 60 miles South of Sable Island Eastbound when proceeding on U.S. Tracks and Canadian Track "D." When proceeding on Canadian Tracks "E" or "F" via Halifax, ships pass North of Sable Island both Westbound and Eastbound. (NOTE.—General Instructions Canadian Tracks for vessels bound to or from the North of Ireland.)

Vessels bound direct to Portland (Maine) may follow the Canadian Seasonal Tracks.

When courses are changed at the intersections of meridians any time before or after noon, Commanders must note in their logs both distances to and from the meridians that the ship has sailed from noon to noon, and not the distance from the position at noon the day before to the position at noon the day after the meridian is crossed.

The date on which Tracks change is to apply to the meridian of the Fastnet for Westbound steamers and the meridian of 70° 00' West for Eastbound vessels.

Communications on General Track matters between the British Lines will pass through the CUNARD Line. The HOLLAND AMERICAN Line will communicate with the Continental Lines except that, during the Ice Season, the CUNARD Line will communicate direct with all Lines.

With regard to proposals for any changes in Tracks owing to the prevalence of Ice, the CUNARD and WHITE STAR Lines in Liverpool will confer and decide dates on which changes are to become operative, advising Lines by telegraph. Lines undertake to give immediate instructions to their steamers in accordance with such advices.

North Atlantic Lane Routes—Canada.

Track "D."

From 15th February to 10th April (both days inclusive):—

Westbound.

Steer from the Fastnet, Inishtrahull, or 10 miles South of the Bishop Rock on Great Circle course, to cross the meridian of 50° 00' West in Latitude 43° 00' North, thence to Halifax or other Port passing not less than 40 miles South of Sable Island.

Eastbound.

Steer from Halifax or other port to pass 60 miles South of Sable Island to cross the meridian of 50° West in Latitude 42° 00' North thence on the Great Circle course to Fastnet, Inishtrahull, or 10 miles South of the Bishop Rock.

Track "E."

From 11th April to 15th May, or until the Cape Race Route clear of ice, and 1st December to 14th February:—

Westbound.

Steer from the Fastnet, Inishtrahull, or 10 miles South of the Bishop Rock on the Great Circle course, to the meridian of 50° West in Latitude 45° 55' North thence to Halifax or the Gulf of St. Lawrence.

NOTE.—THE DONALDSON LINE reserve the right to cross Longitude 45° West in Latitude 45° North on this track.

Eastbound.

Steer from Halifax or the Gulf of St. Lawrence to cross the meridian of 50° West in Latitude 45° 25' North, thence on the Great Circle course to the Fastnet, Inishtrahull, or 10 miles South of the Bishop Rock.

Track "F."

From 16th May to the opening of Belle Isle Route, and to the 30th November when not using the Belle Isle Route.

Westbound.

Steer from Fastnet, Inishtrahull, or 10 miles South of the Bishop Rock on a course 10 miles North of the Great Circle track until approaching Cape Race, then steer a course to pass 10 miles South of Cape Race, thence to Halifax or the Gulf of St. Lawrence.

Eastbound.

Steer from Halifax or the Gulf of St. Lawrence to a position 25 miles South of Cape Race, thence on a course 10 miles South of the Great Circle track until approaching Fastnet, Inishtrahull, or 10 miles South of Bishop Rock.

Track "G."

Belle Isle Route—From the opening of the Straits of Belle Isle to 14th November.

Westbound.

Steer from Fastnet, Inishtrahull, or 10 miles South of Bishop Rock, on a course 10 miles North of the Great Circle track until approaching Belle Isle.

Eastbound.

Steer from Belle Isle on a course 10 miles South of the Great Circle track until approaching Fastnet, Inishtrahull, or 10 miles South of the Bishop Rock.

General Instructions.

Vessels bound to or from U.S. Ports from or to the North of Ireland have the option of following either the U.S. or the Canadian Seasonal Tracks, D, E and F remaining on Track F during the operative dates of Track G.

On Tracks E and F, vessels passing 40 miles South of Sable Island Westbound, thence to position South of Nantucket and Eastbound from position 40° 10' North in 70° 00' West to position 60 miles South of Sable Island.

On Track D Westbound proceeding by rhumb line from position 43° 00' North in 50° 00' West to position South of Nantucket and Eastbound from position 40° 10' North in 70° 00' West to position 42° 00' North in 50° 00' West.

Commanders on encountering ice, have permission to deviate from these tracks, and, after the end of October to leave the Belle Isle for the more Southerly route at their discretion, according to weather conditions. Should vessels on Track "C" bound to or from the United States be deviated to Track "B" on account of ice, Canadian vessels will remain on Track "D" for the period prescribed, but will have the above option of deviating as necessary in the vicinity of ice areas.

The Lines have the option of continuing the use of the Belle Isle Route after 14th November should they wish to do so.

Summary of Ice Conditions during 1929.

The following monthly summary of ice conditions in the Western North Atlantic during 1929 is compiled from Ice Reports returned by ships of the Voluntary Observing Fleet using Trans-North Atlantic routes, also from the Bulletins issued by the International Ice Patrol Service and reports received through other sources.

The number of bergs which drifted south of the 48th parallel, thereby becoming a menace to navigation during the 1929 season, was abnormally great. The Ice Patrol which is usually discontinued in the latter half of June was maintained until August 3rd on account of the prevalence of ice south of the Tail of the Grand Banks.

The following table, compiled by the International Ice Patrol Service, shows the number of bergs which drifted south of the 48th parallel during the 1929 season, together with the average number which drifted south of the same parallel for the period 1900-1926.

	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
Bergs South of Lat. 48° North normally.	3	10	36	83	130	68	25	13	9	4	3	2	386
Bergs South of Lat. 48° North in 1929.	0	0	45	332	460	376	107	1	0	—	—	—	1321
Bergs South of Lat. 43° North normally.	0	1	4	9	18	13	3	2	1	0	0	0	51
Bergs South of Lat. 43° North in 1929.	0	0	0	32	9	72	21	0	0	—	—	—	134

January.—No ice was reported in the Western North Atlantic during the first half of the month. Between January 6th and 12th the Canadian Government Icebreaker *Montcalm* on passage from Quebec to Sydney C.B. reported the Gulf of St. Lawrence entirely free from ice, an unusual condition at this season. On January 24th field ice was reported between Latitude 45° 28' N., Longitude 59° 18' W., and Latitude 45° 23' N., Longitude 58° 08' W.

February.—During the first half of the month large fields of ice were reported North of Sable Island between the 59th and 61st meridians, and during the last week of the month extensive floes containing many growlers were reported over the Grand Banks North of the Virgin Rocks.

March.—Light field ice was reported on the 17th on the Banquereau Bank North of Sable Island. Throughout the month extensive fields of heavy ice were reported over the Grand Banks North of the 46th parallel, impeding navigation and in combination with heavy N.W. gales threatening great danger to shipping.

On March 5th s.s. *Vela* was icebound when 100 miles N.E. of Cape Race, and other vessels were reported as requiring assistance in order to make port.

Many bergs and growlers were reported on the Eastern edge of the Banks between the 45th and 49th parallel.

April.—On April 12th the Canadian Signal Service reported "Montreal to Fame Point no ice in sight. Anticosta, Magdalen Islands, Cabot Straits, Northumberland Strait, Gut of Canso, and Belle Isle Strait, heavy open and heavy close packed ice everywhere." The first vessel to reach Montreal was the s.s. *Amarant* which arrived on the 20th. The United States Coast Guard Cutter *Tampa* commenced the 1929 ice patrol for the protection of shipping on the North Atlantic Lane Routes at the beginning of the month.

In the Western North Atlantic numerous reports of bergs and field ice were received during the month over an area bounded by the 42nd and 50th parallels and the 43rd and 52nd meridians.

The Southernmost berg reported during the month was on the 17th in Latitude 42° 05' N. Longitude 50° 59' W. The S.S. *Pennland*, bound for Halifax, when crossing the Grand Banks on the 19th, reported between Latitudes 46° 50' N. and 46° 10' N. and Longitudes 48° 24' W. and 49° 50' W. heavy pack ice, numerous growlers, and many large bergs, some 200 feet high.

The Captain of the S.S. *Ungava*, on April 28th reported ice conditions along the Labrador coast as the worst he had experienced in 35 years.

May.—On the 13th May the Canadian Signal Service reported within the Gulf of St. Lawrence "Heavy close packed ice and bergs everywhere in Belle Isle Strait, elsewhere no ice in sight."

In the Western North Atlantic over the Grand Banks North of the 46th parallel some field ice was reported, while reports of bergs were numerous from the 40th meridian to the Newfoundland coast. Ships using the Cape Race routes reported the tracks thickly menaced with ice.

South of the 46th parallel all reports of bergs were in the vicinity of the Eastern edge and tail of the Grand Banks. The Southernmost berg was reported on the 15th in Latitude $42^{\circ} 20' N.$, Longitude $50^{\circ} 45' W.$, by the Ice Patrol Cutter.

June.—Within the Gulf of St. Lawrence numerous bergs with heavy open and heavy close packed ice were reported in the Straits of Belle Isle during the first half of the month.

On June 7th the Danish Meteorological Institute reported "Off Arsuk western edge of ice 50 miles offshore, no open coast water," and on the 19th "Edge of open ice 30 miles off Cape Farewell with icebergs inside."

Ships using the Cape Race routes reported numerous bergs North of the 46th parallel and west of the 40th meridian.

On June 21st S.S. *Manchester Merchant* sighted 32 bergs on either side of her track within a distance of eight miles. Off the N.E. coast of Newfoundland the ice was of an exceptionally heavy character. The S.S. *Clyde* on June 10th reported an unbroken and almost impenetrable pack extending Northward from Cape St. John. The Labrador fishing fleet in attempting the outside passage became jammed in the pack, which contained numerous bergs of huge dimensions.

South of the 46th parallel many bergs were reported on the Eastern side and around the Tail of the Grand Banks. The Southernmost berg was reported on June 7th in Latitude $41^{\circ} 38' N.$, Longitude $48^{\circ} 56' W.$, and this was the only ice sighted South of the 42nd Parallel during the month.

July.—Throughout the month numerous bergs and growlers were reported in Belle Isle Strait and on the tracks East of Belle Isle to the 50th meridian.

Over the Grand Banks North of the 46th parallel, ships on the Cape Race routes reported bergs both North and South of the tracks between the 45th meridian and the Newfoundland coast.

South of the 46th parallel bergs were reported between the 45th and 55th meridians, more especially immediately South of the Tail of the Grand Banks. The Southernmost berg was reported on the 20th in Latitude $41^{\circ} 15' N.$ Longitude $48^{\circ} 36' W.$

August.—Between August 12th and 17th the Danish Meteorological Institute reported "Off West Coast of Greenland. A few icebergs. Navigation unimpeded by Storis. The Ice does not extend past Cape Farewell."

A few bergs were reported during the month in the Straits between Point Amour and Belle Isle, but east of Belle Isle, bergs were frequently reported North and South of the tracks to the 48th meridian.

In the region of the Grand Banks two reports of bergs were received North of the 46th parallel, but South of this Latitude no ice was reported throughout the month.

The Ice Patrol Cutter after searching the Banks and finding the tracks free from all menace of ice discontinued the Patrol for the season of 1929 on August 3rd.

September.—The Danish Meteorological Institute reported:—"Off West Coast of Greenland, September 20th. Free of ice 20 miles off Cape Farewell. Free of ice in Julianehab Bay. Icebergs met with in Longitude $41^{\circ} W.$ "

Within the Straits of Belle Isle two bergs were reported during the month. East of Belle Isle ice was reported on the tracks to the 50th meridian. On the Grand Banks no ice was sighted North of the 46th parallel, but one berg was reported on the 19th in Latitude $44^{\circ} 05' N.$, Longitude $44^{\circ} 30' W.$

October.—The Danish Meteorological Institute reported on October 4th. "Between Arsuk and Cape Farewell. Navigation unimpeded by Storis. Few icebergs between Arsuk and Cape Farewell. The ice does not extend beyond Cape Farewell."

Other than a few bergs sighted West of the 51st meridian on the Belle Isle route, no ice was reported in the Western North Atlantic during the month.

November.—During the month an occasional berg was reported on the Belle Isle route West of the 53rd meridian.

North of the 46th parallel, bergs were reported towards the end of the month on the Cape Race tracks, between Cape Race and Longitude $51^{\circ} West.$

South of the 46th parallel, no reports of ice were received.

December.—The Canadian Signal Service reported on the 13th—"Montreal to Sorel Island, river solid. Three Rivers to about Saguenay River, considerable ice. Eastward to about Fame Point, open ice inshore. Point Amour and Belle Isle heavy slob ice with occasional berg off Belle Isle. Elsewhere no ice."

On the Cape Race routes bergs were sighted between Cape Race and the 47th meridian during the month. South of the 46th parallel no ice was reported.

SUMMARY OF THE STATE OF THE ICE IN THE DANISH WATERS DURING THE WINTER 1928-29.

By Captain C. I. SPEERSCHNEIDER.

In the middle of December ice commenced to form in some of the fiords, and at the beginning of the year this ice spread out. About the middle of January brash was observed here and there on open coasts, but in the main fairways the formation of ice may be said to have commenced on January 25th, on which day ice was formed in the southern part of the Great-Belt and the Little-Belt.

During the first days of February the ice spread out in the Belts, and on the 3rd after a south-easterly gale the state of the ice grew worse, so that Femer-Belt was passable only with the assistance of an ice-breaker, and the southern part of the Langeland-Belt was closed. Ice was formed from Anholt southward through the Sound.

In the course of the following days several steamers stuck fast at different places and easterly winds pressed the ice against the eastern coasts of the country and into the bays and narrows. On the route Kiel-Rygen about 60 steamers stuck fast.

From February 7th to 9th the sea was filled with ice from north of Læso right to the Baltic, and generally speaking navigation was only possible with the assistance of icebreakers. As the west channel in the Kattegat was closed, ships had to be navigated through the eastern part of the Kattegat and east of Hveen in the Sound.

When ice has started to form it is always advisable to navigate east of Hveen.

On the evening of the 9th a south-easterly wind sprang up, and in the course of the night a northward ice drift commenced. During

the 10th—when the speed of the current was 2 miles per hour—this drift produced a violent packing of the ice in all the fairways, rendering navigation injudicious. When the ice drift stopped the ice in the Kattegat had packed to a thickness of more than three feet and navigation was nowhere possible without the assistance of an icebreaker, the fairways being generally closed.

At Esbjerg the same south-easterly wind drove the drift ice out to about Horn-Reef, and ice was formed along the whole west coast of Jutland because the continuous easterly wind brought severe frost with it. At the Vyl lightship the temperature of the water was below freezing point right to the bottom of the sea.

From now on to the Middle of March, most of the Danish ports were closed or were only accessible with the assistance of an icebreaker, because all navigation depended on the conditions of the ice in the main fairways.

On February 14th, a north-easterly gale drove the ice against the east coasts of the various parts of the country, and from the 15th to 20th the Swedish coast in the Kattegat was free of ice, and the east side of the Sound was navigable. Again on the 17th an easterly gale was blowing, packing the ice still harder towards the west. This packing of the ice against the east coasts was a characteristic feature of this winter, and the closely massed ice remained longer than it would have done if the conditions had been different. Later on, the very thick ice from the east coast of Jutland drifted over the Kattegat to Sweden, and for a long while it was lying in the

northern entrance to the Sound. The last vestige of this ice was observed at Tistlarne on April 9th.

The above mentioned gale also pressed the ice so hard into Fakse-Bay that it took the ground in $8\frac{1}{2}$ fathoms of water, and the screwings attained a height of 20 feet above the water. It lasted a long time before this heavy ice was destroyed, and on April 10th it was still observed in the fairways.

Some days before the middle of February, the ice commenced to spread out towards the east in the waters between the Sound-Gedserrev-Bornholm. On February 10th, brash was formed at Bornholm. From the 21st this water was only navigable with the assistance of an icebreaker and several steamers stuck fast. Such a state of the ice here must necessarily prolong the ice period especially in the Sound.

On February 21st, the formation of the ice commenced again in the free from ice part of the eastern side of the Kattegat, and the next day a fresh westerly breeze drove vast ice fields eastwards in the Kattegat, while there was a rapid northward ice drift in the Great-Belt. The following day the wind was easterly and the ice was again packed against the east coast of Jutland while the young ice which was formed in the eastern part of the Kattegat drifted north and west about the Scaw. On the 27th and the following days the sea was filled with ice from 10 miles west of the Scaw to just east of Bornholm, and all navigation was stopped, except in the east channel in the Kattegat and the Sound. Such bad conditions of ice in Danish waters have scarcely been known since 1893, when all navigation was closed for two months.

In the Skagerak the ice appeared on the 25th of February, and remained to March 2nd, when a fresh westerly wind drove the ice eastwards against the Swedish coast. During the days mentioned above the ice extended from Hirtshals to about 40 miles north-west and 50 miles north of the Scaw, and many steamers stuck fast in the ice. The appearance of the ice in this locality was rather exceptional as it was not caused directly by the severity of the winter but by wind conditions, the fresh easterly wind driving large masses of ice from the Swedish coast westward up the Skagerak. Thus the phenomenon was an ice drift caused by the wind and as there was so much ice, and also a severe frost, young ice was formed between the ice fields. When the wind subsided a lane of open water was immediately formed along the coast from Hirtshals to the Scaw and through this lane navigation took place.

During the first days of March variable winds drove the ice to and fro in the Kattegat and the Belt-Sea. From March 4th to 7th, westerly wind drove the ice eastward in the Kattegat and from Nidingen towards the south the ice was lying closely packed. Screwings occurred throughout the east channel and specially off the entrance to the Sound. This was the beginning of the period when the ice completely blocked the northern entrance to the Sound.

On March 8th, most of the ice in the Kattegat had drifted towards the east rendering navigation possible through Læso Rende southward to Revsnæs and south about Hesselø where the western edge of the packed ice was met with.

In the Baltic there was a lane of open water along the south coast of Skaane and water free from ice was met with just east of Bornholm from where the eastern edge of the ice ran southward towards Rixhoft.

During the period March 4th-20th, the edge of the ice was lying from Nidingen past Anholt and Hesselø to Tisvilde. East of this line the ice was closely packed while there was open water or only a little drift ice west of the line. The Sound and the Great-Belt were passable for powerful steamers, and in the Baltic the ice was gradually drifting southward against the German coast.

Off the northern entrance to the Sound the ice masses decreased by slow degrees and still many steamers were sticking fast. Femer-Belt became passable for steamers, and the Little-Belt became free from ice except in both entrances. The approach to the ports now again depended on the local conditions of the ice.

On March 20th the situation changed as southeasterly wind and southerly current drove the ice offshore from the north coast of Sealand, thus rendering navigation free. At the same time the German coast ice drifted toward northwest, and from March 20th to 29th the waters between Stevns and Bornholm were again filled with ice.

As the wind on the 23rd changed to southwest the Sound was spared from an ice drift, and from the 25th to the 27th the Sound and the Great-Belt were practically free of ice. In the Kattegat the ice was lying along the Swedish coast, and in the Baltic the western edge of the ice was trending from Smygehuk towards Gedserrev.

The ice, however, was now rapidly disintegrating; on the 30th a little ice was met with here and there and the heavy ice from the Fakse-Bay was drifting towards Rygen.

On April 3rd easterly wind drove the Swedish coast ice out in the Kattegat and on the 9th it passed Winga on its northward drift. This same easterly wind also drove the ice that had come from the Fakse Bay away from Rygen towards Moen and Gedserrev and through Grönsund. For some days there was heavy drift ice round Moen and the last ice was observed there on April 10th.

As the conditions of the ice in the North Sea were so exceptional they deserve a special description.

On February 10th the drift ice drifted offshore from Esbjerg and brash was formed along the west coast of Jutland from Hanstholm southward. On the 16th a British Captain reported the very rare occurrence of the formation of pancake-ice in 11 fathoms of water.

The drift ice continued its westward drift and on the 27th it was met with 70 miles west of Esbjerg, while the brash extended to about 25 miles offshore along the whole west coast of Jutland.

One steamer reported drift ice on her whole voyage from Frederikshavn to Horn Reef, where she had to turn about on account of heavy drift ice. Another steamer reported steaming through firm ice 6 in. thick from Elben to Hanstholm, from which the sea was open to Hirtshals.

Probably ice had been lying round Horn Reef and along the west coast from February 13th to March 4th, but still the navigation to Esbjerg met with no great difficulties.

So much ice in the North Sea has never before been recorded. It is known that in former years there has been much coast ice on the coast of Holland and Belgium and a few times also on the British coasts. At the west coast of Jutland thin ice has been observed in 1879, drift ice in 1891, and in 1895 a belt of drift ice some 15 miles wide was lying off Esbjerg.

These records, however, are as nothing against the formation of ice in 1929, and the reason was the continuous easterly wind. At Blaavandshuk, in February, the frequency of winds from northeast and southeast was 74 per cent., and at Hanstholm, 85 per cent. The easterly winds brought frost and at Horn Reef lightship the monthly mean temperature of the air at 8.00 a.m. was $24^{\circ}.8\text{F}$.

At Horn Reef the temperature of the water was $30^{\circ}.2\text{F}$. to a depth of over 16 fathoms.

East of Bornholm the sea was free from ice, and it is seldom that ice is formed in the central part of the Baltic. The formation of pancake ice was, however, observed 60 miles southeast of Bornholm showing that a general formation of ice was occurring not very far away. In this locality there was more ice in 1893, while the central part of the Baltic was filled with ice in 1881 and 1888.

During the winter, 1929, there was a continuous ice period which, however, was divided into four different phases:—

1. From January 25th to February 2nd the ice was formed and increased in thickness.
2. From February 13th to March 2nd the ice was lying packed against the east coast, filling bays and fiords.
3. From March 4th to 20th the ice blocked the northern entrance of the Sound, while the waters south of the Sound were free from ice.
4. From March 20th to 29th the Baltic south of the Sound was filled with ice, while the northern entrance to the Sound was free from ice.

These different phases were due to the wind conditions, and the winter proved that without a thorough knowledge of the wind conditions and their influence on the direction of the current it is impossible to set up a forecast concerning the ice conditions.

Generally speaking, ice ranging from brash to heavy ice was found in the Danish waters during a period of 75 days.

I.—SHIPS' WEATHER SIGNALS.

No. 73, MARINE OBSERVER, the list below gives information of those stations which have been detailed, up to the time of going to press, to receive on C.W., reports from **A Selected Ships**, and Chart V herewith illustrates this, also spark stations which may intercept reports from **B Selected Ships**, addressed to **CQ**.

Request for Information.

[illegible]

II.—WIRELESS WEATHER SIGNALS.

WIRELESS WEATHER BULLETINS.

FRANCE.

The method of decoding station weather reports made in code from shore stations intended for shipping was described in the British "Weather Shipping" Bulletin, on page 52 of Volume VII, No. 74. (The February, 1930 Number.)

C.W. Issues "International Collective Reports."

Paris—Eiffel Tower W/T Station, approximate latitude 48° 51' N., Longitude 2° 18' E., call sign FLE, broadcasts weather bulletins, in code, as follows:—

Times of broadcast.	Wavelength.	Observations of
0845 G.M.T.	7,200 m. (C.W.)	Ships and Syrian Land Stations.
0945 G.M.T.	{ 7,200 m. (C.W.) 1,478 m. (C.W.) }	Land Stations.
2055 G.M.T.	73.5 m. (C.W.)	Ships and Land Stations.

All bulletins commence with the letters "O.N.M."

0845 G.M.T. Bulletin.

This bulletin is preceded by the words "Météo Atlantique," and is divided into four parts, viz:—

Part I.—Commencing with the words "Atlantique oriental," contains observations from ships in the Eastern North Atlantic.*

Part II.—Commencing with the words "Atlantique occidental," contains observations from American ships in the Western North Atlantic.*

Part III.—Commencing with the words "Service Jacques Cartier," contains observations from ships.*

Part IV.—Commencing with the words "Syrie 0600," contains observations of 0600 G.M.T. taken at stations in Syria.

The same method of decoding weather reports applies in all cases where the International Ship's Wireless Weather Telegraphy Code is used, having regard to the key figures given in each case where they differ from the British "Weather Shipping" Bulletin.

0945 G.M.T. Bulletin.

This bulletin, preceded by the words "Météo Europe," contains observations of 0700 G.M.T. taken at a selection of 50 to 60 of the stations given in the list below.*

2055 G.M.T. Bulletin.

This bulletin is divided into four parts, viz:—

Part I.—Preceded by the words "Météo Europe," contains observations of 1800 G.M.T. taken at a selection of 50 or 60 of the stations given in the list below.

Part II.—Preceded by the words "Atlantique Oriental," contains observations from ships.*

The observations from ships in Part II of this bulletin do not necessarily synchronise with those from the land stations in Part I. Marine observers are advised to examine the dates and times of observation carefully before use.

Part III.—Preceded by the words "Syrie 1800," contains observations of 1800 G.M.T. taken at stations in Syria.

Part IV.—Preceded by the words "Amerique du Sud 1200," contains observations of 1200 G.M.T. taken at stations in South America.

OBSERVATION STATIONS.

Code No.	Station.	Position. Latitude. Longitude.	Code No.	Station.	Position. Latitude. Longitude.	Code No.	Station.	Position. Latitude. Longitude.	Code No.	Station.	Position. Latitude. Longitude.
NORWAY.											
000	Mygbugten	73° 30' N. 21° 30' W.	045	Dombaaas	62° 05' N. 9° 07' E.	091	Västervik	57° 46' N. 16° 39' E.	159	Falmouth	50° 09' N. 05° 03' W.
001	Jan Mayen	70° 59' N. 8° 18' W.	046	Fokstua	62° 14' N. 9° 16' E.	092	Ystad	55° 25' N. 13° 49' E.	160	Plymouth	50° 22' N. 04° 08' W.
002	Green Harbour	78° 02' N. 14° 15' E.	047	Röros	62° 34' N. 11° 23' E.	093	Ljunghyhed	56° 05' N. 13° 13' E.	162	Portland Bill	50° 32' N. 02° 27' W.
003	Björnøya	74° 28' N. 19° 17' E.	048	Nesbyen	60° 35' N. 9° 06' E.				163	Calshot	50° 49' N. 01° 18' W.
004	Vardø	70° 22' N. 31° 17' E.							165	Dungeness	50° 55' N. 00° 58' E.
005	Ingøy	71° 04' N. 24° 09' E.	SWEDEN.								
006	Loppa	70° 20' N. 21° 27' E.	050	Haparanda	65° 50' N. 24° 09' E.	101	Valentia	51° 56' N. 10° 15' W.	166	Lympe	51° 05' N. 01° 01' E.
007	Kautokeino	68° 59' N. 23° 07' E.	051	Ostersund	63° 11' N. 14° 39' E.	102	Roches Point	51° 47' N. 08° 15' W.	167	Manston	51° 21' N. 01° 21' E.
008	Tromsø	69° 39' N. 18° 57' E.	052	Karlstad	59° 23' N. 13° 30' E.	103	Birr Castle	53° 06' N. 07° 56' W.	168	Guernsey	49° 26' N. 02° 30' W.
009	Andenes	69° 19' N. 16° 07' E.	053	Jönköping	57° 47' N. 14° 10' E.	104	Blacksoad Point	54° 06' N. 10° 04' W.			
010	Borgvaer	68° 20' N. 13° 48' E.	054	Visby	57° 39' N. 18° 18' E.	105	Malin Head	55° 23' N. 07° 24' W.	ICELAND.		
011	Röst	67° 30' N. 12° 04' E.	055	Abisko	68° 21' N. 18° 49' E.	107	Aldergrove	54° 39' N. 06° 13' W.	170	Reykjavik	64° 09' N. 21° 55' W.
012	Myken	66° 46' N. 12° 29' E.	056	Stensele	65° 04' N. 17° 10' E.	108	Donaghadee	54° 38' N. 05° 32' W.	171	Stykkisholm	66° 05' N. 22° 46' W.
013	Brønnøysund	65° 28' N. 12° 12' E.	057	Härnösand	62° 37' N. 17° 57' E.	110	Lerwick	60° 09' N. 01° 08' W.	172	Isafjord	66° 15' N. 23° 30' W.
014	Nordøyen	64° 48' N. 10° 53' E.	058	Särna	61° 41' N. 13° 07' E.	111	Stornoway	58° 11' N. 06° 22' W.	173	Blönduós	65° 40' N. 20° 19' W.
015	Nordli	64° 28' N. 13° 35' E.	059	Stockholm	59° 21' N. 18° 04' E.	112	Wick	58° 27' N. 03° 06' W.	174	Akureyri	66° 40' N. 18° 04' W.
016	Vallersund	63° 52' N. 9° 45' E.	060	Grimskar	56° 39' N. 16° 22' E.	113	Tiree	56° 31' N. 06° 55' W.	175	Raufarhöfn	65° 28' N. 15° 57' W.
017	Trondhjem	63° 26' N. 10° 25' E.	061	Gällivare	67° 08' N. 20° 40' E.	115	Nairn	57° 36' N. 03° 52' W.	176	Seydisfjord	65° 20' N. 13° 40' W.
018	Titran	63° 40' N. 8° 19' E.	062	Bjuröklubb	64° 28' N. 21° 34' E.	116	Aberdeen	57° 10' N. 02° 06' W.	177	Holar	64° 18' N. 15° 05' W.
019	Ona	62° 52' N. 6° 53' E.	063	Storlien	63° 19' N. 12° 06' E.	117	Leuchars	56° 23' N. 02° 53' W.	178	Vestmanna	63° 26' N. 20° 15' W.
020	Runde	62° 24' N. 5° 39' E.	064	Linköping	58° 25' N. 15° 38' E.	118	Renfrew	55° 52' N. 04° 24' W.	179	Grindavik	63° 50' N. 22° 26' W.
021	Kinn	61° 33' N. 4° 48' E.	065	Ölands norra udde	57° 22' N. 17° 06' E.	119	Inchkeith	56° 02' N. 03° 08' W.			
022	Bergen	60° 24' N. 5° 19' E.	066	Brämö	62° 13' N. 17° 44' E.	120	Eskdalemuir	55° 19' N. 03° 12' W.	DENMARK, ETC.		
023	Rundemannen	60° 24' N. 5° 22' E.	067	Falun	60° 37' N. 15° 38' E.	124	Tynemouth	55° 01' N. 01° 25' W.	181	Copenhagen	55° 42' N. 12° 37' E.
024	Fanaraaken	61° 31' N. 7° 55' E.	068	Karlshamn	56° 10' N. 14° 52' E.	126	Holyhead	53° 18' N. 04° 39' W.	182	Skagen	57° 44' N. 10° 38' E.
025	Slireaa	60° 36' N. 7° 32' E.	069	Karesuando	68° 27' N. 22° 30' E.	127	Liverpool	53° 24' N. 03° 04' W.	183	Hanstholm	57° 07' N. 08° 36' E.
026	Svandalsfjona	59° 50' N. 6° 59' E.	070	Holmögadd	63° 35' N. 20° 45' E.	128	Sealand	53° 14' N. 03° 00' W.	184	Blaavandshuk	55° 33' N. 08° 05' E.
027	Slotterøy	59° 55' N. 5° 04' E.	071	Orebro	59° 16' N. 15° 13' E.	130	Harrogate	54° 00' N. 01° 36' W.	185	Hammeren	55° 17' N. 14° 46' E.
028	Utsire	59° 18' N. 4° 53' E.	072	Göteborg	57° 42' N. 11° 58' E.	132	Spurn Head	63° 34' N. 00° 07' E.	190	Scoreshysund	70° 29' N. 21° 58' W.
029	Obrested	58° 39' N. 5° 34' E.	073	Kiruna	67° 51' N. 20° 14' E.	133	Birmingham	52° 28' N. 01° 56' W.	191	Thorshavn	62° 03' N. 06° 45' W.
030	Lister	58° 06' N. 6° 34' E.	074	Sveg	62° 03' N. 14° 25' E.	135	Christchurch	43° 02' N. 00° 31' W.	196	Julianehaab	60° 43' N. 46° 03' W.
031	Lindesnes	57° 59' N. 7° 05' E.	075	Landsort	58° 44' N. 17° 52' E.	136	Cranwell	53° 02' N. 00° 31' W.	197	Godthaab	64° 10' N. 51° 45' W.
032	Oksøy	58° 04' N. 8° 04' E.	076	Hoburg	56° 55' N. 18° 09' E.	137	Newton	52° 52' N. 00° 40' E.	198	Godhavn	69° 14' N. 53° 31' W.
033	Byglandsfjord	58° 40' N. 7° 48' E.	077	Suorva	67° 32' N. 18° 14' E.	139	Pembroke	51° 41' N. 05° 11' W.	199	Angmagsalik	65° 36' N. 37° 34' W.
034	Gvarv	59° 24' N. 9° 10' E.	078	Bjuråker	61° 52' N. 16° 34' E.	140	Ross-on-Wye	51° 54' N. 02° 34' W.			
035	Lyngör	58° 38' N. 9° 07' E.	079	Gotska Sandön	58° 23' N. 19° 11' E.	141	Leafeld	51° 50' N. 01° 33' W.	FRANCE.		
036	Ferder	59° 02' N. 10° 32' E.	080	Växjö	56° 53' N. 14° 29' E.	143	Upper Heyford	51° 56' N. 01° 15' W.	200	Reims	49° 15' N. 04° 05' E.
037	Horten	59° 20' N. 10° 20' E.	081	Kviksjö	66° 57' N. 17° 45' E.	144	Cardington	52° 06' N. 00° 25' W.	201	Rochefort	45° 55' N. 00° 59' W.
038	Aas	59° 40' N. 10° 46' E.	082	Knön	60° 10' N. 13° 47' E.	145	Duxford	52° 06' N. 00° 08' E.	202	Sococa	43° 23' N. 01° 41' W.
039	Oslo	59° 55' N. 10° 43' E.	083	Skara	58° 24' N. 13° 27' E.	147	Worthy Down	51° 07' N. 01° 19' W.	203	Bordeaux	44° 50' N. 00° 42' W.
040	Tryvanns- höiden	59° 59' N. 10° 41' E.	084	Halmstad	56° 40' N. 12° 52' E.	149	Farnborough	51° 15' N. 00° 45' W.	204	Beauvais	49° 27' N. 02° 06' E.
041	Kjeller	59° 58' N. 11° 02' E.	085	Boden	65° 49' N. 21° 42' E.	150	Kew	51° 28' N. 00° 19' W.	205	Cherbourg	49° 38' N. 01° 39' W.
042	Flisa	60° 37' N. 12° 01' E.	086	Uppsala	59° 51' N. 17° 38' E.	151	Croydon	51° 21' N. 00° 07' W.	206	Clermont Ferrand	45° 47' N. 03° 09' E.
043	Kutjern	60° 34' N. 10° 33' E.	087	Vanersborg	58° 23' N. 12° 20' E.	153	Shoeburyness	51° 32' N. 00° 47' E.	207	Dijon	47° 16' N. 05° 06' E.
044	Lillehammer	61° 07' N. 10° 28' E.	088	Malmö	55° 37' N. 13° 02' E.	154	Clacton	51° 47' N. 01° 09' E.	208	St. Inglevert	50° 52' N. 01° 44' E.
			089	Gäddede	64° 30' N. 14° 07' E.	155	Felixstowe	51° 57' N. 01° 20' E.	209	Paris	48° 52' N. 02° 18' E.
			090	Västerås	59° 37' N. 16° 33' E.	156	Scilly	49° 56' N. 06° 18' W.	210	Lyons	45° 44' N. 04° 55' E.
									211	Brest	48° 20' N. 04° 46' W.

* No information is available up to the time of going to press as to changes of Key Letters or Code for ships' use, following the Conference of Safety of Life at Sea, 1929, and the International Meteorological Conference at Copenhagen, 1929. See "Wireless Weather Signals," page 37, Vol. VII, No. 74.

Code No.	Station.	Latitude.	Longitude.	Code No.	Station.	Latitude.	Longitude.	Code No.	Station.	Latitude.	Longitude.	Code No.	Station.	Latitude.	Longitude.	
212	Nimes	43° 51' N.	04° 24' E.	350	San Sebastian	43° 09' N.	01° 38' W.	464	Arkona	54° 41' N.	13° 26' E.	605	Safi	32° 19' N.	09° 16' W.	
213	Mayence	49° 59' N.	08° 16' E.	351	Gijon	43° 33' N.	05° 39' W.	465	Heligoland	54° 11' N.	07° 54' E.	606	Magador	31° 31' N.	09° 49' W.	
214	Compiegne	49° 23' N.	02° 55' E.	352	Vigo	42° 14' N.	08° 43' W.		LITHUANIA.			607	Agadir	30° 28' N.	09° 32' W.	
215	Le Bourget	48° 57' N.	02° 26' E.	353	Madrid	40° 24' N.	03° 41' W.	466	Kovno	54° 55' N.	23° 56' E.	608	Beni Malek	34° 48' N.	05° 34' W.	
216	Perpignan	42° 44' N.	02° 52' E.	354	Seville	37° 23' N.	05° 59' W.	467	Memel	55° 42' N.	21° 10' E.	609	Meknes	33° 55' N.	05° 35' W.	
217	Er Hastellie	47° 20' N.	03° 16' W.	355	Almeria	36° 51' N.	02° 28' W.	468	Telsh	55° 59' N.	22° 15' E.	610	Fez	34° 05' N.	05° 03' W.	
218	Rennes	48° 07' N.	01° 43' W.	356	Alicante	38° 21' N.	00° 29' W.	469	Birshe	56° 12' N.	24° 45' E.	611	Taza	34° 14' N.	04° 02' W.	
219	Strasbourg	48° 33' N.	07° 38' E.	357	Mahon	39° 53' N.	04° 16' E.		LATVIA.			612	Oujda	34° 41' N.	01° 56' W.	
220	Cuers	43° 15' N.	06° 08' E.	358	Barcelona	41° 23' N.	02° 10' E.	470	Riga	56° 59' N.	24° 05' E.	613	Marrakesh	31° 39' N.	08° 01' W.	
221	Toulouse	43° 33' N.	01° 23' E.	359	Valencia	39° 28' N.	00° 23' W.	471	Libau	56° 31' N.	21° 00' E.	614	Midelt	32° 36' N.	04° 46' W.	
222	Tours	47° 25' N.	00° 42' E.	360	Zaragossa	41° 39' N.	00° 53' W.	472	Malnova	56° 47' N.	27° 44' E.	615	Bou Denib	32° 00' N.	04° 54' W.	
223	Antibes	43° 35' N.	07° 07' E.	361	Santauder	43° 29' N.	03° 47' W.	473	Tangier	34° 35' N.	03° 21' W.	616	Kasbah Tadmra	32° 37' N.	06° 18' W.	
224	Cette	43° 24' N.	03° 41' E.	362	Corunna	43° 23' N.	08° 22' W.	474	Dvinsk	55° 53' N.	26° 30' E.	617	Guercif	34° 35' N.	03° 21' W.	
225	Pau	43° 22' N.	00° 24' W.	363	Burgos	42° 20' N.	03° 42' W.		ESTONIA.			618	Timadit	33° 15' N.	05° 10' W.	
226	Ajaccio	41° 55' N.	08° 45' E.	364	Valladolid	41° 38' N.	04° 44' W.	475	Tallinn	59° 26' N.	24° 48' E.	620	Tangier	(Spain)	35° 47' N.	05° 49' W.
227	Argentan	48° 45' N.	00° 01' W.	365	Badajoz	38° 54' N.	06° 58' W.	476	Tartu	58° 23' N.	26° 43' E.	621	Melilla	35° 17' N.	02° 59' W.	
228	St. Cyr	48° 47' N.	02° 02' E.	366	Cordoba	37° 53' N.	04° 49' W.	477	Vilandi	58° 23' N.	21° 49' E.	622	Tetuan	35° 32' N.	05° 24' W.	
229	La Hague	49° 43' N.	01° 56' W.	367	Malaga	36° 43' N.	04° 23' W.	478	Narva-Jõesuu	59° 28' N.	28° 04' E.	623	Larache	35° 03' N.	06° 05' W.	
230	Le Havre	49° 31' N.	00° 04' E.	368	Los Alcazares	37° 44' N.	00° 51' W.	479	Pakerort	59° 24' N.	24° 04' E.	624	C. Juby	27° 56' N.	13° 00' W.	
231	Marignane	43° 26' N.	05° 12' E.	369	San Fernando	36° 26' N.	06° 12' W.		FINLAND.			625	Rio de Oro	23° 40' N.	15° 54' W.	
232	Metz	49° 06' N.	06° 12' E.	370	Tenerife	28° 19' N.	16° 30' W.	481	Helsingfors	60° 10' N.	24° 57' E.		ALGERIA.			
233	Montelimar	44° 35' N.	04° 43' E.	371	Izaña	28° 15' N.	16° 40' W.	482	Sortavala	61° 42' N.	30° 41' E.	631	Oran	35° 38' N.	00° 39' W.	
234	Romilly	48° 30' N.	03° 45' E.	372	Guadalajara	40° 38' N.	03° 10' W.	483	Vaasa	63° 05' N.	21° 32' E.	632	Algiers	36° 46' N.	03° 03' E.	
235	Valenciennes	50° 20' N.	03° 32' E.	373	Granada	37° 11' N.	03° 36' W.	484	Kuopio	62° 54' N.	27° 40' E.	633	Setif	36° 20' N.	05° 33' E.	
236	Abbeville	50° 08' N.	01° 50' E.		PORTUGAL.			485	Sodankylä	67° 22' N.	26° 39' E.	634	Biskra	34° 51' N.	05° 44' E.	
237	Nancy	48° 42' N.	06° 14' E.	381	Oporto	41° 12' N.	08° 43' W.	486	Kajaani	64° 13' N.	27° 46' E.	635	Touggourt	33° 06' N.	06° 04' E.	
238	Belfort	47° 38' N.	06° 52' E.	382	Coimbra	40° 12' N.	08° 25' W.	487	Tampere	61° 30' N.	23° 46' E.	636	Ouargla	31° 55' N.	05° 10' E.	
239	Epinal	48° 10' N.	06° 26' E.	383	Berlema	39° 25' N.	09° 30' W.	488	Abo	60° 27' N.	22° 16' E.	637	In-Salah	27° 08' N.	02° 27' E.	
240	St. Raphael	43° 25' N.	06° 45' E.	384	Lisbon	38° 44' N.	09° 11' W.	489	Inari	68° 57' N.	26° 49' E.	638	Colomb			
241	Avord	47° 02' N.	02° 39' E.	385	St. Vincent	37° 01' N.	09° 00' W.	490	Hanko	59° 49' N.	22° 56' E.		Béchar	31° 38' N.	02° 13' W.	
242	Angoulême	45° 40' N.	00° 13' E.	386	Faro	37° 01' N.	07° 56' W.	491	Maarian- hamm	60° 06' N.	19° 57' E.	639	Béni-Abbes	30° 00' N.	02° 21' W.	
243	Orléans	47° 56' N.	01° 53' E.	387	Alverca	38° 54' N.	09° 01' W.		AUSTRIA.			640	Timoun	29° 12' N.	00° 02' E.	
244	Portiers	46° 45' N.	00° 18' E.	388	Tancos	39° 29' N.	08° 19' W.	501	Vienna	48° 15' N.	16° 22' E.	641	Laghout	33° 48' N.	02° 53' E.	
245	Le Puy	45° 03' N.	03° 53' E.	389	Villa Real de S. Antonio	37° 11' N.	07° 25' W.	502	Klagenfurt	46° 37' N.	14° 18' E.	642	Ain-Sefra	32° 48' N.	00° 36' W.	
246	Puy-de-Dôme	45° 46' N.	02° 58' E.	393	Praya, C. Verde Is.	14° 55' N.	23° 31' W.	503	Sonnblick	47° 03' N.	12° 57' E.	643	El-Golâ	30° 33' N.	03° 04' E.	
247	Pic-du-Midi	42° 56' N.	00° 08' E.	394	S. Vincent	16° 53' N.	24° 59' W.	504	Villach	46° 35' N.	13° 50' E.	644	El-Oned	33° 21' N.	06° 54' E.	
248	Mont-Ventoux	44° 10' N.	05° 17' E.	395	Madeira	32° 48' N.	17° 16' W.	505	Graz	47° 04' N.	15° 28' E.	645	Ghardaia	32° 29' N.	03° 40' E.	
249	Mont-Aigoual	44° 07' N.	03° 35' E.	396	Ponta Delgada	37° 44' N.	25° 40' W.	506	Obir	46° 30' N.	14° 29' E.	646	Adrar	27° 28' N.	00° 05' E.	
250	Toul	48° 41' N.	05° 52' E.	397	Angra	38° 39' N.	27° 14' W.	507	Innsbruck	47° 16' N.	11° 24' E.	647	Cap Carbon	36° 45' N.	05° 00' E.	
251	La Courtine	45° 42' N.	02° 15' E.	398	Horta	38° 32' N.	28° 38' W.	508	Salzburg	47° 48' N.	13° 02' E.	648	Ouallen	24° 30' N.	00° 50' E.	
252	Chateauroux	46° 49' N.	01° 46' E.	399	Flores	39° 27' N.	31° 08' W.		CZECHOSLOVAKIA.			649	Fort Flatters	28° 00' N.	07° 20' E.	
253	Remorantin	47° 19' N.	01° 41' E.		GERMANY.			520	Prague	50° 04' N.	14° 26' E.	650	Fort			
254	Chartres	48° 27' N.	01° 30' E.	401	Borkum	53° 36' N.	06° 45' E.	521	Cheb	50° 05' N.	12° 24' E.		Polignac	26° 30' N.	08° 40' E.	
255	Mourmelon	49° 07' N.	04° 21' E.	402	Nordhorn	52° 26' N.	07° 06' E.	522	Olomouc	49° 36' N.	17° 16' E.	651	Djanet	32° 30' N.	10° 00' E.	
256	Istres	43° 25' N.	04° 57' E.	403	Hamburg	53° 33' N.	09° 59' E.	523	Vajnorý	48° 12' N.	17° 13' E.	652	Tamanrasset	22° 45' N.	05° 00' E.	
257	Cazaux	44° 32' N.	01° 08' W.	404	Stettin	53° 25' N.	14° 30' E.	524	Kosice	48° 42' N.	21° 16' E.	653	Bone	36° 50' N.	07° 50' E.	
258	Angers	47° 29' N.	00° 34' W.	405	Danzig	54° 21' N.	18° 40' E.		HUNGARY.			654	Le Kreider	34° 09' N.	00° 05' E.	
259	Sanguinaires	41° 52' N.	08° 35' E.	406	Warnemund	54° 11' N.	12° 06' E.	541	Budapest	47° 30' N.	19° 02' E.	655	Cap de Garde	36° 59' N.	07° 45' E.	
260	Cap Corse	43° 01' N.	09° 21' E.	407	Aachen	50° 46' N.	06° 08' E.	542	Szombathely	47° 15' N.	16° 36' E.	656	Cap Tenes	36° 36' N.	01° 19' E.	
261	Pertusato	41° 22' N.	09° 10' E.	408	Magdeburg	52° 08' N.	11° 38' E.	543	Kaposvár	46° 22' N.	17° 48' E.	657	Bougaroni	37° 09' N.	06° 29' E.	
262	Besançon	47° 15' N.	05° 59' E.	409	Berlin-Stadt	52° 31' N.	13° 24' E.	544	Szeged	46° 15' N.	20° 09' E.	658	Cap de Fer	37° 07' N.	07° 08' E.	
263	Bréhat	41° 51' N.	03° 00' W.	410	Dresden	51° 03' N.	13° 45' E.	545	Debreczen	47° 31' N.	21° 38' E.		TUNISIA.			
264	Ouessant	48° 27' N.	05° 07' W.	411	Breslau	51° 06' N.	17° 02' E.	546	Sopron	47° 41' N.	16° 35' E.	661	Tunis	36° 48' N.	10° 30' E.	
265	Penmarch	49° 47' N.	04° 22' W.	412	Frankfurt	50° 07' N.	08° 41' E.	547	Pécs	46° 06' N.	18° 15' E.	662	Bizerta	37° 17' N.	09° 52' E.	
266	Thionville	49° 21' N.	06° 12' E.	413	Karlsruhe	49° 02' N.	08° 23' E.	548	Turkeve	47° 07' N.	20° 45' E.	663	Sfax	34° 44' N.	10° 45' E.	
267	Saverne	48° 44' N.	07° 21' E.	414	Munich	48° 09' N.	11° 37' E.	549	Eger	47° 53' N.	20° 23' E.	664	Médenine	34° 14' N.	10° 05' E.	
268	La Chiappa	41° 35' N.	09° 21' E.	415	Bamberg	49° 53' N.	10° 53' E.		POLAND.			665	Tozeur	34° 10' N.	08° 06' E.	
269	La Coubre	45° 41' N.	01° 14' W.	416	Zugspitze	47° 25' N.	11° 00' E.	551	Posen	52° 25' N.	16° 51' E.	666	Ben Gardane	33° 08' N.	11° 10' E.	
270	St. Julien en Genevois	46° 08' N.	06° 08' E.	417	Kahler Asten	51° 11' N.	08° 30' E.	552	Warsaw	52° 11' N.	21° 01' E.	667	Sousse	35° 50' N.	10° 34' E.	
271	Neustadt	49° 19' N.	08° 13' E.	418	Brocken	51° 41' N.	10° 38' E.	553	Vilna	54° 41' N.	25° 15' E.	668	Metlaoui	34° 20' N.	08° 22' E.	
272	Treves	49° 45' N.	06° 39' E.	419	Fichtelberg	50° 27' N.	12° 53' E.	554	Lublin	51° 15' N.	22° 34' E.	669	Gabes	33° 53' N.	10° 13' E.	
273	Gavres	47° 41' N.	03° 21' W.	420	Grünberg	51° 56' N.	15° 30' E.	555	Cracow	50° 05' N.	20° 01' E.	670	Bir Kecira			
274				421	Hanover	52° 22' N.	09° 45' E.	556	Lemberg	49° 50' N.	24° 00' E.	671	Kebili	33° 40' N.	09° 10' E.	
	BELGIUM.			422	Königsberg	54° 43' N.	20° 30' E.	557	Kielce	50° 53' N.	20° 38' E.	672	Kairouan	35° 41' N.	10° 04' E.	
275	Ostend	51° 12' N.	02° 54' E.	423	Wasserkuppe	50° 31' N.	09° 57' E.	558	Bromberg	53° 08' N.	18° 00' E.	673	La Galite			
276	Brussels	50° 48' N.	04° 21' E.	424	Feldberg	50° 13' N.	08° 27' E.	559	Zakopane	49° 17' N.	19° 58' E.	674	Fort Saint			
277	St. Hubert	50° 02' N.	05° 24' E.	425	Tannus	50° 13' N.	08° 27' E.	560	Pinsk	52° 07' N.	26° 06' E.	675	Cap Bon	37° 00' N.	11° 10' E.	
	SWITZERLAND.			426	Fürth	49° 30' N.	10° 59' E.	561	Danzig	54° 24' N.	18° 40' E.		EGYPT, SUDAN AND CYPRUS.			
281	Zürich	47° 23' N.	08° 33' E.	427	Feldberg	47° 52' N.	08° 02' E.	562	Puck	54° 43' N.	18° 25' E.	681	Helwan	29° 52' N.	31° 20' E.	
282	Berne	46° 57' N.	07° 26' E.	428	Schneekoppe	50° 44' N.	15° 44' E.	563	Brzesce	52° 06' N.	23° 40' E.	682	Alexandria	31° 12' N.	29° 53' E.	
283	Geneva	46° 12' N.	06° 09' E.	429	Rügenwalder- mund	54° 25' N.	16° 25' E.	564	Dgbem	51° 34' N.	21° 52' E.	683	Sollum	31° 33' N.	25° 11' E.	
284	Lugano	46° 00' N.	08° 57' E.	430	Wilhelms- haven	53° 32' N.	08° 09' E.	565	Grudziadz	53° 29' N.	18° 45' E.	684	Mersa Matruh	31° 22' N.	27° 14' E.	
285	Santis	47° 15' N.	09° 20' E.	431	Wehnde	51° 27' N.	10° 20' E.	566	Torun	53° 01' N.	18° 37' E.	685	Port Said	31° 16' N.	32° 19' E.	
286	Jungfrauoch	46° 32' N.	07° 58' E.	432	Borkumriff	53										

Code No.	Station.	Latitude.	Longitude.	Code No.	Station.	Latitude.	Longitude.	Code No.	Station.	Latitude.	Longitude.	Code No.	Station.	Latitude.	Longitude.
722	G. Oréhovitz	43° 07' N.	25° 42' E.		SYRIA.			853	Tomp	58° 44' N.	27° 50' E.	943	Kamyshin	50° 02' N.	45° 07' E.
723	Kazanlik	42° 37' N.	25° 24' E.	781	Damascus	33° 31' N.	36° 14' E.	854	Luga	58° 44' N.	29° 53' E.	944	Alexandrov		
724	Yamboli	42° 29' N.	26° 31' E.	782	Muslimie	36° 21' N.	37° 08' E.	855	Novgorod	58° 37' N.	31° 11' E.		Gai	50° 13' N.	48° 38' E.
725	Rustchuk	43° 52' N.	25° 56' E.	783	Deir-es-Zoor	35° 20' N.	40° 11' E.	856	Verebe	58° 39' N.	32° 42' E.	946	Stalingrad	48° 42' N.	44° 31' E.
726	Plevna	43° 24' N.	24° 37' E.	784	Rakka	35° 36' N.	39° 03' E.	857	Ostrov	57° 20' N.	28° 00' E.	947	Verkne		
	GREECE.			785	Hasseitje	36° 12' N.	40° 50' E.	858	Dno	57° 51' N.	29° 59' E.		Baskunchak	48° 10' N.	46° 49' E.
730	Athens	37° 58' N.	23° 43' E.	786	Palmyra	34° 18' N.	38° 34' E.	859	Valdai	57° 59' N.	33° 15' E.	949	Astrakhan	46° 21' N.	48° 02' E.
731	Salonika	40° 40' N.	22° 52' E.	787	Homs	34° 46' N.	36° 46' E.	860	Holm	57° 09' N.	31° 10' E.	950	Novgorod		
732	Alexandrou- polis	40° 51' N.	25° 52' E.	788	Deraa	32° 40' N.	36° 08' E.	863	V. Luki	56° 21' N.	30° 31' E.		Sieversk	52° 01' N.	33° 18' E.
733	Corfu	39° 37' N.	19° 57' E.	789	Sorveida	32° 45' N.	36° 25' E.	864	Toropetz	56° 29' N.	31° 38' E.	951	Shepetovka	51° 10' N.	27° 04' E.
734	Lemnos	39° 53' N.	25° 04' E.	790	Rayack	33° 52' N.	36° 00' E.	865	Koeuas	64° 34' N.	47° 39' E.	952	Chernigov	51° 29' N.	31° 20' E.
	(Kastro)	39° 53' N.	25° 04' E.	791	Ksara	33° 49' N.	35° 53' E.	866	Syva	63° 35' N.	45° 38' E.	953	Nyehzin	51° 03' N.	31° 53' E.
735	Chios	38° 23' N.	26° 09' E.	792	Djedeide	33° 54' N.	35° 34' E.	869	Shenkursk	62° 06' N.	42° 54' E.	955	Zviagel	50° 36' N.	27° 38' E.
736	Zante	37° 47' N.	20° 55' E.	793	Latakia	35° 36' N.	35° 48' E.	870	Kargopol	61° 30' N.	38° 57' E.	956	Zhitomir	50° 15' N.	28° 40' E.
737	Canea	35° 30' N.	24° 02' E.	794	Alexandretta	36° 38' N.	36° 11' E.	872	Velsk	61° 05' N.	42° 07' E.	957	Kiev	50° 27' N.	30° 30' E.
738	Calamata	37° 02' N.	22° 08' E.	795	Jerablus	36° 48' N.	37° 58' E.	873	V. Ustyug	60° 46' N.	46° 18' E.	958	Lubny	50° 01' N.	33° 02' E.
739	Candia	35° 19' N.	25° 09' E.	796	Merdjayoun	33° 23' N.	35° 33' E.	875	Vologda	59° 15' N.	39° 50' E.	959	Kharkov	50° 00' N.	36° 14' E.
	TURKEY.				RUSSIA			876	Totma	59° 58' N.	42° 45' E.	960	Volochitzk	49° 32' N.	26° 10' E.
740	Angora	39° 58' N.	32° 48' E.	801	Alexandrowsk	69° 12' N.	33° 23' E.	878	Ust Tsylna	56° 26' N.	52° 10' E.	961	Vinnitsa	49° 12' N.	28° 29' E.
741	Adrianople	41° 10' N.	26° 34' E.	802	Kola	68° 53' N.	33° 01' E.	881	Troitsk	62° 42' N.	56° 13' E.	962	Poltava	49° 37' N.	34° 34' E.
742	Smyrna	38° 27' N.	27° 15' E.	803	Teriberka	69° 10' N.	35° 08' E.		Pechorsk	61° 40' N.	50° 51' E.	963	Izyum	49° 11' N.	37° 17' E.
743	Stamboul	41° 02' N.	28° 47' E.	804	Kanin Nos	68° 39' N.	43° 18' E.	882	U. Sysolsk	61° 40' N.	50° 51' E.	964	Starobylsk	49° 17' N.	38° 55' E.
744	Adana	36° 58' N.	35° 18' E.	806	Harlovka	68° 47' N.	37° 22' E.	884	Ust-Usa			965	Kamenetz		
745	Caesarea	38° 44' N.	36° 28' E.	807	Sviata Mos	68° 09' N.	39° 49' E.	885	Vitebsk	55° 12' N.	30° 11' E.		Podolsk	48° 40' N.	26° 43' E.
746	Kerasund	41° 01' N.	38° 28' E.	808	Hibini	67° 44' N.	33° 02' E.	887	Minsk	53° 54' N.	27° 33' E.	966	Uman	48° 45' N.	30° 13' E.
747	Sinope	42° 02' N.	35° 10' E.	810	Orlovski	67° 12' N.	41° 22' E.	888	Gorki	54° 17' N.	30° 59' E.	967	Zinovievsk	48° 31' N.	32° 17' E.
748	Songuldak	41° 30' N.	31° 51' E.	811	Kandalaksha	67° 08' N.	32° 26' E.	889	Smolensk	54° 47' N.	32° 04' E.	968	Dnipropetrovsk		
750	Konia	37° 52' N.	32° 30' E.	812	Morzhovetz	66° 46' N.	42° 25' E.	893	Jizdra	53° 45' N.	34° 44' E.			48° 27' N.	35° 04' E.
751	Eski Shehr	39° 43' N.	30° 29' E.	814	Kovda	66° 41' N.	32° 54' E.	895	Vasilevitchi	52° 16' N.	29° 48' E.	969	Tasinovatia	48° 04' N.	37° 50' E.
752	Adalia	36° 53' N.	30° 46' E.	815	Kuzomen	66° 17' N.	36° 54' E.	896	Novozybkov	52° 31' N.	31° 50' E.	970	Lugansk	48° 35' N.	39° 20' E.
753	Diabekir	37° 50' N.	40° 25' E.	816	Pialitsa	66° 10' N.	39° 32' E.	898	V. Volochek	57° 35' N.	34° 34' E.	971	Berzulov	47° 51' N.	29° 32' E.
754	Siwas	37° 10' N.	39° 43' E.	817	Gudeno	65° 56' N.	34° 46' E.	899	Mishkin	58° 03' N.	38° 51' E.	972	Voznesensk	47° 34' N.	31° 20' E.
756	Ezerum	39° 55' N.	41° 17' E.	818	Zimuegorski	65° 28' N.	39° 44' E.	900	Rybinsk	58° 03' N.	38° 51' E.	973	Nikopol	47° 36' N.	34° 25' E.
	PALESTINE.			820	Mezen	65° 50' N.	44° 16' E.	901	Kostroma	57° 46' N.	40° 56' E.	974	Melctopol	46° 52' N.	35° 22' E.
760	Haifa	32° 48' N.	34° 59' E.	821	Kem	64° 57' N.	34° 39' E.	903	Ivanova			975	Odesa	46° 26' N.	30° 46' E.
761	Gaza	31° 30' N.	34° 27' E.	822	Onega	63° 54' N.	38° 07' E.	905	Rzhev	56° 16' N.	34° 20' E.	976	Nicolaev	46° 58' N.	31° 58' E.
762	Ramleh	31° 54' N.	34° 54' E.	824	Archangel	64° 34' N.	40° 33' E.	907	N. Novgorod	56° 20' N.	44° 00' E.	977	Kherson	46° 11' N.	32° 37' E.
763	Amman	31° 57' N.	35° 57' E.	828	Matotchkin			909	Moscow	55° 50' N.	37° 33' E.	978	Genichesk	46° 11' N.	34° 50' E.
764	Ma'an	30° 11' N.	35° 39' E.	830	Vaigach	70° 24' N.	58° 48' E.	911	Kaluga	54° 31' N.	36° 16' E.	979	Berdiansk	46° 38' N.	36° 48' E.
	IRAQ.			832	Ugorski Shar	69° 49' N.	60° 45' E.	913	Sklatma	54° 58' N.	41° 45' E.	981	Marioupol	47° 08' N.	37° 34' E.
770	Mosul	36° 20' N.	43° 08' E.	834	Talvesoehnoe	67° 35' N.	52° 53' E.	914	Ykuratovo	53° 34' N.	37° 00' E.	982	Taganrog	47° 12' N.	38° 57' E.
771	Sulaimania	35° 53' N.	45° 27' E.	836	Reboli	63° 50' N.	30° 48' E.	918	Zemetcheno	53° 30' N.	42° 57' E.	983	Rostov-Don	47° 12' N.	39° 41' E.
772	Baija	34° 55' N.	43° 50' E.	837	Padani	63° 15' N.	33° 15' E.	919	Vetluga	57° 51' N.	45° 48' E.	984	Azov	47° 07' N.	39° 24' E.
773	Palkanah	34° 49' N.	44° 44' E.	838	Medvieja Gora	62° 53' N.	34° 27' E.	923	Kazan	55° 47' N.	49° 08' E.	985	Yalsk	46° 44' N.	38° 17' E.
774	Hinaiidi	33° 17' N.	44° 29' E.	840	Petrozavodsk	61° 47' N.	34° 23' E.	924	Elabuga	55° 45' N.	52° 04' E.	986	Akhitari	46° 02' N.	38° 09' E.
775	Diwaniya	31° 58' N.	44° 51' E.	843	Sveritsa	60° 29' N.	32° 55' E.	925	Poretzkoe	55° 11' N.	46° 20' E.	987	Eupatoria	45° 09' N.	33° 16' E.
776	Rutbah	32° 55' N.	40° 05' E.	844	Vitegra	61° 00' N.	36° 27' E.	929	Penza	53° 11' N.	45° 01' E.	988	Sevastapol	44° 37' N.	33° 32' E.
777	Shaibah	30° 26' N.	47° 41' E.	845	Leningrad	59° 56' N.	30° 16' E.	930	Buguruslan	53° 39' N.	52° 26' E.	989	Yalta	44° 30' N.	34° 11' E.
				848	Byelozersk	60° 02' N.	37° 47' E.	931	Bezenchuk	52° 59' N.	49° 29' E.	990	Theodosia	45° 02' N.	35° 24' E.
				849	Kurgolovo	59° 47' N.	28° 08' E.	933	Kozlov	52° 53' N.	40° 31' E.	991	Kerch	45° 22' N.	36° 29' E.
				850	Tikhvin	59° 41' N.	33° 30' E.	935	Kursk	51° 45' N.	36° 12' E.	992	Anapa	44° 54' N.	37° 18' E.
				851	Babaev	59° 23' N.	35° 57' E.	936	Voronezh	51° 40' N.	39° 13' E.	993	Novorossiisk	44° 44' N.	37° 49' E.
				852	Cherepovets	59° 07' N.	37° 56' E.	939	Boguchar	59° 56' N.	40° 36' E.	994	Tuapse	44° 06' N.	39° 04' E.
								940	Balashov	51° 33' N.	43° 09' E.	995	Sochi	43° 35' N.	39° 43' E.
								941	Saratov	51° 32' N.	46° 02' E.	997	Sukhum	42° 58' N.	40° 55' E.
												998	Poti	42° 09' N.	41° 39' E.
												999	Batoum	41° 39' N.	41° 38' E.

WIRELESS STORM WARNINGS.

C.W. Issues.

Eiffel Tower W/T Station, call sign **FLE**, broadcasts wireless storm warnings immediately after the daily weather bulletins at 0220 G.M.T. on a wavelength of 1,478 m. C.W. and at 0820 G.M.T. on a wavelength of 7,200 m. C.W.

St. Pierre des Corps W/T Station, call sign **FYG.**, also broadcasts wireless storm warnings immediately after the daily weather bulletin at 1920 G.M.T. on a wavelength of 7,200 m. C.W.

The warnings are broadcast if the forecasts indicate that the wind force is likely to exceed force 7 on the Beaufort scale.

The signals refer to the following French coastal areas:—

"Manche"	...	Belgian frontier to and including Carteret.
"Bretagne"	...	From and including Cherbourg to estuary of Loire.
"Océan"	...	From and including Lorient to the Gironde.
"Gascogne"	...	From and including Île de Ré to Spanish frontier.
"Roussillon"	...	From Spanish frontier to and including Cette.
"Rhône"	...	From and including Cette to Camarat.
"Provence"	...	From and including Camarat to Italian frontier.
"Corse"	...	All the coasts of Corsica.

Form of Message.

The warnings are sent *en clair*, and are valid for 24 hours from the time indicated in the message.

They commence with the name of the day of the week, the time from which the validity of the warning is reckoned, the name of area threatened followed by the word "Tempête" and the probable direction from which the gale may be expected.

Example.

"Jeudi 15 heures Manche tempête, Nord-Ouest (N.W.)."

Explanation.

Storms or gales are predicted (or will continue) from now until 1500 to-morrow in the area and from the direction mentioned.

Spark Issues.

The following W/T stations broadcast storm warnings concerning the areas "Manche," "Bretagne," "Ocean," and "Gascogne":—

Cherbourg - Rouges Terres	...	Approximate Latitude 49° 37' N., Longitude 1° 36' W., call sign FUC.
Brest-Mengam	...	Approximate Latitude 48° 22' N., Longitude 4° 34' W., call sign FUE.
Lorient (Pen-Mané)	...	Approximate Latitude 47° 44' N., Longitude 3° 21' W., call sign FUN.
Rochefort	...	Approximate Latitude 45° 55' N., Longitude 0° 57' W., call sign FUR.

The following W/T stations broadcast storm warnings concerning the areas "Rousillon," "Provence," "Rhône," and "Corse":—

Porquerolles	...	Approximate Latitude 42° 59' N., Longitude 6° 12' E., call sign FUQ and
Ajaccio	...	Approximate Latitude 41° 56' N., Longitude 8° 46' E., call sign FUI.

The W/T stations transmit the warning on the 600 metre wave length as soon as it is received. The International Safety Signal — — — (TTT) is first sent out, followed by D.E. and station call sign. This transmission commences towards the end of one of the international three-minute silent periods and the nature of the warning is sent immediately after the end of the silent period. The message is repeated after several minutes.

When the time of sending falls outside a single operator watch on board ship the message is repeated at the commencement of the succeeding watch.

III.—WIRELESS TIME SIGNALS.

C.W. Issues.

Time signals in accordance with the New International System of W/T Time Signals proposed by the International Time Commission, held at Cambridge in July, 1925, are now broadcast from wireless stations in France, as follows:—

Paris—Eiffel Tower W/T Station.

Position, Latitude 48° 51' 30" N., Longitude 2° 17' 43" E.

Call Sign **FLE**. Wavelengths 32.5 m. (C.W.) and 2,650 m. (I.C.W.).

New International Time-Signals.

W/T Time-Signals are transmitted automatically from the Standard Clock at Paris Observatory, Latitude 48° 50' 11" N., Longitude 2° 20' 14" E., in accordance with the New International System of W/T Time-Signals as follows:—

	h.	m.	s.	h.	m.	s.	
(1) From	7	56	00	to	8	00	00 on 32.5 metres. (C.W.)
(2) „	9	26	00	„	9	30	00 „ 2,650 „ (I.C.W.)
(3) „	19	56	00	„	20	00	00 „ 32.5 „ (C.W.)
(4) „	22	26	00	„	22	30	00 „ 2,650 „ (I.C.W.)

The transmission of each series of signals is similar in every respect, the procedure as regards (1) being:—

G.M.T.						Signal.																
h.	m.	s.	h.	m.	s.																	
7	55	30				Call (— — — — —) followed by initials of the Bureau International de l'Heure (— — — — —) and two groups of three one-second (— — — — —).																
7	56	05 to 7 56 50				— — — — — every 10 sec., except that the third series from 25 sec. to 30 sec. consists of a single dash prolonged for 5 sec.																
57	00	„	57	50		— — — — — etc.																
57	55	„	58	00		<table><tr><td>{</td><td>55</td><td>56</td><td>57</td><td>58</td><td>59</td><td>60</td><td></td></tr><tr><td></td><td>■</td><td>■</td><td>■</td><td>■</td><td>■</td><td>■</td><td><i>Time signal.</i></td></tr></table>	{	55	56	57	58	59	60			■	■	■	■	■	■	<i>Time signal.</i>
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	■	■	■	■	■	■	<i>Time signal.</i>															
7	58	08 „	7	58	10	— — —																
58	18	„	58	20		— — —																
58	28	„	58	30		— — —																
58	38	„	58	40		— — —																
58	48	„	58	50		— — —																
58	55	„	59	00		<table><tr><td>{</td><td>55</td><td>56</td><td>57</td><td>58</td><td>59</td><td>60</td><td></td></tr><tr><td></td><td>■</td><td>■</td><td>■</td><td>■</td><td>■</td><td>■</td><td><i>Time signal.</i></td></tr></table>	{	55	56	57	58	59	60			■	■	■	■	■	■	<i>Time signal.</i>
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	■	■	■	■	■	■	<i>Time signal.</i>															
59	06	„	59	10		— — — — —																
59	16	„	59	20		— — — — —																
59	26	„	59	30		— — — — —																
59	36	„	59	40		— — — — —																
59	46	„	59	50		— — — — —																
7	59	55 „	8	00	00	<table><tr><td>{</td><td>55</td><td>56</td><td>57</td><td>58</td><td>59</td><td>60</td><td></td></tr><tr><td></td><td>■</td><td>■</td><td>■</td><td>■</td><td>■</td><td>■</td><td><i>Time signal.</i></td></tr></table>	{	55	56	57	58	59	60			■	■	■	■	■	■	<i>Time signal.</i>
{	55	56	57	58	59	60																
	■	■	■	■	■	■	<i>Time signal.</i>															
— = 1 sec. ; ■ = 0.2 sec.																						

— = 1 sec.; ■ = 0.2 sec.

Croix d'Hins W/T Station.

Position, Latitude 44° 42' 22" N., Longitude 0° 48' 30" W.

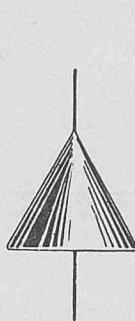
Call Sign **FYL**. Wavelength 18,900 m. (C.W.).

New International Time-Signals.

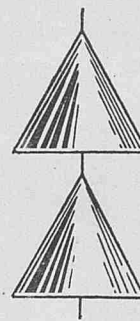
Time-Signals in accordance with the New International System of W/T Time-signals are broadcast twice daily, at 8^h. 00^m. 00^s. G.M.T. and 20^h. 00^m. 00^s. G.M.T. The signals are transmitted automatically by the Standard Clock at Paris Observatory. For procedure, see Eiffel Tower New International System of W/T Time-Signals above.

IV.—VISUAL GALE WARNINGS.

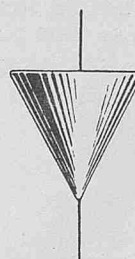
Day Signals.



Hoisted when a gale is probable from N.W.



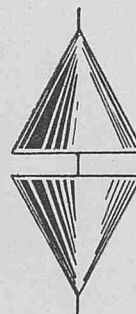
Hoisted when a gale is probable from N.E.



Hoisted when a gale is probable from S.W.



Hoisted when a gale is probable from S.E.



Hoisted when gales of hurricane force are probable.

Any of these signals indicate that there is an atmospheric disturbance in existence, which will probably cause a gale from the quarter indicated by the signal used within a distance of about 50 miles of the place where the signal is hoisted, and the knowledge of which is likely to be of use to seamen. Its meaning is simply "Look out! Bad weather as indicated is probably approaching you."

The signals are hoisted when necessary at the semaphore stations and port offices on the coast of France, and remain hoisted 48 hours from the time of receiving notice from the Ministry of Marine.

GREAT BRITAIN—AMENDMENT.

Wireless Weather Bulletins.

"Weather Shipping" Bulletin.

VOLUME VII, No. 74, Page 53, column 1, line 8:—For "fourth" substitute "third."

Special Notices Regarding Personnel.

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

Obituary.

The death of Captain A. SCOTLAND of S.S. *Clan McNeil* at the age of 58, in hospital at Mossel Bay, South Africa, on Christmas Eve, 1929, is noted with regret.

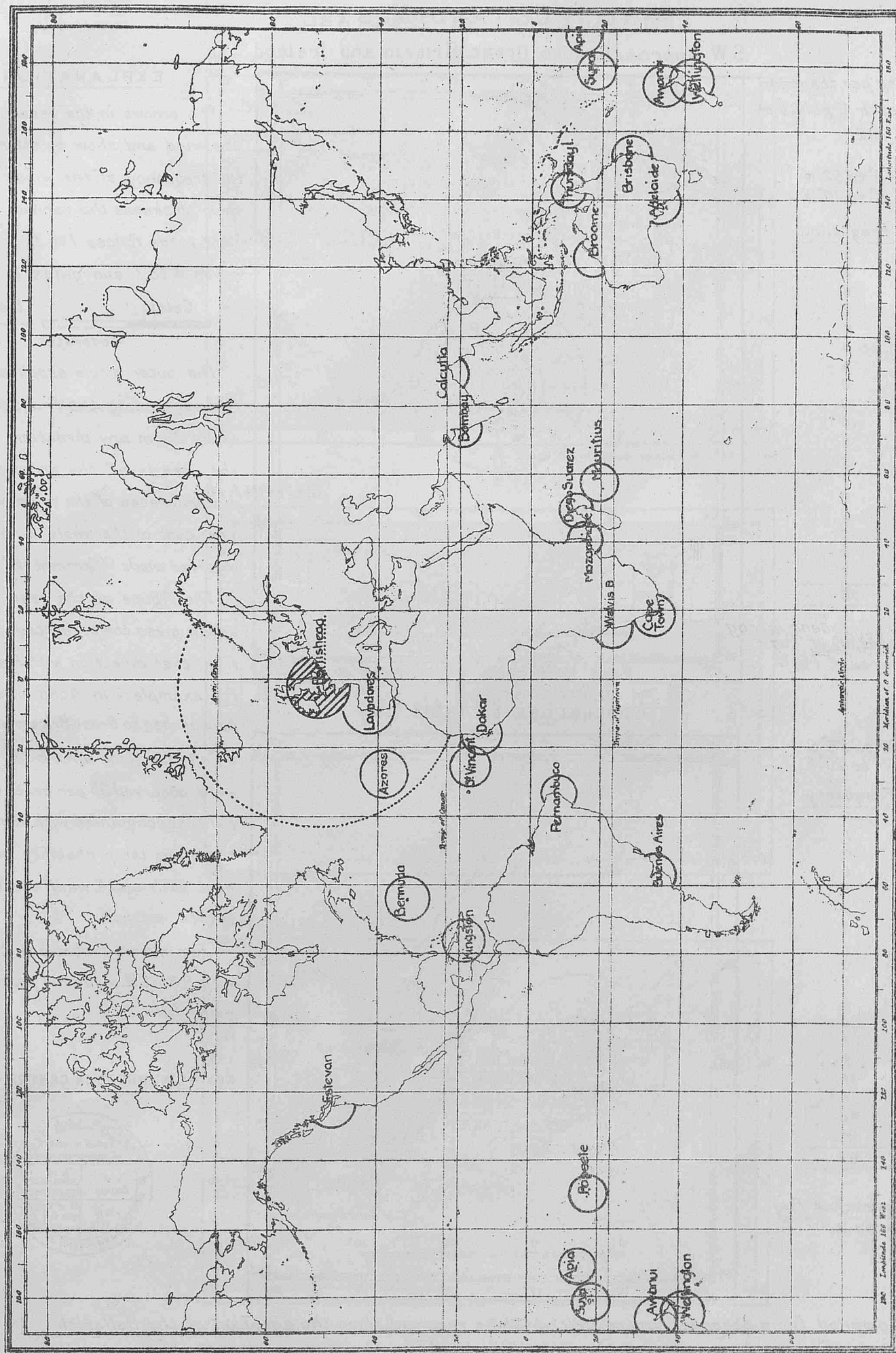
Captain SCOTLAND had been in the CLAN LINE service for over 30 years. He was a member of the Corps of Voluntary Marine Observers when in command of S.S. *Clan Sinclair* and *Clan Mackellar* from 1922 to 1927.

In 1916, during the Great War, when in command of S.S. *Clan Lindsay*, he repelled the attack of a submarine in the Bay of Biscay.

The death of Captain R. R. POND at Liverpool on February 15th, 1930, is noted with regret.

Captain POND retired from active service in the NELSON LINE in February, 1929. He had commanded the *Highland Watch*, *Highland Piper*, *Highland Brae*, *Highland Pride* and *Highland Enterprise*. He was a member of the Corps of Voluntary Marine Observers when in command of the last named vessel between 1920 and 1924.

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



The dotted circle indicates the area in which British ships would report to Portishead.

The small shaded circle indicates the area from which reports are prohibited to Pontishead.

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

APRIL.

WIND, FOG AND MIST.

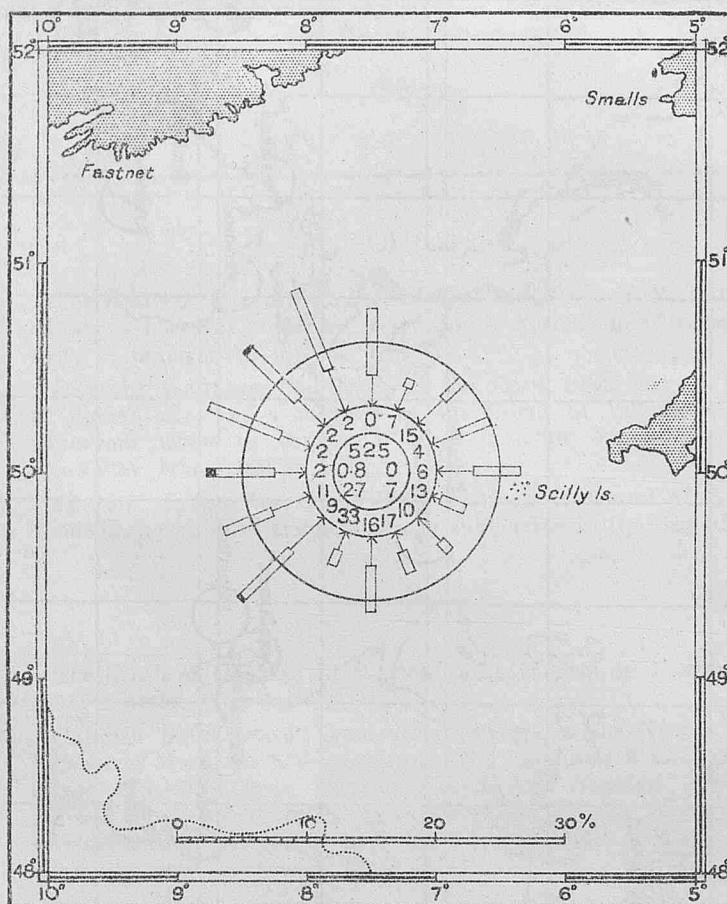
S.W. Approaches to Great Britain and Ireland

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

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

Direction.	Frequency.
N	0
NNE	2
NE	8
ENE	2
E	4
ESE	4
SE	4
SSE	6
S	10
SSW	10
SW	8
WSW	8
W	2
WNW	2
NW	2
NNW	2
Calm	0
Var.	2
TOTAL	76

Percentage Frequency of Fog and Mist for area = 7.6 %.



EXPLANATION.

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

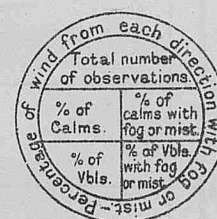
Gales Light
Moderate

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

The figure at the head of the arrow gives the percentage of wind from that direction with fog or mist, for example:- In April, in the S.W. Approaches to Great Britain and Ireland on all occasions when S.S.W'y winds were observed 33 per cent of them were accompanied with fog or mist, therefore the probability of fog or mist with a S.S.W. wind during this month is 1 in 3.

Fog is most probable in this month with S. & S.S.W. winds, the percentage being 1.

KEY TO NUMBERS IN CENTRE OF ROSES.

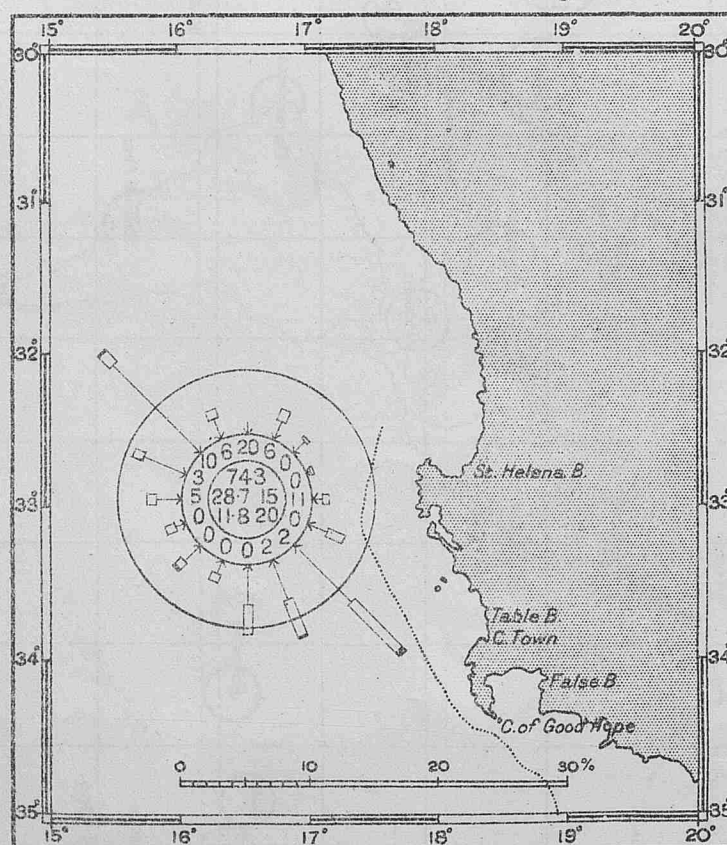


Approaches to Table Bay.

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

Direction.	Frequency.
N	1
NNE	1
NE	0
ENE	0
E	1
ESE	0
SE	3
SSE	1
S	0
SSW	0
SW	0
WSW	0
W	1
WNW	1
NW	11
NNW	1
Calm	42
Var.	24
TOTAL	87

Percentage Frequency of Fog and Mist for area = 8.7 %.



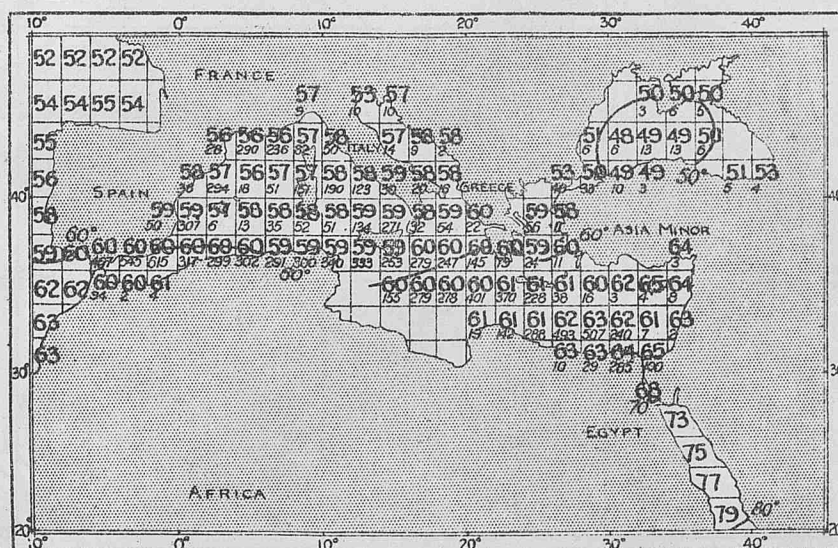
Compiled from observations of British Ships received since the adoption of the Hollerith system of extraction covering the years 1921 to 1928.

MEDITERRANEAN SEA

SEA SURFACE TEMPERATURES

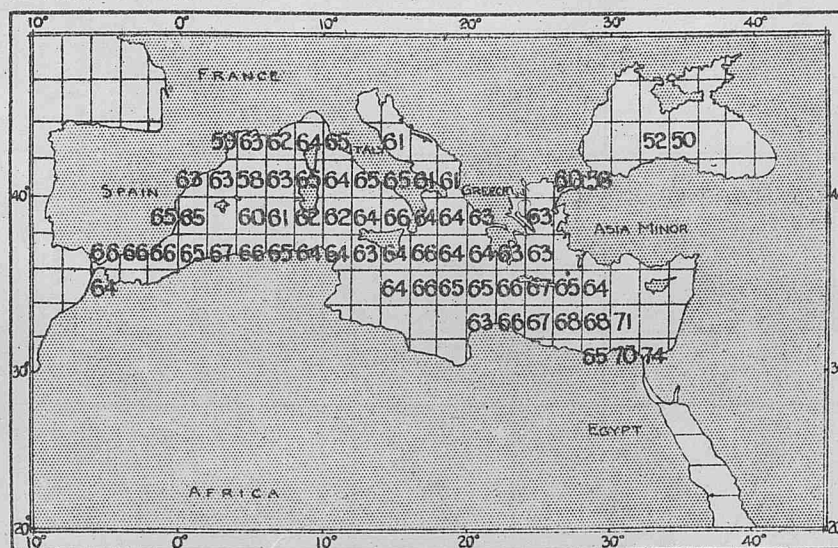
MEAN.

APRIL.

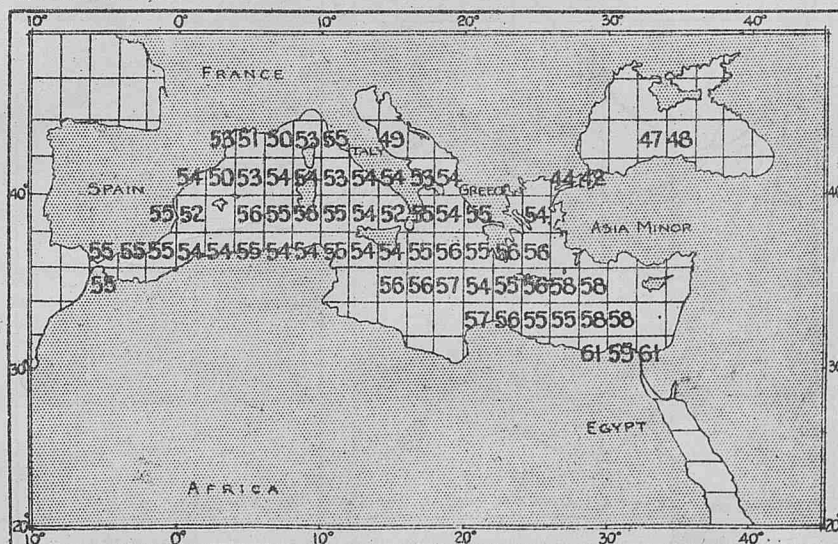


Small figure gives number of observations.

MAXIMUM.



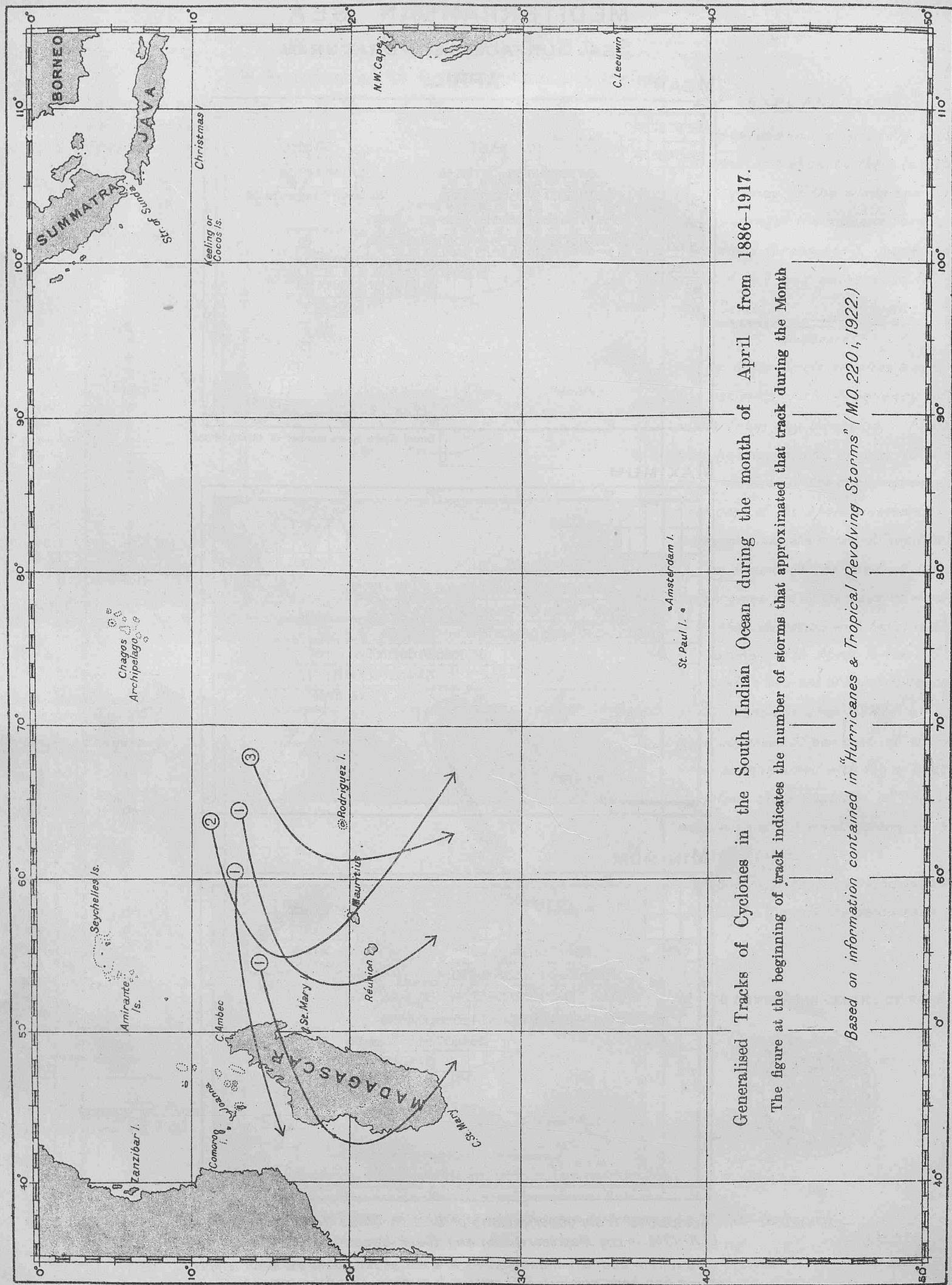
MINIMUM.



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

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

CYCLONE TRACKS OF THE SOUTH INDIAN OCEAN.



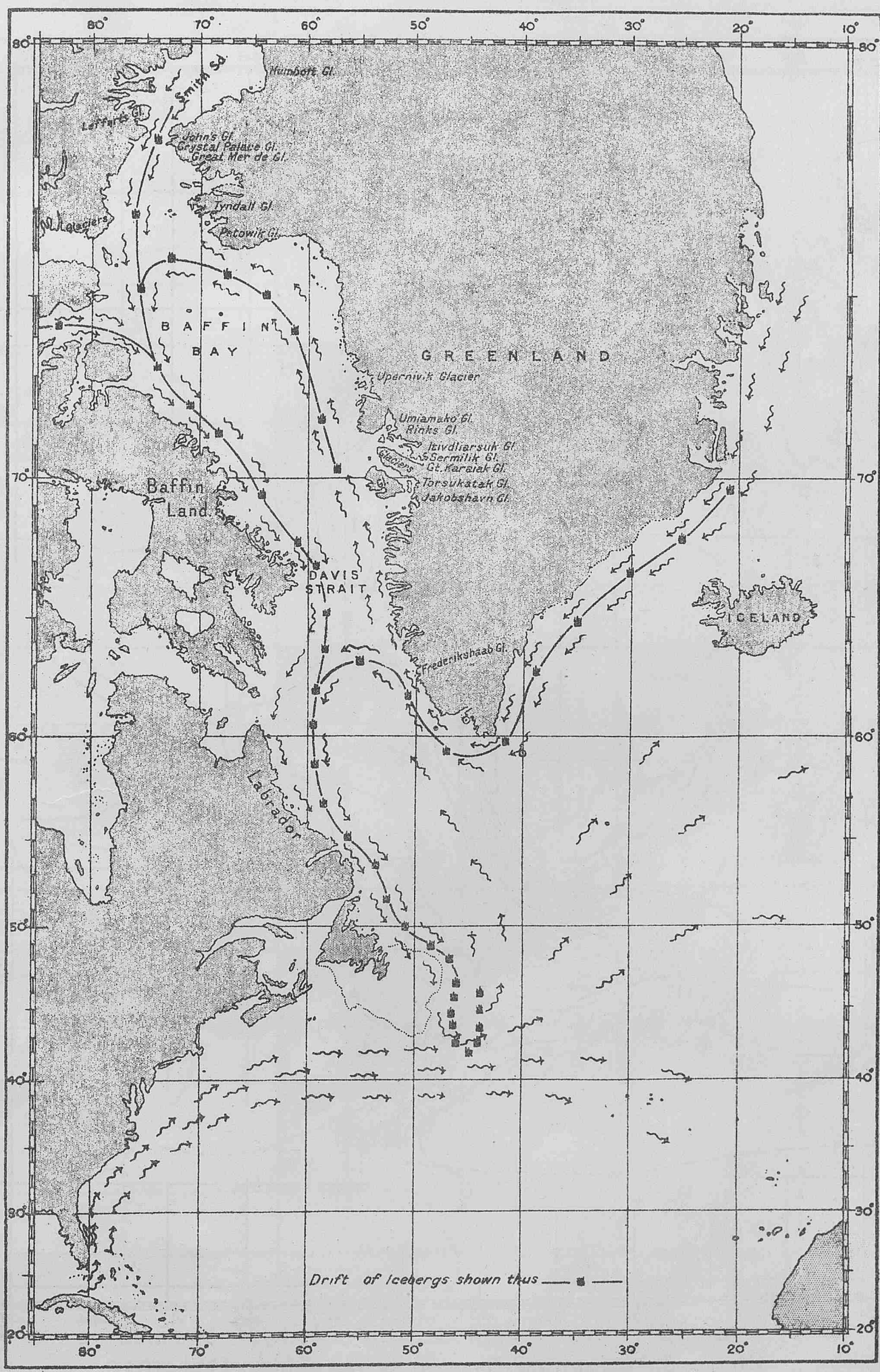


Chart A.—GENERAL DRIFT OF ICEBERGS.

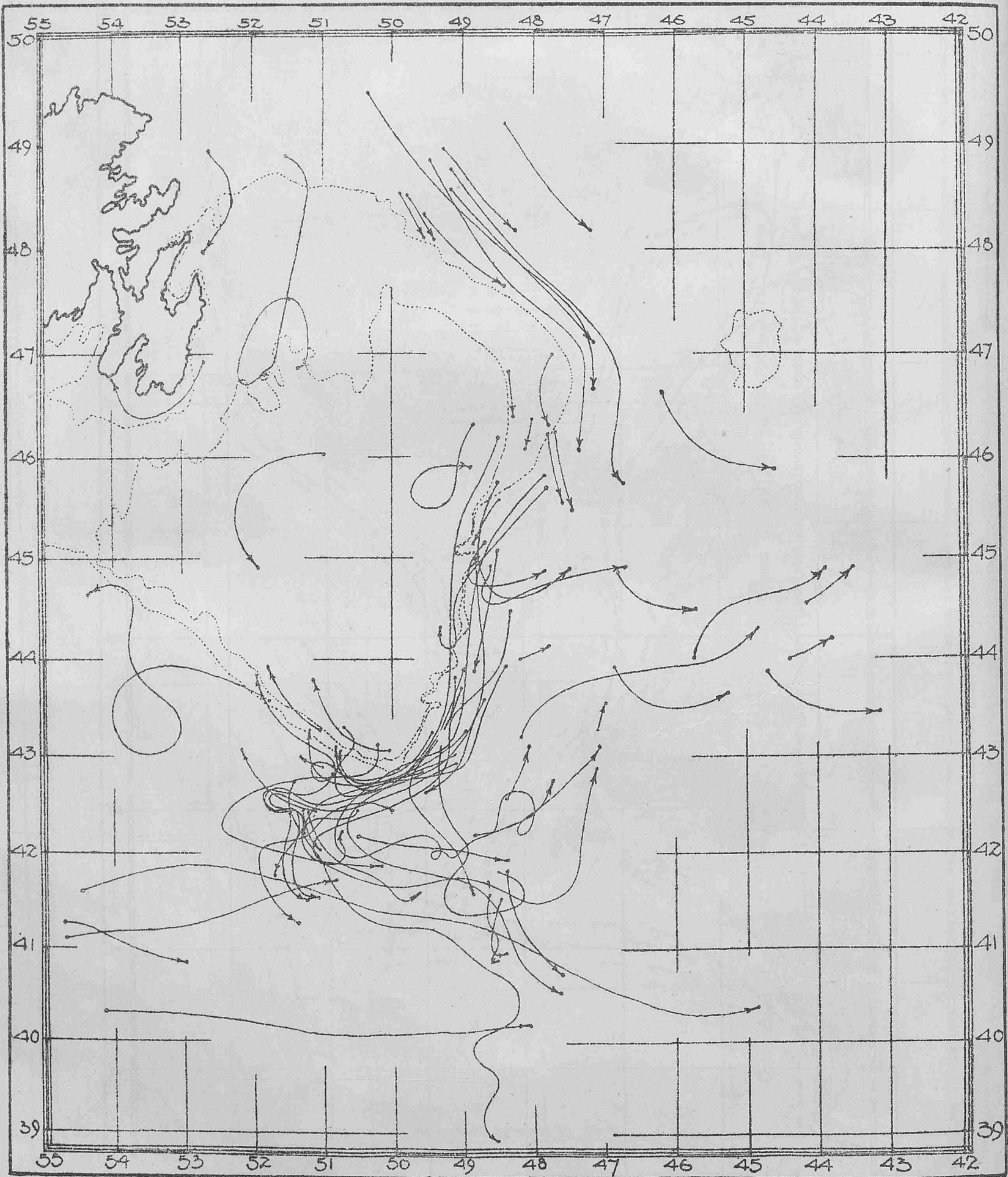


Chart B.—COMPILED DRIFTS OF ICEBERGS, 1914-1926.

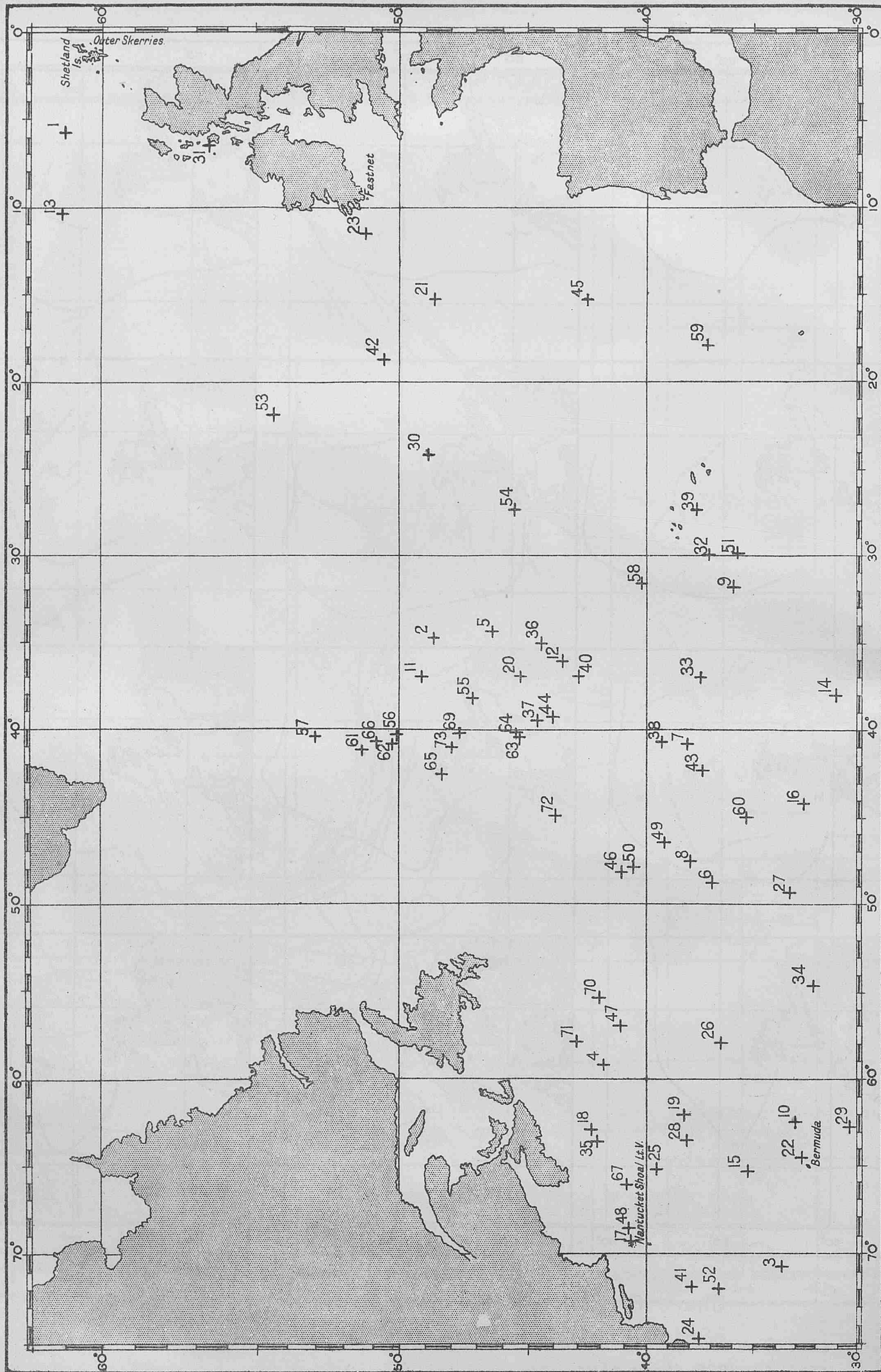


Chart C.- LIMITS OF ICE, WESTERN NORTH ATLANTIC.

Limit from 1901 to 1929 shown thus —————

Limit for 1929 shown thus - - - - -

PHENOMENAL POSITIONS OF ICE.



NOTICES.

PARTICULARS FOR APPLICATION BY INTENDING MARINE OBSERVERS.

Commanders and Officers who wish to have their names placed on the list of regular observing ships, or Commanders on transfer who wish to continue will greatly assist by furnishing the following particulars to the Agents at the ports, or at ports where Agencies do not exist, to the Marine Superintendent, Meteorological Office, London.

Name of Ship

Port of Registry

Steam, Motor or Sail, with Rig

Gross Tonnage

Name of Captain

Owners

Address

Trade in which usually employed, naming route and principal ports. }

The name and rank of the Officer whom it is intended shall act as principal observer. }

If Captain and principal observing officer are old marine observers, state name of last ship from which returns were made. }

Description of Barometer carried, stating whether Mercurial or Aneroid, height above water line, and, if possible, giving three recent readings taken in port at 0100 G.M.T., 0700 G.M.T., 1300 G.M.T., and 1800 G.M.T.; giving dates and times, for comparison. }

Nature of W/T installation.

When a Commander on transfer wishes to take the place of his ship in the fleet list to his new Command, in sending notification it should be made clear whether his relief wishes to carry on or not.

For list of Agents and their addresses, see overleaf.

ICE REPORTS.

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

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

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

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.

THE PROPAGATION OF SOUND AND WEATHER CONDITIONS.

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

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

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

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

Wind True Direction and Force.

Weather by the Beaufort notation.

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

Temperature of the air, dry and wet bulb.

Temperature of the sea.

Visibility by scale.

General remarks.

ICE CHART. WESTERN NORTH ATLANTIC.

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

- (B) From 1st April to 31st August, inclusive.
- (D) From 15th February to 10th April, inclusive.
- (E) From 11th April to 15th May, or until the Cape Race route clear of ice.

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

ROUTE NOTICES.

For latest information re Tracks see pages 89-90, of this Number, also copy of letter from Cunard S.S. Co. on this Chart.

SYMBOLS USED ON THE CHART.

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

PHENOMENAL POSITIONS OF ICE.

Date.	Ship or Source of Report.	Position.	Remarks.
April 6, 1909	S.S. Trafalgar ...	35°54'N. 31°47'W.	2 pieces 18 in. in diameter.
" 11, 1914	S.S. Erodiane ...	32°56'N. 62°11'W.	Apparently river ice about the size of a lifeboat.
" 24, 1916	S.S. Communipaw...	49°05'N. 36°48'W.	4 ft. high 50 ft. wide, and 100 ft. long.
" 4, 1921	S.S. Hollandia ...	43°35'N. 35°57'W.	Large berg.
" 16, 1926	Trawler Orizaba ...	61°03'N. 10°30'W.	Floating ice, about 40 ft. long, and 3 ft. high.

Reports of Ice sighted between February 1st and February 28th, 1930, which have been received by the Meteorological Office, are shown in the position reported, the figures indicating the day of the month.

IMPORTANT.

The following is a copy of a letter from the Cunard Steamship Co., dated 11th February, 1930 :—

North Atlantic Lane Routes.

"We desire to inform you that a cable has been received reporting an iceberg in position Latitude 43°30' North, Longitude 48°58' West. The message goes on to say that the Hydrographer expects an early and heavy movement of ice this season, and that a vessel is being despatched to investigate the ice conditions. It has been decided, therefore, that Track "C" be discontinued and Track "B" brought into operation eastbound and westbound as from and including Saturday next, the 15th instant."

MARINE METEOROLOGY.

NOTICES.

LATE PRESS.

DERELICTS AND FLOATING WRECKAGE.

Co-operation of Shipowners, Masters and Mates.

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

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

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

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

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

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

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

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

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

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

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

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

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

The instrumental equipment on board each regular observing ship is indicated in the "Fleet List" in THE MARINE OBSERVER.

"Selected Ships," *i.e.*, those ships which are detailed for Voluntary Routine Wireless Weather Telegraphy, are indicated by a number and symbols in the "Fleet List" in THE MARINE OBSERVER.

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.

Date.	Position.		Description.
	Latitude.	Longitude.	
NORTH SEA.			
4.2.30	51°26'N.	1°54'E.	Buoy, red and white vertical stripes. Floating wreckage consisting of ship's wheel, speaking tube, etc.
9.2.30	55°18'N.	0°19'E.	
ENGLISH CHANNEL.			
3.2.30	49°59'N.	3°45'W.	Black bell buoy.
14.2.30	25 m. S. of Shambles Lt. Vessel.		Heavy submerged obstruction.
20.2.30	50°09'N.	2°28'W.	Heavy piece of wreckage.
24.2.30	49°17'N.	3°51'W.	Buoy.
IRISH SEA.			
2.2.30	52°16'N.	5°26'W.	Projecting mast (7 ft. above water) apparently attached wreckage.
6.2.30	54°17'N.	5°00'W.	Derelict schooner—dangerous.
17.2.30	54°08'N.	5°22'W.	Logs—dangerous to navigation.
NORTH ATLANTIC.			
1.2.30	39°10'N.	74°19'W.	Can buoy, marked <i>N 2</i> .
2.2.30	44°37'N.	46°10'W.	Lighted gas buoy, showing flashing white light every 5 seconds.
4.2.30	3½ miles W. of Torinana Lt.		Several heavy logs.
6.2.30	43°49'N.	25°53'W.	Large black spherical buoy, with tripod and lamp, drifting S.W.
6.2.30	39°36'N.	68°05'W.	Cylindrical white buoy with 9ft. staff.
7.2.30	33°43'N.	77°20'W.	Flat bottomed scow, bottom up and awash.
10.2.30	28°10'N.	78°35'W.	Barge, bottom up, sides showing 2 ft. out of water.
10.2.30	39°33'N.	53°16'W.	Derelict schooner <i>Dorothy Baird</i> , waterlogged and on fire.
9.2.30	39°57'N.	73°45'W.	Two spars about 40 ft. long, 18" diameter.
13.2.30	39°33'N.	9°44'W.	Waterlogged boat—name <i>KILLORAN MARIE- HAMN</i> .
17.2.30	41°57'N.	11°12'W.	Large spherical buoy—dangerous.
22.2.30	40°30'N.	9°26'W.	Small submerged schooner, 2 masts projecting about 4 ft.
23.2.30	47°51'N.	4°55'W.	White light buoy.
23.2.30	48°16'N.	17°55'W.	Red conical buoy.
GULF OF MEXICO.			
1.2.30	28°00'N.	91°14'W.	Derelict launch 40 ft. long, marked <i>ARK—C 932</i> on bow.
10.2.30	28°08'N.	89°51'W.	Tree trunk, 25 ft. long, 2 ft. out of water.
CARIBBEAN SEA.			
6.2.30	15°38'N.	81°23'W.	Bell buoy, bell missing but three hammers attached.
NORTH PACIFIC.			
1.2.30	3°03'N.	80°14'W.	Log about 40 ft. long, 3 ft. diameter.
1.2.30	3°34'N.	141°47'W.	Log 40 ft. long, 4 ft. diameter.

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

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

THAMES ...

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

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

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

GLYDE ... Captain W. E. SOMMERVILLE, Messrs. H. Hogarth & Son's Office, 120, St. Vincent Street, Glasgow
(Telephone No.: *8707 Central*).

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

Agents (contd.).

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

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

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

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

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

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

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